Health Exemplar to the User Interface Platform of the Global Framework for Climate Services
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HEALTH EXEMPLAR

TO

THE USER INTERFACE PLATFORM

OF THE

GLOBAL FRAMEWORK FOR CLIMATE SERVICES
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EXECUTIVE SUMMARY

Individual and population health and safety are closely linked to weather and climate conditions through extreme events such as heat waves, cyclones, floods and drought. Weather and climate conditions also have strong influences on the occurrence and distribution of some of the most important infectious disease burdens, particularly of poorer populations, such as diarrhoea, malaria and other vector-borne and water-borne diseases. More fundamentally, climatic conditions affect the natural and managed ecosystem services that underpin population health, including the availability of freshwater and agricultural production, as determinants of food and potable water security, and shelter. Extreme weather, climate variability, and long-term climate change pose important challenges to the performance and management of health systems and health care services.

The global health community has taken these risks seriously and is moving forward at all levels to identify and systematically manage risks of climate change to health. The World Health Assembly, comprised of Ministries of Health representing UN Member States passed a keystone resolution in 2008 on health protection from climate change (WHA61.19), leading to a board approved four pillar work plan on climate and health (EB124.R5). A specific resolution passed in 2011 focuses on strengthening national health emergency and disaster management capacities for managing the risks of meteorological and other extreme events (WHA64.10). Ministries of Health have translated these global mandates into regional and national frameworks and plans of action to address climate-related risks in all its forms, and are now advancing National Climate and Health Policies and programmes, often with national and international funding for climate change adaptation.

The climate community also recognizes the importance of the linkages to health. The UN Framework Convention on Climate Change (UNFCCC) specifies damage to human health as one of the three sets of “adverse effects” to be avoided, and proposes the utilization of different tools, for example, health impact assessment, to assess the impacts on health of any adaptation or mitigation policy or programme. The Intergovernmental Panel on Climate Change has both highlighted multiple climate risks to health, and described the potential for meteorological information to improve early warning systems for meteorological risks. Climate-informed health systems and services can not only save lives but help increase the efficient use of limited resources by identifying and targeting the populations most at risk in vulnerable areas and developing the capacity of health and other sectors to manage the risks to health. There is an opportunity to improve health protection by increasing the climate resilience of the formal health sector, and of health-determining sectors such as water-resources, agriculture, and multi-sectoral disaster risk reduction.

Until recently, there has been no coherent global approach to support the management of climate risks to health. Climate variability and change has been seen mainly as an environmental rather than a health issue, and there has been very little investment in climate and health connections. Climate service related health projects that have occurred have been isolated, and mainly "supply driven", by the interests and products of meteorological agencies or research institutions, rather than "demand driven", by the decision-support needs of health actors in developing countries. Although, climate-related projects have begun in almost all regions of the world, the health community has also not organized itself to systematically use meteorological information in its operations nor integrate climatic conditions into health operations and monitoring and evaluation mechanisms. This represents a missed opportunity to improve health operations and risk assessment and monitoring, and to promote a more integrated approach to sustainable development.

The global health community acknowledges and appreciates that the WMO has recently placed a much greater emphasis on providing a service to society, building on the data or forecasts it typically provides. The Third World Climate Conference in 2009 and the World Meteorological Congress in 2011 mandated a Global Framework for Climate Services (GFCS), identifying health as a priority alongside disaster risk reduction, agriculture, and water resources. The GFCS is now an overarching strategic priority for WMO, guiding its work with national meteorological agencies.
The Framework provides an important opportunity for the health sector to establish a comprehensive and stable approach to better support and inform management of climate risks to health. The five pillars of the Framework interrelate with the Health Exemplar and the correct implementation of its objectives: Observation and Monitoring (OBS) Climate Services Information System (CSIS) Research, Modelling, and Prediction (RES), the User-Interface Platform (UIP) and Capacity Development (CD). (Figure 1)

![Diagram of the Framework](image)

**Figure 1** The pillars of the Global Framework for Climate Services

The User Interface Platform (UIP) is particularly relevant for the health sector, because it is the pillar of the Framework which provides a structured means for users, user representatives, climate researchers and climate service providers to interface at global, regional, national and community levels. This interface across the four objectives of the UIP (feedback, dialogue, outreach and monitoring and evaluation), can facilitate and enable the climate-related activities underway and planned in the health exemplar.

WMO has worked with WHO and other health partners via consultations and expert networks to define how WHO and the health community can contribute to and benefit from the Global Framework. A primary mechanism for the health sector to contribute to and benefit from the Framework is through the Health Exemplar. The Health Exemplar is the translation of the Global Framework for Climate Services to the health sector, and provides a structure and processes to identify and respond to the climate information related needs of the health sector from global to local levels.

The **goal** of the Health Exemplar is to improve health outcomes and enhance the management of climate-related risks to health, by pursuing, inter alia the following **four specific objectives**:

1. Strengthened communication and partnerships among climate and health actors at all levels for the promotion of effective utilization of climate information within health policy, research and practice.
2. Improved health and climate research and evidence of the linkage of climate and health.
3. Increased capacity of health sector to effectively access, understand and use climate and weather information for health decisions.
4. Climate and weather data effectively mainstreamed to health operations.
Clear inter-linkages exist between the objectives of the Health Exemplar and the five pillars of the GFCS. Effective implementation of the GFCS must also strengthen inter-sectoral collaboration. The UIP can facilitate the establishment of formal inter-sectoral collaboration mechanisms. As shown in the following figure, meeting these objectives can improve health operations, and enhance the achievement of health goals and agendas.

A Health Exemplar workplan has been elaborated to propose a set of prioritized activities that can ensure the attainment of the Exemplar goal, objectives, and outcomes (shown in Table 1).
application of climate services as a way to adapt and protect health from climate related risks.

**Obj. 3: Health & Climate Capacity Development**
Increased capacity of health sector to effectively access, understand and use climate and weather information for health decisions.

6. Develop training and capacity-building materials, and support learning mechanisms, training programmes, forums, and networks to build the capacity of health and climate service partners and users.

7. Support institutional capacity needed for the use of climate information, and effective partnerships and collaborations between climate service partners and users.

**Obj. 4: Mainstreaming Climate to Health Operations**
Climate and weather data effectively mainstreamed to health operations.

8. Facilitate the mainstreaming of climate services into health policy, research and practice, by building upon the range of existing activities and collaborations in order build a climate resilient health sector at Global, Regional and National (GRN) levels.

9. Provide operational guidance to health partners on how to use climate services and information products, particularly to enhance risk assessment, health surveillance, and health service delivery processes, including risk management.

Table 1. Health Exemplar Goals, Objectives, and Outcomes

The Health Exemplar implementation plan includes three phases. The first phase runs from 2013-2015; phase II from 2015 to 2019; and phase III from 2019 to 2023. Proposed activities pertain to phases I and II only, and phase II will be defined as the Framework advances. Activities proposed for the first phase are oriented towards taking stock and addressing existing gaps, with a focus on establishing institutional structures and prioritizing strengthening or scaling up existing initiatives at either global, regional or national levels. Selection criteria for countries and activities are included in the health exemplar.

In addition to the activities included in the Health Exemplar, one fast-tracked activity has been identified to jump-start sectoral engagement and achieve success at the National level. The proposed activity will establish Climate and Health Working Groups (CHWG) (3 to 5 depending on funding) in countries with existing health projects that can benefit from enhanced collaboration with climate services. Working groups are nationally led initiatives that form national mechanisms for joint research and operations, as decided, to address local needs.

To successfully implement the Health Exemplar and maximize the contribution of health actors to the GFCS, it is essential that the following necessary conditions be met:

(i) Genuine ownership of the GFCS by end-users and participation with all pillars of the GFCS, including health representation at the highest level within the overall GFCS management structure;

(ii) Accountability of joint commitments by both climate and health stakeholders for responding to health sector needs, ensuring direct relevance to measurable health outcomes, and in support of existing health mandates, agendas, and goals;

(iii) The most direct possible link to the operational, policy and technical support mechanisms of the health sector, as well as the climate sector, starting with secretariat functions that run as a joint project between WHO and WMO, which translates to regional and national levels;

(iv) Political and financial commitment to the GFCS, from both health and meteorological agencies, including through the global governing bodies for meteorology, and for health;

(v) Interdisciplinary collaboration and coordination with climate service advances in all areas of water, agriculture, and DRR.
The Health Exemplar also suggests specific leadership and management opportunities that will improve the Framework implementation and ownership by the Health Sector.

In response to the goals of the Framework, this Health Exemplar outlines the priority needs of the health community to improve its work via climate services, and the way in which the Framework, and the UIP specifically can enable the health community to be an active partner in climate services. The following plan describes the scope and function of the Health Exemplar, existing mechanisms and key policy and implementing actors, and an implementation plan including resource requirements, and necessary conditions and enabling mechanisms for the roll-out of this Exemplar.
1INTRODUCTION

1.1 OBJECTIVE, SCOPE AND FUNCTIONS

The Health Exemplar constitutes the translation of the Global Framework for Climate Services to the health sector, and serves to provide a structure and processes to identify and respond to the climate information related needs of the health sector from global to local levels.

The goal of the Health Exemplar is to improve health outcomes and enhance the management of climate-related risks to health. The Health Exemplar will enable the health sector to engage with Framework partners to improve access and use of climate information that can enhance health system performance and management. This Health Exemplar highlights key needs and outlines a general structure for partnerships and leadership, and proposes specific actions that can accelerate interactions between the climate and health communities and enhance climate informed decision-making.

1.2 REQUIREMENT FOR A HEALTH& CLIMATE SERVICES EXEMPLAR

The need for collaboration between the climate and health sectors has increased over the past decade, along with the need to better manage health risks associated with climate variability and change. To do so, the health community calls for better access, interpretation, and use of both weather and climate information for decision-making in health policy, research, and practice. The specific technical and process needs have been articulated through a series of technical dialogues (listed below). This demand culminated during the WCC-3 process whereby the health community called for WMO and the GFCS to recognize these needs and prioritize the health sector in the GFCS.

Key Climate and Health Partnership Meetings

- Climate and Health In Africa, Bamako, Mali, 22 March–9 April 1999 (IRI)
- Living with Climate Variability and Change: Understanding the Uncertainties and Managing the Risks Espoo, Finland, 17–21 July 2006 (WMO)¹
- Secure and Sustainable living Social and Economic Benefits of Weather Climate and Water Services, Madrid Spain March 2007² (WMO)
- World Climate Conference–3: Climate and Health Working Session (August 2009) (WMO)
- WCC-3 Side meeting on Climate Risk Management of Infectious Diseases (August 2009) (WMO)
- Climate and Health in Africa: 10 Years on (April 2011) (IRI)
- International Conference on Climate Services (Oct 2011) (CSP)
- Global Framework for Climate Services Consultation on DRR and Health (November 2011) (WMO/WHO/IFRC/UNISDR)

The WCC-3 in its final proceedings outlined five key recommendations that inform the Health Exemplar. WCC-3 delegates called for:

1. Full engagement of the public health community, through the WHO, in the establishment of a GFCS in order to enable the inclusion of climate information in public health decision-making.

2. Research and training opportunities, designed to build capacity and provide evidence for policy and practice, to be developed through effective collaboration across relevant disciplines.

² Madrid Report http://www.preventionweb.net/english/professional/publications/v.php?id=2621,
3. Invest in a public service platform within WMO Member and partner institutions to encourage cross-sectoral interaction including cooperation on the establishment of observing and monitoring networks, the development of decision-support tools and systems and the development of ‘one stop’ advisory services for the health sector that will strengthen health surveillance and response systems.

4. The sharing of data, information and capacity (at local, regional and global scales) is necessary for improving health monitoring and surveillance systems to achieve “the most elementary public health adaptation” […] especially for least developed countries.

5. Existing programmes, initiatives and organizations working in climate and health should jointly prioritize the development of the GFCS as it relates to health. Institutional mechanisms that link outputs & responsible actors to the recommendations above are required and a clear framework for activities is essential.

Over the past decade, WMO and partners in the meteorological sector have pro-actively sought the perspective of operational "end-users", including the health sector, to help guide the development of climate services. However, it is widely recognized that both available weather and climate information and services are not being used to full potential in the health sector (Rogers et al. 2010) (Hellmuth et al. 2007) (Connor et al. 2010). A structured process, such as the Health Exemplar can identify and respond to health sector needs from global to local levels, and respond to the WCC-3 and other technical recommendations in order to protect human health in an ever-changing climate. The partnerships and actions implemented through the vehicle of the UIP and Health Exemplar can facilitate the improvement of health sector performance and management with the use of climate information.

The range of health risks sensitive to changes in weather and climate conditions is extensive. The direct impacts of climate variability and change on human health include additional deaths and illness due to direct exposure to hazardous meteorological conditions, such as heatwaves, coldwaves, droughts, storms, floods, UV radiation, and cyclones. Climate also influences health in fundamental ways by influencing, and often deteriorating, the environmental determinants of health, including the availability and safety of fresh water, food, which can result in under-nutrition, nutrient deficiencies, and disease. The indirect impacts of climate constitute the majority of climate related illnesses. This is because changes in temperature and precipitation influence the environmental conditions that determine the geographic range and incidence of vector-, rodent-, water-, and foodborne diseases, and alterations air pollution and aeroallergen related diseases. Sea-level rise and increased sea-surface temperatures can reduce water quality and access to drinking water by salinization of coastal aquifers, coastal erosion and land loss, and safety and availability of fish and marine food products.

Finally, health is impacted indirectly by extreme weather events disrupting or destroying critical health infrastructure, including health facilities, and water and sanitation infrastructure, with consequent loss of health services and loss of investment in health facilities. It is also well documented that extreme weather events create social and economic losses that significantly impact mental health, and can reduce access to health care or food at the community or household level. Box 1 provides an in-depth example of the linkages of climate, water, and health.
Detailed Example of Water, Health, and Climate Linkages

All water-related health impacts are climate sensitive, and amongst the major causes of global death and disability. Water-related diseases are caused by micro-organisms (cholera, shigella) and chemicals in water people drink; diseases like schistosomiasis which have part of their lifecycle in water; diseases like malaria with water-related vectors; drowning and some injuries; and others such as legionellosis carried by aerosols containing certain micro-organisms. Adequate and safe access to drinking water and sanitation, as well as hygiene, and the safety of recreational and marine waters are strongly affected by climatic and weather conditions. An important pathway will be how well water and sanitation infrastructure stand-up to and perform under future climate conditions.

Vision 2030, a collaborative project between WHO, DFID, and the UK Met office considered this impact, by looking at the resilience of water and sanitation services to future climate change. Based on Climate Projections (UK Met Office 2009), Bartram and Howard summarize three broad scenarios of how major climate-related threats can affect water and sanitation technologies (2009, 6) which provide vital public health services. They may be affected by:

(a) Increasing likelihood of flooding or increased run-off that overwhelms currently used sanitary protection measures, leading to damage or destruction of infrastructure and gross contamination. Increased flooding is likely to derive from more intense rainfall events, from increased average rainfall, or a combination of both.

(b) Decreasing rainfall resulting in declining surface and renewable groundwater availability, leading to increased challenges to meet demands for water for domestic use or for supporting water-borne sanitation. Decreasing rainfall will also reduce the capacity of surface water to dilute, attenuate and remove pollution.

(c) Increasing rainfall leading to long-term increases in groundwater levels, reducing the potential for pathogen and chemical attenuation or removal, and causing flooding of sub-surface infrastructure and potentially rapid shallow groundwater flow.

The failure of public health infrastructure to these pressures will significantly challenge the global health community to manage diarrheal, respiratory, and dermatological diseases.

Box 1 Detailed Example of Water, Health, and Climate Linkages

Public health protection from climate exacerbated health risks requires a complex health service delivery nexus and active collaboration amongst health influencing sectors. Conditions in water, agriculture, land planning, disaster management and others, often determine disease transmission or access to life-sustaining resources such as food and water. Information about how weather and climatic conditions will influence these sectors is essential for the appropriate investment and deployment of public health and health care policy and services.

Need for Climate Informed Health Decision-Making

Evidence based decision-making is a fundamental principle for the health sector. The health community relies on appropriate and timely epidemiological, environmental, and climate information at relevant spatial and time-scale data to make informed decisions. Available, accessible, and useful weather and climate information can help health decision makers improve, *inter alia*, understanding of the mechanisms of climates impact on disease transmission and occurrence, and estimate populations at risk (e.g. risk mapping). It can help estimate seasonality of disease occurrence and necessary timing of interventions and investments. It can help monitor and predict year-to-year variations in disease incidence (e.g. early warning systems for epidemics), as well as longer term trends of potential impacts (e.g. climate change assessments). Climate information can also improve impact assessments, by removing climate as a confounder of health intervention performance.

Weather and climate information can be particularly helpful to anticipate, prepare for and respond to health risks on both short time scales to address health problems triggered by climate variability (such as an outbreak, or thermal extremes), as well as longer time frame risk changes associated with climate change (i.e. droughts, sea-level rise and health infrastructure protection). It should be noted, health users infrequently distinguish between weather and climate services.
Although the Framework focuses on the development of Climate Services, it should be recognized that the health community views climate services as part of the continuum from weather services (i.e. the most effective way to manage long-term climate risks to health is often through building on services that help to manage more acute weather-related risks). Common, but not an exclusive list of decisions that benefit from information about the weather and climate include:

- Assessment and early warning of extreme weather events that pose health risks;
- Identification of populations vulnerable to weather and climate hazards;
- Resource allocation;
- Personnel and infrastructure planning, siting, design and development (i.e. health facilities, water treatment facilities);
- Emergency and disaster risk management, including prevention, emergency preparedness, response and recovery;
- Public health information dissemination, i.e. Public Service Announcements and Alerts;
- Health policy;
- Disease control strategies;
- Regulation and laws;
- Pharmaceutical, health supplies, pesticide and vaccine supply flow, storage, and management;
- Health staffing decisions;
- Training of the health workforce for potential outbreaks or signs of illnesses, exacerbated risk factors as well as potential side effects of pharmaceuticals in extreme temperatures.

1.2.1 Current Trends and Gaps in Climate Services for Health

Today the types of climate services used by the health sector are limited, and often focus on early warning systems, particularly for heat and cold, and extreme weather events. However, it is important to recognize that the health sector is a common consumer of climate services for other sectors such as food security (i.e. famine early warning and nutritional forecasts) and disaster communities (i.e. extreme weather alerts), and sometimes hydrometeorological services.

There are limited examples of health sector benefits from seasonal forecasts from global producing centres (GPC) and Regional Climate Centres (RCC). At national level, capacities for the provision of climate services are varied, often weather related, and decadal and longer time predictions are still under development.

Framework partners should recognize the range of pre-existing needs and gaps are not only on the climate side. Short-comings on the health side often limit health partners’ ability to uptake “climate-informed” decision-making processes or tools. Needs include:

- Capacity development of health professionals and communities to better assess, manage and monitor health risks of climate variability and change (Box 3);
- Capacity development of health professionals and communities to access, understand and use climate information and products appropriately;
- The development of health emergency and disaster risk management capacities for managing the risks to health from climate and other extreme events;
- Improved, standardized, and quality controlled health surveillance data which is compatible with environmental and climate information;
- Monitoring and evaluation of the appropriate, effective, and cost-effective use of climate information for health decisions;
- Research and forecasting of health impacts associated with climate variability and change, in collaboration with the climate research community;

3 Developed predominantly in North America and Europe, users stress the on-going need to evaluate their effectiveness.
Development and deployment of Health - Early Warning Systems (Health-EWS) and other interface tools that help health professionals and community access pertinent weather and climate-related health information;

Sustainable financial and technical support;

Collaboration with the climate community for interdisciplinary policy, practice and research.

Climate services that go beyond providing information are needed. Joint-development of services is needed to identify and understand, often at the local level, how environmental and climate factors influence the timing and location of health risk factors. Only by working collaboratively and iteratively will health and climate professionals be able to develop tools and systems that can effectively forecast and provide warnings that improve health preparedness and critically extend the lead-time health actors have for decisions and preventive measures. Effective delivery of climate services critically depends on the two communities working together and learning from each other. Health oriented climate services can not only save lives but help increase the efficient use of limited resources by identifying and targeting the areas or populations most at risk.

Current Gaps in Availability of Climate Information & Services

Recent advances in science and technology offer the prospect of further improvements in quality of climate information and prediction services. However, there is room for improvement on how seasonal to multi-decadal predictions and long-term climate projections are effectively integrated into decision-making, including in the health sector. This can be addressed by improving the two-way dialogues between providers and at-risk sectors on the range, timing, quality and content of climate products and services, to ensure that decisions relating to managing climate risks are well informed, more effective and better targeted, and also by systematic strengthening of institutional and operational capacities of climate information providers at the national, regional and international levels, to ensure sustainable development and availability of information for risk management and planning.

End-users need help to focus on relevant time frames for decision-making with an emphasis on days to decades, including seasonal and inter-annual variability, but also including long-term adaptation to climate change. Connor et al, (2010) point out that given the effects of variations on different timescales, it is clear that information is needed on all levels. They also indicate that climate variability and trends over multiple timescales pose a major challenge to the use of climate change scenarios for near-term climate change (for example, over 10–30 year time horizons). They note longer-term trends may be countered by shorter-term experience both on year-to-year and decadal timescales, and that today, climate change models are only able to capture the overall variability within the trend, and are incapable of indicating when in the future decadal or year-to-year changes and extremes may occur.

Connor et al., (2010) also point out the need for down-scaled regional models, as climate change scenarios and seasonal climate forecasts are modelled at the global—regional scale at best. A variety of tools and approaches exist for the downscaling of global climate products for use at regional and local scales, although limitations should be recognized. For example, they cite several regional climate models (and forecast systems) which have successfully been developed and applied in developing country settings. However, they note that few developing country institutions have both the human and infrastructure capacity to utilize these models routinely in seasonal forecasting or in longer-term climate assessments.

These observations and limitations highlight the vital interconnectedness of all five pillars. Relevant actors must be brought together to holistically strengthen the entire system from CS development and delivery to Health sector capacity to use these CS.

1.3 INTER-LINKAGES WITH FRAMEWORK PILLARS AND SECTORS

The health priorities described in this Health Exemplar should both inform and benefit from the developments made in the other priority sectors and each of the five Framework pillars: (CSIS) Climate Services Information System, (OBS) Observations and Monitoring, (RES) Research,

1.3.1 Linkages with Framework Pillars

1.3.1.1 (CSIS) Climate Services Information System

The CSIS is concerned with the generation and dissemination of climate information that is essential for underpinning a wide range of climate services. The phrase “climate information” in a CSIS context refers to knowledge and advice about the past, present and future characteristics of the Earth’s climate and at all relevant time and space scales. The CSIS is the ‘operational core’ of the GFCS. It includes climate monitoring, prediction (monthly, seasonal, decadal) and projection (centennial) activities. The CSIS will process and/or interpret data and products to provide outlooks, warnings, bulletins, reports and statements containing knowledge and information on climate and related sensitive socio-economic and environmental sectors for use in climate change adaptation and risk management policies and decisions.

The CSIS will communicate with user-communities through products such as alerts, forecasts, or watches, and collect feedback from the user communities. Health actors will be responsible to inform the CSIS of specific information or product needs, and need to jointly develop the products useful for health applications. Actors in health research and operations will need active collaboration with CSIS. Further Health Research needs are described in section 2.4. Operational needs include:

1) Evidence based health risk assessments are core health decision support processes that require integrated approaches to link historical climate data and observations, with qualitative and quantitative health vulnerability and exposure information. A real need exists to take stock of gaps and needs in: (1) the availability of historical and future hazard data, metadata, tools and methodologies in hazard mapping and human expertise of the technical agencies (on the provider side); but also (2) availability of health sensitivity, impact, vulnerability and weather related hazard exposure information, and user-capacity to incorporate climate information in routine health decisions.

2) Health surveillance is a core function of the health sector and the backbone of decision-making. It is analogous to observations for the climate community. Integrating social indicators from health surveillance with climate and environmental observations will be a core task for most collaborative action. Development of guidance, standards, and tools can assist this process.

3) Emergency Operations and Health Service Delivery

Health decisions that can potentially be climate informed are vast and depend upon the type of stakeholder and the time-frame of the decision (i.e. long-term planning or day-to-day emergency management). Useful example products include: maps to describe hydrometeorological or climate related hazards in relation to population vulnerabilities, health service capacities and other risks; Country profiles to describe climate surfaces for spatial risk mapping; decadal climate projection maps for human vulnerability assessment and adaptation planning.

The CSIS, by focusing on meeting the health user-needs for CI products and collaboratively developing products, can enhance not only the quality of information available to the health community, but the actual uptake and use to conduct research, risk assessments, and routine use of climate information alongside health surveillance and for health service delivery and emergency management.

The health sector currently uses the following types of meteorological, hydrological and climate information-products and services. Four categories of climate information and services used by the health sector are shown in Table 2 according to time frame. Further detail and example applications can be found in Annex 3.
### Table 2: Types of Climate Information Relevant for Health Decision-Making

<table>
<thead>
<tr>
<th>Time Scale</th>
<th>Example Climate Information Products</th>
<th>Example Application Areas (more examples in Annex 3)</th>
</tr>
</thead>
</table>
| Long Range Climate Information (decades) | Climate change scenarios  
Dynamic climate models, Global Circulation Models                                            | Long-term health infrastructure investments, research, demographic/population models, health systems planning  
Increase understanding of disease trends, epidemic behaviour on a regional scale |
| Mid-term Climate Information (annual to multi-year) | Status of El Niño  
Inter-annual forecasts  
Dynamic climate models                                                           | Mid-term policy decisions for disease control, research                                                     |
| Short-term Climate Information (Decadal, Monthly, Seasonal, Annual) | Risk indexes of Cyclones, Floods, Dust Storm, Wind Storms, Extreme Temperature, Fire  
Temperature/precipitation Outlooks of (6, 3, 1 month) average, maximum and minimum  
Seasonal trends  
Tercile forecasts  
Dynamic and Statistical climate models                                        | Short-term operational investment in preparedness, outbreak prevention, resource needs  
Example, adaptation of WHO/national response plans based on El Niño/La Niña forecasts |
| Weather Information (Hourly, Daily, Weekly) | Daily Weather: temperature, precipitation, humidity, etc.  
Weather statistics: real-time monitoring, historic time-series, summary statistics | Short-term operational decisions  
Risk announcements, trigger response plans, staff placement, delivery of supplies |

Several points of interaction can be expected between CSIS and Health. For example, the health community is currently focusing on strengthening the understanding of the correlations and causal pathways between climate and health outcomes. To respond to this pressing need, CSIS should prioritize providing historical data and climate monitoring information to health actors, over the development of forecasts. This information is essential to providing robust evidence of the linkages and impact assessments which can subsequently aid the development of risk assessments and forecasts. Recent work in Ethiopia (Dinku et al. 2011) (WMO Bulletin 60 (2)) highlights this need and proposes an approach to improving access and use of climate information.

Regarding future products, however, it can be said that collaborative work will be essential to develop the prediction products (monthly, seasonal, decadal) that can be easily used by the health community for their decision needs. The CSIS will need to process and/or interpret data and products in relation to the health hazards considered (i.e. heat stress, UV exposure, and cyclones) and provide outlooks, warnings, bulletins, reports and statements that are understandable and contain knowledge and information on the health and social risk conditions which make this climate hazard problematic. Only with combined efforts will CS products be useful for health decision-making.

Importantly, experience has shown that even when climate information is available, limitations still exist to adequately use this information appropriately and to its full potential. The CSIS and climate service providers should recognize the limitations within the user community, and design services and capacity-building efforts accordingly. A background report prepared for the GFCS Health Consultation[^4] provides an extensive listing of gaps and recommendations from health-users (WHO, 2011). Some widely recognized health limitations are currently related to:

Limited availability, reliability, resolution, and completeness of epidemiological surveillance data;

The dynamic and fast changing context of public health can make climate information obsolete as prevention tool;

Limitations in knowledge about sensitivity of diseases to climatic conditions;

Limited capacity in environmental health and epidemiology;

Local nature and determinants of disease can often not be generalized and need to be context specific;

Needs for historical data and climate observations, over forecasts.

Box 2 Translating Climate Information to Improve Uptake by End-Users

Translating Available Climate Information for Users

Experience has shown that making Climate Information available is only the first step. There is a strong need for CI to be further translated into products that make sense of the information in relation to the health risks associated with the climatic hazard.

Clear and direct explanations of what the information means for health risks, along with communication about uncertainty is essential. An example is the “explanation note” of La Niña conditions developed for the health community, by IRI and WHO (2009). The note provides regional summaries as well as action points of what health authorities should do next to collaborate with NMSs to find out national conditions.

Source:

1.3.1.2 Observations and Monitoring (OBS):

Observations of the Earth’s climate system provide the foundation for delivery of climate services. Observations of today’s conditions enable changing aspects of the climate system to be monitored: temperature, sea-level and concentrations of greenhouse-gases and aerosol, for example. These observations allow current climate extremes and consequent human vulnerabilities to be identified. They are used to establish the baseline conditions for forecasts out to seasons ahead, and they set initial values of key, slowly-changing variables for longer-term projections. The OBS Pillar will invest in improvements in the global observing systems operated by WMO and NMSs.

The observations required to provide climate services to health include those directly related to user needs, such as local measurements of precipitation, soil moisture and surface air temperature, such as is needed to identify malaria risk by correlating health and population information with observations of local ecological conditions conducive or non-conducive for transmission. Observations are also needed to enable useful forecasts to be made. For example, seasonal forecasts of conditions over tropical land areas such as Africa and South Asia depend on forecasts of sea-surface temperature in the tropics, which in turn depend on the availability of observations of the initial state of the sub-surface ocean. Gaps in the observation system result in less precise and more uncertain forecasts that can be used by the health sector.

Several points of interaction can be expected between OBS and Health.
First, dialogue to identify and inform OBS of the kinds of observational information required and what spatial and temporal resolution is needed by the health community. Observational data is particularly important to establish baselines for historical climate conditions required by health researchers to make correlations and causal linkages between climate and health outcomes. These observations need to be made available, and presented in easily understandable ways to health researchers or decision-makers.

Second, dialogue is needed on how to bring together the physical climate observations and socio-economic data necessary to develop a health specific climate service. Informing OBS of the needs for socio-economic data will require substantial interaction between the producers of physical climate observations and health partners. NMSs, national ocean services, and other organizations dealing with physical phenomena, do not have the mandate or mission to collect socio-economic data. Thus joint action is needed to create usable products for decision-making. The GFCS UIP can foster this connection, via activities such as a UIP workshop to bring together climate observation providers and socio-economic data providers and users to take stock of data needs, compatibility issues, and establish data standards. The workshop could consider what socio-economic data are needed on a sector-by-sector basis for effective climate services, current availability and gaps for such data, as well as costs to address those gaps. Outcomes could identify potential mechanisms to promote more formal interaction between the climate community and health community on regular basis.

Recommendations for the improvement of Services and Data (IRI, 2011):

- **Develop tailored services** in partnerships with weather/climate and health organizations, recognizing health forecasts are different from weather forecasts. The products should act as early warnings to different users, assist in the prediction of future health outcomes, and be well designed and easily understood by all;
- **Improve existing data**, for example through the digitization of historical health and climatic data; the increased use of metadata analyses and validation tools; the inclusion of aggregated health data at appropriate spatial and temporal scales; and the enhanced awareness of, and use of, observational and processed data, appropriate satellite, and climate model data sources;
- **Access and use data in a systematic manner** in order to identify vulnerable groups and areas. This needs to involve: employing data strategically within and across sectors; considering trend and seasonality issues; using data to evaluate the success of interventions; and, importantly, understanding how communities cope;
- **Incorporating other data into these health forecast services**, i.e., population, rural vs. urban residence, migration, nutritional status, environmental and poverty data;
- **Collaboration and new, multi-disciplinary initiatives** that involve communities beyond health and climate/weather; build upon existing initiatives and progress; aim to meet emerging challenges; and communicate with end-users in appropriate ways.

1.3.1.3 Research, Modeling and Prediction (RES):

Strong linkages between the Health Exemplar and the RES pillar can be expected. Several global, regional, and national level research agendas exist on Climate and Health (described in 1.4) outlining health research priorities, to above all understand the influences and impacts of climate change on health, particularly the economic costs of impacts and adaptation. This includes the economic value of climate information, which should be prioritized as a research opportunity enabling the health community to assess the value of climate information relative to other interventions.

The health community needs strong collaboration with climate service providers to successfully advance these Health research agendas, which may also benefit climate actors. The RES pillar can facilitate and support this work by identifying the information and climate product requirements for the conduct climate and health research. The health community seeks involvement in joint Research and Development (R&D) to improve existing or develop new climate product applications, metrics and modelling used by the health sector.
For example, identified health research needs that could benefit from RES:

- Research and forecasting of health impacts associated with CV & CC;
- Continued research to fill current gaps in understanding the role of climate in health outcomes (i.e. studies of correlation and causality), and in development of operational methods and tools (such as climate-health indices for heatwave alerts) including climate enabled decision support systems, such as EWS;
- Conduct evaluations to identify evidence-based guidelines for the use of climate services in healthcare. Operational research is needed on the temporal, spatial and spectral aspects of meteorological data for healthcare purposes, as well as for the quality, level, and detail of healthcare data required for disease modelling. Once CI is being routinely used, monitoring of system performance and health user-appropriateness is essential for feedback and system adjustment;
- Integrate existing weather and climate research with health service delivery operating systems (i.e. hospital preparedness for extreme weather) to continue to create a seamless prediction system, and tools relevant to health decisions.

Work conducted under the RES pillar in other sectors, such as water, DRR, and agriculture will also have benefits for the health sector. The work within RES will expand the available knowledge base for the benefits of the health and other sectors. Through joint RES related work between health and climate actors, available products and services for the health sector are likely to improve in quality and reliability, and thus improve the utility and confidence in climate services for health.

1.3.1.4 Capacity Development (CD)

Human resource capacity to absorb and utilize climate information in the health sector is almost non-existent in developing countries. Regardless of capacity built within the NMS to provide CS, if prioritization is not given to building end-user capacity there will be no demand for CS. Capacity-building in the climate community should also be undertaken - enabling them to engage in meaningful dialogue with the health community. It is likely to take health actors longer to build absorption capacity than it is service provider capacity. Prioritization should thus focus on integrating climate information into routine epidemiological training in mainstream public health and epidemiological training.

The GFCS Health consultation background report 5 presents the identified Health sector capacity needs, both human and institutional, a sample provided in Box 3. A priority set of Capacity activities for health actors are outlined in the health exemplar activity plan.

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5 Background Report can be found at: [http://www.who.int/globalchange/mediacentre/events/2011/CGFCS_Background_111111.pdf](http://www.who.int/globalchange/mediacentre/events/2011/CGFCS_Background_111111.pdf)
Example Technical/Professional Capacity needs for climate and health

A range of professional skills are needed by health actors to access, interpret and use climate information, including the need to understand:

- Uncertainty, and the probabilistic nature of climate service information products
- Appreciate the multiple ways in which climate adversely affects public health
- The value of applied climate information in public health surveillance
- The concept of climate risk management to development
- The relevance of ENSO to human activities and welfare
- The basic concepts of the dynamics of transmission of vector-borne diseases and their relationship with climatic factors climatic factors
- The variability in space and time of climate-sensitive disease risks
- How climate impacts public health through increased hazards and vulnerability, resulting in increased risk of health impacts, including emergencies and disasters
- How health risks can be reduced with prevention, preparedness, and response measures

Box 3 Identified Human Resource Capacity needs for climate and health

To address these needs, the CD pillar should target capacity development which can:

1. Improve assessments of the impact of climate-sensitive interventions;
2. Develop research and professional training in the use of climate information for public health decision-making to be launched in centres of learning (for example, schools of public health training for graduate and non-graduate health professionals) throughout the world;
3. Support the establishment of an independent expert process for assessing the evidence of health–climate linkages for policy development and decision-making using the example of the Cochrane and Campbell reviews processes;
4. Integrate weather and climate research to continue to create a seamless prediction system, and creating tools relevant to health decisions;
5. Develop verification and quality assurance of climate products relevant to health outcomes.

1.3.2 Linkages with the User Interface Platform

The User Interface Platform (UIP) is the pillar of the Framework, which provides a structured means for users, user representatives, climate researchers and operational climate service providers to interact. UIP activities will help upstart actions in the exemplars by providing the space, structure, resources and network for enabling interactions to occur.

A UIP is required to improve engagement in the health sector, to identify and respond to specific needs of health users at all levels, and to make sure the Framework is adequately meeting user needs. For example, the UIP will help jumpstart collaboration for the Health Exemplar activities by providing advocacy and information materials, facilitating two-way communications, helping establish coordination and monitoring procedures on behalf of, or in conjunction with health implementing actors. Once partnerships are effectively working between health and climate service providers, UIP activities may shift focus to feedback and evaluation of the partnership.

The UIP has four objectives in feedback, dialogue, evaluation, and outreach to ensure the Framework meets end-user needs for climate services, maximizes the usefulness of climate services, and develops new and improved applications of climate information for health partners. The UIP objectives described here are in relation to what the UIP can be expected to do for the health community.

Feedback: Identify the optimal methods for obtaining feedback from the health community. It is the satisfaction of the Framework’s users’, monitored using the UIP that will support the on-going work programmes in other Pillars and Exemplars.
Dialogue: Build dialogue between climate service users in the health sector and those responsible for the observation, research and information system components of the Framework with the aim of developing metrics for the performance of the Framework as affected by the contributions of the components.

Monitoring and Evaluation: Develop monitoring and evaluation measures for the Framework that is agreed between users and providers. It is the satisfaction of the Framework’s Health users that are to be used to evaluate the outcomes that arise from the provision of services supported by the Framework.

The UIP will need to establish and maintain evaluation mechanisms that are essential to monitor the overall success of the Framework in delivering climate services for sectors. Reporting may occur through technical oversight committees, and/or other thematic or technical mechanisms that ultimately inform the respective donors, executive committees, and the GFCS Board on health sector progress and needs. The UIP can also ensure health actors are represented on GFCS task forces, expert teams, and technical committees having organizational responsibilities for activities undertaken under the Framework.

Outreach: Improve outreach to enable the appropriate application of climate information to health sector decision-making and actions, through a range of advocacy, outreach, public education initiatives and training programmes.

For example, existing climate services are often not used by the health sector simply because potential users are unaware they are available or how they could be used. The Framework, through investment in the UIP, can address needs for improved climate literacy. Actions such as information campaigns about climate services targeted to health users are needed; as well as enhanced communication regarding opportunities for health oriented (user) training and related capacity development initiatives.

1.3.3 Engagement with other Priority Sectors

Health risks are often generated in other sectors, such as water, agriculture, and disasters. The UIP is needed to improve critical inter-sectoral collaboration so that climate service advances in one sector can benefit or be shared with others.

Agriculture:
Human nutrition stands at the interface of food security and human health. Climate-related changes in global and local food production are anticipated to have major impacts on the future under nutrition and human health. Health actors need access to information about agriculture changes which will affect nutritional needs in a country. Opportunities for joint collaboration, may be, for example, involvement of technical and research partners, other operational UN agencies involved in nutrition and food security, (i.e. UN Standing Committee on Nutrition, FAO, WFP, UNICEF, WHO, and WMO).

Water:
Climate change is expected to affect the capacity and operations of existing water and sanitation infrastructure and services. These services have to prepare for the widely anticipated consequences of floods and droughts, or risk compromising access to safe drinking water and adequate sanitation for substantial numbers of people in developing and developed countries, with cascading effects on human health and development.

Water affects health via numerous pathways. The overlaps and opportunity for collaboration between the Water and Health Exemplars are most prominent in relation to “water and sanitation for health protection”, particularly in relation to flooding. Other potential areas of collaborative action include understanding and addressing health risks posed by:

- Surface and ground water availability, including salinization of aquifers;
- Marine water quality and safety, including food safety of marine products related to water quality (i.e. cholera and seafood);
- Sewage and solid waste management for run-off and contaminant management;
• Durability of drinking water and sanitation infrastructure, technology, and services.

Disaster Risk Reduction:
Health risks from extreme weather events represent a significant proportion of the potential negative consequences of climate variability and climate change for health. The DRR Exemplar describes six priority categories of activities that can be implemented under GFCS: Risk Assessment, Data Loss, Early Warning Systems, Risk Reduction in Sectors, Planning Investment in Reducing Risk, Risk Financing and Transfer. These categories are aligned with existing disaster risk reduction structures, and compatible with other relevant international initiatives. From these categories, individual projects will be developed in partnership with other stakeholders, including health actors in national health emergency preparedness and management.

1.4 RELEVANT EXISTING ACTIVITIES
Over the last decade many climate and health related partnerships and initiatives have developed. This section describes some of the notable, but not exhaustive list of partnerships at global, regional, and national levels, followed by a description of resulting projects and initiatives, and five boxes providing examples.

1.4.1 Global Level Partnerships
WMO and WHO have a longstanding formal relationship dating back to 1952. Global level partnerships, such as that of the WHO and WMO, support Member States in protecting them against climate-related risks, by providing normative and technical frameworks. The International Research Institute for Climate and Society (IRI) at Columbia University, and the London School of Tropical Medicine and Hygiene are WHO collaborating centres for climate and health. WHO partners with these centres of excellence for research, training, and technical support on climate and health worldwide.

The UN Standing Committee on Nutrition has an international partnership for climate change with WHO, FAO, WFP, and civil society partners. A global US based partnership between NASA and USAID, SERVIR, have developed networks on 4 continents to provide observational information for development. These agencies bring together a wealth of data and regional collaborations that serve as an interface for climate and health communities. The Group on Earth Observations (GEO) is another global level partnership, which proposes that an integrated, comprehensive, and sustained Earth observation system can support the health sector, and is currently advancing a number of research and early warning system pilots. These technical or information-based communities of practice enhance access to timely and comprehensive information to improve real-time health decisions.

1.4.2 Regional Level Partnerships
Regional level partnerships are important to bolster capacity and resources for national and community level initiatives, and respond to transboundary issues. National Meteorological Services may be limited to perform a full range of functions, analyses, and climate services needed by health actors. Regional level organizations can help fill gaps and build capacity through shared mechanisms with a block of countries. Regional meteorological centres and Regional Climate Outlook Forums are particularly important.

For example in Africa, active regional networks include: the African Centre of Meteorological Application for Development (ACMAD), IGAD Climate Prediction and Applications Centre (ICPAC), Southern Africa Development Community/ Climate Services Centre. (SADC/CSC)(Botswana). A range of regional climate and health research, early warning, and surveillance projects include Clim-Dev Africa, Healthy Futures, Malaria Outlook Forum (MALOF), VIGIRISC, SDS-WAS, and AMMA. The Meningitis Environmental Risk Information Technologies (MERIT) initiative convenes global, regional, and local research and operational partners to focus on understanding and managing meningitis across the "Meningitis belt" of the Sahel and West Africa. The MALOF is a

6 http://www.earthobservations.org
regional partnership of health actors in association with the annual RCOFS to inform the Malaria Early Warning Systems (MEWS) in Southern Africa and the Greater Horn of Africa.

1.4.3 National Level Partnerships
National and local level climate and health partnerships are essential for health risk management of extreme weather events and infectious diseases. Locally and nationally relevant information and capacity are fundamental since decision-making for disease control and health emergency risk management and preparedness occurs at national, sub-national and local scales. Many national level examples and models exist, ranging from Climate and Health Working Groups and task forces, to inter-ministerial, inter-departmental government coordination mechanisms, NGO led coordination, and city-scale oriented climate information services (e.g. Shanghai MHEWS).

1.5 EXISTING CLIMATE AND HEALTH INITIATIVES
An extensive range of collaborative activities between the meteorological and health communities span health policy, research, and practice at global, regional, and national scales. These on-going efforts have built experience, learning, and a community of practice to expand upon and consider for partnership. Notable examples include:

- Heat-health and cold-health early warning systems, including development and use of climate indices relevant to health outcomes (municipal/national in Europe, China, Canada);
- Health-sector participation in RCOFs/NCOFs (Africa);
- Early warning systems for malaria, rift valley fever, plague, water borne diseases and meningitis (Africa, Indian Ocean, Asia, Pacific);
- Health emergency and disaster management programmes across the world to deal with health risks and effects of climate and weather events;
- Air quality, pollens and allergens, ultra-violet radiation and their impacts on human health, especially in cities (Americas, Europe, Asia);
- Interdisciplinary training, knowledge building and awareness raising (global);
- Gathering and managing evidence on the impacts of climate variability and change on the various aspects of the health sector, including vector and water borne diseases, for improved surveillance, evaluation, preparation and response activities (impacts assessment, impacts modelling, etc.) (Africa, Americas, Europe, Asia);
- Multi-hazard early warning systems at national and municipal scale (e.g. Shanghai);
- Integrated Climate, Health, and Environment Surveillance Systems (Africa);
- UNFCCC National Communications and National Adaptation Plans of Action, for health;
- Climate and Health Vulnerability and Adaptation Assessments;
- Improved public health system management of temperature extremes, most regions;
- WHA and Regional Committee work plans for Climate and Health Adaptation Policy;
- Safe Hospitals Initiative (global) assesses and improves the safety and preparedness of existing health facilities and ensures building new facilities are designed in relation to local risks, including climate variability and change;
- WMO Pilot Projects for Climate and Health Working Groups (Africa).

Other notable opportunities for future synergy include:

Integrated Health and Environment Policy and Programmes
Ministries of Health and Ministries of Environment in Africa to implement the Libreville declaration (2009) for Health and the Environment, are conducting Environmental Health Situation Analyses and preparing National Plans of Joint Action with support from WHO and UNEP. Climate is a key health risk included in the assessment and action plans.

National Environmental Health Action Plans (NEHAPs)⁷
NEHAPs are comprehensive and inter-sectoral environmental health planning and implementation processes, existing in approximately 35 countries, particularly in Asia.

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UNFCCC National Adaptation Plans of Action (NAPAs) National Action Plans (NAPs) NAPAs and NAPs often recognize the impacts of climate on health, but fall short of rigorous risk assessment or appropriate planning. NAPAs/NAPs for health can be significantly improved with climate information and direct coupling with Health activities.

1.6 EXAMPLE CLIMATE AND HEALTH INITIATIVES
The following boxes present six examples of current climate and health initiatives. The MERIT initiative, the WMO Climate and Health Working Groups, a specific example of the Madagascar Climate and Health Working Group, the IRI Training Programme on Climate Information for Public Health, Health Alert systems for Extreme Weather events in the UK, and a Regional Health Policy for Climate Change.

Partnerships in Operational Research on Climate and Health

The Meningitis Environmental Risk Information Technologies (MERIT) is a collaborative effort of the World Health Organization (WHO) and members of the environmental, public health and epidemiological communities to bridge operational needs and researchers. The MERIT experience has shown the public health context (health services, technology, policies) can change over time, at times over short periods of time and marking significant change in the dynamics of a disease. It is therefore important that researchers and providers of climate services are not only tracking environmental risk conditions, but also kept abreast of strategic developments in social risk conditions, and be prepared to identify and respond to these accordingly.

In the case of MERIT, the initial objectives of the multi-disciplinary initiative were developed in response to an expressed need of the public health community to help improve the existing reactive vaccination strategy. The activities developed under the MERIT framework have focused in large part on the development of statistical and spatio-temporal models designed to increase the understanding of the influence of environmental factors on the seasonal, epidemic nature of the disease. By increasing this knowledge, MERIT aimed to identify and integrate relevant information into the public health decision-support systems to help improve outbreak response strategies and more effectively plan vaccination activities during an epidemic season.

In 2010, with the launch of a new, more effective meningitis conjugate vaccine in Africa however, the epidemiological situation is set to change quite dramatically as it is introduced in countries across the Meningitis Belt over the coming 3-5 years. As a result of the development and introduction of this new vaccine, the meningitis control strategy in Africa is moving towards a longer-term, preventive approach and the nature of the disease and dynamics of epidemics will be significantly altered. While these developments are incredibly promising for susceptible populations in Africa, the MERIT community is looking at how its activities can be adapted in response to the changing epidemiological situation. A strategic review of the MERIT Initiative in November 2011 addressed these challenges and explored opportunities for the public health strategy to benefit from existing and future research projects.

Box 4 Example of Health and Climate Initiative: MERIT
Climate and Health Working Groups in Africa: A Model for National Coordination and Cooperation

In recent years, a number of WMO forums have been organized to provide opportunities for promoting interdisciplinary assessment of socio-economic benefits of meteorological and hydrological services involving service providers and users. The overall outcome has shown:

- Inadequate understanding of user needs for information and services;
- Lack of awareness of users of the available and potential services;
- The difficulty of integrating Weather, Climate and Water Services into national development strategies and priorities;
- Lack of capacities and competencies in NMHSs to deliver services to meet user needs;
- Inadequate communication between NMHSs and users;
- Political barriers to technical participation of NMSs staff in Regional Climate Forums.

In order to address the specific needs of the health sector, as a user, for climate and weather information, the PWS Programme of WMO embarked on an approach to establish “Climate and Health Working Groups” in a number of countries in Africa, or where they already existed to help strengthen them.

The Climate and Health Working Groups work to develop national capacity through the following process:

- Identifying the weather and climate data, information and service needs of the health sector; gaps in current data, information and service delivery; and recommendations for filling these gaps, including enhanced observing networks, decision support tools;
- Identifying gaps and problems which constrain the routine use of weather and climate information by the health sector, and identifying and pursuing the means to overcome them;
- Formulating institutional data sharing among the sectors;
- Identifying research needs on climate and health;
- Identifying education and training needs across the sectors;
- Facilitating access to tools of climate and weather for the health sector;
- Enhancing the use of early warning systems for climate-sensitive diseases like malaria and the plague;
- Building the capacity of national, local and community based organizations to widen and strengthen their services in this area;
- Organizing and presenting to decision-makers scientific evidence on the impact of climate variability and climate change on health;
- Organizing annual workshops on weather/climate and health issues;
- Collaborating with similar groups the region to share experiences and building on each other’s skills.

The Key outcomes of the CHWGs have been improved service delivery (to the benefit of health services and the participating NMHSs); enhanced capacity in the NMHS; and enhanced capacity to use weather and climate services in the health sector.

1. Helping the NMS move from data gatherer to service provider;
2. Helping with the use of weather and climate knowledge and information vs simply building archives of data;
3. Providing better services to the population.

Text provided by Haleh Kootval
The Climate and Health Working Group in Madagascar began in 2008 as a four year demonstration project, with the aims to:

1. Help the Madagascar Meteorological Service to meet the specific needs of the health sector in terms of climate data and information as effectively as possible; and,
2. Adopt new working methods in the health sector with regard to the effective and efficient use of climate data and climate information for the prevention of epidemics and guiding response activities, in the case of three most important diseases in the country, namely; malaria, plague and Rift Valley Fever.

The project review clearly demonstrated that in spite of many challenges in a developing African country, the partnership between the meteorological and health communities has been successfully established for the conduct of research, education and data exchange. What remains is measuring and evaluating the impact of the use of climate data in improving provision of health services over the next few years.

Given the needs of the health services in Africa, and the role of climate in disease outbreaks, a partnership between NMHSs and the health sector is one of the best practices to provide climate services to an important user sector. This ensures that both communities speak the same language and understand the common issues and problems.

The project in Madagascar showed that a modest investment can result in:

- Establishing dialogue, collaboration and partnership between the Met and Health communities;
- Helping the NMS to move from data gatherer to service provider;
- Helping with the use of weather and climate knowledge and information versus simply building archives of data;
- Providing better services to the population.

Similar projects are underway to establish CHWGs in West Africa, namely in Burkina Faso, Mali, Niger and Mauritania, and strengthen the existing CHWG in Ethiopia.
Training and Curriculum for Climate Information for Public Health

The International Research Institute for Climate and Society (IRI), in partnership with the Center for International Earth Science Information Network (CIESIN) and the Mailman School of Public Health (MSPH) at Columbia University has developed a core curriculum and training program that provides a balance of concepts and methods from the health and climate communities. It uses an approach deeply oriented toward methodology, gathering and using evidence for decision-making in order for the participants to get in-depth knowledge and skills in decision-making for health-care planning of climate sensitive diseases.

Since 2008, the IRI has trained over 100 professionals from 25 countries, including trainings on-site in Madagascar, Uruguay, and Ethiopia.

Learning outcomes for successful participants include how to:

- Recognize the role climate plays in driving the infectious disease burden and public health outcomes;
- Understand management and data integration as an opportunity to improve the decision-making process in Public Health;
- Realize the timescales, the benefits and limitations of different climate and environmental data sources including remotely sensed data, meteorological data and climate predictions;
- Use new tools for accessing climate and epidemiological data, for analyzing and mapping through the IRI Data Library and GIS.

Box 7 Example: Capacity-Building in Climate Information for Public Health

Climate Services for Health in the UK

The UK Met Office in collaboration with the UK Department of Health and Health Protection Agency (HPA) jointly operate three climate services for health:

1) Cold Weather Health Watch England;
2) Heatwave Plan and alerts for England;
3) Natural Hazards Partnership which include the Met Office and the Health Protection Agency amongst other partners.

The Cold Weather Health Watch system operates in England from the 1 November to 31 March every year, in association with the Department of Health. The cold weather health watch comprises four levels of response based on cold weather thresholds. The thresholds have been developed to trigger an alert when severe cold weather is likely to significantly affect people’s health. The alerts take account of temperature along with other winter weather threats such as ice and snow.

The Heat-Health Watch system operates in England and Wales annually from 1 June to 15 September in association with the Department of Health and the Welsh Assembly. The Heat-Health Watch system comprises four levels of response based upon threshold maximum daytime and minimum night-time temperatures. These thresholds vary by region, but an average threshold temperature is 30 C by day and 15 C overnight.

These systems have a strong network of national partners, as well as international.

Source: http://www.metoffice.gov.uk/weather/uk/coldweatheralert/

Box 8 Example: Climate Services for Health in the UK
Since 2009, the Regional Committees of the World Health Assembly represented by Member State Health Authorities, have endorsed resolutions and action plans to confront climate change risks to health in each WHO world regions. These new action plans call on countries in their respective regions to develop national climate change strategies with technical help from WHO/PAHO, as well as national campaigns to increase awareness of the health risks of climate change.

These resolutions are broadly similar priority across all WHO Regions, but diverse in details depending on regional needs. For example, the Americas highlight 4 strategic areas of work, with associated objectives and indicators:

**Strategic Area 1: Evidence:**
Strengthening the generation and dissemination of knowledge regarding health risks associated with climate change and about the appropriate public health response to this phenomenon.

**Strategic Area 2: Awareness raising and education:**
Creating awareness and increasing knowledge about the health effects of climate change among the general public and in other sectors, including health personnel, by promoting training and by communicating and disseminating information through a multidisciplinary approach.

**Strategic Area 3: Partnerships:**
Promoting, articulating, and establishing cross-disciplinary, interagency, and inter-sectoral partnerships to ensure that health protection and promotion is central to climate change policies.

**Strategic Area 4: Adaptation:**
Strengthening and developing the capacity of health systems to design, implement, monitor, and evaluate adaptation measures designed to improve response capacity to the risks posed by climate change.

The specific actions can all benefit from enhanced climate services and climate literacy within the health sector. In order for health actors to conduct climate vulnerability and adaptation assessments, implement policy and adaptation measures based on assessments of climate change and health vulnerability, and enhance capacity to respond to public health needs in emergencies caused by an increased frequency and intensity of disasters related to modifications in hydro-meteorological patterns, and to wide-reaching epidemics – climate information, climate services, and active partnerships are needed.
2 IMPLEMENTATION OF THE HEALTH EXEMPLAR

2.1 NECESSARY AND SUFFICIENT CONDITIONS FOR SUCCESSFUL IMPLEMENTATION

The successful implementation of the Framework, including the Health Exemplar, requires full engagement and buy-in of the health community at global, national, and local levels to develop and successfully deliver climate services for health. Six conditions are critical to encourage this ownership on both sides and facilitate joint implementation of climate services for health. These include:

(i) Genuine ownership of the GFCS by end-users and participation with all pillars of the GFCS, including health representation at the highest level within the overall GFCS management structure;

(ii) Accountability of joint commitments by both climate and health stakeholders for responding to health sector needs, ensuring direct relevance to measurable health outcomes, and in support of existing health goals, mandates, and agendas;

(iii) The most direct possible link to the operational, policy and technical support mechanisms of the health sector, as well as the climate sector, starting with secretariat functions that run as a joint project between WHO and WMO, which translates to regional and national levels;

(iv) Political and financial commitment to the GFCS, from both health and meteorological agencies, (including through the global governing bodies for meteorology, and for health);

(v) Interdisciplinary collaboration and coordination with climate service advances in all areas of Water, Agriculture, and DRR.

The sections below elaborate each condition the Framework and Health Exemplar should acknowledge and integrate to ensure success.

Necessary Condition 1: Genuine ownership of the GFCS by end-users and participation with all pillars of the GFCS. This implies that there should be health representation at the highest level within the overall GFCS management structure, as well as representation in other technical and sub-committees of the Framework. In addition, declarations or clear Memorandums of Understanding can articulate an organization’s commitment to the Implementation Plan of the GFCS, and engagement in feedback mechanisms for users to follow progress.

Necessary Condition 2: Actions implemented within the Health Exemplar, and for the benefit of health actors, should have direct relevance to measurable health outcomes and support existing health mandates, agendas, and goals, (including health commitments and needs expressed through the UNFCCC), with appropriate accountability mechanisms in place.

A tight coupling with health policy and operations is necessary to achieve increased buy-in and active partnerships with health actors. Current needs and gaps should be met, in sequence of priority, as set forth by expert committees of health and climate services.

The credibility of the Framework for health actors, and interest and investments in partnerships will depend upon the Frameworks accountability to meet health priorities. It will be necessary to consistently demonstrate to health actors the following: that the needs of the health community are being met; that collaborations and joint action are directly relevant to improving the management of climate sensitive health issues; there is measurable benefits to human lives and health; investments and climate services practically enhance the performance and delivery of existing health priorities, goals, and technical agendas; and the cost effectiveness of partnering and using climate services.
It is highly recommended that performance measurements of GFCS activities are assessed against health criteria, ideally through existing surveillance and monitoring systems, and health emergency information management systems. For example, demonstrating that climate services contribute to the reduction of elderly mortality rates during extreme heat events; under 5 years of age malnutrition rates in drought prone areas, and injury and mortality rates during extreme weather events (hurricanes, tornadoes, etc.). Consistent commitment from both sides will be needed to maintain political, technical, and financial support to address priority gaps.

Necessary Condition 3: Climate services and the Framework with respect to the health sector, should maintain the most direct possible link to the operational, policy and technical support mechanisms of the health sector, as well as the climate sector. This is necessary to ensure that the most appropriate links are created between Climate Services and the operational, policy and technical areas of the health sector.

The “health sector” is comprised of a range of diverse actors that engage in health policy, practice, and research, although all three have significant and tight inter-linkages, they have significantly diverse needs for climate services. It is recommended that secretariat functions of the Health Exemplar run as a joint project between health and climate agencies to establish and maintain strong and appropriate linkages with the health sector and its users. This will also ensure legitimacy of action in both domains. The UIP, working with the joint programme office, can also assist the Framework by identifying and disaggregating the range of health user-groups who potentially need customized services, along with their respective policy and operational mechanisms.

Necessary Condition 4: Political and financial commitment from health and meteorological agencies, including through the global governing bodies for meteorology, and for health. The legitimacy of the Framework will require the endorsement of global and regional health governing bodies, including the WHO Executive Board, the World Health Assembly, and the WHO Regional Committees. A modified version of the Health Exemplar, such as a “Climate Service and Health Strategy” should be prepared, discussed, and endorsed for implementation by Regional and National Health actors. Global and regional political support via WHO-HQ and Regional Offices will enable and facilitate national level engagement and commitment from Member State representatives (Ministries of Health).

Necessary Condition 5: Interdisciplinary collaboration and coordination with climate service advances in all areas of Water, Agriculture, and DRR. To achieve effective CS for health, strong collaboration and joint mechanisms with climate services for Water, Agriculture, and DRR are essential. Many practical advances to protect health can be made by including health risks into the risk management system of other sectors. For example, food security and nutrition are tightly coupled. Partnerships between the health and agriculture sector, can utilize food security early warning systems to provide health actors lead-time to preposition early and targeted nutritional and health support to food insecure populations. Collaboration between health and other sectors can improve health outcomes for communities.

2.2 ENGAGEMENT IN THE WORKING MECHANISMS OF POTENTIAL PARTNERS

To ensure the Framework has direct relevance to health, it is essential for climate services to engage with existing health mechanisms. The health sector has well-established mechanisms to ensure global, as well as national level, governance, coordination, training, funding, and delivery of health interventions. Via the Health Exemplar and the UIP, the Framework can support, endorse, and integrate with these mechanisms. Particularly vital to understand is health governance and the guiding global health priorities and policies orienting the sector as a whole, at all levels.

Section 1.4 provided examples of existing climate and health partnerships and initiatives. Annex 7 provides two tables of current potential Health Exemplar partners at global, regional, and national levels, which span categories of governmental, non-governmental, academic, and private sector partners. Annex 7 also provides annotated descriptions of these relevant institutions, active projects and partnerships for climate and health. Despite the fact many current partners exist in
North America, Europe, or Australia, they often operate internationally, partner with developing countries, or serve as a resource base for capacity-building, technical transfer, and collaboration to developing countries.

EXISTING HEALTH MECHANISMS
The Framework will need to actively collaborate with a range of existing health mechanisms. Table 3 presents an indicative, and not exhaustive selection of health mechanisms that climate service partners should be aware of and may likely interface with during implementation of the Exemplar. Health and climate-relevant policy and research mechanisms, mandates, and existing agendas are fully described in Annex 5.

<table>
<thead>
<tr>
<th>Existing Health Sector Institutions and Mechanism</th>
<th>Global</th>
<th>Regional</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance, partnerships, coordination mechanisms</td>
<td>UN, WHO, WHA Global Health Cluster, MDGs, IHRs, IASC, UNISDR thematic platform on disaster risk management for health WHA Resolutions</td>
<td>(WHO) Red Cross (RC) Regional disaster management groups</td>
<td>(WHO CCA) (UNCT) NGO consortiums Legislation National health policies, plans and strategies WHO Country Cooperation Strategies National emergency committees</td>
</tr>
<tr>
<td>Capacity-building mechanisms</td>
<td>E-health CIPHAN Tephí-net/Afrinet IHR Capacity Development Universities UNITAR - UNU</td>
<td>WHO Regional Offices Universities Regional centers (e.g. ADPC)</td>
<td>Ministries of Health Universities</td>
</tr>
<tr>
<td>Communications mechanisms</td>
<td>Media Professional Associations</td>
<td>Media Professional Associations</td>
<td>Media Professional Associations</td>
</tr>
<tr>
<td>Research mechanisms</td>
<td>Public Health &amp; Medical Associations Evidence Aid/ Cochrane Global initiatives (eg ODI, ALNAP) Donor research programs Existing Climate/Health Research Agendas</td>
<td></td>
<td>Public Health &amp; Medical Associations, Universities</td>
</tr>
<tr>
<td>Operational mechanisms</td>
<td>GOARN WHO global emergency and disaster management programmes Safe hospitals initiative</td>
<td>GOARN WHO Regional Offices</td>
<td>GOARN Ministry of Health emergency management units WHO Country Offices Health Clusters</td>
</tr>
</tbody>
</table>

Table 3 Example Health Sector Mechanisms for Climate Services to engage

2.3 GOALS AND CRITERIA FOR IDENTIFICATION OF ACTIVITIES
The Health Exemplar ultimately aims to improve health actions and outcomes related to climate risks, by supporting and building capacity of health actors to have successful partnerships with local climate services. In addition, to responding to the 8 principles of the Framework, and in concordance with international health policy and ethics, the below criteria are suggested to guide the identification of specific activities and locations. Proposed Health Exemplar actions should aspire to:

- Protect climate vulnerable populations;
- Support the achievement of existing health sector goals;
- Address climate sensitive health condition of public health priority;
- Address major gaps identified at regional and/or national levels in climate-health partnership and project delivery;
Engage a range of health, DRR, food security, and meteorological stakeholders in partnership with the aim of protecting health and wellbeing; Include effective monitoring and evaluation functions; Has a risk communication function; Serve to develop the capacity of national health and meteorological actors; Cost-effective; Strengthen the evidence base for policy and programmatic decision-making; Include a sustainability or mainstreaming plan.

Roll-out will happen in a step-wise manner, in 2-, 6- and 10-year timeframes. Initial phase activities should select activities and countries with high chances of successfully delivering within the 2-year time frame, likely to provide maximum return on investment to demonstrate progress of the Framework. Additional priority countries will be selected for the 6 and 10-year timeframes, benefiting from successes and lessons learned from the initial implementation activities. Furthermore, based on over a decade of work and feedback from practitioners, the following lessons should be kept in mind when developing new activities.

Box 10 Lessons Learned that Inform Health Exemplar design

<table>
<thead>
<tr>
<th>Existing Lessons Learned from Climate Services for Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>To gain health actor participation, partnerships between climate and health actors should support the achievement of existing health priorities, workplans, and agendas.</td>
</tr>
<tr>
<td>To make available services useful, recognize the diverse demands for climate information and services among the distinct health sector user-groups, and design climate services which respond to those needs.</td>
</tr>
<tr>
<td>Develop climate services that not only provide information, but jointly develop and manage information products and processes that enhance health risk management.</td>
</tr>
<tr>
<td>For the holistic risk management of health, it is vital to bridge and unite risk management (resources/information/processes) for other sectors which impact health.</td>
</tr>
<tr>
<td>Focus on strengthening national capacity, including strengthening health systems and health information systems that are fundamental to the effective use of climate information and services.</td>
</tr>
<tr>
<td>Strengthen coordination of data from different sectors (transdisciplinary data sets) for application to complex environment-health issues, including solutions for privacy and ownership, clean data, at the appropriate format and scale.</td>
</tr>
<tr>
<td>Develop a greater understanding of current patterns and burdens of many diseases, and the linkages to environment and climate.</td>
</tr>
<tr>
<td>Access to both climate and health surveillance data is not always easy and openly available. Trust must be built between both communities to enable data sharing and collaboration.</td>
</tr>
<tr>
<td>Although many information products are underutilized it cannot be assumed products are ready off the shelf to be used. R&amp;D is needed to develop reliable models, methods, tools, that can be used by operational systems to produce consistent and reliable products.</td>
</tr>
<tr>
<td>A strategic approach to interventions is needed and should be based on effective health risk assessment, including capacity assessment at national levels.</td>
</tr>
<tr>
<td>The need to build local capacities - where health services are delivered cannot be overemphasized.</td>
</tr>
<tr>
<td>Integration of climate variability and change in a health emergency and disaster risk management approach can be effective introduction for the health community</td>
</tr>
</tbody>
</table>

Source: WCC-3 Consultation on Health and Climate Services, 2009
3 HEALTH EXEMPLAR IMPLEMENTATION ACTIVITIES

The Health Exemplar is the primary mechanism for the health sector to contribute to and benefit from the Framework. The Health Exemplar is the translation of the Framework to the health sector, and guides how the health community can implement the Framework. The Health Exemplar workplan outlines specific activities that link health sector priorities to the overall Framework, and can identify and accelerate interactions between the climate and health communities at global, regional, and national levels.

The Exemplar is informed by existing identified needs (Connor et al, 2010; WHO, 2011). This includes an overarching need to compile, assess, and learn from a decade of pilot projects and path-finding collaborations which can indicate good practices, gaps, and opportunities for the next ten years of work under the Framework. The Health Exemplar serves as a institutional structure to facilitate this stocktaking, help standardize and institutionalize good practices, and bring partners together to innovatively respond to health user needs to manage climate risks to health. It aims to facilitate and structure the process toward eventually mainstreaming climate services as public health service, which are essential for health management in the context of climate change.

Figure 2 provides a conceptual overview of the Exemplar. In response to climate-sensitive health priorities, a range of health decisions, systems, and activities (i.e. risk assessment, health surveillance, emergency health risk management, and health service delivery) can be improved with climate information and services. The work plan is organized into four objectives to support these health actions: (1) communications and partnerships; (2) climate and health research; (3) capacity development; and (4) mainstreaming climate services. Tables 5-8 proposed a range of activities to be implemented by health actors, in conjunction with climate partners. The right side shows each objective aligns with GFCS Pillars, more specific linkages are indicated in Tables 5-8. Proposed activities for the 2013-2015 period respond to identified needs and aim to enhance health policy and practice through intensified collaboration with CS partners. Simultaneous progress across the four objectives, in addition to All-Sector work of the GFCS IP and UIP, can collectively advance the aims of the Framework to save lives and improve well-being. The subsequent six-year and ten-year work plans should be elaborated with inputs from partners based on phase one achievements and needs.

**Climate Sensitive Health Issues**

- Humanitarian action - Health Emergency and Disaster Risk Management -- Nutrition --
- Infectious Disease Control -- Air Quality -- Water and Sanitation -- Health Systems -- Climate Adaptation

<table>
<thead>
<tr>
<th>Health Risk Assessment</th>
<th>Integrated Epidemiological Surveillance &amp; Environmental Monitoring</th>
<th>Health Emergency Risk Prevention &amp; Management</th>
<th>Health Service Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Exemplar Objectives</td>
<td>Primary Linkages with GFCS Pillars</td>
<td>UIP</td>
<td>RES, CD, OBS, CSIS, UIP</td>
</tr>
<tr>
<td>Health &amp; Climate Communications &amp; Partnerships</td>
<td>CD, OBS, CSIS, UIP</td>
<td>CD, OBS, CSIS, UIP</td>
<td></td>
</tr>
<tr>
<td>Health &amp; Climate Research</td>
<td>CD, OBS, CSIS, UIP</td>
<td>CD, OBS, CSIS, UIP</td>
<td></td>
</tr>
<tr>
<td>Health &amp; Climate Capacity Development</td>
<td>CD, OBS, CSIS, UIP</td>
<td>CD, OBS, CSIS, UIP</td>
<td></td>
</tr>
<tr>
<td>Mainstreaming Climate Services to Health Operations</td>
<td>CD, OBS, CSIS, UIP</td>
<td>CD, OBS, CSIS, UIP</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2 GFCS Health Exemplar Structure**

3.1.1 Health within the All-Sector Activities of the IP and UIP

Health actors will be involved in and benefit from actions in the overall Framework IP and the UIP. The UIP will instrumentally facilitate Health Exemplar implementation by facilitating end-user engagement with Framework pillars for health specific initiatives. Active coordination should identify how activities of the IP and UIP will enhance, alter or make redundant activities identified...
in the Health Exemplar. Specifically, Health actors can anticipate involvement in the following planned actions of the overall Framework IP:

1. Establish leadership and management capability to advance the Framework;
2. Establish Frameworks for Climate Services at national and/or regional levels;
3. Host a set of regional workshops to build the capacity of NMSs to implement climate watch systems at national levels to enhance user awareness of on-going or foreseen climate anomalies and the negative consequences they might cause;
4. Bridge the gap between users’ needs and climate capability. Improve the ability of users to incorporate climate information into their decision-making processes to prepare for and manage climate-related risks;
5. Improve decision-making processes, build national and regional capacities through the UIP, and establish multi-disciplinary research;
6. Distribute Climate Service Toolkit;
7. Develop and strengthen the capacity of climate information and services providers to clearly communicate with user sectors.

Secondly, health actors will be active implementing partners of the UIP activities. The UIP specifically serves to create a conducive environment and point of contact for priority sectors (health, water, agriculture, DRR) to engage with the Framework and individual pillars. Below are UIP actions described in relation to Health.

1. **Feedback:** Identify needs and support health actors with appropriate and timely information and services to integrate environmental and climate factors into health policy and practice processes at the national, regional, and global levels;
   - **UIP Activity:** Organize in Health a systematic process to gather and analyze the sector’s user requirements for climate information.
   - **UIP Activity:** Undertake a survey of relevant existing Health user-focused networks, collaborations, partnerships, forums, centers and learning exchanges relevant to each of the priority sectors. Analyze their function, successes and impediments and provide recommendations on action via the UIP to enhance their capabilities.

2. **Dialogue:** Build dialogue between health sector climate service users and those responsible for the observation, research and information system pillars of the Framework with the aim of developing metrics for the performance of the Framework as affected by the contributions of the pillars;
   - **UIP Activity:** Interact with other pillars of the Framework to articulate health user needs and perspectives as required. Stimulate the development and dissemination of user-oriented applications methodologies, good practices and relevant standards of performance.
   - **UIP Activity:** Build a suitable means (website, social media cloud facility) for the UIP to foster the gathering, analysis and dissemination of health user needs for climate information and its application.

3. **Outreach:** Advocate that the provision of good health is considered an end-goal of other sectors, including climate, DRR, water, agriculture, and bring the benefits of CS for other sectors full spectrum to protect health through joint applications between multiple sectors, (i.e. vector and zoonotic disease control with the agriculture sector).
   - **UIP Activity:** Advocate the benefits of using climate information and utility of the Framework to potential beneficiaries, users and user organizations. Formulate key messages about the UIP, in consultation with representatives of user organizations and the other components of the Framework.
UIP Activity: Contribute guidance and support to facilitate effective user engagement in the projects undertaken for Capacity-Building. Support other actors, particularly in developing countries, to undertake these tasks at regional and national levels. Prepare a short communications brochure on the User Interface Platform and its first year intentions for general use by user partners.

4. **Monitoring and Evaluation:** Monitor and respond to the evolving needs of health community by developing and working to mainstream climate services into core public-health functions (i.e., epidemiology, health surveillance, health emergency and disaster risk management, preparedness, multi-sectoral disease control)

UIP Activity: Organize a health sector-specific assessment of the most promising areas for introducing climate services to existing collaborative mechanisms. Through the UIPs communication tool, provide open channels for users to express user needs and to communicate good practices and success stories in the application of climate services.

UIP Activity: Coordinate the monitoring of health user perspectives and feedback on the functioning of the Framework, and provide necessary health user-oriented support to the other pillars of the Framework, including exchange of requirements and technical information between Pillars and users; and evaluation of how climate services are used by the decision makers in the priority areas.

### 3.1.2 Health Exemplar Work Plan

This section outlines the proposed activities of the Health Exemplar. Work will be executed in three phases: Phase I (2013-2015), Phase II (2015-2019), and Phase III (2019-2023). Actions proposed for the first phase aim to stock-take and address existing gaps, focus on establishing institutional structures, and prioritize strengthening or scaling up existing initiatives at either global (G), regional (R) or national (N) levels.

The success of the Health Exemplar will in part be a function of the effectiveness of the UIP to communicate the benefits of such an initiative to both the health and climate communities, as well as the ability to leverage existing and new resources and partnerships. Actual implementation will depend on the availability of resources. The Health Exemplar objectives and outcomes are summarized in Table 4.

<table>
<thead>
<tr>
<th>OVERVIEW</th>
<th>Health Exemplar Goals, Objectives, and Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal:</strong> To improve health outcomes and enhance the management of climate-related risks to health, by pursuing, inter alia, the following four specific objectives:</td>
<td></td>
</tr>
<tr>
<td><strong>Obj. 1: Communications &amp; Partnerships</strong></td>
<td>Strengthened communication and partnerships among climate and health actors at all levels for the promotion of effective utilization of climate information within health policy, research and practice.</td>
</tr>
<tr>
<td>1. Support health and climate partners to increase participation and demand by raising awareness of climate risks to health, the availability, uses, and benefits of climate services for health policy and operations.</td>
<td></td>
</tr>
<tr>
<td>2. Build, maintain, and facilitate an active community of practice, and network of partners and experts supporting and implementing climate and health work, by actively supporting interdisciplinary dialogue and partnerships.</td>
<td></td>
</tr>
<tr>
<td><strong>Obj. 2: Health &amp; Climate Research:</strong></td>
<td>Improved health and climate research and evidence</td>
</tr>
<tr>
<td>3. Enable Climate Service providers to better support research which builds evidence for health policymaking and operations, via both provision of information and engagement in jointly developed health oriented climate service products.</td>
<td></td>
</tr>
</tbody>
</table>
4. Establish and maintain a global climate and health research forum that accelerates the use of climate research and information for health, and works to address key barriers to the optimized use of available climate research in health operations.

5. Support and invest in joint research that builds research capacity and responds to global health research agenda priorities, such as building the economic and political case for the application of climate services as a way to adapt and protect health from climate related risks.

Obj. 3: Health & Climate Capacity Development
Increased capacity of health sector to effectively access, understand and use climate and weather information for health decisions.

6. Develop training and capacity-building materials, and support learning mechanisms, training programs, forums, and networks to build the capacity of health and climate service partners and users.

7. Support institutional capacity needed for the use of climate information, and effective partnerships and collaborations between climate service partners and users.

Obj. 4: Mainstreaming Climate to Health Operations
Climate and weather data effectively mainstreamed to health operations.

8. Facilitate the mainstreaming of climate services into health policy, research and practice, by building upon the range of existing activities and collaborations in order build a climate resilient health sector at Global, Regional, and National (GRN) levels.

9. Provide operational guidance to health partners on how to use climate services and information products, particularly to enhance risk assessment, health surveillance, and health service delivery processes, including risk management.

Table 4 Health Exemplar Goals, Objectives, and Outcomes

3.1.3 Objective1: Communication & Partnerships
Communication is vital to create genuine ownership of the GFCS by end-users. The Health Exemplar priority actions for communications and partnerships outline ways to support health and climate partners to: communicate and raise awareness of the availability and benefits of climate services; attain buy-in from health actors; advocate for partnership and sponsorship; and build trust amongst communities of practice. Investment in communication is essential to create health-user demand for climate services, and motivate engagement in dialogue. These actions will be reinforced by UIP investments in Feedback, Outreach, and Dialogue.

Lessons learned from climate and health partnerships offer the following rules of thumb (WHO, 2011) as recommendations for how to enable and sustain effective partnerships.
Success Factors for Climate and Health Partnerships

- **Build Partnerships on Common Principles**: these include health equity, definition of concrete outcomes, and clear vision of actor roles in achieving those outcomes.
- **Identify and articulate benefits of cross-sectoral collaboration**, the sustainability and strength of relationships and joint activities can be particularly enhanced when collaborative work is the identified pathway to each partner achieving actions/solutions to their own objectives.
- **Engagement is achieved at all levels** – from individual interest and willingness to be at this interface & learn about another sector's needs and capacities, to an institutional framework which allows the working relationships and exchange of information between those individuals.
- **Solidarity in knowledge and technology transfer.** This would include North/South and South/South partnerships.
- **Good communication** processes.
- **Political commitment and mandates** are behind the partnerships raison d'être, or are designated within political mandates, such as those for climate adaptation.
- **Strong incentives for collaboration are in place**, such as legal, economic, technical, professional incentives which catalyze and encourage individuals and partnerships to embark on collaborative work and share information.
- **Addressing user-needs are designed into collaboration objectives**, effectiveness of joint outcomes is often best when goals to meet explicit timing, quality, and precision of information needs are outlined.
- **Scale considerations are explicitly addressed** allowing the right scales of data to match intervention decision needs: local, national, regional, global.
- **Stakeholder equality and partnership roles are effectively managed.** Partnerships that work try to understand what each partner has to gain and lose from the partnership, and recognize differential needs and incentives to stay engaged and participate.

Box 10 Success Factors for Climate and Health Partnerships

**Health Exemplar Outcomes and Activities for Communications and Partnerships:**

Objective: Strengthened communication and partnerships among climate and health actors at all levels for the promotion of effective utilization of climate information within health policy, research and practice. To achieve the objective for communications and partnerships, outcomes 1 and 2 are presented below in Table 5 along with a series of proposed activities to be implemented in Phases I and II of the Framework.

<table>
<thead>
<tr>
<th>No</th>
<th>Activity</th>
<th>Deliverables</th>
<th>Time</th>
<th>Links</th>
<th>Level G-R-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Support and manage <strong>global virtual platform</strong> at secretariat level, which houses other online resources: (1) COP pages; (2) research forum; (3) online learning portal; (4) guidance docs, etc.</td>
<td>Web portal</td>
<td>Phase 1-yr 1</td>
<td>RES Global</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Awareness campaign for policymakers and health professionals of climate and weather service availability and potential use in 20 high-need countries</td>
<td>Materials</td>
<td>Phase 1-yr 1</td>
<td>CD Global or Reg. coord. -national projects</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Translation of key documents into at minimum 6 UN languages, regional languages as identified</td>
<td>Materials</td>
<td>Phase 1-yr 1</td>
<td>CD Global</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Develop publication series to translate science and research knowledge- into user friendly products that communicate both risks and associated actions needed. Such as: AR5 Health Chapter - for health professionals (what does it mean), translated and disseminated.</td>
<td>Publication Series</td>
<td>Phase 1-yr 2</td>
<td>CD Global</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Develop guidance for national level climate risk communication, including uncertainty, and common definitions of health specific jargon.</td>
<td>Guidance Doc</td>
<td>Phase 2</td>
<td>CD Global or Reg. coord. -national projects</td>
<td></td>
</tr>
</tbody>
</table>
Communications

Outcome 2: To build, maintain, and facilitate an active community of practice, and network of partners and experts supporting and implementing climate and health work, by actively supporting interdisciplinary dialogue and partnerships.

6 Generate online forum for C&H Community of Practice: include publicly available roster of experts, focal points and experienced champions in C&H applications; self-registration of organizations and institutions conducting C&H projects, research, and/or training in climate and health organized by global, regional, national levels. Include Forum functions where members can self-post updates/news. (As part of GFCS Health web portal)

Web portal: COP
Phases: Phase 1
Pillar: UIP
Global

7 Organize health activities and dialogues at RCOF/NCOFs (or other technical forums) to enhance dialog and communication with regional/national health community and improve operational use of CS for health. Support Participation of key actors to build networks/awareness

Meeting Phases: Phase 1
CD-OPS Regional / National

8 Develop "starter kits" for new C&H partnerships outlining what CS can do generally/commonly - to match basic climate service package with health operational needs. Provide guidance to CS providers on the uses and needs of the health sector, data standards, and general requisites of the health community.

Materials (outcome of fast track CHWG)
Phase 1
Global

9 Monitor and provide feedback on GFCS UIP activities to support the health sector. Annual according to UIP reporting

Feedback ALL UIP

Table 5 Proposed Communication and Partnership Activities

3.1.4 Objective 2: Health Research and Evidence
The global health community has voiced the need to address significant gaps in knowledge about the influences of climate on global health outcomes and priorities. The Health Exemplar serves to inform climate services how to make available and accessible the relevant climate information needed to conduct health research. This includes the provision of services and forums to assist health partners translate and use climate information for health research and operational decision-making. Whilst these actions directly link to the RES pillar, they are also tied to CSIS, CD and the UIP. To prioritize the development of CI and CS to support the health research community, a series of UIP actions which link user-needs with pillars is needed. For example, an Atlas of Health and Climate was jointly created by the WHO and WMO Secretariats in 2012, as a pilot project of how the Exemplar can function to support health research.

Guiding research activities are outlined in several established global research agendas. Foremost, the WHA Member States, via the 2008 climate and health resolution, requested the WHO to support more applied research on the linkages between climate, and policies addressing climate change and health outcomes (Campbell-Lendrum et al. 2009). The WHO mandate is to promote further research in five priority areas:

- Interactions of climate change with other health-related determinants and trends;
- Direct and indirect climate impacts on human health;
- Effectiveness of various strategies to contend with climate-related health impacts;
- Health implications of climate mitigation and adaptation strategies;
- Means to enhance public health systems.

In addition to the WHO led global research agenda (Campbell-Lendrum et al. 2009) (WHO 2009), other climate and health research agendas include the Earth System Science Partnership scientific strategy for Global Environmental Change Human Health (ESSP) the US-Interagency Report Outlining the Research Needs on the Human Health Effects of Climate Change, predominantly in

http://www.who.int/globalchange/publications/atlas/en/
the United States (GECHH 2007), and the TDR agenda for climate change and tropical and neglected diseases (TDR, 2010).

The research and evidence objective outlines how health and climate research can benefit from the Framework, inter alia, supporting the advancement of existing global research agendas, building national capacity of both climate and health partners to conduct research, and improving the availability, access, and use of climate information.

**Health Exemplar Outcomes and Activities for Research and Evidence:**

**Objective: Improved Health Research and Evidence**

To achieve the objective for research and evidence, outcomes 3, 4, and 5 are presented below in Table 6, along with a series of proposed activities to be implemented in Phases I and II of the Framework.

<table>
<thead>
<tr>
<th>No</th>
<th>Activity</th>
<th>Deliverables</th>
<th>Time</th>
<th>Links</th>
<th>Level</th>
<th>G-R-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Conduct global gap analysis: Part A: Products/Services. Create inventory of available climate information, products, and services currently available to the health sector which can be optimized and improved, and (2) compare available information and services with what is optimally required for health risk management and adaptation.</td>
<td>Inventory to inform strategy</td>
<td>Phase 1</td>
<td>CSIS, OBS, CD</td>
<td>Global</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Conduct global gap analysis Part B: Research needs: (1) compile already identified climate and health research gaps (from existing agendas - WHO DELPHI research stocktaking exercise 2013) to identify opportunities for GFCS support; (2) develop research support plan of how climate services/GFCS can help the global health research committee.</td>
<td>Roadmap for research</td>
<td>Phase 1</td>
<td>RES, CD</td>
<td>Global</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Support representation of Climate Service Providers in Health Research Commission</td>
<td>Meetings</td>
<td>ALL</td>
<td>CD</td>
<td>Global</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Conduct systematic capacity analysis of current health actor readiness to make climate informed decisions and conduct research, including: (i) minimum capacity standards for common uses; (ii) regional capacity needs.</td>
<td>(a) needs assessment (b) standards</td>
<td>Phase 1</td>
<td>CD</td>
<td>All – national projects</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Support research and develop tools to evaluate the performance and cost-effectiveness of climate informed health operations.</td>
<td>(a) Materials (b)study</td>
<td>Phase 2</td>
<td>RES, CD</td>
<td>Global</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Develop verification and quality assurance mechanisms of climate information products relevant to health outcomes. Deploy and monitor.</td>
<td>(a) Process (b)standards (c) materials</td>
<td>Phase 3</td>
<td>RES, CSIS</td>
<td>All – national projects</td>
<td></td>
</tr>
</tbody>
</table>

**[Research] Outcome 4: To establish and maintain a global climate and health research forum, that accelerates the use of climate research and information for health, and works to address key barriers to the optimized use of available climate research in health operations.**

<table>
<thead>
<tr>
<th>No</th>
<th>Activity</th>
<th>Deliverables</th>
<th>Time</th>
<th>Links</th>
<th>Level</th>
<th>G-R-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Establish and maintain climate and health research forum (commission/task force) to: (1) synchronize with global research initiatives (i.e. IPCC); (2) provide standardize methods and tools; (3) monitor and inform on C&amp;H research needs.</td>
<td>New body</td>
<td>Phase 2</td>
<td>RES</td>
<td></td>
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<tr>
<td>17</td>
<td>Develop, manage, and maintain a virtual forum on climate and health research - to publish C&amp;H research commission progress, strategy, and supporting tools/information (As part of GFCS Health web portal)</td>
<td>Web-Portal: Research</td>
<td>Phase 1</td>
<td>RES, UIP</td>
<td>Global</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Develop GFCS climate &amp; health research strategy, to set targets and priorities on how to support critical research needs at regional and national levels.</td>
<td>Availability of strategy</td>
<td>Phase 2</td>
<td>RES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Monitor and provide feedback on GFCS RES activities to support the health sector “ according to UIP reporting</td>
<td>Annual Feedback -</td>
<td>ALL</td>
<td>UIP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
[Research] Outcome 5: To support and invest in joint research that builds research capacity and responds to global health research agenda priorities.

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<tr>
<td>20</td>
<td>Support research to evaluate example national-level health EWS and/or climate-sensitivity models to: (i) identify best and standard practices; (ii) cost-effectiveness and cost-benefit for health; (iii) recommended evaluation criteria of future projects</td>
<td>(a) best practices for health EWS</td>
<td>Phase 2 UIP</td>
</tr>
<tr>
<td>21</td>
<td>Conduct joint R&amp;D for advancement of CI products, CS, and applications for the health sector to respond to identified needs of gap analysis</td>
<td>(b) cost-benefit analysis</td>
<td>Joint Research</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(c) M&amp;E criteria</td>
<td>Phase 2/3 ALL</td>
</tr>
</tbody>
</table>

Table 6 Proposed Health and Climate Research Activities

3.1.5 Objective 3: Capacity Development

The specific capacity needs of the health actors break down into the categories of human resource needs and institutional capacity needs. Human resource capacity-building refers to training and learning that equips individuals with the understanding, skills, information, and knowledge to enable them to generate, communicate and use decision-relevant climate information. Institutional capacity-building refers to support to elaborate management structures, processes and procedures that enable effective climate services not only within organizations but also in managing relationships between the different organizations and sectors (public, private, community). These activities will develop independently from, but in conjunction with the Capacity Development pillar, which aims to systematically develop capacity of National Climate Services and climate service stakeholders (i.e. health actors) to enable all countries to manage climate risk effectively through the use of climate services.

Identified Human Resource Capacity Development Needs

Limited human resource capacity is a primary challenge for Health community. Health actors, particularly at the national and sub-national level are currently challenged to recognize, understand, appropriately interpret and apply available climate information. Reaching out to the health sector with awareness and training activities to address this gap is a paramount priority. Specific capacity needs to be addressed include:

- Supporting the technical/professional capacity development to incorporate climate relevant issues into standard epidemiological training, and vice versa to incorporate health (sectoral relevance) into the training of meteorological professionals;
- Supporting the development of services which have the capacity to translate, analyze, and interpret data (often pre-existing) to meet health decision needs, and ensure dialogue regarding the implications and uncertainty of that information;
- Strengthening health systems with climate services and information for operations in communicable disease control, emergency risk management, and environmental health (including water and sanitation).

Six core competency areas for health professionals to make climate informed decisions, particularly in developing countries, have been identified through the development of field training programs (Cibrelus and Mantilla 2011). These include Basic Concepts in Public Health and Climate, Methods and Tools for Analyzing Climate and Public Health Data; Use of Climate information in decision-making for climate-sensitive diseases; computer and information technology; communication in public health and climate; and collaborating, mentoring, and training on climate information for public health. More information on competencies is provided in Figure 3.

Identified Institutional Capacity Development Needs

Specific capacity needs to be addressed include:

- All climate services for health should be designed with clear roles and responsibilities of actors to produce, provide, analyze, apply, and act upon available information to support institutional frameworks for collaboration;
- Partnerships should be actively managed and encouraged to focus on delivering and improving health operations;
- Defining, implementing and advancing best practices for generating and using climate information;
- Enable access to the resources that are needed to generate, archive and use climate data and decision-relevant information, including observing networks, data management systems, computer hardware and software, internet, manuals and scientific literature.

### Health Exemplar Outcomes and Activities for Capacity Development:

**Objective**: Increased capacity of health sector to effectively access, understand and use climate and weather information for health decisions. To achieve the objective for capacity development, outcomes 6, 7, and 8 along with proposed activities are presented below in Table 7.

<table>
<thead>
<tr>
<th>No</th>
<th>Activity</th>
<th>Deliverables</th>
<th>Timelines</th>
<th>Pillar linkages</th>
<th>Level G-R-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td><strong>Map learning needs</strong> of health practitioners and stakeholders across different geographic scales, specifically these learning groups: Researchers and teachers, graduate and undergraduate students, practitioners in the public health system, community opinion leaders, traditional healers, impacted communities/special interest groups.**</td>
<td>Mapping learning needs</td>
<td>Phase 1</td>
<td>CD, UIP</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td><strong>Develop Kits: Technical Capacity Development:</strong> Provide guidance and templates for capacity-building in C&amp;H by developing standard models for technical skills in risk assessment, health management, and research.**</td>
<td>Materials</td>
<td>Phase 2</td>
<td>CD, UIP</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td><strong>Develop curricula and supporting materials</strong> for higher-education climate and meteorology training, to include modules on social and health applications of climate and weather information.**</td>
<td>Curricula + course</td>
<td>Phase 2</td>
<td>CD, UIP</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td><strong>Develop curricula and supporting materials</strong> for higher-education: (a) professional development, and (b) research capacity-building of health actors, for classroom or distance learning delivery, and/or applied training/continuing education formats. Make core modules available to centers of learning (e.g. schools of public health, geography, etc).**</td>
<td>Curricula + course</td>
<td>Phase 2</td>
<td>CD, UIP</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td><strong>Provide and manage competitive scholarship fund</strong> for health and climate professionals to cover travel and tuition costs receive training and education in climate change and health, at recognized partner institutions, or in GFCS developed short courses.**</td>
<td>Scholarships (10-12K per student)</td>
<td>Phase 2</td>
<td>CD, UIP</td>
<td>National</td>
</tr>
<tr>
<td>27</td>
<td><strong>Develop, manage, and maintain an online learning hub</strong> and human resource center where experts and expertise is shared and sourced. Include sections to locate regional level institutions and organizations that deliver training courses, conduct research and provide policy advisory on &quot;Climate, Health and Prevention&quot;. (As part of GFCS Health web portal)**</td>
<td>Web-Portal: Learning hub</td>
<td>Phase 1</td>
<td>UIP, CD</td>
<td>Global</td>
</tr>
<tr>
<td>28</td>
<td><strong>Support the development and deployment of “climate-field schools”</strong> to make training in the use of climate services for health and in climate informed decision-making to professionals available in (n = 3) countries per year. Ideally linked to ongoing climate and health projects as a way to &quot;top up&quot; and enhance existing capacity.**</td>
<td>Project. Trainings conducted</td>
<td>ALL</td>
<td>CD, UIP</td>
<td>National</td>
</tr>
<tr>
<td>29</td>
<td><strong>Develop and deploy short courses</strong> for local health workforce level on how to access/interpret/use specific climate products used for health EWS, risk assessment, integrated surveillance, and health service delivery.**</td>
<td>Training Materials, Training Programmes</td>
<td></td>
<td></td>
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<tr>
<td>30</td>
<td><strong>Facilitate mentoring and on-the-job training</strong> opportunities of national health and met authorities to collaboratively work together to conduct health risk assessment and risk management, and improve EWS design and use.**</td>
<td>Link to Staff Exchange</td>
<td>Phase 2-3</td>
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</tbody>
</table>
### [Capacity Development] Outcome 7: To support institutional capacity needed for effective partnerships and collaborations between health and climate service partners and users.

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<tbody>
<tr>
<td>31</td>
<td>&quot;Fast Track Project: Climate and Health Working Groups&quot;</td>
</tr>
</tbody>
</table>

#### 32 Develop Kits: Institutional Capacity Development

Create "starter-kits" for climate and health collaboration to accelerate partnerships with strong institutional frameworks. Provide examples and guidance on the ToR, and potential roles and responsibilities of actors to produce, provide, communicate, analyze, apply, and act upon available information at the national level.

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<tbody>
<tr>
<td>Materials examples</td>
<td>Phase 1</td>
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</tbody>
</table>

#### 33 Monitor and provide feedback on GFCS CD activities to support the health sector. Annual according to UIP reporting.

<p>| | |</p>
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<tr>
<td>Feedback</td>
<td>CD, UIP</td>
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</table>

#### 34 Define minimum standards to use, translate, analyze, and interpret climate information meet health decision needs for EWS, surveillance, risk assessment, health delivery. Provide support to national level health institutional capacities (such as IHRs and health emergency risk management) to encourage dialogue regarding the implications and uncertainty of that information.

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<tr>
<td>Guidance Standards, Communication</td>
<td>Phase 2-3</td>
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</table>

#### 35 Support staff exchanges by providing models and guidance on how to set up and conduct successful climate and health staff exchanges.

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<tr>
<td>Guidance</td>
<td>Phase 2-3</td>
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</tbody>
</table>

### Table 7 Proposed Capacity Development Outcomes and Activities

#### 3.1.6 Objective 4: Mainstreaming Climate Services in Health Operations

Mainstreaming CS in Health operations aims to support the testing and mainstreaming of climate services into ongoing health practice. Health and climate partners need to accelerate the translation of research to operations, test and refine climate products, and enhance the quality and frequency of climate informed health decisions by building upon current initiatives between the climate and health community. Only through “learning-by-doing” will the testing ground be established to generate feedback to OBS, CSIS, RES, and CD of the real needs of the health community in action. Mainstreaming actions are closely linked to the 3 other objectives: the learning-by-doing approach will build capacity; expand health and climate research; and strengthen communications and partnerships for mainstreaming climate services for health.

Health operations that can particularly benefit from partnering with CS include health risk assessment, integrated environmental and health surveillance and environmental monitoring, health emergency risk management, and health service delivery. Mainstreaming a climate-informed approach in these areas can improve performance of infectious disease control, water and sanitation, environmental health management, and emergency and disaster risk management, and climate adaptation.

**Health Exemplar Outcomes and Activities for Mainstreaming to Operations:**

**Objective: Climate and weather data effectively mainstreamed to health operations.**

To achieve the objective for mainstreaming climate services to health operations, outcomes 8 and 9 along with proposed activities are presented below in Table 8.

#### Table 8 Proposed Capacity Development Outcomes and Activities

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<tbody>
<tr>
<td>Provide technical support to National NAP teams (n=10) on how to enhance adaptation plans for health with CS as part of new NAPs, and partner with National CS.</td>
<td>Technical Support, Institutional Capacity</td>
</tr>
</tbody>
</table>

33
Prepare “climate-enhanced International Health Regulations” by identifying explicit linkages to enhance IHR implementation capacities with climate services; develop relevant tools and trainings.

Enhance Safe Hospitals in Emergencies and Disasters initiative, by developing tools/guidance on CS linkages to improve health risk management and services.

Support end-to-end pilot projects (n = 5), providing the additional climate partnership component to strengthen health, WASH, and/or nutritional surveillance and response systems to climate risks, evaluate, and document practices and recommendations.

Support end-to-end projects (n=3) for strengthening health disaster risk management programmes (incl. nutritional emergencies) to manage climate risks - evaluate, and document practices and recommendations.

Identify and respond to CS needs for health emergency management personnel of mass gatherings (i.e. the Haj, sport events, displaced people).

Conduct performance evaluation of select climate services for health operations, and develop priority recommendations for enhanced future services.

[Operations]Outcome 9: To provide operational guidance to health partners on how to use climate services and information products, particularly to enhance risk assessment, health surveillance, and health service delivery processes, including risk management.

<table>
<thead>
<tr>
<th>No.</th>
<th>Activity Description</th>
<th>Phase</th>
<th>Resources</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>Prepare “climate-enhanced International Health Regulations” by identifying explicit linkages to enhance IHR implementation capacities with climate services; develop relevant tools and trainings.</td>
<td>Materials - Institutional Capacity</td>
<td>Phase 2</td>
<td>CD, UIP</td>
</tr>
<tr>
<td>38</td>
<td>Enhance Safe Hospitals in Emergencies and Disasters initiative, by developing tools/guidance on CS linkages to improve health risk management and services.</td>
<td>Materials</td>
<td>Phase 2</td>
<td>CD, UIP</td>
</tr>
<tr>
<td>39</td>
<td>Support end-to-end pilot projects (n = 5), providing the additional climate partnership component to strengthen health, WASH, and/or nutritional surveillance and response systems to climate risks, evaluate, and document practices and recommendations.</td>
<td>Projects - best practice</td>
<td>Phase 1</td>
<td>UIP, CSIS, OBS, CD</td>
</tr>
<tr>
<td>40</td>
<td>Support end-to-end projects (n=3) for strengthening health disaster risk management programmes (incl. nutritional emergencies) to manage climate risks - evaluate, and document practices and recommendations.</td>
<td>Projects - best practice</td>
<td>Phase 2</td>
<td>UIP, CSIS, OBS, CD</td>
</tr>
<tr>
<td>41</td>
<td>Identify and respond to CS needs for health emergency management personnel of mass gatherings (i.e. the Haj, sport events, displaced people)</td>
<td>Needs assessment</td>
<td>Phase 2</td>
<td>UIPC, SIS, OBS, CD</td>
</tr>
<tr>
<td>42</td>
<td>Conduct performance evaluation of select climate services for health operations, and develop priority recommendations for enhanced future services.</td>
<td>M&amp;E, Impact analysis, recommendations</td>
<td>Phase 2</td>
<td>UIP</td>
</tr>
</tbody>
</table>

Table 8 Proposed Operational Outcomes and Activities

3.1.7 Fast-Track Health Project

In addition to the activities proposed in the Health Exemplar, one fast-tracked activity per sector has been proposed to jumpstart sectoral engagement and achieve success for the implementation of the framework at the national level. The proposed activity for Health, starting in early 2013, can incorporate actions from all objectives in the Health Exemplar, and spur the holistic capacity development of health and climate service partners at the national level to provide and utilize climate services over the long run.

Priority Activity for Health

In 2010 and 2011, Regional Committees of the World Health Assembly endorsed climate and health work plans to guide the member Ministries of Health in all world regions toward priority actions for climate adaptation. The successful completion of actions within these agendas requires close collaboration and joint programming with National Meteorological and Climate Services. Several climate and health working groups (CHWGs) have been established in Africa since 2008,
supported by WMO and other partners, which serve as models to be expanded to meet this need (described in Box 4). These CHWGs have proven to be a successful model to build national level capacity to respond to the tailored needs of the health community, while establishing structured mechanisms for collaboration.

Within 2 years, establish \( n = 3-5 \) pending available funding) national level climate and health working groups, in countries that have existing projects or plans that can benefit from Climate Services (i.e. expressed interest by the MoH in further development of health actions within UNFCCC NAPAs, NC, the conduct of Vulnerability and Adaptation assessments, or climate informed health emergency preparedness and management plans, or have existing climate adaptation projects)\(^9\). Work plans jointly developed by national health and climate sector actors will respond to nationally identified needs to enhance health activities with climate information, such as climate vulnerability assessments, or establishment of early warning systems. Global and regional level activities will support national actors with technical guidance, networking, and institutional capacity development that can establish structures to later support national actors at a wider scale. New WGs can benefit from guidance and lessons learned through existing WMO supported working groups, with the aim that activities reach beyond research to enhance policy and operations.

Objectives: This activity aims to establish national mechanisms whereby the research and operational sections of the climate sector can interact with health actors, and build capacity in a learning-by-doing approach to the jointly identify, implement and evaluate the use of climate information services in support of and as direct inputs into improved health protection. It will serve as a model and help establish standard tools and references for the expansion of the model in other countries and regions.

Benefits: The capacity of both health and NMS partners will be developed through training, linkages to international and regional experts, and via the structured mechanism for collaboration necessary for health actors to implement climate-informed policy, research, and practice. The capacity of national networks can be further strengthened by bridging national collaborators with each other through the RCOF processes (i.e. national to national working group) as well with regional and international experts.

Activities:
- Hold national workshops to identify partners, needs, and priorities for joint action.
- Establish WG mechanisms.
- Implement national activities, as oriented by existing priorities.
- Develop RCOF activities involving NWGs, to meet National Needs.
- Training.
- Communications tools.
- Development of Operational and Policy Guidance.

Deliverables:
- Guidance on the establishment of National institutional Mechanisms for collaboration between climate and health.
- Linkages made between National Working Groups, in West/East Africa
- Development of applied sessions within RCOFs that cater to sectoral and national service needs.
- Link National WGs to RCOF processes as applied activities.
- Develop capacity for health and climate sector for applied.

\(^9\) WHO has an existing list of countries waiting to start or expand climate and health actions
- National activities to fulfill and implement UNFCCC processes (i.e. NC, NAPAs, V&A assessments) and climate-enhanced national emergency preparedness and management plans.
- Engagement of WHO and health partners at National and Regional levels and hospital preparedness (Latin America and the Caribbean).

**Prerequisites:**
Receive input from WHO and WMO at Global, Regional, and National levels:
- Technical assistance and training from international climate and health partners.
- WHO engagement at national and regional levels to identify and prioritize participating countries.

**Indicators and Assessment measures:**
- National workplans shared.
- National WGs attend RCOFs and benefit from specific activities.
- Health activities held at RCOFs that address the needs of the national groups (emergency preparedness, infectious disease control).
- Guidance documents published.
- Public health preparedness plans routinely use climate information.

**Risks:**
- Sustainability of funding.
- Identification and engagement of international and regional partners to support activities.
- Motivation of local partners.

**Linkages with other projects**
- Existing working groups in Madagascar, Kenya, and Ethiopia have experience in different models of CHWGs albeit with similar objectives and aims.
- WMO efforts to establish new WGs in Mali, Mauretania, Burkina Faso, and Niger.
- WHO supports climate adaptation projects around the world which could all benefit from stronger and active partnerships with NMS, and RCOF services, including: 7 country projects (WHO/UNDP/GEF); (EUR) a German funded project in 7 Eastern European and Central Asia, Europe) countries, (WPR) 16 Pacific Islands developing adaptation plans, etc.
- Existing training networks and collaborating centers with capacity related activities exist in both developed and less-developed country contexts.

**Potential Funders:**
GFCS funds available through fast track funding, additional resources to be identified.

**Stakeholders:**
Key stakeholders in WMO and WHO, at global, regional, and national levels. The primary stakeholders will be the member states represented by the MoH and NMS. Regional climate centers, regional processes such as the RCOF actors, and international partners such as the IRI and local partners.
### Deliverables
- Guidance for institutional mechanisms
- Expanded network of National to Regional expertise
- Engaged WHO partners at National/Regional levels
- Applied sessions within RCOFs for sectoral and national service needs.
- Capacity of national health and climate partners increased and enhancing UNFCCC processes

### Indicators
- Guidance documents published
- National Work plans shared
- National WG attend RCOFs
- Health activities held at RCOFs that address the needs of the national groups (emergency preparedness, infectious disease control)
- Public health preparedness plans routinely use climate information

### Assessment measures (sources of verification)
- Working Groups established with ToR, and work plans shared.
- Report of WGs from RCOFs.
- Measurable improvement in management of additional morbidity and mortality associated with extreme weather events.
- Training Reports

### Partners
- WHO, WMO, National Met Services, Ministries Health, Collaborating academic centers

### Stakeholders
- CD
- Est. National Framework

### Links
- TBD

### Cost
- Minimal risk, if funding available

### Risks

<table>
<thead>
<tr>
<th>Deliverables</th>
<th>Indicators</th>
<th>Assessment measures (sources of verification)</th>
<th>Partners Stakeholders</th>
<th>Links</th>
<th>Cost</th>
<th>Risks</th>
</tr>
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<tbody>
<tr>
<td>Guidance for institutional mechanisms</td>
<td>National Work plans shared</td>
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<td>WHO, WMO, National Met Services, Ministries Health, Collaborating academic centers</td>
<td>CD</td>
<td>TBD</td>
<td>Minimal risk, if funding available</td>
</tr>
<tr>
<td>Expanded network of National to Regional expertise</td>
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<td>Report of WGs from RCOFs.</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Engagement of WHO and partners at National/Regional levels</td>
<td>Guidance documents published</td>
<td>Training Reports</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity of national health and climate partners increased and enhancing UNFCCC processes</td>
<td>Public health preparedness plans routinely use climate information</td>
<td>Publications</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Table 9 Fast-Track Activity Matrix: National Climate & Health Working Groups

### 3.2 IMPLEMENTATION APPROACH

The Health Exemplar will be implemented in three phases spanning 2, 6, and 10 years: Phase I (2013-2015) Phase II (2015-2019), Phase III (2019-2023). Table 10 describes that actions proposed for the first phase focus on addressing identified existing gaps and establishing institutional structures, and will prioritize learning from, strengthening or scaling up existing initiatives at either global (G), regional (R) and national (N) levels.

<table>
<thead>
<tr>
<th>Phase 1 2013-2015</th>
<th>Phase 2 2015-2018</th>
<th>Phase 3 2018-2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>2yr targets &amp; types of activities</td>
<td>5yr targets &amp; types of activities</td>
<td>10yr targets &amp; types of activities</td>
</tr>
</tbody>
</table>

**Organizational and Health Specific**
- Establish institutional mechanisms/joint project office
- Fast Track project for National Working Groups
- Prioritize Health Objectives/Outcomes
- Establish work plans
- Establish Funding Strategy
- Maintenance and improvement of engagement in institutional mechanisms
- Advance Health Objectives/Outcomes
- Maintenance and sustainability of institutional mechanisms
- Advance Health Objectives/Outcomes

**In Relation to UIP**
- Feedback Stocktaking
- Feedback to UIP
- Establish website & communication strategy
- Feedback to UIP
- Feedback to UIP
Outreach: Awareness and partnership building
- Develop first technical guidance

Mainstreaming to Operations:
- Expansion/continuation of existing projects
- New Projects and Processes

M&E:
- Establish M&E
- Monitor and evaluate progress for feedback

### Benchmarks for Health Objectives

<table>
<thead>
<tr>
<th>Communication Partnership</th>
<th>Research</th>
<th>Capacity</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness raising</td>
<td>Research Forum and Roadmap established</td>
<td>Climate and Health Field Schools developed and deployed</td>
<td>Test end-to-end projects</td>
</tr>
<tr>
<td>Web portal maintained</td>
<td>Support for health research occurring</td>
<td>Climate and Health training materials and opportunities expand</td>
<td>Develop and apply best practices</td>
</tr>
<tr>
<td>Web portal maintained</td>
<td>Support for health research occurring</td>
<td>Climate and Health training materials and opportunities available</td>
<td>Continue mainstreaming</td>
</tr>
</tbody>
</table>

**Table 10 Key actions of each phase of implementation**

### 3.3 MANAGEMENT AND LEADERSHIP NEEDS FOR IMPLEMENTATION

Ensuring ownership of the Framework is a fundamental requirement for implementation. The foundation for ownership will be the synergies made with Health governance. Thus the overall Framework must have effective and sector inclusive governance. This will be complemented by Framework actions taken forward within health sector governance to create an effective political, financial, and coordinating environment for the Health Exemplar. WHO, representing the WHO Member States, and the interests of the health community, is best placed to provide stewardship, legitimacy, and leadership for engagement and guidance of health actors to be effective partners in climate services.

In addition, for the Framework and Health Exemplar to successfully attain ownership and relevance to public health, they must deliver on a set of well-established principles of good health governance; including **Leadership, Ethics, Programme Risk Management and Accountability**. To operationalize these principles and achieve ownership the Framework should ensure the following four issues, and proposed steps:

1. **Provide leadership to guide member states and Framework partners to support the Health sector and better protect global public health from climate risks.**
   - Options for including health representation within the highest level of the governing body of the GFCS need to be considered at the First Meeting of the Inter-governmental Board as a matter of priority.
   - Engage individuals with high public and political profile to act as champions for health and climate services at all levels.
   - Establish a Technical Committee for Health for monitoring, oversight, and support.
   - Bring together relevant WHO focal points and technical partners from regions to launch and create leadership at regional and national levels.
   - Attain support from WHO Member States and Regional Committees.
   - Convene and coordinate partners through appropriate mechanisms.
2. **Provide accountability to assure actions and processes within the Framework and implemented by partners comply with commonly agreed ethical principles, including medical ethical values.**

- Draft assessment criteria for GFCS-supported activities to ensure compliance with commonly agreed ethical principles, including medical ethical values.

3. **Ensure operational and financial accountability**

- See specific recommendations under Section 3.7 Reporting Mechanisms.

4. **Create and maintain appropriate mechanisms for coordination and programme risk management.**

- Establish a joint project office between WHO and WMO at the global level, with terms of reference including services to be supplied to health operational programmes at the global level, and facilitation and supporting functions at regional and national level.
- Establish a coordination mechanism between the priority sectors as a function of the UIP at the global level, including health protection as a shared objective.
- Develop and promote institutional capacity-building for accelerated coordination and cooperation at regional and national levels.

### 3.4 GLOBAL LEVEL IMPLEMENTATION

A joint project office for Health and Climate Services established between WHO and WMO in Geneva will serve to coordinate, support and ensure the Framework and the Health Exemplar are endowed with the appropriate resources, political and technical support to achieve its health goals and objectives. Terms of Reference for this joint office are under development.

Activities may be implemented directly by the joint project office, through WHO’s formal mechanisms of collaborating centers, as well as other expert technical partners. WHO will draw upon these networks, including two collaborating centers for Climate and Health, the IRI at Columbia University (USA) and London School of Hygiene and Tropical Medicine (UK). A range of expert partners in academia, government, and non-governmental organizations may share responsibility for developing activities within the Exemplar, in conjunction with WHO and WMO.

### 3.5 REGIONAL LEVEL IMPLEMENTATION

The GFCS and Health Exemplar should be raised to the WHO Regional Offices and Committees for Africa, Americas, Europe, South Asia, Western Pacific, and Mediterranean, with appropriate focal points designated for each. Alignment with regional health priorities should be sought, and regional committees’ progress reports should feed into reporting on GFCS progress in health at the World Health Assembly.

The WHO Regional Offices play a critical and important role in guiding and enabling actions at the National Level. Regional Offices can identify regional needs, leverage regional scale resources, bring together technical support, convene and ensure political engagement of national government partners. It will be essential that the six WHO Regional Offices be active partners within the GFCS, and proposed activities will consult and strengthen the partnership and role of WHO ROs for the GFCS implementation.

### 3.6 NATIONAL LEVEL IMPLEMENTATION

The development and operation at the national level, in relation to health, should engage Ministries of Health, the primary implementing partner for the Health Sector at the National Level. WHO Country Offices and other relevant regional partners, can support the Framework by convening and technically or financially supporting Health Authorities, and other local health partners in implementation.
At the national level focus will be on ensuring access to data and knowledge products, tailoring information to user requirements, building capacity, ensuring effective routine use of information in planning and management along with developing sustainable capacities in these respects. National Climate Centers/NMSs will support the provision of climate services. Climate and Health Working Groups will be encouraged as structure to consider to coordinate partners and implement locally appropriate activities.

3.7 MONITORING AND EVALUATION OF THE IMPLEMENTATION OF ACTIVITIES
See Section 4.3 Review mechanisms, and 3.2 Leadership and management requirements.

3.8 PROGRAMME RISK MANAGEMENT IN THE IMPLEMENTATION OF ACTIVITIES
Two major risks exist for the Health Exemplar implementation. First, if there is not significant and genuine buy in and ownership from the health community, then partnerships and actions to apply climate services to health will remain marginal and climate services will not become a standard and mainstreamed application for the health sector. If the necessary and sufficient conditions for implementation, and suggested management and leadership needs are not fulfilled – ownership and partnership from the health sector will be hindered. In addition, if advocacy and communication fail to improve understanding and buy-in, and meet the pre-requisite conditions for health engagement in the Framework, buy-in can be expected to be limited.

Secondly, without mobilizing and sustaining financial resources at global, regional, and national levels engagement of the health sector and implementation will not be possible. The Framework Secretariat and the WHO-WMO joint project office will need to actively raise and sustain funding for partners and secretariat level operations. Actions proposed in Operations, as well as rigorous M&E can demonstrate achievements to mainstream climate services as an essential health service, and thus leverage resources for climate informed health delivery, emergency management, and disease control.
4 ENABLING MECHANISMS

Health exemplar success can be improved by building synergies with existing activities, strengthening partnerships, and effective review, communication and resource mobilization. Investment in these mechanisms can ensure the necessary conditions are met and sustained, and health sector priorities needs for climate services are met.

4.1 SYNERGIES WITH EXISTING ACTIVITIES

Synergy with existing health agendas and operations is not only an enabling mechanism, but necessary conditions for Health Exemplar implementation. Notably, condition No. 2 (actions are directly relevant, and in support of existing health mandates, agendas, and goals); and No. 3 (most direct possible link to the operational, policy and technical support mechanisms of the health sector).

To ensure immediate progress and results, the UIP can benefit by learning from and expanding upon existing activities at global, regional, and national scales. Existing Initiatives and Partnerships are described in Section 1.4. Some models developed in Europe and North America could be translated to developing country contexts. Annex 7 outlines existing partnerships, institutions, projects, and mechanisms that serve as initial points of engagement for the Health Exemplar. Almost all partners, even those based in OECD countries, either operate internationally or may serve as a resource base for capacity-building, technical transfer, and collaboration with developing country partners.

4.2 BUILDING LOCAL, NATIONAL, REGIONAL AND GLOBAL PARTNERSHIPS

The strength of future partnerships will depend upon multiple factors including the political support for the Framework by government and health partners, the flexibility to advertise successful experience to encourage engagement, the ability to secure adequate financing, the effective establishment of a functional and communicative secretariat. The UIP must offer concrete incentives, opportunities and advantages for partners to engage.

4.3 REVIEW MECHANISMS

A provisional project oversight board has been created to monitor framework implementation. It is recommended this structure is made permanent, along with a health technical committee. A health technical committee is needed to monitor operational and financial accountability of the Health Exemplar; and in order inform leadership, donors, and partners of changes, needs, and opportunities.

Long-term success of the overall Framework will be assessed in terms of improved climate-informed health decision-making that results in lives saved, climate-smart health investments, and health outcomes and human well-being protected from climate hazards across the globe. In the shorter-term, Framework success will be shown through metrics that capture the adequate access, and appropriate application of climate information to health decisions. Accountability of the Health Exemplar should include:

- Adopting financial reporting and auditing processes that comply with the standard criteria of WMO and/or WHO.
- Establish a results-based monitoring and evaluation framework for the Health Exemplar to capture how health decision-making has improved with the availability and use of CS. It should connect Framework action with health metrics, such as lives saved, or population coverage with proven interventions within defined timeframes. Climate and health mechanisms, such as the Regional Climate Outlook forums and the Malaria Outlook forum, should be assessed against performance criteria established with operational health programmes.
- Establish monitoring and evaluation standards for existing and new interventions, and develop indicators, particularly related to economic costs and benefits.
Integrate reporting on delivery of the GFCS into the existing governance mechanisms for meteorological agencies, and health agencies, including the World Health Assembly, and equivalent bodies at the regional and national level.

4.4 COMMUNICATION STRATEGY

The UIP in its functions for dialogue and outreach will establish an overall communication plan, and provide key messages and resources for communicating the Framework. To raise awareness and communicate the benefits and successes of GFCS, as well as receive feedback, the Health Exemplar plans to raise awareness with the health community, including during the following key health policy fora.

Meetings at international-level relevant to Health and Climate:

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
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<tbody>
<tr>
<td>11-22 November 2013</td>
<td>UNFCCC COP 19</td>
</tr>
<tr>
<td>May 2013, Geneva</td>
<td>Global Platform for Disaster Risk Reduction</td>
</tr>
</tbody>
</table>

WHO, Global and regional-level meetings - 2013:

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>29-30 May Geneva</td>
<td>Executive Board: 133rd session</td>
</tr>
<tr>
<td>20-28 May Geneva</td>
<td>Sixty-sixth World Health Assembly</td>
</tr>
<tr>
<td>28-29 May Geneva</td>
<td>Executive Board: 132nd session</td>
</tr>
<tr>
<td>2–6 September</td>
<td>Regional Committee for Africa: 63rd session</td>
</tr>
<tr>
<td>11–13 September 2013</td>
<td>Regional Committee for South-East Asia: 66th session</td>
</tr>
<tr>
<td>16-19 September: Portugal</td>
<td>Regional Committee for Europe: 63rd session</td>
</tr>
<tr>
<td>30 September – 4 October: USA</td>
<td>Regional Committee for the Americas: 65th session</td>
</tr>
<tr>
<td>21-25 September: Philippines</td>
<td>Regional Committee for the Western Pacific: 64th session</td>
</tr>
<tr>
<td>26-30 October: Tunisia</td>
<td>Regional Committee for the Eastern Mediterranean: 60th session</td>
</tr>
</tbody>
</table>
5 RESOURCE MOBILIZATION

The success of the Health Exemplar will be a function of the effectiveness of leveraging existing and new resources and partnerships. As expressed in the Framework’s IP, “the bulk of implementation resources for the Framework will come from the routine contribution of services and the participation of experts supported by governments and stakeholder organizations as part of their on-going mandates and programmes. The tasks of implementing the Framework in the developing world will require support from development agencies and banks, particularly for the new initiatives proposed, and should also be supported by the country programmes of the United Nations System.” Framework leadership should facilitate cross-sectoral discussion at the funding source, particularly with Development Banks and key donor countries to make resources holistically available to all priority sectors.

5.1 NATIONAL LEVEL

At the national level, Governments may mobilize funding from multilateral development banks and development assistance agencies for health activities by aligning them with their Country Cooperation Agreements with WHO, United Nations Development Assistance Framework (UNDAF) documents and Poverty Reduction Strategy Papers (PRSP). Mobilizing funding for the Framework’s priority activities will require that governments reallocate funds; thus these must readily fit within and complement existing plans and programmes for health system development and priority public health concerns. Ministries of Health should be encouraged to benefit from capacity developed through the Framework’s other funded activities. In the slightly longer term, Ministries of Health and other government agencies should be encouraged to include the activities proposed here in their strategic planning to mainstream climate services as a public health service for consideration by international development agencies and banks.

5.2 REGIONAL AND GLOBAL LEVELS

At regional and global levels development agencies and banks should be encouraged to facilitate resources for activities that can be embedded in existing country and regional health programming, adding value to existing portfolios and national health policies. Partner agencies should be encouraged to combine resources and jointly fundraise. It would be particularly helpful for organizations to assist governments in navigating international funding procedures for development, environment, climate change adaptation, humanitarian assistance and DRR.

Resource mobilization for the Framework’s six-year and ten-year timeframes should begin as soon as possible and in tandem with the implementation of priority activities. Activities in the longer term will ideally become integrated components of system-wide coordinated programming by UN agencies and major nongovernmental organizations.

6 COSTED SUMMARY OF ACTIVITIES/PROJECTS

To be determined based on final establishment of workplans.
ANNEX 1 REFERENCES


## ANNEX 2 ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACMAD</td>
<td>African Centre of Meteorological Applications for Development</td>
</tr>
<tr>
<td>ACPC</td>
<td>Africa Climate Policy Centre</td>
</tr>
<tr>
<td>AFRO</td>
<td>WHO Africa Regional Office</td>
</tr>
<tr>
<td>AfDB</td>
<td>African Development Bank</td>
</tr>
<tr>
<td>AUC</td>
<td>The African Union Commission</td>
</tr>
<tr>
<td>CHWG</td>
<td>Climate and Health Working Group</td>
</tr>
<tr>
<td>Clim-Dev</td>
<td>Climate for Development Programme for Africa</td>
</tr>
<tr>
<td>CRM</td>
<td>Climate Risk Management</td>
</tr>
<tr>
<td>CSF</td>
<td>Climate Services Framework</td>
</tr>
<tr>
<td>CSIS</td>
<td>Climate Services Information System</td>
</tr>
<tr>
<td>DNP</td>
<td>Department of National Planning</td>
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<tr>
<td>EWS</td>
<td>Early Warning Systems</td>
</tr>
<tr>
<td>FEWSNET</td>
<td>Famine Early Warning System Network</td>
</tr>
<tr>
<td>GCOS</td>
<td>Global Climate Observing System</td>
</tr>
<tr>
<td>GMP</td>
<td>WHO Global Malaria Programme</td>
</tr>
<tr>
<td>HCF</td>
<td>Health and Climate Foundation</td>
</tr>
<tr>
<td>IFRC</td>
<td>International Federation of the Red Cross Red Crescent</td>
</tr>
<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
</tr>
<tr>
<td>IRI</td>
<td>International Research Institute for Climate and Society</td>
</tr>
<tr>
<td>LDC</td>
<td>Least Developed Country</td>
</tr>
<tr>
<td>MALOF</td>
<td>Malaria Outlook Forum</td>
</tr>
<tr>
<td>MDG</td>
<td>Millennium Development Goals</td>
</tr>
<tr>
<td>MEWS</td>
<td>Malaria Early Warning System</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>MERIT</td>
<td>Meningitis Environmental Risk Information Technologies</td>
</tr>
<tr>
<td>NMHS</td>
<td>National Meteorological and Hydrological Service</td>
</tr>
<tr>
<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
</tr>
<tr>
<td>OBS</td>
<td>Observation and Monitoring</td>
</tr>
<tr>
<td>PPP</td>
<td>Public-Private Partnerships</td>
</tr>
<tr>
<td>PHE</td>
<td>WHO Department of Public Health and Environment</td>
</tr>
<tr>
<td>RBM</td>
<td>Roll Back Malaria Programme</td>
</tr>
<tr>
<td>RES</td>
<td>Research, Modelling, and Prediction</td>
</tr>
<tr>
<td>SAMC</td>
<td>East and Southern Africa Malaria Control</td>
</tr>
<tr>
<td>SDS WAS</td>
<td>Sand and Dust Storm Warning Advisory and Assessment System</td>
</tr>
<tr>
<td>UIP</td>
<td>User Interface Platform</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
</tr>
<tr>
<td>UNECA</td>
<td>United Nations Economic Commission for Africa</td>
</tr>
<tr>
<td>UNEP</td>
<td>United Nations Environmental Programme</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children's Fund</td>
</tr>
<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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<td>WCC-3</td>
<td>World Climate Conference-3</td>
</tr>
<tr>
<td>VIGIRISC</td>
<td>African Early Warning and Advisory Climate Services</td>
</tr>
<tr>
<td>WHA</td>
<td>World Health Assembly</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>WMO</td>
<td>World Meteorological Organization</td>
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</tbody>
</table>
ANNEX 3  EXAMPLES OF HEALTH APPLICATION FOR CLIMATE PRODUCTS

1. Long range climate data (decades in the future)

Long-range climate information such as global climate models and climate scenarios anticipate how the conditions of the climate will be decades into the future and is critical for climate adaptation in the health sector. These climate products can provide key information for research, long-range policy, planning, and investment decisions.

2. Mid-term climate information (Multi-year and Annual forecasts)

Climate information which reflects conditions on an annual or multi-year timescale can be useful, such as the status of El Niño as well as inter-annual forecasts can be useful in the following ways:

- Risk assessment (and creation of emergency risk profiles) incorporating meteorological, hydrological and climate information, which will determine capacity and investment needs.
- Climate information related to food security forecasts (good and poor rains for agriculture, drought).
- Historical and projected climate information informs policy on climate change adaptation (such as siting and standards of health infrastructure).
- Historical and projected climate data informs spatial distribution of health risks and burdens (e.g. climate suitability maps for infectious disease transmission, including epidemics).
- Informs WHO research and advocacy on disaster risk management and climate change (through country and regional risk assessments, e.g. E-Atlas).

3. Short-term climate information (seasonal and intra-seasonal forecasts/outlooks)\(^\text{10}\):

Short-term climate information has a broad range of applications, including:

- Adaptation of WHO/national response plans based on seasonal information (such as El Niño/La Niña).
- Development of national/community/health facility response plans for climate-related hazards, including wildfire, flood, storms, landslides, infectious diseases, water shortages, cold weather, heat stress, chemical and radiological hazards and other potential sources of risk, including food security, mass gatherings, population displacement and infrastructure failure.
- WHO contributes to health information to the UN Early Warning Early Action Reports which are distributed to Regional and Country Offices.
- Forecasts also required to emergency response and post-disaster recovery concerning the weather conditions to be expected and impact on public health (e.g. cold weather relates to clothing and shelter, surface water for vectors carrying disease).
- Seasonal information is required for risk assessment and early warning of diseases with epidemic potential (e.g. water-borne diarrhoeal diseases, meningitis, malaria, dengue).
- Pesticide acquisition and timing of application are crucial in reducing vector-borne diseases such as malaria and dengue fever.

\(^{10}\) Climate information for seasonal and intra-seasonal forecasts provides information on climatic conditions in the range of 3-12 months, such as maximum and minimum conditions (rain, wind velocity, etc.), seasonal trends, and intra-seasonal forecasts. (Inter-seasonal outlooks and temperatures, seasonal trends, inter-seasonal rainfall forecasts, monthly and seasonal rainfall forecasts, and risk indices of cyclones, floods, dust storms, wind storms, extreme temperatures, and the fire, status of El Niño conditions.)
• Adequately prepare local health services with human, financial, and material resources according to hazard level which may occur seasonally.

4. **Weather information (days to weeks in the future)**

Weather information on a daily to decadal basis, temperature, precipitation, humidity, can be useful for preparedness and response to climate variability. Weather statistics, real-time monitoring, historic time series, and summary statistics provide information that impacts daily decisions or alerts. Examples include:

• Warning systems for weather events, including storms, floods, heatwaves, extreme cold, and associated health risks, such as infectious disease epidemics.

• Operational information on weather conditions for on-going risk to populations and responders (e.g. temperature, rainfall, wind for plume modelling related to smoke, water and air pollutants from chemical spills, radiological emergencies, fires, volcanoes).

• Operational information on the effect of hydrometeorological factors on humanitarian response operations such as logistics, access to affected populations, siting of health facilities, potable water and latrines.

• Weather information required for the safety management of people attending mass gatherings (e.g. heat, cold, rain).

• Impact water management by providing resource managers with information prevent water depletion through rationing or change of use policies.

• The placement of emergency personnel and health responders are dependent upon these short-term warnings and watches.
ANNEX 4 HEALTH IMPACTS OF CLIMATIC VARIABILITY AND CHANGE

Direct effects of climate conditions on health
- Direct impact of thermal stress from heat and cold events
- Direct injury, drowning, bites during flooding & storm events
- Exposure to UV radiation via slowed ozone hole recovery and changes in cloud distribution due to climate change

Effects of climate conditions on environmental determinants of health
- Temperature and rainfall effects on air pollution and aeroallergen levels
- Temperature effects on food-borne diseases
- Temperature effects on water-borne diseases
- Temperature, humidity, wind and dust effects on disease transmission (i.e. meningitis)
- Effects of extreme rainfall and sea-level rise on flooding
- Risk of malnutrition via changing patterns of agricultural yield and food safety and risk from water quality impacts of increased fertilization to improve productivity
- Risk of micronutrient deficiencies via loss in dietary diversity
- Risk of malnutrition via drought and flooding, pests, diseases, biodiversity loss, economic disruption
- Risk of protein malnutrition via loss of livestock and availability of marine/riverine protein sources
- Increased morbidity and mortality from childhood illnesses in malnourished children and HIV/AIDS affected populations
- Temperature, rainfall, humidity, dust effects on vector borne diseases (malaria, dengue, leishmaniasis, filariasis, schistosomiasis, trypanosomiasis, rift valley fever, kalaazar, chickungunya, plague, etc.)
- Effect of flooding and drought on food and waterborne diseases (e.g., Leptospirosis)
- Risk of dermatological and eye infections (via reduced hygiene practices) related to water scarcity/ reduced access
- Risk of diarrhoeal and respiratory infections (via reduced hygiene practices) related to water scarcity/reduced access
- Risk of eye infections and respiratory diseases related to high atmospheric aerosol/dust concentrations
- Dust storms effects on meningitis epidemics
- Emergence or spread of pathogens via climate change driven biodiversity loss / changes in ecosystem habitats (changing expanse of ecological niches)
- Temperature and precipitation effects on incidence and intensity of forest fires
- Temperature and precipitation effects on dust storms.
- Sea surface temperature increases affecting marine food product availability and safety
- Sea surface temperature increases affecting intensity of hurricanes
- Sea surface temperature increases affecting sea chlorophyll concentrations and triggering harmful algae blooms (impacts on fishing)
- Impact of UV radiation on skin cancer
- Sea-level rise and reduced snowmelt impacts on freshwater availability
- Biodiversity loss reducing availability of traditional medicine species

Effects of climate conditions on socio-economic determinants of health
- Reduced healthcare access and increased economic burden on health systems via damage and destruction of hospitals and other health infrastructure in floods and storms
- Reduced healthcare access via reduced household income available via impacts of extreme events and livelihood stress
- Reduced healthcare and drug access (particularly ARV and DOTS therapies) due to migration and displacement following extreme events as well as reduced long term habitability (environmental refugees)
• Reduced availability of appropriate pharmaceuticals via stock depletion during extreme events
• Reduced availability of appropriate health staff for preventative health care via staff reallocation to health crisis response
• Risk of malnutrition and diseases via changing policies in food trade and safety regulation
• Urban migration & temporary displacement via seasonal flooding/water stress or extreme events
• Social support networks weakened via economic migration following economic and agricultural livelihood losses.
• Increases in health risks via loss of shelter and livelihoods following extreme events
• Risk of increased mental health concerns via experience of extreme events, family and livelihood loss.
ANNEX 5 EXISTING HEALTH POLICY AND RESEARCH MECHANISMS RELEVANT TO GFCS

Global Level Health Policy Mechanisms Relevant to GFCS

GFCS engagement and support for health sector policy mechanisms and goals will be essential. Relevant health policy mechanisms established by the governing body of WHO, the World Health Assembly (WHA), or International UN processes include: the International Health Regulations (IHRs), WHA resolutions, Post-MDG Sustainable Development Goals (SDG) Millennium Development Goals (MDGs), the Hyogo Framework for Action and the associated thematic platform on disaster risk management for health, the UNFCCC mechanisms addressing health including the Nairobi Work Programme and National Adaptation Programmes of Action, among others. Although these global policy agendas represent generalized development priorities, it should be noted at the national level, health sector strategies and plans developed by national health authorities set forth the national health priorities will drive activities and policies, and may only partially reflect these global themes. Important existing health policy mandates and agendas to link to and support include:

International Health Regulations

The International Health Regulation (IHR 2005) are legally binding international health guidance for Member States, adopted in revised form by 194 countries at the World Health Assembly in 2005, to enhance national, regional and global public health security (World Health Assembly. 2008). The IHR provide a new framework for the coordinated management of all significant public health events; including those that may constitute a public health emergency of international concern. Amongst its purposes the IHR aims to improve the capacity of all countries to detect, assess, notify and respond to public health events.

All 194 Member States are required to build on eight core capacity areas (National legislation, policy, and financing, Coordination/National Focal Point (NFP) communications; Surveillance; Response; Preparedness; Risk Communication; Human Resources; Laboratory) to meet minimum standards in these areas. Although supportive of all-hazard risk management the IHRs particularly focus on detection and control of communicable infectious diseases with potential trans-national spread, and require a coordinated international response for control. These core capacities are to be assessed, monitored and reported by Member States. WHO has IHR Contact points in all six Regional Offices to liaise with WHO Country Offices or Member States and coordinate activities between national authorities, WHO, and international partners.

In addition to capacity-building, capacity monitoring and compliance, IHR implementation, WHO is also responsible for global public health event management and coordination. In all of these roles under the IHR there are multiple areas of work that can be enhanced by access to, and use of climate information11.

Primary Existing Health Policy and Mechanisms for Health and Climate

WHA Resolution on Climate & Health (WHA Resolution 61.19)

A political mandate recognized by health authorities worldwide, is the World Health Assembly resolution 61.19 on Climate and Health (WHO 2008a). This resolution established a four pillar action plan to address climate change in the areas of advocacy and awareness, research, coordination amongst UN agencies and partners, and strengthening health systems (WHO 2008b). Pillar four promotes six areas of intervention to strengthen health systems; namely to address the needs to: (1) assess and monitor vulnerability to climate change-related health risks; (2) strengthen primary health care (including primary prevention) services to support capacity of local communities to become resilient to climate-related health risks; (3) strengthen and finance public health systems at the national level; (4) prepare, implement and evaluate regional and national mitigation and adaptation plans; (5) develop early warning systems related to the health

11 Source: www.who.int/ihr/Processes_of_IHR_Monitoring_Framework_and_Indicators.pdf
consequences of climate variability and climate change; and (6) assess the effectiveness of health emergency management measures in reducing the impact of extreme events on health.

Regional workplans have been developed and endorsed by representative Ministries of Health who comprise the WHO Regional Committees for Africa, Americas, Europe, South Asia Western Pacific, and Mediterranean Region\(^\text{12}\). Each of these priority areas of intervention can benefit from effective collaboration with climate services.

**Existing Health Engagement in UNFCCC**

Ministries of Health have expressed extensive needs, including the improved access and use of climate information, to be able to fully engage in UNFCCC processes. Ministries of health need climate service collaboration to conduct critical initial steps such climate impact assessments to inform National Communications and sectoral plans and strategies which consider climate influences; and to improve performance of Health Surveillance, and Early Warning Systems. These activities which aim to consider climate influences, necessarily require collaborative agreements and work along side both National Meteorological and Climate Services. The IPCC (SREX) Report on Extreme Events, 2011 also highlights the risks and need of the health sector.

**Existing Agendas for Climate and Health Research**

An increasingly large community of interdisciplinary research on climate and health has evolved in the last decade. WHO has two formal collaborating centres for climate and health research at the IRI-Columbia University (USA) and the London School of Tropical Medicine and Hygiene (UK) who conduct global scale, and national level research in developing countries. Amongst many research initiatives the EU funded Health Futures Alliance, and Canadian International Development Research Centre specifically work to bridge North and South research communities.

Important for the Health Exemplar, multiple existing research agendas on climate and health have been defined by experts, at global, regional and sometimes national scales. These agendas described below outline current research needs and priorities which can be supported by the Framework to strengthen the understanding of the influence of climate on human health:

- **WHO Applied Research Agenda for Climate and Health (WHO 2009a)**
- **IPCC**
- **US-NIEHS US Interagency working group on Climate and Health**
- **WHO-TDR TDR Research Agenda for Tropical and Neglected Diseases, ESSP/GCCH (2007)**,
- **ECDC-WHO/EURO**
- **WHO-South Asia Research Priorities for Climate and Health**

**Primary Existing Health Policy and Mechanisms for Climate-Related Emergencies**

**Hyogo Framework for Action**

The Hyogo Framework for Action 2005-2015 (HFA), adopted at the World Conference on Disaster Reduction in January 2005 in specific relation to health, established the following priority to measure the commitment to and success of national emergency risk reduction programmes: (a) Integrate disaster risk reduction planning into the health sector; and (b) promote the goal of “hospitals safe from disasters” by ensuring that all new hospitals are built with a level of resilience that strengthens their capacity to remain functional in disaster situations and implement mitigation

\(^{12}\)Regional Work plans can be found: [http://www.who.int/globalchange/health_policy/env/index.html](http://www.who.int/globalchange/health_policy/env/index.html)
measures to reinforce existing health facilities" (UNISDR 2005). A suite of initiatives exist worldwide to fulfil this mandate and can directly benefit from the use of climate services.

A thematic platform on Disaster Risk Management for Health established by WHO in collaboration with the ISDR system, aims to build a multi-disciplinary and multi-sectoral community to implement the Hyogo Framework for Action through the health sector, and advocate, share information and catalyse action on risk reduction for health. Actions include sharing of national policies and strategies and good practice for health risk reduction, advocacy to raise awareness of the health imperative for risk reduction and a greater investment in the health sector, forums for building partnerships and a health risk reduction community across sectors and disciplines, and coordination of health sector inputs to the implementation of the Hyogo Framework for Action, and ISDR systems reports and forums, such as the Global Platform for Disaster Risk Reduction.

**WHA Resolution: Strengthening National Health Emergency and Disaster Management Capacities and Resilience of Health Systems** (Resolution 64.10)

The World Health Assembly adopted WHA Resolution 64.10 in May 2011 on "Strengthening national health emergency and disaster management capacities and the resilience of health systems". This Resolution addresses the significant risks to public health, health infrastructure and health systems from the risks of natural, biological, technological and societal hazards, including climate and weather events. WHA 64.10 urges Member States to develop capacities to assess risks, proactively reduce risks, prepare for, respond to, and recover from, emergencies, disasters and other crises through: (1) strengthening all-hazards, health-emergency, and disaster risk-management programmes as part of national health systems to improve health outcomes, protect investment in health infrastructure, and strengthen the resilience of the health system and society at large; (2) integrating all-hazards, health emergency, and disaster risk-management programmes into national health plans and institutionalizing capacities for coordinated health and multi-sectoral action; (3) developing safe hospitals programmes to ensure the safety and preparedness of existing and new hospitals to withstand local hazards and provide health response to emergencies; (4) promoting regional and sub-regional collaboration for capacity development, as well as for risk reduction, response and recovery; and (5) strengthening the role of the local health workforce in the health-emergency management system to provide local leadership and health services, through enhanced planning, training, and access to other resources. It also calls on donors and development cooperation partners to allocate sufficient resources for health-emergency and disaster risk-management programmes, and to support for the World Health Organisation’s role in these matters. It requests that the WHO Secretariat, through the Director General, to provide the necessary technical guidance and support to Member States and partners for developing health emergency and disaster risk management programmes at national and local levels; to strengthen collaboration with relevant entities, including public, private, nongovernmental and academia; to strengthen the evidence base for health-emergency and disaster risk-management programmes, including operational research and economic assessment; and to support national assessment of risks and capacities for health-emergency and disaster risk-management, as a basis for catalysing action and strengthening national health-emergency and disaster risk-management capacities.

Regional Committees have also passed Resolutions on health emergency and disaster risk management, including Safe Hospitals. The implementation of these Resolutions, and the actions of Member States, supported by WHO and partners, will benefit from stronger collaboration between health and climate sectors.

**Other Mechanisms for Climate-Sensitive Health Issues**

Health and disease control policy exists at global, regional and local levels responding to existing burdens of disease and population vulnerability to additional risks (i.e. transmission of disease, or exposure to climate related hazards). These strategies often guide local health decision-making and resource allocation for the management of risks to communicable and non-communicable diseases, emergency risk management and humanitarian action, climate adaptation, environmental health and air quality, water and sanitation quality, etc. Given many of these health
outcomes are sensitive to climatic conditions, their performance and planning can be improved with climate services.

**MDGs**  
The MDGs are a set of eight goals to address core issues of human development and poverty eradication, endorsed by 189 UN Member States at the UN General Assembly in 2000, under the UN Millennium Declaration (UN, 2000). Whilst the improvement in each and every development Goal will have consequent positive effects on human health, three of the eight MDGs are directly related to health (reducing child mortality, improving maternal health, and combating HIV/AIDS, malaria, and other diseases). The other goals refer to critical social and environmental determinants of good health, such as poverty, education, adequate food, and water. Almost all of the MDGs are sensitive to the direct or indirect impacts of climate variability and change (Abeygunawardena 2002), and the management of these development priorities can subsequently benefit from climate services.

**Post 2015 Sustainable Development Goals**  
A new set of Development Goals will be developed in 2012-2015 as a follow-on from the MDGs. These will inform norms for green economic policy, energy and water use, disaster management, oceans, transport, housing, and species preservation.

**Primary Existing Health Policy and Mechanisms for Water and Sanitation**  
Policies and actions to protect health from water related hazards are high priorities for the global health community, the WHO, and national governments. Four important global policies guide global action on Sanitation and Drinking Water for health. These include.

1) **MDG Goal 7** (Ensure environmental sustainability)/Target C calls for halving the proportion of 1990 population without sustainable access to safe drinking water and basic sanitation by 2015. This target for the part of water was achieved in 2010. Achievement of MDG7c is interlinked to the achievement of other Goals, particularly Goals 1 (poverty), 4 (Reduce child mortality), 5 (Improve maternal health) and 6 (Combat HIV/AIDS, malaria and other diseases)\(^\text{13}\).  

2) **WHA Resolution 64.24 (2011) on Drinking water, Sanitation and Health** (WHO 2011, 64). This resolution urges Member States to highlight the importance of safe drinking-water, sanitation and hygiene as the basis for primary prevention in national public health strategies and to ensure that these strategies contribute to the achievement of the water- and sanitation-related MDG target and to the progressive realization of the human right to water and sanitation.

3) **WHA Resolution 64/15 on Cholera: mechanism for control and prevention**. This Resolution highlights the key role of access to clean water and adequate sanitation in cholera prevention, and revitalization of the Global Task Force on Cholera Control.

4) **UN General Assembly Resolution64/292**. The human right to water and sanitation. (UN General Assembly 2010)

5) **UN Human Rights Council Resolution 7/22**. Human rights and access to safe drinking water and sanitation (UNHRC, 2010)

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\(^{13}\)The WHO, during 2012 will develop an actionable work plan to outline the steps and the get the outputs ready for submission at 2013 UN General Assembly where post-MDG discussion will take place for the first time. At the National Level, the achievement of national goals to progressively realize these Human rights and Sustainable Development agendas, can likely benefit from increased engagement with climate services.
ANNEX 6 CATEGORIES OF HEALTH ACTORS

A primary distinction is that the “health sector” is comprised of actors that engage in health policy, practice, and research, although all three have significant and tight inter-linkages. Secondary distinctions will draw the lines between health policy and health systems, and the services delivered for the provision of health care, public health, medical emergency management, policy and management. Medical and health research can be a domain of its own, or applied to both operational and policy domains. The collective functions of this broad nexus of health sector partners, range from the provision of health services at a community or national level, to agencies involved in risk communication, research, policy and law making, or teaching and education. These actors respond to the full range of health needs from chronic and infectious diseases to emergency event management, and thus have diverse decision needs, over immediate, short, mid-term and long-term time horizons, which can be informed by climate information. These actors may operate at global, national, sub-national, and local levels, with active linkages between levels. Table 11 describes categories of actors, along with primary decision areas. The following section describes illustrative associated mechanisms.

<table>
<thead>
<tr>
<th>Categories of Health Actors</th>
<th>Example</th>
<th>Primary Decision areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) National &amp; Local Governments</td>
<td>Ministries of Health (MoH), Departments of Health, other Ministries and government agencies which jointly protect health, such as Agriculture, Livestock, water, etc.</td>
<td>Policy. Resource Allocation. Operations.</td>
</tr>
<tr>
<td>3) Public health service providers (gov’t/private/NGO)</td>
<td>Regional or district level health managers, disease control program staff, urban planners</td>
<td>Operations. Policy.</td>
</tr>
<tr>
<td>4) Health care providers</td>
<td>Clinicians, pharmacies, hospital personnel</td>
<td>Operations.</td>
</tr>
<tr>
<td>5) Health emergency managers humanitarian actors, early warning providers, emergency planners, emergency response and recovery agencies, service providers</td>
<td>Emergency managers, hospitals emergency departments, international humanitarian agencies. Managers, logistic, community health workers, pharmaceutical and commodity managers. (NGOs, CBOs), local authorities (emergency medical services, fire and rescue)</td>
<td>Planning. Operations.</td>
</tr>
<tr>
<td>7) Media and telecommunications, and communication services:</td>
<td>TV, newspaper, radio journalists, telecommunication companies</td>
<td>Inform communities of risks, PSAs, and advisories.</td>
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<tr>
<td>8) Training &amp; Education</td>
<td>Universities, institutes, primary and secondary schools</td>
<td>Training and Capacity-building</td>
</tr>
<tr>
<td>9) Communities</td>
<td>CBOs, community health workers, health care providers</td>
<td>Response. Risk identification.</td>
</tr>
</tbody>
</table>

Table 11 Categories of Health Sector actors that use Climate Information
ANNEX 7 EXISTING AND POTENTIAL PARTNERS AND MECHANISMS
This annex is provided to support the Health Exemplar implementing teams and partners to identify relevant stakeholders and partners that should be engaged and targeted for communications that can build strong networks and enhance implementation and partnerships.

Potential Partners at Global, Regional National Levels

<table>
<thead>
<tr>
<th>WMO constituent bodies and co-sponsored programmes</th>
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</thead>
<tbody>
<tr>
<td>• World Climate Research Programme WCRP</td>
</tr>
<tr>
<td>• International Council for Science ICSU</td>
</tr>
<tr>
<td>• Regional Climate Centers/ Regional Climate Outlook Forums RCOF</td>
</tr>
<tr>
<td>• Sand and Dust Storm Warning Advisory and Assessment System SDS-WAS</td>
</tr>
<tr>
<td>• ACMAD – Climate and Health Service</td>
</tr>
<tr>
<td>• ICPAC – Climate and Health Service</td>
</tr>
<tr>
<td>• USGCRP- Interagency Crosscutting Group on Climate Change and Human Health CCHHG</td>
</tr>
<tr>
<td>• Group on Earth Observations GEO Health &amp; Environment Community of Practice COP</td>
</tr>
<tr>
<td>• Earth System Science Partnership ESSP Project: Global Environmental Change and Human health GECHH</td>
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</tbody>
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<table>
<thead>
<tr>
<th>National Meteorological and National Hydrological Services Climate &amp; Health Working Groups:</th>
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</thead>
<tbody>
<tr>
<td>• Kenya, Madagascar, Mauritania, Ethiopia</td>
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</table>

<table>
<thead>
<tr>
<th>World Health Organization and Global Health Partners and co-sponsored programmes</th>
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</thead>
<tbody>
<tr>
<td>• WHO Regional Offices and Committees for Africa, Americas, Europe, South Asia, Western Pacific, and Mediterranean</td>
</tr>
<tr>
<td>• World Health Assembly</td>
</tr>
<tr>
<td>• Ministries of Health</td>
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<tr>
<td>• WHO/PAHO Collaborating Center for Climate Sensitive Diseases – IRI at Columbia University</td>
</tr>
<tr>
<td>• WHO Collaborating Center for Climate and Global Health – London School of Tropical Medicine and Hygiene</td>
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<tr>
<td>• Research and Training in Tropical Disease (TDR)</td>
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<tr>
<td>• Global Outbreak and Response Network (GOARN)</td>
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<tr>
<td>• Global Health Cluster (GHC)</td>
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<tr>
<td>• International Health Regulations (IHRs)</td>
</tr>
<tr>
<td>• Global Platform for Disaster Risk Reduction for Health</td>
</tr>
<tr>
<td>• Safe Hospital Partnership</td>
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<tr>
<td>• Healthy and Resilient Communities Alliance</td>
</tr>
<tr>
<td>• Water and Sanitation (WASH) partnership</td>
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<tr>
<td>• Global Malaria Program</td>
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<tr>
<td>• Roll Back Malaria Partnership</td>
</tr>
<tr>
<td>• Malaria Outlook Forum MALOF (Africa)</td>
</tr>
<tr>
<td>• Meningitis Environmental Risk Information Technologies (MERIT)</td>
</tr>
<tr>
<td>• Famine Early Warning System Network FEWS – Net</td>
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</table>

<table>
<thead>
<tr>
<th>Other UN agencies and programmes</th>
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<tbody>
<tr>
<td>UNCT - United Nations Country Teams</td>
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<tr>
<td>UNDAF – UN Development Assistance Frameworks</td>
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<td>UNEP</td>
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<tr>
<td>PROVIA</td>
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<tr>
<td>UNDP</td>
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<tr>
<td>UNITAR UNICEF</td>
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<td>UN.CCLEARN</td>
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<td>UNESCO</td>
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<tr>
<td>UN-Water</td>
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<tr>
<td>ISDR</td>
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<tr>
<td>UNFCCC UN Framework Convention on Climate Change</td>
</tr>
<tr>
<td>- Cancun Adaptation Framework, National Adaptation Plans of Action, National Communications, Nairobi work Programme</td>
</tr>
<tr>
<td>WFP - HEWS NET Humanitarian Early Warning System</td>
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<td>FAO</td>
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<tr>
<th>Governmental Agencies</th>
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<tbody>
<tr>
<td>Ministries of Health</td>
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<tr>
<td>Departments of Health</td>
</tr>
<tr>
<td>Livestock and Animal Health Agencies</td>
</tr>
<tr>
<td>Urban Planning</td>
</tr>
<tr>
<td>National, Subnational, and Local Government Programmes</td>
</tr>
<tr>
<td>US - NOAA, NASA, CDC, NIEHS USAID (US), AEMET, UK-MET</td>
</tr>
</tbody>
</table>
Bi-Lateral Donors: DFID (UK), SDC (Switzerland), DANIDA (Denmark), USAID (USA) JICA (Japan) Norway.

Other Inter-governmental Organizations and Donors
- Common Market for Eastern and Southern Africa COMESA
- Community of Sahel-Saharan States CEN-SAD
- Economic Community of Central African States ECCAS
- Economic Community of West African States ECOWAS
- Inter-Governmental Authority on Development IGAD
- APEC
- ASEAN

Development Banks: IMF, World Bank, ADB, African Development Bank, Inter-American Development Bank

Health Donors: (GAVI) Global Vaccine Alliance, Global Fund for TB, Malaria and HIV, Gates Foundation, Clinton Foundation

Non-Governmental Organizations
- Health and Climate Foundation
- Climate Information for Public Health Action Network (CIPHAN)
- Training Programmes in Epidemiology and Public Health Interventions Network (TEPHINET)
- African Field Epidemiological Network (AFENET)
- Humanitarian Organizations (CARE, OXFAM, MSF, etc.)
- International Federation of Red Cross Red Crescent Societies
- Red Cross Red Crescent – Climate Centre (Netherlands)
- Institute Pasteur (France/Global)
- World Federation of Public Health Associations
- Anti-Malaria Association (Ethiopia)

Universities and research institutions
- International Research Institute IRI for Clim ate and Society at Columbia-University (USA)
- Human Health Adaptation Research Network - Australian National University
- United Nations University (UNU)
- Global Environmental Change Human Health (GECHH)
- London School of Hygiene and Tropical Medicine
- Liverpool School of Tropical Medicine
- University of Capetown - Climate Systems Analysis Group (South Africa)
- Mahidol University (Thailand)
- Makarere University (Uganda)
- Kenyatta University (Kenya)
- Addis Ababa University (Ethiopia)

Private sector
- Media - newspaper, radio journalists, Social Media
- Pharmaceutical Companies
- Technology and Infrastructure companies
- Telecommunications

Table 12 Potential Partners of the Health and Climate Service Exemplar

A) **WMO constituent bodies and co-sponsored programmes**

Existing climate services for health, or government sponsored initiatives, are pathfinders for innovations and best practices, and may serve as models or partner networks for expanded CS in developing countries. Existing services include:

**UK-MET** – The Met Office has been working on in the UK to understand the links between weather, climate and health for the past 12 years. The work has focused around three main areas:

1. The impact of weather on Public Health. This encompasses work to understand the population based risks from the weather. The interventions are usually targeted at the whole population, or a large proportion of the population. The main areas of this work are focused on mortality, and include alert service for heat waves and severe cold weather to target reduction of excess winter mortality. However activities such as UV index forecasting and allergen forecasting also fall into
this category of services, but these activities are focused, respectively, on the long term health impacts and well being.

2. Individual health risk. This encompasses services which can be effectively targeted at individuals directly. They include the Met Office's flagship service for people with COPD, called Healthy Outlook. This is a service where forecasts of risk for people with COPD are delivered directly to those at risk using an automated, interactive telephone call. Other areas of development in this area have included services for people with SAD and cardiovascular disease.

3. Demand Management: This area focuses on forecasts to help healthcare providers anticipate surges in demand for services and has been mainly focused on acute trusts. Pilot services of this nature have been delivered in the past and now this work is being consolidated around a research project with two leading universities in the UK.

**African Center for Meteorological applications to Development (ACMAD)**
ACMAD provides climate services for health, and publishes a quarterly climate and health bulletin.

**Climate for Development in Africa Programme CLIM-DEV Africa**
The Climate for Development in Africa Programme is an integrated, multi-partner programme addressing climate observations, climate services, climate risk management, and climate policy needs in Africa. It seeks to overcome the lack of necessary information, analysis, and options required by policy and decision makers at all levels. ClimDev-Africa supports operations in the: (1) generation and wide dissemination of reliable and high quality information on climatic situation in Africa; (2) capacity enhancement of policy makers and policy support institutions to integrate information on climate change into development programmes; and (3) implementation of pilot adaptation practices that demonstrate the value of mainstreaming climate information into development. [http://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/climate-for-development-in-africa-climdev-africa-initiative/](http://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/climate-for-development-in-africa-climdev-africa-initiative/). Principal partners include GCOS, WMO, the UN Economic Commission for Africa, the African Union, the African Development Bank, and bi-lateral donors including the UK DFID.

**African Monsoon Multidisciplinary Analysis**
[http://www.amma-international.org/](http://www.amma-international.org/)
AMMA is an international interdisciplinary programme international concerned with the variability of the West African Monsoon and its impacts on communities in that region. AMMA is motivated by an interest in fundamental scientific issues and by the societal need for improved prediction of the West African Monsoon and its impacts on West African nations. Recognizing the societal need to develop strategies that reduce the socioeconomic impacts of the variability of the West African Monsoon, AMMA will facilitate the multidisciplinary research required to provide improved predictions of the WAM and its impacts.

**Climate and Health Working Groups**
WMO supported CHWGS have been established in Madagascar, Burkina Faso, Niger, and Mauritania. Similar Climate and Health working groups also exist in Kenya and Ethiopia that partner with NMS.

**MALOF – Malaria Outlook Forum (Africa)**
An application of Regional Climate Outlook Forums (RCOFs) since 2004 in the Southern Africa region and since 2007 in the East Africa-Greater Horn of Africa region is the Malaria Outlook Forum (MALOF). The MALOF has a primary mission to establish an operational early warning system for malaria.

**Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS)**
WMO and international partners implement a Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) to enhance the ability of WMO Members to deliver timely and quality sand and dust storm forecasts, observations, information and knowledge to users through an international partnership of research and operational communities, including the health sector.
(i.e. MERIT for meningitis epidemics studies, and national health authorities in charge of particulate matter standard excedences caused by dust intrusions).

**Famine Early Warning System Network (FEWS NET)** is a USAID project uses national meteorological datasets (rainfall, temperature, etc.) and regional climate outlooks to identify actual local and regional trends and patterns in weather and climate, identifies which global models explain this reality and extends the patterns forward in time. FEWS NET improves the accuracy of famine prediction systems in part by refining and applying climate data to the prediction and monitoring of food insecurity through a field-based presence in 20 countries in Africa, Central America and Caribbean, Central Asia and Middle East with additional remote monitoring in nine countries. FEWSNET integrates scientific analysis of food security and climate change, and is a climate service that could be better utilized by the health community. [http://www.fews.net/](http://www.fews.net/)

**SERVIR (Regional Visualization and Monitoring System)** is a NASA and USAID collaboration of regional centers offering earth observation, monitoring and visualization tools. SERVIR provides 8 countries in Central America and 14 countries in East Africa, and the Hindu Kush/Himalaya region from Afghanistan and Pakistan to China with satellite imagery and useable weather and climate information, to inform decision-making in health, environmental management, and disaster preparedness. SERVIR network serves USAIDs 31 priority adaptation countries. [http://www.servirglobal.net/en/Home.aspx](http://www.servirglobal.net/en/Home.aspx)

http://www.hewsweb.org/hp/

**IASC Humanitarian Early Warning Service (HEWSweb)** is an inter-agency partnership project aimed at establishing a common platform for humanitarian early warnings and forecasts for natural hazards. The main objective of HEWSweb is to bring together and make accessible in a simple manner the most credible early warning information available at the global level from multiple specialized institutions. The HEWSweb service has dedicated pages for each type of hazard (see top navigation bar). This includes dedicated pages for floods, storms, locust, volcanoes, earthquakes, weather and other hazards. HEWSweb partners include WFP, UNICEF, UNDP, OCHA, ICRC, IFRC, UNHCR, WHO, FAO, WMO, IOM, SCHR, US-NOAA.

**US-NOAA**

NOAA’s National Climatic Data Center (NCDC) works with various groups, both as an information provider and as an applied research partner, to examine the effects of weather and climate on human health. This type of information can help decision makers and stakeholders within the health sector make practical decisions in order to adapt to climate changes and variations and to mitigate possible effects.

Climate Services for Health [http://www.ncdc.noaa.gov/oa/userengagement/health.pdf](http://www.ncdc.noaa.gov/oa/userengagement/health.pdf)

**US - Interagency Crosscutting Group on Climate Change and Human Health (CCHHG)**

The US Government Interagency Crosscutting Group on Climate Change and Human Health (CCHHG) is charged by the USGCRP with planning, coordinating, implementing, evaluating, and reporting on federal research and related scientific activities on the human health impacts of global environmental change. The CCHHG has identified a set of key work streams:

- Adaptation—including support for the Interagency Climate Change Adaptation Task Force.
- Assessment—including support for the National Climate Assessment.
- Communication, Education and Engagement—including coordination with broader USGCRP education and communication activities.
- Data Integration—including coordination with the. Group on Earth Observations (GEO) Health and Environment Community of Practice.
- Joint Research and Application Planning—including development of a health and climate change research framework, gap analysis and prioritization of research needs, and coordination of joint funding opportunities.
- International—including review of International health adaptation plans and assessments to capture lessons learned.
Other US Agencies and Initiatives engaged in Climate and Health related work:
http://www.state.gov/e/oes/rls/fs/2011/153994.htm

**Group on Earth Observations (GEO) Health and Environment Community of Practice (COP)**
http://www.earthobservations.org/cop_he_henv.shtml

The COP, whose members include national, regional and international organizations, seeks to address the user perspective on issues involving environment and health, with an emphasis on using environmental observations to improve health decision-making at the international, regional, country, and district levels. Areas of interest include information architecture for the environment, ecosystems, climate, and health; oceans, water quality, and health; vector-borne disease; and disasters and health.

The COP supports several ongoing projects in GEO’s Work Plan involving:
- Health information systems integrating Earth observation remote-sensing imagery as a contributor to the World Health Organization’s Open Health information system.
- Health monitoring and prediction systems for aerosol impacts on health and the environment, air quality observations and forecasting, global monitoring of persistent organic pollutants, and monitoring of atmospheric mercury.
- End-to-end projects for health aimed at implementing a meningitis decision-support tool and a globally coordinated malaria warning system, a cholera early warning system and at describing the linkage between ecosystems, biodiversity, and health in order to integrate these components into decision-support tools.

**Earth System Science Partnership (ESSP) Project: Global Environmental Change and Human Health (GECHH)**
http://www.gechh.unu.edu/

The Global Environmental Change and Human Health (GECHH) launched in 2006 as a Joint Project of the ESSP responds to the growing need to better understand the multi-faceted and complex linkages between global environmental change (including climate change, land and sea use change, global biodiversity loss and change, global socio-economic change) and human health. The GECHH, is a partnership particularly relevant for research and capacity-building.

GECHH research agenda supports research that can:
1. Identify and quantify health risks posed by GEC, now and in the reasonably foreseeable future:
   a) develop methods of modelling/understanding tradeoffs between economic development, environmental change and human health; and (b) take account of the roles of culture, social institutions and technology choices in modulating health risks, affecting vulnerability and influencing policy responses.
2. Describe spatial (geographic, intra/inter-population) and temporal differences in health risks, to better understand vulnerabilities and priorities for interventions.
3. Develop adaptation strategies for reducing health risks, assess their cost-effectiveness and communicate results (especially to decision-makers).
4. Foster research training programs, to boost networked international research capacity in global environmental change and human health.

**b) WHO – World Health Organization and programmes**

WHO is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends. Regarding climate matters, WHO plays a leading role to support government Health agencies to be represented in UNFCCC negotiations, and provides technical support for the implementation of adaptation and mitigation measures.
World Health Assembly
The World Health Assembly is the decision-making body of WHO. It is attended by delegations from all WHO Member States and focuses on a specific health agenda prepared by the Executive Board. The main functions of the World Health Assembly are to determine the policies of the Organization, appoint the Director-General, supervise financial policies, and review and approve the proposed programme budget. The Health Assembly is held annually in Geneva, Switzerland.

WHO Regional Committees
RCs for Europe, Africa, Americas, Mediterranean, Western Pacific, and South Asia regions, are the WHO’s decision-making bodies of the respective Regions. It comprises representatives of each Member State in the Region, and meets for four days in September each year. At these annual sessions, Member States: formulate regional policies; supervise WHO/Europe’s activities; comment on the regional component of WHO’s proposed programme budget; every five years, nominate the Regional Director for Europe and transmit their decision to the WHO Executive Board for endorsement.

- Research and Training in Tropical Diseases (TDR) http://apps.who.int/tdr/
  TDR, the Special Programme for Research and Training in Tropical Diseases, is a global programme of scientific collaboration that helps coordinate, support and influence global efforts to combat a portfolio of major diseases of the poor and disadvantaged. TDR is based at and executed by the WHO, co-sponsored by UNICEF, UNDP, the World Bank and WHO. TDR supports and advocates for research to address diseases that disproportionately affect those living in poverty and works to build the capacity of researchers where these diseases persist. The organization has a worldwide network that connects scientists, researchers, nongovernmental organizations and other partners. Climate Change is a priority focus for TDR, as many of these diseases are climate sensitive and may be exacerbated by climate change.
  http://apps.who.int/tdr/svc/topics/environment/priorities-environment/_Climate_change_and

Global Outbreak Alert Response Network (GOARN)
http://www.who.int/csr/outbreaknetwork/en/
The Global Outbreak Alert and Response Network (GOARN) is a technical collaboration of existing institutions and networks that pool human and technical resources for the rapid identification, confirmation and response to outbreaks of international importance. The Network provides an operational framework to link this expertise and skill to keep the international community constantly alert to the threat of outbreaks and ready to respond. The Global Outbreak Alert and Response Network focuses technical and operational resources from scientific institutions in Member States, medical and surveillance initiatives, regional technical networks, networks of laboratories, United Nations organizations (e.g. UNICEF, UNHCR), the Red Cross (International Committee of the Red Cross, International Federation of Red Cross and Red Crescent Societies and national societies) and international humanitarian nongovernmental organizations (e.g. Médecins sans Frontières, International Rescue Committee, Merlin and Epicentre). The diseases monitored and covered by GOARN are almost all climate sensitive and this network represents a key set of technical partners that could benefit from CS.

The Global Health Cluster (GHC), under the leadership of the World Health Organization, is made up of more than 30 international humanitarian health organizations that have been working together over the past four years to build partnerships and mutual understanding and to develop common approaches to humanitarian health action. The GHC provides training and technical guidance for the implementation of the health cluster at global to national levels, and is a structure that exists at the country level as part of the international response to national level humanitarian emergencies.
Global Thematic Platform on Disaster Risk Management for Health
WHO and the health sector has worked with the ISDR system to establish the thematic platform on disaster risk management for health which aims to build a multi-disciplinary and multi-sectoral community to advocate, share information and catalyze action on risk reduction for health, and implement the Hyogo Framework for Action through the health sector. Actions include sharing of national policies and strategies and good practice for health risk reduction, advocacy to raise awareness of the health imperative for risk reduction and a greater investment in the health sector, forums for building partnerships and a health risk reduction community across sectors and disciplines, and coordination of health sector inputs to the implementation of the Hyogo Framework for Action, and ISDR systems reports and forums, such as Global Platform for Disaster Risk Reduction. http://safehospitals.info/images/stories/5GoodPract/ResearchAndDev/thematic_platform_risk_reduction_health_12oct09.pdf

Healthy and Resilient Communities Working Group
A partnership between WHO, the International Federation of Red Cross and Red Crescent Societies, the Global Health Workforce Alliance, UNHCR, UNICEF have a Joint Statement on Scaling-up the Community-based Health Workforce for Emergencies.

WSH Water, Sanitation, and Hygiene Programme
http://www.who.int/water_sanitation_health/en/
The WHO water, sanitation and hygiene program supports the health sector in effectively address water- and waste-related disease burden and in engaging others in its reduction. And, to assist non-health sectors in understanding and acting on the health impacts of their actions. Six core activities: Drinking-water quality management; Water supply and sanitation monitoring; Cholera surveillance and prevention; Water and sanitation in different settings; Water resources management; Miscellaneous activities (including Economic aspects, Climate change, and the Millennium Development Goals). A large network of WHO collaborating centers exists around the world,

WHO Collaborating Centers: including the UK-Health Protection Agency (HPA).

Global Malaria Programme http://www.who.int/malaria/en/
GMP, as part of the WHO, convenes experts to review evidence and set global policies. GMP’s policy advice provides the benchmark for national malaria programmes and multilateral funding agencies.

WHO Malaria training programme (and affiliate Malaria training programmes)
Ethiopia (Addis Ababa University) Thailand (Mahidol University) Uganda (Makarere University), Madagascar (Institute Pasteur) http://www.malariajournal.com/content/7/1/80

MERIT

C) Other UN Agencies and Programmes

- UNSCN
The UN Standing Committee on Nutrition, convenes an e-forum on Nutrition and Climate Change, bringing together partners for advocacy purposes.

- UNICEF
UNICEF is mandated by the United Nations to advocate for the protection of children's rights, especially in situations of war, disasters, extreme poverty and all forms of violence. UNICEF’s mission is dedicated exclusively to children, working to provide child protection, survival and development within the framework of the Convention on the Rights of the Child. Children are the primary population vulnerable to the negative impacts of climate
change. UNICEF is operational in 190 countries and mobilizes resources to help countries, particularly developing countries, deliver services for children, including health, nutrition, and water and sanitation.

- **UNEP**
  
  UNEP’s mission is to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations. UNEP is a key partner for health particularly in Africa, where UNEP jointly lead’s along with WHO, the Health and Environment Strategic Alliance (HESA)\(^4\) to implement the inter-ministerial Libreville Declaration for Health and the Environment at the national and international levels. The HESA aims to develop and coordinate actions by the health and environment sectors within the development planning processes in order to effectively value and utilize health and environment linkages for protecting and promoting public health and ecosystem integrity with a view to achieving the Millennium Development Goals. Climate change is an overarching theme of the Libreville process.

- **PROVIA** \(\text{http://www.provia-climatechange.org/}\)
  
  The Programme of Research on Climate Change Vulnerability, Impacts and Adaptation (PROVIA) is a global initiative between WMO, UNEP, and UNESCO which aims to provide direction and coherence at the international level for research on vulnerability, impacts and adaptation (VIA). Launched with the support of leading scientists and decision-makers, PROVIA responds to the urgent call by the scientific community for a more cohesive and coordinated approach, and the critical need to harmonize, mobilize, and communicate the growing knowledge-base on VIA. To this end, PROVIA will act as a new and growing network of scientists, practitioners and decision-makers working towards identifying research gaps and meeting policy needs in climate change vulnerability, impact and adaptation research.

- **UNDP**
  
  The United Nations Development Programme (UNDP) is the UN’s global development network, present in 177 countries. UNDP advocates for change and connecting countries to knowledge, experience and resources in order to develop local solutions to development challenges and develop national and local capacities that will help them achieve human development and the Millennium Development Goals. UNDP at the country level often serves a coordination role, as Resident Coordinator, and chairs the UN Development Group.

- **UNCT (United Nations Country Teams)**
  
  The United Nations Country Team (UNCT) exists in 136 countries, covering all of the 180 countries where there are United Nations programmes. The UNCT encompasses all the entities of the UN system that carry out operational activities for development, emergency, recovery and transition in programme countries. The UNCT ensures inter-agency coordination and decision-making at the country level. The main purpose of the Country Team is for individual agencies to plan and work together, as part of the Resident Coordinator system, to ensure the delivery of tangible results in support of the development agenda of the Government. \(\text{http://www.undg.org/}\)

o United Nations Development Assistance Framework (UNDAF)

The UNDAF programme documents the relationship between a government and the United Nations Country Team that describes the collective actions and strategies of the United Nations to the achievement of national development. The UNDAF is the strategic programme framework that describes the collective response of the UN system to national development priorities. The UNDAF includes outcomes, activities and UN agency responsibilities that are agreed by government.

o UN CC:LEARN http://www.uncclearn.org/

UN CC:Learn is a partnership of 32 UN agencies which supports Member States, UN agencies and other development partners in designing and implementing results-oriented and sustainable learning to address climate change. CC:Learn is included in the "One UN Climate Change Action Framework" of the UN System Chief Executives Board for Coordination through the HLCP capacity development group convened by UNDP and UNEP. The Secretariat of CC:Learn is hosted by UNITAR.

o UN Framework Convention on Climate Change (UNFCCC) http://unfccc.int/

UNFCCC is an international environmental treaty produced at the United Nations Conference on Environment and Development (UNCED) in 1992. Various mechanisms of the FCCC, particularly pertaining to Adaptation, are relevant to, and should be linked to developments within the Framework and UIP. Resource and technical needs identified through the UIP for adaptation of the health sector to climate change, should be communicated through the FCCC. Including but not limited to:

- The Cancun Adaptation Framework, which resulted from negotiations on enhanced action on adaptation as part of the Bali Action Plan under the Ad-hoc Working Group on Long-Term Cooperative Action under the Convention (AWG-LCA);
- Nairobi work programme on impacts, vulnerability and adaptation to climate change, development and transfer of technologies, research and systematic observation under the Subsidiary Body for Scientific and Technological Advice (SBSTA);
- National adaptation programmes of action (NAPAs), and supporting adaptation through finance, technology and capacity-building under the Subsidiary Body for Implementation (SBI);
- National Communications, as national assessments of the impacts of climate on all sectors should increasingly identify potential impacts to health.

D) National Meteorological and National Hydrological Services

National Climate and Health Working Groups

CHWG currently exist or are being established in 7 African countries, as a collaborative effort between NMS and health partners to translate and use climate services for health. Each structure and Terms of Reference is slightly different depending on the context and partners in Kenya, Madagascar, Ethiopia, Burkina Faso, Niger, Mali, and Mauritania.

For example:

Ethiopia Climate and Health Working Group

Has the goal to create a climate-informed health sector and beneficiary communities that routinely request and use appropriate climate information to improve the effectiveness of health Interventions. The working group functions include review the status climate and health information especially on malaria, meningitis and acute watery diarrhoea; reviewing the status of early warning system in the country especially usage of climate information for early epidemic detection and control; and fostering research on climate sensitive diseases. Develop information sharing system: Capacity-building. These working groups have international partner members, and are
collaboratively supported by the IRI, the Health and Climate Foundation, and GEO’s Global Earth Observation System of Systems (GEOSS).

The Kenya Climate Change Working Group (KCCWG)[http://www.kccwg.org/index.php/en/ is a forum that unites Civil Society Organizations, non-state actors and donor partners working on issues relating to Climate Change. The purpose is to create synergies, harmonize and strengthen efforts in the design and implementation of activities that address climate change. Our vision is to participate and lead in the development and implementation of climate change sensitive policies, projects and activities within and without our Kenyan borders. One of our main objectives is to advocate for positive national policies on climate change. KCCWG Members elect a National Steering Committee (NSC) at the thematic group’s level, including Health. Thematic groups on: Water, Energy, Agriculture, Livestock and Fisheries, Tourism, Trade and Industry, Conservation, Pastoralism and Conflict over Natural Resources; Health; Forestry; Urbanization, Housing and; Education.

HEALTHMET Mauritania Climate and Health Working Group
http://www.afrimet.org/control/Ficheros_Afri_Public_list.php?language=English

E) Non-government organizations

- Red Cross Red Crescent – Climate Centre (Netherlands) [http://www.climatecentre.org/]
The Red Cross / Red Crescent Climate Centre is the reference centre on climate change of the Red Cross / Red Crescent family. The Climate Centre supports the Red Cross and Red Crescent Movement to understand and address the humanitarian consequences of climate change and extreme weather events, including health.

- Health and Climate Foundation [http://www.hc-foundation.org/(USA)]
The Health and Climate Foundation aims to reduce health risks due the impact of climate and of inequities in mitigation and adaptation strategies by facilitating and convening dialogue and interaction between the health sector, climate services, research and development institutions, decision makers and communities.

- Training Programmes in Epidemiology and Public Health Interventions Network (TEPHINET)
TEPHINET is a professional network of field epidemiology training programs (FETPs) located in 48 countries around the world. TEPHINET aims to strengthen international public health capacity by training field epidemiologists through an applied apprenticeship program. Trainees of FETPs master a set of core competencies that are vital to the practice of public health, while providing a valuable public health service to their countries and regions. [http://www.tephinet.org/]. The IRI at Columbia University has an established partnership with TEPHINET to improve epidemiological training through the use of climate information.

- African Field Epidemiological Network (AFENET) [http://www.afenet.net/english/]
AFENET is a non-profit organization and networking alliance dedicated to helping Ministries of Health (MOHs) in Africa build strong, effective, sustainable programs and capacity to improve public health systems on the African continent. The AFENET secretariat is located in Kampala, Uganda. AFENET works with MOHs and other public health institutions to strengthen their countries epidemiology workforce through Field Epidemiology Training Programs (FETPs) and Field Epidemiology and Laboratory Training Programs (FELTPs), which are residency-based programs in applied epidemiology and laboratory practice.

- eNetworks to enhance Health Surveillance

F) Universities, research institutions and projects
International Research Institute (IRI) for Climate and Society at Columbia-University (USA) [http://bit.ly/v735iR]
The IRI at Columbia University is a multi-disciplinary institute with a mission to enhance society’s capability to understand, anticipate and manage the impacts of climate in order to improve human welfare and the environment, especially in developing countries. The IRI conducts strategic and applied research, education, capacity-building, and provides forecasts and information products with an emphasis on practical and verifiable utility and partnership. IRI has a thematic focus on health, and is a PAHO/WHO Collaborating Centre on Early Warning Systems for Malaria and other Climate-Sensitive Diseases. The IRI provides training, research, policy, and operational support to both health and climate sector professionals to make climate informed health decisions.

Climate Information for Public Health Action Network (CIPHAN)
http://ciphan.iri.columbia.edu/
The CIPHAN has been developed to provide public health professionals with knowledge, methodologies, tools, and data to better manage climate sensitive diseases toward improving health outcomes. It acts as a web portal to guide the learner towards other sources of information, as well as a source of learning resources, such as educational modules and exercises. This site’s library also contains a directory of published material to give the reader opportunity for further investigation. This portal is subdivided into three sections: the Climate Sensitive Disease Library, Courses and Training Tools.

University of Cape Town - Climate Systems Analysis Group (South Africa)
CSAG is a unique research group within Africa that focuses on putting the needs of developing nation users at the forefront actions. CSAG seeks to apply its core research to meet the knowledge needs of responding to climate variability and change. CSAG specializes in climate modelling, applied climate science, delivering tailored climate information, capacity-building in adaptation and policy-making, stakeholder engagement

Healthy Futures Consortium-- Health, environmental change and adaptive capacity: mapping, examining and anticipating future risks of water-related vector-borne diseases in eastern Africa. Healthy Futures is an EU FP7 funded project which aims to build a disease risk mapping system for three water-related high-impact VBDs (malaria, Rift Valley fever (RVF) and schistosomiasis) in Africa, accounting for environmental/climatic trends to predict future risk. Concentrating on eastern Africa as a study area, the project comprises a comprehensive, inter-disciplinary consortium of health, environment, socio-economic and climate experts in addition to governmental health departments. The consortium comprises both African- and Europe-based institutions, with the majority (8 of a total of 15) based in Africa. The project will deploy a bottom-up, end-user/stakeholder-focused approach to achieve its aims. http://www.healthyfutures.eu/

One Health is both a concept and the founding principle of multiple initiatives which aim to consider the joint improvement of animal and human health. The One Health concept is a worldwide strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals and the environment. The synergism achieved will advance health care for the 21st century and beyond by accelerating biomedical research discoveries, enhancing public health efficacy, expeditiously expanding the scientific knowledge base, and improving medical education and clinical care. When properly implemented, it will help protect and save untold millions of lives in our present and future generations. http://www.cdc.gov/onehealth/
http://onehealthinitiative.com/?goback=%2Egde_2060408_member_106107304
http://www.ucghi.universityofcalifornia.edu/coes/one-health/index.aspx

Kenya Medical Research Institute (KEMRI) is a state corporation established through the Science and Technology (Amendment) Act of 1979, as the national body responsible for carrying out health research in Kenya. Since its inception, KEMRI has developed a critical mass of scientists and technical personnel, to enable it mount a competitive research infrastructure to rank as a leading centre of excellence in health research both in Africa as well as globally. http://www.kemri.org/

International Livestock Research Institute, Nairobi, Kenya - (ILRI) ILRI is a non-for-profit NGO with headquarters in Nairobi, Kenya, and in Addis Ababa, Ethiopia. ILRI employs over 700 staff
from about 40 countries, operating at the crossroads of livestock and poverty, bringing high-quality science and capacity-building to bear on poverty reduction and sustainable development. All ILRI work is conducted in extensive and strategic partnerships that facilitate and add value to the contribution of many other players in livestock research for development work. ILRI employs an innovation systems approach to enhance the effectiveness of its research. ILRI’s strategic intention is to use livestock as a development tool. ILRI is funded by more than 60 private, public and government organizations. ILRI is a strategic partner for health research, policy, and practice with regards to zoonosis control.

Human Health Adaptation Research Network - Australian National University
http://climatehealthresearch.org/. The Adaptation Research Network for Human Health comprises researchers from various disciplines (including epidemiology, climate science, environment, rural science, sociology, economics, mental health, infectious diseases, physiology, ergonomics, health promotion, health services) and research users (policymakers, practitioners, industry, community). The network has 3 objectives to:

- Foster interdisciplinary research and emerging research methods (time-series methods, spatial analyses, systems-based modelling of complex ecological relationships and processes, and scenario-based modelling of future health risks).
- Build research and decision-making capacity by attracting and leveraging new funding, and focusing on mentoring and support for early career researchers and policymakers.
- Facilitate collaboration between researchers, policymakers and practitioners, to strengthen Australia's capacity to anticipate and mitigate the human health consequences of climate change.

United Nations University (UNU) www.unu.edu – UNU is the academic arm of the United Nations system, implementing research and educational programmes in the area of sustainable development, with the particular aim of assisting developing countries. The work of several centers is of particular relevance, Institute for International Global Health; Environment and Human Security; Institute for Water, Environment and Health.

eHealth Taskforce: http://iap.esa.int/projects/health

The European Space Agency (ESA) focused on health in sub-saharan African countries, and has partnership with private companies as well as academic, NGO, and UN agencies including WHO and local health partners. Five projects currently in place provide R&D aimed to provide (e-care, e-surveillance, etc.) for disease control, pharmaceutical distribution, and telemedicine.

(1) PREDICT - Prevent and Respond to Epidemics and Demonstrate Information and Communication Technologies. This project aims at becoming a sustainable new health service for monitoring and early warning of outbreaks of infectious diseases in humans and livestock. PREDICT services are intended to be implemented over a system integrating a variety of technologies, including satellite communications, satellite navigation and remote sensing. This system improves early detection, reporting and rapid response in case of an epidemic or epizootic outbreak in order to limit and contain the spreading of infectious diseases.

(2) Satellite African e-Health Validation The SAHEL initiative is a demonstration project for telemedicine service in Sub-Saharan Africa. The project will define and implement an operational pilot system connecting some isolated areas in both Western and Eastern countries of the Sub-Saharan region with medical centers of excellence for clinical services and eLearning. It is the first building block of a large pan-African network for telemedicine, in line with the TTF (Telemedicine Task Force) objectives.

(3) VEC MAP http://iap.esa.int/projects/health/vecmap VECMAP aims at assessing the viability of a tool and associated service for automated mosquito mapping and forecasting, integrating earth observation (EO) and satellite navigation assets with modelling, mapping and in-situ measurement
techniques. To achieve this, four companies and one public-health agency have joined efforts to develop an integrated software package and a pilot service.

(4) T4MOD - Remote Assistance for Medical Teams Deployed Abroad  T4MOD project aims at defining, developing, realizing, qualifying and validating a user friendly Telemedicine system, through an interoperable IP overlay satellite network associated to an intelligent end-to-end communication platform, capable to support different medical specialties.

(5) GULLIVER Space based system for pharmaceutical logistics service in remote regions. The GULLIVER feasibility study aims at assessing the added value of space assets in securing the delivery of pharmaceutical goods. For that purpose, Novacom Services has fostered the creation of a wide community of experienced users covering the end-to-end distribution chain. Navigation, Telecommunication and Earth Observation’s applicability will be tested against the daily requirements of those stakeholders. The end-users in this project are the large pharmaceutical companies on the one side, the users of pharmaceuticals (NGOs) on the other side, and the insurance companies in the middle.

Pan-African eNetwork http://www.panafricanenetwork.com/

- Pan African eNetwork: a continental wide satellite based network owned by the African Union (54 countries) currently focus on health and education.

International Strategy for Disaster Reduction system (UNISDR). The International Strategy for Disaster Reduction (ISDR) is a system of partnerships including governments, the United Nations System, regional bodies and platforms, international financial institutions, civil society organizations, academia and research institutions, the private sector, and media. The overall objective of the partnerships is to generate and support a global movement to reduce risk to disasters. The ISDR system’s active mechanisms are the Global Platform for Disaster Risk Reduction, regional platforms, national platforms, thematic platforms, the ISDR Support Group, the ISDR Inter-Agency Group, and the ISDR Secretariat (or UNISDR).

Asian Disaster Preparedness Center (ADPC). ADPC is a non-profit organization based in Bangkok Thailand, supporting the advancement of safer communities and sustainable development, through implementing programmes and projects that reduce the impact of disasters upon countries and communities in Asia and the Pacific, by: (1) developing and enhancing sustainable institutional disaster risk management capacities, frameworks and mechanisms, and supporting the development and implementation of government policies; (2) facilitating the dissemination and exchange of disaster risk management expertise, experience and information; and (3) raising awareness and enhancing disaster risk management knowledge and skills.

Focus areas of work include, Urban Disaster Risk Management; Climate Variability and Change/Climate Risk Management; Community-Based Disaster Risk Reduction; Public Health in Emergencies/Health Risk Management; Emergency Preparedness and Response System Development; End to End Multi Hazard Early Warning Systems; Mainstreaming Disaster Risk Reduction into Development; Post-disaster Recovery and Reconstruction; Risk Assessment; Technological Hazard Risk Management.http://www.adpc.net/

G) The Private Sector

Public-Private Partnerships (PPP)  
Involvement of the private sector should be considered a positive collaborative interface for the health and climate communities of practice. PPPs can be a solution to health service delivery and overcome the financial sustainability challenges often faced by public services institutions. A good understanding of the role of private actors as potential coordinating partners, data and information providers, logistic and research operators should be further explored, as a potentially successful mechanism for climate and health risk management.
H) Bi-lateral Donors

Many bi-lateral government aid donors have positions for financial and technical support for climate change, specifically in reference to health are the following examples:

USAID: Climate and Health Position
Healthy communities and populations are key to adapting to climate change; at the same time it is important to ensure that USAID’s health investments are resilient to climate impacts. Health decision makers in developing countries need knowledge and skills to understand and anticipate health-related climate impacts on key sectors such as health systems strengthening, malaria and other infectious diseases, and community health, particularly the health of vulnerable populations including women and children. Potential areas for USAID learning include capacity-building of key health stakeholders to understand and anticipate climate change impacts and develop climate resilient health policies and plans in key sectors such as maternal and child health and malaria prevention. This work could assist policymakers to implement climate resilient health plans for the most vulnerable communities to demonstrate how to build adaptation into health sector planning and implementation. USAID’s direct investments in climate adaptation prioritize small island developing states (SIDS), least developed countries (LDCs), especially in sub-Saharan Africa, and glacier dependent countries.

European Union has pledged $3.36 billion per year over 2010-2012, much of it for adaptation for small island developing states, and the rest for mitigation related efforts in developing countries around the world.

UK Department for International Development (DfID) working on two new public-private partnerships that will target low carbon and adaptation investments in Asia and large-scale renewable energy in Africa. DfID has also called on all of its country offices to carry out a climate change strategic review of its entire portfolio.

Swedish International Development Cooperation Agency (SIDA) has pledged $168 million over four years for climate change adaption efforts.

Japan (JICA) has made commitments of $15 billion over three years, including concessional loans; much of that money will be channelled into mitigation efforts, with smaller amounts going to REDD+ and adaptation efforts.
<table>
<thead>
<tr>
<th>Domain</th>
<th>Competency Statement</th>
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<tbody>
<tr>
<td>1. Basic Concepts in Public Health and Climate</td>
<td>Understand the basic frameworks for public health analyses, the factors that drive the climate system and the range of methods used to capture public health and climate information</td>
</tr>
<tr>
<td>2. Methods and Tools for Analyzing Climate and Public Health Data</td>
<td>Analyze in space and time the relationship between climate and public health data using appropriate statistics, methods and tools</td>
</tr>
<tr>
<td>3. Use of Climate Information in Decision-Making for Climate-Sensitive Diseases</td>
<td>Apply climate information to enhance public health surveillance, early warning, prevention and control of climate-sensitive public health issues</td>
</tr>
<tr>
<td>4. Computer and Information Technology</td>
<td>Use computers and relevant software for applications in climate information for public health</td>
</tr>
<tr>
<td>5. Communication in Public Health and Climate</td>
<td>Develop effective communication means and tools for public health and climate information</td>
</tr>
<tr>
<td>6. Collaborating, Mentoring and Training on Climate Information for Public Health</td>
<td>Advise, train and collaborate with public health and climate and weather professionals using relevant platforms, mechanisms and partnerships</td>
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</table>

Figure 3 Core Competencies for Use of Climate Information in Public Health
Source: Curriculum for Climate Information for Public Health (Cibrelus and Mantilla 2011)
ANNEX 8 DEFINITIONS

**Climate Information** is a broad term that includes summary statistics, historic time-series records, near-real-time monitoring, predictive information from daily weather to seasonal to inter-annual time scales, and climate change scenarios.

**Climate informed health decisions** are those that incorporate spatial and time-scale climate data with clinical and epidemiological data to prevent public health impact from climate-sensitive variables (flooding, pathogens, famine).

**Climate Products** cover a range of information from climate observations and information, such as temperature, precipitation, wind velocity, soil temperatures and other climate information that has been collected and organized.

**Climate services** are climate information prepared and delivered to meet users’ needs.
ANNEX 9 TERMS OF REFERENCE CLIMATE AND HEALTH PROJECT OFFICE

These Terms of Reference serve to:
Establish a joint WMO-WHO Climate and Health Project Office (henceforth referred to as the Project Office) on an interim (2-year) basis whose fundamental task would be to steer the creation of formal, more permanent arrangements in this field.

Background:

- Adopted the draft Implementation Plan of the Global Framework for Climate Services;
- Established the Intergovernmental Board on Climate Services (the Board), its terms of reference and rules of procedure; and
- Approved the specific functions of the Secretariat in support of the GFCS.

During the proceedings it was recognized that climate has a profound impact on human health and that decision-makers at all levels need access to the most relevant and reliable information available on various timescales to strengthen the resilience of health systems and support proactive decision-making.

It was further recognized that to respond to this need, several National Meteorological and Hydrological Services in collaboration with their national health counterparts are developing health and climate programmes. Similarly, climate and health has also emerged as a theme in several parts of the world and is a major focus of the Global Framework for Climate Services (GFCS). WMO and WHO have committed to working more closely in this area.

With a view to advancing the collaboration between the WMO and WHO towards implementation of the GFCS, the establishment of a joint Project Office on climate and health is needed as soon as possible.

Activities of the Project Office
The Project Office will support the development of specific activities emanating from the Implementation Plan of the Global Framework for Climate Services and respective Annexes and Exemplars to promote the development and application of climate services in support of health decision-making. The Project Office will be used to:

1. Complete the health Exemplar for the considerations of the first meeting of the Intergovernmental Board on Climate Services;
2. Develop and prioritize a set of health-related project initiatives to be in included compendium of GFCS projects initiatives to be considered by the first meeting of the Intergovernmental Board on Climate Services, with first priority assigned to the establishment of climate and health working Groups, as identified priority health initiative in the GFCS Implementation Plan;
3. Facilitate the development and implementation of health-related projects and programmes developed as part of the implementation of the GFCS in the health sector;
4. Provide administrative support for a joint WMO-WHO steering group whose activities include, but are not limited to:
   a. Organization of meetings, working groups, and expert consultations with a view to advancing this area;
   b. Facilitating through communication and coordination regional bodies and entities to make an effective contribution to the process;
   c. Facilitation of effective participation of experts from developing and countries with economies in transition;
   d. Promotion and mobilization of support for climate and health through an appropriate and effective outreach programme;
e. Supplementing regular budget resources to meet staff costs for coordinating, monitoring and follow-up activities;
5. Support the GFCS Secretariat on health-related matters, in particular leading the preparation of a full business case for developing the mechanism and structure of a Joint Climate and Health Programme under the appropriate governance line ready for the next WMO Congress;
6. Subsequently, an outline strategic plan which includes financing would have to be developed and approved by both WMO and WHO.

**Funding of the Project Office**
Funding of the office estimated at around CHF 300 000 per year would be used to mostly:
- Provide one person employed full-time on a contractual basis for two years;
- Develop kick-start activities such as the Climate and Health Working Groups.

**Location and Staffing of the Programme Office**
The location of the programme office will be within the GFCS Secretariat in WMO, Geneva. It is suggested that initially a single post will develop the office and its activities.

**Reporting**
The post-holder will provide regular (6-monthly) reports to the GFCS office which will subsequently be distributed across appropriate areas of WHO and WMO.
For more information, please contact:

World Meteorological Organization
7 bis, avenue de la Paix – P.O. Box 2300 – CH 1211 Geneva 2 – Switzerland

Communications and Public Affairs Office
Tel.: +41 (0) 22 730 83 14 – Fax: +41 (0) 22 730 80 27
E-mail: cpa@wmo.int

Global Framework for Climate Services
Tel.: +41 (0) 22 730 85 79/82 36 – Fax: +41 (0) 22 730 80 37
E-mail: gfcs@wmo.int

www.wmo.int