Climate Information for Disaster Management and Decision Making: The IRI-IFRC Partnership
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Global | Disaster Risk Reduction

INTRODUCTION
The partnership between the International Research Institute for Climate and Society (IRI) and the International Federation of the Red Cross Crescent Societies (IFRC) formed in 2007 and addresses the need to reduce the impact of global weather and climate related disaster through prevention and preparedness activities, early warning, and early action.

Through the IRI-IFRC Partnership, the IRI seeks to understand the weather and climate information needs of the International Federation of Red Cross and Red Crescent Societies and provide them with the tools and support necessary to use this information to improve disaster management and decision making.

There are four main components to the IRI-IFRC partnership. It is the combination of these complementary components that largely contributes to the success of this collaboration.

1. IFRC Maproom - An online mapping tool of tailored, user-friendly weather and climate information was developed to answer specific questions of interest to the IFRC. For example, “Where is exceptionally heavy rainfall expected in the next six days?” The maproom, now available in English and Spanish, and includes six-day and seasonal forecasts for precipitation along with recent historical climate information on seasonal, decadal and longer-term timescales. This mapping tool is available through the IRI Data Library and is also accessible to disaster managers worldwide though the IFRC’s online Disaster Management Information System (DMIS).

2. The IFRC Helpdesk at IRI - Using the IFRC Helpdesk at IRI, the IFRC is able to email a wide variety of climate and weather-related questions to IRI scientists. To answer questions, available information and research is assessed and a response is sent out within one business day. This short response time ensures that answers are received by the IFRC in a timely manner and also limits the time commitment required of IRI scientists.

3. Interns - Through summer internships and research, nearly 100 students have contributed to the partnership to date. Many work with the partnership through the IRI-affiliated Climate and Society Master’s Program at Columbia University. Interns are essential to brokering relationships between National Societies and national met offices. Other types of intern projects include participatory GIS, literature reviews, community surveys, climate and health data analysis, case study research/writing, and the development of flood contingency plans.

4. Liaison based at the IRI - Though s/he is placed at IRI, the liaison holds a joint position at both the Red Cross and Red Crescent Climate Centre (RCCC) and IRI, and facilitates direct communication between both partners. This link enables ongoing dialogue between IRI and the Red Cross, which is critical in the process of identifying and addressing needs.

SOCIOECONOMIC BACKGROUND
The IFRC is the world’s largest humanitarian organization, with a network of approximately 100 million volunteers and staff in 186 countries. Its most fundamental aim in using IRI climate services is to prevent and alleviate human suffering due to climate-induced disasters and crises. To this end, the IFRC supports its National Societies and helps them to avert and respond to disaster, providing them with information to anticipate and manage risks (e.g. the Disaster Management Information System [DMIS], a web-based working tool that made accessible to Red Cross and Red Crescent staff working in National Societies, delegations, and the Geneva headquarters that aims to provide information about disasters and monitor factors that may signal an impending disaster). The Red Cross and Red Crescent Climate Centre (RCCC) is the reference centre on climate risk management of the Red Cross and Red Crescent network and helps to facilitate efforts to make climate information accessible and relevant to humanitarian decisions.

CLIMATE AND CONTEXTUAL INFORMATION
This partnership takes advantage of several different kinds of climatic and contextual information. As detailed below, these include global climate forecasts, historical climate information, climate change information, socioeconomic data, and health-related statistics. In addition to these, new research is constantly evolving and expanding to meet the needs of the IFRC.

Forecasts
Interactive global climate forecast maps, the primary climate information products produced for this partnership, are housed in the online IRI Maproom and are freely accessible, tailored, and user-friendly (Figure 1). The Maproom products are based on IRI seasonal forecasts and the NOAA Earth System Research Laboratory (ESRL) Physical Sciences Division (PSD) 6-day precipitation forecasts.

The maps display the relative severity of forecasted global precipitation events one to six days in advance by comparing the current forecast amounts with a 25-year forecast model climatology. The tool also displays probabilistic seasonal precipitation forecasts for the globe (Figure 2), including “predictions in context” maps that show where the seasonal forecast indicates an enhanced probability for the continuation or reversal of previously-observed above-normal or below-normal seasonal precipitation.

Maps of monthly precipitation climatology are also provided along with population and poverty maps to allow for the examination of relative exposure to weather events and seasonal precipitation fluctuations.

The forecasts made available by the IFRC Maproom are only intended to provide a quick global overview of areas that particularly warrant attention. IRI strongly encourages users in the Red Cross Red Crescent to connect with national meteorological services or other related regional/national/local information providers who can impart more detailed information. In some case IRI facilitates this connection through direct email exchanges and intern-driven partnership building. IRI’s seasonal forecasts are also tailored in the form of forecast updates that highlight areas to monitor and include specific suggestions for action. These bulletins are generated monthly and are emailed to approximately 100 disaster risk managers within the IFRC, as well as to many National Red Cross and Red Crescent disaster risk managers. They are also made available on the Climate Centre website. These forecasts have been integrated into regional disaster management updates and contingency plans.
Historical Climate Information

Historical climate information is also used in the IFRC Maproom. One set of maps, for example, describes ENSO teleconnection patterns with rainfall and is adapted from an IRI analysis of probabilistic precipitation anomalies associated with ENSO (Figure 3). Meanwhile, a recent innovation called the “Timescales” Maproom enables users to assess interannual and decadal variability as well as century-long trends for regions or user-selected locations. This tool uses the University of East Anglia Climate Research Unit’s TS3p1 mean monthly temperature and precipitation data for the past century.

Climate Change Information

Preparedness for Climate Change Reports were created by IRI for selected National Societies. These reports draw climate change information from the Intergovernmental Panel on Climate Change (IPCC) and other sources, and provide a tailored summary for the disaster management community at the country level.

Socioeconomic Data

As mentioned above, maps of population and poverty maps are used in concert with monthly precipitation climatology to allow for the consideration of relative exposure to weather events and seasonal precipitation fluctuations.

The IFRC Maproom also includes population density and infant mortality maps from the Socio-Economic Data Center (SEDAC) at the Center for International Earth Science Information Network (CIESIN). This information is made available to help identify vulnerable populations inhabiting areas at risk from heavy rainfall. However there is little documented use of these products and it is generally beyond the scope of the partnership to produce or use this type of information directly. Disaster managers, however, can consider the complex combination of factors and effectively assess vulnerability.

Climate and Health

Through this partnership, IRI worked with the IFRC and the Climate Centre to implement the Health Risk Management in a Changing Climate project, which used climate information to reduce health risks in four different countries around the world. Specifically, the project focused on dengue fever in Vietnam and Indonesia, and also targeted diarrheal diseases and malaria in Kenya and Tanzania.

The two-year project began in 2010, and involved trainings and contingency planning to prevent climate-related diseases in project communities. The partnership between the IRI and the Climate Centre supported National Societies in establishing relationships with their meteorological departments and developing communication materials. IRI staff and interns also analyzed local climate and health statistics and helped Red Cross branches to develop contingency plans for health risk management in a changing climate.

New Climate Research

In addition to the climate information currently used by the partnership, ongoing research seeks to answer additional questions of interest to the IFRC. These analyses inform current activities and are used in the creation of new products and tools. For example, forecasts of total seasonal rainfall have limited use to the IFRC, which is more interested in the risk of exceptionally heavy rainfall events that would result in flooding. Several intern projects at IRI attempt to address this disconnect. Research is being conducted to assess the extent to which probabilistic seasonal precipitation forecasts can predict individual heavy rainfall events during the target season. The spatial scale of predictability for exceptionally heavy rainfall events at seasonal timescales is an important component of the research, as is the relationship between actual disaster occurrence and the sharpness of the seasonal forecasts.
TAILORING AND CONTEXTUALIZING CLIMATE INFORMATION

All information and tools used in the partnership are tailored a range of users around the world, including IFRC disaster managers at the zonal and regional levels, RC RC National Societies, and Climate Centre staff. This involves summarizing and contextualizing the most relevant information using simple language and a convenient format. The tailoring process is often based on an ongoing dialogue with representatives from the IFRC and the Climate Centre. The IFRC Maproom for example, has undergone major improvements every year since its creation in 2008; IRI has developed new ways to present and describe the maps, and has also created innovative tools for data analysis.

Helpdesk requests received from the Climate Centre or IFRC often identify topics or language that need to be clarified as well as new questions of interest that can be addressed. For example, in 2009 IRI received a Helpdesk question that simply asked, “Strong La Niña, so what?” This question led to the development of the forecast bulletins described above, which include tailored ENSO and seasonal forecast information.

Despite tailoring efforts, however, additional levels of filtering and contextualization (described below) are often required before this information can be used to trigger humanitarian action.

CLIMATE INFORMATION FOR DECISION MAKING

A recent survey pooled a representative sample of IFRC offices and revealed that all use at least one type of weather or climate information in decision-making, most commonly short-term weather forecasts. Actions that can be taken on seasonal to weather timescales are currently developed on a case-by-case basis, often using a “ready, set, go” or similar framework (e.g., Figure 4) to describe options. Seasonal forecasts, for example, can be used to initiate activities such as monitoring shorter-term forecasts, updating contingency plans, training volunteers, sensitizing communities, and enabling early warning systems. Meanwhile, mid-range forecasts can initiate activities such as the mobilizing assessment teams, alerting volunteers, warning communities, and triggering local preparation activities. Finally, short-range forecasts can initiate the deployment of assessment teams, activate volunteers, and prompt the distribution of instructions for community evacuation if necessary.

To build capacity for climate change, Preparedness for Climate Change reports and the IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX) are used to discuss a potential future increase in disasters and engage countries in preparedness and capacity building efforts. This information can also be used in proposals.

Despite these potential applications, however, the use of climate information for disaster preparedness and risk reduction in the Red Cross and Red Crescent is still limited. Barriers to use include:

- Difficulty understanding how to take action, especially for longer-term forecasts
- Difficulty making information relevant and simple enough for end-users at the local level
- Lack of capacity to act on such information
- Fearing the negative repercussions of “acting in vain”, or, due to uncertainty in the forecast, preparing for a disaster that does not ultimately materialize
- Turnover of personnel, which results in a loss of existing capacity

Progress has been made to overcome these barriers by working to identify specific actions that can be taken with each type of climate information and how to best build capacity. The following two examples illustrate specific ways in which climate information has been used by the IFRC and national Red Cross/Red Crescent societies:

West Africa floods in 2008

In 2008, IFRC’s West and Central Africa Zone (WCAZ) used seasonal precipitation forecasts to initiate flood preparedness measures, an initiative that ultimately saved lives and resources throughout the region. The climate information used for the IFRC effort was provided by both IRI and the regional forecast provider, the African Centre of Meteorological Applications for Development (ACMAD). The initiative was facilitated by the placement of an IRI-Climate Centre intern at the zone level who helped connect zone staff with climate information. The willingness of specific zone staff to take risks and use a new type of information in an appeal for early action was also critical.

This was one of the first instances in which disaster risk managers used seasonal climate information in a funded appeal for disaster preparedness. The success story was well-documented and widely circulated online among partners and in Disasters. The story generated great enthusiasm for the potential of the IRI-IFRC partnership to facilitate the use of climate information for improved disaster preparedness and response.

Pacific drought in 2010

In mid-2010, seasonal climate and ENSO information from IRI was disseminated to the IFRC Regional Office for the Pacific that indicated a dramatic change of wet and dry conditions in the coming months due to an emerging La Niña event. Multiple levels of tailoring were required for climate information to ultimately be acted upon in this context: the Regional Office training officer received the IRI message and, in consultation with the IFRC Helpdesk, drafted a climate briefing for the region that further simplified and adapted climate information to address the specific needs of countries at heightened risk. The Helpdesk also encouraged the incorporation of information from regional and local sources, such as the Island Climate Updates from New Zealand’s National Institute of Water and Atmospheric Research, and the Fiji Meteorological Service.

Recommendations for National Society action included contacting national meteorological services and disaster management offices.

Figure 4. Ready, set, go framework for early action across time scales (From Climate and Society Publication 3)
Specific disaster preparedness actions that could be taken on the ground were also listed.

National Societies in Kiribati and Tuvalu acted on these suggestions and took concrete steps to prepare for the possibility of drought. Because droughts are slow-onset disasters, climate forecasts could be used to assess the chance of drought conditions developing and continuing. Drought preparedness programs such as typhoid and water management awareness campaigns were implemented and capacity building was scaled up based on this information. The Pacific drought example clearly highlights the role of the Partnership in supporting the use of local and regional information by the Red Cross and Red Crescent Movement.

IMPLEMENTATION

PROCESSES AND MECHANISMS

STAKEHOLDER AND ISSUE IDENTIFICATION

One of the most important reasons for the partnership’s sustained success is the commitment of a few key individuals, who acted as entry points to partnership activities and relationships. These individuals’ openness to new ideas and their willingness to take risks were essential to the partnership’s creation and success. In addition to these “entry points”, the continued support of many others through a variety of methods and means (as described below) has also been important for the partnership’s development.

- IFRC: The IFRC is the world largest humanitarian organization, with a network of about 100 million volunteers and staff in 186 countries. Founded in 1919, the IFRC comprises 187 member Red Cross and Red Crescent National Societies, a secretariat in Geneva, and more than 60 delegations strategically located to support activities around the world.

- IFRC Secretariat: IFRC Secretariat office in Geneva, including the Disaster Crisis Management Department, identified the need for contextualized climate and weather information in the form of an online map tool, integrated IRI’s IFRC Maproom into the Disaster Management Information System (DMIS), and made the original decision to form a partnership with IRI in late 2007. Currently, they provide oversight to the partnership, facilitate the dissemination of climate information and tools through the IFRC, and provide feedback on products in close consultation with the IFRC’s Community Preparedness and Risk Reduction Department (CPRR).

- IFRC Secretariat Zonal, Regional and Country-level Disaster Managers: Disaster managers at these three levels manage IFRCs operations and support groups of National Societies by disseminating and providing additional levels of tailoring. These Disaster Managers directly receive climate information, and are often able to make decisions accordingly. They also provide valuable feedback on information and tools, such as the Maproom, which is vital for further improvements and innovations.

- National Red Cross and Red Crescent Societies: These country-level organizations are auxiliary to their national governments and are engaged on the ground with disasters.

- The Red Cross/Red Crescent Climate Centre: The RC RC reference center on climate risk management is a joint venture between the IFRC and the Netherlands Red Cross, and is hosted by latter. Its mandate is to support the Red Cross and Red Crescent Movement and its partners in reducing the impacts of climate change and extreme weather events on vulnerable people. It provides support at global, zonal, regional, and national levels, facilitates internship programs (including with the Columbia/IRI Climate and Society Master’s program), supports analysis and documentation of best practice, and fosters innovation in climate risk management practice.

- The International Research Institute for Climate and Society: The IRI’s state-of-the-art climate science and tools are tailored for IFRC use in consultation with the IFRC Secretariat and Climate Centre staff. Simon Mason, Chief Climate Scientist, is IRI’s focal point for the partnership, though several other researchers are also regularly involved. The IFRC Secretariat and Climate Centre provide feedback to IRI from their interactions at all levels, and also provide insight based on their own expert advice. Meanwhile, the IRI Helpdesk provides a formal mechanism for anyone in the Movement to directly contact IRI for assistance with weather or climate-related questions. This is also an effective method of flagging product problems, tailoring needs, and exploring new questions.

- Interns: To date, nearly 100 interns from a range of institutions of higher learning have contributed to partnership activities in a wide variety of ways. Some interns are placed at IRI, though most are at RC/RC offices around the world. The knowledge and connections gained through these internships often continue to benefit the work of the partnership, as some students continue on in careers in the humanitarian and/or climate fields.

- Regional climate centers and national meteorological services: It is critical that regional and local information providers be directly engaged with the Red Cross and Red Crescent so as to provide for their information needs. The partnership therefore strongly encourages and often facilitates these connections.

FUNDING MECHANISMS

In the first few years of the partnership, support for IRI’s work came from NOAA core funding. The Climate Centre also facilitated donor funding for the partnership, including through the two phases of its Preparedness for Climate Change program and the current Partners for Resilience project. The interns received funding from NOAA for several years, though their funding now comes from a variety of sources. IFRC Maproom development is now being supported by USAID’s Bureau for Economic Growth, Education, and the Environment.

MANAGEMENT AND DECISION MAKING

The IFRC Secretariat and the RCCC identify opportunities for improved use of climate information within the many levels and regions of the IFRC network. The IRI then works closely with the RCCC and the IFRC Secretariat to tailor climate information and tools that are disseminated to a wide range of targeted audiences. Ultimately, all those at risk of hydro-meteorological disasters are potential beneficiaries of this partnership.

Most major decisions regarding joint work are taken together by both IFRC and IRI. The liaison based at the IRI facilitates communication between the different institutions.

EVALUATION

Climate information is best used in combination with the many other factors in each specific situation (e.g. vulnerability and socioeconomic conditions). However, this integrated approach makes it more difficult
to extract the role that climate information alone plays in the decision-making process.

Evaluation is partly ad-hoc but it does occur regularly. Formal evaluations are conducted on a case-by-case basis: an assessment report for the West Africa 2008 flood, for example, included an analysis of resources saved as a result of early action. Meanwhile, the two phases of the Preparedness for Climate Change program were independently and externally evaluated, and received positive feedback on the collaboration and the role of the interns in bridging science and applications.

The IFRC Helpdesk at IRI is also a formal communication channel that generates substantial dialogue and thereby creates many opportunities to adjust services and better suit user needs, flagging product problems and identifying new questions of interest. In 2010 IRI surveyed all Helpdesk users, and found that 80% of respondents said the weather or climate information provided “helped them help the people they serve”.

IRI also monitors Maproom page views to assess the use of map products. However, it has been difficult to extract the exact uses and value of climate information due to the often complex combination of factors involved in decision making. Still, the ongoing evaluation of products allows for changes and improvements to be made regularly. The IFR Maproom and the forecast bulletins, for example, have both undergone several major revisions based on user feedback over the past several years.

Finally, partnership interns are currently undertaking a preliminary assessment of the types and timing of information used in the face of climate-related disasters. One intern, for example, is currently engaged in an assessment of the relationship between seasonal precipitation forecasts and flooding and the ways in which this relationship may help to determine forecast thresholds for action. Another intern is researching the value of decisions informed by the partnership. This research looks at the cost of acting based on a forecast, and compares it to the cost of acting after a disaster has ensued. It then incorporates the cost of acting in vain, and will generate a rough idea of how much more effective decisions are/can be when taken based on a forecast.

CABILITIES

EXISTING CABILITIES

IRI’s climate products, expert knowledge, innovate research, and Data Library infrastructure are all important capacities for the purposes of this partnership. The IFRC Secretariat and Climate Centre support the use of climate information throughout the wider IFRC network.

CAPACITY GAPS

Some examples of challenges to the partnership include the following:

- Forecasts of rainfall cannot be directly translated into forecasts of disaster, which make them hard for people to understand and use.
- Information is available in a fairly coarse resolution, which presents a challenge in terms of identifying specific locations and timing for action.

To meet user needs, the Partnership has put several innovations into place:

- The contextualization of forecasts via the IFRC Maproom for the purposes of a broad global overview. The Maproom has been translated into Spanish to reach a larger network of users.
- Collaboration with regional and national met services that have higher-resolution data and expert knowledge of the local context and conditions.
- Research into the relationship between forecasted rainfall and disaster occurrence.
- Research into new rainfall forecast products for extreme events.
- Novel communication tools to help users understand the relation between the science and their decisions.

LOOKING TOWARD THE FUTURE

GOALS

Ultimately, this partnership aims to allow all RC RC National Societies make effective use of weather and climate information and thereby better manage the risk of weather and climate extremes. Currently, the application of this information could still be expanded to use in disaster relief, preparedness, and risk reduction efforts, as well as in health care, and water and sanitation work. Ensuring that National Societies are well connected with their national meteorological services, regional climate centres, and similar organizations will facilitate this effort. The direct connection ensures that the needs of the National Societies are known to information providers, which in turn can facilitate the availability of high quality, usable information generated and accessible to the Red Cross Red and Crescent Movement at all spatial scales of decision making. Procedures and policies must also be in place for acting on the information, such as the development of contingency plans.

PROJECT EXPANSION

There is interest in scaling up this work both within the IFRC and among other humanitarian organizations. Future work could include identifying location-specific forecast thresholds for action and developing early warning protocols based on these thresholds. Ideally, funding for these protocols will become available ahead of a disaster, based on climate information. Other sectors could also model this work, as the routine use of weather and climate information and connections with those who provide this information is very applicable to other sectors.

LESSONS LEARNED

The overall success of the partnership draws its strength from the combination of components (Maproom, Helpdesk, Interns, Liaison) that support and facilitate the use of climate information. The key placement of “gateway” individuals to support and sustain the partnership is also critical.

There were also aspects of the four project components that did not work as well, especially in the earlier years of the partnership. The IFR Maproom, for example, originally included only very technical descriptions of the maps and data, rendering it almost completely inaccessible to users in the Red Cross and Red Crescent Movement. Eventually, the text was completely revised to a simpler and more relevant format. Ensuring a mechanism for gathering feedback and implementing revisions and improvements over time was also essential to refining the products and services of the partnership to their current levels of success.
THE WAY FORWARD
Despite advances, contextualizing rainfall information continues to be challenging. Funding preventative action for disaster is also a major obstacle, as most funding only becomes available once the disaster has occurred. Individuals often suffer negative consequences, such as culpability for having “wasted” time and resources, if they take action based on a forecast and a disaster does not ensue. Eliminating these negative repercussions by standardizing appropriate actions will aid in the scalability of this approach.

Developing contingency plans so that people know exactly what to do based on a forecast (rather than only reacting after a disaster) will be an important step in linking early warning with early action, and must be combined with discussions regarding relevant funding mechanisms. Such discussions are ongoing, partly in light of international donor community requests to redirect humanitarian aid to be focused on anticipation and resilience rather than response.