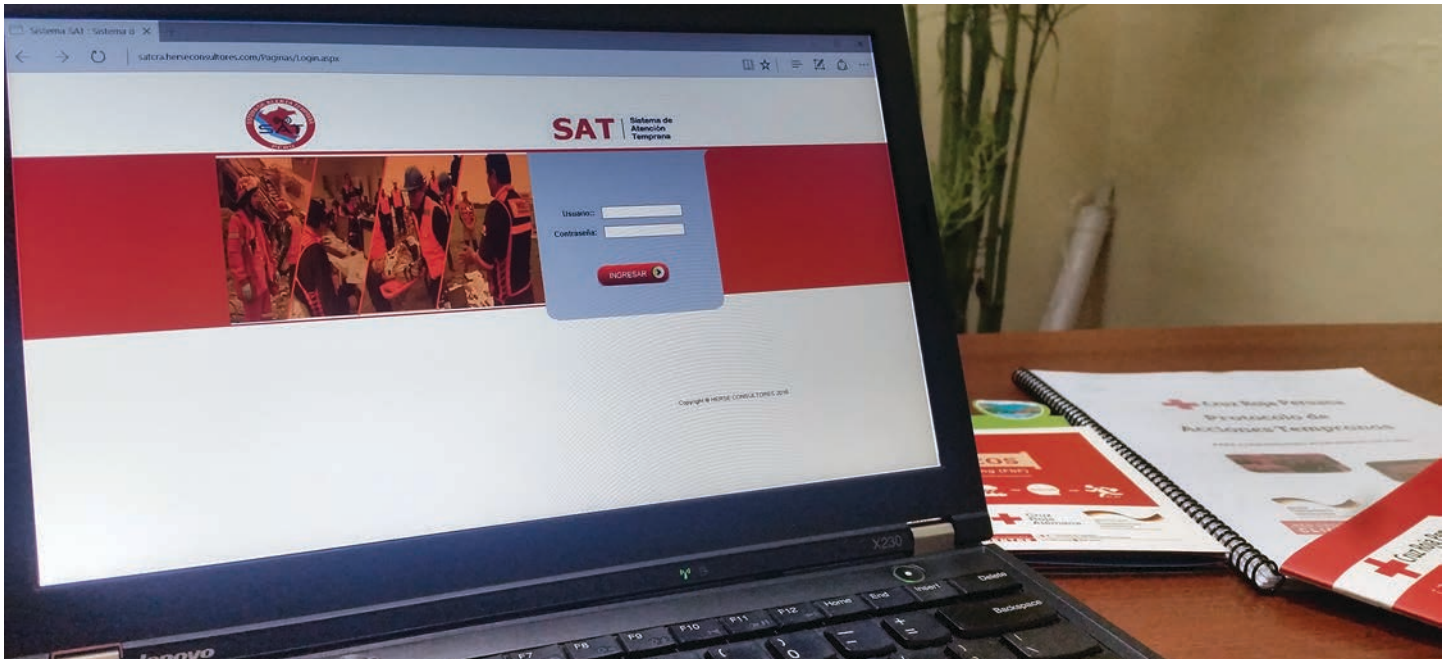


Early Warning to Early Action

Automatic Dissemination Mechanism

Contributions of the Red Cross to the construction of the National Network in Peru.

Forecast-based Financing Project (FbF)

Cruz Roja Peruana

German Red Cross

german humanitarian assistance
DEUTSCHE HUMANITÄRE HILFE

RED CROSS/RED CRESCENT CLIMATE CENTRE

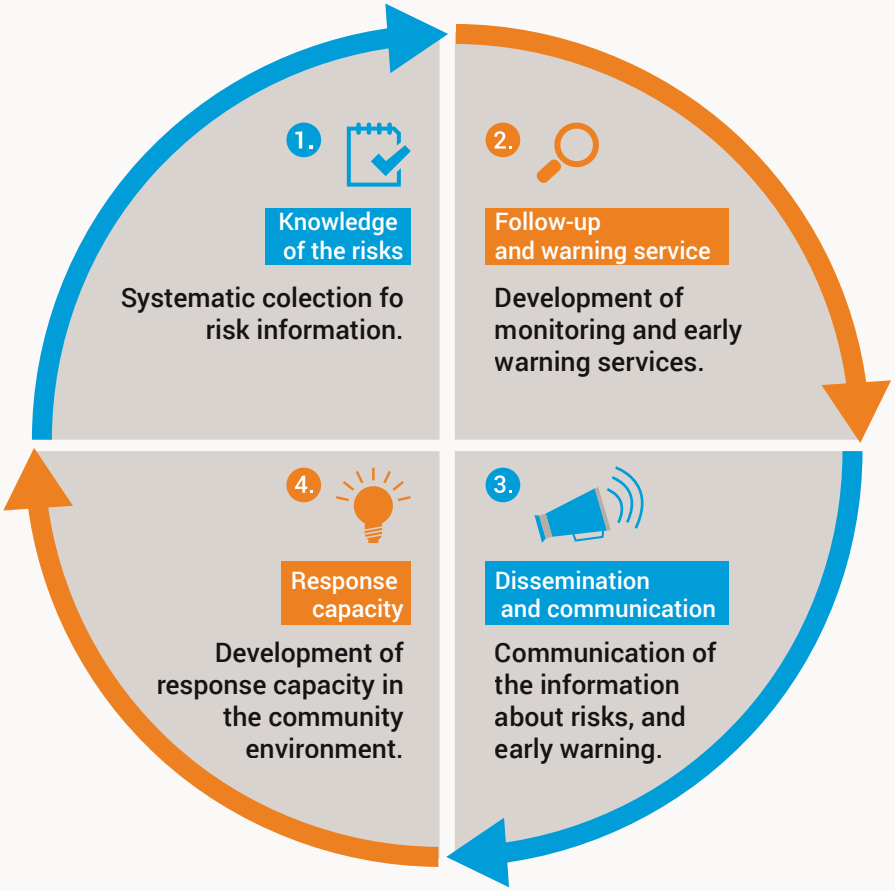
International Federation of Red Cross and Red Crescent Societies

The Netherlands Red Cross

WHAT IS AN EARLY WARNING SYSTEM (EWS)?

An EWS is the total of capacities needed to generate and disseminate timely and significant warning information with the objective to allow people, communities and organizations facing disaster risks to prepare themselves and to act appropriately and with sufficient lead time to reduce damage and loss [1]. EWS are part of the disaster preparation process and are ideally based on a multi-hazard focus.

A complete and effective early warning system includes four interrelated elements, from knowledge of the risks, follow-up and warning, dissemination and communication, to preparation and response capacity[2]. Early warning systems based on best practices also establish sound internal relations and provide effective communication channels between all their elements.



Source: ISDR. EWC III. Third International Early Warning Conference. Development of Early Warning Systems, 2006.

The National Early Warning Network in Peru

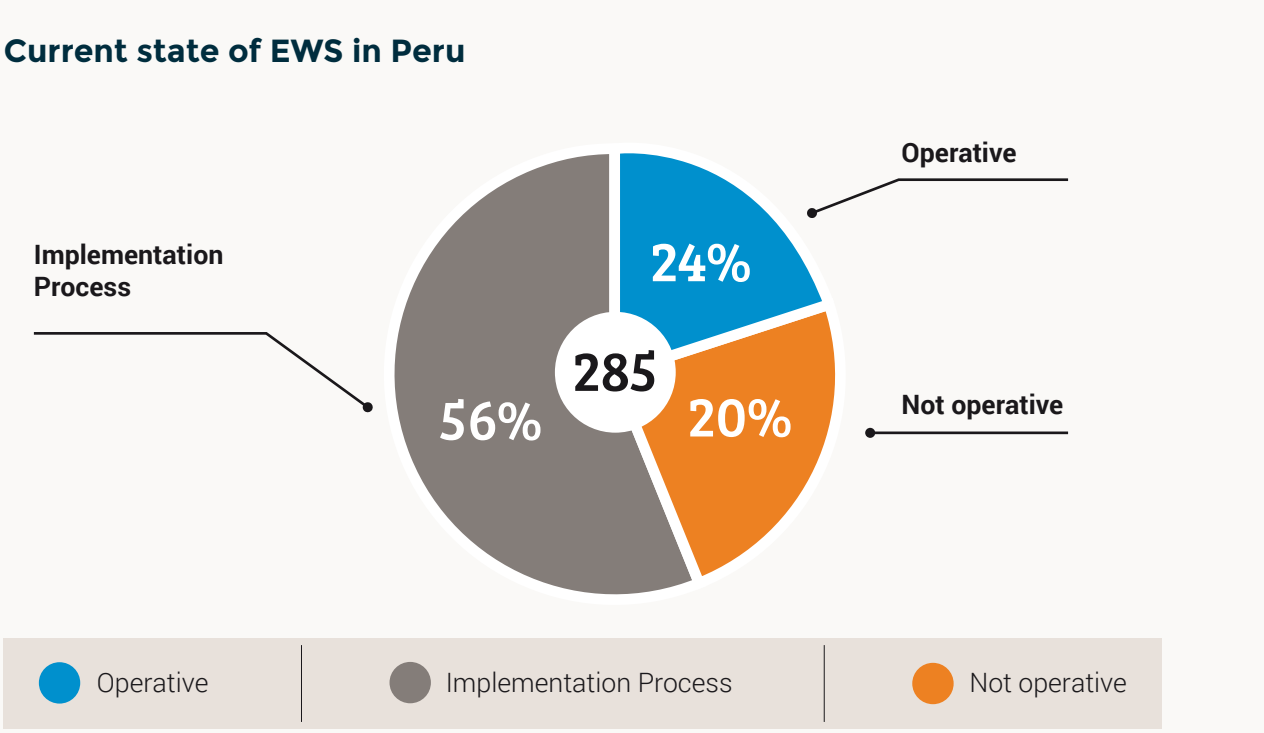
The National Early Warning Network (Spanish Abbreviation: RNAT) was constituted via Ministerial Resolution in 2015 (M.R. # 172-2015-PCM[3]). Since then, the network has had two guidelines for its conformation and functioning. The National Civil Defense Institute (INDECI) is responsible for drawing up policies and management tools for the follow-up and monitoring of the early warning systems.

The National Early Warning Network (RNAT) includes four main components (1. Knowledge and permanent real-time surveillance of hazards, 2. Follow-up and warning, 3. Dissemination and communication, 4. Response capacity), and it is deployed at a national, regional, provincial, district and community level.

1. IFRC, guiding principles of community early warning systems, 2012.
2. UNISDR, EWC III. Third International Early Warning Conference. Development of Early Warning Systems, 2006.
3. Ministerial Resolution, July 10, 2015 Guidelines for the implementation of the Permanent Warning Service (SAP) in the entities forming part of the National Disaster Risk Management System SINAGERD.

A look at the Early Warning Systems in Peru

In Peru, there are EWS experiences for floods, cold waves, landslides, removal of glacier mass, tsunamis, among others. In 2015, INDECI registered 285 installed Early Warning Systems, only 68 of which are operative. 75% of the systems in the country work with information gathered at community level[4].



Source: INDECI 2015. Number of early warning systems installed in Peru.

Challenges:

There are more and more disaster risks, and the number of operational EWS which have been adapted to warn the population is not sufficient yet.

Considering the increasing frequency of disasters in Peru, it is necessary to develop early warning systems which adapt themselves to any context and effectively activate early action.

The new National Early Warning Network has the opportunity to integrate sound relations and an effective communication between the 4 components. This is even more important if we consider the high disaster risk and probability in Peru and the fact that the number of EWS in the country is still insufficient. Currently, there are numerous high-risk areas with multiple hazards, but the majority of EWS focus on only one. In the case of community EWS, the (majority of) data they provide are processed manually instead of automatically, which is why it is not easy to send a warning on time.

4. Technical guide for the implementation of community EWS. INDECI.

CURRENT WARNING DISSEMINATION

From scientific forecast to the emission of warnings to the community

Technical-scientific institutions like ANA, DHN, IGP, INGEMMET and SENAMHI[5] emit information and forecasts. This information is valuable, as it serves to notify and warn risk management institutions (DRM[6]) and the population. These technical-scientific entities send the data to the National Emergency Operation Center (COEN) at INDECI, which can emit a warning (depending on the predetermined danger levels) to activate communication about the event.

After that, the responsible authorities of the Operation Centers at a regional, provincial and district level, with the support of the Decentralized Offices of INDECI, activate their protocols (action and coordination) to notify the population of the hazard through the available media (radio, horns, phone, motorcycles, among others).

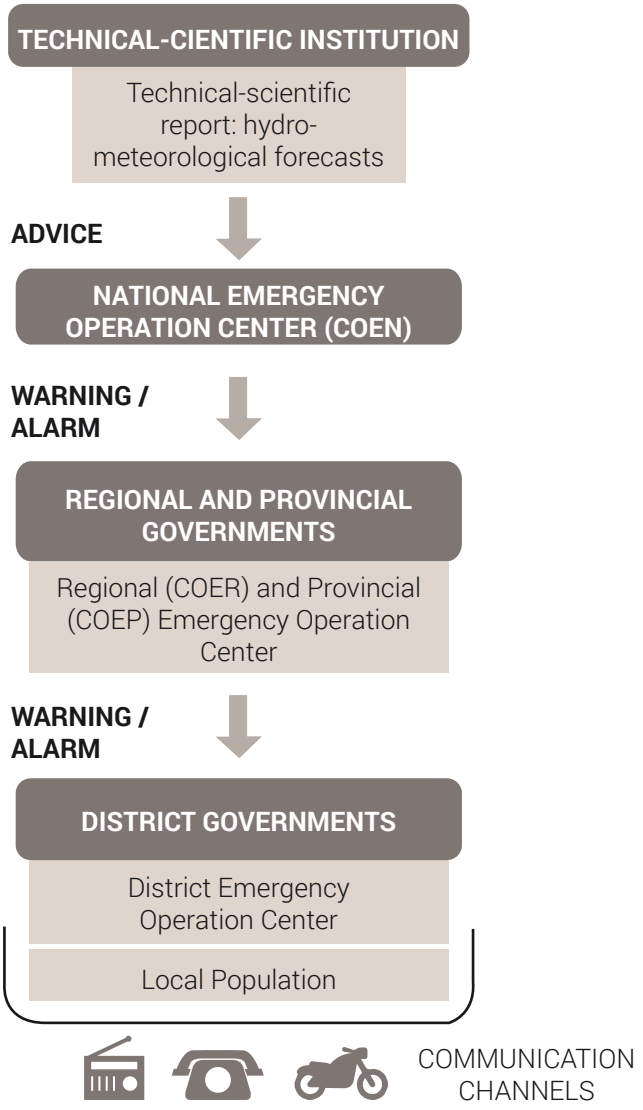
ADVICE
Drawn up by the technical-scientific organizations. Provides information about the event (time, magnitude, duration)

WARNING
The type of communication emitted to the population so they can take precautionary measures due to the 'possible' occurrence of a disaster which might affect a particular area.

Activates local or national contingency plans and early action protocols.

ALARM
The type of communication emitted to the population so they take immediate action due to the 'imminent' occurrence of a disaster which might affect a particular area.

Activates emergency operation plans.



Source: Workshop with INDECI, SENAMHI, Red Cross, April 2016. Current chain of warning dissemination.

5 National Water Authority; Direction of Hydrography and Navigation; Peruvian Geophysical Institute; Institute for Geology, Mining and Metallurgy; Peruvian National Meteorological and Hydrological Service.
6 Disaster Risk Management

Challenges

INDECI, SENAMHI, COER Puno and the Red Cross jointly identified the following **challenges of the current dissemination process**[7].

1. **FASTER DISSEMINATION:**
   The transmission of hydro-meteorological advice between institutions, for example about cold waves, can take too long. Therefore, it might happen that the end user (the community) is not informed about the event before it actually occurs and cannot take adequate preparatory action.

2. **SHORTER RESPONSE TIME:**
   Warning or alarm via radio or phone. There is no feedback system yet which indicates whether or not the community has received the information so people can execute their early action protocols.[8]

3. **IMPROVED PRECISION OF THE FORECAST:**
   Hydro-meteorological advice are generally emitted at a regional and departmental level. However, the capacity of technical-scientific entities to make more precise forecasts is continuously increasing[9], which is why decision-making and warning can be more effective.

7 Workshops with INDECI, SENAMHI, COER Puno, Red Cross in Lima and Puno on April 12 and May 11, 2016.
8 It must be recognized that INDECI and the Japanese Agency for International Cooperation (JICA) are making great efforts to coordinate an EWS for tsunamis in the coastal area with early warning committees at community level. It will be necessary to broaden these efforts to include other areas and diverse hazards.
9 The Red Cross and SENAMI improved the resolution of the cold wave forecast models in Puno.

MECHANISM FOR THE AUTOMATIC DISSEMINATION OF WARNINGS

Software as a tool of the mechanism and the National Early Warning Network

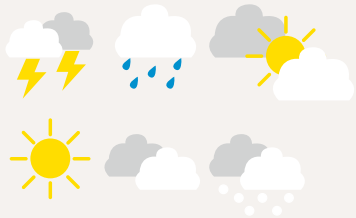
The Red Cross and INDECI[10] have developed **an automatic early warning dissemination mechanism and a software to make it operational.** The software works automatically, generates warnings and immediately sends emails and text messages to all players involved.

The software is designed to be an effective tool of the RNAT (National Early Warning Network) in Peru. It is also conceived for use at a multi-hazard countrywide scale. It is a unique tool to **facilitate anticipatory decision-making and to quickly activate early action protocols.**

In the course of the year 2016, the mechanism, as well as the software, were already implemented experimentally in Puno in the context of the **Forecast-based Financing** project of the Red Cross. The software runs on the INDECI servers and is ready to be used on a larger scale and for a variety of hazards.

Automatic submission

1. The **technical-scientific entities** gather and generate scientific data on a particular geographical area



2. Based on this work, the data are processed to generate files with forecasts and information.

Automatic detection

3. At **INDECI**, the software is permanently capturing the files it receives from the diverse scientific entities.

4. ...until it detects data which coincide with the danger levels (critical thresholds) previously established and entered into the software.

10 The technical work was done with the support of HERSE Consultores.

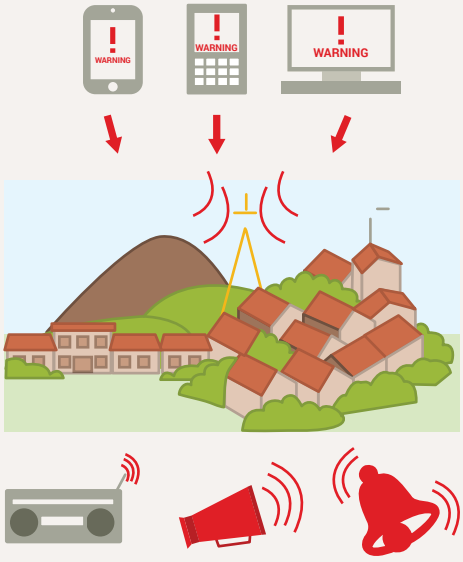
How does the software work?

The technical-scientific organization (SENAMHI) makes the information on the forecasts directly available to the software without any need to draw up a report. The software verifies whether the thresholds are exceeded. If this is the case, it **automatically sends an advice or a warning by email, and a text message** to the players involved (Civil Defense, humanitarian players, local governments and the population of the area) so they activate their early action protocols. They can also increase the resilience of the community before a disaster occurs, thus diminishing the impact of the event.

In order for the software to work correctly, it is necessary to first establish the **danger levels** (or critical thresholds). They can vary from institution to institution or from one geographical area to another, and they can warn at a macro or a micro level. Besides, the software allows the inclusion of field observations, for example the water level in the upper basin of a river, to be able to warn the communities in the lower basin.

Automatic dissemination

5 Now is the moment that the **early warning entities** (COEN, regional government, COER, regional INDECI office, Red Cross, mayors, local EWS and community leaders) are notified via text message and email.



Activation of action protocols

6 When they receive the messages, **the entities involved and the population** in general activate their (early) action protocols in order to increase institutional and community resilience and reduce the impact of the event.

WITHOUT THE MECHANISM

1 to 4 hours (APPROX.)

- **Manual** analysis of information
- Elaboration of a map
- **Manual** elaboration of a advice
- Approval of the advice

ADVICE

TECHNICAL-SCIENTIFIC ENTITY

Technical and scientific report: hydro-meteorological forecasts

1 to 3 hours (APPROX.)

- Reception of advice
- **Manual** analysis of information
- Elaboration of a warning or alarm according to INDECI danger levels
- **Manual** submission of a warning or an alarm

NATIONAL EMERGENCY OPERATION CENTER (COEN)

WARNING ALARM

REGIONAL AND PROVINCIAL GOVERNMENTS

Regional (COER) and Provincial (COEP) Emergency Operation Centers

WARNING ALARM

1 a 3 days (APPROX.)

- Communication and coordination with the next lower decentralized level depending on the available tools

DISTRICT GOVERNMENTS

District Emergency Operation Center

COMMUNICATION CHANNELS

SOURCE: Red Cross, 2015. Comparative scheme of the current information chain and the one proposed by the FbF project in Peru.

The mechanism allows us to gain time to act before the disaster occurs

Before the implementation of the automatic warning dissemination mechanism, the process took between 1 and 3 days[11]. Currently, with the mechanism in place, the activation of the Early Warning System is possible in as little as one hour, with all players

11 Workshop with INDECI, Red Cross, SENAMHI, COER Puno, April-May 2015

WITH THE MECHANISM

TECHNICAL-SCIENTIFIC ENTITY

Technical-scientific information, hydro-meteorological forecasts

- Provides information to EWS in **REAL TIME**

30 min.

WARNING ALARM

- **AUTOMATIC** use of forecasts.
- Predefined application of THRESHOLDS.
- **IMMEDIATE** MESSAGING via EMAIL and TEXT MESSAGE

IMMEDIATE

National Emergency Operation Center (COEN)

POPULATION OF THE AREA

Regional Emergency Operation Center (COER)

Provincial Emergency Operation Center (COEP)

- **IMMEDIATE** activation of the local early action protocols before the event occurs.

IMMEDIATE

DISTRICT GOVERNMENTS

District Emergency Operation Center (COED)

ACTIVATION OF LOCAL EWS

- District / community EWS can provide OBSERVATION DATA to the software.

IMMEDIATE

and beneficiaries notified. This means **'gaining an opportunity' to be prepared beforehand** if an extreme event occurs, so that the action protocols can be activated and the inhabitants can protect themselves.

OPPORTUNITIES

ESTABLISHING THRESHOLDS AT A DECENTRALIZED LEVEL

The software offers humanitarian players such as INDECI, UN-OCHA (United Nations Office for the Coordination of Humanitarian Affairs), WFP (World Food Program), WHH (Welthungerhilfe), OXFAM or the Red Cross the opportunity to act before the disaster occurs, using their own thresholds. The Red Cross, for instance, can (for example, the Red Cross can act and activate their protocols when snow levels in a district reach 40cm, while INDECI already acts with snow levels of 20cm^2). It will be key to involve the relevant players at district level in the establishment of these thresholds, which would allow the warnings to be much better adapted to the local context. The software would be a tool to ensure to that the text messages can get directly to the 'end users' in the districts where the necessary early action protocols can be activated.

USING THE SOFTWARE AS A MULTI-HAZARDS TOOL

The Red Cross implemented the pilot initiative for 2 hydro-meteorological hazards in Puno: cold waves and snowfall. However, other hazards can be considered: tsunamis, landslides, floods, cold wave, extraordinary rainstorms etc. The use of the Early Warning Software and the continuous revision of threshold and information from the members of the National Early Warning Network are key to the sustainability of the software as a multi-hazard tool at a national, regional and local level.

USING NEW TECHNOLOGIES

First of all, the SISMATE 30472[12] law, approved on June 27, 2016, is an opportunity for the Early Warning Software with regard to the submission of text messages to all people in the area which is likely to be affected. Secondly, the software allows for the use of ITC technology and also a greater real-time integration of more complex hydro meteorological models and field observations.

12 Retrieved in September 2016 on:
http://busquedas.elperuano.com.pe/normaslegales/ley-que-dispone-la-creacion-implementacion-operacion-y-man-ley-n-30472-1397744-1/

LINKING WARNINGS WITH TIMELY EARLY ACTION

The International Federation of Red Cross and Red Crescent Societies (IFRC) emphasized in its publication "Early Warning, Early Action"[13] that an EWS is only effective if it results in the activation of early action. Also, it points at the importance of having (1) information disseminated on time, (2) appropriate action to save lives and reduce diseases and (3) early action protocols (SOP) which help implement early action.

It is fundamental to have an operational unit for complementary early actions. Both the Red Cross (National Disaster Intervention Team[14]) and INDECI have such rapid deployment structures down to the most decentralized level.

LINKING ACTION TO FINANCING

The Early Warning and Early Action System needs a financing mechanism to trigger early action. In Peru, the Ministry of Economy and Finance shows a willingness to use climate information for anticipatory decision-making and forecast-based action (for instance the response to EL NIÑO signals 2015-16). Also at an international level, the German Ministry of Foreign Affairs is financing 'Forecast-Based Financing' projects in order to accelerate the execution of early action prior to an extreme event.

This paradigm shift will be an opportunity at a global level to strengthen the information and early warning/action systems.

13 Early warning Early action. International Federation of Red Cross and Red Crescent Societies, 2008.
14 Look up at IFRC, Setting Up a National Disaster Preparedness and Response Mechanism, 2010.

CONCLUSIONS

There are three innovative elements which can improve the effective, rapid and appropriate dissemination of information in the context of the experience obtained with the Red Cross' FbF pilot project in Puno, where the software was implemented:

Automation facilitates rapid and real-time communication of information among the technical-scientific institutions, risk management institutions and the population.

The introduction of **critical-thresholds** (necesarily related to the levels of danger caused by hazards and idealy specific to each district), providing the opportunity to take anticipatory decisions and thus gain time.

The Early Warning Software allows the use of filters so that **the text messaging system** communicates directly with the relevants actors: decision-makers, humanitarian players and the population in an appropriate period of time.

TECHNICAL, SCIENTIFIC AND COORDINATION TEAM

German Red Cross
Mathieu Destrooper
m.destrooper@drkamericas.de

Peruvian Red Cross
Marcia Puell
direccion.ejecutiva@cruzroja.org.pe

Climate Centre
Juan Bazo
Bazo@climatecentre.org

Peruvian Red Cross
Juan Carlos Melgar
eni001@cruzroja.org.pe

Communication Coordinator: Arlene Villanueva

Design and layout: Javier Domínguez | Juan José Vásquez