Forecast-based Financing

Changing the paradigm, acting faster

El Niño in Peru

Cruz Roja Peruana

German Red Cross

german humanitarian assistance
DEUTSCHE HUMANITÄRE HILFE

RED CROSS/RED CRESCENT CLIMATE CENTRE

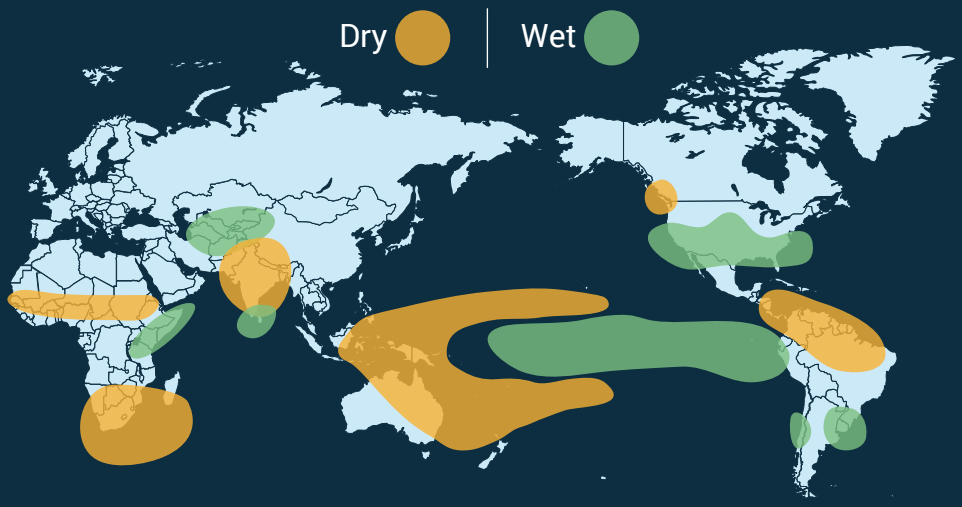
International Federation of Red Cross and Red Crescent Societies

The Netherlands Red Cross

WHAT IS EL NIÑO?

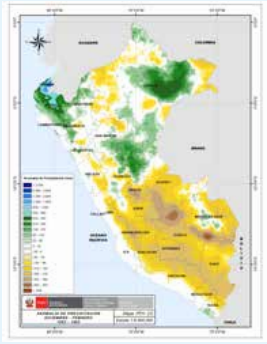
El Niño is a complex interaction of the tropical Pacific and the atmosphere, resulting in cyclical episodes (every four to seven years) of changes in ocean and weather patterns in many parts of the world. Often these episodes have considerable impacts occurring over several months, such as altered marine habitats, rainfall, floods, droughts and changes in storm patterns.[1]

El Niño and rainfall[2]



Historical impact of El Niño event in Peru[3]

El Niño 1982-1983 | Impacts



Economic **losses**:
US$ 7,500 m.

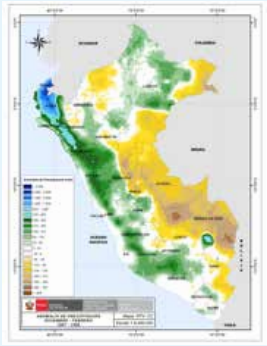
Loss of GDP: **-12%**

512 deaths

Homes **destroyed:**
98,000

1'267,720 people affected

El Niño 1997-1998 | Impacts



Economic **losses**:
US$ 3,500 m.

Loss of GDP: **-5%**

366 deaths

Homes **destroyed:**
42,342

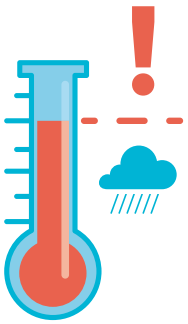
531,104 people affected

In both the 1982-1983 and 1997-1998 El Niño, northern Peru (Tumbes, Piura and Lambayeque) suffered flooding from heavy rains, while the south of the country suffered severe droughts. In this context, the Peruvian Red Cross (PRC), the German Red Cross (GRC) and the Red Cross Red Crescent Climate Centre, designed a project which uses scientific (observations and forecasts) to implement early action in the most vulnerable areas. Forecast-based financing (FbF) is still in its pilot phase, and the latest 2015-16 El Niño was one of the first applications of the mechanism.

1 Definition taken from UNISDR | **2** Taken from http://iri.columbia.edu/enso | **3** Information recorded by INDECI.

FbF CONCEPT

Some preparedness and humanitarian aid can be secured between a forecast and the impact of an event. Most hazards related to weather can be predicted. Thus, the humanitarian community can get information and know where and when to act, if a storm, flood or drought is expected.



FbF develops new processes and methodologies to prepare, deliver and respond in a more effective and efficient manner, based on national and international hydro-meteorological forecasts. It formulates defined danger levels and early actions. These actions are triggered when a forecast exceeds a danger level in a vulnerable intervention area (e.g. a specified amount of rain that make rivers and communities flood). Hence, actions can be taken before the impact of the disaster and strengthen resilience, of both communities and institutions.

Applying FbF during El Niño in 2015-2016 proved that you can establish a system that triggers the use of funds to implement preparedness actions before a predicted disaster occurs. In this way suffering and losses can be avoided, and aid funds more efficiently used. Moreover it improves resilience and community preparedness.

What do we want to change in the Peruvian context?

Historical data from 1982-1983 and 1997-1998, show that a strong El Niño has a great impact on health, drinking water, food security and housing. FbF seeks to act before the disaster, with early action to build and enforce resilience, reducing the impact of an El Niño Event and ensuring that basic needs are available at the time that families and communities need them most.

In which field do we take early action?

HOW IMPLEMENTED?

WHAT ARE THE KEY ASPECTS OF THE PROJECT?

1 To understand the risk scenarios

The risk scenarios are consulted to analysing threats including historical impact data and level of vulnerability.

2 To identify available forecasts

- Use of national and international data.
- Taking into consideration the probability, intensity and time prior to the occurrence of an event.

3 To formulate early actions

Such as:

- Awareness raising campaign on hygiene or safe drinking water
- Strengthening of houses.

4 To identify danger levels

- Define the threshold for a specific hazard.
- Identify the critical character, analysing vulnerability and the historical impact in the area of intervention.
- Consider institutional capacity to act.

Between August and September 2015, the Red Cross, local government, disaster risk management authorities (INDECI and CENEPRED), the Met Office (SENAMHI) and agencies in the health, agriculture, housing and transport sectors, jointly analysed risk scenarios, historical impact and vulnerability. As a result, relevant early actions were selected. The project also defined very specific danger levels based on thresholds of available forecasts, historical data and vulnerability in the intervention area.

5

To create a Standard Operating Procedure (SOP or early action guidelines)

This includes:

- Responsibilities
- When to act
- Where to act
- Funds to be made available

6

Validate SOP with key actors

- Met. service
- Local governments
- Members of the national disaster risk management system.

Monitoring hydro meteorological forecasts

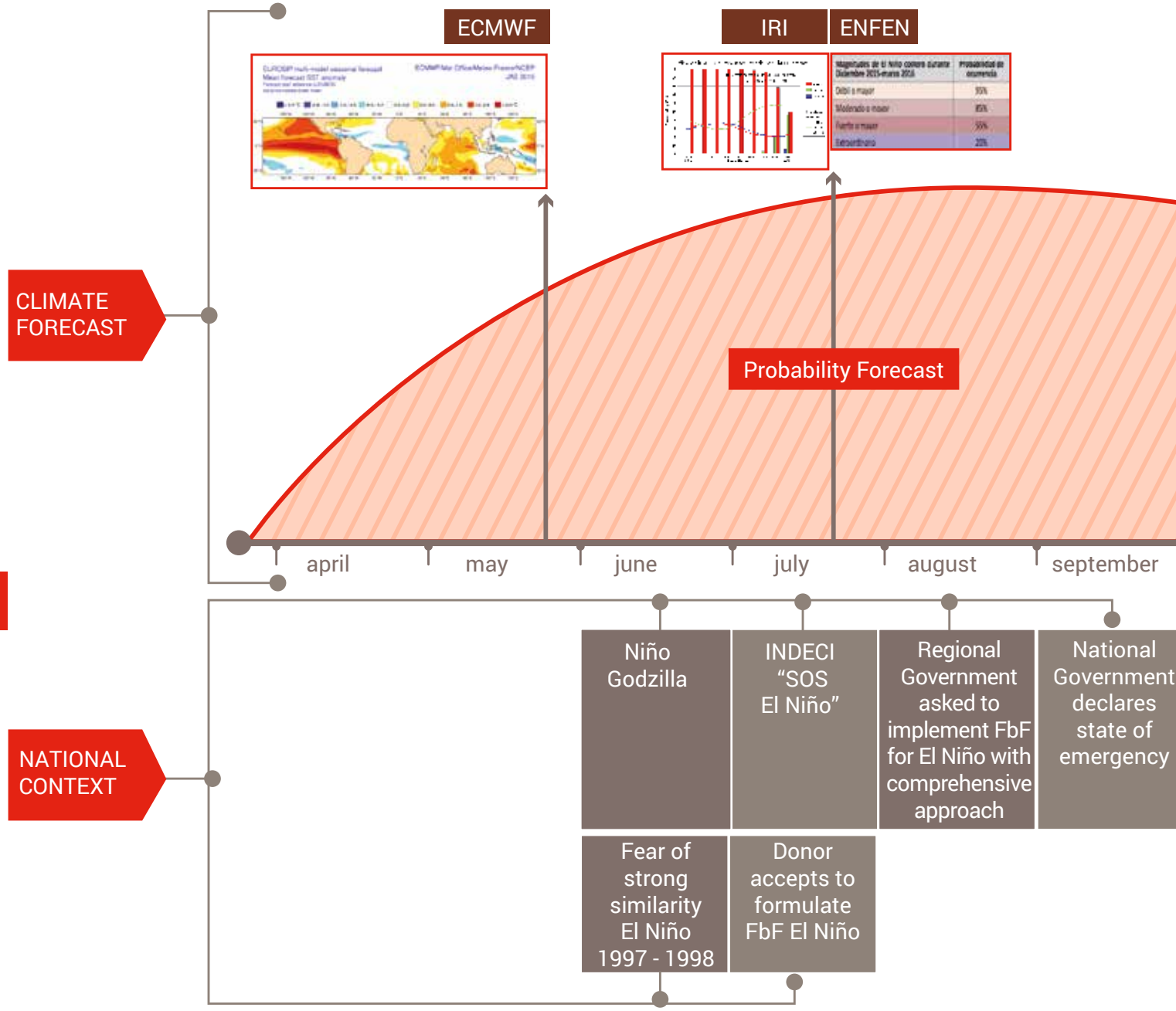
YES
The danger level is exceeded

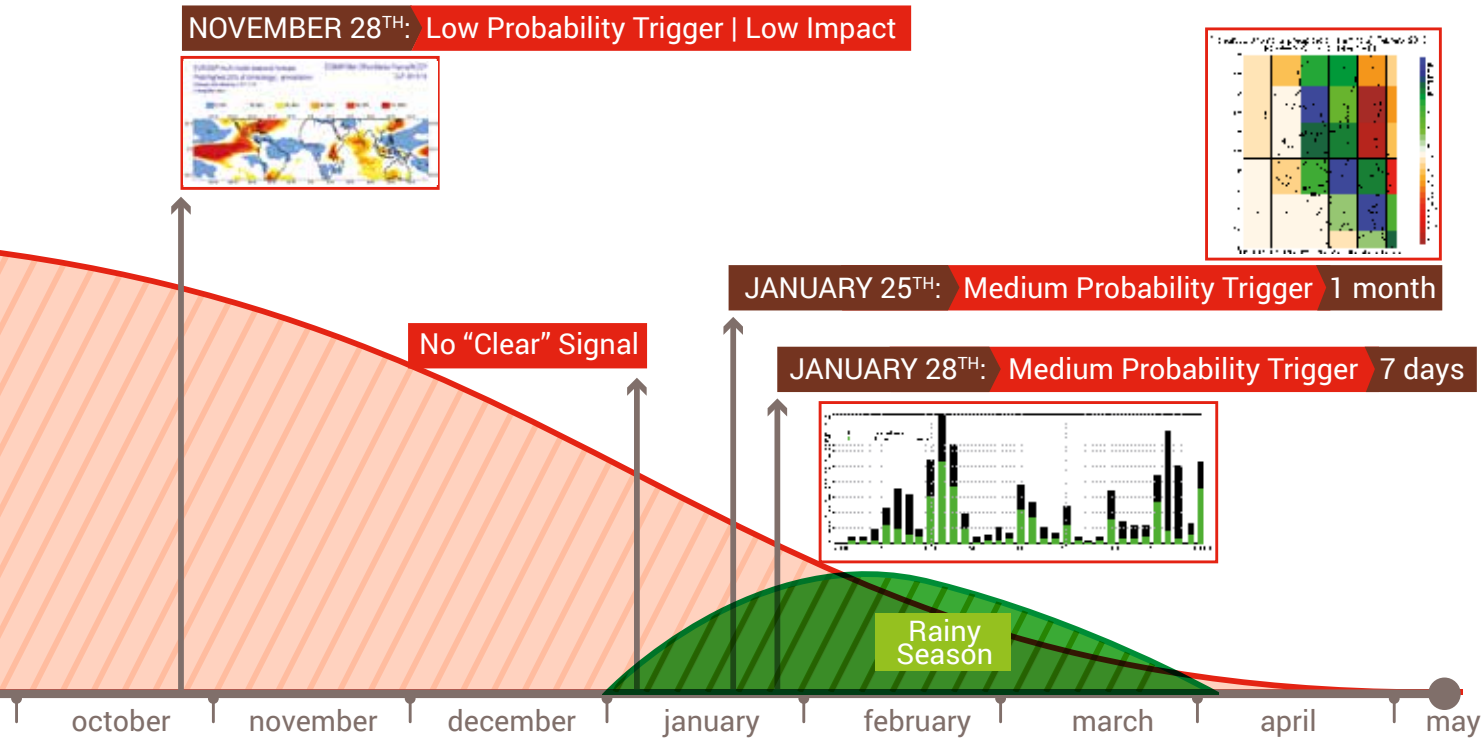
Early actions are to be implemented *(according to the SOP)*

No
The danger level is not exceeded

No early actions are to be implemented

EL NIÑO 2015-2016
FBF TIMELINE





Identifying of hazard levels

Deployment field team

Training on key practice volunteers.
Awareness raising in community
Establish brigades in the communities for early warning and First Aid

Start of purchasing process

Start cons-truction and reinforcement housing process

Kit distribution on water and hygiene

FROM SCIENCE...

The next matrix shows forecasts of various national and international sources (EU, CFS NOAA, NOAA GFS-ENFEN-PERU, IRI-Columbia University, Eurosip- ECMWF, GloFAS), organized by time of forecast, impact and probability, according to the levels of danger to the population. The arrows indicate how forecasts could be translated into actions that could be triggered, if danger levels were exceeded.

PROBABILITY / IMPACT	Lead time: Seasonal	Lead time: Monthly	Lead time: Weekly
Low	• El Niño 1+2 SST* anomaly: 2˚C • ENFEN: 10% probability of 'extraordinary' • IRI: 20% probability of top 10% precipitation • EUROSIP: 40-50% probability of top 20% precipitation	• Forecast precipitation 1 month (NOAA.CFSv2) (4-6 mm/day anomaly)	
Medium	• Niño 1+2 SST* anomaly: 2.5˚C • ENFEN: 15% probability of 'extraordinary' • IRI: 30% probability of top 10% precipitation • EUROSIP: 50-70% probability of top 20% precipitation	• Forecast precipitation 1 month (NOAA.CFSv2) (6-10 mm/day anomaly)	• 66% probability of excee-ding the 10 year return period threshold of GloFAS* model (for Bajo Piura) • Forecast precipitation: Percentile 85 of ECMWF and GFS –NOAA (> 20mm/day absolute values (Piura and Lambayeque)
High	• El Niño 1+2 SST anomaly: 3˚C • ENFEN: 20% probability of 'extraordinary' • IRI: 40% probability of top 10% precipitation • EUROSIP: 70-100% probability of top 20% precipitation	• Forecast precipitation 1 month (NOAA.CFSv2) (10 or + mm/day anomaly)	• 68% probability of exceeding the 10 year return period threshold of GloFAS* model (for Bajo Piura) • Forecast precipitation: Percentile 93 of ECMWF and GFS –NOAA (> 30mm/day absolute values) (Piura and Lambayeque

***SST:** Sea Surface Temperature

***GloFAS:** Global Flood Awareness System

...TO ACTION

The FbF project builds a bridge between scientific information and early action, firstly to use available forecasts effectively, then to take actions and make decisions to be better prepared for disasters and increase resilience to floods and heavy rain.

PROBABILITY / IMPACT

Lead time

Surface sea water is warmer (>2ºC) and a lot more rain than normal (P90).

Community awareness brigades and installation of early warning.

Wetter than normal (>4mm/day).

Community awareness and installation of brigades for early warning.

Surface sea water is warmer (>2.5ºC) and a lot more rain than normal (P90).

- Equip 18 units of first aid
- Provide drinking water for 2,000 families;
- 2000 assist families in healthcare
- Strengthen and protect homes at risk of collapse for 300 families

Wetter than normal (>6mm/day).

- Equip 18 first aid units Provide drinking water for
- 2,000 families
- Strengthen and protect homes at risk of collapse for 300 families.

66% chance of flood (Glofas) or very heavy rainfall with short-term forecasts (>20mm/day)

- Distribution of buckets, chlorine, instalation of water reservoirs, temporary water tanks, distribution of hygiene kit.

Surface sea water is warmer (>3ºC) and a lot more rain than normal (P90).

Provide communities with 100 temporary housing for 100 families. Support for seed storage.

A lot more rain than normal (>10mm/day).

Provide communities with 100 temporary housing for 100 families. Support for seed storage.

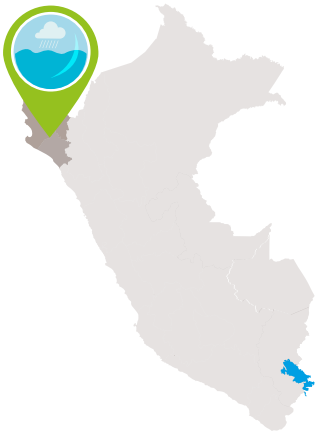
68% chance of flood (Glofas) or very heavy rainfall with short-term forecasts (>30mm/day).

(Early) evacuation.

HUMANITARIAN EL NIÑO INTERVENTIONS

WHY USE FORECASTS IN LAMBAYEQUE AND PIURA?

- In 1982/1983 and 1997/1998, El Niño led to severe impacts in this region, causing significant great loss of life, infrastructure and crops.
- The level of preparedness in communities remains low.



2000 families Approximately

18 communities

GENERAL PREPAREDNESS AT THE BEGINNING OF THE SEASON

- **40** volunteers trained from Peruvian Red Cross branches.
- **18** vulnerability and capability assessments conducted.
- **18** early warning established committees.
- SOP confirmed by key actors.

10

FORECAST

3 MONTHS lead time

If the forecast exceeds the danger level

The following early actions will be implemented with low or medium probability:

- **2000** families will receive awareness raising sessions on water and hygiene.
- **18** community brigades will be constituted, equipped and trained.

In case of an extreme weather forecast event with high impact

The following early actions will be implemented:

- Build **1000 shelters.**
- Build **1000 latrines.**
- Provide assistance to store **seeds and food items**

1 MONTH lead time

If the forecast exceeds the danger level

The following early actions will be implemented with medium probability forecast:

- Distribute **18** first aid kits.
- Preposition **2000** buckets and chlorine tablets
- Preposition **06** 15lt water tanks each.
- Preposition **1000** hygiene kits.
- Fumigate **18** communities.
- Reinforcing **300** houses.

7 DAYS lead time

If the forecast exceeds the danger level

The following early actions will be implemented:

- Distribute **1000** buckets, chlorine tablets and hygiene kits (for 1 family during 1 month)

CONCLUSIONS

Forecast-based financing for El Niño in Peru is a unique initiative with an innovative approach. The use by the Red Cross of probabilistic forecasts for humanitarian early action is a first in Latin America. It is worth exploring what possibilities FbF can offer for other hydrometeorological events, and whether the probability, the impact, or the intensity of event, or a combination of all three, is important to consider.

Although, scientific signs predicting El Niño are improving, the local and international scientific communities still face a challenge to achieve forecast accuracy on both the probability and intensity of the phenomenon. It also remains extremely challenging to predict how it will influence local weather patterns.

In 2015-2016, El Niño in Peru was not a strong or extreme event. It should be noted that not all El Niños are equal, and a single El Niño does not impact in all places with the same intensity. In 2016 Argentina, Paraguay, Uruguay and Brazil suffered heavy rains and flooding, while in Colombia, Venezuela and much of Central America suffered severe droughts.

Some actions were taken in vain, but most were beneficial in the long run, contributing to building the capacity for early action of the National Society and local communities. The project also improved the housing stock. Moreover, in very vulnerable rural areas, awareness raising was done in the field of health, safe drinking water, and hygiene and early warning. These are long-term benefits that increase resilience and contribute to being prepared for other events.

Droughts associated with El Niño and La Niña do not appear overnight. A combination of observation (e.g. sea-surface temperature) and forecasts with a longer lead-time provide humanitarians with several months' advance warning.

FbF interventions in Piura and Lambayeque will be measured through an impact study and analysed in an inter-agency workshop. Lessons will be identified and guidelines developed to scale up FbF in other countries and for other hazards.

TECHNICAL AND COORDINATION TEAM

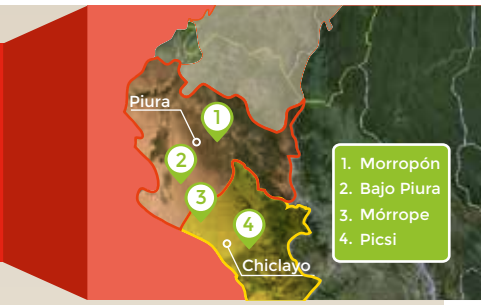
German Red Cross
Mathieu Destrooper
m.destrooper@drkamericas.de

Red Cross Climate Centre
Juan Bazo
Bazo@climatecentre.org

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

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

THE MECHANISM OF FORECAST-BASED FINANCING IN EL NIÑO IN PERÚ



> Community **awareness** campaigns.

> **Distributing** equipment and **first aid kits**.

> Strengthening and protecting **housing.**

> **Humanitarian aid** prepared.

DEVELOP EARLY ACTION

IDENTIFYING DANGER LEVELS

> Climate **threshold** defined.

> The **critical danger level** was identified by analysing the vulnerability and impact in the **target area.**

> It took into account the capacity of **institutional performance.**

MONITORING FORECASTS IF DANGER LEVELS WERE EXCEEDED

3 MONTHS LEAD TIME

FORECASTED AND TRIGGERED

- ✓ WATER IS WARMER > 2°C THAN NORMAL.
- ✓ LOT MORE RAIN THAN NORMAL AND POSSIBLE FLOODS.

2000 families will receive awareness raising sessions

40 trained volunteers

18 community brigades will be constituted, equipped and trained

1 MONTH LEAD TIME

FORECASTED AND TRIGGERED

- ✓ > 6 TO 10 MM OF RAIN PER DAY.

18 first aid kits were distributed

300 reinforced houses

2000 families could access to clean drinking water

7 DAYS LEAD TIME

FORECASTED AND TRIGGERED

- ✓ > 20 MM OF RAIN PER DAY.

1000 families access to clean drinking water in Piura

1000 hygiene kits

3 MONTHS LEAD TIME

WAS NOT FORECASTED

- ✗ > 30 MM OF RAIN PER DAY.
- ✗ FLOODS CAUSED BY RIVER OVERFLOW.

100 shelters built

Provide assistance to store seeds and food items

Cruz Roja Peruana

German Red Cross

RED CROSS/RED CRESCENT CLIMATE CENTRE

International Federation of Red Cross and Red Crescent Societies

The Netherlands Red Cross

german humanitarian assistance

DEUTSCHE HUMANITÄRE HILFE