Linking seasonal forecasts with disaster preparedness in the Pacific

From information to action

Left - Islands of Samoa, Benoit Matsha-Carpentier/IFRC (2013). Right - Inundation in Kiribati, Teresa Bass/New Zealand Red Cross (2015).

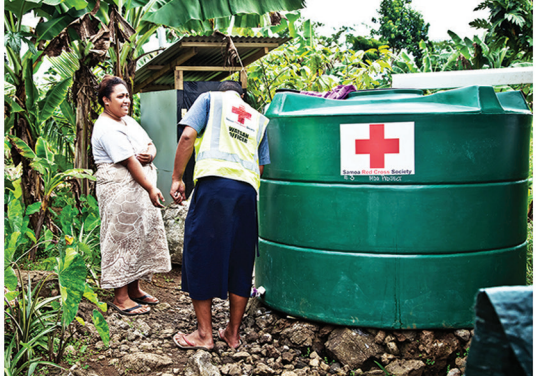
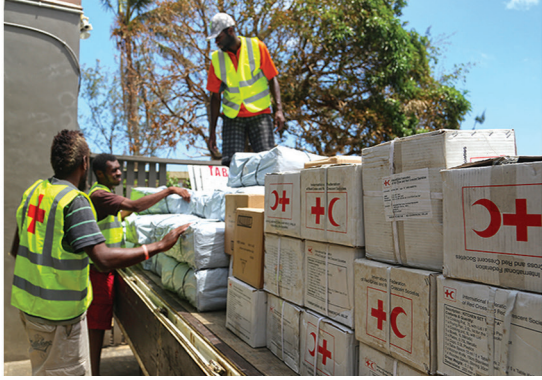
The Australian Bureau of Meteorology and the International Federation of Red Cross and Red Crescent Societies have produced a **Seasonal Rainfall Watch** to encourage Pacific Red Cross disaster managers to make use of seasonal scale rainfall forecasts in preparedness planning.

With this information at hand, they will be better prepared to respond early and help better manage droughts and prolonged wet periods.

The importance of rainfall forecasts in small island developing states

Limited water collection and storage infrastructure make many Pacific Island countries highly vulnerable to drought. On the other end of the scale, prolonged wet periods are often associated with flooding, reduced agricultural production and disease. In the tropical Pacific, rainfall at seasonal and longer periods is strongly influenced by the El Niño Southern Oscillation, which brings us El Niño and La Niña events. This strong relationship makes reliable seasonal rainfall forecasts possible.

Each month, the Pacific Island National Meteorological Services issue seasonal forecasts for their countries, which are then discussed and summarised during a 'climate outlook forum' with the Australian Bureau of Meteorology.

Left – International Day for Disaster Reduction in Solomon Islands, Melissa Matthews (2011). Centre - water tanks for rainfall harvesting in Samoa, Benoit Matsha-Carpentier/IFRC (2013). Right – Cyclone Pam relief items in Vanuatu, Nina Svahn/Finnish Red Cross (2015)

Translating climate forecasts into disaster preparedness

In the past, seasonal rainfall forecasts for the next three months were sent to Pacific Red Cross disaster managers every month, but they contained language such as 'tercile forecast probability', 'confidence levels' and 'El Niño Southern Oscillation Index'. Some disaster managers had trouble understanding these meteorological terms, and weren't comfortable linking disaster preparedness measures with the forecasts being issued. Also, the same types of preparedness actions were being recommended regardless of the confidence or probability level of the forecasts.

The Bureau of Meteorology and the Pacific National Red Cross Societies have created a simple product that points to a colour-coded alert level depending on the chances of above or below average rainfall in the months ahead. On shorter time scales, such as hours and days, disaster managers consider risk and take actions according to predetermined levels – such as evacuating a community when a red alert is issued for a cyclone. This monthly product – known as the Seasonal Rainfall Watch - applies a similar approach to disaster risk management where alert levels can be linked to practical preparedness measures.

How important is 'confidence' in climate forecasting?

In seasonal forecasting, confidence levels basically refer to how much confidence there is that the forecast produced is what will actually happen. This is based on how well similar forecasts have gone in the past.

The probability of what will happen is often broken up into three different portions of 100% – called terciles – that represent how likely it is that conditions will be 'below normal', 'normal', or 'above normal'. The bigger the percentage assigned to the portion, the more likely it is to occur.

At certain times – such as during an El Niño or La Niña event – it is possible to produce seasonal forecasts with higher levels of confidence. Level of confidence and probability are two key ingredients that are important for decision makers to consider, but can be hard to understand.

The Seasonal Rainfall Watch for disaster managers

The Seasonal Rainfall Watch classes alert levels as low, medium or high, according to the level of confidence and probability of the seasonal forecast for above or below average rainfall (Figure 1). Every month seasonal forecasts are converted to alert levels where relevant and then grouped into a summary table that is sent to disaster managers (Figure 2).

This alert system is then linked to general preparedness measures that National Societies could take, based on the level of alert (Figure 3). The alert table uses the same information that is distributed locally by Met Services. However, since it is presented at the regional level, it can be used by disaster managers as a 'heads up' for increased risk levels of drier or wetter than normal conditions. The aim is for this alert to prompt further detailed discussions about the forecast situation between them and their Met Services. It also enables the Red Cross regional office to identify potential situations during which National Societies may request further support in coming months.

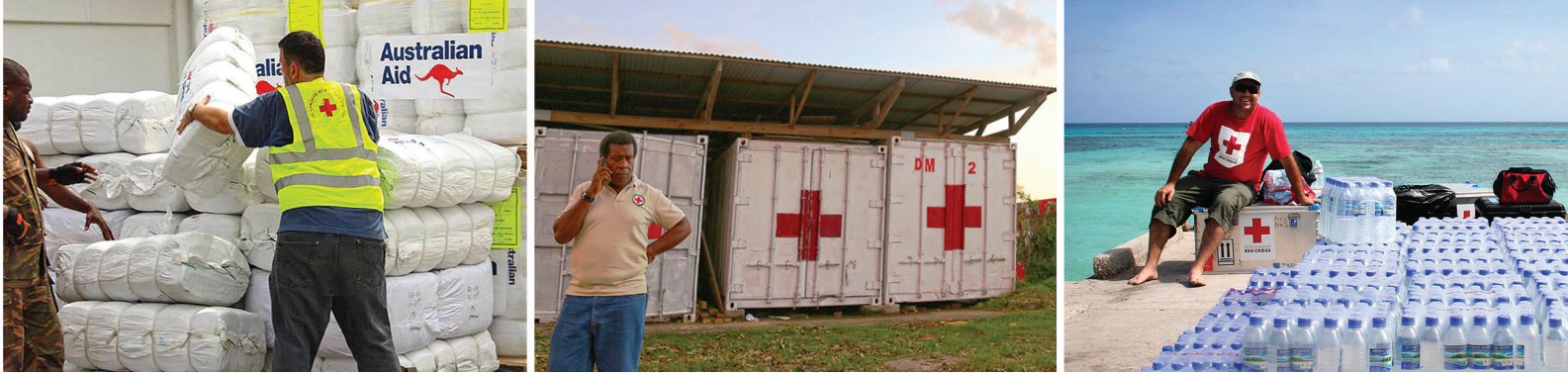
Rating Scale: Above Normal

Forecast Confidence	Tercile Forecast Probabilities (%)				
	39-44	45-50	51-54	55-59	60+
Low					
Low to medium					
Medium					
Medium to high					
High					
Very High					

Rating Scale: Below Normal

Forecast Confidence	Tercile Forecast Probabilities (%)				
	39-44	45-50	51-54	55-59	60+
Low					
Low to medium					
Medium					
Medium to high					
High					
Very High					

Figure 1. Rating scales for above normal rainfall and below normal rainfall. Alert levels are determined by the levels of probability and confidence of seasonal forecasts. The greater the chances of below or above average rainfall, the greater the level of preparedness actions recommended.



Left and centre – Cyclone Pam relief item distribution in Vanuatu/IFRC (2015). Right – Drought relief for Marshall Islands, Ana Zarcovic/New Zealand Red Cross (2013).

Alert Level

◀ Increasing chance of drier 3 months

Increasing chance of wetter 3 months ▶

Alert Level	Divisions with Below Normal Rainfall favoured in the coming 3 months	Alert Level	Divisions with Above Normal Rainfall favoured in the coming 3 months
	Samoa		Solomon Is. (Western Region)
	Cook Islands (Southern) Vanuatu (Southern)		Cook Islands (Northern), Solomon Is. (Central and Eastern Regions)
			Tuvalu

Figure 2. The alert information that the Red Cross receives from the Australian Bureau of Meteorology, which is in turn inserted into a table that has pre-determined preparedness measures.

ACTION Level	Divisions/ Regions	Recommended actions (predetermined by IFRC office)
LOW ACTION	Samoa	** Ensure normal preparedness activities are done, and also: – Use IFRC low rainfall/drought check list for preparedness activities or use your own adapted one – Check that you have sufficient emergency response stocks; for example, do you have enough water storage containers like jerry cans and buckets, and are these are available to all areas that you are committed to serve – Check that your reverse osmosis/ desalination plants are functional, that you have spare parts (refer to comment in footnote)[2] and that there are enough qualified staff/volunteers to operate – Regularly monitor climate and weather updates from Met Service

Figure 3. Pacific Red Cross preparedness measures linked to a 'low' level of alert for a forecast of below average rainfall.

Better outcomes with the Seasonal Rainfall Watch

Feedback from Pacific National Societies has been positive both in regard to the layout and flow on effects of the product. For example, representatives have cited that:

- The layout is more user friendly and better understood,
- They like the straightforward English explanations rather than percentages (Tuvalu),
- The information is easily understood at branch level too (Vanuatu),
- The Watch is initiating discussions between Met Services and National Societies across the southwest Pacific.

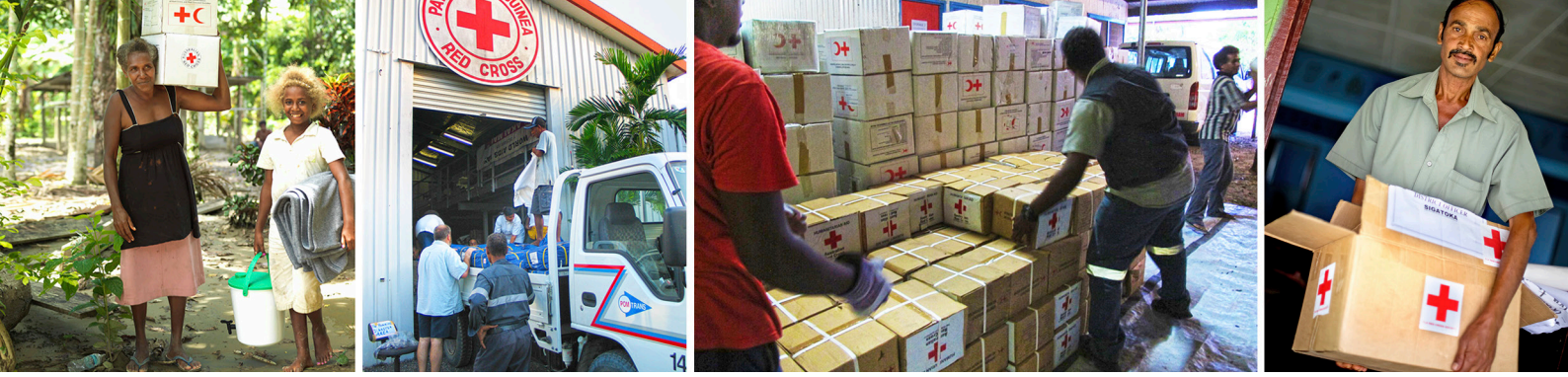
This information was gathered from phone calls to eight Pacific National Societies for feedback on the Seasonal Rainfall Watch, and a focus group discussion at their annual Disaster Management Forum in 2014.

The Seasonal Rainfall Watch in action – examples from the Pacific region

The Papua New Guinea (PNG) Red Cross has a special arrangement with the Digicel phone network to send information to volunteers and branches across the country using text messages. The Seasonal Rainfall Watch is used as a heads up to discuss El Niño and La Niña events with the PNG National Weather Service. This gives the society the right information to disseminate to volunteers and branches so that they can prepare.

The Vanuatu Red Cross attends the Vanuatu Meteorology and Geo-Hazard Department's climate outlook forums and disseminates the Seasonal Rainfall Watch and preparedness actions to its provincial branches. In conjunction with this, the National Society also uses the 'Klaod Nasara' climate animation and toolkit to improve staff, volunteer and community understanding of El Niño and La Niña and the types of information they can use to prepare for such events.

The Tuvalu Red Cross finds that the Seasonal Rainfall Watch encourages the branches to work together with government representatives on preparedness activities. The Climate Change and Disaster Management Officer understood the previous, more technical, seasonal forecast



Far left – Flood-affected families receiving relief in Solomon Islands, Jane Ussher/New Zealand Red Cross (2014). Left – Papua New Guinea Red Cross warehouse in Port Moresby, Rosemarie North/IFRC (2007). Right – Flood relief in Solomon Islands, Janna Hamilton/New Zealand Red Cross (2014). Far right – Village disaster preparedness training in Fiji, Rob Few/IFRC (2009).

format but interpreting it for the branches and communities was difficult. He finds the new format simple and easy to understand. The Tuvalu Red Cross also receives regular updates from its Met Service, and works with the Met Service and National Disaster Management Office in community engagement.

The Tonga Red Cross trained Emergency Response Teams and health volunteers in the use of seasonal forecasts for preparedness with expert assistance from the Tonga Met Service. In the context of managing a dengue fever outbreak, health volunteers have done training looking at what actions to take under different seasonal forecast scenarios to help prevent the spread of the disease – such as destroying mosquito breeding grounds when these are likely to be worsened by upcoming rainfall conditions. They also worked in partnership with their Met Service to translate the Pacific Adventures of the Climate Crab animation into Tonga's national language.

Linking forecasts to funding through the Pacific Disaster Management Partnership

National Societies throughout the Pacific have been using the Seasonal Rainfall Watch and recommended preparedness measures to submit funding requests for their specific disaster preparedness needs under the Australian Department of Foreign Affairs and Trade Pacific Disaster Management Partnership funding.

Moving forward with the Seasonal Rainfall Watch

The Seasonal Rainfall Watch is one more tool in the toolkit when it comes to making informed decisions about preparedness and must be used in conjunction with local situational knowledge. For example, if an alert is put forward for below average rainfall in the coming three months, but the National Society knows that there has been good rainfall in recent times and water tanks are full, this will influence what actions are deemed appropriate to take. It is also not intended that this product replace standard seasonal forecasts, but rather that disaster managers are provided with content that is lighter scientifically, but goes further in 'connecting the dots' to action.

Elements that would be useful to address as this product progresses include further customisation at national level so that alert levels are tailored to national and locally relevant actions, and further validation testing to ensure that alert levels and associated disaster preparedness activities are well representative of the level of risk.

Over time, with practice and application, this product has potential to help develop disaster managers' confidence in making decisions based on probabilistic information. Institutionalising the alert system and related preparedness measures reduces guess work and takes the onus off individual decision making and risk taking. Building a culture in which the information available from seasonal rainfall forecasts influences preparedness decisions well in advance of potentially difficult periods will help to ensure that Pacific disaster managers and the island communities they support together stand ready to face challenging climate conditions.

Development of the Seasonal Rainfall Watch has been a collaboration between the Australian Department of Foreign Affairs and Trade-funded Climate and Oceans Support Program in the Pacific, the Australian Bureau of Meteorology, Pacific National Meteorological Services, the Red Cross Red Crescent Climate Centre, the Australian Red Cross and the International Federation of Red Cross and Red Crescent Societies.

International Federation of Red Cross and Red Crescent Societies

Climate and Oceans Support Program in the Pacific

Australian Government
Department of Foreign Affairs and Trade
Bureau of Meteorology

RED CROSS/RED CRESCENT CLIMATE CENTRE

International Federation of Red Cross and Red Crescent Societies
The Netherlands Red Cross

Australian Red Cross
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