

Central America's Seasonal Climate Outlook Forum

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INTRODUCTION

The Central American Climate Outlook Forum (CA-COF) draws on the capacity of seven weather services in the region to issue three seasonal outlooks per year. The Forum is organized by the Regional Water Resources Committee (CRRH-SICA), which is the technical secretariat of the Central America Integration System and is responsible for the coordination of activities related to weather forecasts, climate, water resources, and climate change assessment in Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama. CA-COF uses regional- and global-scale climate information, which it analyzes alongside its own data to produce climate outlooks for Central America. Over the past decade, the Forum has issued 34 regional climate outlooks.

CA-COF aims to analyze the effects, impacts, and climatic variability projections in sectors including agriculture, water, fisheries, health and nutrition, risk management and energy, and to produce disaster prevention and mitigation strategy, according to the climate scenarios proposed at the end of each forum. CRRH-SICA turns Seasonal Climate Outlooks into risk scenarios used by food-related sectors to support their decisions and minimize food insecurity. This is accomplished as a coordinated effort carried out by specialized entities of the Central American Integration System.

SOCIOECONOMIC BACKGROUND

Climate greatly affects the economy and social well being of Central America. Climate scenarios studies developed for Central America, such as the Intergovernmental Panel on Climate Change (IPCC) report show that over the next decade, climatic change will impact water resources, agriculture, health, coastal resources, biodiversity, and all key elements of food security in the region. They also show a change in the frequency of extreme events, which are likely to have a major impact on Central Americans' livelihoods and ways of life. This is reiterated by Hidalgo and Alfaro (2012) in their study of the physical and socioeconomic impacts of the impacts of climate change on Central America. In this context, developing capacities to manage such climate risk and reduce its impacts is the key step in the adaptation process.

To facilitate the use of climate information in decision making, CRRH-SICA has developed a methodology that turns the Seasonal Climate Outlook into risk scenarios for sectors related to food security, including agriculture, fisheries, potable water, health, and emergency response. These scenarios are given to the decision makers in each sector to facilitate their decisions and to help them develop preventive measures to mitigate the impact of climate variability on food security. Immediately after a CA-COF takes place, a group of regional experts is convened to enhance the Seasonal Climate Outlook with information from the different sectors mentioned above, turning the product into sectoral climate risk scenario that can guide early warnings about actual and potential threats to food security (Table 1 on the following page).

Table 1. Agricultural risk scenarios in Central American from the Seasonal Climate Outlook (December 2011-March 2012)

Central American December 2011-March 2012 Seasonal Climate Outlook							
Climate Risk /potential damages for Main Crops in Central American Countries. Quarter December 2011 -March 2012							
Crop	Country						
	Belize	Costa Rica	El Salvador	Guatemala	Honduras	Nicaragua	Panama
Maize	Plantations in coastal area likely to be affected by above normal precipitation	No risk	No risk	Risk of post harvest damages due to higher humidity associated with above normal rainfall. Increased cost of post-crop product management	Risk in the Caribbean planting area due to above normal rainfall. Second planting season likely to be affected	Second crop in the Atlantic Autonomous Regions likely to be affected by above normal rainfall. Exportations likely to be impacted	Crop losses risk in Western Caribbean area. Possible impacts in food security of indigenous population.
Beans	Plantations in coastal area likely to be affected by above normal precipitation	Risk of crop damage for plantations in Northern Plains, Caribbean area and South Pacific	No risk	No risk	Risk in the Caribbean planting area due to above normal rainfall. Second planting season likely to be affected	Second crop in the Atlantic Autonomous Regions likely to be affected by above normal rainfall. Yield reduction may reach 15%. Likely impacts of beans exportations	Loss of crop risk in Western Caribbean area. Possible impacts in food security of indigenous population.
Sugar Cane	Risk for plantations in coastal area due to excessive rainfall, likely to affect cutting, transportation, and process costs.	No risk	No risk	No risk	Risk in the Caribbean planting area, Valle del Sula in particular, due to above normal rainfall and floods.	No risk	No risk
Coffee	No risk	No risk	No risk	No risk	Area near Guatemala and El Salvador border due to winds and rains associated with "cold surges" reaching Central America. Early picking and recommended	Risk in planting areas near Guatemala and El Salvador border due to winds and rains associated with "cold surges" reaching Central America, and worsening conditions for drying. Early picking and recommended	No risk
Exportations crops (melons)	No risk	No risk	No risk	No risk	No risk	No risk	No risk

TARGET AUDIENCE

The target audience includes government officials of each sector responsible for food security and disaster management decision making; private sector actors with regional operations are also targeted. When the Seasonal Climate Outlook is completed, it is sent to those decision makers in each country in charge of taking a joint decision that will be applied to the specific sector they work in. Table 2 provides an example of recommendations for the risk management sector in Costa Rica.

Table 2. Risk management recommendations for Costa Rica (XIV Seasonal Climate Outlook)

Scenario	Above-normal precipitation
Possible effects	Inundations and landslides on all Pacific coast slopes, the center and the north of the country
Preparation in case of emergency	<p>The National Commission of Emergencies in charge of the forecasts will alert all Local Emergency Committees.</p> <p>Improve coordination among national and municipal entities to strengthen the local committee.</p> <p>Strengthen community organizations and all local monitoring systems.</p> <p>Strengthen the communication mechanism of the National Meteorological Institutes towards all communities particularly with regards to forecasted climatic phenomena</p>
Prevention	<p>Municipal governments will implement risk management activities</p> <p>Create a diagnosis for towns with risk</p>
Mitigation	<p>Local Emergency Committees faced with a risk scenario will execute mitigation actions.</p> <p>Activate or create preparation mechanisms for citizens so meteorological services can socialize, educate, and promote knowledge directly to the communities in coordinate with the local emergency committees.</p> <p>Strengthen coordination among all sectors from the local emergency committees.</p>

CLIMATE AND CONTEXTUAL INFORMATION

Central America has two different climate regimes, the Pacific and the Caribbean. The Pacific regime is characterized by a dry season that lasts from November to April in the north and December to March in the south. In the north, the "little summer" (or, canículas) in July through August is characterized by a reduction in precipitation. In the Caribbean regime, the dry season is shorter but also falls between November and April.

These precipitation patterns define three planting seasons: the primera in April, the postrera in August –September, and the apante or winter season from December to March. Information about precipitation scenarios is very important for a number of sectors, including agriculture, water resource management, and disaster planning. After consultations with the targeted users, the CA-COF organizes its outlooks so that they can disseminate information to users before the beginning of each season.

To provide relevant information to users, the CA-COF revises and analyzes the most recent oceanic and atmospheric conditions along with the hind precipitation data, global model previsions, and their possible implications for the precipitation and temperature patterns in the Mesoamerican region. The CA-COF also analyzes hindcasts and statistical analysis given by each of the meteorological services of the region, the Costa Rican Institute of Electricity (ICE), and the University of Costa Rica.

Other data used to produce the outlooks include:

- the most recent evolution of anomalies and sea surface temperature forecast of the Tropical Atlantic and Pacific oceans
- the observed values of Multivariate ENSO Index (MEI), Pacific Decadal Oscillation (PDO), and Atlantic Multidecadal Oscillation (AMO)
- Atlantic Tropical observed anomalies and atmospheric pressure forecast
- general circulation model seasonal forecasts
- hind precipitation data of analog data for the forecast period
- probabilities for precipitation scenarios for the period
- analysis of canonic correlation with the Climate Predictability Tool
- forecast for the hurricane season ahead for the Atlantic and Pacific Oceans (XIV Seasonal Climate Outlook).

The climatic projections for the seasonal outlook are made with the data available from the International Research Institute for Climate and Society (IRI), the National Oceanic and Atmospheric Administration (NOAA), the European Center for Medium-Range Weather Forecast (ECMWF), the Bureau of Meteorology of Australia, the World Meteorological Organization (WMO), and the Center for Weather Forecast and Climatic Studies (CPTEC). Climate projections are a product of the Climatic Forum, which is coordinated by CRRH-SICA with the support of all the meteorological and hydrological national services in Central America.

The seasonal outlook is given to all the government institutions in the region, and to the technical secretariats within SICA, so that they can be distributed between their regional networks. Each country will in turn generate a report more specific to their region and will distribute it to the pertinent organizations there.

The results are presented in different sections according to the different sectors: risk management, fisheries, agriculture, aquaculture, health and nutrition. They are based on the different scenarios that were discussed through the CA-COF, historical registries, national statistical analysis, feedback from previous years, and the opinion of experts from all the sectors.

The Seasonal Climate Outlook presents the climatic outlook for Central America for the current season, illustrated by way of map that indicates the most likely tercile of above-normal, normal, and below-normal conditions (Figure 1). The Outlook explains what the colors mean by country and continues with a detailed analysis of the results organized by sector. Each of these sections in the Outlook provides an introduction, principal results, risks and opportunities by countries, and recommendations.



Figure 1. Climatic Forecast for Central America for August- October 2011. (XIV Seasonal Climate Outlook)

The main goal of the seasonal outlook is to provide information and advice to risk management and food security stakeholders according to the regional climatic projections. As a result, it is designed to emphasize the impact analysis and foreseeable effects most relevant for risk prevention and mitigation.

IMPLEMENTATION

PROCESSES AND MECHANISMS

STAKEHOLDER AND ISSUE IDENTIFICATION

The working group of CA-COF comprises regional experts in meteorology, climatology, and hydrology from the national hydrological and meteorological services (SMHN) of each country, the University of Costa Rica, other regional programs, which uses the food security

risk scenarios to identify sector-specific preventive measures. More specifically, these stakeholders include:

- Meteorological National Service of Belize (SMN)
- Regional Committee of Water Resources of Costa Rica (CRRH)
- Electricity Institute of Costa Rica (ICE)
- National Institute of Meteorology of Costa Rica (IMN-MINAET)
- Environmental and Natural Resources Ministry/Environmental Observatory General Management from El Salvador (MARN/DGOA)
- Mesoamerican Food Security Warning System from Guatemala (M-FEWS)
- National Institute of Seismology, Volcanology, Meteorology and Hydrology from Guatemala (INSIVUMEH)
- National Meteorological Service of Honduras (SMN)
- Nicaraguan Institute of Territorial Studies (INETER)
- University of Costa Rica

Once the CA-COF comes to an end and the Seasonal Climate Outlook is finalized, it is distributed to a range of organizations that are then responsible for distributing the risk scenarios per sector in their countries. These organizations are:

- Fisheries and Aquaculture Organization of the Central American Ismuths (OSPESCA-SICA)
- Central American Council for Agriculture and Livestock (CAC)
- Central American Coordination Center for the Prevention of Natural Disasters (CEPREDENAC)
- Central American and Dominican Republic Forum of Drainage and Drinking Water (FORCARD)
- Central American Ministry Counsels of Health (COMISCA)
- Central America and Panama Institute of Nutrition (INCAP)
- Regional Programme of Nutritional and Food Security (PRESANCA I y II)
- Mesoamerican Programme of Early Warning and Food Security (MFEWS)

EMERGENCE OF THE CA-COF

Before the late 1990s, there was no regional prediction center involved in supplying projections and risk warnings in Central America; COFS had been focused mostly in Africa.

The 1997-98 El Niño had large impact in the region; it also illustrated how valuable a role global prediction centers could play in advising decision makers about evolving climate threats. In response to this event, CRRH began collecting climate information from all the Central American countries; it also established a collaborative process in which all countries started working together and sharing data and climatic information. In 2000, the National Oceanic and Atmospheric Association (NOAA) contacted CRRH to offer it the opportunity to organize a new COF focusing in the Central American and the Caribbean region, and therefore creating the CA-COF.

CRRH organized the first CA-COF in Belize, inviting organizations from different sectors to participate. These users formed workshops at the end of the event to provide feedback about their thoughts on the information they had just been exposed to. These workshops lead CRRH to realize that most stakeholders need not only explanations of the climatic projections, but also examples of their potential applications. Scientists at CRRH also realized that there was a need to make regional projections with the data available from IRI, NOAA and other relevant international sources, and to put that information in country-by-country context according to the three specific seasons in which the climate affects the sectors, and therefore the decision makers' actions.

After the event in Belize, CRRH created an discussion group in internet which all the stakeholders involved could communicate and ask questions about regional climate and climate forcings in Central America. Throughout all the comments and questions of the group discussion, CRRH realized about the need to strengthen the capacities in the use of statistical data and the use of computational tools through the use of regional climate data from IRI, NOAA, and others. To make climatic projections with percentages of precipitation according to regions. The blog is an ongoing collaboration that has provided all stakeholders with an easy way to communicate information throughout the year.

CRRH also gathered precipitation and temperature data from local weather stations in the region and digitized it. Putting climate data into one format allowed them to monitor climate in a regional level.

The Geophysics Centre of Investigations (CIGEFI) at the University of Costa Rica also supported the building of the Seasonal Climate Outlook under the lead of Dr. Eric Alfaro, whose students worked on computational themes related to the climate forcings that can affect Central America.

STAKEHOLDER INVOLVEMENT

Stakeholders and end users are continuously involved in providing feedback to the Seasonal Climate Outlook Forum, and the Seasonal Climate Outlook itself is built so that decision makers understand the product and are able to make decisions informed by the suggestions provided. It is essential then to hear and understand users needs in the CA-COF to improve and facilitate the production of the Seasonal Climate Outlook.

Regionally, the risk scenarios and suggested actions are circulated among government entities and other organizations involved in addressing food and nutritional security through their own networks, such as through their own general secretariat meetings, and through email. The same method is used at the national level, to produce specific recommendations in each individual country for diverse sectors such as water resource management, agriculture, transportation, health, tourism, and fisheries, as well as emergency and risk prevention administrations. The recommendations are distributed to national authorities and stakeholders in private sectors with a seasonal outlook map and lists of suggested prevention measures.

FUNDING MECHANISMS

Funds have primarily been used to support the meeting costs. Beginning in 2000, NOAA provided funding for the first two years, which was used to organize the CA-COF twice a year. From 2003 to 2007, CRRH received funding to continue the forums three times a year from Taiwan's government, the WMO, and the Spanish Fund in association with the United Nations Development Programme (Fondo España-PNUD). In 2007, in a joint effort between the specialized agencies of the Central American Integration System (SICA) and the European Union funded Program for Vulnerability Reduction (PREVDA) and Regional Food Security Program (PRESANCA II), included CRRH in their program to work as the technical committee for food security at a regional level. However, the funding through PRESANCA will conclude at the end of 2012. In three instances, CRRH also received funding from the cooperation mechanism of Tuxla, a partnership between Mexico and Central American countries.

The funding for training personnel has come through the WMO, EU, and Mexico. In addition, both the International Research Institute for Climate & Society and the Center for Scientific Modeling of the University of Zulia's have funded trainers for the CA-COF. Each participating countries and CRRH-SICA have supported with their own means the logistics, human resources, data analysis, and tool development.

Challenges to financial sustainability remain, particularly since funding is continuously needed to organize the CA-COF and complete the Seasonal Climate Outlooks three times a year. To lower costs, CRRH is now exploring the use of telecommunications to facilitate the meetings, rather than requiring attendance. However, face-to-face work is still needed.

MANAGEMENT AND DECISION MAKING

CRRH is in charge of organizing and coordinating the forum through which the regional climate outlooks are created. For this, CRRH

relies on the financial and technical support of the Regional Program of Information Systems for Nutrition and Food Security (PRESISAN) and the Regional Program of Security Food and Nutritional Security in Central America (PRESANCA II). Each country's regional secretary's office is used to channel the report to all users in various sectors throughout the region.

EVALUATION

In 2005, CRRH received funding from NOAA with the University of California in Santa Barbara to conduct a regional evaluation with decision makers from the sectors of agriculture, electricity generation, potable water provision, and risk management. Through the evaluation CRRH learned about the specific needs of each sector. Representatives from these sectors expressed that the climatic projections were useful to them, but that they wanted to see more regional detail; instead of probabilities, they wanted specific unit limits.

In general, the survey provided CRRH with positive feedback, illustrating that actors in a wide range of sectors used the projections to inform their decisions. The evaluation was also very helpful in leading CRRH to realize that it needed to redirect the projections to be better aligned with what all these different sectors wanted to know for the three different seasons, therefore, from that point on, CRRH began to create the meetings and therefore the outlooks, three times a year.

Until this evaluation in 2005, CRRH had provided information and probabilities without asking what their users wanted, and they realized that they needed to continue learning more about the users' needs in order to most effectively make projections tailored for different sectors and users. Through this evaluation, CRRH also gained insight on how many questions users have about interpreting and applying the information presented in the outlook, particularly because the document was written mostly in relatively technical scientific jargon.

In 2005, after the evaluation, CRRH started to work on making their projections with specific analysis for the agriculture, electricity generation, drinking water, and fisheries sectors, with more detail in the variables, and more detail in the time periods of each sector, in a way they could easily understand. Later, they also added other sectors such as risk management and health.

Based on feedback from the stakeholders, CRRH started to focus on creating risk scenarios based on the end users' and stakeholder's experience. With this system, they can, for example, give an indication of possible impacts associated with various levels of precipitation. With this method it is easier to generate a climatic risk scenario that will help and be easily understood by the stakeholders and decision makers.

CAPACITIES

EXISTING CAPACITIES

Both the CA-COF and its Seasonal Climate Outlook were built incrementally based on feedback and support from all involved stakeholders, particularly personnel working for the national meteorological services in each country. None of the stakeholders receive any monetary compensation for the work put in the creation of the Seasonal Climate Outlook. Therefore, all human resources that go into producing the Seasonal Climate Outlook are provided by the national institutions, with the organization and coordination coming from CRRH.

One great innovation is that data used to make the Outlook is not sold, but shared amongst stakeholders. The climatic data and relevant information is shared through the CA-COF and through their database; the Central American Database (BDCAC).

CAPACITY GAPS

Since the very beginning of CA-COF's establishment, CRRH has made great efforts to work with existing capacities in each country. Some countries are able to contribute only in terms of human resources but not data while others had only data. Even though CRRH lacked a great deal of data and other capacities, the emphasis was placed on building a regional service from which all stakeholders could benefit. CRRH wanted to move away from a limited nation-centered view which prevents climate services from being as widely accessible as possible. So far, CRRH has built their database with historical climatic data from all different countries, but lacks the funds to insert climatic data in real-time so to be able to work on the forecasts anywhere.

The greatest challenge has been developing the decision makers' trust in the climate information created for the climate seasonal outlooks. Initially it was difficult for the decision makers from each sector to trust in the climatic projections and recommendations obtained through the CA-COF and the Seasonal Climate Outlook. Throughout the years, with a more personal approach and understanding of the decision makers needs, the Seasonal Climate Outlook was tailored to reach the user's needs and therefore obtain their trust.

It has been equally important to present the information in a way that is easily accessible to decision-makers in all of the involved sectors. One type of information can be valuable to different sectors, but it has to be tailored to the specific context. The specific actions that should be taken if above-normal precipitation is forecasted, for instance, will be very different for those in the agriculture sector, than those for the fishery sector.

CRRH found that the Seasonal Climate Outlook end users had minimal climatic knowledge, and hopes that the forum can help to create a "climate culture" which would raise awareness and help users see climatic information as a resource of great value. Developing such a climate culture is recognized as a priority by CRRH for the advance of the climate services in the region. It is also important to promote the inclusion of climate risk in the climate-sensitive sectors' decision-making processes. For example, the PROFRUTAS program informs decisions for climate risk management in fruit production by identifying climate threats and mitigation options based on the climate forecasts provided by the Seasonal Climate Outlook.

LOOKING TOWARD THE FUTURE

GOALS

One important future goal is to empower CA-COF to use more objective tools such as more specific and detailed recommendations that would allow it to improve the quality of the outlook scenarios in the different sectors. Another goal is to strengthen the relationship between stakeholders and decision-makers so as to allow CRRH to more effectively identify end users' vulnerability to climate variability.

Finally, a third major goal is to institutionalize the service, establishing a physical unit (building, office) where there would be personnel dedicated only for the creation of the Seasonal Climate Outlooks.

CRRH envisions creating a new tool that would allow them to measure the economic value of the information produced through the COF, as well as the value of the meteorological services. It would also be useful to be able to measure the difference between decisions made with and without the Seasonal Climate Outlooks, such as how many people have not been affected due to that decision. If such a tool could be developed, it could help interest those who can pay or contribute to the service.

PROJECT EXPANSION

CRRH is already working on a proposal to identify correlations between climate and diseases. There have been initial investments for the implementation of a regional climate database (BDCAC), though, CRRH will need more funding to be able to insert more information in their database (BDCAC).

LESSONS LEARNED

NOAA's original strategy of organizing big meetings to try and reach every single stakeholder and user at the same time was not successful. Users have different needs and worries, and they can't be all addressed at the same time. Instead, CRRH has assembled a

team with stakeholders representing all Central American countries; this team provides a platform for stakeholders can share data and mutually benefit. The regional view through the CA-COF has worked well and has helped to build trust among all the stakeholders and users.

These kinds of lessons learned by CRRH throughout the development of the COF are transferable to other institutions in Latin America that have already begun to model their own work on CRRH's approach to the Seasonal Climate Outlooks; mainly its success in coordinating work throughout the regional and devoting time to understanding the users needs sector by sector.

THE WAY FORWARD

In the first survey done to evaluate the use the Seasonal Climate Outlooks and climate risk information, CRRH focused on the importance of strengthening decision-making efforts. This showed both the interest of the decision makers and their acceptance of the product. However, CRRH is still in the process of developing tools for predicting the relationship between climate variables and impacts in each individual sector. This process is expected to demand significant new resources for data collection and its analysis, as are the necessary applied research and capacity building involved. Sharing climate information with the users so that they can improve their decision-making processes has been and will continue to be a challenging task.

PRINCIPLES OF THE GFCS

Principle 1: All countries will benefit, but priority shall go to building the capacity of climate-vulnerable developing countries.

All Central American countries benefit from the Seasonal Climate Outlook Forum.

Principle 2: The primary goal of the Framework will be to ensure greater availability of, access to, and use of climate services for all countries.

The Seasonal Climate Outlook is issued three times a year, and all countries can easily access it.

Principle 3: Framework activities will address three geographic domains; global, regional and national

The Seasonal Climate Outlook is regionally and nationally focused.

Principle 4: Operational climate services will be the core element of the Framework.

Operational climate services are at the core of the CA-COF.

Principle 5: Climate information is primarily an international public good provided by governments, which will have a central role in its management through the Framework.

The Seasonal Climate Outlook is an international public good provided by the CA-COF. Both private sectors and Central American governments use it for decision-making.

Principle 6: The Framework will promote the free and open exchange of climate-relevant observational data while respecting national and international data policies.

The Seasonal Climate Outlook does promote free and open exchange of climate-relevant observational data while respecting national and international data policies.

Principle 7: The role of the Framework will be to facilitate and strengthen, not to duplicate.

The Seasonal Climate Outlook does facilitate and strengthen rather than duplicating information.

Principle 8: The Framework will be built through user – provider partnerships that include all stakeholders.

The Seasonal Climate Outlook was built through user–provider partnerships that include all stakeholders.

References

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