

# Data Sharing and Collaboration: Regional and National Climate Outlook Forums in South America

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South America | Agriculture / Disaster Risk Reduction / Information Products

## INTRODUCTION

The Western Coast of South America Climate Outlook Forum (WCSACOF) is a regional network that fosters collaboration and data sharing between Bolivia, Chile, Colombia, Ecuador, Peru, and Venezuela. It also organizes an annual meeting, which provides a unique opportunity for users and producers of climate projections to meet face to face, evaluate work, discuss challenges, and set future priorities. The forums address a wide range of socioeconomic issues and are attended by diverse organizations for which climate-related risk management and food security are central goals.

Participants are agricultural producers, government risk management agencies, humanitarian non-profits, water resource management officials, and public health representatives. With access to climate forecasts, these groups can better manage resources and prepare for climate-related disasters such as droughts or flooding. WCSACOF is coordinated by International Center for Research on El Niño (CIIEFN), which has been involved with the forum since 2004.

Regular monthly national forums have also emerged out of WCSACOF, providing further opportunities for meteorological scientists to meet, discuss challenges, and produce national-level forecasts in a coordinated manner. These national forums began in 2008 and are now held by several participating countries, although there is substantial regional variation in their organization. These meetings are more focused on comparing data to publish local climate projections. That said, the meetings are also attended by a wide range of information users. This case study focuses on WCSACOF and on Ecuador's national climate forum, which is organized by the National Institute of Meteorology and Hydrology (INAMHI).

## SOCIOECONOMIC BACKGROUND

As a broad regional network, WCSACOF addresses a wide range of socioeconomic issues. All of the participating organizations are based in developing countries vulnerable to climate variability, though its impacts affect various regions very differently. Bolivia, Southern Peru, and Northern Chile, for example, are more challenged by drought and water scarcity, which have a major impact on many people because they affect issues as central as food security and hydro-electricity generation. Others areas may be more concerned with flooding or the impact of extreme storms on food security. All of these issues have broad-reaching impacts on the general public of the involved countries.

## TARGET AUDIENCE

WCSACOF's target audience includes agricultural producers, government risk management agencies, humanitarian non-profits, water resource managers, and public health organizations. When CIIEFN first began coordinating WCSACOF, it identified these groups by extending invitations to organizations with clear interests in using climate forecasts. The national-level Ecuadorian forums involve a similar audience but are able to reach out to more users because they are more frequent and localized. For example, rather than working primarily with medium to large agricultural producers, the Ecuadorian forums, INAMHI has been successful in reaching out to work with associations of smaller farmers as well.

## CLIMATE AND CONTEXTUAL INFORMATION

WCSACOF and the related national forums are primarily focused on forecasts for rainfall and atmospheric temperature extremes. Particular attention is paid to the El Niño-Southern Oscillation, which has a major impact on the region.

The forecasts discussed in these forums are produced regionally and nationally. In the case of the former, forecasts are made for three-month time frames, updated by the national meteorological services (NMSs) and coordinated, re-published, and distributed every month by CIIEFN. The local versions published through the national climate forums follow the same structure. They too are produced on a monthly basis, but provide greater local detail than the forecasts produced regionally.

The information used to produce the WCSACOF forecasts comes from two central sources: the network of meteorological service stations in all participating countries and the Data Library<sup>1</sup> of the International Research Institute for Climate and Society (IRI), which is used primarily for its maps and historic records. Some of the data accessed through IRI originates from sources such as the US National Oceanic and Atmospheric Administration (NOAA), the European Centre for Medium Range Weather Forecasts, the Tokyo Climate Center, the Beijing Climate Center and Météo-France. Almost all of the information is free and accessible online.

Among groups involved with WCSACOF and the Ecuadorian national climate forums, climate information is most commonly used for decision-making among government risk managers and the private agricultural sector. Risk-management agencies use projections to help them prepare for climate-related extreme events such as drought

<sup>1</sup> <http://iridl.ldeo.columbia.edu/>

or floods. When very little rainfall was expected in the Ecuadorian province of Manabí, for example, risk management officials were prepared to stock the region with extra food supplies. Meanwhile, agricultural producers use climate forecasts to plan for the upcoming growing season. Farmers are particularly interested in detail regarding the start of the rainy season, as most young plants are especially vulnerable to drought or excess water.

In most cases, the needs of WCSACOF participants are too diverse to make tailoring information practical for every involved sector. Though tailoring is a mid-term goal for CIIFEN, it is a complicated endeavor that demands tremendous effort and expertise, not only for each sector, but also for every region and every country. Tailoring information for a substantially wider range of sectors would require a different user interface and a different approach. For this purpose, a multidisciplinary network is being planned and the initial steps for these alliances are in progress.

**Agro-Climatic Risk Maps:** CIIFEN's agro-climatic risk map initiative began in 2007 and remains the most tailored climate information project generated through WCSACOF and the national forums. The maps integrate climate forecasts with information regarding the vulnerability of particular crops; they are ambitiously structured using the WCSACOF network to help manage climate risk across many political, cultural and geographic borders.

CIIFEN produced the original maps and then held trainings sessions, which gave the national meteorological services the tools necessary to produce maps on their own. The first three years of map production and associated trainings were financed in part by the Inter-American Development Bank, though eventually support for the initiative shifted to the responsibility of the individual countries involved. CIIFEN supports and drives such initiatives to achieve sustainability in their own right. This involves motivating national institutions to get directly involved in agenda setting and project development and encouraging them to continue to support the agro-climatic maps in the long-run.

For annual crops, maps are important in helping producers decide when to plant their seeds. Annual crops are especially vulnerable at early stages of their development and can be easily destroyed by drought, excessive rain, or frost. For perennial crops such as bananas or plantains, rainfall forecasts help producers to plan pesticide, fungicide and herbicide application. Bananas, for example, are a genetically homogenous crop and are extremely susceptible to fungus, which grows best in wet conditions. When wet weather is projected, producers spray more fungicides, clean their drainage systems, and prepare their water pumps. Meanwhile, drought forecasts allow cattle herders to invest in buying more concentrated feed rather than relying too much on pasture. In some cases, larger-scale operations even move their herds to unaffected regions.

Climate has a highly localized impact on agricultural production. Different plants have very specific needs and are sensitive to even the slightest environmental changes. When the agro-climatic risk maps were first being implemented, each country chose to focus on several of their most important or potentially vulnerable crops. Ecuador, for example, chose soy, rice and corn; Venezuela, rice, corn, sorghum and sesame, and Bolivia; potatoes, fava beans and quinoa. After attending CIIFEN's trainings, each country went on to continue producing maps, expanding their focus into more regions and in many cases, more crops. In Peru, for example, maps for potatoes, corn and artichokes were considered extremely useful and soon began to

receive financial support from the national government. In Colombia, maps were initially made for flower crops, though in partnership with the Ministry of Agriculture, the Colombian National Meteorological Service has shifted its focus to four food crops; potatoes, plantains, rice, and sugarcane.

**The Map-Making Process:** On both the regional and national levels, producing the agro-climatic risk maps requires coordination between climatologists, who supply rainfall and temperature forecasts, and agricultural experts, who provide information regarding the ways in which particular weather conditions can affect each crop as it moves through different stages of development. In order to determine vulnerability of a given region, they study several geographic, environmental and biological characteristics, including soil profile and texture, geomorphology, sensitivity to climate-related pests and disease, altitude, and general agricultural capacity. In areas with sandy, thin soils, for example, vulnerability is considered to be high since the land is less able to hold water and is more likely to erode. Using this information, mapmakers are able to generate predictions regarding the time and location at which different crops are likely to be at risk.

The maps are updated monthly for a three-month time horizon. In Ecuador, the National Institute of Meteorology and Hydrology, INAMHI, is now responsible for producing these short-term risk maps. Meanwhile, on the regional level CIIFEN generates analysis for longer-term vulnerability.

**Dissemination:** Agro-climatic risk maps in Ecuador are available on INAMHI's website. INAMHI has also partnered with the agrichemical business Agripac, which publishes the maps in their catalogue free of charge, as well as with small agricultural unions who display maps on their front windows in some towns. For emergency conditions, such as those for heavy flooding forecasts, INAMHI works with Movistar, a cellular phone company, to send text message alerts.

**Users:** Map users vary greatly from country to country, as each country as each focuses on different crops and therefore reaches out to different populations of agricultural producers. In Chile, the users include large wine grape producers and other large agro-industrial businesses. In Colombia, the National Meteorological Service works very closely with the Ministry of Agriculture, and has been able to reach out to many small farmer associations.

When maps first were produced in Ecuador, the users were medium- and large-scale agribusinesses, which were easy to identify, contact, and partner with. However, as the project has evolved, the network of users has expanded to include smaller-scale agricultural producers. This expansion required tremendous effort on the part of INAMHI, whose technicians traveled throughout the countryside visiting small town centers and connecting with small-scale farmers and associations in the provinces of Guayas, Los Rios, and Manabí. In addition to establishing these contacts, INAMHI also made detailed observations on soil profiles and crop production, which they used to produce maps in greater detail. Today many of the map users in Ecuador are farmers who own just 5-25 hectares. In the future, INAMHI hopes to increase the number of users it reaches and expand map-making to cover a wider range of crops.

# IMPLEMENTATION

## PROCESSES AND MECHANISMS

### STAKEHOLDER AND ISSUE IDENTIFICATION

The main stakeholders in WCSACOF are agricultural producers, government risk management agencies, humanitarian non-profits, water resource managers and public health organizations, though the first two groups are much more heavily represented in the forum than the rest. When CIIFEN first began to organize WCSACOF, it identified participants by contacting organizations with potential interest in using climate forecasts. Participation has grown over the years, and others stakeholders have self-identified and joined the network. In organizing Ecuador's national climate forums, INAMHI recruited participants in a similar manner, though its meetings are now frequent enough that it is able to invite specific stakeholders depending on the theme and location to the particular forum. The participants attending Ecuador's national climate forums thus change substantially from meeting to meeting and include more representatives from smaller institutions than their regional counterpart does.

The regional collaboration fostered by WCSACOF is particularly important in light of South America, where there has been a lag in technical development for decades. CIIFEN is dedicated to putting an end to this trend through regional capacity building. CIIFEN supports technical training sessions and encourages publications led by local authors while simultaneously strengthening international collaboration that empowers regional leaders to train more of their colleagues and continue spreading new information. CIIFEN's Science Director, Rodney Martínez, notes that the International Institute for Climate and Society's (IRI) approach to sharing tools and expertise is a good example of a strong partnership helping to jump-start such regional capacity building.

### STAKEHOLDER INVOLVEMENT

WCSACOF is made up of a network of meteorological services and climate information users in all six participating countries. National service scientists send their data to CIIFEN, which processes it to make regional maps and then publishes those maps on the CIIFEN website where anyone can access them free of charge. CIIFEN also sends forecasts out to a list of roughly 6,000 users in the form of a digital monthly bulletin. Collaborating on all of this work requires that projections be made using standardized methodology, which was initially a challenge to coordinate, but was accomplished through technical workshops made available to scientists in each country.

In some cases, information is also spread with assistance from the private sector. Climate projections in Ecuador have been announced on the early morning community radio stations that are most listened to by agricultural producers. In other cases when extremely high rainfall is expected, CIIFEN and INAMHI have worked together with the telephone company Movistar to send text messages out to a list of roughly 1,000 users free of charge. There haven't been many times when this mass text alert system has been necessary, but it proved itself to be useful during major flooding in 2010. However, Movistar does not have a wide customer base along the coastal regions of the country, leading INAMHI to consider the possibility of finding funding to expand this emergency alert system, although nothing has been solidified thus far.

WCSACOF has built a powerful network over the years, and although a great deal of communication happens through the internet, the more intangible establishment of trust is also key in facilitating the sharing of information necessary for producing regional climate forecasts. Sharing data has long been and continues to be a challenge, though the creation CIIFEN's regional database has played a major role in bridging this gap. In 2007, all involved countries signed on to a protocol that standardized procedures for information sharing. CIIFEN follows these set guidelines, and shared data can only be used in the production of agreed upon climate information products. This arrangement allows all parties to benefit, as raw data is protected and the processed results are shared widely with WCSACOF's many users.

### FUNDING MECHANISMS

WCSACOF is funded by the World Meteorological Organization (WMO), and the national climate forums are funded by the governments of the countries in which they take place, with the exception of Chile, which receives substantial support from the private sector. The funding for WCSACOF is very stable, and operations are relatively low cost since the national meteorological services already collect data, and most coordination is managed through the Internet. WCSACOF has already expanded substantially since it first began, and is determined to continue growing. This coming October of 2012, it plans on collaborating with Brazil, Paraguay, Uruguay and Argentina, which are also organized into their own Regional Climate Outlook Forum. The two regions' annual meetings will be held together to discuss potential joint projects.

The national climate forums in Ecuador were initially funded entirely by INAMHI, but after proving themselves to be extremely useful, they now receive full government support and have begun to occur even more often than on a monthly basis, as was originally the case. CIIFEN sees the development of government funding for national climate forums like Ecuador's as an exciting example of WCSACOF's success in fostering stable national initiatives, and is thrilled that even without CIIFEN involvement, growing networks of local forums are running smoothly on their own.

### MANAGEMENT AND DECISION MAKING

The many institutions involved in WCSACOF and Ecuador's national climate forums have very established roles when it comes to management and decision-making. The meteorological services coordinate the work of the data collection stations in each country, and CIIFEN then coordinates the processing of this data to produce regional climate forecasts. An informal committee of Meteorological Service scientists sets the thematic agenda for each annual meeting, and climate information users themselves influence the content and design of forecasts through their feedback (described below). In all six countries, meteorological service scientists are now focused on user needs in a way that didn't use to be the case, and WCSACOF has played a major part in creating this shift.

### EVALUATION

The West Coast of South America is an extraordinarily diverse area, from the Amazon Rainforest to the Andes Mountains to the high-altitude plains and long, low coastlines. The needs and priorities of climate information users are similarly varied; regional climate forecasts are successful in large part because their format was designed with close attention to this diversity and the regular feedback from users.

In CIIFEN's experience, scientists are not always interested in the broader societal importance and climate services applications of their work. However, the face-to-face contact and sustained communication made possible through WCSACOF and the national forums has helped to bridge some of these disconnects. In fact, one of the central goals of WCSACOF is to create a space for climate information users to provide feedback regarding CIIFEN products. In workshops at this meeting, users are free to express their concerns, comments, experiences or complaints, all of which are assembled into a report at the end of the event. CIIFEN also receives feedback via email on a regular basis and watches the statistics tracker on their website, which allows them to see what information people from various regions are using most and gives them a constantly updated snapshot of user demand.

CIIFEN is very conscious of the need to internalize and actualize responses from its target audience. The format and design of climate forecasts, for example, have changed many times as a result of user feedback. In one instance, people were confused by the scales used for rainfall projections and were unsure of how to interpret relative terms such as "above average" or "below average." As a result, numbered scales are now included. In general, the language in all information products has evolved to use as little jargon as possible in order to make the information more accessible.

Users also stated that color scales would make forecasts easier to read. As a result, CIIFEN changed the format and made it as intuitive as possible, using green and brown to represent high and low rainfall respectively. Another shift had to do with the distances incorporated into climate projections. Contoured maps that made rough estimates for areas of land far between stations where precise measurements did not exist were poorly received. Through this, WCSACOF information producers realized that it is better to leave space blank and admit uncertainty than make misleading rough estimates.

For similar reasons, WCSACOF has also adjusted its presentation of climate information. Users were sometimes frustrated when forecasts did not turn out as predicted, and producers have therefore learned to clearly explain climate's inherently uncertain nature and what can reasonably be expected given the limitations of forecasting capabilities.

In general, most user organizations do not have a great deal of climate expertise, and therefore rely on external support to help them interpret forecasts. They often send emails asking for clarification after receiving monthly bulletins, and also attend workshops both through and outside of the national forums. This dependency is a large part of why information products continue to be developed according to feedback.

## **INFLUENCING ADAPTATION**

The most concrete examples of forecasts facilitating adaption to climate change are in the risk management and agricultural sectors. At the last WCSACOF conference in 2011, for example, Chile's Ministry of Public Safety (ONEMI), stated that the Ministry conducted an internal survey of its regional offices and found that of the 80% of regional directors who responded, 100% said they found CIIFEN's monthly climate forecasts very useful, and 91% said that this information helped them to anticipate weather-related challenges (ONEMI 23). The use of agro-climatic risk maps is also a good example of how many agricultural producers use climate information to adapt to the impacts of climate.

## **CAPACITIES**

### **EXISTING CAPACITIES**

WCSACOF's development can be broken down into several steps. Firstly, a regional institution, in this case CIIFEN, was needed to serve as the head coordinator. Secondly, regional necessities had to be identified and agreed upon by all involved meteorological services and organizing stakeholders in order to set and prioritize goals. Concerns regarding financial sustainability were also taken into consideration.

WCSACOF is built on upon a network and operational system that has taken many years to establish. Much of its success relies on the commitment of key players and institutional partnerships. When CIIFEN first began working on seasonal forecasts, their tools and knowledge were quite limited. However, capacity has grown tremendously over the years large part thanks to external support that has facilitated the movement of expertise, technology, and other resources into the region. Many of the people who have been involved in WCSACOF since its early years have become important contacts as they advanced in their own careers. A parallel growth in climatological and related educational opportunities throughout the region has also contributed to WCSACOF's development, as young professionals emerge and are better prepared to get involved.

### **CAPACITY GAPS**

Initially, there were major discrepancies among the projections generated by WCSACOF participating countries. However, standardizing methodologies between countries has served to smooth out differences among them. CIIFEN was involved in organizing trainings on issues such as data quality control and management, but has found that such trainings are only useful when their lessons are adequately reinforced. There also must be opportunities for participants to discuss questions and future planning to ensure that new skills will be put into practice. As described in earlier sections, data sharing continues to be a challenge, but has been managed through the development of WCSACOF's protocol, CIIFEN's regional database, and the slow process of trust building that has occurred over the years.

## **LOOKING TOWARD THE FUTURE**

### **GOALS**

WCSACOF and the national climate forums plan to continue growing by involving more stakeholders and reaching out to coordinate their work with more countries.

WCSACOF and the national forums are determined to further tailor the information they produce to meet the specific needs of a wider variety of users. This will involve the expansion of agro-climatic risk maps to cover more crops, and continued data sharing between partnering countries.

CIIFEN is also getting more involved in water resource management, which has important implications for hydro-electricity production, irrigation needs, and public health.

## LESSONS LEARNED

CIIFEN has learned a number of important lessons by coordinating WCSACOF over the years, many of which could apply to similar networks and climate services. These lessons are outlined below:

- a. It is important to balance the needs of users and scientists, and to not assume that users will understand new information or be comfortable properly interpreting new formats without external support. WCSACOF's structure has therefore evolved to provide ample time for addressing user feedback.
- b. All training information must be reinforced and organized so that it reaches the most number of people. Trainings in the use of the Climate Predictability Tool (CPT) serves as a good example of the ways in which international collaboration can equip and empower local trainers to continue capacity building in their own regions.
- c. Communication between meteorological services is key. Regional meetings, for example, are held between meteorological service directors, who discuss the ways in which parallel programs and

trainings are handled in their countries, and address the challenges they face.

- d. Challenges involving political instability and high turnover of government employees are difficult to navigate. They are best confronted with patience, flexibility, and continued strengthening of contact networks.

## THE WAY FORWARD

WCSACOF's biggest challenges are in maintaining the quality of forecasts, the commitments of diverse stakeholders, and the confidence of information users. All of this requires diligence and clear communication between national, regional, and global players. Individuals do not get paid to be a part of the network; their belief in the value of collaboration and their devotion to this effort is therefore critical to its continuation.

In more technical matters, CIIFEN must put effort into staying up to date on climate modeling information equipment, and expertise. Equipment in particular is a constant investment, as it quickly becomes obsolete if it is not upgraded.

# PRINCIPLES OF THE GFCS

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

All of the countries involved in WCSACOF and related national forums are developing countries, and therefore particularly vulnerable to the impacts of climate change.

**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.**

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

WCSACOF and the national forums have been established to foster collaboration between these varying geographic levels. CIIFEN feels that WCSACOF is a tremendously successful example of climate services connecting local, regional and global resources.

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

**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.**

Making climate information a public good is a mission at the core of both WCSACOF and the national forums, which are dedicated to making climate forecasts more publically accessible. However information is not provided directly by governments but rather through CIIFEN, which works as a regional coordinator in partnership with WCSACOF and involved governments.

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

The free and open exchange of climate-relevant data is something that WCSACOF and CIIFEN work very hard to coordinate, despite the challenges involved with sharing data openly, as described in this report.

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

The regional coordination involved with organizing the forums helps to ensure that efforts are not get wasted on redundancy.

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

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