Climate Outlook - Rainfall

Statement from the First West African Regional Climate Outlook Forum
4-8 May, 1998, Côte d'Ivoire

SUMMARY

There are enhanced probabilities of above-normal West African rainfall for the period July September 1998 over the Gulf of Guinea coast region, especially west of central Nigeria, and over northwestern Senegal and southwestern Mauritania. Across the Sahel there are enhanced probabilities of near-normal rainfall in those months.

THE CLIMATE OUTLOOK FORUM

From 4-8 May 1998, a Climate Outlook Forum was convened to formulate predictive guidance for the July-September 1998 rainy season in sub-Saharan West Africa. The Forum reviewed the state of the global climate system and its implications for this region Among the principal factors taken into account were the major El Niño event of 1997-98, which has weakened slowly in recent months, and warmer than normal sea-surface temperatures (SSTs) that currently extend across much of the tropical Atlantic. Considerable research has established the linkages between SST anomalies in the tropical Pacific and Atlantic oceans and rainfall variability in sub-Saharan West Africa.

The Climate Outlook that follows assumes the present El Niño will weaken more rapidly during the next few months (following most model predictions), and that there will be no development of a tropical Atlantic SST pattern that is known to accompany extreme sub-Saharan rainfall conditions. Any change in these expected SSTs will necessitate a revision of the Outlook statement. Careful monitoring of tropical Atlantic and Pacific SSTs is therefore needed during the next few months.

METHODOLOGY

The development of the West African Climate Outlook was performed using coupled ocean-atmosphere models, physically-based statistical models, and expert interpretation. Most of the statistical models used were developed by participants at the Pre-Forum Capacity Building Workshop on Seasonal Prediction in West Africa (23 February to 30 April 1998), held at ACMAD. The current status of seasonal- to inter-annual forecasting allows prediction of spatial and temporal averages, and may not fully account for all factors that influence regional and national climate variability. This Outlook is relevant only to seasonal time scales and relatively large areas; local and month-to-month variations may occur. Users are strongly advised to contact their National Meteorological and Hydrological Services for interpretation and local adaptation of this Outlook, and for additional guidance.

The experts established probability distributions to indicate the likelihood of below-, near- or above normal rainfall for each sub-region (see Map). Above-normal rainfall is defined as within the wettest third of recorded rainfall totals in each region; below-normal rainfall is defined as within the driest third of rainfall totals; near-normal is the third centered around the climatological median.

OUTLOOK

July to September receives on average 80% of the annual rainfall total in the Sahel zone, between 12° and 18° N. Further south to the Gulf of Guinea coast, July-September includes the Little Dry Season and hence is a less important period for annual rainfall. However, July-September rainfall anomalies can significantly affect agricultural production in this coastal region.

The probability of above-normal West African rainfall for the period July-September 1998 is 50% for northwestern Senegal and southwestern Mauritania, and also for the Gulf of Guinea coast region as far east as central Nigeria. Further east along the Gulf of Guinea coast region, over south-eastern Nigeria and extending into Cameroon, that probability is reduced to 40% because tropical Atlantic SSTs have a weaker positive influence on rainfall there. Except in the extreme west, July-September 1998 rainfall across the Sahel is presently considered to be most likely in the near-normal (40%) or below-normal (35%) categories. The closeness of this probability of below-normal rainfall (35%) to that of the near-normal category (40%) stems from uncertainty about the longevity of the present El Niño. Since El Niño suppresses Sahelian

rainfall, a slower weakening of El Niño than is currently predicted would increase the likelihood of below-normal Sahelian rainfall For the extreme western Sahel, while the probability of near-normal rainfall remains the same as that for further east (40%) and higher than for the other two rainfall categories, above-normal rainfall is considered to be more likely (35%) there than below-normal rainfall (25%). This is the reverse of the situation for the rest of the Sahel, and instead reflects the influence of the tropical Atlantic SSTs

PARTICIPANTS

Participants at the Forum included representatives of Meteorological Services from eleven countries (Benin; Côte d'Ivoire; Burkina Faso; Chad; Ghana; Guinea-Bissau; Guinea-Conakry; Mali; Niger; Nigeria; Senegal; Togo) and climate scientists and other experts from national, regional, and international institutes (ACMAD; WMO-CLIPS; Cooperative Institute for Mesoscale Meteorological Studies, University of Oklahoma; IRI; Laboratoire Météorologique Dynamique: Météo-France; North Carolina State University; NOAA-NCEP; ORSTOM, Brest; United Kingdom Meteorological Office; University of Zululand) Additional input was supplied by the European Centre for Medium-Range Weather Forecasts

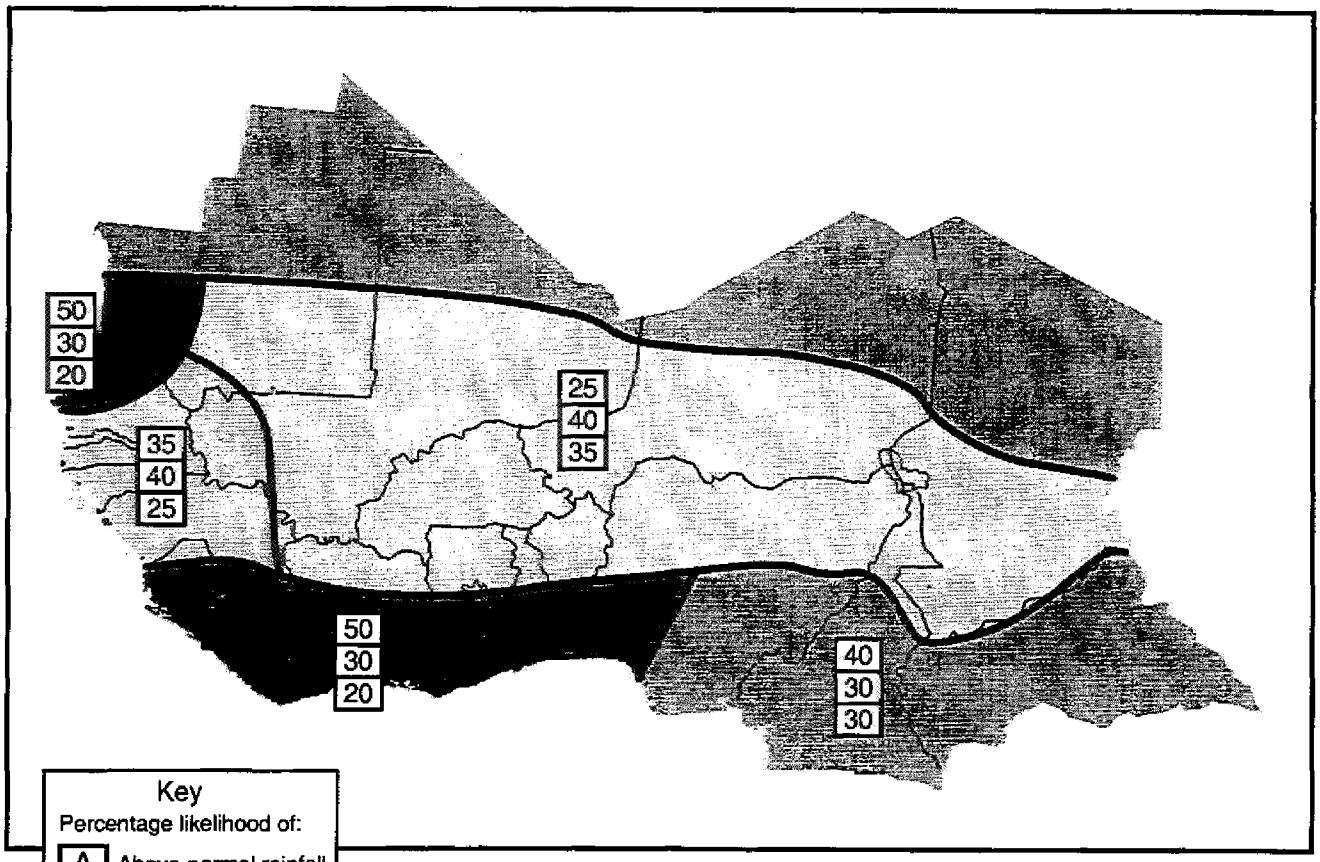
Consensus Climate Guidance

West African Regional Climate Outlook Forum

4-8 May 1998 *Abidjan, Ivory Coast*

(for list of participants and explanatory text see associated discussion)

July - September 1998



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LATIN AMERICA and CARIBBEAN OUTLOOK FORA, APPLICATIONS WORKSHOPS, AND CONFERENCES

A total of five separate Climate Outlook Fora were held in Latin America and the Caribbean during 1997-98, covering the regions of Pacific South America, Southeast South America, Northeast South America, Mesoamerica, and the Caribbean. In addition to the Outlook Fora, a unique methodology evolved in the region to facilitate interaction between the producers and users of climate information. In three of the sub-regions (Pacific, Southeast and Northeast South America), formal conferences and applications workshops, in part made possible by on-going multi-sectoral pilot applications projects, were held in conjunction with the Climate Outlook Fora. The Outlook itself was presented to the participants and used as a venue for advancing discussions on the use of climate information. Following the Caribbean event, a roundtable discussion on natural disaster preparedness was held in place of an applications workshop. Due to the success of the 1997-98 Outlook Fora, many of the sub-regions have continued with consensus forecasting activities, indicating the potential for development of forecast networks in these areas.

Climate impacts associated with El Niño vary greatly with space and time in the Americas, thus the regional Outlook Fora needed to cover several different regions during different seasons. For example, much of northwestern South America suffered severe flooding during January-March 1998, whereas many parts of Central America were extremely dry from April through June. NOAA-OGP's partners in the Americas also span many countries, with organizations such as the Inter-American Institute for Global Change Research (IAI) covering all of the Americas, and CATHALAC covering Mesoamerica and the Caribbean. Working with these organizations and others like them made it possible to address climate impacts in several critical areas.

Products from the Latin America and Caribbean Outlook Fora follow in the next several pages. Maps of forecast precipitation are given for:

- Pacific South America, December 1997-March 1998
- Southeastern South America, January-March 1998
- Northeast South America, February-May 1998
- Mesoamerica, June-August 1998
- Caribbean, June-August 1998

Descriptions for each map are included, each of which outline the general methodology for producing the Outlook, a brief summary of the forecast conditions, and the participating organizations. Also included are estimated precipitation amounts for the forecast period, expressed

in terms of percentage of normal rainfall. A qualitative comparison of each Climate Outlook and estimated precipitation is given below.

Pacific South America - October 1997

The Pacific South America Climate Outlook Forum was held in Lima, Peru, October 1997, in conjunction with a Pilot Applications Design Workshop and a conference on the 1997-98 El Niño entitled, "Is this El Niño of the Century? Impacts and Potential Applications of Forecast Information". The event was locally organized by the Geophysical Institute of Peru, the Peruvian Institute of Fisheries Investigations, and Sealand Advisory Services, Inc. Convened to assess and communicate the impacts of the 1997-1998 El Niño event, the Climate Outlook Forum produced a consensus probabilistic precipitation Outlook for Bolivia, Chile, Colombia, Ecuador and Peru. Participants in the Outlook creation included climate scientists from regional research organizations such as the IAI, national research institutions, National Meteorological and Hydrological Services (NMHS), the IRI, and the WMO.

Pilot Applications Design Workshop

Drawing on the Climate Outlook Forum, the Pilot Applications Design Workshop was held to create climate forecast applications projects tailored for climate-sensitive sectors. Utilizing the consensus diagnostic and forecast products generated by the Climate Outlook Forum, participants discussed identifiable and potential socio-economic impacts and determined potential activities to advance additional understanding of ENSO and its implications. Participants in the Design Workshop included climate researchers (from the Climate Outlook Forum), forecast applications researchers, and potential users of the forecast information. Working groups were created based on the degree of ENSO's impact in particular sectors of the region's economy, including fisheries and aquaculture, water resources, agriculture, and health/natural disaster preparedness.

Since the 1997-98 ENSO event was successfully forecast by scientists, an opportunity existed for the fisheries sector to mitigate the potential damage caused by El Niño, and to take advantage of its possible benefits. As a result of past and current ENSO impacts, the establishment of "vedas" or fishing season closures, has been considered in Ecuador, Peru and Chile. In some cases, such as Ecuador, the aquaculture sector informs users about ENSO development. This

occurs in two ways: 1) monthly and biweekly reports for shrimp hatchery management (assessment of the use of this information is underway); and 2) in situ conferences/workshops about ENSO in different shrimp farm regions.

The majority of fisheries working group participants believed that local coastal and near coastal information produced by forecast models is not adequate at this time. The models are useful for the macro-scale aspects of climate events, but the development of coastal or near coastal models that use global model results as input is necessary. While potential impacts are known from previous ENSO events, only a few groups within the fisheries sector took measures to prepare for the 1997-98 El Niño; this may be due to the fact that the degree to which the event would affect fisheries was not well known. In order to advance the use of available information and set directions for future research, it is important to conduct social science studies to evaluate how useful the climate information was during the 1997-98 ENSO. Two efforts of this type are currently underway related to shrimp hatcheries in Ecuador and ENSO effects on artisan fisheries.

Conference on the 1997-1998 El Niño

In addition to the Climate Outlook Forum and Pilot Applications Design Workshop, a conference on the 1997-98 El Niño was held to educate representatives of government, industry, media, and the general public about El Niño-related climate conditions, possible impacts, and methodologies to utilize climate information. The meeting consisted of a series of panels composed of experts in climate, ENSO impacts and forecast applications (from the Outlook Forum and Applications Workshop) that interacted with participants from climate-sensitive sectors. It provided participants an opportunity to ask questions about climate forecast products and plans to use this information for decision-making in sectors such as agriculture, water resources, human health, and natural disaster management. The conference began a dialogue between climate scientists and potential users of forecast information, with the ultimate goal being the production and refinement of best available climate forecasts with respect to user needs.

Outlook evaluation[28]

The Outlook for Pacific South America indicated there was an increased likelihood of below normal rainfall in Columbia from December 1997 to March 1998. This was corroborated by unusually low rainfall amounts in northern Columbia, but southwest Columbia was wetter than normal during this time. Forecasts of 60 to 80% likelihood for above normal rainfall in western Ecuador and portions of northwest Peru matched very high precipitation totals (200-300% of normal), but the remainder of northwest Peru, forecast as climatology or a increased chance of below-normal rainfall, actually had above-normal rainfall. A forecast of above normal rainfall for a small portion of southern Chile was inconsistent with unusually low rainfall there, while below-normal precipitation in southern Peru and southeastern Bolivia generally matched projected conditions. Eastern Bolivia was drier than normal from December 1997 to March 1998, inconsistent with the Climate Outlook (although drier than normal conditions were forecast at a 20% probability).

[28]For a description of the qualitative method used to evaluate the Outlook, see Comparison of Climate Outlooks and Observations in the Methodology section.

Climate Outlook - Rainfall

Statement from the Pacific South America Climate Outlook Forum
October 28, 1997, Lima, Peru

THE OUTLOOK FORUM

A Climate Outlook Forum was convened on October 28, 1997 to formulate consensus assessment for the summer season in Pacific South America. The forum was comprised of representatives of Meteorological Services and climate researchers from universities and international research institutes. These specialists reviewed the state of the global climate system and its implications for Pacific South America. One of the principal factors taken into account is the strong El Niño event currently underway in the tropical Pacific Ocean. Recent El Niño events resulted in extreme rainfall in some regions of Pacific South America and extreme dry conditions in other regions.

Participants at the Forum included representatives of Meteorological Services of several countries of the region (Bolivia, Chile, Colombia, and Ecuador) and climate scientists and other experts from national, regional and international institutes (Universidad Nacional de Colombia, Universidad de Chile, University of Washington, Instituto del Mar del Peru (IMARPE), IGP, INPESCA, Direccion de Hidrografia y Navigacion de la Marina (HIRDRONAV), NOAA-OGP, NOAA-NCEP, IRI, and IAI.

METHODOLOGY

This regional climate assessment began with consensus that the current strong El Niño event will remain strong over the forecast period (December 1997 - March 1998). The Sea Surface Temperature (SST) forecast and other factors affecting the climate of Pacific South America were based on coupled ocean/atmosphere models, physically-based statistical models and expert interpretation. The Forum endorsed the use of the NOAA National Centers for Environmental Prediction (NCEP) coupled model as the most reliable indicator for the evolution of this El Nino event in terms of SST over the next four months.

OUTLOOK

The Climate Outlook addresses the summer season (December-January-February-March 1997-1998) for Pacific South America. The experts provided probability distributions to indicate the likelihood of below-, near-, or above- normal rainfall for each sub-region (see attached Map). Users are strongly advised to contact participating institutions and other climate information sources for interpretation of this Outlook and for additional guidance.

Above normal rainfall is expected along the coast of Ecuador and northern Peru, with the detailed structure reflecting the topographic relief of the region.

Proceeding north, the regions of eastern Ecuador, Colombia, and northern Peru are expected to experience drier than normal conditions, especially the northwest region of Colombia.

The altiplano region of the southeast Peru and western Bolivia is expected to experience drier than normal conditions Most of the northeastern Bolivia has slightly higher than average probability of a wet summer season. Although it should be noted that there was no complete consistency among the climate forecast and other indicators for this region. Some additional information suggests that the Chaco region of southern Bolivia may experience drier than normal conditions associated with El Niño.

South-central Chile is expected to see above normal precipitation for the remaining austral Spring season.

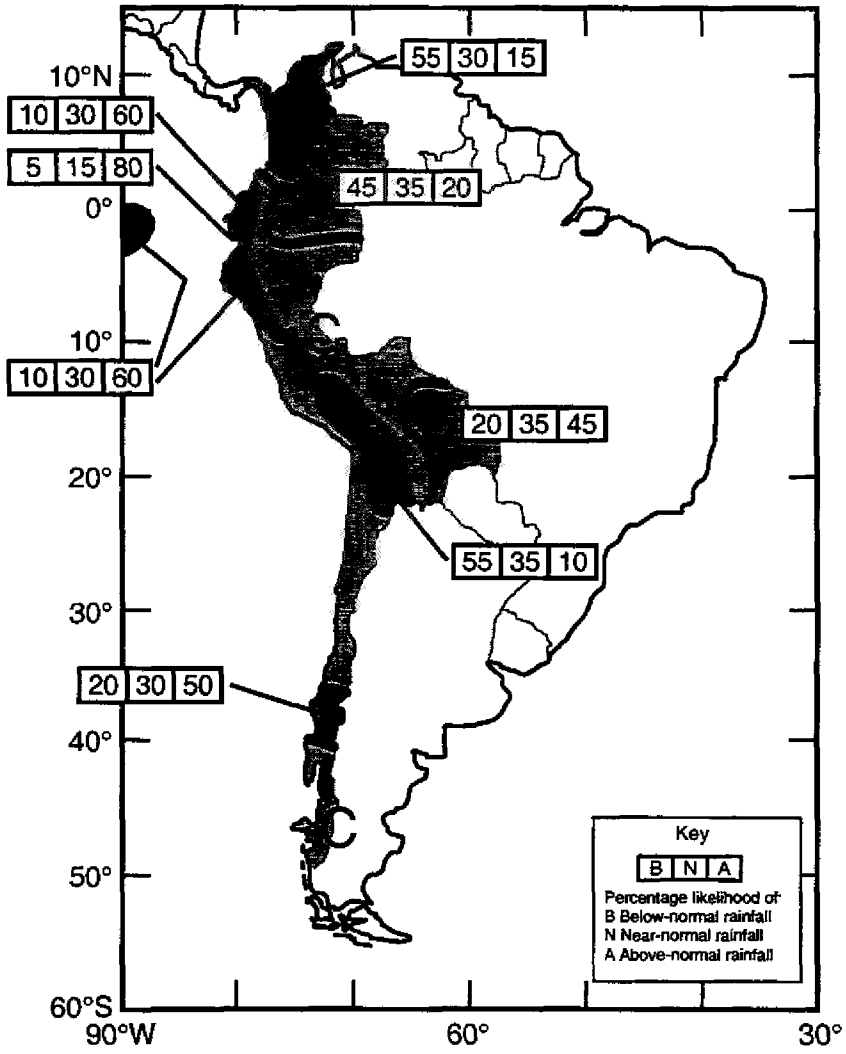
Consensus Climate Guidance

Pacific South America Climate Outlook Forum

October 28, 1997 *Lima, Peru*

(for list of participants and explanatory text see associated discussion)

December 1997 - March 1998



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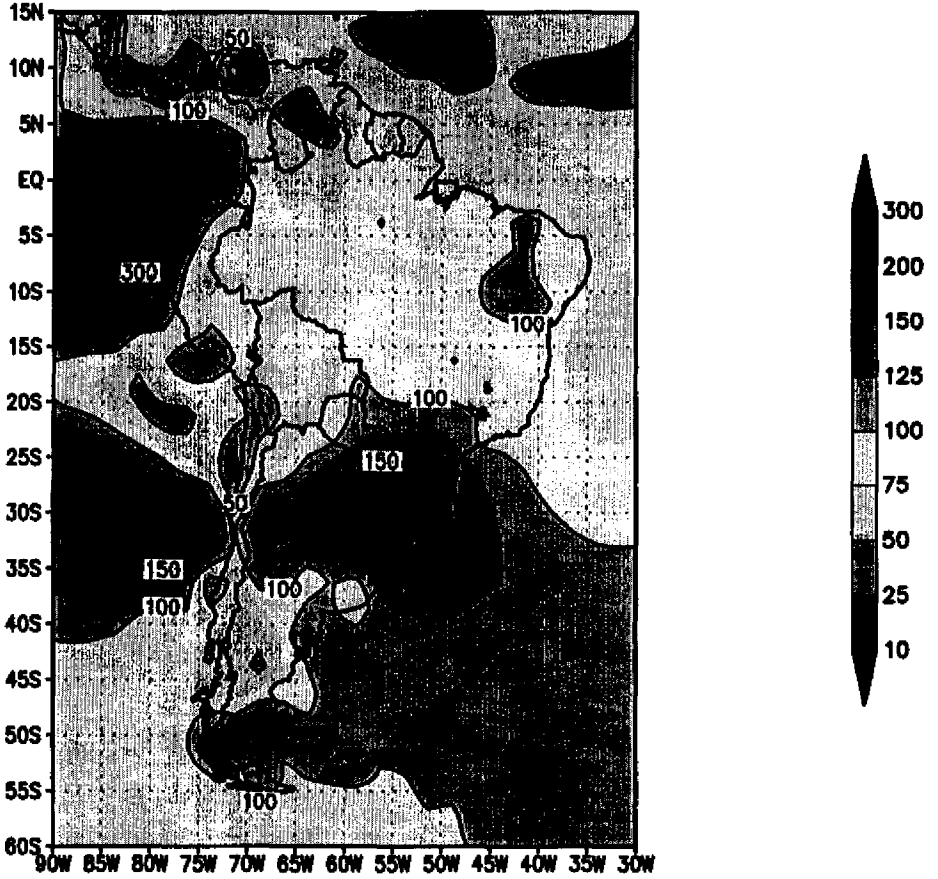

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Southeastern South America - December 1997

The Southeastern South American Regional Climate Outlook Forum, held in Montevideo, Uruguay, December 1997, and locally organized by the Uruguay Rural Association, generally followed the three part structure described for Pacific South America. Similar to the Pacific South America event, the Montevideo meeting served multiple purposes: 1) to produce and communicate a consensus precipitation forecast for Southeastern South American for January-March 1998, 2) to discuss and plan pilot application activities for climate-sensitive sectors (e.g. agriculture-livestock, water resources, energy), and 3) to inform governments, industry, media and the general public of the Climate Outlook and potential opportunities for using climate information. The Outlook and related discussions covered areas of Argentina, Brazil, Paraguay and Uruguay.

Workshop recommendations

Discussions of pilot applications activities were held in three separate working groups, including 1) meteorology/climatology, 2) water resources, energy, and emergency response, and 3) agriculture. Recommendations from the working groups include (with group number in parentheses):

- Establish a regular mechanism to provide seasonal forecast information to users in affected sectors (1,2,3);
- Continue discussions among the forecast users and producers to foster the creation of applicable/useful climate forecasts (1,2,3);
- Apply forecast information to sectors particularly vulnerable to climate variability, such as hydroelectric power generation, civil and emergency defense, agricultural irrigation, and water resources sectors (drinking water supply, river navigation) (2);
- Forecast river discharge using seasonal precipitation forecasts and river flow models to aid planning and response in water resource, emergency management, and energy sectors in critical river basins in the region, including the Uruguay, Paraguay, and Iguazu (2);
- Incorporate forecast information into disaster management to identify high risk areas (2);
- Create an agricultural Forum to forecast seasonal precipitation amounts, demonstrate potential agricultural impacts for various precipitation scenarios, and suggest alternatives for adaptation to climate variability (3); and
- Assign representatives in each country with knowledge of the region and technical aspects of agriculture to promote results of the Forum, identify key methods in which forecast information can aid decision-making, and report results of forecast incorporation into agricultural decision-making to the Forum on a regular basis (3).