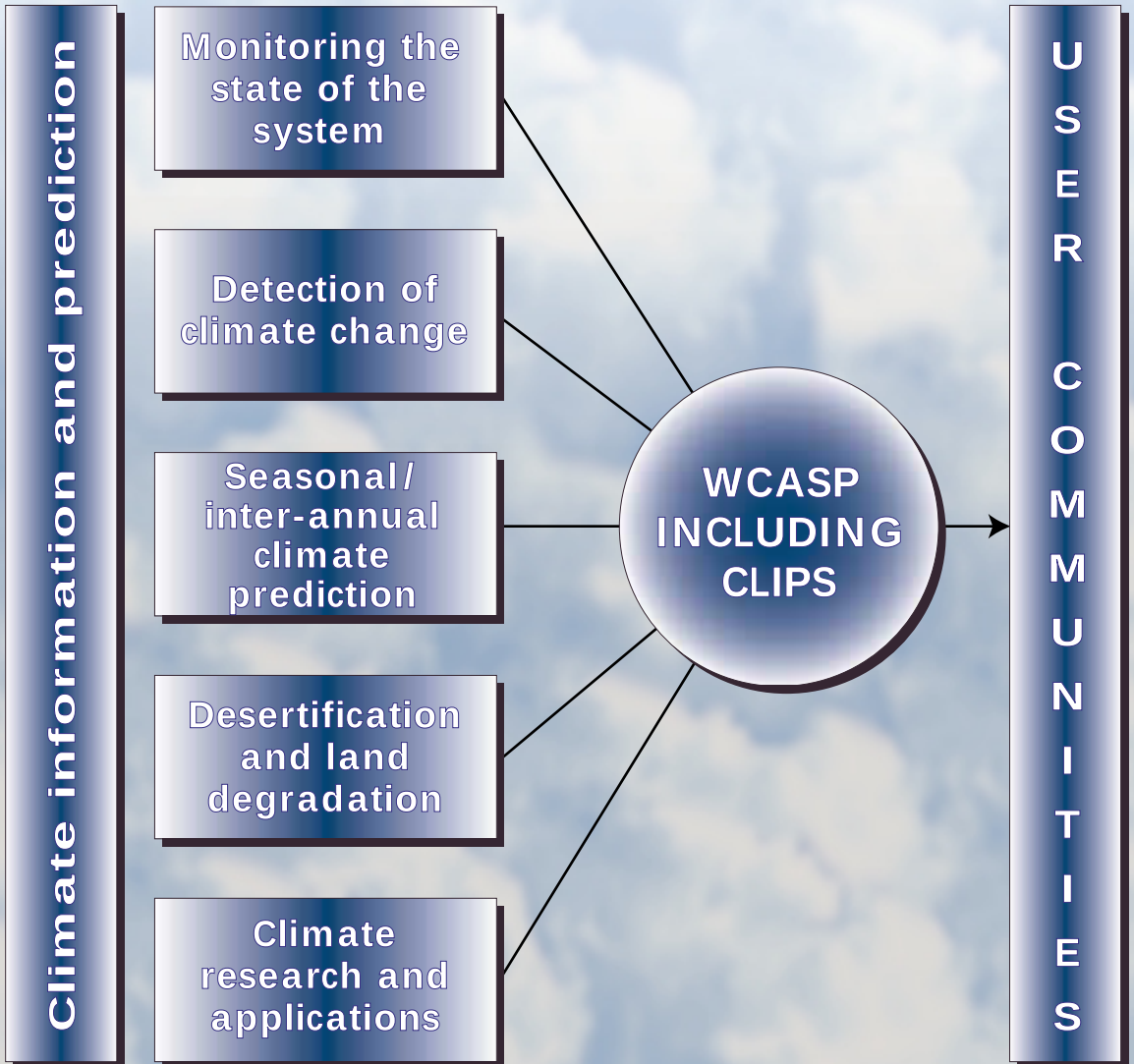


Climate Information and Prediction Services

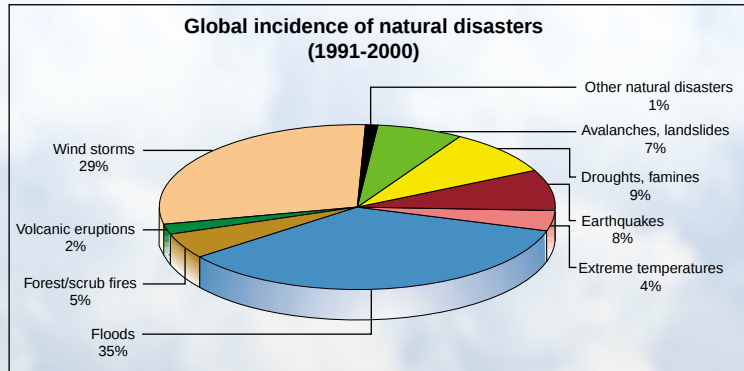


Linking climate prediction and science to the users

Impacts of climate

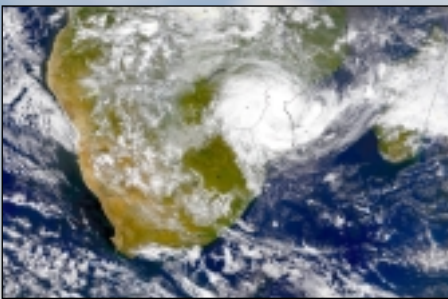
Climate is a vital factor in the availability and quality of food, water, shelter and lifestyle, but it is also a potential hazard, realized through extremes such as floods and droughts. The impacts of climate events can range from inconvenient, through catastrophic. Extremes can undo years of progress and development, and cause terrible hardship to people and nations.

In the 1990s, most natural disasters were related to weather and climate. On average, each year 80 000 lives were lost, 200 million people were affected and economic losses were in the order of US\$ 63 billion. Ever-increasing human populations along with projected climate change will result in increased human vulnerability and losses due to natural disasters.



(Source: Office of US Foreign Disaster Assistance (OFDA)/Centre for Research on the Epidemiology of Disasters (CRED); IFRC)

The example of Mozambique, 1999/2000



(Provided by the SeaWiFS Project, NASA/Goddard Space Flight Center and ORBIMAGE)

From December 1999 through early 2000, vast areas of eastern and southern Africa were inundated with heavy rains and widespread flooding. Tropical Cyclone *Leon-Eline*, shown on 23 February 2000, exacerbated the saturated conditions. Dozens of communities in Mozambique were devastated. Three of the country's major river basins suffered the worst flooding seen in 50 years. More than a million people were affected (almost a third of the population); hundreds died and more

than half a million were displaced from their homes. Extensive damage was inflicted on housing, public buildings, roads and communications networks. Ten per cent of the cultivated lands were destroyed, and 90 per cent of the irrigation structures were damaged, all of which served to hamper recovery.

Governments and citizens can reduce their risk to such climate events with early warnings and climate advice.

Why CLIPS is needed

CLIPS Focal Points

WMO Members are developing a global network of climate scientists specially trained in climate science, statistical modelling and prediction, applications and project management. These CLIPS Focal Points ensure national and regional coordination of climate information and prediction products.



Participants of the CLIPS Training Workshop for Eastern and Southern Africa, August 2002

Regional Climate Outlook Forums (RCOFs):

RCOFs, initiated just prior to the major 1997–1998 El Niño event, are an important vehicle in developing regions for providing advance information on the likely climate features of the upcoming season, and for developing a consensus product from amongst the multiple available individual predictions. Some regions in which RCOFs are held are illustrated below:



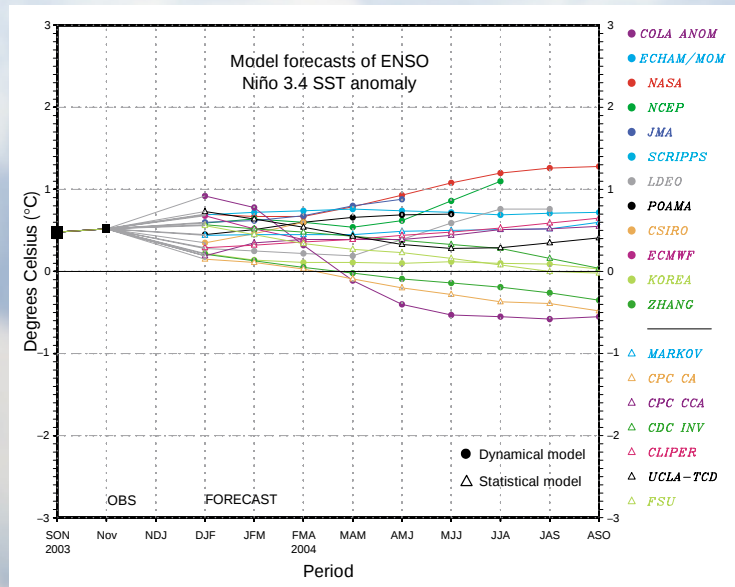
RCOFs stimulate the development of climate capacity in the National Meteorological and Hydrological Services of the area, and do much to generate decisions and activities that mitigate adverse impacts of climate and help communities adapt to climate variability.

The CLIPS Project

Long-range forecasts (LRF)

Producers of long-range forecasts determine how factors such as sea-surface temperature anomalies in the Pacific, Atlantic and Indian Oceans, sea-ice extent in Polar regions and snow cover in high latitudes will impact on global and regional climates in upcoming seasons. In some regions of the world, known interactions between the slowly changing oceans and the atmosphere, particularly the *El Niño*/Southern Oscillation (ENSO) phenomenon, are the basis for predictability of climate on seasonal to interannual time frames. ENSO is an ocean-atmosphere cycle that involves periodic building-up of unusually warm or cold waters in large parts of the eastern and central equatorial Pacific Ocean and associated shifts in atmospheric circulation patterns (*El Niño* and *La Niña*, respectively). ENSO events generally last from three to six seasons, recur every two to seven years, and have typical, thus predictable, climate impacts.

Long-range forecasts are generally produced using statistical methods based on historical climate data (30-50 year records); or using dynamical computer models such as global coupled ocean-atmosphere general circulation models (GCMs) and higher-resolution regional models, based on the physical laws that govern the climate



(Source: IRI)

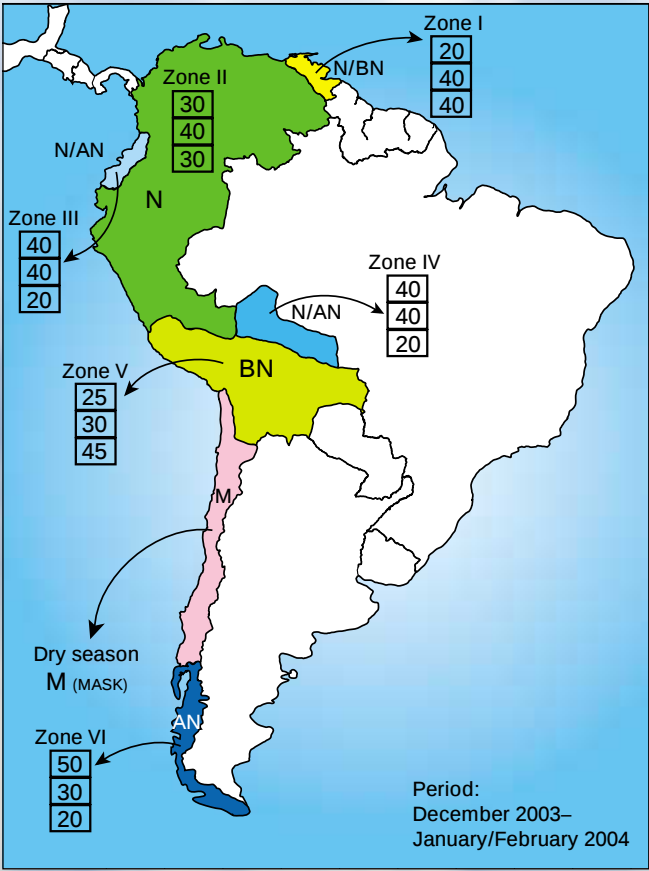
system. In ensemble forecasting, the GCM is run numerous times with different initial conditions. Often, statistical and dynamical modeling techniques are combined to achieve the best estimates of likelihood and uncertainty in the forecasts.

Global scale prediction input to CLIPS

Regional seasonal forecasts

Forecast probabilities are often provided in terciles, to indicate above normal, near normal or below normal rain probability for various areas. The probability that the seasonal precipitation will fall into the wettest third, middle third or driest third of the years is shown in the top, middle and bottom numbers respectively, as described in this table:

Tercile	Condition of rains
A	Above normal
N	Normal
B	Below normal



This consensus forecast for seasonal precipitation is a typical product of the Regional Climate Outlook Forums for the west coast of South America. Neutral ENSO conditions were predicted for the forecast period in this example – typically a more difficult forecasting situation than when there is a strong *El Niño* or *La Niña* signal. Factors considered included Kelvin waves in the Pacific Ocean, movement of the Intertropical Convergence Zone (ITCZ), present and projected states of the atmosphere and oceans, and local climate information from participating countries. Results include prediction

of drier than normal conditions for the south part of Peru and Bolivia, and wetter than normal conditions for southern Chile.

One goal of the CLIPS project is to help end-users better understand and use such products.

CLIPS products and processes

Demonstration and pilot projects

CLIPS initiates demonstration and pilot projects around the world to show the value of climate information in decision processes. In the Showcase Project 'Seasonal Weather Forecasting for the Food Chain', CLIPS and the UK Foresight Programme brought together climate and research scientists and specialists from the UK food chain industry (retailers, agronomists, farmers and processors) to investigate the scientific and economic benefits of collaboration.

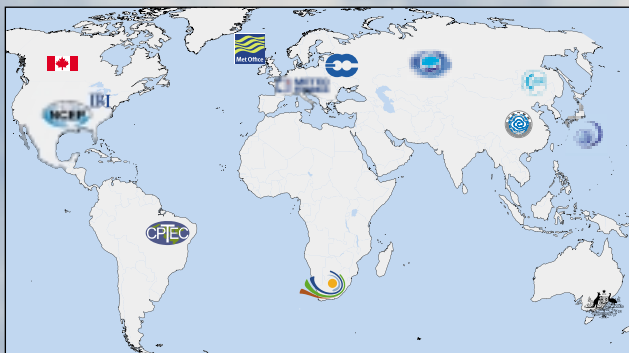
Application of climate information to crops such as peas, sugar beets, apples and tomatoes revealed that, generally, the more perishable and weather-sensitive the crop, the greater the potential benefit of using seasonal forecasts. Increasingly useful climate forecasts, and better understanding of them within the whole food chain have great potential to improve supply-chain management, reduce losses and contribute to lessening the impact of agriculture on the environment.

Partners

In addition to global forecast groups and specialized meteorological centres such as the Drought Monitoring Centres in Africa, CLIPS also promotes collaboration with international agencies concerned with agriculture and food security, health and water resources; aid and disaster response; science and social research; and funding and development (amongst others the Food and Agriculture Organization of the United Nations; the United Nations Environment Programme; the International Federation of Red Cross and Red Crescent Societies (IFRC); the World Health Organization; and the World Bank).

Global producers of long-range forecasts

- Centre for Weather Prediction and Climate Studies/National Institute for Space Research (CPTEC/INPE)
- Climate Prediction Center, National Centres for Environmental Prediction (CPC/NCEP/NWS/NOAA)
- European Centre for Medium-range Weather Forecasts (ECMWF)
- International Research Institute (IRI)
- Japan Meteorological Agency (JMA)
- Met Office (United Kingdom)
- Météo-France
- Meteorological Service of Canada (MSC)
- Korean Meteorological Administration (KMA)
- National Climate Centre of the China Meteorological Administration (NCC/CMA)
- South African Weather Service (SAWS)
- World Meteorological Centre Melbourne
- World Meteorological Centre Moscow



The CLIPS Project

Value of climate services

Climate variability and change are key factors in the management and profitability of sectors such as agriculture, water resources, tourism, health, energy, transportation, and communications.

Knowledge of climate and increasing skill in predicting future climates months and seasons ahead are powerful tools to assist planning and management for all the socio-economic activities that underpin sustainable development. These tools also allow governments and societies to prepare for, and mitigate the consequences of extreme climate events, and thereby improve societal and individual well-being.



(Source: IFRC)

CLIPS bridges the gap

The Climate Information and Prediction Services (CLIPS) Project links oceanic, atmospheric and social scientists; climate forecasting and applications specialists; and global producers of long-range forecasts (LRF) with sectoral users of climate information to develop useful and timely climate forecasts, information, products and services. These are used by National Meteorological and Hydrological Services to help decision makers.

The goals of the CLIPS Project are to:

- Develop the infrastructure for LRF;
- Facilitate Regional Climate Centres (RCCs);
- Develop and apply LRF products;
- Promote capacity building of producers and users of LRF through training, workshops, and demonstration and pilot projects.

Ultimately, these efforts will help to save lives and protect vulnerable economies worldwide.

Why CLIPS is needed

Next steps

Capacity building:

The CLIPS Project will continue to facilitate workshops and training, as well as development of the global network of CLIPS Focal Points.

Applications projects:

Pilot Application Projects, developed in collaboration with other WMO Programmes (i.e., Hydrology and Water Resources, Agricultural Meteorology, Voluntary Cooperation), WMO Members and Regional Associations, will address issues from production to dissemination of information and products, interpretation, use and evaluation of the Climate Outlook Forums.

Science and methodology:

CLIPS will encourage dissemination of model intercomparisons by forecast producers; will work to increase temporal and spatial resolution of digital data for downscaling; will help establish operational methods for forecast verification; and will set criteria for measurement of forecast quality.

Regional collaboration:

CLIPS will work with the WMO Regional Associations to facilitate the implementation of RCCs. The CLIPS Focal Points will be instrumental in defining the requirements for the responsibilities of the RCCs.

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Or visit the CLIPS web site:
<http://www.wmo.ch/web/wcp/clips2001/html/index.html>

Or contact your National Meteorological or Hydrometeorological Service

The future for CLIPS