

African Regional Climate Outlook Forums

Best Practices



United Nations
Economic Commission for Africa



WMO

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First printing October 2020

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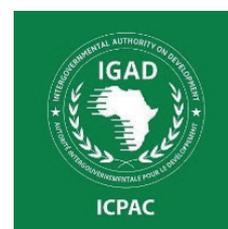
Designed and printed in Addis Ababa, Ethiopia by the ECA Printing and Publishing Unit. ISO 14001:2015 certified.
Printed on chlorine free paper

Cover photos: Shutterstock.com

The production of this document was coordinated by:



And received contributions from the following partners:



Under the auspices of:



Foreword

The World Meteorological Organization (WMO) is humbled by the invitation to contribute to the production of this guide on the best practices of regional climate outlook forums in Africa. The African Climate Policy Centre (ACPC) is to be congratulated for its decision to document the development of the outlook forums since 1996, when they were a mere concept at an international meeting in Zimbabwe in Southern Africa, the first forums in Southern and Eastern Africa in 1997, up to the present seven outlook forums in all the regional economic communities. This success story has now been replicated by the other WMO regions so that there are now 20 outlook forums. Sincere gratitude is also extended to the United Kingdom Department for International Development (DfID), through the WISER Programme, for providing financial support. Last, but not least, WMO appreciates the contributions of the experts who took part in the compilation and review of this well-crafted document.

Regional climate outlook forums are yet another success story coming out of Africa. They have clearly demonstrated that, with a shared vision and collective determination, albeit separate mandates, any initiative can yield far-reaching benefits. In this case, it was the realization by all stakeholders of the role of weather and climate in the socioeconomic development of Africa, which is underpinned by various forms of agriculture. Agriculture is the mainstay of many economies in Africa, where approximately 80 per cent of populations are primarily rural and rely on agriculture for their subsistence. These economies are also highly vulnerable to disasters such as floods and droughts, diseases such as malaria, food insecurity and water shortages, among others.

For its part, WMO has been a prominent player in regional climate outlook forums. It has been involved in resource mobilization, and has also upscaled its technical contribution, including by a shift to impact-based forecasts, establishing the Global Framework for Climate Services (GFCS) and national frameworks for climate services, and creating regional climate centres in all the five regional economic communities. In the near future, WMO will be launching multi-hazard early warning systems in Africa in partnership with other United Nations organizations. In addition, WMO is seeking to engage the private sector in partnerships with national meteorological and hydrological services to disseminate national climate outlook forum products.

Despite the relevance of the regional climate outlook forums, WMO is concerned about the inadequate financial support to sustain them. Governments are urged to take the greatest responsibility for this as they are the primary beneficiaries of the forecasts and attendant recommendations. They need to own these forums because support cannot be left to donors and development partners since that would not be sustainable. Similarly, stakeholders and users of weather and climate information are requested to contribute to the forums other than by simply supporting the attendance of their own representatives.

WMO is aware that, with the increase in sector-specific demands for regional climate outlook forum products, the forums should also be tailored to reflect the Sustainable Development Goals and the African Union Agenda 2063. The increase in the frequency and severity of extreme weather events worldwide, with the attendant devastating impacts on life and property, mean that the time has also come for the United Nations Economic Commission for Africa (ECA), the African Union Commission (AUC) and WMO to forge even closer collaboration. The private sector needs to be brought in, in a win-win arrangement, particularly in the dissemination of forum products. Through employing best practices, regional climate outlook forums can become more useful and even mainstreamed in national decision-making and planning.

Preface

Adverse weather and climate events have continued to ravage vulnerable people and communities and to disrupt livelihoods and economic activity in Africa. Strengthening the capacity for early warning systems underpinned by sound climate information, services therefore continues to be an urgent need for Africa to protect socioeconomic gains and contribute to progress towards achieving both Agenda 2063 and the 2030 Agenda for Sustainable Development.

Under the auspices of the Weather and Climate Information Services for Africa (WISER) initiative, generously funded by the United Kingdom Department for International Development, the African Climate Policy Centre has been supporting the enhancement of the policy and enabling environment for the production, uptake and use of climate information services in Africa. It is in this context that ACPC conceived the series of knowledge exchange workshops that led to the production of this document, with the intention of identifying and documenting the best practices of the African regional climate outlook forums processes. The workshops brought together representatives of African regional climate centres, who formed a knowledge partnership. The outcome of the knowledge exchange workshops convened by the ACPC in 2018 was a rich collection of material consisting of procedures, lessons and practices that the regional centres have used over the years to produce consensus-based subseasonal to seasonal forecasts, organize the climate outlook forums and engage stakeholders. In order to upscale and extend the benefits of this resource, the ACPC decided to support the compilation of this knowledge into a document that can serve as a reference for regional climate centres and other stakeholders involved in outlook forum processes.

The knowledge partnership between the regional climate centres and the regional climate outlook forums was therefore geared towards improving the coordination of climate information service activities in Africa and supporting the capacity enhancement of African regional centres under the patronage of WISER.

The authors of this document are members of the African outlook forums knowledge partnership with the African climate centres. The centres that participated fully in the two workshops and one write-shop were the African Centre of Meteorological Applications for Development (ACMAD), the Intergovernmental Authority on Development Climate Prediction and Application Centre (IGAD-ICPAC), the Central Africa Centre for Application and Climatological Forecasting (CAPC-AC), Agrometeorological, Hydrology, Meteorology (AGRHYMET) and the Southern Africa Development Community Climate Services Centre (SADC-CSC). Their contributions were complemented by input from national meteorological and hydrological services, regional economic commissions and WMO in its capacity as the initiator and custodian of regional climate centres globally. Climate scientists from two regional economic communities – the East African Community (EAC) and the Economic Community of West African States (ECOWAS) – also contributed.

The United Nations Economic Commission for Africa is confident that this compendium of best practices will be a valuable contribution to ongoing efforts to support investment in the production, analysis and uptake of climate information services in development policy and implementation in Africa, and ultimately inform climate-resilient societies, ecosystems and economies on the continent.

Jean-Paul Adam,

Director, Technology, Climate Change and Natural Resources Division,

United Nations Economic Commission for Africa.

Use of this document

This best practices document is produced to support the organization of regional climate outlook forums in Africa. It is thus intended to serve as a reference guide for regional climate centres in their efforts to convene and consult stakeholders during the production, dissemination, use of and feedback on consensus seasonal forecasts.

During the initial stages of establishing national climate outlook forums, this document may also be useful in so far as it embodies general principles and guidelines that are applicable at national level.

Executive summary

Formally initiated at the Workshop on Reducing Climate-Related Vulnerability, held in October 1996 in Victoria Falls, Zimbabwe, the innovative WMO concept of regional climate outlook forums is now well established in Africa. There are now seven operational outlook forums in Africa coordinated by WMO-designated regional climate centres under each regional economic commission. The process of organizing an outlook forum includes a training session, a pre-forum, a forum and an outreach session. The differences in regional context, capacity and policy mean that there are likely to be variations in organization, funding mechanisms, consensus development, communication, dissemination and stakeholder engagement. It is thus crucial to highlight best practices to improve exchange between the various outlook forums and foster standardization of the process across the continent.

One of the most important best practices in organizing a regional climate outlook forum is the involvement of operational meteorologists, climatologists and researchers from national meteorological and hydrological services, and regional and international centres for the development of consensus products; media experts for communication and dissemination; and users from the main climate-sensitive socioeconomic sectors for decision-making. Moreover, the training session and the fact that it takes place before the forum itself is key for the acquisition, testing and assimilation of new methodologies and tools, the capacity-building of critical mass in national meteorological and hydrological services and the evaluation of the performance of the previous seasonal forecast regionally, based on ground truths provided by climate scientists from national meteorological and hydrological services. During the development phase, the good practices that lead to improved results and consolidate the consensus-based regional climate outlook are: verification of the products over specific areas with historical data sets, triggering further models and tools development; and the consideration of multi-models and/or multi-tools ensembles, rather than using a single method.

Communicating and disseminating the information is another key aspect of regional climate outlook forums. The African forums use two approaches labelled as best practices. A detailed technical report is developed by and for experts, while a press release is drafted for comprehension, consumption and dissemination by media experts for users, decision makers and the general public.

Current funding mechanisms do not guarantee the sustainability of African outlook forums. Each regional climate centre sources funding from development partners and donors to support the forum, while day-to-day logistics are the responsibility of the host country.

Over the years, African outlook forums have developed strong partnerships among stakeholders. The way stakeholders are involved is itself a vital best practice. Some stakeholders are engaged from the beginning of the process through involvement in investment, financing and organization; others are engaged at a later stage through involvement in the development of forecasts, the production of information and drafting the press release and technical reports and delivery of the products. Key stakeholders for African outlook forums are users, users' intermediaries and extensions. These are fully involved in the identification of sectoral applications for tailored advisories and in the delivery and uptake of products. Through this engagement, users also provide feedback and express their needs and this informs the development of new tools and products.

Besides the historical outlook forum practices outlined in this compilation, new innovative developments in the processes will continue to be introduced. In this regard, for the first time in the history of the Greater

Horn of Africa Climate Outlook Forum (GHACOF), ICPAC put into operation a consolidated, objective forecasting system and replaced the consensus-based seasonal outlook process beginning in May 2019. The third objective seasonal outlook was issued for March-April-May 2020 at the fifty-fourth session of GHACOF using the new approach, which, it was noted, had brought significant improvements in forecast reliability.

Introduction

As a natural phenomenon, climate fulfils our basic needs but also poses a variety of challenges in the form of extremes. Over the years, human beings have developed some resilience to the vagaries of weather and climate but, every now and then, our social and economic systems are deeply stressed by severe weather and extreme events. Better adaptive capacities are needed to meet this growing challenge, and these are made possible by greater scientific understanding of the climate system. As our understanding of the climate system grows, as society becomes more aware of the potential opportunities for such knowledge and as greater risks are taken by a rapidly developing society, there is increasing demand for better climate information services.

Climate information is needed for adaptation to climate change and climate variability; for short-, medium- and long-term planning and early warnings. Such information is produced, packaged and delivered within a climate service framework. A climate service is a decision-making aid that helps end users make better decisions based on forecasts. It requires appropriate and iterative engagement to produce a timely advisory that end users can comprehensively understand and that can guide their decision-making to enable early action and preparedness. It needs to be provided in a seamless manner and has to respond to user requirements (Tall and others, 2018). Of the services needed, information about the upcoming rainy season is a top priority for practitioners and decision makers (Vincent and others, 2018).

To this end, in the 1990s, WMO, national meteorological and hydrological services, regional institutions and other international organizations initiated an innovative process known as the regional climate outlook forums. These forums bring together national, regional and international climate experts on an operational basis to produce consensus-based, user-relevant climate outlook products in real time for the next rainy season in order to reduce climate-related risks. By bringing together countries with closely related climatological characteristics, the outlook forums ensure consistency in access to, and interpretation of, climate information. In addition to the information developed and disseminated and through interaction with user communities in the key socioeconomic sectors, extension agencies and policymakers, the forums assess the likely implications of the outlook for the various socioeconomic sectors that are critical for sustainable development in the region concerned (Ogallo and others, 2008).

Typically, regional climate outlook forums attract practitioners and decision makers from sectors such as: agriculture and food security; water resources; energy production and distribution; public health; transport (air, land and water); disaster risk reduction and response; and outreach and communication. Based on the needs of specific sectors, specialized, sector-oriented outlook forums, such as the Malaria Outlook Forums (MALOFs) in Africa, are held in conjunction with regional climate outlook forums.

With the different technical, financial and networking capacities of the leading and existing institutions of the various climate outlook forums and the differences in regional contexts and modalities of cooperation (in data sharing, for example) of the various countries with common climatological features, there are some variations in terms of typical organization of the event, funding mechanisms, development of consensual forecasts, communication and dissemination of forecasts and, more importantly, the way stakeholders are engaged. However, efforts are ongoing to standardize the forums and integrate them within the climate service infrastructure of WMO (WMO, 2003; Brasseur and Gallardo, 2016). There is thus a need to highlight best practices for better exchange and transferability of methodologies in order to further improve the usefulness and usability of the information derived from the various outlook forums and standardize the process among the different regions.

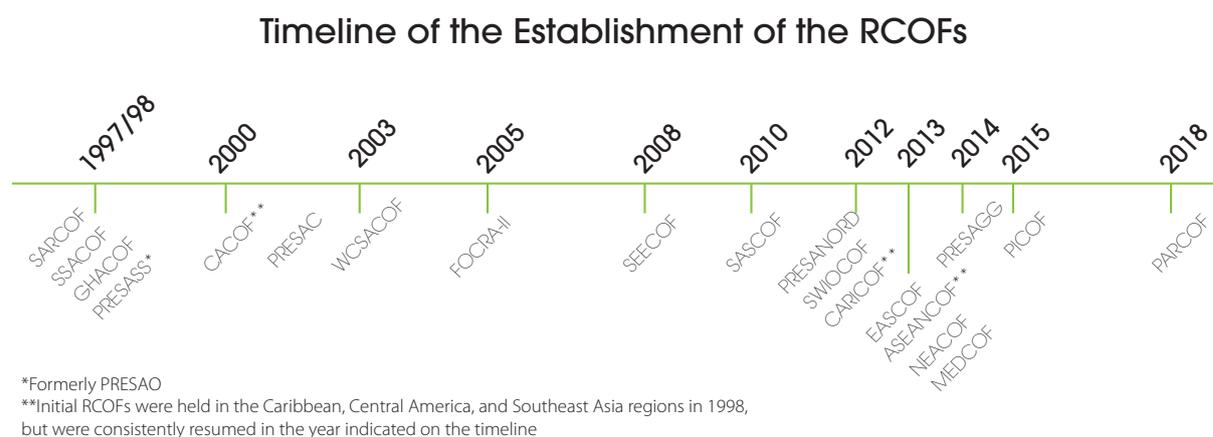
Establishment and expansion of African regional climate outlook forums (history)

The regional climate outlook forum is an innovative concept developed and supported as part of the WMO Climate Information and Prediction Services (CLIPS) project, in partnership with national meteorological and hydrological services, regional climate institutions and other agencies. Outlook forums have been held successfully for more than twenty years in different subregions of Africa. The process of organizing them was formally initiated at the Workshop on Reducing Climate-Related Vulnerability, held in October 1996 in Victoria Falls, Zimbabwe. The ever-growing concerns about potential changes in rainfall variability associated with global warming caused unprecedented public awareness and prompted the organization of the first regional climate outlook forum in Southern Africa in September 1997 in Kadoma, Zimbabwe, in order to better anticipate and manage climate fluctuations (Basher and others, 2000). Meteorologists and representatives of government ministries, nongovernmental organizations (NGOs), and businesses met to negotiate a seasonal climate forecast of rainfall for the next three to six months that would be useful for climate-sensitive sectors, such as agriculture and food security, health and water resources (Ogallo and others, 2008). Notwithstanding the failure of the efforts to apply these first forecasts and

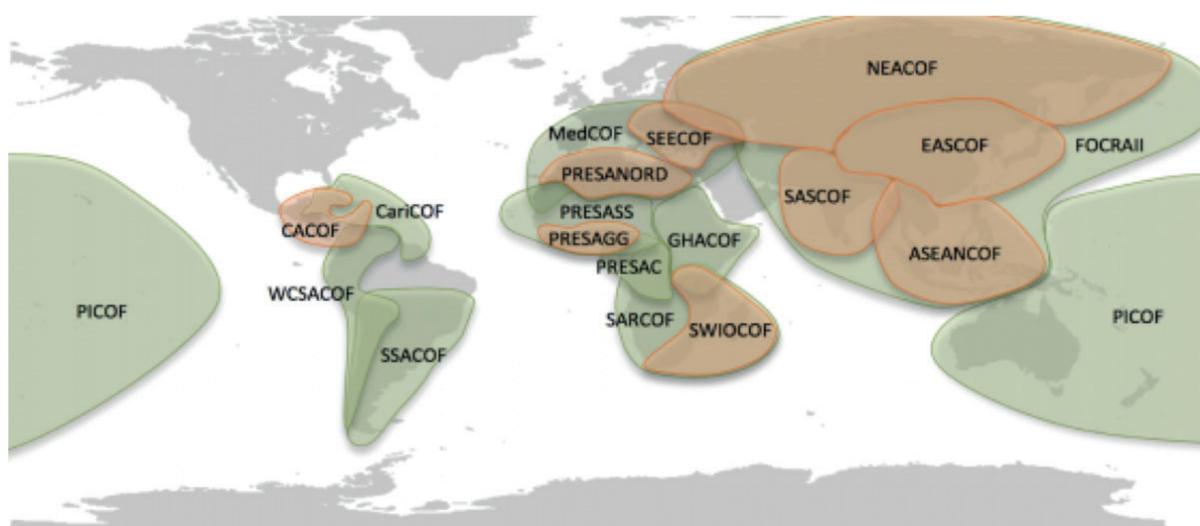


the complaints of stakeholders that they were misled by forum organizers (Phillips and others, 2002), the process gained considerable momentum and other forums were already planned (Patt and others, 2007). In fact, ICPAC organized the first Greater Horn of Africa Climate Outlook Forum in February 1998 in Nairobi, Kenya, for the target season of March-April-May. West Africa followed suit in May 1998 in Abidjan, Cote d'Ivoire, where the African Centre of Meteorological Applications for Development facilitated the outlook forum. This was the first West African Forum on Climate Variability and Prediction and its Application in Early Warning Systems for Food Security (PRESAO-01) for the June-July-August-September season. Other outlook forums were held in other regions of the world, such as South America, Central America, the Caribbean, South-East Asia and the Pacific (NOAA, 1998). See figure 1 for the timeline of the establishment of regional climate outlook forums.

Since then, climate outlook forums have expanded to cover all regions of Africa and the world (see figures 1 and 2), with some countries participating in multiple forums. The events take place regularly, making the forums a well-established process. There are now seven operational outlook forums in Africa (see figure 2), which are coordinated by the WMO-designated regional centres: ACMAD, ICPAC, AGRHYMET, Economic Community of Central African States (ECCAS)-CAPC and SADC-CSC (Sylla and others, 2018). AGRHYMET and ACMAD, both based in Niamey, Niger coordinate two regional outlook forums: the Regional Climate Outlook Forum for Sudano-Sahelian Africa (with a French acronym, PRESASS), covering 17 countries in West and Central Africa; and the Regional Climate Outlook Forum for the Gulf of Guinea Countries (with a French acronym, PRESAGG), covering countries in the coastal Atlantic region of West and Central Africa. ACMAD initiated PRESAGG, which is now a joint undertaking with AGRHYMET, and currently supports two others: the South West Indian Ocean Countries Climate Outlook Forum (SWIOCOF), which covers island countries in the south-west Indian Ocean and nearby countries in southern Africa; and the Regional Climate Outlook Forum for Central Africa (with a French acronym: PRESAC), covering countries in Central Africa including Sao Tome and Principe. The North Africa Climate Outlook forum (PRESANORD) was initiated under the leadership of ACMAD. These regional outlook forums are now joint undertakings: between ACMAD and ECCAS/CAPC in the case of PRESAC; between ACMAD and Météo-France (La Reunion) in the case of SWIOCOF; and ACMAD and the Regional Climate Centre network in the case of North Africa. The Greater Horn of Africa Climate Outlook Forum is coordinated by ICPAC, based in Nairobi, Kenya, and covers 11 countries, while the Southern African Regional Climate Outlook Forum (SARCOF) is coordinated by the SADC-CSC based in Gaborone, Botswana, and covers all 14 SADC Member States. It is important to note that the Regional Climate Outlook Forum for Northern Africa (with a French acronym: PRESANORD) consisting of the five countries in North Africa has joined the South-East European Climate Outlook Forum (SEECOF) to form the Mediterranean Climate Outlook Forum (MedCOF), coordinated by the State Meteorological Agency of Spain (AEMET), with a contribution from ACMAD.

Figure 1 Timeline of the establishment of global regional climate outlook forums

Source: WMO website.

Figure 2 Locations of the different regional climate outlook forums across world

Source: WMO website.

Best practices in African regional climate outlook forums

Organization

In the five Regional Economic Communities (RECs) of Africa, the user communities that benefit from the outlook forums contribute to their organization and to the scale of the sessions in order to meet their needs.

The process of organizing the forums involves a pre-forum training, the forum proper, the review of climate information use and lessons learnt, and an outreach session. Thus, the outlook forums process typically includes the following components:

- A pre-forum training workshop on seasonal climate prediction to strengthen the technical capacity of national and regional climate experts. At the end of the workshop, the climate experts in attendance develop a consensus for the regional climate outlook, typically in a probabilistic form.
- The forum proper, where there are meetings involving both climate scientists and representatives of user sectors to:
 - Review impediments to the use of climate information and experiences and lessons learned regarding applications of previous outlook forum products and the enhancement of sector-specific applications.
 - Identify impacts and implications and the formulation of response strategies.
 - Consider the potential applications of outlook forum products for decision-making and action in the relevant climate-sensitive sectors.
- Special outreach sessions involving media experts, to develop effective communications strategies.

Figure 3 highlights these different steps and processes.

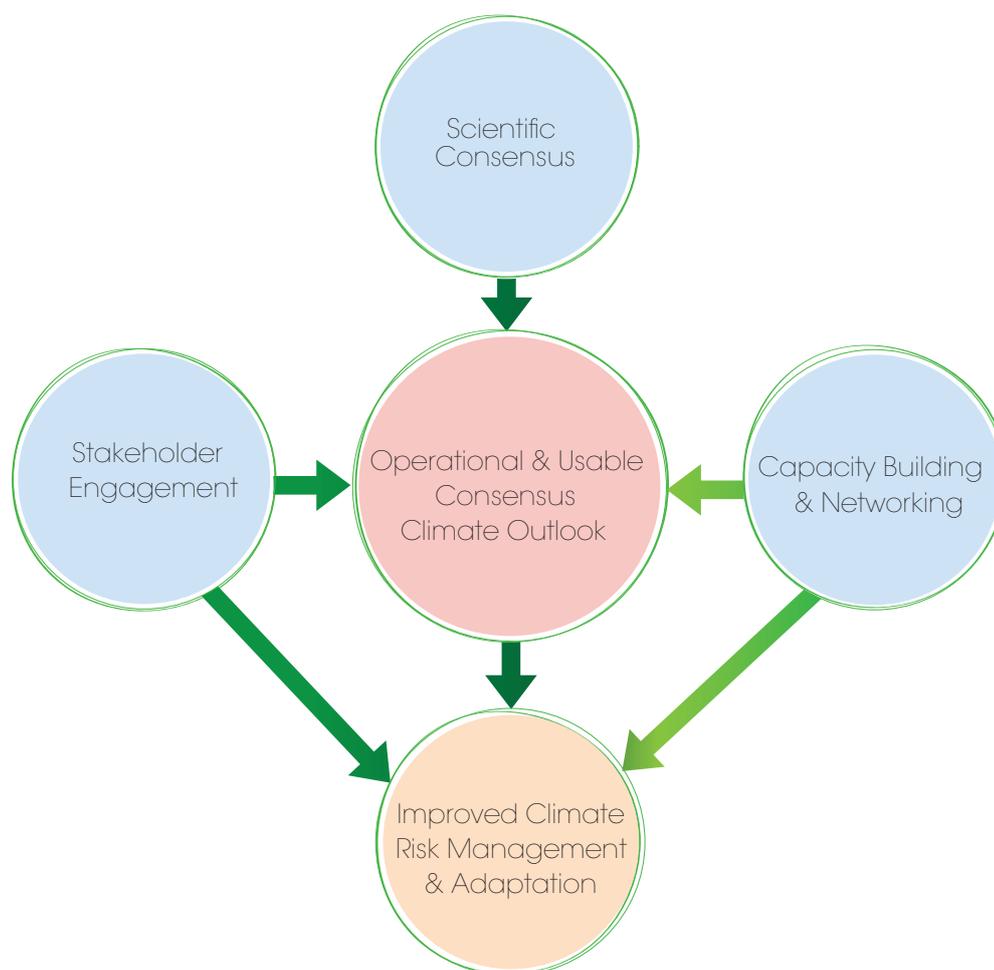
Regional climate outlook forums are hosted on a voluntary, rotational basis by participating Member States, while ensuring strong links with the regional climate centres and regional economic communities that organize them. Participants invited to the forum are selected on the basis of a multisectoral, multi-stakeholder and multidisciplinary approach. The organizers invite the most appropriate people from academia and research centres, climate scientists, researchers, users from key socioeconomic and climate-sensitive sectors, governmental and non-governmental organizations, development partners, decision makers, and civil society, among other stakeholders, while ensuring gender balance, which may require selecting a cross-section of users within a particular group.

Meeting sessions are designed to support or inform decision-making processes for the various sectors. Some outlook forums include sessions during the forum at which different sectors interpret, discuss and assess the implications of the forecasts for climate risk management. For example, several regions organize dedicated “user forums” that are held as stand-alone events after the outlook forum. For example, in some regions of Africa, malaria outlook forums have been held, at which health professionals use the forecast to assess the probable incidence of malaria and actions that could be taken to minimize outbreaks (Patt and others, 2007). Similar sector-based user forums have been organized for stakeholders in food security, health, water management and disaster risk reduction and management in many regions of Africa (WMO, 2011b).

The mechanism enabling feedback from users has driven the development and improvement of new climate information products. For example, in the Greater Horn of Africa region, requests from users have prompted the provision of new types of parameters within the seasonal climate outlook, such as within-season characteristics (along with their variability) of the forecast season. These new types of parameters include: the expected start dates of the rainy season; intervening dry and wet spells in a month or season; expected dates of the end of rainfall; and expected duration of the forecast season. These parameters are provided as an ensemble mean of 15-20 dynamically downscaled forecasts.

Many regional climate outlook forums employ multiple forms of user engagement across this spectrum but the manner in which users are involved can vary from year to year and from region to region, often as a result of availability of funding and means.

Figure 3 The different components and processes contributing to achieving the goals of regional climate outlook forums



Source: Daly and Dessai, 2018.

Training and capacity-building

In the early years of the regional climate outlook forums, national experts and CLIPS focal points had to participate in intensive training courses of up to four weeks on the scientific basis and operational practices of climate prediction. Statistical forecasting tools based on Sea Surface Temperature (SST) – rainfall relationships and, to a lesser extent, some guidance on the interpretation of dynamic models resulted from the training. Later on, these courses were shortened to one or two weeks on the assumption that capacity had been built on the basic knowledge and the focus was now on the downscaling techniques it was hoped would improve products.

The outlook forums have also been successful in training users to understand and interpret climate forecasts. Training has been provided on application of the climate forecast in various socioeconomic sectors. Journalists and media practitioners have been trained to identify key messages, and in the dissemination and communication of climate information through various channels. Traction in this area has been made effective through the involvement of nascent media networks such as the Regional Network of Climate Journalists and the Network of Climate Journalists of the Greater Horn of Africa. These efforts expand the reach and use of climate information, products and services.

Technical training has also been organized for experts in disaster risk reduction, water resources management, agriculture and health, among others.

The training starts before the forecast is produced. This practice is very effective for updating the audience on new methodology to ensure that the forecasting process is assimilated and understood. Important training needs are noted in the outlook forum process, so training workshops need to be maintained as an important component of outlook forum operations.

After the formal training workshop, the forum production phase is an opportunity for hands-on training for climate service providers. The methods and tools presented during the training workshop are applied in practical real-world climate forecasting, linking training and practice. The new tools developed are used in the statistical process of developing the forecasting model.

National meteorological and hydrological service forecasters are trained to produce forecasts for their respective countries for training purposes. This allows capacity to be built for the sustainability of the process after the outlook forum so that they can continue to do the work when they have returned home, and helps to build confidence in the end results to be discussed during the consensus phase, but their work needs to be monitored by the facilitator of the training to make sure that participants have made no errors in the process of building the model and making the forecast. During the training session, participants also assess the strengths and weaknesses of the methods and tools used.



Many national meteorological and hydrological service staff have been trained over the years to build human capacity in meteorological services: every year, the services send new staff to be trained. This practice helps to produce a critical mass of trained staff. It compensates for losses through the brain drain and maintains the institutional capacity to continue delivering according to the mandate of the service.

Consensus seasonal forecasts

A consensus forecast is a general agreement among participants on the accepted forecast when there is discrepancy between outputs from different models or when there is break flow between neighbouring countries in the regional scale. The consensus among scientists is built by comparing the outputs from the global circulation models with the downscaled forecast from the ground stations data set provided by the Member States. The consensus discussion is held in different ways in the different regions. The combination of large-scale, regional and national information is sometimes quite subjective and questionable (Ogallo and others, 2008), but verification and feedback from end user communities testifies to the added value of the consensus products. Some users from countries that have their own models continue to rely more on the consensus products than on the output of a single model. For the purpose of comparing and consolidating outlook forum products from different regions, work must continue to develop a guide for operational practices to ensure a more objective methodology for preparing the consensus.

This is done through operational research. During the forum, participants verify the products over specific areas with historical data sets to allow for the identification of the weakness of the model in order to improve it. This exercise has allowed many areas to be identified that do not respond to the teleconnection relationship used for the predictability tool, thus triggering the use of other tools and methods.

Many tools are used to generate the forecast and the consensus, such as the climate predictability (CPT) tool for statistical downscaling; GEOCOF for climate clustering and prediction using SST; and through manually coding on Fortran, Shell scripting, GrADS, NCL, and IDL platforms. The use of different tools along with the comparison of the output with historical data allows the strengths and weaknesses of each tool to be identified. All the tools are statistical-based using national data sets and the output from dynamical models. Some outlook forums have started running dynamical models such as WRF for dynamical downscaling. Satellite-based data sets are used for downscaling the global circulation model outputs.

During climate outlook forums, the automation of the process incorporated in some tools, such as GEOCOF, CPT and weather research and forecasting model (WRF), has shortened the time it takes to do the forecast and has substantially improved forecasts. The combination of statistical to statistical and the general circulation model (GCM) in automated function has improved the products. SADC has developed the GEOCOF software as an open source which is used by all regional climate outlook forums.

The consensus forecast is based on consistency of outputs in the different models in spatial and temporal scale. If there is no agreement among the outputs, consensus is needed. More weight is given to the outputs drawn from national data set models. Citizen knowledge comes in when the skill of the model is low. This leads some area forecasts to be modified on the basis of past experience and climate diagnosis analysis. Sometimes, identification of analogue years is used. Some outlook forums use the comparison of seasonal predicted SST patterns with historical patterns and find analogue years (3, 4, 5 years). From these analogue years, an input is drawn to show the direction of the forecast according to the tercile approach.

African climate outlook forums share trainers for knowledge transfer in order to harmonize the methodology.

Communications and dissemination

Regional climate outlook forums have raised awareness of the importance of climate information, including climate predictions, in mitigating the impacts of climate variability and change. They use a conference approach whereby a range of stakeholders is invited to a face-to-face meeting for discussions on the interpretation of the products, their impacts and how to improve them. Participants are expected to be the first to propagate the information gathered at the conference.

Seasonal forecast-related advisories are disseminated through various channels at the beginning of each season. Among others, the forecast is disseminated through:

- Specific messages drafted for comprehension, consumption and dissemination by the media in the form of press releases
- A detailed outlook conference technical statement for experts
- Communication of the outlook conference products through different local and regional media outlets such as radio, TV, print, social media, websites, etc.

There is also some dedicated training for users and dissemination sessions with the media and other communications experts (e.g. media training and press releases) to improve interpretation and communication of the forecasts (WMO, 2016). Provision of training to media and boundary stakeholders improves the communication and dissemination of outlook forum products.

The outlook forum platforms are also used for advocacy purposes and to improve and promote awareness of climate information and the available products.

Since the organization of regional climate outlook forums follows similar processes, communication of their products by WMO, ACMAD, regional climate centres and national meteorological and hydrological services is through consistent messaging, although in some regions customized products are tailored to meet specific user needs.

The main success story of the outlook forums is the use of seasonal forecasts by ECCAS through its disaster risk reduction platform for contingency planning for floods. Interactions between climate and disaster management communities have been successful in the region and this had led to the production of a tailored disaster risk reduction product called “vigilance map for the season ahead”, containing information on the expected hazards. This success has been extended to other regions and Africa as a whole, while emerging seasonal hazards and expected impacts maps contribute to WMO efforts on impact forecasting.

Funding mechanisms and sustainability

Donor partners are the source of regional climate centre funding for the regional climate outlook forum process. The annual budgets of the regional climate centres do not factor in this very important flagship event. Participants in the forum from the private sector, NGOs and other agencies fund themselves and

additional national experts are usually facilitated by the participating Member States, but this represents a challenge to the sustainability of the outlook forums as those sources might run out.

Regional climate centres will continue to lead and coordinate the organization of the outlook forums in collaboration with participating national meteorological and hydrological services and partners. They will also continue to mobilize the resources required for the organization of the outlook forums, but key users need to start seeking their own funding to attend the events, while the regional climate centres take responsibility for convening forums and the cost of the meetings.

In organizing forums, local organizing committees drawn from the host country and comprised of various departmental representatives, are charged with day-to-day logistics for successful hosting of the event. They are responsible for finding the venue and transport to it from the airport, among other tasks, with the support of the host country.

The first activity on the first day of the forum is the official opening, which is normally attended by the political head of the line ministry that includes the meteorological department. This further affirms the political goodwill and backing of the host government.

Outlook forum products enhance the socioeconomic benefits of relevant sectors in the region. The users that benefit from the forums are true stakeholders who contribute to the organization and growth of the sessions, thus ensuring their sustainability and relevance to user needs. Typically, outlook forums attract the participation of practitioners and decision makers from various sectors, including agriculture and food security, water resources, energy production and distribution, and public health. Unlike those of other regional climate centres in Africa, the Greater Horn of Africa climate outlook forums have always included the discussion of conflict early warning and response mechanisms (CEWARN) in sector breakout sessions, as climate-related conflicts are common in the region.



Engaging stakeholders (including feedback and partnerships)

Engagement with potential stakeholders was an early rationale for African outlook forums (Patt and others, 2007). With the establishment of the Global Framework for Climate Services, which was intended to create a platform for interaction between producers and users of climate services to ensure the development of adequate and relevant products (WMO, 2011), stakeholder engagement has gained in importance. Despite the resource challenges, including human and infrastructural capacities, African outlook forums have achieved remarkable progress in regional networking and stakeholder engagement and substantially contributed to capacity-building and user awareness. The stakeholders participating in outlook forums are very diverse and include WMO regional climate centres and networks such as ICPAC, AGRHYMET, SADC-CSC and ACMAD, national meteorological and hydrological services, regional economic commissions, the African Union Commission, the ECA African Climate Policy Centre, the New Partnership for Africa's Development (NEPAD), the African Development Bank (AfDB), the World Bank and various intergovernmental organizations. Humanitarian agencies (including the International Federation of Red Cross and Red Crescent Societies (IFRC)), the World Food Programme (WFP), the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), the United Nations Children's Fund (UNICEF) and the United Nations International Strategy for Disaster Reduction (UNISDR) are also involved, as are NGOs, research institutions, the United States Agency for International Development Famine Early Warning System (USAID-FEWS), the Permanent Interstate Committee for Drought Control in the Sahel (CILSS), networks of climate journalists and sectoral users.

Regional climate outlook forums have strengthened stakeholder engagement with capacity-building for climate experts, intermediaries, extensions and users. They have facilitated interaction between producers and users, which done much to develop user understanding and interpretation of climate forecasts. Training courses have been provided on the application of climate forecasts in various socioeconomic sectors. Regional climate centres have also continued to provide guidance in the dissemination and communication of climate information through various channels, notably the media. This has been made more effective through the nascent Regional Network of Climate Journalists. Technical training has been organized for experts in disaster risk reduction, water resources management and health, among others.

While some stakeholders are engaged from the beginning of the process through investment, financing and joint organization (i.e. funding agencies, host countries and regional climate centres), others are engaged at a later stage through development of forecasts and production of information (i.e. modellers and forecasters), drafting the press release (journalists) and technical reports (climate experts) and delivery of the products (i.e. the media) (see figure 4).

Among the most important stakeholders are users, users' intermediaries and extensions, whose engagement is seen as essential. These categories of actors are the primary recipients of the consensus products. For this reason, they are mainly involved in the final stage of the outlook forum (see figure 4). The objectives are to enhance the dissemination and uptake of the products by training them to interpret the information and by involving them in identifying sectoral applications. For some outlook forums (i.e. PRESSAS and GHACOF), applications are in this way identified by users when the products are released and disseminated. This has helped in the issuance of sectoral outlooks, such as water level outlook and agriculture and food security outlook, at the same time as the climate outlook. Some regional climate centres convene a separate sectoral meeting after the outlook forum, however. This is the case of the disaster risk reduction contingency plan workshop, which is organized two months after the forum by SARCOF. African outlook forums have evolved considerably over the years and developed a strong

partnership between forecasters and users, users' intermediaries and extensions. Through this partnership, users communicate their needs which then inform the development and consideration of new tools and products. For example, some African outlook forums now include sectoral impact models. Users, users' intermediaries and extensions are fully involved in the interpretation of forecasts, the identification of sectoral applications for tailored advisories and the delivery and uptake of products (see figure 4). In turn, they provide feedback on the performance of the previous forecast and applications.

Figure 4 Conceptual models of stakeholder engagement in African regional climate outlook forums



Concluding remarks and outlook

Over the past 20 years, African regional climate outlook forums have brought together scientific experts from the region and beyond and regional stakeholders to produce seasonal climate outlook information products for the next rainy season. The seasonal forecast is done in several ways. Complex dynamical models project the climate evolution from its currently observed state. Statistical forecast models can also capture some of the precursors of such developments. Expert knowledge of the past and analysis of the current situation add further value, especially in interpreting the implications of the observed drivers of climate evolution. Analytical methods include composite, analogue, trends, persistence and variability. Climate outlook forums have facilitated regional cooperation and networking, built capacity in the region and demonstrated the benefits of sharing climate information and experience. Close interaction between the providers and users of climate information and predictions has enhanced feedback from users to climate experts, and catalysed the development of many user-specific products. Over time, many of the best practices presented here have helped to improve the outcome of the outlook forum process, although challenges remain if the process is to be improved and become sustainable. During the compilation of these best practices, GHACOF transitioned from consensus seasonal forecasts to consolidated objective forecasting, an approach that has demonstrated improved forecast reliability.

Some of the challenges concern finance. Outlook forums are organized with a donor-based support system. It is often difficult to mobilize enough resources because of the involvement of a large number of participants from different countries, which imposes substantial travel costs. Other weaknesses that need to be tackled are the subjective development of a consensus climate outlook and lack of socioeconomic data sets and baselines for deriving and formulating objective sector mitigation strategies. Moreover, the lack of a strong political will and the lack of interest on the part of some decision-making bodies to take up and use outlook forum products downgrades the utility of the event. Indeed, the regional economic communities and most governments currently have no strategies for implementing the outcome of the forums. Furthermore, communication within government bureaucracies hinders effective application of the products at the national level. The feedback mechanism from users is not robust and lacks consistency between regions. Interaction among stakeholders ceases immediately after the forum, a lack of communication that prevents proper exchange on possible improvement of tools and methodologies.

Finally, there is still some reluctance on the side of users to take up, disseminate and use products in their day-to-day decision-making, perhaps because of the technical terminology used in them.

With regard to these challenges, it is clear that there is a need to augment the financial capacity of the regional climate centres. Financial support is needed from Member States to secure adequate budgets that include the organization and basic expenses of regional climate outlook forums. Enhanced collaboration is required between training programmes on climate prediction and joint activities by global and regional organizations to harmonize the content of the training materials used by the various training programmes (e.g., WMO, UNESCO/International Centre for Theoretical Physics (ICTP), and other national and international initiatives) for an effective and more consistent transfer from research to operational communities. In addition, a methodology needs to be developed, documented and applied in all regions for objective consensus forecast generation. A full integration of the Seasonal-to-Subseasonal (S2S) forecast system could help to develop a more objective consensus. Furthermore, contributions and feedback from stakeholders and users should be strengthened through structured and permanent communication, follow-up and exchange. More engagement of regional economic communities and political support from governments through the development of strategies for the implementation of outlook forum recommendations is needed for better and enhanced applications of the consensus outlook in member countries. Sectoral outlooks need to be developed and integrated either during or following outlook forums to produce a refined product tailored to the different sectors.

Other steps that need to be taken to address challenges are: documentation of regional drivers of climate variability; establishment of a schedule of seasonal forecasts with users; review of the performance of issued forecasts; discussion of the current state of climate to identify prevailing climate conditions; provision of probabilistic guidance for consensus seasonal forecast preparation; and agreement of the physical basis for the consensus seasonal forecast.

Regional climate outlook forums are usually followed by national forums to develop detailed national-scale climate outlooks and risk information, including warnings for communication to user communities, decision makers and the general public. To enhance national outlooks, national forums need to use a denser network of stations in the country in downscaling to the subnational level.

References

Basher R. C., C. M. Dillely and M. Harrison (2000). Coping with the climate: a way forward. A multi-stakeholder review of regional climate forums. International Research Institute for Climate Prediction Publ. IRI-CW/01/2, 31 pp. New York: Columbia University.

Brasseur G. P., and L. Gallardo (2016). Climate services: lessons learned and future prospects. *Earth's Future*, 4, 79–89. Available from <https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2015EF000338>.

Ogallo L. and others (2008). Adapting to climate variability and change: The Climate Outlook Forum process. *WMO Bulletin* 57: 93-102.

Patt A. G., L. Ogallo and M. E. Hellmuth (2007). Learning from 10 years of climate outlook forums in Africa. *Science*, vol. 318 no.5847 pp. 49-50.

Phillips J. G. and others (2002). Implications of farm-level response to seasonal climate forecasts for aggregate grain production in Zimbabwe. *Agricultural Systems* 74 (2002): 351-369.

Sylla M. B. and others (2018). Review of meteorological/climate data sharing policy (WMO Resolution 40) to promote their use to support climate information services uptake in the African continent. Available from https://www.researchgate.net/publication/332785929_Review_of_meteorologicalclimate_data_sharing_policy_WMO_Resolution_40_to_promote_their_use_to_support_Climate_Information_Services_uptake_in_the_African_continent.

Tall A., J. Y. Coulibaly and M. Diop (2018). Do climate services make a difference? A review of evaluation methodologies and practices to assess the value of climate information services for farmers: implications for Africa. *Climate Services* 11: 1-12. Available from <https://ccafs.cgiar.org/publications/do-climate-services-make-difference-review-evaluation-methodologies-and-practices#.Xucd-UUzY2w>.

United States of America, National Oceanic and Atmospheric Administration (1998). An experiment in the application of climate forecasts: NOAA-OGP activities related to the 1997-98 El Niño event. Office of Global Programs, NOAA, and U.S. Department of Commerce, 134 pp.

Vincent, K. and others (2018). What can climate services learn from theory and practice of co-production? *Climate Services* 12: 48-58. Available from <https://www.sciencedirect.com/science/article/pii/S2405880718300712?via%3Dihub>

World Meteorological Organization (2003). Linking climate prediction and science to the users. WMO Brochure, 8 pp.

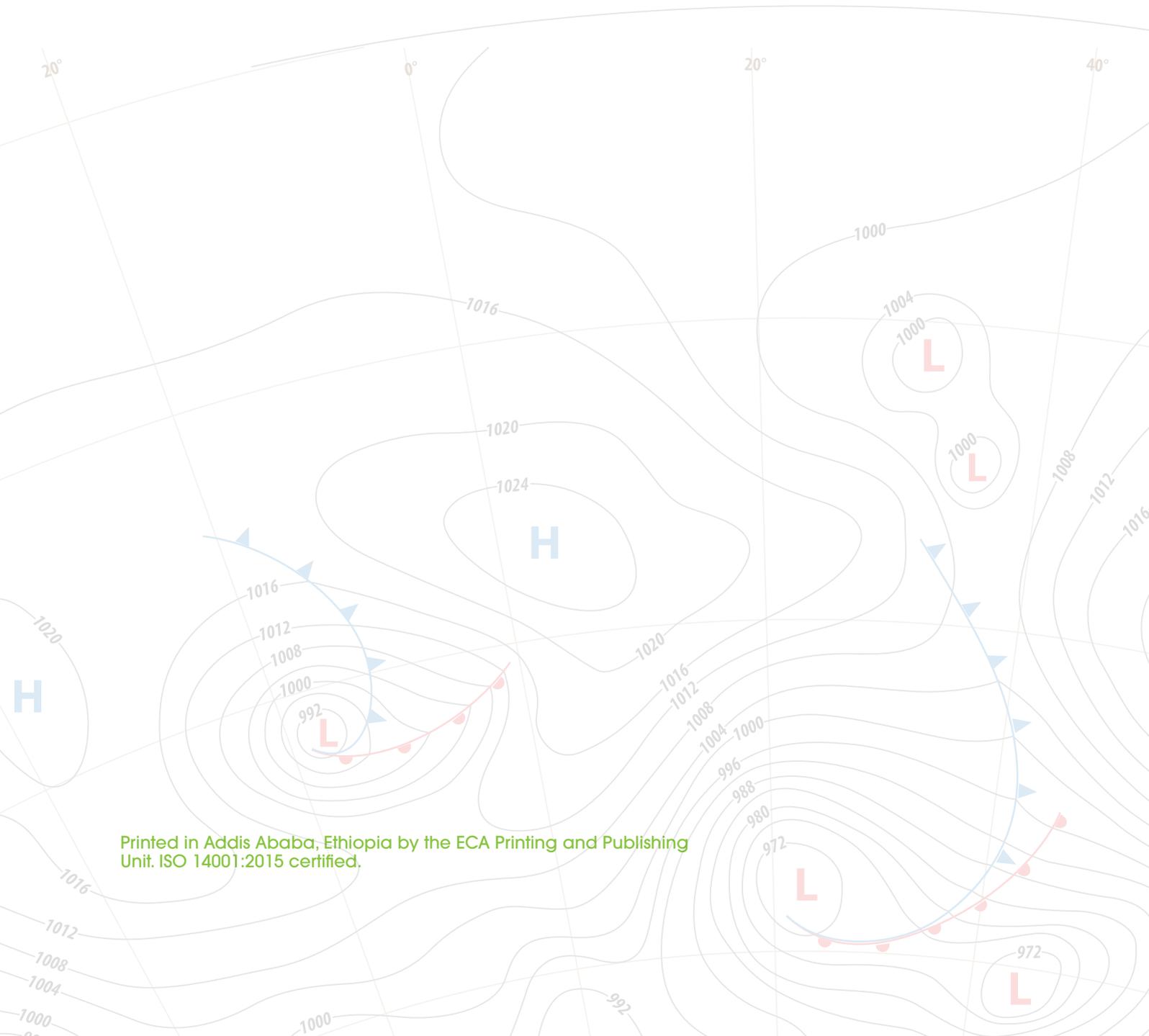
_____ (2011a). Climate knowledge for action: A global framework for climate services – Empowering the most vulnerable. Available from https://www.wmo.int/gfcs/sites/default/files/FAQ/HLT/HLT_FAQ_en.pdf.

_____ (2011b). Meeting of the Commission for Climatology (CCI) Task team on user participation in climate outlook forums (TT-UPCOF). WMO Final Report, 26 pp., http://www.wmo.int/pages/prog/wcp/ccl/opace/opace4/meetings/documents/DraftreportTT_UPCOF_22Feb2012.pdf.

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