

ORGANIZACIÓN METEOROLÓGICA MUNDIAL



# ENANDES-

# Inception Workshop Final Report











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# Acronyms

AEMET	Agencia Estatal de Meteorología
AF	Adaptation Fund
AUS	Australia
BOM	Bureau of Meteorology of Australia
CDMS	Climate Data Management System
CIIFEN	International Centre for Research on the El Niño Phenomenon
CREWS	Climate Risk and Early Warning Systems Initiative
CRC-OSA	Centro Regional del Clima para el Oeste de Sur América
CRC-SAS	Centro Regional del Clima para el Sur de América del Sur
CS	Climate Services
CST	Climate Services Toolkit
DMC	Meteorological Directorate of Chile
DRR	Disaster Risk Reduction
EST	Eastern Standard Time
GBON	Global Basic Observing Network
GFCS	Global Framework for Climate Services
IDEAM	Institute of Hydrology, Meteorology and Environmental Studies of Colombia
INPE	National Institute of Space Research of Brazil
IRI	International Institute for Climate and Society
MeteoSwiss	Meteorological Service of Switzerland
NDC	Nationally Determined Contributions
NFCS	National Framework for Climate Services
NMHSs	National Meteorological and Hydrological Services
OSCAR	Observing Systems Capability Analysis and Review Tool
РҮ	Paraguay
Q&A	Question & Answer
RBON	Regional Basic Observing Network
RCC	WMO Regional Climate Centre
RCC-WSA	Regional Climate Centre for Western South America
S2S	Subseasonal to Seasonal
SENAMHI	National Meteorology and Hydrology Service of Peru
SISSA	The Drought Information System for southern South America
SRL	Sociedad de Responsabilidad Limitada
SWCEM	Space-based Weather and Climate Extremes Monitoring
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization

#### **Executive Summary**

In the next decades climate variability and change will generate new risks for food production, water provision, and energy generation. Despite considerable advances in climate science and predictions that can help to design adaptation strategies to the new climatic scenarios, potentially useful climate information often goes unused and thus stakeholders are not fully benefiting from effective climate information and services in support of decision-making, risk management and adaptation to climate change.

The "Enhancing Adaptive Capacity of Andean Communities through Climate Services" (ENANDES) Project, financed by the Adaptation Fund, seeks to enhance the capacity of society and communities in Chile, Colombia and Peru to adapt to a varying and changing climate through the access and use of climate information. The World Meteorological Organization (WMO) is the leading Implementing Institution of ENANDES and will collaborate and coordinate with National Hydro-Meteorological Services in the three participating countries and with the International Centre for Investigation on the Niño (CIIFEN) in its role of WMO Regional Climate Centre (RCC) for Western South America. The RCC will ensure the regional approach of the project as well as the formulation of needed coordination among countries.

The plan of actions is currently structured around four major components and related outcomes:

- O1. Design, production and communication of climate and water information and services;
- O2. Institutional coordination to facilitate the tailoring of information, products, and services to user needs;
- O3. Engagement of stakeholders and beneficiaries in the co-development and implementation of services for local adaptation plans;
- O4. Regional coordination and cooperation for supporting the provision of national climate services and scalability.

Each component will achieve the related outcome by developing a set of outputs through the implementation of country based but regionally scoped activities. In each country the project will design and implement various activities to enhance the capacity of stakeholders to access, understand and use climate information for managing the risks arising from weather/climate hazards and for adapting to climate change. Adaptation plans and measures will be co-designed, implemented and assessed in various sites among which the RIMAC and Huallaga Watersheds in Peru, the Aconcagua river basin in Chile as well as the electricity distribution network from Arica to Chiloé and selected territories in the Municipality of Popayan in Colombia (Rio de Las Piedras basin and Los Cerrillos region).

To mark the beginning of the ENANDES implementation phase, an **Inception Workshop was organised from 2nd to 4th of February 2021** in a format of a sequence of virtual sessions and presentations. The event had 166, **159** and **75** participants the first, second and third day, respectively, representing about 40 different institutions connected from 16 countries. Among the participants and presenters of the event there were all the main actors involved in the project implementation, as well as the institutional authorities and government representatives of Chile, Colombia and Peru', experts from executing partners and relevant national, regional or international allies/stakeholders. The first day consisted of the opening session lasting 2 hours of welcoming messages from the Executive Manager of Adaptation Fund (AF), the National AF Designated Authorities in the ENANDES countries, the Permanent Representatives to WMO/Directors of National Meteorological and Hydrological Services (NMHSs) and the WMO project managers. The second day lasted 3 hours and was dedicated in providing more details of the project. The session started with an overview of ENANDES project (background, climate rationale and objectives/outcomes/outputs) followed by specific presentations by executing partners on how the project will generate benefits in each country, focusing on one component in the national context. At the end of the second day, WMO invited a few identified strategic partners to present their products and processes in support of the countries' specific project outputs. These strategic partners were: the International Research Centre for Climate and Society (IRI, USA), the National Spatial Investigation Centre (INPE, Brazil) and the Bureau of Meteorology (BOM, Australia).

Finally, the third day lasted 3 hours and served as a platform for the beneficiary institutions of ENANDES who, advised by experts in different topics, worked in groups to analyse the priorities in the implementation plans, exchange on synergies, challenges and improvements in the national-regional articulation. The breakout groups were formed around the topics/technical areas corresponding to the core issues of Project Outcome 1: i) data management (Group 1), (ii) forecast (Group 2), (iii) translation and application of information (Group 3) and (iv) capacities building and regional strengthening (Group 4). In each group about 20 officers from WMO, DMC (Meteorological Directorate of Chile), IDEAM (Institute of Hydrology, Meteorology and Environmental Studies of Colombia), SENAMHI (National Meteorology and Hydrology Service of Peru), and CIIFEN participated as well as experts from IRI, INPE, CRC-SAS<sup>1</sup>, AEMET<sup>2</sup> and MeteoSwiss<sup>3</sup>. The participants

<sup>&</sup>lt;sup>1</sup> Centro Regional del Clima para el Sur de América del Sur.

<sup>&</sup>lt;sup>2</sup> Agencia Estatal de Meteorología de España: http://www.aemet.es/es/portada

<sup>&</sup>lt;sup>3</sup> MeteoSwiss: https://www.meteoswiss.admin.ch/home.html?tab=overview

of each group were called to answer specific questions regarding 1 of the 4 core technical areas. Groups 1 to 3 were debating on *Current Situation/Baseline, Expectations* in terms of implementation of national, regional or international strategic plans, *Needs* and *Facilities/Opportunities* offered by ENANDES to move ahead with the implementation of Climate Service Value Chain. Group 4 focused on training needs, methodologies and articulation among regional actors, finding out a solution to efficiency, centralization of management but wide open access to institutions and stakeholders (such as e-learning platforms etc.). The main result of the third day is a detailed classification of priority actions to be taken in the first stage of implementation, which shows the way to the elaboration of 2021 Project Work plan. Regarding *data management*, partners agreed on the necessity of improving the alignment of their procedures and data quality to WMO proposed standards for WIGOS, WIS and WHO Hydrological Observing System. Monitoring of hazards and potential impacts will need a significant effort at country level also to rescue historical information and non-digital data as well as enhancing drought monitoring by new source of information and a set of indexes. The top priority was given to an assessment of capacities at country and regional level to elaborate and transmit the information, stressing the importance of users' feedback the attention needed to events that may affect transboundary territories. Sub-seasonal to seasonal forecasts (S2S) improvement is considered as a priority by all institutions involved, focusing their interest in NextGen methodology of the IRI.

The most relevant outcome of the project will be the translation of climate information in terms of potential impact on the selected sectors, and the partners are all aware that to achieve relevant socio-economic benefit of climate services application imply need, exposure and vulnerability assessment, indexes identification, impact evaluation and also design and effective communication strategy. While addressing and finding solutions for the communication constraints, the project will also take charge of offering available resource to update, consolidate and promote the National Framework for Climate Services, helping target country to move one step forward in the use of climate information to generate socio-economic benefits (i.e. loss and damages reduction and avoided rehabilitation, assistance costs, for instance).

The CIIFEN and NMHSs' experts participating at "Capacities" Working group supported the generation of specific contents for most vulnerable groups and integrate them in the regional communication, dissemination and training strategies. CIIFEN will also lead project efforts to generate synergies with other projects under implementation in region, such as the EUROCLIMA+ Project and (IADB) SISSA Project and to scale up project benefits regionalizing climate scenarios and modelling and capturing the interest of other countries in the region.

It is essential now to translate identified priorities into an action plan that will guide the project team along the first year of implementation and that will mark first expected deliverables and progresses. The formal Implementation Arrangements between WMO and Executing Partners are already under review and agreements with other institutions capable of providing expertise and know-how will be signed within two months after the workshop opening the way to first assessments and gap analysis.

#### **Resumen Ejecutivo**

En las próximas décadas, la variabilidad y el cambio climático generarán graves riesgos para la producción de alimentos, el suministro de agua y la generación de energía. A pesar de los considerables avances en la ciencia del clima que seguramente ayudarán a diseñar estrategias de adaptación a los nuevos escenarios climáticos, la información climática potencialmente útil a menudo no se utiliza y, por lo tanto, las partes interesadas no se benefician plenamente de la información y los servicios climáticos eficaces para apoyar la toma de decisiones, la gestión de riesgos y la adaptación al cambio climático.

El proyecto ENANDES "Mejora de la capacidad de adaptación de las comunidades andinas a través de los servicios climáticos", financiado por el Fondo de Adaptación, pretende mejorar la capacidad de la sociedad y las comunidades de Chile, Colombia y Perú para adaptarse a un clima variable y cambiante. La OMM es el líder del proyecto y la Institución Implementadora y colaborará y coordinará con los Servicios Nacionales de Meteorología e Hidrología (SNMHs) de los tres países y con el Centro Internacional para la Investigación del Fenómeno de El Niño (CIIFEN) en su papel de Centro Climático Regional para el Oeste de Sur América encargado de garantizar el alcance regional del proyecto y la necesaria articulación entre países.

La acción está actualmente estructurada en cuatro grandes componentes y resultados relacionados:

- O1. Diseño, producción y comunicación de información y servicios sobre el clima y el agua;
- O2. Coordinación institucional para facilitar la orientación de la información, los productos y los servicios a las necesidades de los usuarios;
- O3. Compromiso de las partes interesadas en el desarrollo conjunto y la aplicación del plan local de adaptación;
- O4. Coordinación y cooperación regional y global para la prestación de servicios climáticos y acciones de adaptación. Cada componente logrará el resultado correspondiente generando un conjunto de productos a través de la ejecución de actividades basadas en el país, pero centradas en la región.

En cada país, el proyecto diseñará y ejecutará diversas actividades para mejorar la capacidad de las partes interesadas de acceder, comprender y utilizar la información climática para gestionar los riesgos derivados de los peligros meteorológicos/climáticos y para adaptarse al cambio climático. Se co-diseñarán, implementarán y evaluarán planes y medidas de adaptación en varios sitios, entre ellos las cuencas del Rimac y del Huallaga en Perú, la cuenca del río Aconcagua en Chile, así como la red de distribución de electricidad de Arica a Chiloé y territorios seleccionados del municipio de Popayán en Colombia (cuenca del Río Las Piedras y región de Los Cerrillos).

De acuerdo con la normativa del Fondo de Adaptación, del 2 al 4 de febrero se organizó un Taller de Inicio para marcar el comienzo de la fase de implementación de ENANDES. El evento que fue diseñado como una serie de reuniones virtuales y presentaciones en la plataforma *Zoom*, ha reunido a 166, 159 y 75 participantes el primer, segundo y tercer día respectivamente, representando a unas 40 instituciones diferentes conectadas de 16 países. Entre los participantes y presentadores, el evento pudo involucrar a todos los principales actores implicados, garantizando la participación de autoridades institucionales y representantes gubernamentales, así como departamentos técnicos y expertos de los socios ejecutores y aliados/partes interesadas nacionales, regionales o internacionales relevantes.

El evento de 3 días dedicó un primer día a realizar una sesión abierta de 2 horas que albergó palabras de bienvenida del Gerente Ejecutivo del Fondo de Adaptación, los representantes de las Autoridades Designadas en los países de ENANDES, los Representantes Permanentes de la OMM/Directores de los Servicios Meteorológicos e Hidrológicos Nacionales y los Gerentes Ejecutivos de Proyectos en la OMM. El segundo día, con una sesión abierta de 3 horas, permitió presentar una visión general del proyecto: antecedentes, fundamentos climáticos, objetivos, resultados y productos, seguida de presentaciones específicas por parte de los socios ejecutores sobre cómo el proyecto aterrizará y generará beneficios en cada país y enfocando cada componente del proyecto en uno de los contextos nacionales. Así, los 4 resultados esperados de ENANDES han sido presentados por 1 NHMS, DMC, SENAMHI, IDEAM y CIIFEN para los resultados 1, 2, 3 y 4 respectivamente. Durante el segundo día, la OMM invitó también a algunos aliados estratégicos identificados capaces de guiar/apoyar a los países en la generación de resultados específicos, como el Centro Internacional de Investigación para el Clima y la Sociedad (IRI), el Centro Nacional de Investigación Espacial de Brasil (INPE) y la Oficina de Meteorología de Australia (BOM) para explicar cómo su experiencia/metodologías pueden proporcionar un activo para la implementación del proyecto. Presentación general del plan de trabajo de ENANDES adaptado al contexto nacional de cada país, y su contribución/complemento a los servicios climáticos, meteorológicos e hídricos (Presupuesto por país y por componente).

Finalmente, el tercer día (sesión de 3 horas) sirvió de plataforma para las instituciones beneficiarias de ENANDES que, asesoradas por expertos en diferentes temas, trabajaron en grupos para analizar las prioridades en los planes de implementación, intercambiar sobre sinergias, retos y mejoras en la articulación nacional-regional. Los grupos de trabajo se formaron en torno a los temas/áreas técnicas correspondientes a los temas centrales del resultado 1 del proyecto: i) gestión de datos (Grupo 1), ii) previsión (Grupo 2), iii) traducción y aplicación de la información (Grupo 3) y iv) creación de capacidades y fortalecimiento regional (Grupo 4). En cada grupo participaron unos 20 funcionarios de la OMM, el DMC, el IDEAM, el SENAMHI y el CIIFEN, así como expertos del IRI, el INPE, el CRC-SAS, la AEMET y MeteoSwiss. Los participantes de cada grupo fueron llamados a responder a preguntas específicas relativas a 1 de las 4 áreas técnicas principales. Los grupos 1 a 3 debatieron sobre la Situación Actual/Línea de Base, las Expectativas en cuanto a la implementación de planes estratégicos nacionales, regionales o internacionales, las Necesidades y los Recursos/Oportunidades que ofrece ENANDES para avanzar en la implementación de la Cadena de Valor de los Servicios Climáticos. El grupo 4 se centró en las necesidades de formación, las metodologías y la articulación entre los actores regionales, la búsqueda de una solución a la eficiencia, la centralización de la gestión, pero un amplio acceso abierto a las instituciones y las partes interesadas (como las plataformas de e-learning, etc.). El principal resultado de la tercera jornada es una clasificación detallada de las acciones prioritarias que deben llevarse a cabo en la primera fase de ejecución, que muestra el camino hacia la elaboración del plan de trabajo del proyecto 2021. En lo que respecta a la gestión de datos, los socios coincidieron en la necesidad de mejorar la alineación con los estándares de WIGOS y WIS y con el Sistema de Observación Hidrológica de la OMS, así como de mejorar el control de calidad de los datos, incluyendo los aspectos técnicos necesarios. El seguimiento de los riesgos y los posibles impactos requerirá un esfuerzo significativo a nivel nacional para rescatar también la información histórica y los datos no digitales, así como para mejorar el seguimiento de la seguía mediante nuevas fuentes de información y un conjunto de índices. En cuanto a las Previsiones, se dio máxima prioridad a una evaluación de las capacidades a nivel nacional y regional para elaborar y transmitir la información, destacando la importancia de que los usuarios retroalimenten la atención necesaria a los eventos que puedan afectar a los territorios transfronterizos. La mejora de las previsiones subestacionales a estacionales (S2S) es considerada como una prioridad por todas las instituciones implicadas, centrando su interés en la metodología NextGen del Instituto Internacional de Investigación sobre el Clima y la Sociedad - IRI.

El resultado más relevante del proyecto es la traducción de la información climática en términos de impacto potencial en los sectores seleccionados, y todos los socios son conscientes de que para lograr un beneficio socioeconómico relevante de la aplicación de los servicios climáticos implica la necesidad, la exposición y la evaluación de la vulnerabilidad, la identificación de los índices, la evaluación del impacto y también el diseño y la estrategia de comunicación eficaz. Al mismo tiempo que se abordan y se encuentran soluciones para las limitaciones de comunicación, el proyecto también se encargará de ofrecer los recursos disponibles para actualizar, consolidar y promover el Marco Nacional de Servicios Climáticos, ayudando al país objetivo a dar un paso adelante en el uso de la información climática para generar beneficios socioeconómicos (es decir,

reducción de pérdidas y daños y rehabilitación evitada, costes de asistencia, por ejemplo). Los expertos de CIIFEN y de los SMHN que participan en el grupo de trabajo "Capacidades" apoyaron la generación de contenidos específicos para los grupos más vulnerables y los integraron en las estrategias regionales de comunicación, difusión y formación. El CIIFEN también dirigirá los esfuerzos del proyecto para generar sinergias con otros proyectos que se están ejecutando en la región, como el proyecto EUROCLIMA+ y el proyecto SISSA (BID), y para ampliar los beneficios del proyecto regionalizando los escenarios y modelos climáticos y captando el interés de otros países de la región.

Ahora es esencial traducir las prioridades identificadas en un plan de acción que guiará al equipo del proyecto a lo largo del primer año de ejecución y que marcará los primeros resultados y progresos previstos. Como primeros pasos, ya se están revisando los acuerdos formales de ejecución entre la OMM y los socios ejecutores, y en los dos meses siguientes al taller se firmarán acuerdos con otras instituciones capaces de aportar su experiencia y conocimientos técnicos, lo que abrirá el camino a las primeras evaluaciones y diagnósticos.

#### 1. Introduction

In the next decades, food production, water management, and energy generation will take place in a context of exacerbated climate variability and change. This situation coupled with increasing urbanization, economic growth, migration, and evolving social preferences and values will create additional stresses on society and pose unprecedented systemic risks to humans, ecosystems and infrastructure. Decision makers at many levels - households, communities, regions and countries increasingly will need actionable scientific evidence and information to enhance their capacity to respond and adapt to the challenges. Increasing awareness of the central role that climate plays in human welfare so far has not been matched with a corresponding ability to use climate information and knowledge for adaptation to climate variability and change, and for mitigation of their impacts on natural systems and human communities. Consequently, there are active efforts to enhance the provision of "climate services" at international, regional and national levels. Climate services involve the timely production, translation, and delivery of climate data, information and knowledge for societal decision making. These services are intended to facilitate both climate risk management and adaptation to climate variability and change, important challenges to sustainable development. The Global Framework for Climate Services (GFCS) was established in 2009 by WMO to guide the development and application of science-based climate information and services in support of decision-making in climate sensitive sectors. The GFCS focuses on developing and delivering services in priority areas that present immediate opportunities to bring benefits and wellbeing: (i) agriculture and food security, (ii) disaster risk reduction, (iii) energy, (iv) human health, and (v) water. At the national level, the GFCS goals are pursued by the National Frameworks for Climate Services (NFCSs), the coordinating process designed to enable development and delivery of climate services at national level. The NFCS facilitates and strengthens coordination and collaboration among national institutions and key stakeholders, ensuring that the entire value chain for the production and use of climate services is addressed systematically and in a coordinated manner with the involvement of all relevant actors.

#### 1.1. Project Goal

The "Enhancing Adaptive Capacity of Andean Communities through Climate Services" (ENANDES) Project, financed by the Adaptation Fund, seeks to enhance the capacity of society and communities in Chile, Colombia and Peru to adapt to a varying and changing climate. This will be possible by continuously producing, communicating and assessing the use of science-based climate information in order to make it more credible and useful for decision- and policymaking on preparedness for, and reduction of damages from climatic hazards.

ENANDES will help to build human and infrastructure capacity, and will seek to overcome institutional, technological and cultural barriers through increased coordination among climate and non-climate actors of society. It will be focused in four out of the five GFCS priority sectors:

i) agriculture and food security;

- ii) energy;
- iii) water;
- iv) disaster risk reduction;

#### **1.2. Project Components**

The ENANDES project, with a lifespan of 4 years, was originally scheduled to start in August 2020, but the COVID-19 pandemic forcing WMO and Executing Partners to postpone the official inception of the implementation until February 2021. The action plan is currently structured around four major components focused on:

- 1. Design, production and communication of climate and water information and services
- 2. Institutional coordination to facilitate the tailoring of information, products, and services to user's needs
- 3. Engagement of stakeholders in the co-development and implementation of local plan for adaptation

4. Regional and global coordination and cooperation for the provision of national climate services and adaptation actions.

Each component relates to the building blocks of the climate **service value chain** (as shown in figure 1) and to a specific project outcome<sup>4</sup>, as described below.



Figure 1: Representation of Climate Services Value Chain (WMO n. 1153, 2015) and the "Value-Adding" Process.

**Outcome 1**: Enhanced design, production and communication of climate/water information and services., will introduce innovation and investment in capacity that will produce a major leap in the capacities of National Meteorological and Hydrological Services (NMHSs) to produce and communicate timely, and relevant and sector-tailored climate and water information and knowledge. Climate information (historical, monitored, and predicted) and early warning systems will enable decision makers to better anticipate and manage adverse climatic conditions, take advantage of favourable conditions, and actively adapt to change. Six main project outputs will be generated by the project to guarantee the outcome:

- Output 1.1. National climatic and hydrological data management systems have been enhanced and updated. WIGOS implementation supported.
- Output 1.2. The characterization and communication of historical and recent states of climatic hazards have been improved.
- Output 1.3. The production and dissemination of forecasts of high-impact weather has been improved.
- Output 1.4. The production and dissemination of sub-seasonal to seasonal (S2S) predictions of regional climate and hydrological conditions has been improved.
- Output 1.5: The access, processing and dissemination of multi-model projections of regional climate change (decadal to multi-decadal) from multiple institutions and models has been made easier.
- Output 1.6: Procedures and tools have been implemented by NMHSs to downscale seasonal forecasts and climate change projections in space/time. Global forecasts/projections have been calibrated for the ENANDES region.

**Outcome 2:** Strengthened institutional coordination and value-adding tools and processes allow climate/weather information to be tailored and translated into user-centric and sector-specific adaptation actions. Five main outputs are foreseen:

- Output 2.1: (a) Knowledge and action networks have been implemented that facilitate the design, production, delivery, and use of climate information and services; relevant strategic partners have been engaged; (b) capability gaps in strategic partners have been identified and addressed; and (c) Gender Baseline Assessment undertaken and used to monitor progress in gender issues.
- Output 2.2: The needs for tailored weather/climate information have been identified for target sectors in demonstration adaptation regions.
- Output 2.3: Sectoral models have been used to "translate" observed/predicted weather/climate conditions into likely local impacts at demonstration sites.

<sup>&</sup>lt;sup>4</sup> https://wmoomm.sharepoint.com/:b:/s/Services/EaMEv8IGLjtOvZoV\_NF7pQ8BVSMdJaxMIFmVFHZ4yoJZJQ?e=rjf6p3

- Output 2.4: Communication and knowledge management strategies have been developed for ENANDES. Relevant information about observed/predicted weather/climate hazards and their likely impacts are routinely communicated through appropriate channels.
- Output 2.5: Multiple requisites of a National Framework for Climate Services, such as identification of stakeholders and information needs and implementation of national dialogs, have been addressed.

**Outcome 3:** Engaged and empowered stakeholders have participated in the co-development and implementation of local plans and activities for adaptation to climate variability and change that rely on climate/water information. Main outputs will be as follows:

- Output 3.1: The factors that determine vulnerability to climatic variability and change have been identified for the sectors and regions targeted.
- Output 3.2: Capacity building and outreach efforts have improved the accessibility, comprehension and use of climate and water information for risk management and adaptation among local stakeholders and communities.
- Output 3.3: Context-appropriate preparedness and adaptation plans and actions to reduce local damages from climate variability and change have been designed through participatory processes. Demonstration projects have been implemented and monitored to test those plans and actions.
- Output 3.4: Early-warning systems and enhanced processes for inter-institutional coordination have (i) strengthened national/local management of risks and (ii) have reduced the negative impacts of droughts and floods for demonstration adaptation sites/sectors.
- Output 3.5: Evaluations of the socio-economic benefits of ENANDES demonstration adaptation actions have been carried out.
- Output 3.6: Useful lessons on local adaptation actions have been provided by an active project tracking effort (complementary to M&E efforts) that allowed active adaptation of goals, outcomes and outputs throughout the project.

**Outcome 4:** Regional and global coordination and cooperation mechanisms are strengthened; lessons, tools and approaches from ENANDES help others to provide climate services and replicate adaptation actions elsewhere. Specific outputs of the regional and global articulation are as follows:

- Output 4.1: Regional coordination activities have been carried out to support the update of national climatic and hydrological data management systems, and interoperable regional databases.
- Output 4.2: Complementary support provided to strengthen national capacities for climate monitoring and prediction.
- Output 4.3: Complementary support provided to strengthen capacities for climate services production, dissemination and uptake.
- Output 4.4: Regional Technical Working Groups have been re-convened, revitalized or established. Active liaison with other ongoing projects in the region has achieved positive synergies and enhanced economic efficiency.
- Output 4.5: A Climate Services Toolkit (CST) has been implemented that is tailored to the previously determined operational needs of ENANDES NMHSs.
- Output 4.6: Capacity building efforts for ENANDES have been defined by ENANDES participants, and jointly implemented by WMO Regional Training Centres, WMO Training Activities Division and other institutions.

#### **1.3. ENANDES Beneficiaries**

ENANDES will design and implement various activities to enhance the capacity of stakeholders to access, understand and use climate information for managing the risks arising from weather/climate hazards and for adapting to climate change. Adaptation plans and measures will be co-designed, implemented and assessed in various sites of the ENANDES countries. In each country, ENANDES will support the development of capacities in the NMHSs to produce and communicate timely, relevant and sector-tailored climate and water services to inform decision- and policy-making on preparedness for, and reduction of damages from climatic hazards.

The main innovation is that the suite of climate products and services to be provided will respond to needs elicited from the local Andean communities and vulnerable groups, and will be tailored to be consistent with decision needs and protocols of different actors/sectors.

In Chile, the demonstration areas will address water security and energy production as identified priorities for assessing the climate service value chain benefits:

- The Aconcagua River Basin hosts half a million of people which are dependent on primary agricultural production and consequently on water availability heavily influenced by climate changes and variability.
- The Chilean electricity distribution network from Arica to Chiloe depends on an interconnected power infrastructure which is particularly vulnerable to weather and climate fluctuation. For example, extreme heat near Santiago, will

have implications over most of the interconnected system. Climate services for the Power Sector in Chile may secure energy access to 93% of the Chilean population.

In Colombia, the demonstration areas are located in the Municipality of Popayan:

- The Río Las Piedras Basin hosts the second biggest indigenous community of the country (7.400 persons) and a considerable Afro-Colombian population of about 7.541 persons. These communities and the small-scale farmers that live in the watershed, face recurrent droughts and floods.
- The region of Los Cerrillos is also prone to drought and most of the local population is not receiving any information on weather forecasts or climate predictions, only 14% of small-scale farmers have access to hydro-meteorological information.

In Peru, the project will address the vulnerability of two relevant territories:

- The middle and upper basins of the Rímac River near Lima whose streamflow variability impacts directly almost 9 million people.
- The Huallaga River basin in the eastern slopes of the Andes and the "Selva" region, is home to settlements dwelling along the riverbanks. These communities are vulnerable to extreme floods events which have increased in frequency and intensity in the last decade.

## **1.4. Executing Partners**

ENANDES is implemented by WMO, jointly with the Chile's Meteorological Directorate (DMC), the Institute of Hydrology, Meteorology and Environmental Studies of Colombia (IDEAM), the National Meteorology and Hydrology Service of Peru (SENAMHI), and the International Research Centre on El Niño (CIIFEN), which is the WMO Regional Climatic Centre for Western South America.

#### **1.5. External Strategic Allies**

ENANDES will mobilize qualified international, regional, national and local expertise from experts and partners, which will directly support the project implementation. The support from academia as well as the European hydro-meteo services. Among these institutions there are concrete opportunities to involve: Research centres, meteorological services are already supporting the countries and CIIFEN to prepare for implementation. Some of them are mentioned below:

- $\cdot$  International Institute for Climate and Society IRI in New York.
- $\cdot$  National Institute of Space Research of Brazil INPE
- · Bureau of Meteorology of Australia BoM
- · State Meteorology Agency of Spain- AEMET
- · Swiss Meteorological Service MeteoSwiss

In the future, new partners will join to provide tailored support in various areas related to climate, weather and water.

# 2. ENANDES Inception Workshop

According to Adaptation Fund regulations, an inception workshop need to be organised for marking the beginning of the ENANDES implementation phase. The event gathered the main actors involved in the project proposal preparation, ensuring participation of institutional authorities and government representatives, as well as representatives of local entities from the pilot areas. In normal conditions, the inception workshop would have been a physical event in one of the participating countries with all relevant partners and stakeholders attending, including representatives of Andean communities. Due to the restrictions in place for preventing COVID19 spread, the ENANDES inception workshop was converted into a virtual event with the remote digital connection of relevant actors.

The meeting was held from 2nd and 4th February 2021, with an overall duration of 3 hours each day, from 13:00 till 16:00 EST. The complete agenda of the event can be found in Annex 1. For the last day, four Working Groups were proposed for fostering exchange of experiences and generating specific recommendations for the first year of expected achievements. Main goal of this approach was to ensure a good understanding of the scope of the project by every partner, and to share and validate expected products and the cooperation mechanisms that must be followed to jointly achieve the defined objectives.

In order to manage in the most effective and efficient way the virtual meeting and getting the best level of technical facilitation and interaction with participants, WMO hired three companies to take charge of specific technological aspects: platform and agenda management (KOGA Srl) video recording and documenting (BONGO PY), real time Spanish to English translation for non-Spanish speaking participants (Caption Groups Srl).

This report aims to summarize the main conclusions and recommendations put forward during the Inception Workshop. More information about how the Workshop was organized, can be found in Annex 2.

# 2.1. The Workshop Objectives

The objective of this virtual meeting was to foster commitment and collaboration among the involved partner institutions, thus together achieving the project objectives.

Thereby, the launch event was intended to:

- Provide a common understanding of the scope, objectives and components of the ENANDES project.
- Encourage the complementary actions with national and regional services related to climate, weather and water.
- Ensure articulation and coordination between the different actors involved at the national and regional level.
- Encourage commitment of decision makers through workspaces designed to foster collective intelligence and the development of plans and activities between sectors and countries.

#### 2.2. Participation

Participation to the Workshop may be summarized as follows: **166 participants** attended the first day of the Inception Workshop, 159 the second day and 75, the third day. Participants represented more than **40 different institutions** either private, public or academic and from **16 different countries**. These numbers and diversity represent a great achievement in terms of raising interest in Climate Service delivery and reflect the need to involve different types of stakeholders in order to achieve a successful implementation of ENANDES in the region. The complete list of participants is provided in Annex 3.



Figure 2: Zoom screenshot. Participants of Day 1 - 2.02.2021

DAY ONE		DAY TWO		DAY THREE		
Total Users	166	Total Users	159	Total Users	75	
Chile	27	Chile	30	Chile	9	
Peru	65	Peru	66	Peru	28	
Colombia	11	Colombia	9	Colombia	11	
Other countries	63	Other countries	54	Other countries	27	
Exclusive viewers	139	Exclusive viewers	105	Group 1	13	
Maximum simultaneous views	124	Maximum simultaneous views	101	Group 2	20	
Average viewing time	1h 27'	Average viewing time	2h 16'	Group 3	15	
				Group 4	11	

Table 1: Number and origin of participants to the 3 days ENANDES Inception Workshop

#### 2.3. Presentations

Presentations, in Spanish or English, were provided for every session for interactive discussions. Participants had the opportunity to ask questions or provide feedback through the Q&A section available in the Zoom Platform. These questions were answered live.

#### 2.4. Press release and photos

The press releases and photos related to the Inception Workshop are available here.

# 3. Outcomes of the ENANDES Inception Workshop

The Inception Workshop was marked by two days of plenary presentations from the executing partners as well as invited external partners, followed by one day for brainstorming and collaborative work and discussions among the experts of the participating entities.

All presentations that were exposed during the three days can be found in the following links:

- Day One / 2nd of February Presentations: HERE
- Day Two / 3rd of February Presentations: HERE
- Day Three / 4th of February Presentations: HERE

#### DAY 1

The first session began with the welcoming remarks of Julián Báez Benítez, Director of the Regional Office for the Americas, and Maxx Dilley, Deputy Director of Services Department.



Figure 3: Zoom screenshot Welcome remarks of Day 1 - 2.02.2021

These were followed by the welcoming remarks from **Mikko Ollikainen**, **Executive Manager of the Adaptation Fund**, who highlighted the central role of climate in human welfare, and the raising interest in enhancing operational provision of Climate Services that at regional and national level is foremost important for climate risk management and adaptation to climate change. Climate risk is borderless in nature so adaptation is not just a local or national issue. The Adaptation Fund recognizes the importance of regional approach, creating networks and disseminating knowledge, giving relevance to scientific research and its role in supporting Climate Services and decision-making processes. Since 2015, Adaptation Funds through the Regional Funding Window have already funded 14 projects and ENANDES is the third WMO regional project approved for funding. ENANDES will yield tangible experience to facilitate operational implementation of climate services in Colombia, Chile and Peru, and will hopefully offer a model for other countries for replication and scaling up.

Nevertheless, at global level, there is still a huge need for climate finance to deliver Climate Services and improve the capacity to supply and use the information that is still uneven across regions and countries. According to Mr. Ollikainen, the challenge is to strengthen Regional and National Hydro-Meteorological Systems to operationalize and deliver CS products such as ENANDES will do.

After the Manager of Adaptation Fund, representatives of the designated authorities in the ENANDES countries have been invited to convey welcoming words from their institutions.

**Kelly Moreno**, on behalf of David Felipe Olarte Amaya, Director of International Affair Office, the Ministry of Environment and Sustainable Development of **Colombia**, designated authority for Adaptation Fund, stressed the strategic importance of the ENANDES project for the Country and committed the full support of the Ministry to IDEAM for the whole duration of implementation of the project.

**Cristina Rodríguez**, conveyed welcoming words on behalf of the Minister of the Environment, Mr. Gabriel Quijandría Acosta and Rosa Morales, Director of Climate Change and Desertification of the Ministry of the Environment of **Peru**. At the same time, she stressed how the COVID-19 pandemic demonstrated the tight connection between social and natural systems, therefore the need to address this kind of emergencies with a multidisciplinary and inclusive approach based on scientific knowledge. ENANDES represents a relevant opportunity to improve knowledge, capacities and decision-making processes, finally promoting adaptation to climate change at community level and promoting a reduction of the impacts of extreme events. Peru, after submitting the last NDC to UNFCCC, is calling for a National Mitigation and Adaptation Strategy based on Climate Information and pushing for an articulated Climate Action, multi-sectorial, multi stakeholders and multi-level. ENANDES project is starting in a very favourable context and it is foreseen to supply a strong support to DRR, Adaptation and NDC.

**Maria Carolina Urmenata**, Director of the Office of Climate Change of the Ministry of the Environment of **Chile** acknowledged the importance of the ENANDES project for the level of vulnerability that the country is facing and because the Government of Chile was the first to propose Intergovernmental roundtable on the nexus adaptation-mitigation during their Presidency of COP25. Chile already has National as well as Sectoral Adaptation Plans under implementation which will benefit from the tools provided by the project. The priority is to formulate a set of indicators capable of measuring concrete progress on adaptation. Chile can also count on a Climate Risk Atlas at District level developed with scientific approach and support by the Government of Germany. Miss. Urmenata also thanked the Adaptation Fund for supporting already two interventions, one in the North of the Country focused on reducing risk of floods in urban and peri-urban coastal areas and one in Central Chile addressing exposure and vulnerability of small scale farmers. Both of them are aligned with ENANDES's logic and expected outcomes.

Both Chile and Peru highlighted the opportunity of putting adaptation at the centre of Post-COVID19 recovering (30% of public investment).

After a small break, the first day followed by inviting the Permanent Representatives of WMO in the partner countries to provide a short presentation of national contexts and how ENANDES project will align with WMO Regional Association Strategy and National Hydro-Meteorological Services agenda.

The first intervention was from Dr. **Ken Takahashi Guevara**, Director general of SENAMHI in Peru, who, after describing the biophysical characteristics of the country, and its exposure to the El Niño and La Niña related events, highlighted the importance of the project for the populations settled in the demonstration areas. One of these, the Rimac basin, is very diverse in terms of socio-economic development, cultural identity, communities and stakeholder's variety and is vulnerable to several natural hazards affecting directly the population living downstream in Lima. The project is offering the opportunity to address the needs of all these actors through an inclusive and multicultural approach. Also, regarding the other demonstration area, ENANDES will support SENAMHI to work for the first time with amazon indigenous communities. The project is aligned with national strategies and supports progress with the NDC that put at the core of the national agenda for adaptation both EWS as well as DRR in general stressing the importance of generating and applying scientific knowledge to all related processes. This full presentation can be found <u>here</u>.

The second intervention was given by **Reinaldo Gutiérrez Cisterna**, Director of DMC in Chile, that stated how ENANDES will provide concrete support to strengthen the coordination and collaboration efforts among national institutions to supply stakeholders and population with real time and reliable climatic and meteorological forecasts, warnings and information. DMC will work directly with the Ministry of Agriculture, of Energy, the General Directorate for Water and the national Corporation for Indigenous Development and the project will promote and generate synergies between different interventions among which EUROCLIMA + and SISSA. Finally, ENANDES represents a valuable opportunity for strengthening capacities of DMC in Climate Services.

Finally, **Yolanda González Hernández**, Director of IDEAM in Colombia and recently elected President of WMO Regional Association III (South America), took the floor highlighting the relevance of ENANDES in terms of watershed management addressing adaptation in three important basins (Rimac, Huallaga y Aconcagua), in the energy production and in indigenous communities. She stressed the motivation and commitment that the IDEAM team is going to provide to the project implementation, expecting the generation of ideas, best practices and participatory experiences with local communities, private sector, civil society organizations and local authorities.

**Juan Jose Nieto,** Director of the International Research Centre on el Niño - CIIFEN, was also invited to say a few words on the mandate of CIIFEN to reduce the gap and bridging between science and policy regarding climate and related phenomenon. He highlighted the coherence between ENANDES project and the four Institutional strategic objectives: strengthening the use and applications of climate services for DRR, enhance regional coordination on CS, contribution to the generation and dissemination of scientific knowledge and contributing to improve regional, national and local resilience to climate change. Even though each country has its own needs and strategic planning, CIIFEN will provide the scope of a regional frame for finding possible solutions and the focus to apply methodologies and tools. This full presentation can be found here.

The day ended with two presentations by WMO Officers. The first one was by **Maxx Dilley who** focused on Global Framework for Climate Services(GFCS), and the Climate Service Information System and stressed the importance of the operationalization of such CS delivery systems. CS cannot be effective without integrating final users' decisions and feedback and the evaluation of the socio-economic benefits that may be generated. The CS value chain is not complete unless impacts and benefits are quantified and measured, for this reason ENANDES strategy includes application at community level. Each block of the CS value chain is integrating part of the added value and is essential to generate and maintain the interconnection between the local, the national and the regional level of operationalization of information systems. This full presentation can be found <u>here</u>.

The last presentation of the day by **Roberta Boscolo focused** on the preparation of the ENANDES Project and on the first steps taken after its approval by Adaptation Fund. She noted the challenges that the project faced due to the COVID19 pandemic and the need to adapt inception modalities and first year agenda due to unforeseen mobility constraints. The first idea of the project design occurred in November 2017 at a participatory workshop in Bogota, Colombia. Some of the national officers involved in the first consultation process are now involved in project implementation. The design process of ENANDES represents a reference of good practice for project preparation for the level of participation, dedication and articulation achieved among countries and institutions involved. This full presentation can be found here.

All the presentations were followed by questions and discussions with the participants. This time gave the opportunity for debating about the importance of the involvement of communities and local stakeholders in the planning and execution of project activities.

#### DAY 2

The second day focused on providing a detailed description of the ENANDES design and strategy. The session again began with few words of welcome from Julián Báez, followed by a general introduction of the ENANDES project by Project Manager, **Raul Polato**, who described in details the project structure, expected outcomes, outputs and activities at country and regional level, the components of the project, as well as the objectives. More information on how ENANDES was going to be implemented in each country was provided later by the presentations by ENANDES executing partners.

The first component, corresponding to **OUTCOME 1** - *Enhanced design, production and communication of climate/water information and services*" was presented by the officers of the **Direction of Meteorology of Chile - DMC**<sup>5</sup> who are directly involved in ENANDES activities. All the outstanding information they shared can be found <u>in their presentation</u>. The most challenging climate aspect in Chile is the so-called "megasequia" (mega-drought) that has been affecting the country for the last 10 years which is creating water shortages, ecosystem degradation and an increase in forest fires. Even though Chile already has developed platforms for gathering and dissemination of related information, the different national institutions involved in the communication need a coordination framework focused on providing Climate Services.

ENANDES will be implemented by 30+ institutions across governmental and local authorities through the coordination led by DMC. The most relevant output that DMC is expecting to deliver through ENANDES is the digitalization of rescued climate data and the consolidation, merging and standardization of climate datasets coming from different institutions. For this purpose, there will be the need to generate metadata following the WMO Integrated Global Observing System (WIGOS) framework.

<sup>&</sup>lt;sup>5</sup> Ricardo Vásquez, Research Meteorologist; Sara Alvear, Agrometeorological Applications Analyst; José Miguel Vicencio, Research Meteorologist; Luis Lazcano, Head of the Data Bank Office and Carmen Vega, Scientific Advisor,

The OSCAR Surface Platform will be used to collect, separate, and classify the metadata. ENANDES will also support the knowledge transfer for Quality Assessment of the data. In order to store and make accessible validated data, Chile is already using the national platform called SACLIM.

A specific action that DMC will perform is the homogenization of climate data. Experts will be hired to strengthen DMC programming capacities and manage the dissemination of information through accessible websites. In terms of climate risk management, Chile decided to focus on drought monitoring and forecasting, wishing to apply and measure indexes and mapping them on the pilot areas.

Finally, DMC wishes to monitor and mapping agro-climatic risks, under floods and drought scenarios. The Climate Service department of DMC can already count on capacities installed and skills to perform sub-seasonal to seasonal forecasting (S2S), but they are willing to improve. Finally, DMC wants to design and develop a website to make accessible sub seasonal forecasts.



Figure 4: ENANDES multisectoral benefits for Chile. Day 2 - 3.02.2021

The second Component, corresponding to **OUTCOME 2** - "Strengthened institutional coordination and value-adding tools and processes allow climate/weather information to be tailored and translated into user centric and sector-specific adaptation actions", was presented by Grinia Avalos Roldán, Director of the National Hydrology and Meteorology Service of Peru. She highlighted the recent re-classification of the climatic zones of Peru, identifying 38 different climatic types characterizing the country. Besides the frequent occurrence of extreme events such as floods, haze and storms, it was observed that in the last 50 years precipitation has relevantly increased in the north of the country. At the same time, maximum and minimum annual mean temperatures are also increasing.



Figure 5: ENANDES Inter Institutional coordination and collaboration in Peru. Day 2 - 3.02.2021

The most important contributions and benefits from ENANDES implementation in Peru will be the support to the NDC formulation process in three priority areas: agriculture, forestry and water management; the relevance of the output for Land Use Planning and Land Management, through the generation of scenarios, zoning and mapping; and water resources availability, among others. ENANDES is aligned with national strategic policy such as "Plan Bicentenario" for 2031 as well it has synergies with other projects and actions such as the EUROCLIMA + (CIIFEN) and the SISSA projects. The project will facilitate the generation of relevant information on stakeholders needs in terms of climate information as well as design the impact-based forecast in collaboration with the other institutions involved in DRR in Peru. Finally, ENANDES will provide the opportunity for SENAMHI to work on DRR and EWS for the first time in an Amazonian territory and with local indigenous communities. The presentation shared by Peru can be found <u>here</u>.

IDEAM of Colombia presented the **OUTCOME 3** - "Engaged and empowered stakeholders have participated in the codevelopment and implementation of local plans and activities for adaptation to climate variability and change that rely on climate/water information." Hugo A. Saavedra Umba, Deputy Director of Meteorology explained the mission and structure of IDEAM and highlighted the coordination among different IDEAM directorates (Meteorology, Hydrology, Ecosystems and Environmental Information and Environmental Research) to guarantee a joint and more effective implementation of ENANDES.



Figure 6: ENANDES multisector benefits for Colombia. Day 2 - 3.02.2021

Luis BARRETO, Specialized Professional at Sub-Directorate of Meteorology, mentioned how Colombia initiated the process for formalizing the National Framework for Climate Services and is developing a National Strategic Plan to achieve its five goals. IDEAM is working with the national partners to reduce the gap between climate information providers and end users by promoting the application of scientific research and new knowledge to address users' needs and achieve greater benefits (local and societal). The National Framework for Climate Services is considering the following priority sectors: agriculture and food security; climate risk management; health; water; and energy. Colombia will implement the NFCS in the country according to the National CS Strategic Plan and ENANDES project will support the implementation at local scale of the value chain. Helmer GUZMÁN, Coordinator of the Climatology and Agro-meteorology Group at IDEAM provided an overview of the engagement with the stakeholders who have participated in the co-development and implementation of local plans and activities for climate adaptation and who rely on climate and water information for reducing vulnerability. Their presentation can be found <u>here</u>.

Juan José Nieto, CIIFEN International Director, continued the session with a presentation on the ENANDES plans to achieve **OUTCOME 4 - "Regional and global coordination and cooperation mechanisms are strengthened; lessons, tools and approaches from ENANDES help others to provide climate services and replicate adaptation actions elsewhere and about the importance of strengthening regional and global coordination and cooperation mechanisms."** According to Juan José, the lessons, tools and approaches of ENANDES will help others to provide climate services and replicate adaptation actions adaptation actions in multiple places.

The idea is that the coordination and planning will improve among Western South American countries and continuous climaterelated measures can be applied to maximize positive synergies and increase the economic efficiency of investments in the region. In this way, the capacity building initiatives in the ENANDES countries and the needs of the region in general will be coordinated. Lessons learned will also be summarized and disseminated to support their subsequent replication and expansion in other contexts. More details of his presentation can be found <u>here</u>.



Figure 7: Regional and International coordination and articulation. Day 2 - 3.02.2021



Figure 8: International alliances for the ENANDES project. Day 2 - 3.02.2021

After the presentation of ENANDES Executing Partners, time was given to the external partners, and potential capacity development providers who have shown interest and competencies to support the ENANDES implementation and help generate products aligned with expected project outputs. Three institutions have been in close working relationships with WMO during the planning stage. These are: International Research Institute for Climate and Society<sup>6</sup> represented by Ángel Muñoz, Associate Research Scientist; the Institute for Spatial Research of Brazil<sup>7</sup>, represented by Daniel Vila; Researcher for the Div. Satellites and Meteorological Sensors and the Bureau of Meteorology of Australia<sup>8</sup> represented by Yuriy Kuleshov.

Ángel Muñoz highlighted that, due to the nature of IRI's work, products and expertise, the IRI team can support two broad sets of ENANDES activities:

1. The Implementation of the cross-timescale *NextGen forecast* system in the countries (Outputs 1.4, 1.5, 1.6, 2.3 and 4.5). NextGen is a systematic general approach for co-designing, implementing, producing and verifying

<sup>&</sup>lt;sup>6</sup> https://iri.columbia.edu/

<sup>7</sup> http://www.inpe.br/

<sup>8</sup> http://www.bom.gov.au/

objective climate forecasts at multiple timescales. It is designed by the user, and offers tailored probabilistic forecasts at multiple timescales, providing information on how the rainfall will be distributed such as the frequency of rainy/dry days in the target season, onset, demise and duration of the rainy season(s). as well as information on other variables of interest, such as minimum, mean and maximum temperatures.

2. Contribute to strengthening of local capacities to improve translation, transfer and use of past, present (monitoring) and future (forecast) climate information (Outputs 3.2, 4.2 and 4.5).

Other outstanding information shared by Ángel Muñoz can be found in his PowerPoint document here.

Daniel Vila presented the INPE effort in ENANDES to support for drought monitoring for agriculture and water management based on:

- Satellite-based products.
- Satellite-based precipitation algorithms for drought monitoring.
- Vegetation-stress monitoring and other drought-related parameters.
- Training and dissemination tools.



Figure 9: International alliances for the ENANDES project. Day 2 - 3.02.2021

Satellite-based remote sensing can provide a relatively high spatial resolution (i.e., local to synoptic scale) and high temporal resolution (i.e., hours to days) observations of the surface Earth. A unique advantage of satellite observations is their larger scale spatial coverage which complements the potentially more accurate but spatially sparse ground-based observations. INPE full presentation can be found <u>here</u>.

Finally, **Yuriy Kuleshov** presented the potential Contributions of WMO Initiatives to Climate Change Adaptation Activities in RA-III (South America), such as:

- WMO Global Producing Centers Long-Ranage Forecasts / Australian BoM disseminating S2S products from ACCESS-S.
- WMO Space-based Weather and Climate Extremes Monitoring (SWCEM) providing satellite-derived products for RA-III, e.g., precipitation estimates, SPI, VHI etc., similar to regional and national products for RA-I, II, and V (Africa, Asia, SW Pacific).
- WMO CREWS Project developing Drought Risk Analyser for Chile, Columbia, and Peru.

Full presentation by the Bureau of Meteorology of Australia can be found and reviewed in this link.



Figure 10: International alliances, Bureau of Meteorology of australia, Day 2 - 3.02.2021

All these presentations were followed by a Q&A session on the Zoom chat and were answered live during the session.

## DAY 3

The third day was organized in a way to foster interactive discussions among the participants around four common aspects of the climate services value chain, namely:

- data management,
- climate forecast,
- translation and application of information,
- capacity development programme.

In order to facilitate the discussions, the participants were divided into breakout groups and each group had a "Miro" virtual whiteboard set up specifically for each different topic. Prior to day 3, all participants received guidelines documents to prepare for the online discussions (Annex 5).

The working groups composition was as follows:

	Technical Area	Number of Participants	Implementing/Executing Partners	External Allies
Group 1	Data Management	13	WMO, CIIFEN, DMC, SENAMHI, IDEAM,	AEMET, MeteoSwiss
Group 2	Forecast	20	WMO, CIIFEN, DMC, SENAMHI, IDEAM,	IRI
Group 3	Translation and application of information	15	WMO, CIIFEN, DMC, SENAMHI, IDEAM,	MeteoSwiss
Group 4	Creation and strengthening of capacities	11	WMO, CIIFEN, DMC, SENAMHI, IDEAM,	AEMET

Table 2: ENANDES Participation to Workout Groups

Before starting the discussion in groups, **Lina Sjaavik** Project manager at WMO, gave an overview of the current and future hydro-meteorological development projects in Latin America. There are several initiatives that WMO is implementing as a leader or partner in the region and those represent sources of best practices, of lessons learned and opportunities for synergies and coordination with ENANDES operations (see complete presentation <u>here</u>).

The following is a brief summary of the group discussions.

#### **GROUP 1: Data Management**

The group 1 discussions were led by Jose Guijarro, AEMET, who gave a short introductory presentation in order to provide some context to the group members. His presentation can be reviewed <u>here</u>.

Group 1 had the following questions as a guide to the discussions:

Current Situation	Main current deficiencies in Information management systems of climate data, Degree of satisfaction with your Climate Data Management System (CDMS) What main obstacles hinder the achievement of organization objectives?
Expectations	Which deliverables can be achieved in 2021?
Needs	What tools, resources or skills do we need to get where we want to go? Priorities in improving data management How could you solve the difficulties?
Facilities	How can ENANDES help us achieve these goals? What aspects do you think will be easier thanks to the project? How can the exchange of experiences be taken advantage of within ENANDES?

Table 3: Questions for group 1. Day 3, 4.02.2021

All questions were answered on a digital canvas like the one shown below, and later all the answers have been transferred to an Excel file for a better review (consolidated matrix accessible <u>here</u>). This Canvas and the following ones have been saved in Annex 4 with high resolution, so to allow a better consultation of the contents and results.



Figure 11: ENANDES Breakout Group 1

The processing of the information recollected during the group work on Data Management allowed the group to classify the actions according to top, medium or low priority. Several actions will be integrated into the updated 2021 Work Plan. The concrete activities with the highest priority rate have been collected and listed in Table 4, associating them to the specific project output they concur to achieve.

Project Output/ Priority Action	Peru	Colombia	Chile	Region		
Output 1.1: National climatic and hydrological data management systems have been enhanced and updated through improved/new tools and processes. WIGOS implementation has been supported						
Update Metadata of weather and hydro stations according to WIGSO and WIS standards	+++	+++	+++	+++		
Conduct Gap Analysis for complying with Global Basic Observing Network	+++	+++	+++	+++		
Conduct regional training in WIGOS, WIS and GBON expertise	+++	+++	+++	+++		
Organize Capacity Building Session and Experience Exchange among partners for Data Rescue and Digitalization	n.c.	+++	+++	++		
Organize Training Session on Data Quality Control	+++	+++	+++	+++		
Organize Training on Database management	+++	+++	+++	+++		
Conduct systematization of hydrological monitoring activities in the region and provide network analysis	+++	+++	+++	+++		
Conduct Gap Analysis on national data supply to WMO Hydrological Observing System	+++	+++	+++	+++		
Conduct Gap Analysis on national data quality and supply to Global Hydrological Status and Outlook System	+++	+++	+++	+++		
Design and validate data access and exchange protocol (among national institutions).	+++	+++	+++	+++		
Design and validate data quality requirements and exchange protocol between public institutions and private sector.	++	++	++	++		
Output 1.2: The characterization and communication of historics through new/enhanced tools and processes	al and recent states	s of climatic haza	rds have been ir	nproved		
Realize systematization of climate Indexes used and monitored in the region and applied methodologies and technologies	+++	+++	+++	+++		
Identify a set of drought indexes suitable at national and regional level	+++	+++	+++	+++		
Output 1.3: The production and dissemination of forecasts of his processes	gh-impact weather	has been improv	ed through new	models and		
Mapping and reviewing national and regional application for information and warning production and dissemination to end users.	++	++	++	++		

 Table 4: Priority action to be taken in order to achieve the Improve Data Management Systems. Level of priority classified High (+++),

 Medium (++), low (+), n.c. (no classification)

# **GROUP 2: Forecasts**

The Group 2 discussions were facilitated by Guillermo Armenta, CIIFEN, who gave a short introductory presentation to put all participants in context. His presentation can be reviewed <u>here</u>. Discussions were guided by the questions described in Table 5 and the result is expressed by Figure 12 (accessible in high resolution in Annex 4) and Table 6.

Current Situation	What kind of early warnings do you generate and how do you communicate them to the population? How do you monitor that this information actually reaches the affected population? Do you consider that the timescales of the sub-seasonal and seasonal forecasts that you generate are sufficient? How do you quantify the uncertainty of the climate forecasts? Do you think they have enough HR and technicians to generate climate forecasts?
Expectations	What sectors of the population are important for the generation and use of climate forecasts? Of those not covered yet, which ones has priority and why and why? What aspects do you consider that limit the quality of your climate forecasts and their access or use by the population?
Needs	What inputs, information products, and strengthened information capacities that you do not currently have, do you think could be used to improve short-term forecasts and that the ENANDES project could provide you?
Facilities	Which of the inputs that the ENANDES project seeks to generate (information from world centres, tools, forecasting systems and capacity-building programs) do you consider to be the ones that would best serve your institutions in the medium and long term?

Table 5: Questions for group 2. Day 3, 4.02.2021



Figure 12: ENANDES Breakout Group 2

Project Output/ Priority Action	Peru	Colombia	Chile	Region		
Output 1.3: The production and dissemination of forecasts of high-impact weather has been improved through new models and processes						
Development of a digital tool and related use protocol for users' feedback on weather and climate forecast	+++	+++	+++	+++		
Conduct Gap Analysis on warning/alert production capacities at national and transboundary level	+++	+++	+++	+++		
Output 1.4:The production and dissemination of sub-seasonal to conditions has been improved through new models and processes	o seasonal (S2S) pr s	edictions of regio	nal climate and	hydrological		
Mapping and analysis of available sub-seasonal forecasting methodologies and tools	+++	+++	+++	+++		
Select and Sign agreement with provider partner of S2S methodology and training (IRI/NextGen)	+++	+++	+++	+++		
Perform Gap analysis for NextGen integration into NMHS tasks and tools	+++	+++	+++	+++		
Implement NextGen Training Sessions	+++	+++	+++	+++		
Analyse and Identify NextGen requirement to be applied/tailored to selected sectors: Agriculture, Water and Energy	+++	+++	+++	+++		
Output 1.5: The access, processing and dissemination of multi-m	odel projections of	regional climate	change			
Conduct Needs assessment and gap analysis for the implementation of ensemble weather and climate prediction systems (EWP)	++/+++	++/++	++/+++	++/++		
Implement most suitable EWP at national level	++/+++	++/++	++/+++	++/++		
Output 1.6: Procedures and tools have been implemented by projections in space/time.	Output 1.6: Procedures and tools have been implemented by NMHSs to downscale seasonal forecasts and climate change projections in space/time.					
Conduct survey to analyse existing approaches for developing downscaled and tailored forecast for agriculture, water and energy	+++	+++	+++	+++		
Perform Gap Analysis on country capacities and tools for downscaling	+++	+++	+++	+++		
Develop downscaling methodology adapted to capácities installed and tools available in each country	+++	+++	+++	+++		

 Table 6: Priority action to be taken in order to achieve the Improved Forecast capacity. Level of priority classified High (+++), Medium (++), low (+), n.c. (no classification)

#### GROUP 3: Translation and Application of Information to the Interested Sectors and the Territory

The group 3 discussions were led by Daniel Pabón, who gave a short introductory presentation in order to share context with all the participants. This presentation can be reviewed <u>here</u>.

Discussions were guided by the question described in Table 7 and the result is expressed by Figure 13. The identified priorities for action since the start-up of the projects are resumed in Table 8.

Current Situation	What strategy for the communication of the system and information technology on climate services to the sectors and the community do you apply in your institution? which, initiatives or actions are in place for improving strategy of the communication of information? which difficulties / obstacles did you encounter that have prevented progress in the communication strategy?
Expectations	In a long-term look, what progress would you like to achieve in terms of communication and incorporation of climate services information in sectors and communities? Do they hey introduce considerations of inclusion of gender differences and ethnic diversity?
Needs	What tool, resources or skills do we need to get in order to achieve your expectations? In what processes or activities that strengthen the communication strategy of climate services information requires the support / guidance of the Regional Climate Centres?
Facilities	The ENANDES project could promote the development of these actions and promote others in the short and medium term. Which ones would you see need to be addressed within the framework of ENANDES in the short term (2021)? What resources are required (time, financial, technological, human, research, regional integration, workshops, etc.)?

Table 7: Questions for group 3. Day 3, 4.02.2021

Consolidated matrix accessible <u>here</u>. In addition, the annexes include this same Canvas in a higher resolution, which allows it to be read without difficulties.



Figure 13: ENANDES Breakout Group nr 3

Project Output/ Priority Action	Peru	Colombia	Chile	Region		
Output 2.1 Knowledge and action networks have been implemented that facilitate the design, production, delivery, and use of climate information and services						
Define communication constraints and needs to address a gender focused information plan and elaborate appropriate material	+++	+++	+++	+++		
Mapping indigenous people and communities in demonstration areas	+++	+++	+++	+++		
Define communication constraints and needs to to guarantee inclusive and accessible information for indigenous people	+++	+++	+++	+++		
Prepare a roaster of Amazon indigenous languages translators	+++	++	n.c.	++		
Analysis of Best Practices implemented by the Mesas Técnicas Agroclimaticas (MTAC) in Colombia	+++	+++	+++	+++		
Replicate the MTAC experience and participative model in Peru and Chile to address sectors needs and involve sector representatives.	+++	+++	+++	+++		
Output 2.2: The needs for tailored weather/climate information	have been identifi	ed for target secto	ors			
Review agro climatic indexes to monitor crop evolution and to provide thresholds for extreme events monitoring and forecasts	++	++	++	++		
Output 2.4: Communication and knowledge management strateg	gies have been dev	eloped				
Training of Trainers for regional and local institutions on the use of climate information and risk management	+++	+++	+++	+++		
Organize training material and agenda to improve communication skills and strategies of NMHS officers	+++	+++	+++	+++		
Development of e-learning tools and e-guides to work in remote training or to support presential training.	++	++	++	++		
Output 2.5: Multiple requisites of a National Framework fo information needs and implementation of national dialogs, ha implementation	r Climate Service ve been addresse	es, such as identi d by ENANDES,	fication of stake thus contributi	eholders and ing to NFCS		
Conduct gap analysis of NFCS implementation at country level	+++	+++	+++	+++		
Elaborate strategy to align NFCS objectives with ENANDES work plan and output at country level	+++	+++	+++	+++		
Formulating a Plan for improved platform (User Interface) per country.	+++	+++	+++	+++.		
Define roadmap (the full value chain) for climate and weather information, broadcast mechanisms, training / capacity building and feedback for each pilot area	++	++	++	++		

 Table 8: Priority action to be taken in order to achieve the Translation of Information . Level of priority classified High (+++), Medium

 (++), low (+), n.c. (no classification)

#### **GROUP 4: Creation and Strengthening of Capacities**

The group 4 discussions were led by Elba Fiallo-Pantziou, CIIFEN project manager, who gave a short introductory presentation to put all participants in context. This presentation can be reviewed <u>here</u>.

Group 4 based the participatory work on a set of slightly different questions, since it has been dealing mainly with the regional dimension of the project strategy. Basic questions/topics that guided the exchange are summarized in Table 9 and main output/ recommendations in the Table10.

Current Situation	What is the current capacity baseline? Are there already projects, tools or actions that are making progress on this issue? What obstacles have been encountered?
Needs	What are the training needs that you identify to achieve the goals defined for 2021? Indicate the order of priority (it is not necessary to complete the 5 options)
Training systems	Indicate training media preferences: Face-to-face workshops, e-learning platform (modules), Webinars on specific topics.
Regional Climate Centre for Western South America RCC-WSA	In what way do you think the CRC-OSA could support the ENANDES project so that the goals that are being proposed for 2021 can be met?

Table9: Questions for group 4. Day 3, 4.02.2021



Figure 14: ENANDES Breakout Group 4

Project Output/ Priority Action	Peru	Colombia	Chile	Region		
Output 4.1: Regional coordination activities like syntheses of surveys and needs, and regional expert meetings have been carried out t to support the update of national climatic and hydrological data management systems, and the implementation of interoperable regional databases						
Organization of congresses with the participation of experts and countries of the region	+++	+++	+++	+++		
Organization of meeting agenda with ENANDES partners and with non Enandes NMHS.	+++	+++	+++	+++		
Organize a regional Workshop to evaluate national hydrological modelling capacities and identify opportunities to improve and align the countries.	+++	+++	+++	+++		
Organize Digital Workshops and Webinar with other NMHSs and decision makers to scale up the project regional efforts.	+++	+++	+++	+++		
Output 4.2: Regional coordination activities like consultations a complement national strengthening of capacities for climate mon	nd expert meetings itoring and predic	s have been carrie tion	d out to suppor	t and		
Involve the ENANDES Advisory Board to support a road map to the regionalization of climate scenarios and modelling.	+++	+++	+++	+++		
Output 4.3: Regional coordination activities like consultations and expert meetings have been carried out to support and complement national strengthening of capacities for climate services production, dissemination and uptake						
Formulate and Integrate the gender and indigenous people approaches to the communication and dissemination strategy	+++	+++	+++	+++		
Output 4.4: Regional Technical Working Groups have been re-co ongoing projects	onvened, revitalize	d or established	Active liaison w	th other		
Coordinate and take advantage of the experiences of allied institutions such as CIMHET and SISSA to	+++	+++	+++	+++		
Output 4.5: An ENANDES Climate Services Toolkit (CST) has b operational needs of ENANDES NMHSs	een implemented t	hat is tailored to	the previously d	etermined		
Output 4.6: Capacity building efforts for ENANDES have be CIIFEN/RCC-WSA and (iii) jointly planned and implemented by	en (i) defined by y countries and Wi	ENANDES parti MO Re	icipants, (ii) coo	ordinated by		
Conduct a gap analysis on the availability and of needed technology, tools and digital platforms to plan blended learning (digital/phisical)	+++	+++	+++	+++		
Organize training in seasonal and sub-seasonal forecasting (physical principles, implementation, evaluation and verification)	+++	+++	+++	+++		
Organize training on data quality, homogenization and automatization	+++	+++	+++	+++		
Organize training on programming (R and Python)	+++	+++	+++	+++		
Organize training on Geographic Information System - GIS	+++	+++	+++	+++		

 Table 10: Priority action to be taken in order to achieve the CREATION and STRENGTHENING of CAPACITIES. Level of priority

 classified High (+++), Medium (++), low (+), n.c. (no classification)

# 4. Recommendations

Since the Inception Workshop of the ENANDES project was conceived as an initial kick-off workshop, further dialogue sessions and networking between the implementation partners are needed and expected to achieve good practices sharing and the interactions required during the deployment of the project.

Nevertheless, the relevant participation of officers representing different technical departments of executing partners, of experts from external allies and of interested national institutions, permitted a detailed and clear review of the scope of the project and an update needs assessment. The breakout groups could identify and agree on priorities and first steps and actions that ENANDES should take during the first year of action.

Groups 1 and 2 analysed two different aspects of first component of the project, **data management** and **forecast generation**. Regarding Data management, partners agreed on the necessity of improving the alignment and conformity of national data systems to WIGOS, WIS standards and to the WHO Hydrological Observing System and to upgrade the data quality control. Technical training will be needed to progress on quality compliance, so the project should start by analysing actual gaps in knowledge and capacities and address them. At the same time partners agree on designing data exchange protocols, among national institutions as well as among NMHS in the region. Monitoring of hazards and potential impacts will need a significant effort at country level also to rescue historical information and non-digital data to permit to systematize, spatialize and classify of extreme events. The partners agree also on the needs to enhance drought monitoring by selecting and integrating new source of information and a set of indexes. Historical series of events including information on intensity and areas/population affected plus the use of satellite and remote sensing derived indexes may allow to move towards the access to impact based forecasts which will need consequently an urgent effort to design processes for information and warning production and dissemination. This last issue regarding access to forecasts and alert by end users, was discussed also by Groups 2 that suggested to give priority to an assessment of capacities of at country and regional level to elaborate and transmit the information and stressing the importance of letting end users support the validation of forecast, providing real time feedback as well as paying attention to extreme events that may affect transboundary territories.

**Sub seasonal to seasonal forecast (S2S)** improvement is considered as a priority by all institutions involved, so the first year of implementation will focus on establishing all the collaboration needed to provide NMHS with enhanced methodologies and approaches. **NextGen** methodology can supply both the national and regional approach required so the definition of the terms of collaboration with the IRI and related work plan will be among the first task of project management. At the same time, WMO will assist NMHSs to identify the most suitable tools/models for ensemble weather and climate predictions and for downscaling forecast addressing information/adaptation and warning needs of specific sectors or territories.

The most relevant and innovative outcome of ENANDES project is the **translation of climate information** in terms of potential impact on the selected sectors, that means providing valuable information for prevent food loss, energy drop or blackout and water shortage either for agriculture, livestock or human consumption. The partners are all aware that to achieve such a relevant socio-economic benefit of climate services application imply **need**, **exposure and vulnerability assessment**, **indexes identification**, **impact evaluation** and also design and **effective communication strategy**. In terms of assessment, debate and consensus, the project will build on the existence of the Agro-Climatic Technical Roundtables<sup>9</sup> in Colombia, replicating the same multi-stakeholders' coordination capacities in the NMHS, focusing on the specific needs of most vulnerable groups such as women, children and youths and indigenous communities. While addressing and finding solutions for the communication constraints, the project will also take charge of offering available resource to update, consolidate and promote the National Framework for Climate Services, helping target country to move one step forward in the use of climate information to generate socio-economic benefits (i.e. loss and damages reduction and avoided rehabilitation, assistance costs, for instance).

Finally, with the support of CIIFEN experts, the Group 4 (Capacities Generation and Strengthening) provided important insights and suggestions to improve effectiveness of the **communication** at regional level, supporting the generation of specific contents for most vulnerable groups and integrate them in the **regional communication, dissemination and training strategies**. CIIFEN will also collaborate with the Training Centres of SENAMHI and of the Regional Climate Centres (SAS and WSA/OSA) to elaborate the contents of the training campaigns to the NMHS, giving priorities to: programming in languages compatible with the sub seasonal to seasonal forecasting tools (such as R and Python); using Geographic Information Systems, management of e-learning platform for permanent capacity building (online e-learning modules). Last but not least CIIFEN will lead project efforts to generate synergies with other projects under implementation in region, such as the

<sup>&</sup>lt;sup>9</sup> Mesas Tecnicas Agro Climaticas

EUROCLIMA + Project and (IABD) SISSA Project and to scale up project benefits regionalizing climate scenarios and modelling and capturing the interest of other countries in the region.

The identification of key activities and priorities has been an excellent exercise to share expectations and commit participants to align personal and institutional interests to common objectives. It is essential now to transfer the information and translate the priorities into a SMART<sup>10</sup> Action Plan for the first year which should be validated with the partners by the end of March 2021. WMO and the partners will also finalize the Implementation Agreements in order to make possible budget disbursements and financial execution to start with consultancies and assessments.

WMO will make available to project partners, through its departments and divisions, all the professional advice and technical support needed to deal with the different components of the climate service value chain. Nevertheless, some priorities may be already addressed by strategic partners such as IRI, INPE and BOM who have actively participated in the workshop and that already provided technical advice and proposals to WMO and to the NMHSs. In the first weeks of the project and by the end of March 2021 the agreements with this Institution will be negotiated and signed in order to be able to start the activities and move forward with first deliverables by the end of the first year of implementation.

Coordination between partners and relevant divisions, such as Regional Climate Prediction, Early Warning Systems, Agro-Meteorology, Hydrology and Education and Training are already on-going and will lead concrete output by the end of the first year of the project.

WMO Coordination Unit is finalizing the generation of the Monitoring and Evaluation tools that will allow to keep permanent knowledge of project implementation status and planned deliverables. At the same time Project Technical Committee, Executive Board and Advisory Board will be set up and formalized by Terms of Reference and individual agreements.

## 5. Conclusions

The "Enhancing Adaptive Capacity of Andean Communities through Climate Services" ENANDES Project, financed by the Adaptation Fund, seeks to enhance the capacity of society and communities in Chile, Colombia and Peru to adapt to a varying and changing climate. This will be possible by continuously producing, communicating and assessing the use of science-based climate information in order to make it more credible and useful for decision-and policy-making on preparedness for, and reduction of damages from climatic hazards.

This Inception Workshop of the ENANDES project, was attended by more than 160 participants, and provided a good platform to create broader awareness and knowledge on the project activities and an initial work plan of the project implementation. During the workshop, participants and international stakeholders provided constructive feedback, suggestions and proposals for the execution and implementation by the partners of the project.

The workshop achieved a high level of commitment and collaboration among the involved partner institutions, so it fulfil the expectation of providing a common understanding of the scope, objectives and components of the ENANDES project and of promoting articulation and coordination between the different actors involved. The high level of interest shown by national authorities and implementation teams, indicate that the project will start under the appropriate conditions to promote exchange, collaboration and lobby for achieving the greatest benefit possible. One main result of the workshop is a detailed classification of priority actions to be taken in the first stage of implementation, which shows the way to the elaboration of 2021 Project Work plan.

The success of this project will rely deeply on the interaction and collaboration between countries, especially in a postpandemic time. As highlighted by the representative of Designated Authorities in Peru and Chile during the welcoming speeches, ENANDEs may even play a role in developing or jointly identifying the priorities and components for a post pandemic recovery plan, giving special attention to the most vulnerable communities and ecosystems.

<sup>&</sup>lt;sup>10</sup> SMART: Specific, Measurable, Agreed, Realistic, Time-bound



Figure 15: Some of the participants