Handout

Data, Analytical Methods and Tools on Climate Change and Water

2nd Technical Workshop on Project Preparation

Green Climate Fund Project Preparation for Transformational Climate Resilience Water Projects in the Mediterranean

11 Feb 2021, Online

This handout aims to provide a succinct overview of data sources, analytical methods and tools for climate change related water challenges. A listing of a website is not an endorsement of the information the website provides. The handout is rather a starting point to point to possible data sources, information and tools. The data and information from these sources needs to be vetted in terms of its appropriateness, quality, uncertainty and prediction capabilities regarding its intended use.

This handout will be continuously updated. It has been developed by the Global Water Partnership (GWP) with inputs from the World Meteorological Organization (WMO) for the 2nd Technical Workshop on Project Preparation for Transformational Climate Resilience Water Projects in the Mediterranean Region for the Green Climate Fund Organized by Global Water Partnership Mediterranean (GWP-Med) and the Union for the Mediterranean (UfM) with the support of the Swedish International Development Cooperation Agency (SIDA) and Austria Development Agency (ADA), with technical input of the Green Climate Fund (GCF) and WMO.

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NOTE: An overview of tools is included in the **GWP Water Supplement to the NAP Technical Guidelines**
https://www4.unfccc.int/sites/NAPC/Documents/Supplements/GWP_NAP_Water_Supplement_May2019.pdf

1. Climate Data and Tools with Relevance to Water Management

1.1 Essential Climate Variables (ECVs) of the Global Climate Observing System (GCOS) are the physical, chemical or biological variables critical to characterize the earth's climate
https://public.wmo.int/en/programmes/global-climate-observing-system/essential-climate-variables

1.2 IPCC 5th Assessment Report Working Group I on the Physical Science Basis includes observations and projections of water cycle change and changes in extremes and detection and attribution of climate change (including the water cycle and extremes) on global and regional level; **Working Group II on Impacts, Adaptation and Vulnerability** includes observed impacts, vulnerability and adaptation with freshwater-related risks of climate change with continental overviews https://www.ipcc.ch/report/ar5/ as well as the **IPCC special report on the impacts of global warming of 1.5 °C** https://www.ipcc.ch/sr15/

1.3 Coordinated Regional Climate Downscaling Experiment (CORDEX) was initiated in 2009 to respond to the need for a coordinated framework for evaluating and improving regional climate

downscaling (RCD) techniques and producing a new generation of RCD-based fine-scale climate projections for specific regions worldwide. http://cordex.org/

1.4 EU Copernicus Climate Change Service (C3S) provides a wide portfolio of data and products and services, including monthly maps and charts of essential climate variables, including hydrological climate variables https://climate.copernicus.eu/

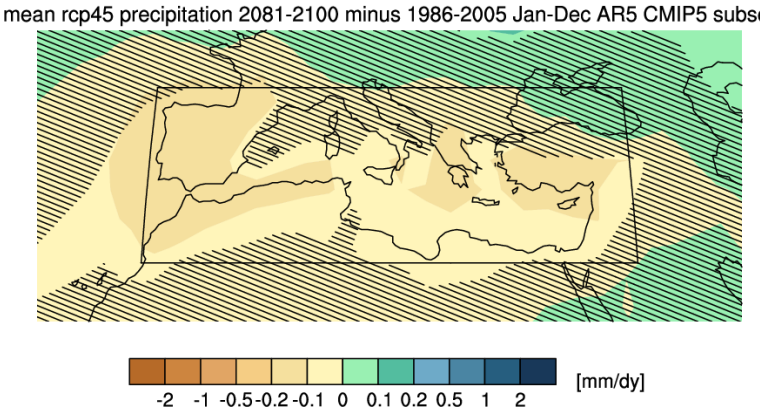
1.5 Global Climate Change Viewer (GCCV) displays future temperature and precipitation changes simulated by global climate models in the Coupled Model Intercomparison Project Phase 5 (CMIP5). Users can view projections for any country, for all available models, and all Representative Concentration Pathways (RCP) emission scenarios. Includes detailed usage instructions. https://toolkit.climate.gov/tool/cmip5-global-climate-change-viewer-gccv

1.6 CCAFS-Climate data portal provides global and regional high-resolution climate datasets that can be used as a basis for assessing the climate change impacts and adaptation in a variety of fields including hydrology, biodiversity, agricultural and livestock production, and ecosystem services. http://ccafs-climate.org/

1.7 Climate Wizard is an easy to use tool to visualize IPCC AR4 (2007) climate projections http://www.climatewizard.org/

1.8 KNMI Climate Explorer is a research tool to investigate the climate. Its web site collects a lot of climate data and analysis tools to visualize for example CORDEX https://climexp.knmi.nl/

Figure: Sample visualization of the difference between Rainfall in the periods 1986-2005 and 2081-2100 on GCM CMIP5 dataset (KNMI Climate Explorer)



1.9 World Bank Climate Change Knowledge Portal (CCKP) provides information, data and reports about climate change including country profiles http://sdwebx.worldbank.org/climateportal/index.cfm

1.10 Global Climate Monitor is a global climate web viewer to geo-visualize climate data and climate-environmental indicator http://www.globalclimatemonitor.org/

1.11 Community-based Risk Screening Tool – Adaptation and Livelihoods (CRiSTAL) is a project-planning tool that helps users design activities that support adaptation to climate variability and change at the community level https://www.iisd.org/cristaltool/

1.12 Climate vulnerability Assessment (Annex to USAID Climate-Resilient Development Framework) provides a conceptual framework for carrying out vulnerability assessment and provides listings of tools and resources that can be used throughout the vulnerability assessment process

https://www.climatelinks.org/resources/climate-vulnerability-assessment-annex-usaid-climate-resilient-development-framework

→ ***WMO Catalogue for Climate Data*** has just been approved by WMO Congress. This will enhance the discoverability, access and use of high-quality climate data and provide a one-stop platform for assessing maturity and quality of climate datasets, thus increasing the visibility of the best data. https://climatedata-catalogue.wmo.int/

2. Water Data, Tools and Models

2.1 WMO Hydrological Observing System (WHOS) is a portal to the online holdings of National Hydrological Services (NHS) around the world that publish their historical and/or real-time data without restrictions or cost http://www.wmo.int/pages/prog/hwrp/chy/whos/index.php

2.2 AQUASTAT provides standardized data and information and tools to generate analysis on water resources, water uses, agricultural water management http://www.fao.org/nr/water/aquastat/main/index.stm

2.3 Integrated Flood Management Help Desk provides 24 tools and several guidelines as well as a function to request tailor-made support from a community of 35 expert organizations on flood management including early warning systems http://www.floodmanagement.info/

2.4 Integrated Drought Management Help Desk provides tools and guidelines as well as a function to request tailor-made support from a community of 34 expert organizations on drought management including monitoring, early warning systems; vulnerability and impact assessment; preparedness and drought mitigation measures http://www.droughtmanagement.info/

2.5 Flood and Drought Monitor is a portal where users can map satellite data to support their planning for flood and drought events http://www.flooddroughtmonitor.com/

2.6 Global Water Tool (GWT) to identify corporate water risks and opportunities http://www.wbcsd.org/Clusters/Water/Resources/Global-Water-Tool

2.7 Global Flood Awareness System (GloFAS) couples weather forecasts with a hydrological model for information on river conditions and continental and global overviews. http://globalfloods.jrc.ec.europa.eu/

2.8 Water Risk Filter a tool to visualize water data and analysis http://waterriskfilter.panda.org/

2.9 AQUEDUCT Water Risk Atlas allows mapping water indicators on a global level to identify water risks broadly http://www.wri.org/applications/maps/aqueduct-atlas includes also a **Global Flood Analyzer** http://floods.wri.org/#/

2.10 SMHI HypeWeb publish modelled Open Data for inspection and free download from multi-basin and large-scale applications of the Hydrological Predictions for the Environment (HYPE) model. The model includes Northern Africa. http://hypeweb.smhi.se/

2.11 Community Water Model is an opensource model to examine how future water demand will evolve in response to socioeconomic change and how water availability will change in response to climate change http://www.iiasa.ac.at/web/home/research/researchPrograms/water/Community_Water_Model.html

2.12 Global Hydro-economic Model is a bottom-up system analysis framework which can be used to develop integrated, long-term planning strategies for the water system to address the impacts of future changing socio-economic and climatic conditions on the water system http://www.iiasa.ac.at/web/home/research/researchPrograms/water/Global_Hydro-economic_Model.html

2.13 The Inter-Sectoral Impact Model Intercomparison Project (ISIMIP) is a community-driven climate-impacts modelling initiative. Models on "Global Water" and "Regional Water" have been contributed for which data can be downloaded (explore with the Search function). Papers have also been published with analysis of the models. https://www.isimip.org/outputdata/

2.14 Emergency Events Database (EM-DAT) contains data on the occurrence and effects of over 22,000 mass disasters (including water-related disasters) in the world from 1900 to the present day http://www.emdat.be/

2.15 Global Runoff Data Centre (GRDC) provides long time series of runoff data around the world http://www.bafg.de/GRDC/EN/Home/homepage_node.html

2.16 Global Precipitation Climatology Centre (GPCC) provides gridded monthly and daily precipitation data sets https://www.dwd.de/EN/ourservices/gpcc/gpcc.html

2.17 Global Groundwater Information System (GGIS) of IGRAC (International Groundwater Resources Assessment Centre), providing information and data on Groundwater around the World https://www.un-igrac.org/global-groundwater-information-system-ggis the **Global Groundwater Monitoring Network (GGMN)** a web-based network of networks displaying groundwater level data and changes occurring in groundwater levels is also available at https://www.un-igrac.org/special-project/ggmn-global-groundwater-monitoring-network

2.18 International Data Centre on Hydrology of Lakes and Reservoirs (HYDROLARE), hosting global data on lake and reservoirs. http://hydrolare.net/

2.19 Consortium of Universities for the Advancement of Hydrologic Science (CUHASI) Water data portal, listing existing data information websites https://www.cuahsi.org/data-models/portals/

2.20 Group on Earth Observations System of Systems (GEO SS) Portal for access of earth observation data from different archives http://www.geoportal.org/

2.21 EarthH2Observe Water Cycle Integrator (WCI) provides a portal to view and analyse earth observation, in-situ and model data https://wci.earth2observe.eu/

2.22 Global Flood Monitoring System (GFMS) is a NASA-funded experimental system using real-time TRMM Multi-satellite Precipitation Analysis (TMPA) precipitation information, hydrological runoff and routing model running, streamflow, surface water storage, inundation variables. In addition, the latest maps of instantaneous precipitation and totals from the last day, three days and seven days are displayed http://flood.umd.edu/

2.23 Global Precipitation Measurement (GPM) mission provides data from an international network of satellites for the global observation of rain and snow data are improvements to our understanding and forecasting of tropical cyclones, extreme weather, floods, landslides, land surface models, the spread of water-borne diseases, agriculture, freshwater availability and climate change https://pmm.nasa.gov/data-access/global-viewer

2.24 Global Flood Alert System (GFAS) uses global satellite precipitation estimates for flood forecasting and warning http://gfas.internationalfloodnetwork.org/gfas-web/

2.25 Real-time Integrated Global Flood Map is an experimental platform to map extreme rainfall http://dma.jrc.it/map/?application=FLOODS

3. Regional Institutions and Mechanisms with technical resources

3.1 Regional Climate Centres (RCCs)

WMO designated (a) Global Producing Centres for Long-Range Forecasts (GPCLRFs) to provide a range of global long-range forecasting products and (b) Regional Climate Centres (RCCs) to generate and deliver more regionally-focused high-resolution data and products as well as training and capacity building. The GPCLRFs and the RCCs constitute integral components of WMO's Global Data Processing and Forecasting System (GDPFS) underpinning the generation of climate information products by the NMHSs.

As Centres of Excellence, the WMO RCCs create regional products including long-range forecasts that support regional and national activities and thereby strengthen capacity of WMO Members in a given region to deliver the best climate services to national users.

RCCs in the Mediterranean

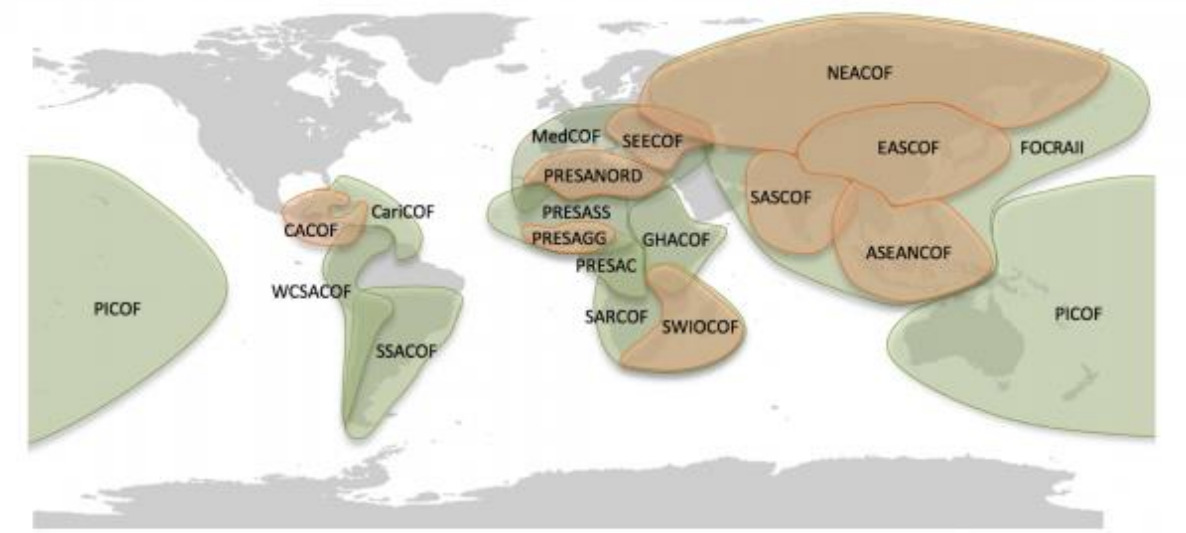
Regional Climate Network Northern Africa
The nodes are:(1) Casablanca Node on Long-Range Forecasting led by Direction de la Météorologie Nationale (DMN), Morocco; (2) Tunis Node on Climate Monitoring led by Institut National de la Météorologie (INM), Tunisia; (3)Algiers Node on Data Services led by National Meteorological Office (ONM), Algeria; and (4) Cairo and Tripoli Node on Training led jointly by Egyptian Meteorological Authority (EMA), Egypt and National Meteorological Centre (NMC), Libya
Overall coordination: DMN, Morocco
Domain of interest: Morocco, Algeria, Libya, Tunisia, Egypt
Website: http://rccnara1.marocmeteo.ma

WMO Regional Association VI (Europe) Regional Climate Centre Network
The nodes are located in De Bilt, the Netherlands (Node on Climate Data Services); Offenbach, Germany (Node on Climate Monitoring); Toulouse, France and Moscow, Russian Federation (Joint Node on Long-Range Forecasting)
Domain of interest: All Europe
Website: http://rcc.dwd.de/

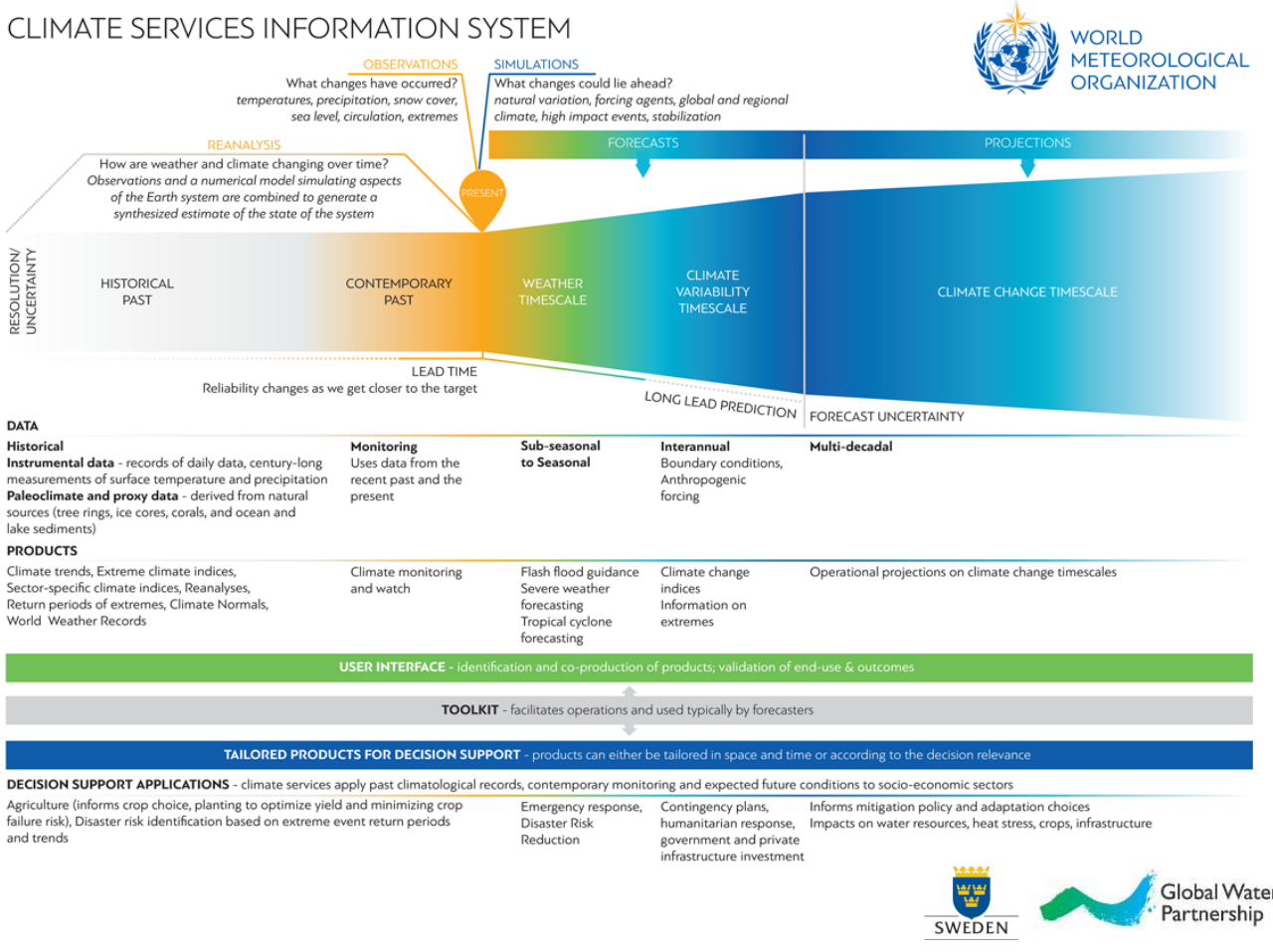
3.2 Regional and National Climate Outlook Forums in the Mediterranean

Regional Climate Outlook Forums (RCOFs) produce consensus-based, user relevant climate outlooks for the coming season on a regular basis.

The **Mediterranean Climate Outlook Forum (MedCOF)** http://medcof.aemet.es/ is an inter-regional initiative from the WMO Regional Association I (Africa) and the WMO Regional Association VI (Europe) for the entire Mediterranean region encompassing two existing RCOFs, the **South-East European Climate Outlook Forum (SEECOF)** https://www.wmo.int/pages/prog/dra/eur/SEECOF.php and the forum of **Prévisions Climatiques Saisonnières en Afrique du Nord (PRESANORD)** http://www.wmo.int/pages/prog/wcp/wcasp/rcofs/webpage/PRESANORD.html. The MedCOF is coordinated by the State Agency for Meteorology of Spain (AEMET).



4. Conceptual framework of a Climate Services Information System (WMO)



Regional approach to implement Climate Services Information Systems (WMO):