



ONLINE DATA MONITORING AND DECISION SUPPORT FOR THE OMO-TURKANA BASIN

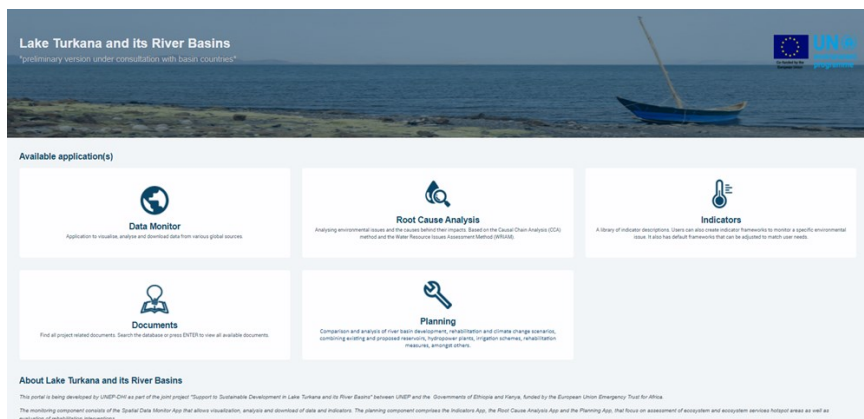
A web portal with applications for data and water resources monitoring, planning and management

Lake Turkana is the world's largest permanent desert lake and lies in Kenya and Ethiopia. The lake is rich in birdlife and has a large population of large water turtles. The Turkana mud turtle is endemic to the lake. The Lake Turkana National Parks are listed as UNESCO World Heritage sites in Danger.

LAKE TURKANA — A FRAGILE ECOSYSTEM

The lake is crucial for the livelihood in the area. The people around the lake originally subsisted through pastoralism, but today fishery is widespread and has become an alternative livelihood.

The lake has no outlet, making it very sensitive and vulnerable to changes in the amount of inflow. This can be caused by changes in upstream abstraction for irrigation, severe climatic variability (like the 1997-98 El Niño), or climate change. Additionally, the optimal water level range is very narrow, making the lake further sensitive to changes. Levels below 362 m.a.s.l. are detrimental for fishery, while severe flooding starts around 364 m.a.s.l. Lake Turkana experienced a very dramatic rise in water levels in 2020, resulting in great damage to settlements, infrastructure, and wildlife. From a historic perspective, this was a rare event but with climate change it may become more common.



The Transboundary Monitoring Observatory (TMO) portal is a freely available web-based service provided by UNEP-DHI for the Omo-Turkana basin for planning and management of water resources in the transboundary basin. The Data Monitor provides a quick and comprehensive overview of data available in the basin.

Water resources planning and management in the basin has previously been hampered by a lack of data and information. A key purpose of this project was to provide free access to, visualization, analysis and download of near real time data and information for the basin through a web-based service.

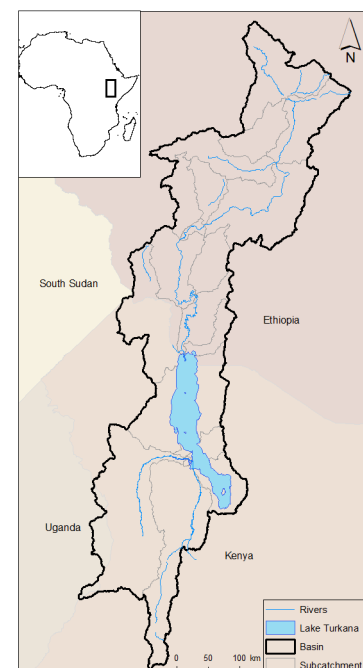
SUPPORT TO SUSTAINABLE DEVELOPMENT IN LAKE TURKANA AND ITS RIVER BASINS

CLIENT

- UNEP and the Basin Countries
- Co-funded by European Union Emergency Trust Fund for Africa

THE PROJECT

The focus of the project was to establish a common scientific understanding of Lake Turkana and its river basins and to promote transboundary dialogue. In the course of the project, a web portal with application for monitoring, planning and management of water resources has been set up and scenario modelling has been carried out.



Lake Turkana lies in the Omo-Turkana Basin, which is divided between Kenya and Ethiopia. The lake is part of the Kenyan Rift Valley and located mainly in Kenya, with the northernmost part extending into Ethiopia. The lake has an area of 6,400 km² and a depth of approx. 32 m.

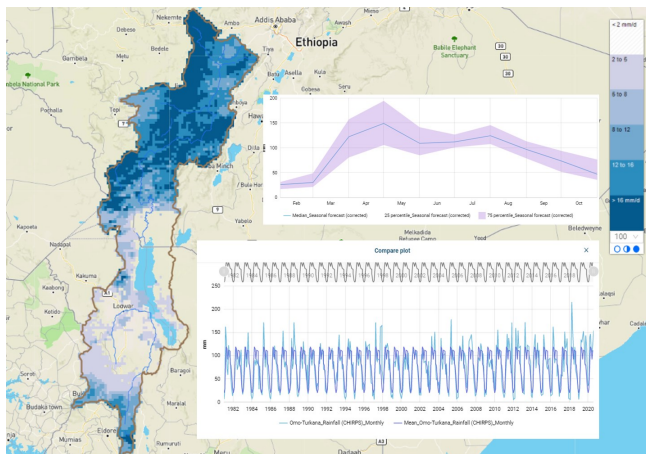
TRANSBOUNDARY MONITORING OBSERVATORY

The Transboundary Monitoring Observatory (TMO) portal is available for all stakeholders and decision makers in Ethiopia and Kenya and contains a total of five different applications: Data Monitor, Root Cause Analysis, Indicators, Planning and Documents.

DATA MONITOR

The Data Monitor application is a free repository of over 130 global spatially distributed satellite and monitoring datasets for the Omo-Turkana Basin. The Data Monitor application was developed to ensure that any user will always have a basic dataset available for planning related to water resources, drought or flood management.

While most of the datasets are global, some local and point datasets specific to the basin are also included. Most of the datasets are continuously updated in near real time and can be displayed in several different ways, including maps, time series (daily, monthly, and long-term mean), ensemble plots and column charts.



Example of a snapshot of gridded daily satellite rainfall from the TMO on 18 July 2020 from the CHIRPS (Climate Hazards Group InfraRed Precipitation with Station data) historical dataset covering the period from 1981 to near present. A seasonal rainfall forecast is also included.

A detailed description of each dataset including spatial and temporal resolution, data period and source is included in the portal. The raw data itself can also be downloaded from the portal in various formats including CSV and NetCDF.

DATASETS

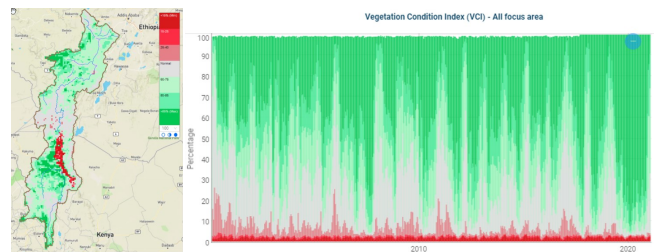
The Data Monitor includes climate variables, climate forecasts, climate change projections, drought related and flood related indices, as well as physical and socio-economic data. The datasets include measured climate and hydrological variables, as well as derived flood and drought indicators. The Data Monitor provides a comprehensive overview of the current and past state of the climate and hydrological conditions in the basin, but also vegetation conditions, land cover and ecosystem services.

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For more information and access to the Data Monitor, visit: www.omoturkana-tmo.org

BASIN MONITORING AND PLANNING

The Data Monitor has been used in a series of workshops throughout the project with key stakeholders, assessing the state of the basin using various indicators, identifying hotspots and determining some of the root causes of degradation in the basin.



Map and column plots of the Vegetation Condition Index (VCI) from the TMO produced by the NASA Earth Observations System (NASA/EOS) program. The VCI indicates where the observed state of vegetation falls between the extreme values (minimum and maximum) in previous years. Lower and higher values indicate bad and good vegetation state conditions, respectively.

The datasets in the Data Monitor are not only useful for monitoring the state of the Omo-Turkana Basin but have also been used as a basis for undertaking hydrological and water resources modelling. Various datasets from the portal including climate, hydrological and climate change data have been used for the development of a MIKE HYDRO Basin model for evaluating a number of different potential environmental rehabilitation measures in the basin, also taking account of future climate change. The inputs and much of the calibration data for the model are based on the satellite data from the Data Monitor. This illustrates how useful the portal is for planning in areas with otherwise limited data availability.

TOWARDS TRANSBOUNDARY COLLABORATION

The water resources model results have been used in the Planning application, which is also available from the TMO portal, for comparing different management scenarios for the basin. What this analysis has clearly shown is that transboundary dialogue and discussion will be necessary to balance the different water uses in the basin including hydropower production, agriculture, domestic supply and fisheries, while at the same time preserving a healthy lake environment for future generations. Access to basin-wide high-quality data as well as modelling results based on this data presents a starting point for informed discussions and transboundary decisions.