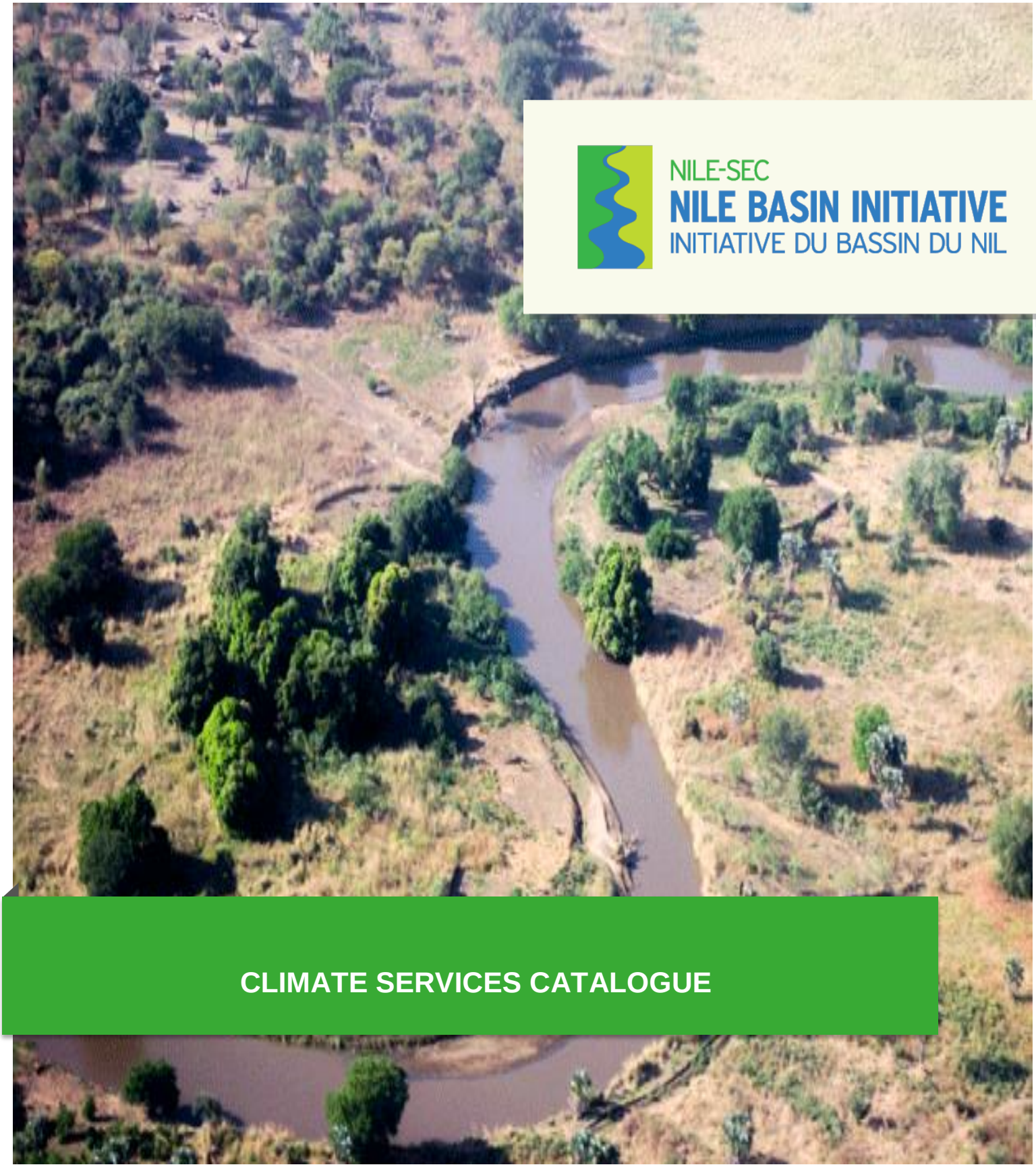


NILE-SEC
NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

CLIMATE SERVICES CATALOGUE

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
of the Federal Republic of Germany

EXECUTIVE SUMMARY:

The Nile Basin Initiative approved in 2013 its Climate Change Strategy (CCS) with the overall goal to strengthen basin – wide resilience to climate change and ensure climate compatible water resource management and development.

In its efforts to implement the CCS 2013, and with a view to strengthen NBI's role as a Climate Service Provider the Climate Service Catalogue (CSC) has been developed. It represents a searchable collection of service oriented and demand-driven climate service products provided by the NBI to support decision making, capacity and resilience building in climate services within the countries of and/or region of the Nile Basin. The aim of climate services is to assist individuals and organizations in society with climate information to make improved decision-making. This requires appropriate and iterative engagement to produce timely advisory that enables end-users to comprehend and aid decision making for early preparedness and eventual action. The CSC sheds light on NBI's existing Climate Services.

NBI's CSC products are part of the Climate Services Value Chain, where most of the products and services are aligned with hydrological and meteorological information systems, including observation and projection data products (raw input or model data); which may later be used for the development of other customized products which can address specific or multipurpose uses, either as per specific user type or location. Secondly, there are climate services products that exist to improve or enhance the usability of others such as forecasting, modelling products, etc. Still within the value-chain of these NBI climate services, there are products which are highly tailored or contextualized information products available to build capacity, support use and decision making among developers and intended recipients. Last but not least there are communication and outreach products such as the NBI website or the climate services portal which remain platforms for retrieving desired information and receive feedback.

This NBI's Climate Services Catalogue leads to the Climate Services Action Plan (CSAP) which provides priority action areas and activities that enable improvement of the existing services, identifying gaps and define complementary new services under the mandate of the NBI; as well as enhancement of use to other sectors. An example is the adoption of various digital platforms (e.g. social media) which are services that facilitate an easier and quicker way to communicate and disseminate data and information.

The NBI aims to provide climate services and/or facilitate networks of their associate National Hydrological and Meteorological Services (NHMS) bodies to further help coordinate the improvement and distribution of this catalogue. Likewise, cooperation with these national entities will ensure continuous update and validation; which will help accelerate the implementation of Climate Services (CS) at both national and regional levels.

Table of Contents:

Lists of Figures and Tables

List of Abbreviations

AP	Auxiliary Product
BMU	Ministry for the Environment, Nature Conservation and Nuclear Safety of the Federal Republic of Germany
CC	Climate Change
CS	Climate Services
CSAP	Climate Services Action Plan
CSC	Climate Services Catalogue
CSI	Climate Services for Infrastructure Investments
DWD	German Weather Service
DSS	Decision Support Service
e-Flows	Environmental Flows
ENTRO	Eastern Nile Technical Regional Office
GHACOF	Greater Horn of African Climate Outlook Forum
GIZ	German Development Cooperation
IGAD	Inter-Governmental Agency on Development
ICPAC	IGAD Climate Prediction and Application Center
IKI	International Climate Initiative
IKP	Integrated Knowledge Portal
NBI	Nile Basin Initiative
NELSAP	Nile Equatorial Lakes Subsidiary Action Program
NGO	Non Governmental Organisation
NHMS	National Hydrological and Meteorological Services
Nile-COM	Nile Council of Ministers
Nile-SEC	Nile Secretariat
PIEVC	Public Infrastructure Engineering Vulnerability Committee
ToR	Terms of Reference
RKH	Regional Knowledge Hub
UN	United Nations
WMO	World Meteorological Organisation

1. INTRODUCTION

This section of the CSC details background information with regards to the objectives and institutional structure of the Nile Basin Initiative (NBI) and its climate strategy. It further elaborates the methodology and expected benefits for the development of the NBI- Climate Service Catalogue (CSC).

1.1 Objective of the NBI- Climate Service Catalogue

The objective of the climate services catalogue is for the NBI to show its climate products and services in a systematic and centralized form. The catalogue is intended to serve as an easy reference by providing a clear and vivid overview on the climate service products that are readily available and/or planned by the Nile Basin Initiative. The CSC products and services range from the provision of information, data, software tools, to training resources and other products and services that enables the NBI and other potential users such as project developers, engineers, policy makers and researchers to keep record of what is available or planned and how it may be used to support at regional, national and sub-catchment levels. Specifically, the CSC aims at:

i. Providing a data and information portal in the public domain for access to and analysis of observations;
ii. Assisting in management, quality control and analysis of data and information; which should eventually lead to improved forecasts and predictions, for better decision making in the region;
iii. Supporting in the dissemination, education, training and capacity development in the Nile Basin; and
iv. Establishing the base for developing the Climate Services Action Plan (CSAP) which shall be a series of priority activities to either ease implementation of existing products or complete those under development or those which are still planned; while improving what already exists including their access to the eventual end-user.

1.2 Background on the NBI

The Nile Basin Initiative (NBI) is an all-inclusive basin-wide institution that was established in 1999. It is an intergovernmental partnership of 10 Nile Basin countries, namely: Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Rwanda, South Sudan, The Sudan, Tanzania and Uganda. Eritrea participates as an observer. The objectives of the NBI are to:

i) Develop the Nile Basin water resources in a sustainable and equitable way to ensure prosperity, security, and peace for all its peoples;
ii) Ensure efficient water management and the optimal use of the resources;
iii) Ensure cooperation and joint action between the riparian countries, seeking win-win gains;
iv) Target poverty eradication and promote economic integration;
v) Ensure that the program results in a move from planning to action.

The NBI institutional framework consists of three key institutions:

i) The Nile Council of Ministers (Nile-COM), which is comprised of Ministers in charge of Water Affairs in each NBI Member State, provides policy guidance and makes decisions. The council holds regular annual meetings as well as extraordinary meetings;

ii) The NBI Technical Advisory Committee is made up of senior civil servants and provides technical advice and assistance to the Council of Ministers. The committee is made up of one representative from each riparian country and one alternate. It meets two to three times a year.
iii) The NBI Secretariat (Nile-SEC) provides administrative support to the Council of Ministers and the Technical Advisory Committee. The Nile-SEC is responsible for the overall corporate direction. It is based in Entebbe, Uganda and is headed by an Executive Director.
iv) Two subsidiary programs are managed by the Eastern Nile Regional Technical Office (ENTRO), which is based in Addis Ababa, and the NELSAP Coordinating Unit (NELSAP-CU), which is based in Kigali, Rwanda. In addition, various projects have regional project management units located in different countries of the Nile Basin.

The Nile Basin is one of the most critical trans-boundary hydrological basins in Africa with the River Nile playing a crucial role and resource for most of the economic and social activities for the countries in Eastern and North-Eastern Africa. That said it is equally facing adverse effects of climate change which is expected to worsen in the future should little or no efforts be done to avert the current trends. Some of the associated challenges of the river basin include: drought and flooding, heavy siltation, deteriorating water quantity, diminishing water levels, etc. This is within the backdrop that the region has high population growth, strong emerging economies and huge demand for its water and environmental services; all which place an unprecedented demand on these resources within the basin. Nevertheless, the Nile Basin Initiative, together with its partners is leading the adaptation against climate change and mitigation (through a low-carbon development path).

1.3 The Climate Service Catalogue nested in NBI's Climate Strategy

The NBI developed a Climate Change Strategy in July 2013 focused on trans-boundary water resources management as a strategic element of climate adaptation and low carbon development in the region. It integrates key strategic plans and activities of the NBI sub-programmes and provides a broader framework for action; one of which is through the implementation of climate services. This is provided for under Output 1.

Output 1: A NBI climate change service function is established

The NBI Secretariat is supporting riparian states on demand in their efforts and actions on climate change adaptation and mitigation. This includes provision and sharing of information and technical support through a Regional Knowledge Hub (RKH), a shared data base on projects and initiatives in the region, an expert roster, the development of joint methodologies and analytical tools, and the targeted use of Decision Support Service (DSS) components to improve predictions on climate change impacts.

The Strategy has since been approved by the NBI governance and serves as the overarching guiding document for NBI's efforts to support member countries in climate change adaptation. The strategy does provide for the provision of climate services in one of its results areas (as provided below) and in so doing, the NBI has embarked on developing a Climate Services Catalogue, Action Plan, and Workflow Manual as part of its climate services function. Considering that climate services are intended to provide climate information in a way that assists decision making by individuals and organizations, the NBI has since embarked on the development of a Climate Services Catalogue which should facilitate appropriate

engagement with an effective access mechanism that responds to user needs. The climate services catalogue has thus been developed as a central hub where NBI products and services may be listed for easy reference and use. The catalogue lists a number of different climate service products that broadly cover the value chain of climate services from hydrological and meteorological systems which measure and record data to those that are used in hydrological modelling, forecasting and scenario development. Furthermore, the services also have products which support decision making, provide communication & outreach and lastly user support & training. These products or services are at different stages of use or development and as such, they are listed as those that already exist or are planned; yet some of the ones that do exist may need special permission from mostly in-country partner agencies (NHMS) to be accessed.

1.4 Outcomes & Benefits of the Climate Service Catalogue

The CSC has enhanced the understanding of climate services within the Nile Basin region and provides NBI a systematic analysis of products and services readily available (or planned) for the benefit of the basin countries. More specifically, this study has contributed to an enhanced understanding of the available (and planned) climate service provided by the NBI while indicating those under development and suggested areas of improvement for example missing data and information that is needed to be compiled for further advancement of products. The CSC also suggests a number of important findings that help the NBI to communicate its work to various stakeholders; this is possible through such structured work in standardized formats that help external parties and end users retrieve information from various NBI platforms.

1.5 Methodology

To get to this Climate Services Catalogue, several activities were initiated and have since been accomplished; these broadly fall under the following:

i. Review and use of the developed framework on climate services which was provided by the German Weather Services (DWD);
ii. Review all the climate data and information products prepared by NBI. Several background documents were scoped and shared with regional stakeholders for consultation and validation;
iii. Streaming knowledge gained in Public Infrastructure Engineering Vulnerability Committee (PIEVC), climate proofing guideline, and risk assessments (The NBI together with GIZ have implemented the project-Climate Services for Infrastructure Investments. This has enhanced the use of climate risk assessment information in planning and climate proofing of infrastructure within the region);
iv. Align with a landscape of pre-existing key NBI policies, strategies and guidelines like environment flow (e-flow) and climate change strategies; and also complement national efforts of NBI member countries.

2. FRAMEWORK FOR CLIMATE SERVICES FOR THE NBI

This section does contain information on the concepts and value-chain behind climate services and how it relates to the NBI as a climate service provider and broadly on the extent of climate services in the Nile Basin Region.

2.1 Concept and dimensions of Climate Services

According to the World Meteorological Organization (WMO-2014), Climate Services is "Providing climate information in a way that assists decision making by individuals and organizations; a service requires appropriate engagement along with an effective access mechanism and must respond to user needs."

This therefore requires appropriate and iterative engagement to produce timely advisory that enables end-users comprehend and aid decision making for early preparedness and eventual action. As illustrated by **Figure 1,** the service-value chain does move iteratively from: Observation and Monitoring, to Projections & Climate Impact modelling, then Climate Information & Data Platform and finally to User-interface (co-design and capacity development); meaning that Climate Services are always end-to-end (all steps from data to decision-making) products which should be **ready to use** with due consideration of **user needs.**

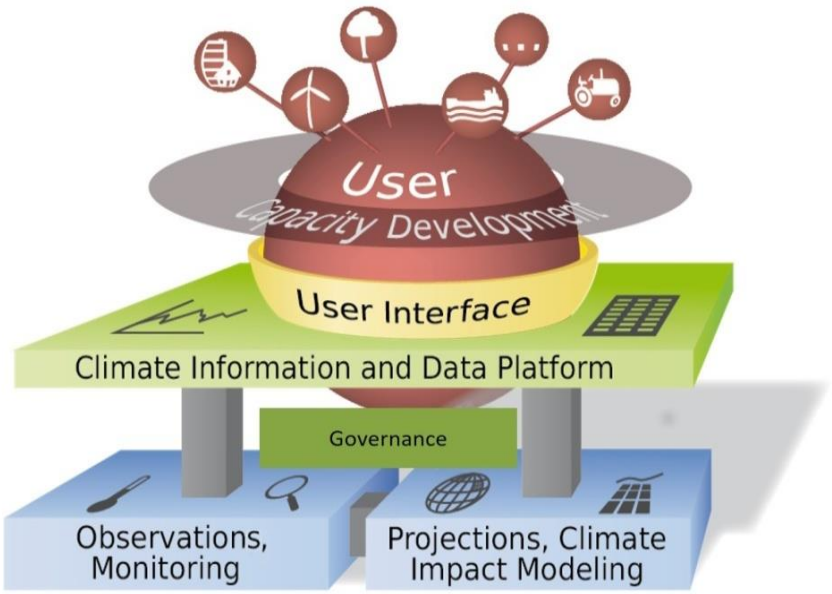


Figure 1: Key Pillars of Climate Services (adapted from DWD 2016)

Climate services are of three dimensions: - technical, service and institutional as illustrated by **Figure 2**. The technical dimension turns data into useful information by tailoring of the data. The service dimension turns useful information into a usable climate information product by tailoring the presentation and format of the information as well as providing user-specific support and advice. The institutional dimension provides the institutional framework within a co-production of climate services can be realized by the cooperation of climate information providers and users.

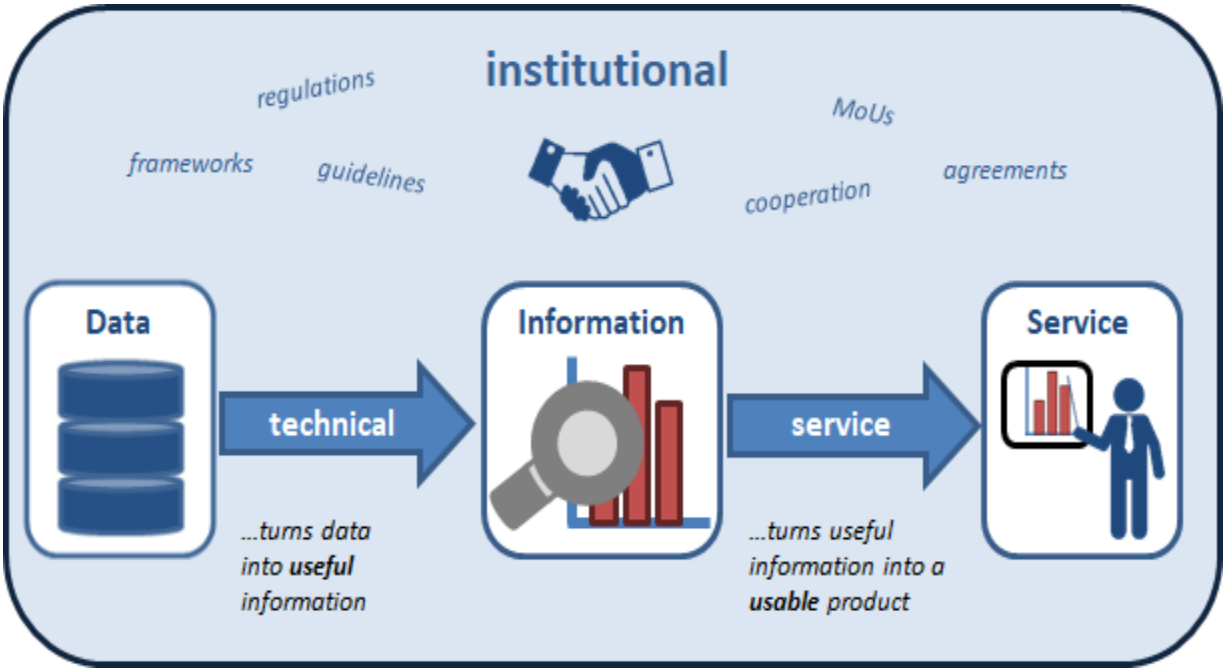


Figure 2: *The Three Dimensions of Climate Services.*

2.2 Climate Services Value Chain

From the above understanding the dimensions of climate services, a CS product does not only need technical input but also needs to focus on the provision, communication, and advice on climate information, as well as the interaction with users and other stakeholders. Hence, the governance of climate information production and provision plays a major role. From this point of view, a climate service product needs to be considered in most cases as a joint product of several stakeholders that requires cooperation and coordination in order to produce added value to users and – therefore – be ready to use in what would be regarded as its value chain.

Therefore the **climate value chain** describes an end-to-end climate information production cycle that "is characterized by one or several steps of value-adding which might be tailoring of data or provision of information and services, etc. to make climate information usable" (GIZ 2018:19). These steps are performed by various stakeholders, characterized as climate information providers (blue box), intermediates (green box) and end-users (orange box), see **Figure 3.** The figure further illustrates how stakeholder types are subdivided by sub-types with specific stakeholders (colored area) as well as their functions regarding climate service development and provision (grey area) (GIZ 2018, modified from WMO-2018).

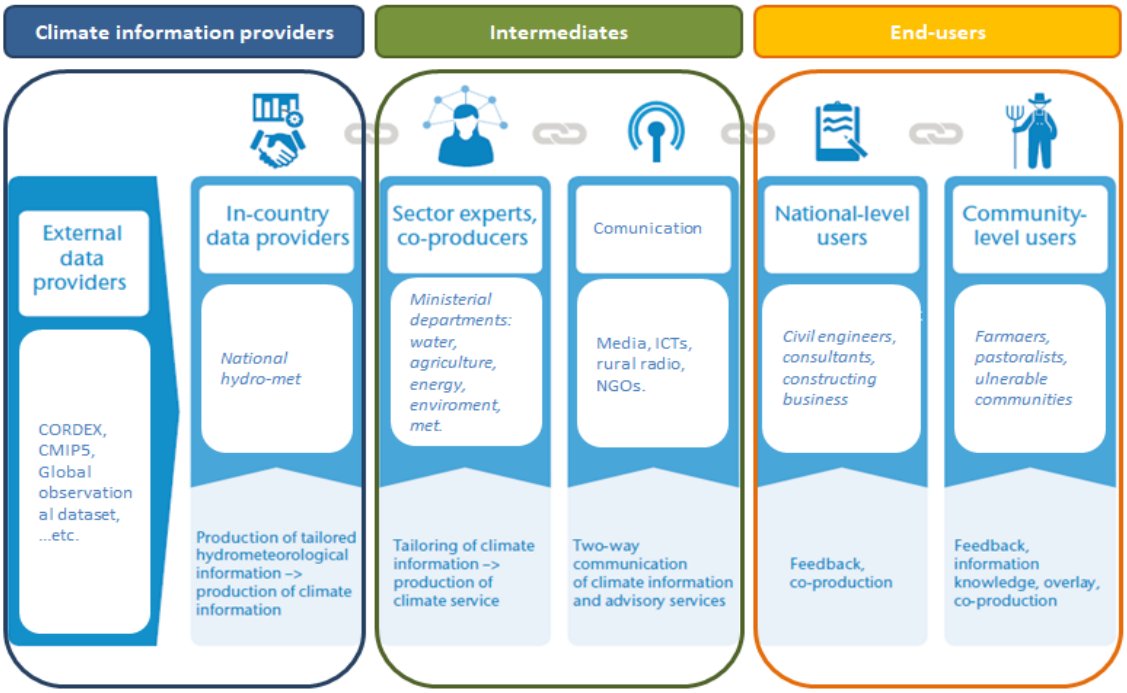


Figure 3: *Presentation of Climate Service Value-Chain.*

2.3 Role of NBI as Climate Service Provider

The NBI has the potential to take a classic role of an intermediate climate service provider regarding hydrological issues at a regional level. In this context, the NBI may potentially take several tasks that enhance the provision of climate services for water sector, these may include:

- Establishment of a regional hub for trans-boundary climate information and knowledge by pooling regional data within a central data and information portal;
- Provision of added-value products for the water sector on the regional level;
- Provision of methods, support, guidance and training for climate change adaptation;
- Communication and dissemination of climate change knowledge and application options;
- Moderation of provider-user exchange;
- Tendering and coordination of research and adaptation projects;
- Acquisition of project funding; and
- Provision of targeted climate services that offer a variety of choices to the institutional decision maker and the intended end-user.

2.4 Climate Services in the Nile Basin Region

The NBI as a trans-boundary water management platform is well equipped to play a main role as an intermediate CS provider for hydrological issues at the regional level. Such a role would center the NBI to facilitate and coordinate user needs and interests with NMHSs and regional organizations which provide climate data and information for the water sector. This helps to fill the prevalent and critical gap within the climate-value chain and interlink primary providers of climate data and basic products. The NBI thus adopts the role as intermediate and knowledge broker in the climate-value chain and as a sectoral

champion for the water sector on a regional level. As sectoral champion, the NBI can support the work of the NMHSs on adaptation to climate change within the water sector by taking part in the development of tailored CS products for the water sector and by using its collaborative role in calling for policy change to free and open data sharing within the basin among others. Other central roles may include:

- The provision and guidance on relevant and appropriate climate projections for hydrological issues in the Nile basin;
- The provision of climate services relevant sectoral planning and design e.g. for infrastructure, farming, irrigation, etc;
- The guidance on appropriate methods on risk assessment for water resource development in the Nile basin; and
- The provision of support to countries to access climate funding.

Therefore in order to fulfill these roles, existing technical resources and capacities, as well as climate information products developed for CS provision shall be considered. This involves a strong cooperation with NMHSs of the partner countries as well as regional and international organizations, especially the Greater Horn of African Climate Outlook Forum (GHACOF). GHACOF is hosted by IGAD Climate Prediction and Application Center (ICPAC) and is already quite active in the provision of CS products for the region.

In this regard, the climate services provided by the NBI have been listed into the NBI Climate Services Catalogue: this includes those which are either readily available and in use, and those that are under development or planned. It must be noted that some auxiliary products have been highlighted to show how they support the development of existing products. The CSC list of products and services will become the framework upon which the action plan shall be developed to bring together different knowledge sources and experiences to develop new services, improve existing services and plan well for future services to support better decision-making and increase end-user outreach.

3. THE NBI CLIMATE SERVICE CATALOGUE PRODUCTS

The climate service catalogue consists of eight (8) readily available products and five (5) products under development or planned. These products may be broadly classified as: Hydrological and Meteorological Products, Climate Change and Hydrological Scenario Products, Tailored Hydrological Modelling and Forecasting Products, Decision-Support Tools, Climate Service Communication & Outreach Products and User Support & Training Products.

These products have been listed in **Table 1** and the information contained therein include: the product/service code (PX or APX-where P or AP is Product and the X denotes a number), product name and description, the access in terms of format (e.g. modes of purchasing and storage format) and the primary provider within the NBI, the purpose of product and targeted audience (e.g. the specific areas of use). It also includes the current status of the product in terms of whether it is readily available or simply under development or planned. More information about each product has been included into a product poster (see Annex) but generally, each product poster which has been provided has similar information as above but only expanded in some cases to include among others: the Title, a Photo Representation, the NBI Logo, Product Category and Purpose, Value-Chain Category and Purpose, Characterization & Functionality, Target Audience, System set-up or input, Similar Category or Interlinked NBI products, Availability and access, and the Provider & their Contact.

Table 1: *Overview on the available NBI Climate Service Categories and Products*[1]

Code	Products	Brief Description	Access & Format	Targeted audience	Product Purpose or use	Provider & Status of service
P1.	Nile Basin Hydrological Bulletin	This is a quarterly bulletin of spatial distribution of monthly and seasonal components of the water cycle such as rainfall, actual evaporation, water levels, and comparison with historical average in the Nile Basin sub-basins using global observational dataset and satellites data observations (such as "The Nile Basin Satellite Observations"). The soft copy of the processed data is also available.	Bulletin (Publication); ● Email (nbisec@nilebasin.org) and Google drive ● NBI website (http://115.124.114.193:8100/ikp/en/knowledge-repository	Reservoir, spillway and dam owners & managers, underground /borehole owners; Disaster risk (Flood and drought warnings) managers; Water resources planners etc.	To provide an overview of the hydrological conditions for a featured period; these may include or be for: triggering drought and flood concerns, report in groundwater levels, streams and rivers levels, model agricultural stress, provide soil moisture deficits, replenishment of reservoir stocks and forecast on transport disruption etc.	The service is readily available and held with Nile-SEC
AP1.	Nile Basin Regional Hydrological Monitoring Network	Although these are not within the scope of NBI climate services, they are networks that belong to member states but are shared with the NBI through cooperation agreement. These are hydrological monitoring networks which do generate near real time flow and river level data on selected gauging stations of the Nile and its sub-basins	Infrastructure (installations) ● NBI website (https://nilebasin.org/) ● Each riparian countries institutional website	National Meteorological and Hydrological Services; Hydrological product developers, Universities and research organisations	Collection and transmission of hydrological time and data series; Use of hydrological data in the planning, design and operation of water-resources projects, and the cost-effectiveness of the information through socio-economic analysis, theories of probability, sampling and optimization, etc.	The services is readily available although it needs individual country permission

[1] *(See Annex with each product/service detail)*

Code	Products	Brief Description	Access & Format	Targeted audience	Product Purpose or use	Provider & Status of service
AP2	Nile Basin hydro-meteorological data series	These are historical hydro-meteorological data from different projects although they are not specifically within the scope of NBI climate services, the networks belong to member states but are shared with the NBI through cooperation agreement. These shall be provided under the Decision Support System and as hydro-met data series	http://115.124.114.193:8100/ikp/en/hydromet-component	National Meteorological & Hydrological Services; Meteorological product developers (e.g. forecasters, predictors etc), Universities and research organisations; Agronomists, transport officers,	Collection and transmission of meteorological time and data series for daily, monthly and seasonal weather and climate forecasting and prediction; but also planning, design and operation of water-resources related projects.	The services is readily available although it needs individual country permission
P2	Climate Change Scenarios for the Nile Basin	These are climate change scenarios within the Nile Basin with bias corrected Global Climate Models and Regional Climate Models into future climate change projection data, downscaled GCMs data, and information for the Nile basin which is essential for planning the management of water resources and climate impact study in the water sector. On call service for specific catchment and also as a guidance document on the ways of statistically	Bulletin (Publication); ● NBI website (https://nilebasin.org/) As NBI technical report ● http://115.124.114.193:8100/ikp/en/knowledge-repository	Water Resources planners, hydropower production and irrigation water release experts, Agricultural water suppliers,	This provides guidance of climate change scenarios within the Nile Basin used to assess the potential impacts of climate change on the hydrology and water resources of the Nile River basin through variability and implication in the magnitude, direction, and seasonality of projected precipitation changes and stream flow as affected by temperature changes. The data is drawn from 34 Global Circulation Models and 18 regional climate models, and evaluated and ranked based on their performance over each of the 10 sub-basins. Also	The service is readily available and held with Nile-SEC

Code	Products	Brief Description	Access & Format	Targeted audience	Product Purpose or use	Provider & Status of service
		downscaling and bias correcting climate change scenarios data for sub-basins of the Nile Basin and generally climate change projections data for the Nile Basin to the different types of users. Relatively high resolution data may be provided upon request from Nile basin institutions.			data and information dissemination portal to be established which will be essential for planning the management of water resources and climate impact study in the water sector.	
P3	Hydrological scenarios for the Nile Basin	This is a hydrological dataset for the development and provision of different hydrological scenarios of the Nile Basin under a range of climate change projections scenarios. It is also an analytic service to provide processed data for specific areas upon demand by end users. This is essential for planning and management of water resources including the study of climate impacts on the water sector.	Bulletin (Publication); ● NBI website (https://nilebasin.org/) ● It is planned to be disseminated through the IKP	Reservoir, spillway and dam owners & managers, Underground /borehole owners; Disaster risk (Flood and drought warnings) managers; Water resources planners etc.	Based on climate change projections from five regional climate models, different scenarios of hydrology of the Blue Nile and White Nile sub-basins have been generated and disseminated in the form of data and information, and therefore a better understanding of the Nile Basin under future climate change scenarios.	The service is readily available and held with Nile-SEC;
P4	Flood early warning for Eastern Nile	These are flood early warning products and other related information such as operational extreme flood forecasts for the Eastern Nile sub-basins.	Electronic e-publication developed by ENTRO ● http://entro.nilebasin.org/) and email ● http://115.124.114.193:8100/rm	Reservoir, spillway and dam owners & managers; Disaster risk (Flood and drought warnings) managers; Water	The service provides flood data and (quality, relevant, accurate & useful) information. The data is generated through hydrological and hydrodynamic modelling; although limited in scope, it does have user and/or problem-specific products which are aggregated and contextualized to serve flooding c	The service is readily available and held with ENTRO

Code	Products	Brief Description	Access & Format	Targeted audience	Product Purpose or use	Provider & Status of service
			si_nile-basin/en/flood-monitoring ● (entro@nilebasin.org)	resources planners etc.	problem in the Eastern Nile	
P5	Nile Basin River Flow forecasting system.	This is a hydrological service-decision support tool for providing daily and seasonal forecasts flow at 80 selected locations and forecasted rainfall over sub-basins to help with water resources operations and management in the Nile Basin. Agricultural and hydropower information are also available. Forecast could be sent to selected emails.	Bulletins (Publication); ● NBI website (https://nilebasin.org/) ● http://115.124.114.193:8100/rmsi_nile-basin/en/flood-monitoring ● http://13.80.108.118/ ● Email: nbisec@nilebasin.org	Water Authorities; Reservoir, spillway and dam owners & managers, Underground /borehole owners; Disaster risk (Flood and drought warnings)	Forecasts of future river conditions are produced routinely for a large number of sites in real time so that hydrometric data and information is acquired for co-ordination of action and interaction within the system or between users. It will also involve software application, including conceptual and mathematical models in order that timing and severity of flood conditions may be predicted and information products developed to design specifications of the Nile Basin. They shall be standardized climate & hydrological information such as short to long range river flow forecast system. Short range (up to 10 days lead time) and medium to long range (season) river flow forecast systems.	The service is planned and to be held with Nile-SEC;
P6	Drought forecasting system	This is to provide drought early warning and other related information such as operational extreme drought forecasts for the Eastern Nile sub-basins. Bi-weekly bulletin.	https://www.floodroughtmonitor.com/home http://115.124.114.193:8100/rmsi_nile-basin/en/flood-monitoring	Dam operation and irrigation specialist; dam owners; Disaster risk (drought warnings) managers; Water	The service provides drought data and information (quality, relevant, accurate & useful). The data is generated through hydrological, weather and climate modelling; it does have user and/or problem-specific products which are aggregated and contextualized to serve specific	The service is planned and to be held with Nile-SEC & ENTRO;

Code	Products	Brief Description	Access & Format	Targeted audience	Product Purpose or use	Provider & Status of service
				resources planners etc.	locations within the Nile Basin where: Seasonal forecast for drought forecasting by suitable indices for hydro and met drought; drought indicators in near real-time and for seasonal forecasts including precipitation based indices, soil moisture indices, hydrological indices; and Web mapping of summary statistics and o other capability to view drought indices result and to generate drought bulletins	
P7	Climate proofing guidance hub for infrastructure and basin planning.	This tool will provide a step by step guidance for climate proofing of water related infrastructure in the Nile Basin. It provides orientation for project developers, designers and operators for the integration of climate change in planning, designing and operation of water related infrastructure into NBI's Project Cycle. The guideline focuses on investments (project level) in the water sector, including both planned and already existing projects. The guideline can be used for a wide range of water sector projects such as flood protection infrastructure, water supply and/or sanitation systems, irrigation and hydropower.	Bulletins (Publication); ● NBI website (https://nilebasin.org/hub)	Flood protection managers; Risk assessment and project managers; Regulators and funders of infrastructure systems such as water supply and/or sanitation systems, irrigation and hydropower, etc;	The user is guided step-by-step through the process of the risk assessment (i.e. risk assessment, risk treatment and monitoring and evaluation) for the relevant stage of the NBI project cycle (i.e. project identification, preparation, resource mobilization, implementation operation). Instructions and hints are provided on the selection of appropriate data and methods to be applied for specific analysis. The output is a completed risk assessment of the infrastructure object/system of concern comprising the current and future risk of critical components as well as recommendations on adaptation. This information is the basis for the integration of climate change in: the process of planning, designing and operation of specific	The service is planned and held with Nile-SEC

Code	Products	Brief Description	Access & Format	Targeted audience	Product Purpose or use	Provider & Status of service
					water infrastructure objects; Sectoral basin planning and regulation and funding of infrastructure systems.	
P8	Nile Basin Decision support tool	The Nile Basin (DSS) is an analytical tool to be used as a framework for understanding river system behavior, evaluating alternative development and management strategies, and supporting informed decision making.	Web interface, Software and Bulletins (Publication); NBI website (https://nilebasin.org/) Online licenses available for NB stakeholders. DSS Web service: https://watertools-portal.azurewebsites.net/portal/login/users/b20361a5-d080-4c39-9580-c7fafdbee650	Water resource planners, Institutional managers, Policy makers,	The DSS is a computer-based platform designed to meet the requirements of complex water resources planning with a diverse set of tools for data processing, modelling, scenario management, optimization and multi-criteria decision making with special consideration of quality, relevance, applicability, etc. It offers tools for integrating environmental, social and economic objectives thus greatly facilitating multi-sector water resources planning at river basin level. It is a generic system that can be applied at different scales – at national as well as trans-boundary levels. It can be installed both within an institutional setup, thereby allowing multiple access to its central database and toolset, and also as a standalone solution.	The service is readily available as online licenses and held with Nile-SEC although the web service is planned.

Code	Products	Brief Description	Access & Format	Targeted audience	Product Purpose or use	Provider & Status of service
P9	Climate Service portal	This is a planned climate service channel through which others services can be held within one portal for multiple purposes including communication and outreach. The portal shall be developed by the NBI and integrated in IKP	Web interface, Software ● NBI website (https://nilebasin.org/) ● http://115.124.114.193:8100/ikp/	Water resource planners; Institutional managers; Policy makers; researchers and academia; infrastructure operators and developers etc.	Although it is not yet functional, It is expected to be integrated with IKP where there will be ease to download data, data and information visualization components through web development etc.	The service is planned and will be held with NILE-SEC, ENTRO
P10	Policymakers & Technical Experts Awareness-raising Products	These are communication and outreach products to inform targeted groups for example policy and/or technical experts associated with or working within the Nile Basin, which may include: State of Basin Report (SOB) and the Nile Basin Atlas	Publications (Reports, briefs, videos, etc).; media; etc ● NBI website (https://nilebasin.org/) ● Announced via email with shared links on Google drive e.g. http://nbi20.nilebasin.org/	Policy makers; technical experts; decision makers; regulators, cooperation frameworks etc.	Depending on the target audience, a policy brief would be of max. 4-6 pages of document on the result of translating results of the NBI research and analysis work on climate services in the NBI countries; while for technical experts would be reports of various uses, relevance, access, facts, adequacy, importance, clarity, etc. Other examples may include: State of Basin Report (SOB), Nile Basin Atlas, etc. It shows the range and complexity of the programmers and activities undertaken over the years as well as some of the major outcomes while proposing what lessons can be drawn to feed into future cooperation.	The service is readily available and held with Nile-SEC;
P11	Capacity building	This is training for strengthening capacity of Nile Basin national experts on water resource management and climate change	Training courses ● NBI-website (https://nilebasin.org/) and	National experts, consultants and NBI staff	Formats of learning and training for staff and users in order to be able to provide or use the available services that mainly focuses on hydrological	The service is readily available and held

Code	Products	Brief Description	Access & Format	Targeted audience	Product Purpose or use	Provider & Status of service
		adaptation. It is a dissemination platform of the Nile DSS mainly using the electronic platform for information management, analysis of water resources, internal learning and also tailor made face to face training.	email • Web interface and online instructors; Register, Login and enroll for the NBI induction; Training; software tools;		and flood modelling and climate change scenario selection and analysis	with Nile-SEC;

4. CONCLUSIONS AND RECOMMENDATIONS

The NBI product portfolio on climate services consists of eight (8) readily available products and another five (5) products that are either under development or planned. Two (2) of the readily available products may be classified as auxiliary products which are needed in the development or continued operationalisation of some of the existing products. The services portfolio has been summarized in tabular form **(Table 1**); with each product given more detail and presented in poster form. The products and/or services have been grouped or categorized as: Hydrological and Meteorological Systems, Climate Change and Hydrological Scenarios, Hydrological Modelling and Forecasting, Decision-Support Tools, Climate Service Communication & Outreach, and User Support & Training.

The NBI CS-products portfolio and categorization does fit relatively well within the climate services value chain with some products serving simply as raw or model data which is used as input to develop other products for multipurpose use or tailoring them for specific use. Others are there to address specific user needs or may be aggregated and contextualized into different climate & hydrological information to serve a specific problem or tailored for a specific user type and location. It is also noted that there is a variety of products and services used to enhance usefulness and usability; such as to turn data into information, support the process of tailoring and contextualizing in order to get user problems and specific climate information. Lastly, the climate services catalogue shall improve on outreach and awareness of available products but also to identify areas that are lacking and need improvement; and this may be done through the Climate Services Action Plan. For example, the NBI will need to adapt to various digital platforms (e.g. various social media platforms) beyond its current website to facilitate the sharing of data and information including facilitating an easier and quicker way to get information out there to the end-user; although for this particular CS catalogue, the website remains an able platform to get out the desired information.

The NBI climate services catalogue should harness (in collaboration with NHMS) opportunities presented by these products while working on limiting the challenges. Herein is what is recommended going forward:

- *The NBI should use the services and/or networks of their different associate national bodies (especially the NHMS) to further help coordinate the compilation, production, proof reading and distribution of the catalogue but equally, the national entities shall be tasked with ensuring that the data and information used to produce the catalogue is continually up to date and authenticated; which will help accelerate the implementation of CS at regional and national levels. This would also encourage co-production of similar areas of work to improve quality, distribution, data and information sourcing, etc;*

- *Increase specific application of products to different user groups and locations by exploring various options to tailor the products to specific user type and location;*

- *Improve on costumed tailored information for other specific applications and multipurpose use by exploring other ways of knowledge and use transfer beyond the current means presented by the available products;*

- *Provide justification for the application of a given CS product with visible results to a particular user or location etc such that such a user sees improvements in decisions as a result of using a said CS product;*

- *To optimize the full functionality of hydrological monitoring systems by ensuring the network meets the required networks density, operational standards and also operating well;.*

- *Increase reliability and performance of the data from Nile Basin Hydrological Monitoring System by enhancing the process of turning data into information to ensure that the data collected and stored meet standard data formats, quality and quantity levels, etc; and also that there are standard guidelines and workflows, tools, scripts, etc. to ensure proper use;*

- *To optimize the full use of possibilities within this product range of hydrological monitoring system by understanding current use and then widening scope of use; and*

- *To proceed to develop the Climate Services Action Plan and Workflow manual as a follow-up to this Catalogue such that some of the above recommendation may come to fruition.*

5. REFERENCES

GIZ (German Development Cooperation-2018), https://www.adaptationcommunity.net/download/climateinformation/Report-Climate-Services-Germany-Carolin-Frisch.pdf

GFCS (Global Framework for Climate Services-2009), http://www.gfcs-climate.org/what-are-climate-services/

NBI (Nile Basin Initiative-2013), Climate Change Strategy in 2013, https://nilebasin.org/transboundary-policies/49-climate-change-strategy/

WMO (World Meteorological Organization -2014), Climate Services for Supporting Climate Change Adaptation, https://library.wmo.int/doc_num.php?explnum_id=7936

WMO (World Meteorological Organization -2018): Step-by-step Guidelines for Establishing a National Framework for Climate Services. Geneva, Switzerland. http://www.wmo.int/gfcs//step-by-step-guidelines-nfcs .

6. ANNEX (PRODUCT AND SERVICE POSTERS)

Table 2: *The Nile Basin Hydrological Bulletin*

THE NILE BASIN HYDROLOGICAL BULLETIN **Product No.** *P1*

NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

Product Category: *Hydrological and Meteorological Systems*

Product/Services Status: *Readily available*

Provider & Contact:

Nile-SEC, Entebbe, Uganda
Tel: +256 (414) 321 424 /
Email: nbisec@nilebasin.org

Product or Service Description:

This quarterly bulletin of spatial distribution, monthly and seasonal monitoring of some of the components of the water cycle such as rainfall, actual evaporation, water levels, and comparison with historical average in the Nile Basin sub-basins using global observational dataset and satellites data observations (such as "The Nile Basin Satellite Observations").

Soft copy of the processed data is also available; but also, stakeholders may send specific shape files for more detailed information or request the raw data and processed data.

Characterization & Functionality:

It provides an overview of the hydrological conditions for a featured period; these may include or be for: triggering drought and flood concerns, report in groundwater levels, streams and rivers levels, model agricultural stress, provide soil moisture deficits, replenishment of reservoir stocks and forecast on transport disruption etc. More specifically, It may provide spatial distribution analysis of seasonal patterns of the hydrological cycle for 10 major sub-basins of the Nile River basin and also an analysis of water levels in the large lakes in the Nile basin over the past three months as compared to the long term average. Data used in this bulletin and similar analysis for smaller catchments of interest can be made available or performed for you by the NBI upon request

Target Audience:

Reservoir, spillway and dam owners & manager; Underground /borehole owners; Disaster risk (Flood and drought warnings) managers; Water resources planners etc.

System Set-Up or Input:

- *Rainfall and actual evapo-transpiration data and models*
- *Collaboration with satellites owners for shared information etc.*

Similar Category and Interlinked NBI Products :

- *Climate change scenarios for the Nile Basin*
- *Hydrological scenarios for the Nile Basin*
- *Input: Nile Basin Hydrological Monitoring Network; Nile Basin hydro-meteorological data series.*
- *Output: Climate proofing guidance hub for infrastructure and basin planning.*

Availability And Access: *Bulletin (Publication);*

- *Email (nbisec@nilebasin.org) and Google drive*
- *NBI website (http://115.124.114.193:8100/ikp/en/knowledge-repository*
- *https://nilebasin.org/)*

Table 3: Climate Change Hydrological Scenarios for the Nile Basin

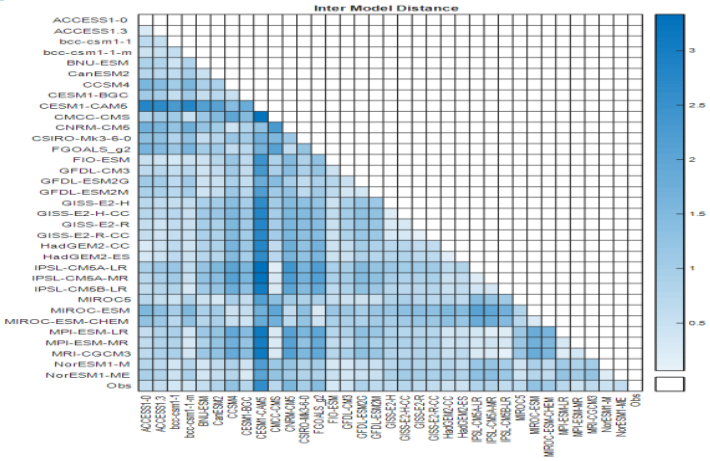
CLIMATE CHANGE SCENARIOS FOR THE NILE BASIN	**Product No. P2**
	NILE BASIN INITIATIVE INITIATIVE DU BASSIN DU NIL **Product Category:** *Climate Change and Hydrological Scenarios* **Product/Services Status:** *Readily available* **Provider & Contact:** *Nile-SEC-Entebbe, Uganda* *Tel: +256 (414) 321 424 /* *Email: nbisec@nilebasin.org*
Product or Service Description: *This provides guidance of climate change scenarios within the Nile Basin with bias corrected Global Climate Models and Regional Climate Models into future climate change projection data, downscaled GCMs data, and information for the Nile basin which is essential for planning the management of water resources and climate impact studies in the water sector. On call service for specific catchment and also as a guidance document on the ways of statistically downscaling and bias correcting climate change scenarios data for sub-basins of the Nile Basin and generally climate change projections data for the Nile Basin to the different types of users.* *Also, stakeholders may request bias corrected RCMs data, GCMs data and data over a specific region.*	**Characterization & Functionality:** *Assess the potential impacts of climate change on the hydrology and water resources of the Nile River basin through variability and implication in the magnitude, direction, and seasonality of projected precipitation changes and stream flow as affected by temperature changes. Bias corrected and statistically downscaled data of climate change scenarios are prepared for the Nile Basin and available for use at national and regional levels. The data is drawn from 34 Global circulation models and 18 regional climate models. The GCMs were evaluated and ranked based on their performance over each of the 10 sub-basins. Relatively high resolution data may be provided upon request from Nile basin institutions. Also data and information dissemination portal to be established which will be is essential for planning the management of water resources and climate impact study in the water sector.*
Target Audience: *Water Resources planners, hydropower production and irrigation water release experts, Agricultural water suppliers,*	**System Set-Up or Input:** *Global circulation models data; inputs like bias correction and spatially downscaled 21st Century simulations.*
Similar Category and Interlinked NBI Products : • *The Nile Basin hydrological bulletin* • *Hydrological scenarios for the Nile Basin* • ***Input:*** *Nile Basin Hydrological Monitoring Network; Nile Basin hydro-meteorological data series.* • ***Output:*** *Climate proofing guidance hub for infrastructure and basin planning.*	**Availability and Access:** *Bulletin (Publication) & NBI technical report;* • *NBI website (*https://nilebasin.org/*)* • *http://115.124.114.193:8100/ikp/en/knowledge-repository*

Table 4: Hydrological scenarios for the Nile Basin

<table>
<tr><td colspan="2">HYDROLOGICAL SCENARIOS FOR THE NILE BASIN</td><td>Product No. P3</td></tr>
<tr><td colspan="2">  </td><td>NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

Product Category: Climate Change and Hydrological Scenarios

Product/Services Status:
Readily available

Provider & Contact:
Nile-SEC-Entebbe, Uganda
Tel: +256 (414) 321 424 /
Email: nbisec@nilebasin.org</td></tr>
<tr><td colspan="2">Product Purpose:
This is a hydrological dataset for the development and provision of different hydrological scenarios of the Nile Basin under a range of climate change projections scenarios. It is also an analytic service to provide processed data for specific areas upon demand by end users. This is essential for planning and management of water resources including the study of climate impacts on the water sector.
Also, Stakeholders may request projected flows in some selected node and request the model used in producing the data.</td><td>Characterization & Functionality:
Based on climate change projections from five regional climate models, different scenarios of hydrology of the Blue Nile and White Nile sub-basins has been generated and disseminated in the form of data and information, and therefore a better understanding of the Nile Basin under future climate change scenarios.</td></tr>
<tr><td colspan="2">Target Audience:
Reservoir, spillway and dam owners & managers, Underground /borehole owners; Disaster risk (Flood and drought warnings) managers; Water resources planners etc.</td><td>System Set-Up or Input:
Climate change scenarios, regional climate models outputs, and hydrology of selected basins of the Nile</td></tr>
<tr><td colspan="2">Similar Category and Interlinked NBI products :
The Nile Basin hydrological bulletin
climate change scenarios for the Nile Basin
Input: Nile Basin Hydrological Monitoring Network; Nile Basin hydro-meteorological data series.
Output: Climate proofing guidance hub for infrastructure and basin planning.</td><td>Availability and Access:
Bulletin (Publication);
NBI website (https://nilebasin.org/)</td></tr>
</table>

Table 5: Flood Early Warning for Eastern Nile

<table>
<tr><td colspan="2">FLOOD EARLY WARNING FOR EASTERN NILE</td><td>Product No. P4</td></tr>
<tr><td colspan="2">  </td><td>NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

Product Category: Tailored Hydrological Modelling and Forecasting Products

Product/Services Status:
Readily available

Provider & Contact: Eastern Nile Technical Regional Office (ENTRO); Addis Ababa, Ethiopia
Tel: +251 (0)116 461 130/32
entro@nilebasin.org</td></tr>
<tr><td>Product Purpose:
This is to provide flood early warning and other related information such as operational extreme flood forecasts for the Eastern Nile sub-basins.</td><td colspan="2">Characterization & Functionality:
The service provides flood data and information (quality, relevant, accurate & useful). The data is generated through hydrological and hydrodynamic modelling; although limited in scope, it does have user and/or problem-specific products which are aggregated and contextualized to serve flooding c problem in the Eastern Nile</td></tr>
<tr><td>Target Audience:
Reservoir, spillway and dam owners & managers; Disaster risk (Flood and drought warnings) managers; Water resources planners etc.</td><td colspan="2">System Set-Up or Input:
• Flood level and weather data
• Factors of exposure and location of vulnerabilities etc.
• Meteorological, hydrological and hydrodynamic modelling</td></tr>
<tr><td colspan="2">Similar Category and Interlinked NBI products :
• Nile Basin River Flow forecasting system;
• Drought forecasting system
• Nile Basin Decision support tool
• Policymakers & Technical Experts Awareness Products
• Climate proofing guidance hub for infrastructure and basin planning.
• Climate Service portal;</td><td>Availability and Access: e-publication
• http://entro.nilebasin.org/) and email
• http://115.124.114.193:8100/rmsi_nile-basin/en/flood-monitoring (entro@nilebasin.org)</td></tr>
</table>

Table 6: Nile Basin River Flow forecasting System

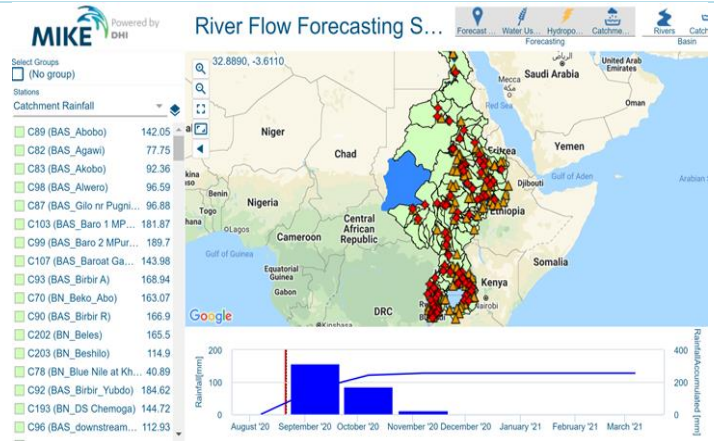
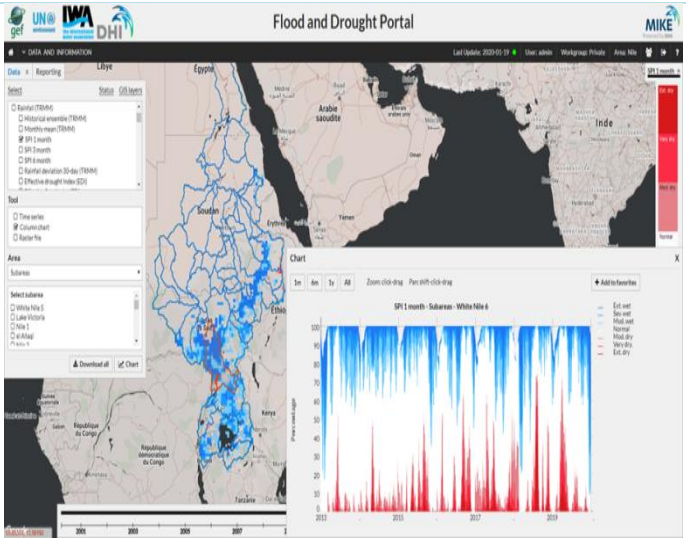
NILE BASIN RIVER FLOW FORECASTING SYSTEM.	**Product No.** P5
	**Product Category:** *Tailored Hydrological Modelling and Forecasting Products* **Product/Services Status:** *Service is Planned.* **Provider & Contact:** *Nile-SEC,-Entebbe, Uganda* *Tel: +256 (414) 321 424 /* *Email: nbisec@nilebasin.org*
Product Purpose: *This is a hydrological service-decision support tool for providing daily and seasonal forecasts flow at 80 selected locations and forecasted rainfall over sub-basins to help with water resources operations and management in the Nile Basin. Agricultural and hydropower information are also available. Forecast could be sent to selected emails.*	**Characterization & Functionality:** *Forecasts of future river conditions are produced routinely for a large number of sites in real time so that hydrometric data is acquired; in so doing co-ordination of action and interaction within the system to users are done. Equally although internally, flow forecasting from the centers is done using a remote system. It will also involve software application for conceptual and mathematical models in order that timing and severity of flood conditions may be predicted and information products developed to design specifications of the Nile Basin. They shall be standardized climate& hydrological information such as short to long range river flow forecast system. Short range (up to 10 days lead time) and medium to long range (season) river flow forecast systems.*
Target Audience: *Water Authorities; Reservoir, spillway and dam owners & managers, Underground /borehole owners; Disaster risk (Flood and drought warnings) managers*	**System Set-Up or Input:** *Typology of river flow forecast systems taking into account key factors, such as technologies used, data needs, flexibility, forecast information they generate, lead time. Etc. Comparative analyses on the advantages and disadvantages of the available river flow forecast systems, and data needs and availability.*
Similar Category and Interlinked NBI products : • *Flood early warning for Eastern Nile;* • *Drought forecasting system* • *Nile Basin Decision support tool* • *Policymakers & Technical Experts Awareness Products* • *Climate proofing guidance hub for infrastructure and basin planning.* • *Climate Service portal*	**Availability and Access:** Bulletins (Publication); • *NBI website (https://nilebasin.org/)* • *http://115.124.114.193:8100/rmsi_nile-basin/en/flood-monitoring* • *http://13.80.108.118/* • *Email: nbisec@nilebasin.org*

Table 7: Drought Forecasting System

DROUGHT FORECASTING SYSTEM	**Product No.** P6



NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

Product Category: *Tailored Hydrological Modelling and Forecasting Products*

Product/Services Status:
Service is planned

Provider & Contact:
Nile-SEC,-Entebbe, Uganda; Tel: +256 (414) 321 424 / Email: nbisec@nilebasin.org
Eastern Nile Technical Regional Office (ENTRO); Addis Ababa, Ethiopia; Tel: +251 (0)116 461 130/32
entro@nilebasin.org

Product Purpose:
This is to provide drought early warning and other related information such as operational extreme drought forecasts for the Eastern Nile sub-basins. Bi-weekly bulletin.

Characterization & Functionality:
The service provides (high quality, relevant, accurate & useful) drought data and information. The data is generated through hydrological, weather and climate modelling; it does have user and/or problem-specific products which are aggregated and contextualized to serve specific locations within the Nile Basin where:

- *.Seasonal forecast for drought forecasting by suitable indices for hydro and met drought.*
- *Drought indicators in near real-time and for seasonal forecasts o including precipitation based indices o soil moisture indices o hydrological indices.*
- *Web mapping o summary statistics and o other capability to view drought indices result and to generate drought bulletin.*

Target Audience:
Dam operation and irrigation specialist; dam owners; Disaster risk (drought warnings) managers; Water resources planners etc.

System Set-Up or Input:

- *Integrate the web interface with Integrated Knowledge Portal (IKP);*
- *seasonal forecast*

Similar Category and Interlinked NBI products :

- *Flood early warning for Eastern Nile;*
- *Nile Basin River Flow forecasting system;*
- *Nile Basin Decision support tool*
- *Policymakers & Technical Experts Awareness Products*
- *Climate proofing guidance hub for infrastructure and basin planning.*
- *Climate Service portal;*

Availability and Access:

- *https://www.flooddroughtmonitor.com/home*
- *http://115.124.114.193:8100/rmsi_nile-basin/en/flood-monitoring*

Table 8: Climate Proofing Guidance Hub for Infrastructure and Basin Planning

CLIMATE PROOFING GUIDANCE HUB FOR INFRASTRUCTURE AND BASIN PLANNING	**Product No.** P7

NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

Product Category: *Decision-Support Tools*

Product/Services Status:
Service is planned

Provider & Contact:
Nile-SEC-Entebbe, Uganda
Tel: +256 (414) 321 424 /
Email: nbisec@nilebasin.org

Product Purpose:
This tool will provide a step by step guidance on climate proofing of water infrastructure in the Nile Basin. It enables the integration of climate change in planning, designing and operation of water infrastructure into NBI's Project Cycle. This is a checklist which helps to gather data and information needed to carryout climate proofing of water infrastructure using the climate proofing guideline. The guideline focuses on investments (project level) in the water sector, including both planned and already existing projects. The guideline can be used for a wide range of water sector projects such as flood protection infrastructure, water supply and/or sanitation systems, irrigation and hydropower

Characterization & Functionality:
The user is guided step-by-step through the process of the risk assessment (i.e. risk assessment, risk treatment and monitoring and evaluation) for the relevant stage of the NBI project cycle (i.e. project identification, preparation, resource mobilization, implementation operation). Instructions and hints are provided on the selection of appropriate data and methods to be applied for specific analysis. The output is a completed risk assessment of the infrastructure object/system of concern comprising the current and future risk of critical components as well as recommendations on adaptation. This information is the basis for the integration of climate change in: the process of planning, designing and operation of specific water infrastructure objects; Sectoral basin planning and regulation and funding of infrastructure systems.

Target Audience:
Flood protection manager; Risk assessment and project managers; Regulators and funders of infrastructure systems such as water supply and/or sanitation systems, irrigation and hydropower

System Set-Up or Input:
- *Integration of external data, analysis tools and expertise is required*
- *Empirical values on sectoral vulnerabilities are provided*
- *Cover both small and large dams*

Similar Category and Interlinked NBI products :
- *Flood early warning for Eastern Nile;*
- *Nile Basin River Flow forecasting system;*
- *Drought forecasting system*
- *Nile Basin Decision support tool*
- *Policymakers & Technical Experts Awareness Products*
- *The Nile Basin hydrological bulletin*
- *climate change scenarios for the Nile Basin*
- *Hydrological scenarios for the Nile Basin*

Availability and Access:
Bulletins (Publication);
- *NBI website (https://nilebasin.org/)*

Table 9: Nile Basin Decision Support Tool

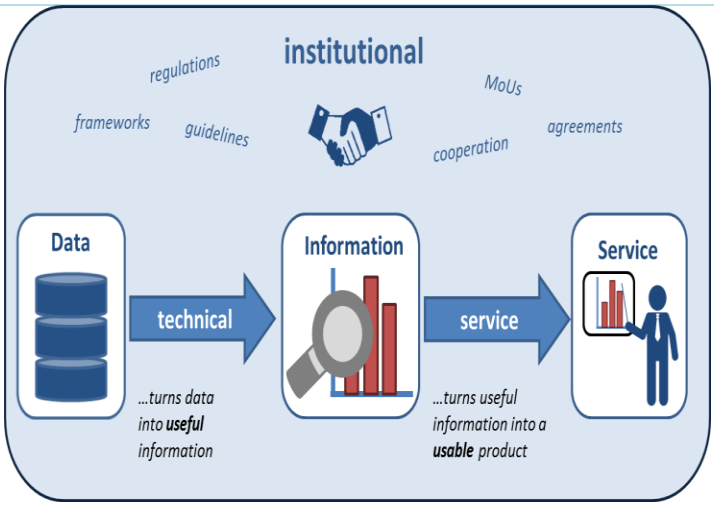
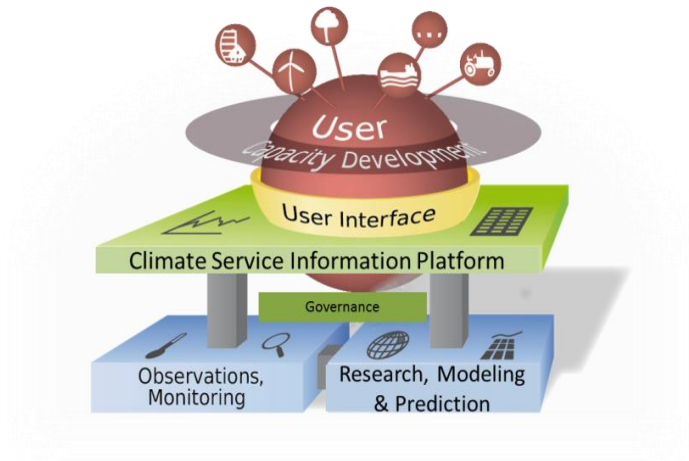
NILE BASIN DECISION SUPPORT TOOL	**Product No.** P8
	NILE BASIN INITIATIVE INITIATIVE DU BASSIN DU NIL **Product Category:** *Decision-Support Tools* **Product/Services Status:** *Online licenses are readily available whereas the web service is planned.* **Provider & Contact:** *Nile-SEC-Entebbe, Uganda* *Tel: +256 (414) 321 424 /* *Email: nbisec@nilebasin.org*
Product Purpose: *The Nile Basin (DSS) is an analytical tool to be used as a framework for understanding river system behavior, evaluating alternative development and management strategies, and supporting informed decision making.*	**Characterization & Functionality:** *The DSS is a computer-based platform designed to meet the requirements of complex water resources planning with a diverse set if tools for data processing, modelling, scenario management, optimization and multi-criteria decision making with special consideration of quality, relevance, applicability, etc. It offers tools for integrating environmental, social and economic objectives thus greatly facilitating multi-sector water resources planning at river basin level. It is a generic system that can be applied at different scales – at national as well as trans-boundary levels. It can be installed both within an institutional setup, thereby allowing multiple access to its central database and toolset, and also as a standalone solution. It should be noted though that it shall be very complex in widely disseminating the DSS.*
Target Audience: *Water resource planners, Institutional managers, Policy makers,*	**System Set-Up or Input:** • *diverse toolsets and datasets,* • *data processing and modelling,* • *scenario management*
Similar Category and Interlinked NBI products : • *Flood early warning for Eastern Nile;* • *Nile Basin River Flow forecasting system;* • *Drought forecasting system* • *Policymakers & Technical Experts Awareness Product;* • *Climate proofing guidance hub for infrastructure and basin planning.* • *Climate Service portal;*	**Availability and Access:** *Web interface, Software and Bulletins (Publication); NBI website (https://nilebasin.org/); Online licenses available for NB stakeholders. DSS Web service: https://watertools-portal.azurewebsites.net/portal/login/users/b20361a5-d080-4c39-9580-c7fafdbee650*

Table 10: Climate Service Portal

<table>
<tr><td colspan="2">CLIMATE SERVICE PORTAL</td><td>Product No. P9</td></tr>
<tr><td colspan="2"> 
</td><td>NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

Product Category: Climate Service Communication & Outreach

Product/Services Status:
Service is planned

Provider & Contact: Nile-SEC-Entebbe, Uganda; Tel: +256 (414) 321 424 / Email: nbisec@nilebasin.org; Eastern Nile Technical Regional Office (ENTRO); Addis Ababa, Ethiopia; Tel: +251 (0)116 461 130/32; entro@nilebasin.org</td></tr>
<tr><td colspan="2">Product Purpose:
This is a planned climate service channel through which others services can be held within one portal for multiple purposes including the communication and outreach. The portal shall be developed by the NBI and integrated in Integrated Knowledge Portal (IKP)</td><td>Characterization & Functionality:
Although it is not yet functional, it is expected to be integrated with IKP where there will be ease to download data, data and information visualization components through web development etc.</td></tr>
<tr><td colspan="2">Target Audience:
Water resource planners; Institutional managers; Policy makers; researchers and academia; infrastructure operators and developers etc.</td><td>System Set-Up or Input:
• Hydrological and climate data and information,
• visualization components
• web development
• Videos and documentaries</td></tr>
<tr><td colspan="2">Similar Category and Interlinked NBI products:
• Flood early warning for Eastern Nile;
• Nile Basin River Flow forecasting system;
• Drought forecasting system
• Nile Basin Decision support tool
• Policymakers & Technical Experts Awareness Products
• Capacity building</td><td>Availability and Access: Web interface, Software
• NBI website (https://nilebasin.org/)
• http://115.124.114.193:8100/ikp/</td></tr>
</table>

Table 11: Policymakers & Technical Experts Awareness Products

POLICYMAKERS & TECHNICAL EXPERTS AWARENESS PRODUCTS	**Product No.** P10
	NILE BASIN INITIATIVE INITIATIVE DU BASSIN DU NIL **Product Category:** *Climate Service Communication & Outreach* **Product/Services Status:** *Readily available* **Provider & Contact:** *Nile-SEC-Entebbe, Uganda* *Tel: +256 (414) 321 424 /* *Email: nbisec@nilebasin.org*
Product Purpose: *These are communication and outreach products to inform targeted groups for example policy and/or technical experts associated with or working within the Nile Basin, which may include: State of Basin Report (SOB), Nile Basin Atlas*	**Characterization & Functionality:** *Depending on the target audience, the communication product would be anywhere from 1 to max. 4-6 pages of document on the result of translating results of the NBI research and analysis work on climate services in the NBI countries; while for technical experts would be reports of various uses, relevance, access, facts, adequacy, importance, clarity, etc. Other examples may include: Policy brief, State of Basin Report (SOB), Nile Basin Atlas, etc. It shows the range and complexity of the programmers and activities undertaken over the years as well as some of the major outcomes while proposing what lessons can be drawn to feed into future cooperation.*
Target Audience: *Policy makers; technical experts; decision makers; regulators, cooperation frameworks etc.*	**System Set-Up or Input:** • *Text, graphs, images about climate services* • *water resources management, analysis and information products, databases ,tools and systems* • *basin resource management tools, services and expertise* • *Cross-cutting and corporate information, financial reports, etc.*
Similar Category and Interlinked NBI products: • *Flood early warning for Eastern Nile;* • *Nile Basin River Flow forecasting system;* • *Drought forecasting system* • *Nile Basin Decision support tool* • *Climate proofing guidance hub for infrastructure and basin planning.* • *Climate Service portal;*	**Availability and Access:** *Publications (Reports, briefs, videos, etc).; media; etc* • *NBI website (https://nilebasin.org/) e.g. https://www.nilebasin.org/* • *Announced via email with shared links on Google drive e.g. http://nbi20.nilebasin.org/*

Table 12: Capacity Building

<table>
<tr><td colspan="2">CAPACITY BUILDING</td><td>Product No. P11</td></tr>
<tr><td colspan="2" rowspan="4">  </td><td>NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL</td></tr>
<tr><td>Product Category:
User Support & Training</td></tr>
<tr><td>Product/Services Status:
Readily available</td></tr>
<tr><td>Provider & Contact:
Nile-SEC, Entebbe, Uganda
Tel: +256 (414) 321 424 /
Email: nbisec@nilebasin.org</td></tr>
<tr><td colspan="2">Product Purpose:
This is training for strengthening capacity of Nile Basin national experts on water resource management and climate change adaptation. It is a dissemination platform of the Nile DSS mainly using the electronic platform for information management, analysis of water resources, internal learning and also tailor made face to face training.</td><td>Characterization & Functionality:
Formats of learning and training for staff and users in order to be able to provide or use the available services that mainly focuses on hydrological and flood modelling and climate change scenario selection and analysis</td></tr>
<tr><td>Target Audience:
National experts, consultants and NBI staff</td><td colspan="2">System Set-Up or Input:
• Hydrological and climate data and information,
• Visualization components like images, videos, publications etc. model installations and components, GIS, time series etc.</td></tr>
<tr><td colspan="2">Similar Category and Interlinked NBI products:
• Climate Service portal;</td><td>Availability and Access: Training; software tools; courses; etc.
• NBI-website (https://nilebasin.org/) and email
• Web interface and online instructors;
• Register, Login and enroll for the NBI induction;</td></tr>
</table>

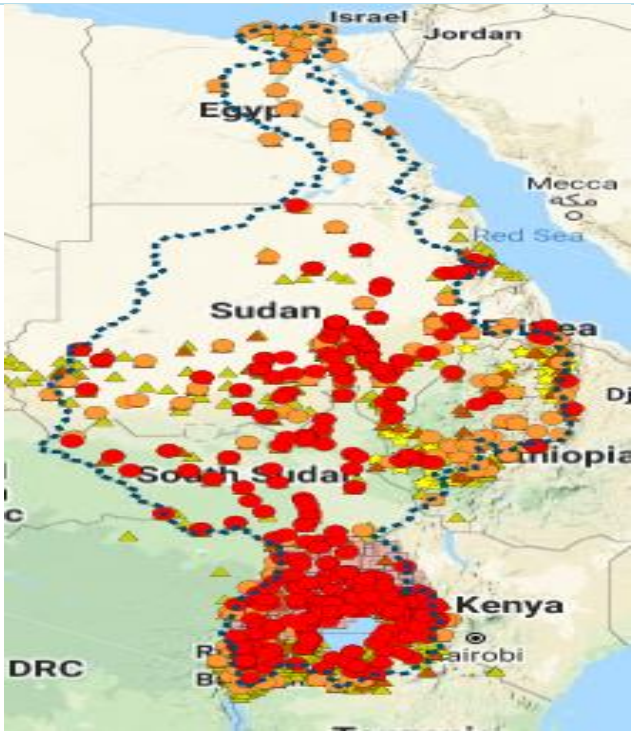
Table 13: Nile Basin Regional Hydrological Monitoring Network (Auxiliary Service)

<table>
<tr><td colspan="2">NILE BASIN REGIONAL HYDROLOGICAL MONITORING NETWORK</td><td>Product No. AP1</td></tr>
<tr><td colspan="2">  </td><td>Product Category:
Hydrological and Meteorological Systems

Product/Services Status: Readily available although it needs individual country permission

Provider & Contact: Nile-SEC, Entebbe, Uganda; Tel: +256 (414) 321 424 / Email: nbisec@nilebasin.org; NELSAP –CU; Kigali, Rwanda; http://nelsap.nilebasin.org/; Eastern Nile Technical Regional Office (ENTRO); Addis Ababa, Ethiopia; Tel: +251 (0)116 461 130/32; entro@nilebasin.org</td></tr>
<tr><td colspan="2">Product Purpose:
It's an auxiliary product (AP) or service which supports others services. Although these are not within the scope of NBI climate services, the networks belongs to member states but are shared with the NBI through cooperation agreement. These are hydrological monitoring networks which do generate near real time flow and river level data on selected gauging stations of the Nile and its sub-basins</td><td colspan="2">Characterization & Functionality:
Collection and transmission of hydrological time and data series; Use of hydrological data in the planning, design and operation of water-resources projects, and the cost-effectiveness of the information through socio-economic analysis, theories of probability, sampling and optimization, etc. It consists of gauging stations in most sub-basins in Tekeze, Atbara, Blue Nile, Baro Akobo Sobat, main Nile River, Bahr el-Ghazal, Bahr el-Jebel and in Victoria lake basins although it is inadequate because significant portions of the Nile Basin are either un-gauged or very sparsely gauged, number of stations that are outdated and out of service, inadequate equipment calibration, lack of adequate or modern data acquisition and management systems, etc.</td></tr>
<tr><td colspan="2">Target Audience:
National Meteorological and Hydrological Services; Hydrological product developers, Universities and research organisations</td><td colspan="2">System Set-Up or Input:
• NBI Hydrometric instruments, data receiving station etc,
• Each riparian country network and institutions
• Various project including the IGAD-HYCOS Program
• Each riparian countries has its own network and institutions with established monitoring networks;</td></tr>
<tr><td colspan="2">Similar Category and Interlinked NBI products:
• Nile Basin hydro-meteorological data series
• The Nile Basin hydrological bulletin
• climate change scenarios for the Nile Basin
Hydrological scenarios for the Nile Basin</td><td colspan="2">Availability and Access:
Infrastructure (installations);
• NBI website (https://nilebasin.org/)
• Each riparian countries institutional website</td></tr>
</table>

Table 14: Nile Basin hydro-meteorological observations (Auxiliary Services)

NILE BASIN HYDRO-METEOROLOGICAL OBSERVATIONS	**Product No.** AP2
	NILE BASIN INITIATIVE INITIATIVE DU BASSIN DU NIL **Product Category:** *Hydrological and Meteorological Systems* **Product/Services Status:** *Readily available with individual country permission* **Provider & Contact:** *Nile-SEC, Entebbe, Uganda; Tel: +256 (414) 321 424 / Email: nbisec@nilebasin.org* *NELSAP –CU; Kigali, Rwanda* *http://nelsap.nilebasin.org/* *Eastern Nile Technical Regional Office (ENTRO); Addis Ababa, Ethiopia* *Tel: +251 (0)116 461 130/32* *entro@nilebasin.org*
Product Purpose: *These are historical hydro-meteorological data from different projects although they are not specifically within the scope of NBI climate services, the networks belong to member states but are shared with the NBI through cooperation agreement. These shall be provided under the Decision Support System and as hydro-met data series*	**Characterization & Functionality:** *These are mostly climate & weather data products from observation, model predictions and projections which are collected and transmitted as meteorological time and data series for daily, monthly and seasonal weather and climate forecasting and prediction; but also planning, design and operation of water-resources related projects.*
Target Audience: *National Meteorological & Hydrological Services; Meteorological product developers (e.g. forecasters, predictors etc), Universities and research organisations; Agronomists, transport officers,*	**System Set-Up or Input:** *These observations are from over 949 meteorological and 427 hydrological stations within the Nile Basin. They measure river or lake water levels, monitor water quality, sediment transport in rivers, and groundwater etc. both software and hardware – and associated institutional setup*
Similar Category and Interlinked NBI Products: • *Nile Basin Hydrological Monitoring Network;* • *The Nile Basin hydrological bulletin* • *climate change scenarios for the Nile Basin* • *Hydrological scenarios for the Nile Basin*	**Availability And Access:** *http://115.124.114.193:8100/ikp/en/hydromet-component*

ONE RIVER
ONE PEOPLE
ONE VISION

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Website: http://nelsap.nilebasin.org

/Nile Basin Initiative

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ENTRO

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