IWRM Conference 2019

Integrated Water Resources Management

Water Resources Monitoring

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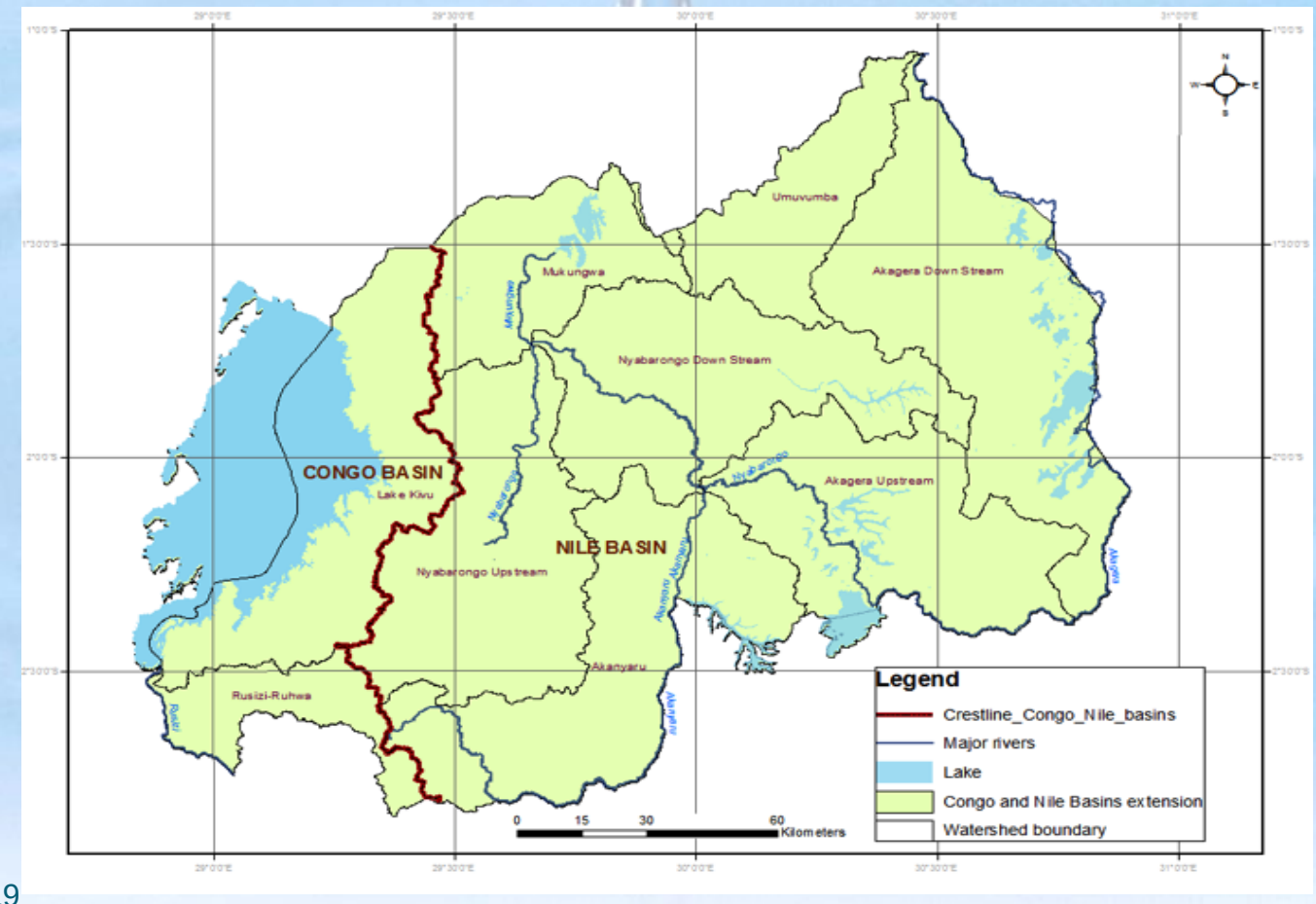
KEY WATER BODIES

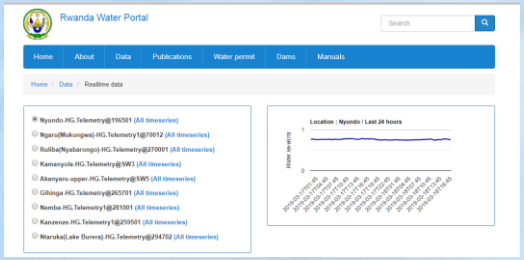
Rwanda hydrological network is divided into two main river basins: Nile Basin covering 67 % of the Rwandan territory and draining 90 % of the country's waters and the Congo basin covering 33 % of the Rwandan territory and draining 10 % of the country's water. The pluviometry varies between 800 and 2000 mm per year with 1200mm in average



What are Water Resources Management Department Does?

Data Collection → Information Management → Analysis & Modeling → Visualization and Dissemination → Decision Support Systems

Surface water, Groundwater and Water Quality Information



Practice Areas

- Hydromet Systems and Analytics
- Flood Modeling and Forecasting
- Dam Monitoring
- Catchment Management and Modeling
- Hydrologic Assessment
- Conjunctive Management of Ground and Surface Water
- Water Demand Modeling and Analysis
- Water Quality Assessment and Modeling

Customer Decisions (Examples)

- *Water Allocation planning*
- *Flood management*
- *Flow measurement data for hydropower, infrastructure upgrade, water supply planning, water storage etc.*

Agriculture/Irrigation

Health

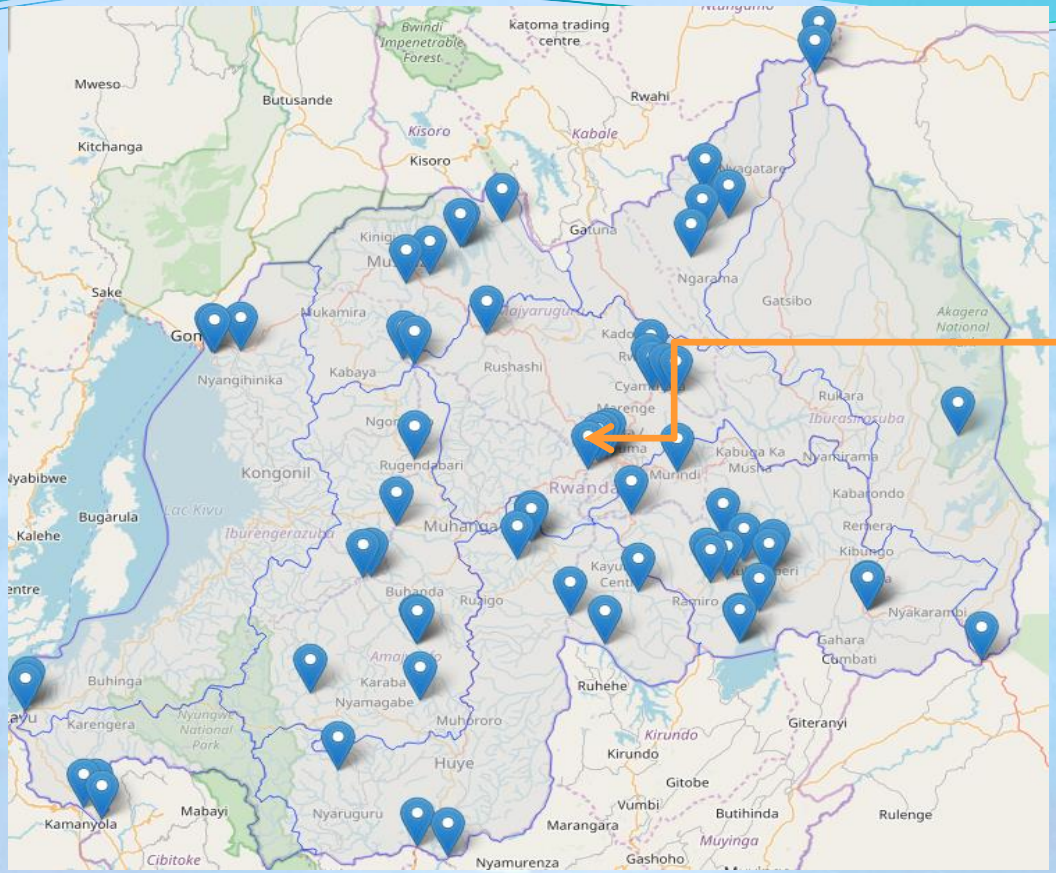
Environment

Infrastructure

Energy

Flood

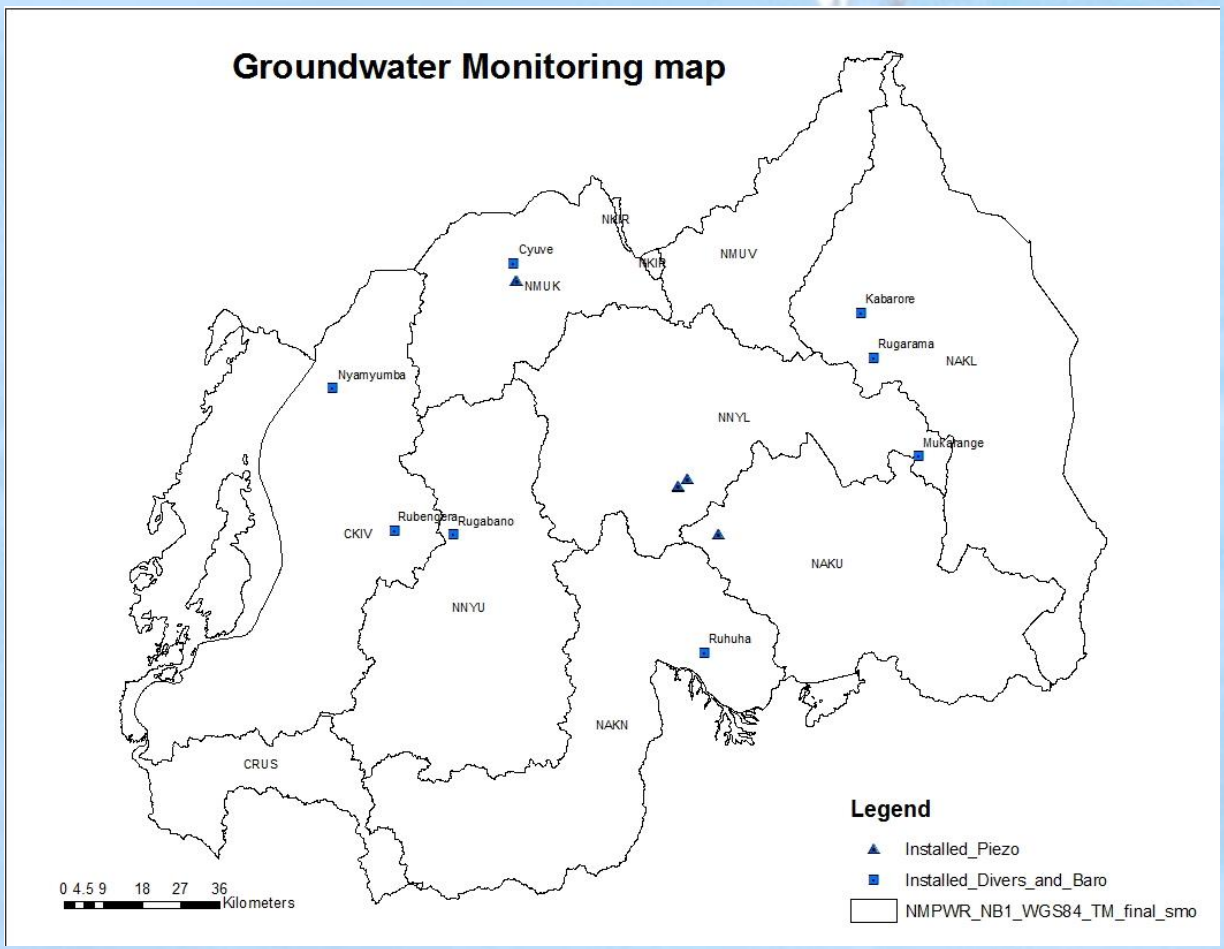
WATER RESOURCES NETWORK IN RWANDA



River Gauging Stations

- Water resources monitoring networks are capturing hydrological data from rivers and lakes (Disharge, Water level fluctuation, water velocity)
- Lake Kivu, Bulera and Mugesera lakes and other small lakes in eastern province
- Groundwater monitoring has been started recently

Groundwater -level Monitoring stations



Groundwater monitoring is an essential element in any environmental information system.

***8** Piezometers were installed to monitor groundwater level*

***12** divers were installed to monitor groundwater level*

DATA COLLECTION

- Discharges measurements on rivers are done by using ADCP, Current meter equipment and Dilution method etc.
- Two types of Monitoring Gauge stations;
  a) Manual Monitoring using Staff gauge
  b) Automatic monitoring using Telemetry

- 43 different hydrometric stations; *10* on lakes and 33 on rivers.
  9 automatic stations using AWLR providing data at 15 minutes and 1 hour frequency;

- There is ongoing rehabilitation of some stations as well as new stations

SOME OF DATA COLLECTION OBJECTIVES

- To provide reliable information on status and trends of water resources to water users and policy makers for economic development;
- To establish a framework of national guidelines and compatible standards for hydrological data collection referring to WMO guidelines;
- To stimulate water resources assessment and development activities;
- To provide necessary information for designing infrastructures on water resources

Monitoring Gauge Stations

DATA COLLECTION EQUIPMENT

-ADCP (Acoustic Doppler Current Profiler)

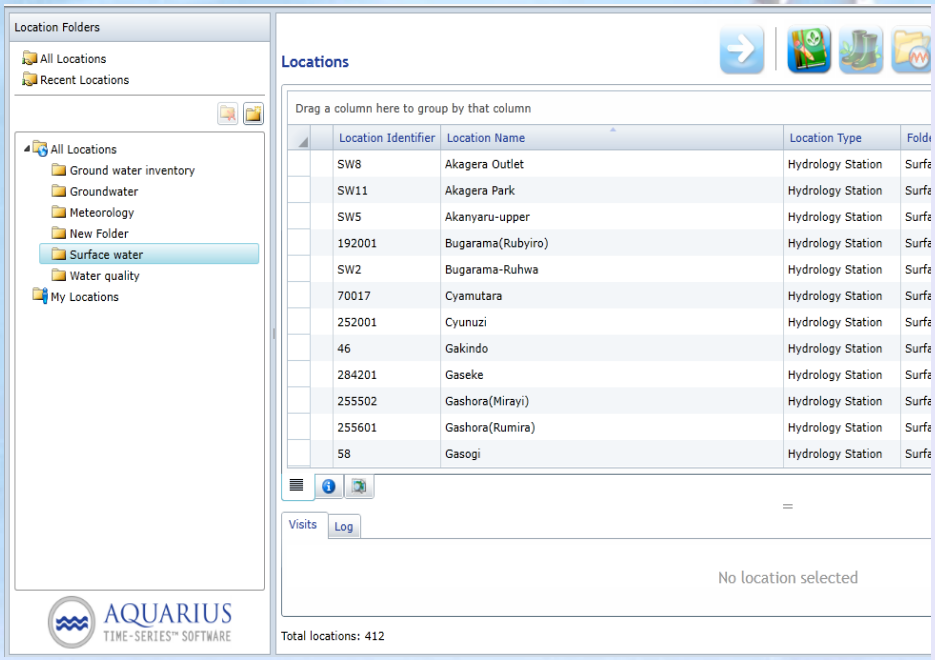
Data Management

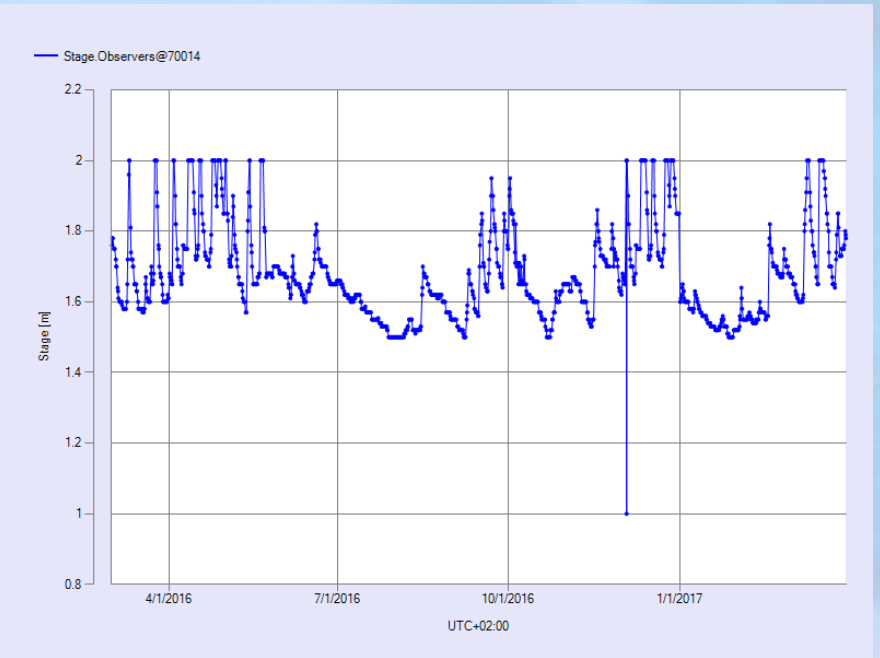
- A major part of monitoring is collecting and accessing the data. Recorded measurements are done onsite, log. Real time data are send and view in WRMD Database

- Data are analyzed and revised before their entry in database for further processing;

DATA PROCESSING AND STORAGE

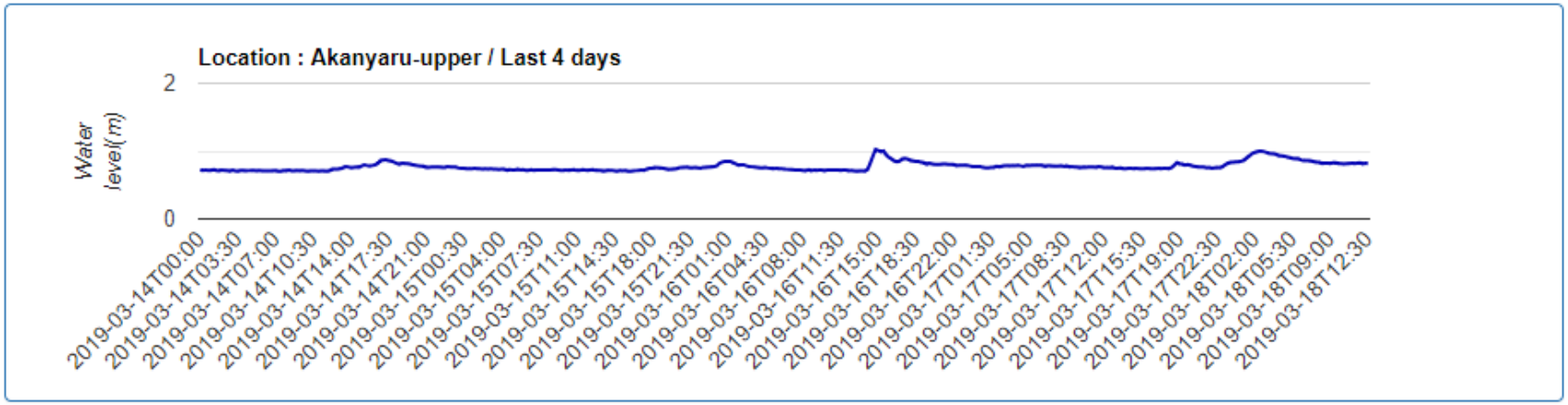
- Data are processed in excel and **Aquarius** database system, for correct and quality control data, build better rating curves and derive statistics.
- Data are also stored in web portal for offering real-time online access water information (waterportal.rwfa.rw)

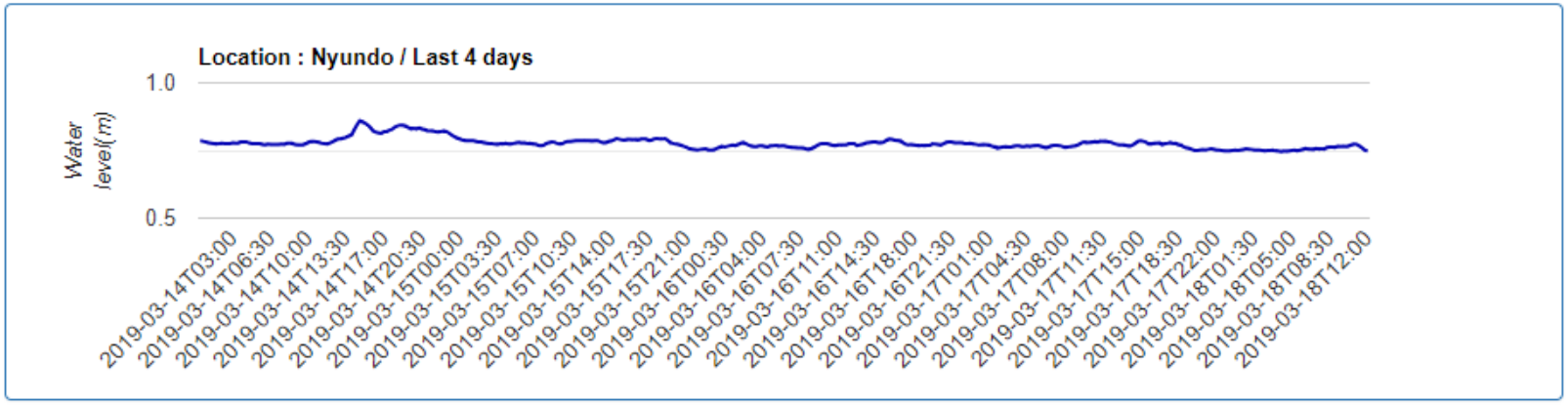




WATER RESOURCES DATA DISSEMINATION

- Data stored in database are processed to produce information;

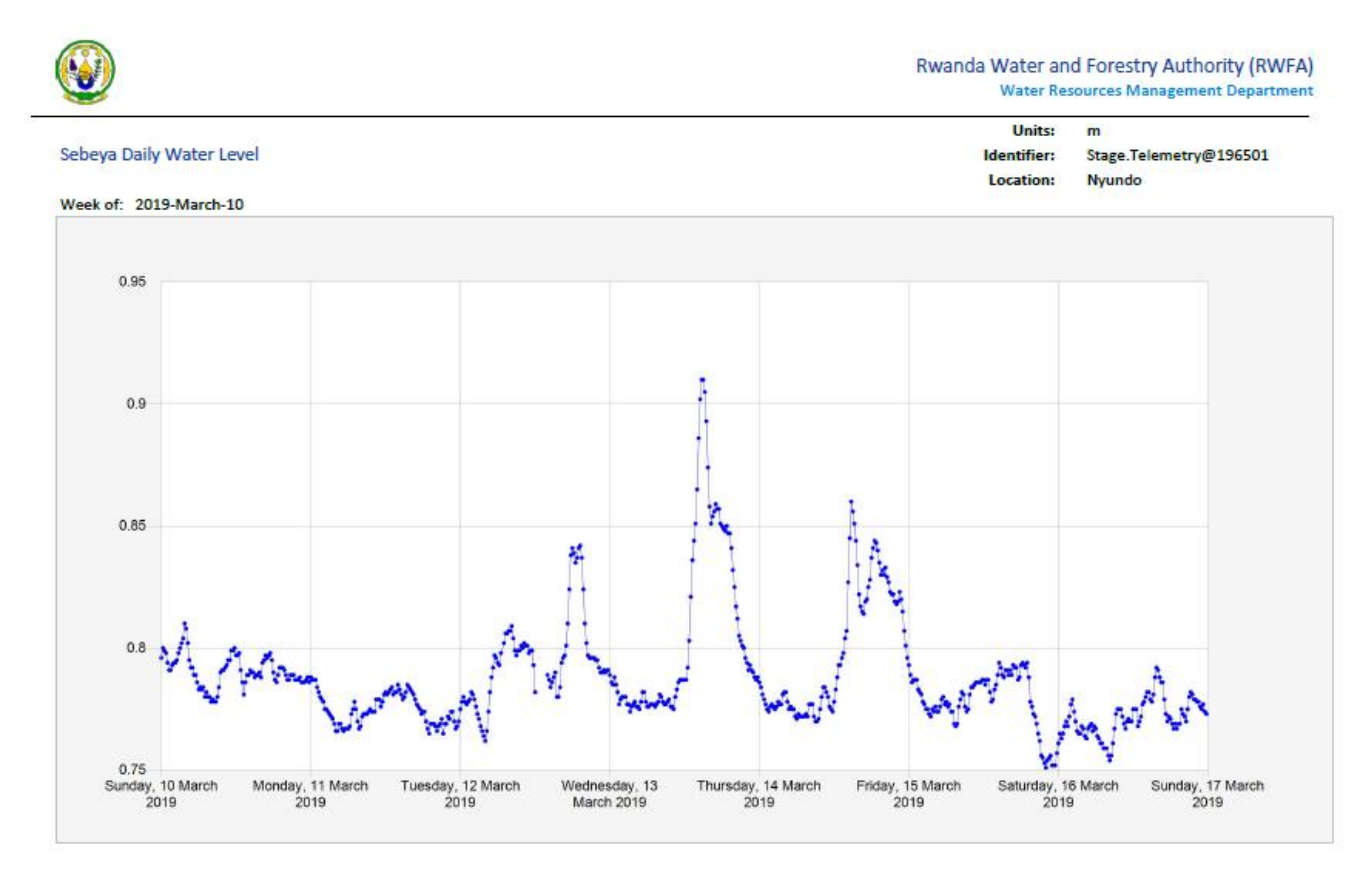




- Data are shared free of charge to consultants, NGOs, Government institutions, students and researchers upon request.

WATER RESOURCES DATA DISSEMINATION

- The information (report) is generated on yearly basis;
- The hydrological bulletin is published on weekly basis and uploaded on the Waterportal



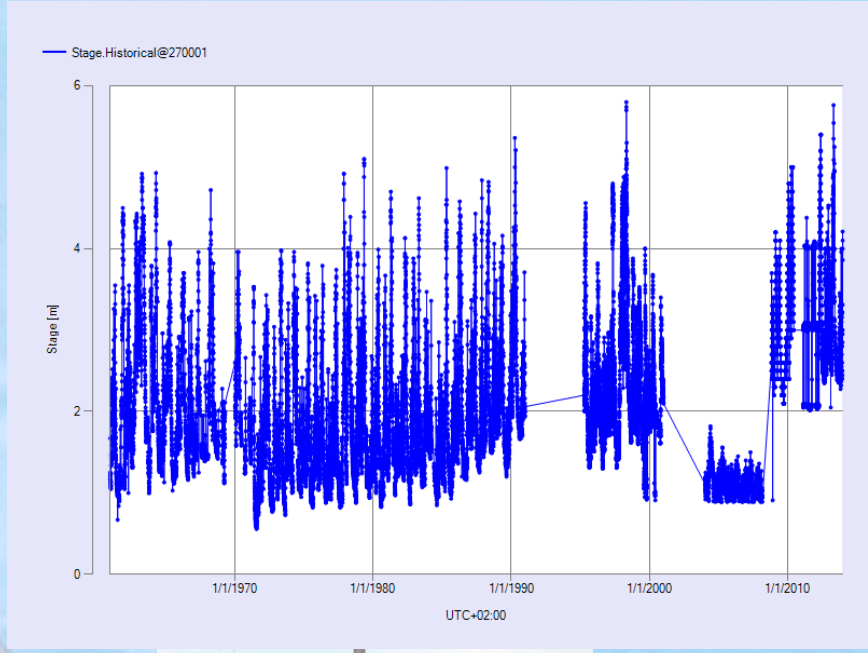
- Plan for seasonal report; to be published also to media;

CRITICAL ANALYSIS OF RWANDA HYDROMET SYSTEM

- Equipment are not calibrated on time
- Outdated rating curves
- Lack of enough monitoring stations
- Water resources data and information is fragmented between institutions and requires extensive work, in order to organize and arrange adequately for application to water resources assessment
- Vandalism of field equipment (automatic stations). This can be tackled through awareness raising

CRITICAL ANALYSIS OF RWANDA HYDROMET SYSTEM

- Inconsistency in data collection, leading to gaps
- Stations maintenance takes too long (waiting for annual budget): need for establishment of a proper framework
- Lack of benchmark at some stations; leading to lack of synergies in data after rehabilitation



CRITICAL ANALYSIS OF RWANDA HYDROMET SYSTEM

- Sediment discharges need special attention and action
- Groundwater monitoring is inadequate
- Surface water monitoring still needs improvement
- Lack of modelling tools for surface and groundwater analysis
- Data exchange among the Institutions
- Lack of flood modelling tools as well strong team in the field

THANK YOU

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