WATERDAYS – DAY2

Assimilation of satellite-based data for dams and hydropower management

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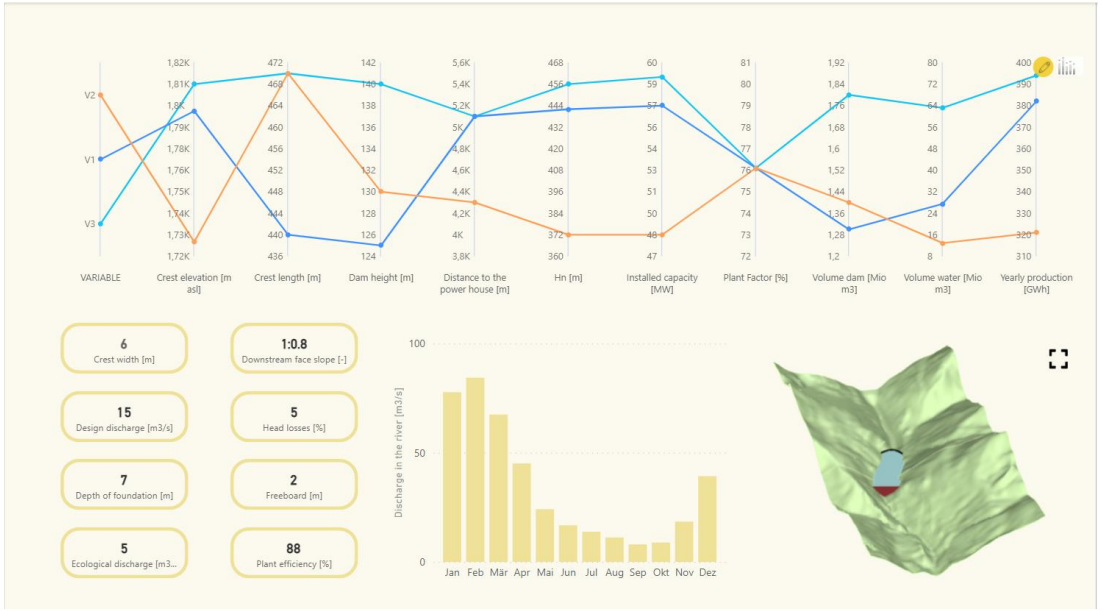
HYDROPOWER DESIGN

DIGITAL ELEVATION MODELS

A detailed knowledge of the topography of the region of implantation is absolutely necessary, Dam engineers need to calculate volumes of material for the construction of the dams, volumes of water retained by the dam for water supply, energy production etc.



Hydrology / Topography / Geology

Dam height = 130 m
L crest = 486 m
Distance to the power house = 4'289 m

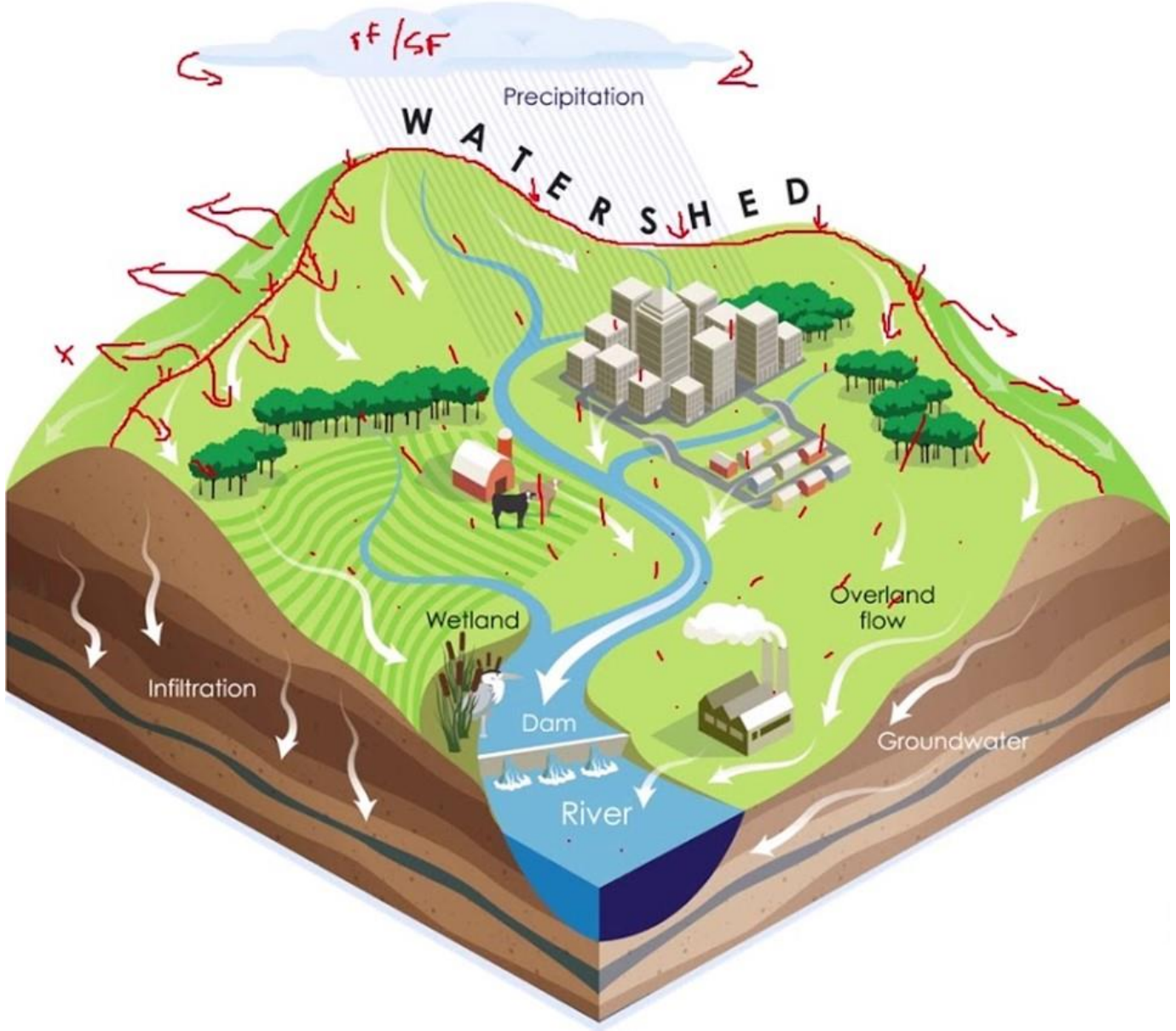
Volume water = 14.5 Mio m3
Volume dam = 1.8 Mio m3

Hn = 374 m
Installed capacity = 48.39 MW
Yearly production =322.59 GWh
Plant Factor =76.1 %

HYDROPOWER DESIGN

AN ENGINEER WANTS TO DESIGN A DAM IN AN AREA WHERE LITTLE OR NO DATA IS AVAILABLE.

- ✓Sediment management plan
  - ✓Safety management
  - ✓Energy loss
  - ✓Upstream and Downstream impact
    - ✓Operators → flushing
    - ✓E&S impacts → Mitigation measures



HYPOS

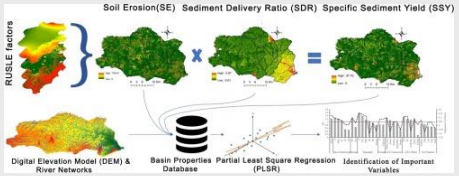
HYDROPOWER DESIGN

HYPOS

A

Literature

B

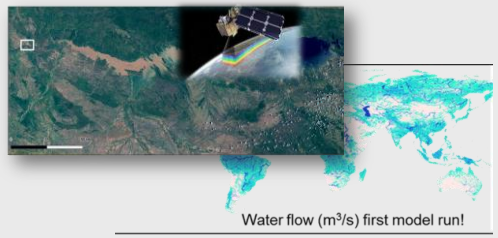


Raw geo information
e.g. USLE equation

C

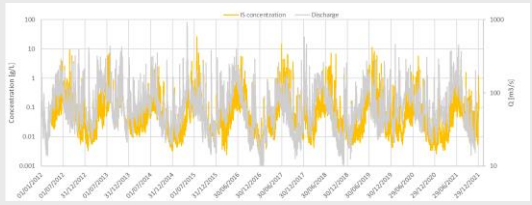
Global modelling
World-Wide HYPE - Sediment

D



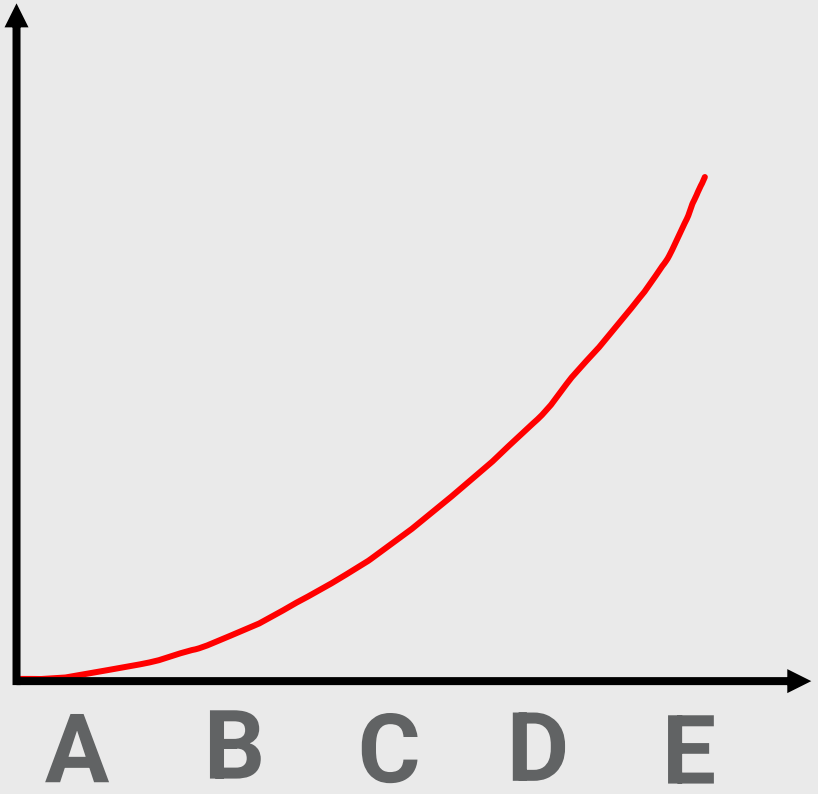
Combining in situ, modelling and satellite data

E



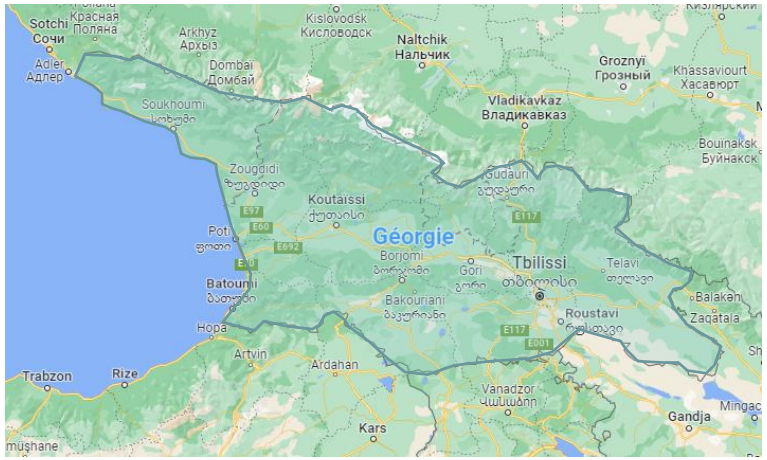
Integrating sediment dynamics

Accuracy /
Degree of discretization

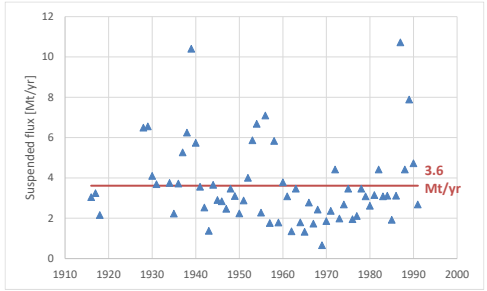


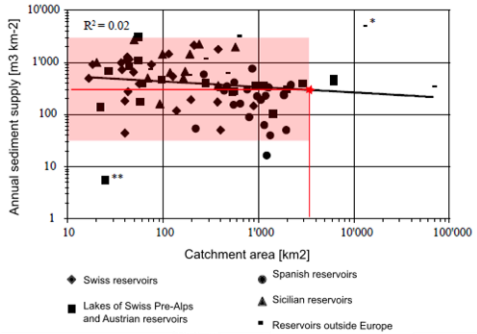
TYPICAL WORKFLOW

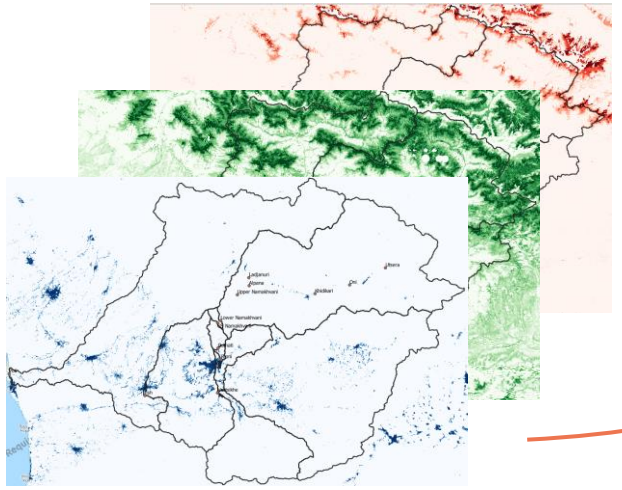
Use Case : Georgia



Data Analysis





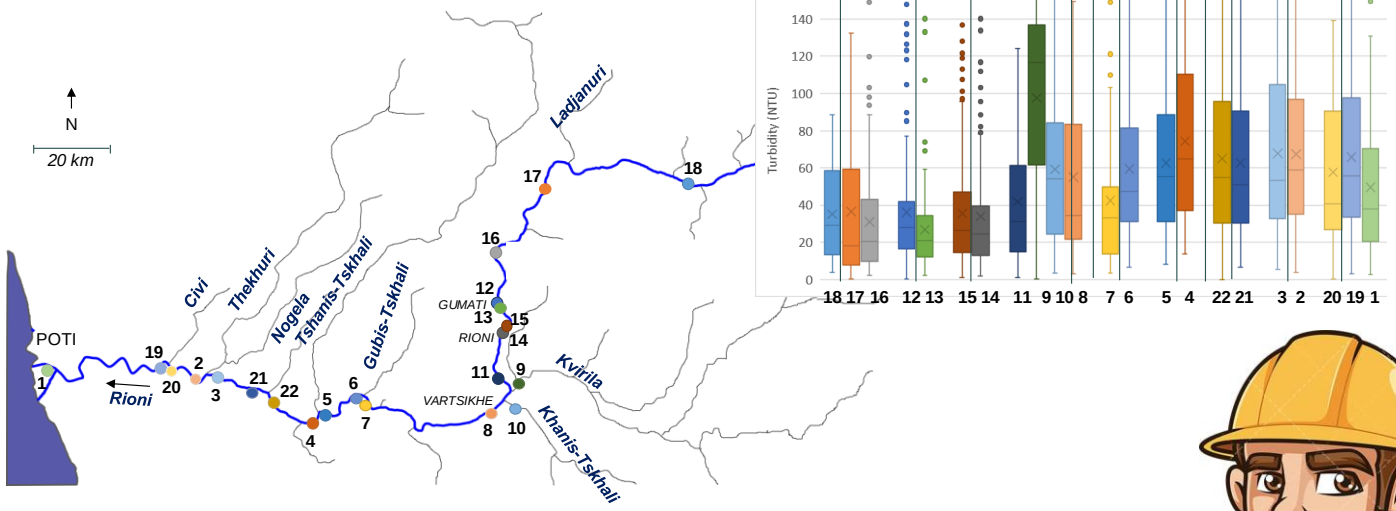


Large Range

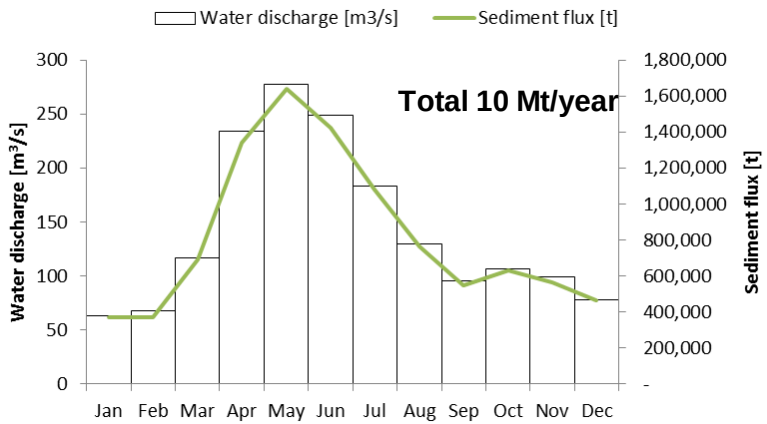
Total sediment transport
2 M to 12 Mt / year

WORKFLOW WITH HYPOS

Stations along river transects



Seasonal variations



Outcome:

- ✓ 10 Mt/year was defined as a basis for the design
- ✓ A sediment management plan has been proposed
- ✓ Sediment monitoring network is to be installed

HYPOS

Key Benefits for Water Management

HOLISTIC VIEW

Sound information on the entire river catchment

MORE ACCURATE DATA

Historical information, validating existing data or filling data gaps

LOWER COSTS

Improved periodicity planning, optimized gauging stations

FLEXIBLE WORKFLOW

Integration of multi-source data, customized reporting

OTHER APPLICATIONS

- MULTISPECTRAL SATELLITE IMAGERY USED TO SUPPORT THE DETERMINATION OF DAM FAILURE
- DAM SAFETY MONITORING
- HYDROLOGY SUPPORT - RESERVOIR WATER LEVEL, WATER LEVEL FLUCTUATION, LANDCOVER, GLACIERS, SNOW COVER (WATER AVAILABILITY)

THANK YOU!

ANY QUESTIONS OR OTHER IDEAS ON HOW TO USE THE DATA?

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