Lake Nasser Flood and Drought Managment Project

Ahmed Abou Elseoud

Senior Biomonitoring and Environmental Flow Expert

Empowered lives.
Resilient nations.

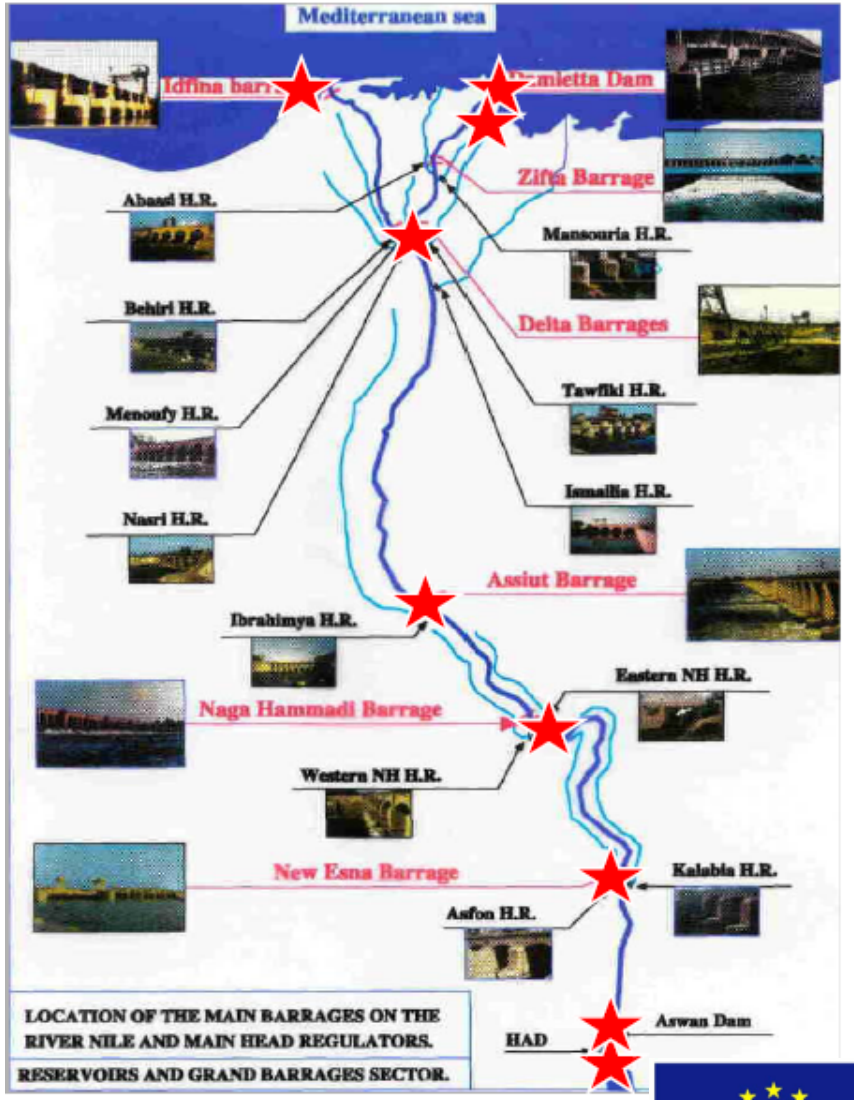
gef

River Nile Flood and Drought

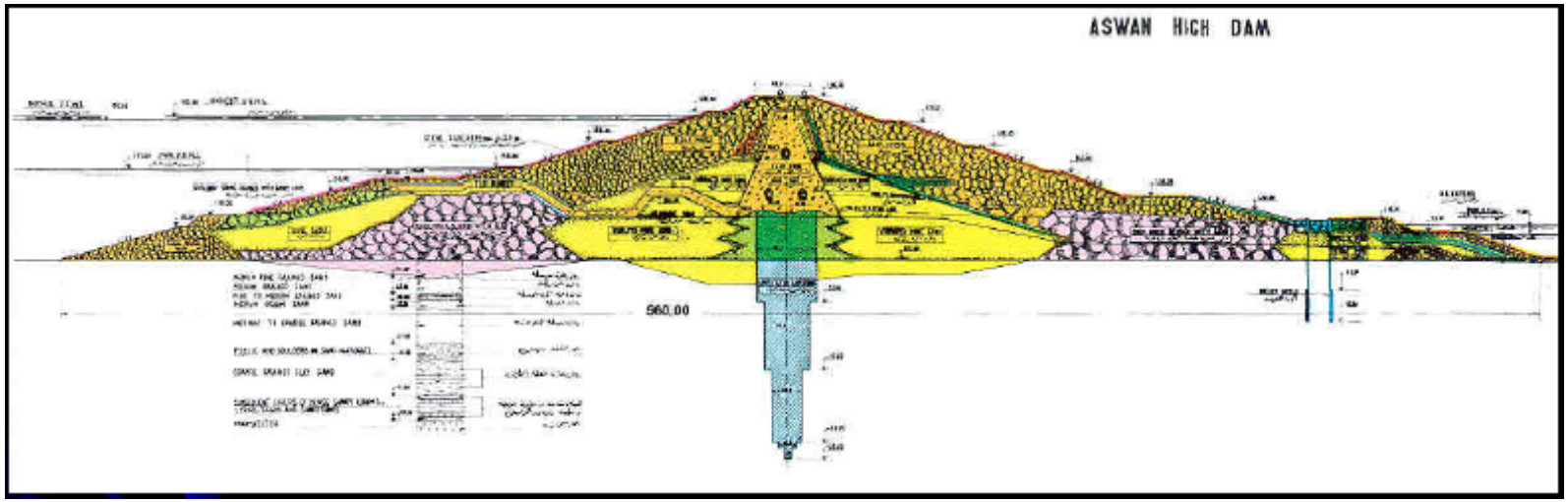
- Nile River Flooding was not controlled prior to the construction of the the High Aswan Dam (HAD)
- The maximum discharge for the Nile before the construction of (HAD) was 14000 m3/s which occurred in the year 1878/79,
- Meanwhile the minimum discharge was 274 m3/s which occurred in the year 1913/14.
- In high water years, catastrophic floods inflicted disastrous harm on agriculture, industry, and dwellings of lower Egypt,
- while in low water years, some lands were exposed to severe droughts.

River Nile Flood and Drought

- The regulation of these varying natural flows had been carried out in steps:
  - **the construction of levees along the river course to prevent flooding,**
  - **building of barrages across the river to raise the water to command levels,**
  - **and later on, some annual storage projects were executed in the river basin.**
- The amount of flood water discharging to the sea between August and October in a normal-flow year was 32 km3
- After building the HAD, Flood water is stored in Lake Nasser



The High Aswan Dam

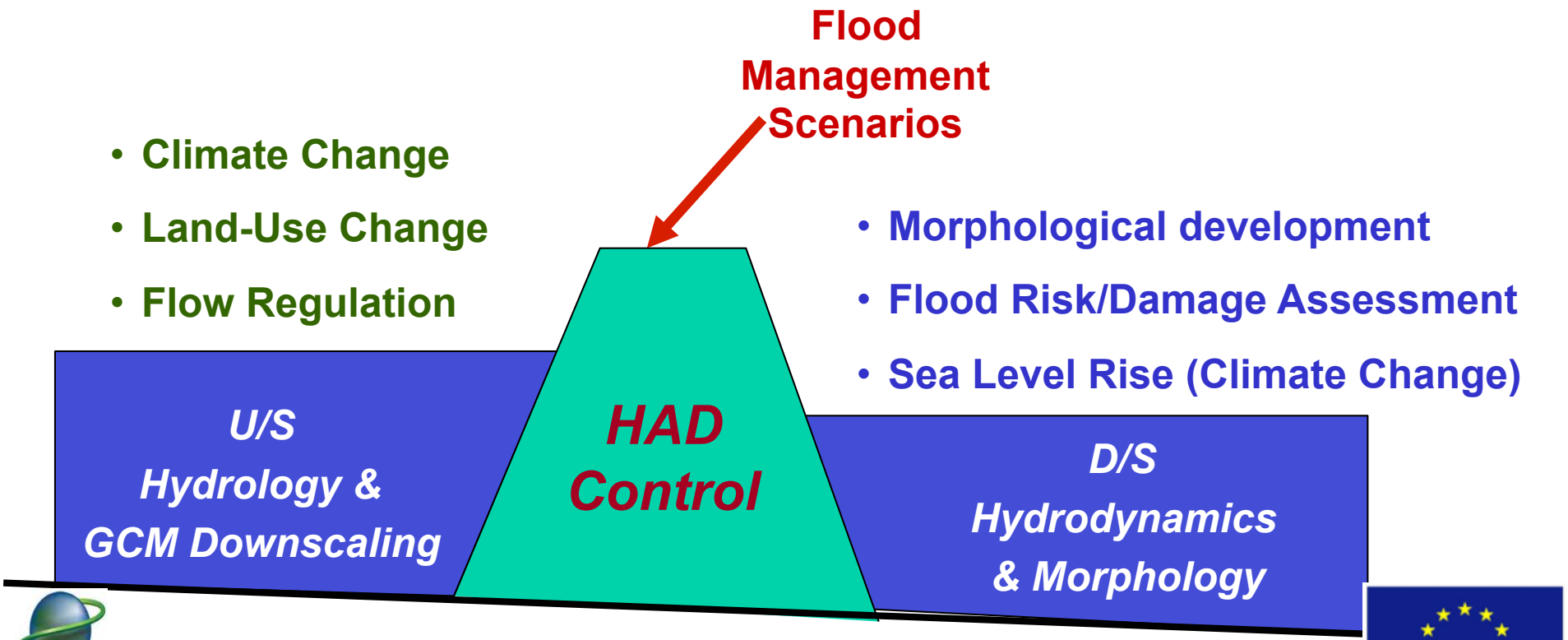


- HAD was completed in 1968.
- It's height is 111 m between the bed level and the roadway level.
- The length of HAD is 3600 m including the two wings.
- It was constructed of granite stone and sand with a core of puddle clay, connected to a horizontal impervious layer in the upstream to prevent water seepage.
- A vertical cut-off curtain below the core having a depth of 210 m penetrated the sedimentary layer to the bedrock.
- The total reservoir storage capacity was estimated at 162 km3 at water level of 182 amsl, including: 90 km3 for live storage, 31 km3 for sediment deposition, and 41 km3 for flood protection.

Lake Nasser Flood and Drought Control

Integration of Climate Change Uncertainty and Flood Risk

Project Components



HAD Operation support the NWRP

National Water Resources Plan is based on a strategy called

“Facing the Challenge: FtC”

To secure water for increasing demand…..

To safeguard its water resources in the future (Quantity and Quality) and how it will use these resources in the best way from a socio-economic point of view

Facing the Challenge : Flood/ Draught

Lake Nasser Flood and Drought control project looks at:

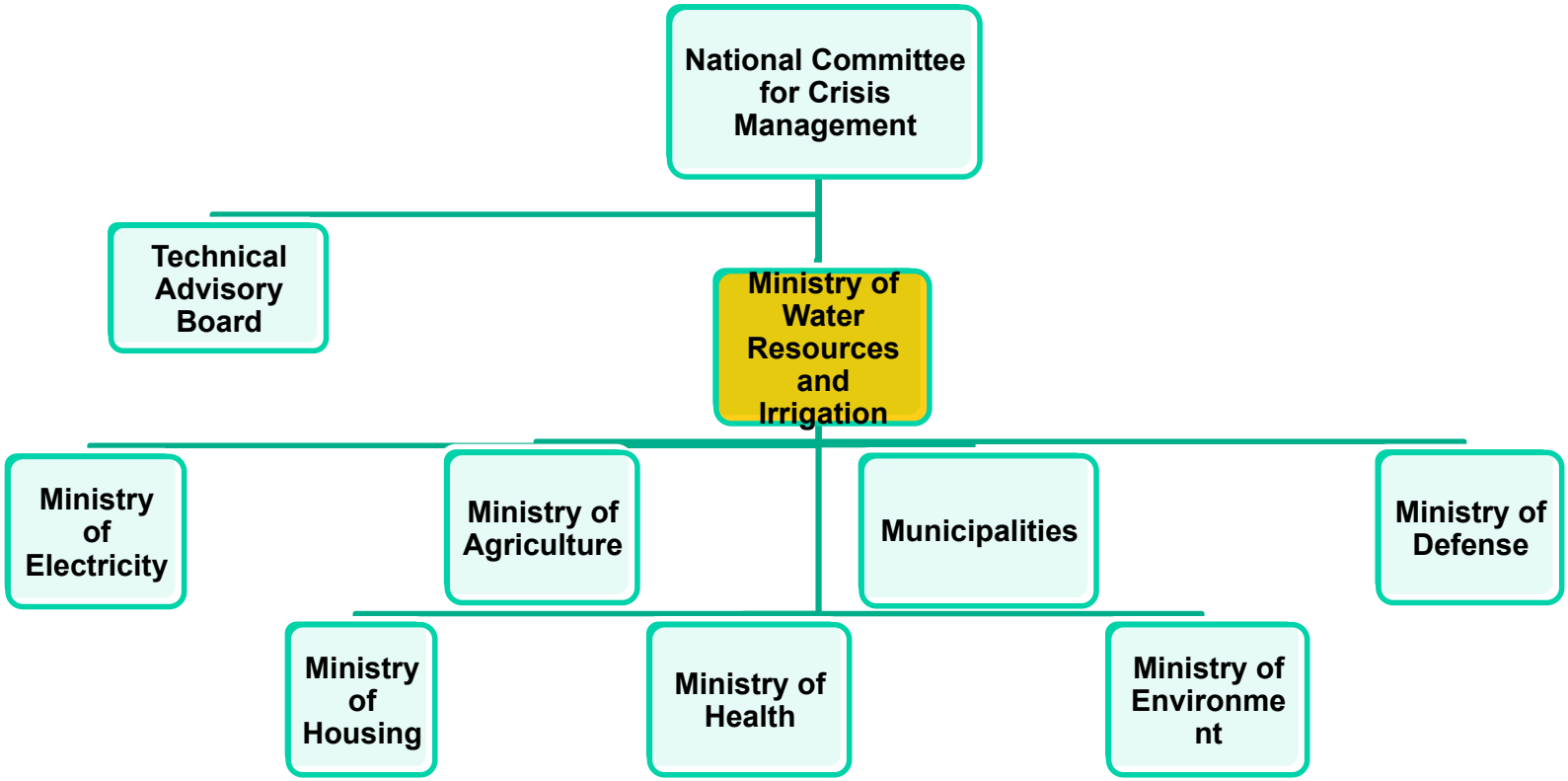
How Lake Nasser management can help

Facing that Challenge

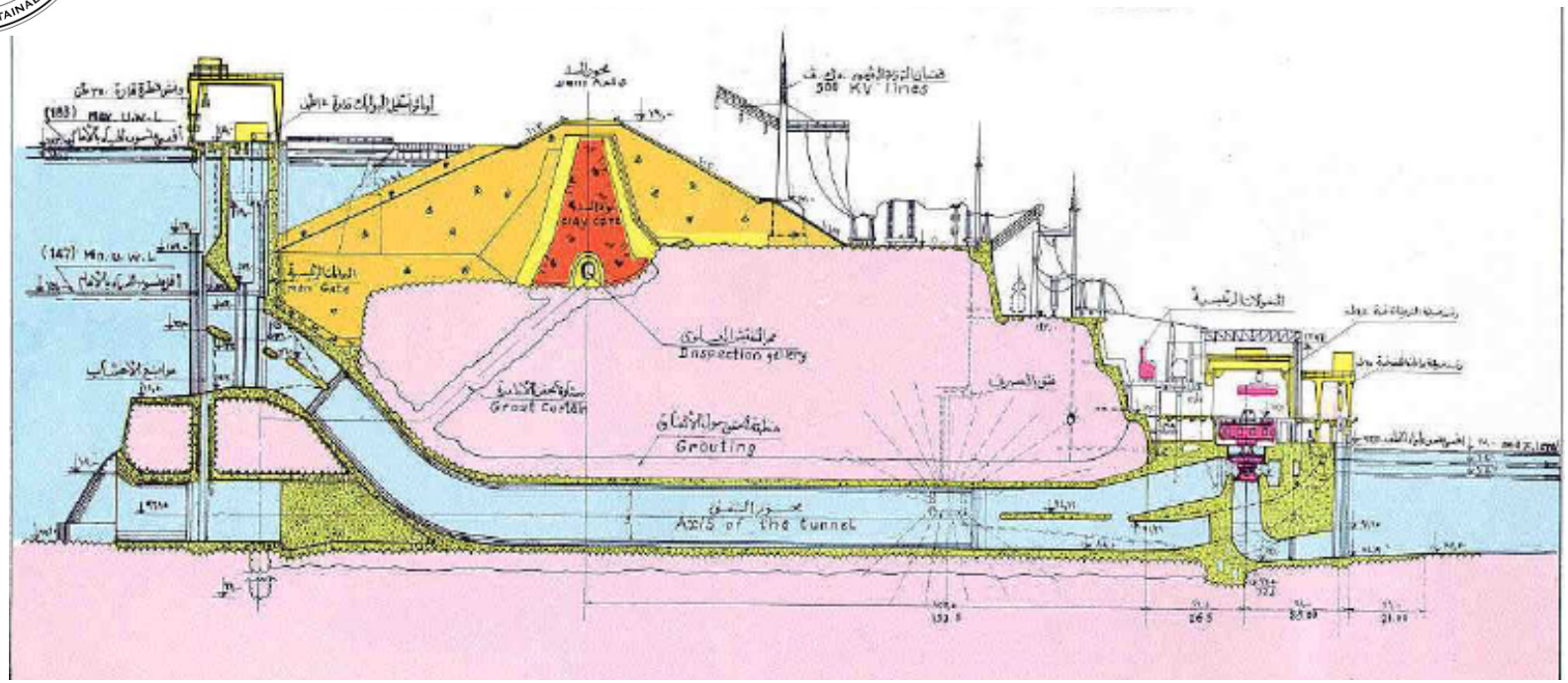
Flood / Draught Management scheme

- Institutional/ Legal Framework
- Physical precaution measures
- Establish Nile Flow Forecasting Center
- Study the Flood Risks Downstream HAD

Institutional Structure for Flood/Drought Management

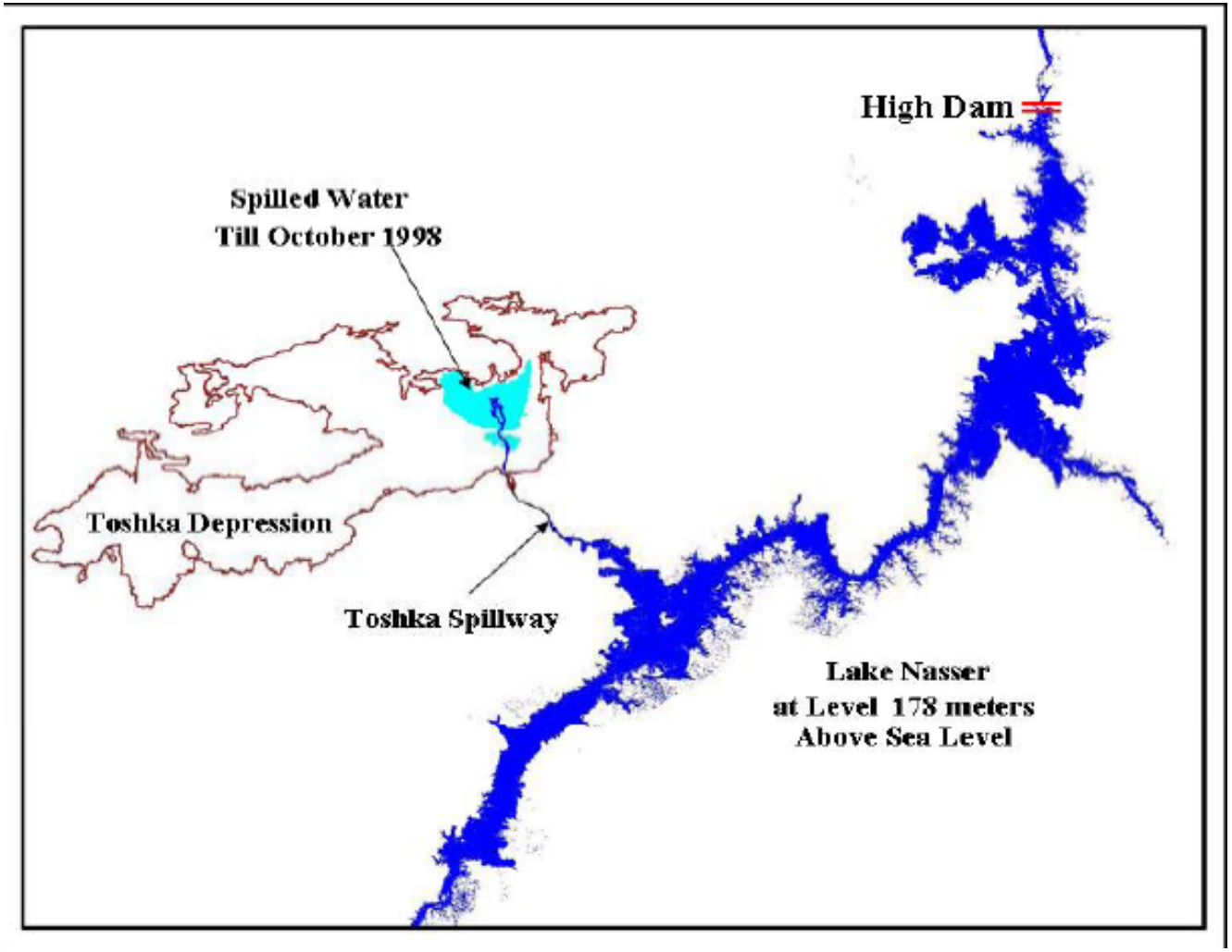


The physical Safety Precautions

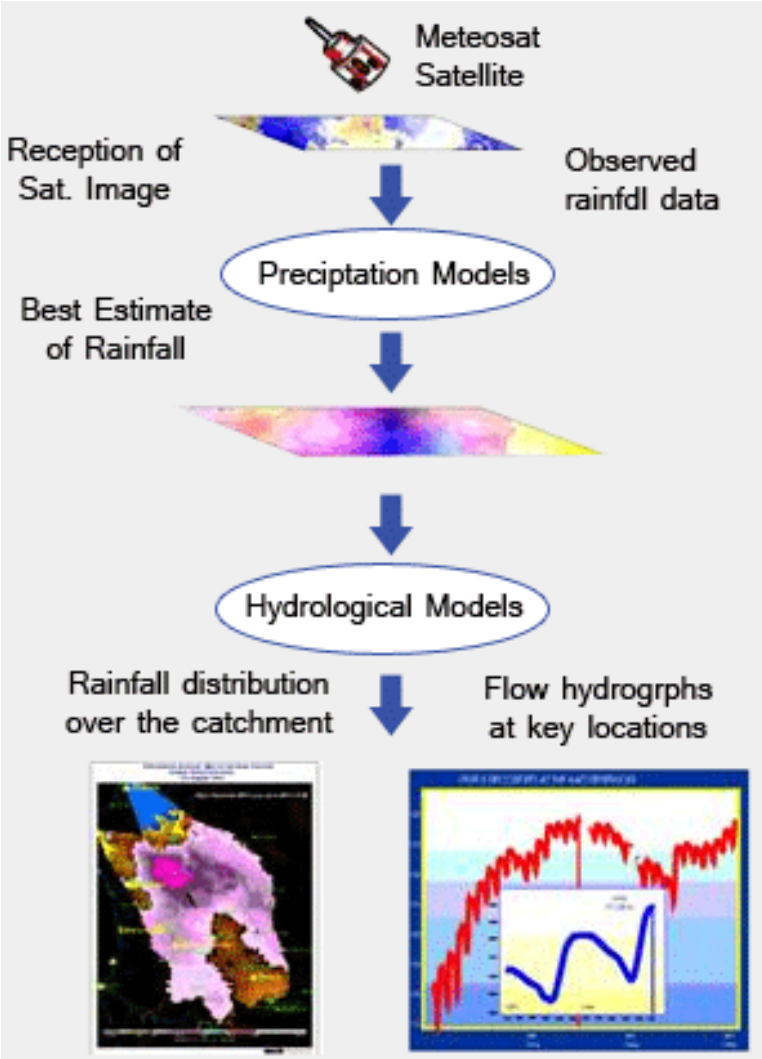


- An emergency gated spillway of crest of length 288m. Is constructed on the left bank to pass the flow when it reaches its maximum level
- Or we can use the **bypasses out of the power station (**The total discharge of these tunnels is 11000 m3/s.)

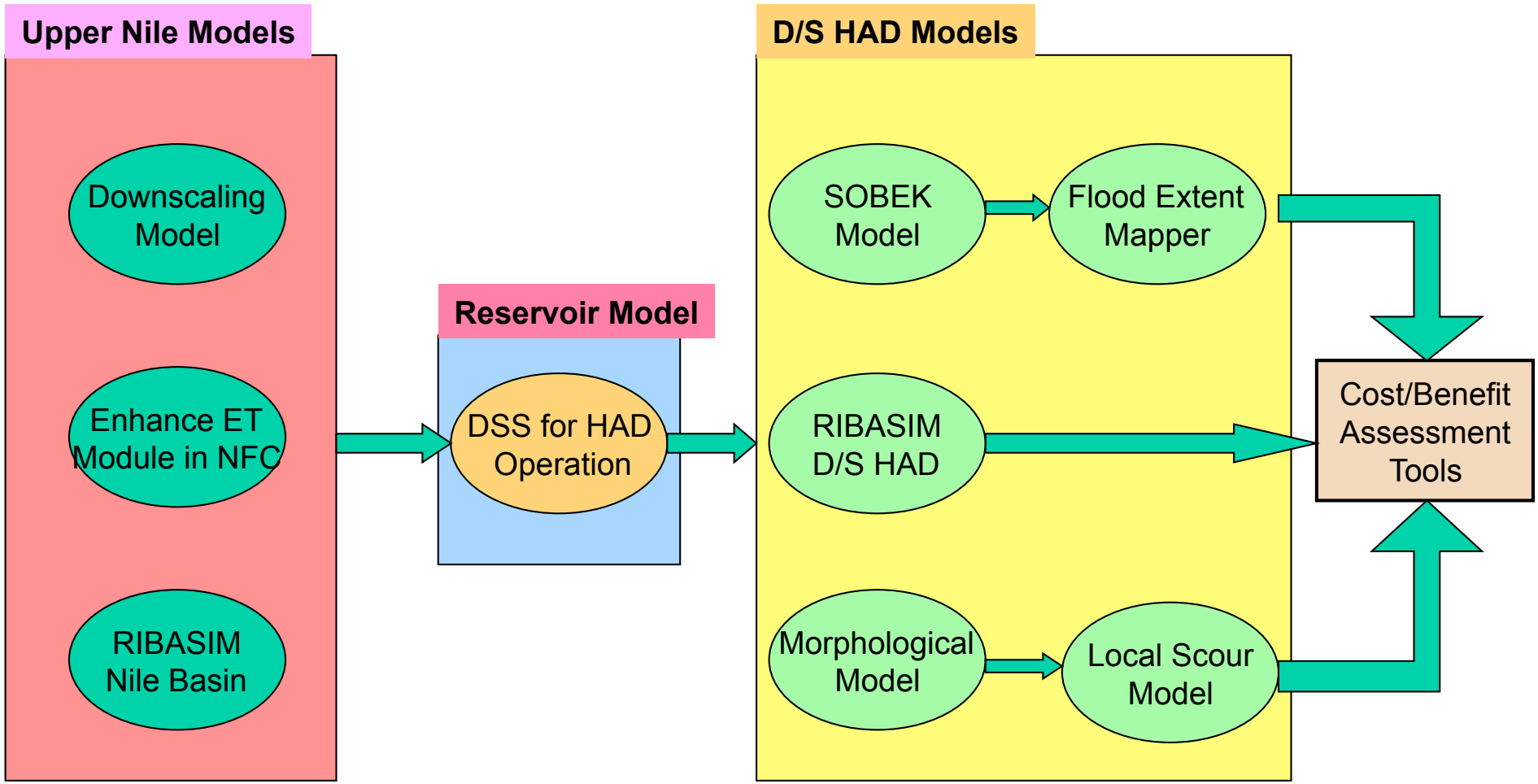
Toushka Spillway



Establishment the National Forecast Center

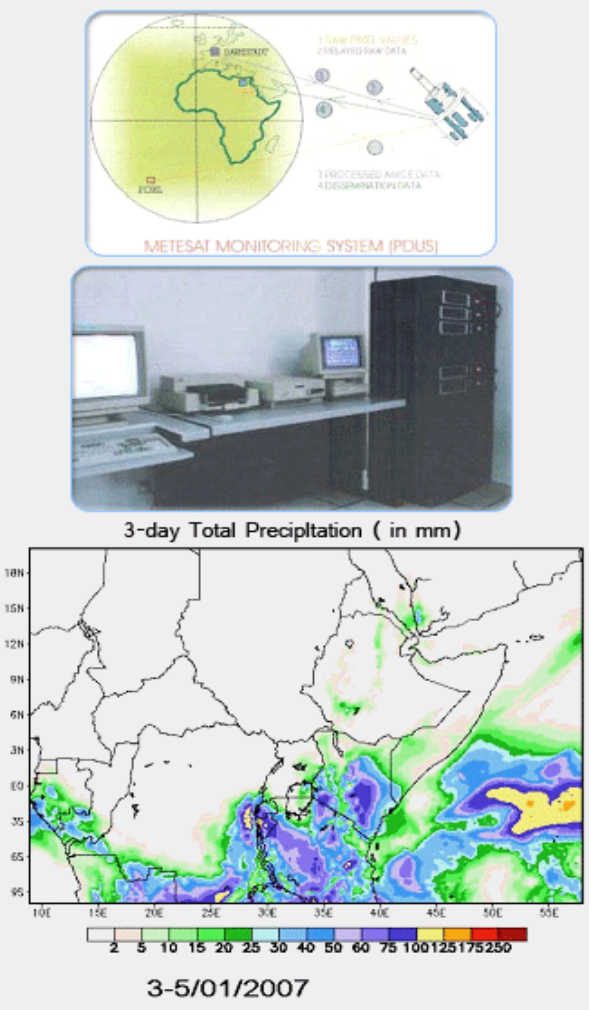


Modeling Tools in the National Forecast Center



Precipitation DOWNSCALING Model

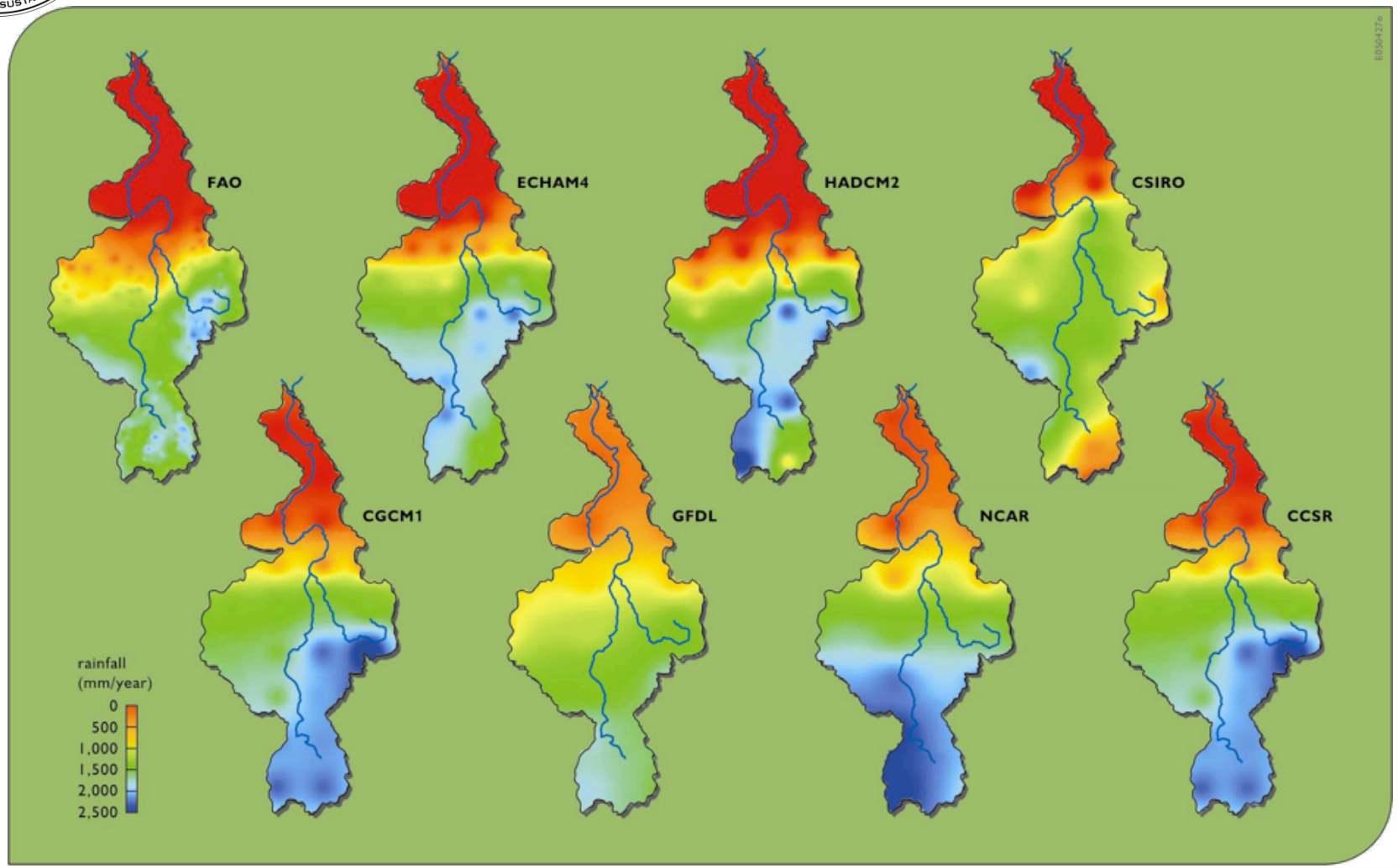
- It is effectively utilizing the results of a variety of handle the outputs from the Atmosphere- Ocean-Genera-Circulation Models (AOGCM's).
- This model will be flexible enough to reprocess a broad spectrum of precipitation estimators into consistent precipitation product



Precipitation downscaling Model

- Makes from General Circulation models a Nile grid model
- Enables climate change impact assessment (dry, central, wet)
- A new Feature added to the existing Nile Forecasting System. Enables it to handle and assess, the outputs (dry, central, wet) of numerous AOGCM

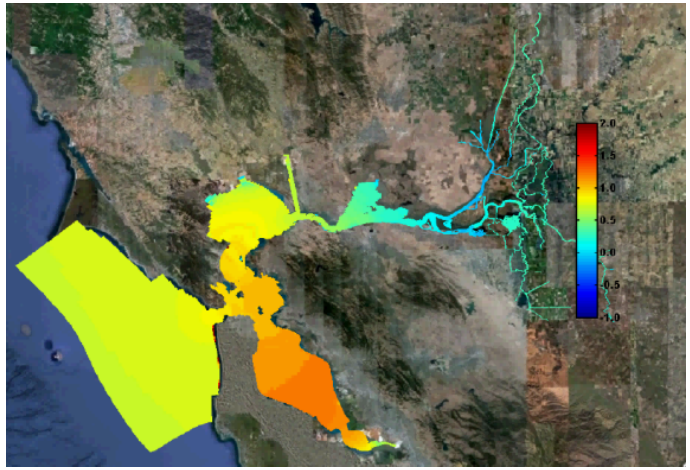
Precipitation downscaling Model Output



Empowered lives.
Resilient nations.

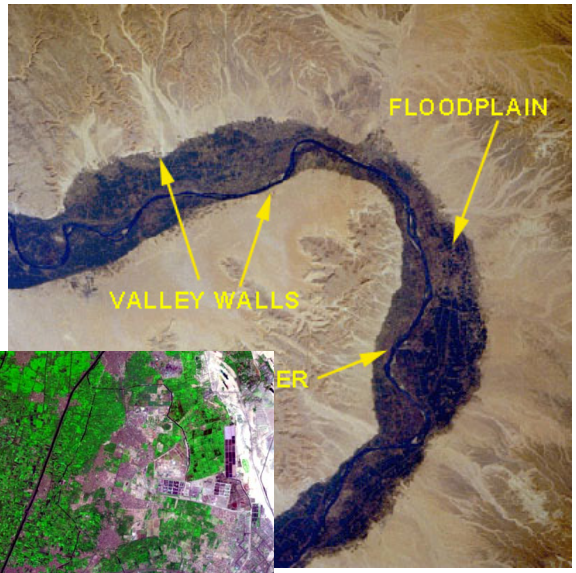
Study the Flood Risks Downstream HAD

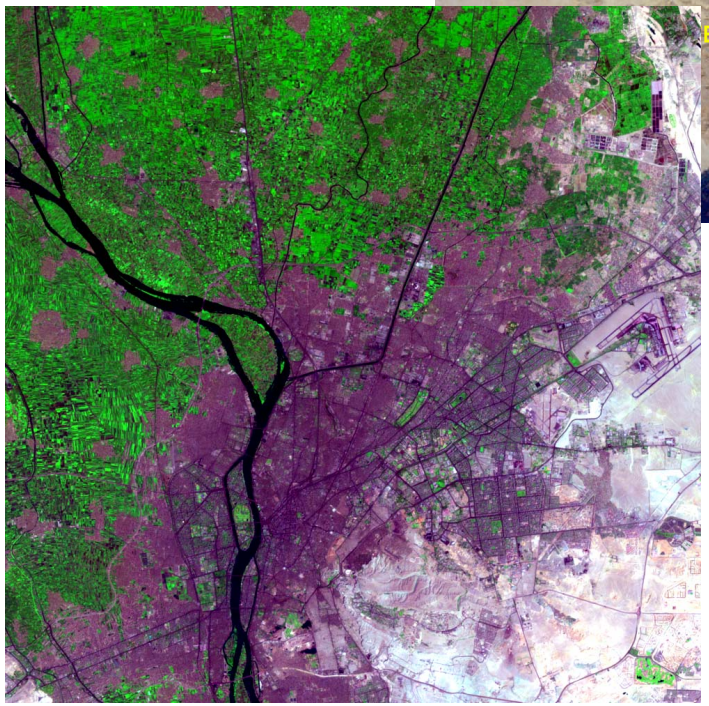
- Identify the areas of potential flood risks downstream HAD
- Using modern techniques in GIS and Mathematical models to simulate water flows along the Nile river



Study the Flood Risks Downstream HAD

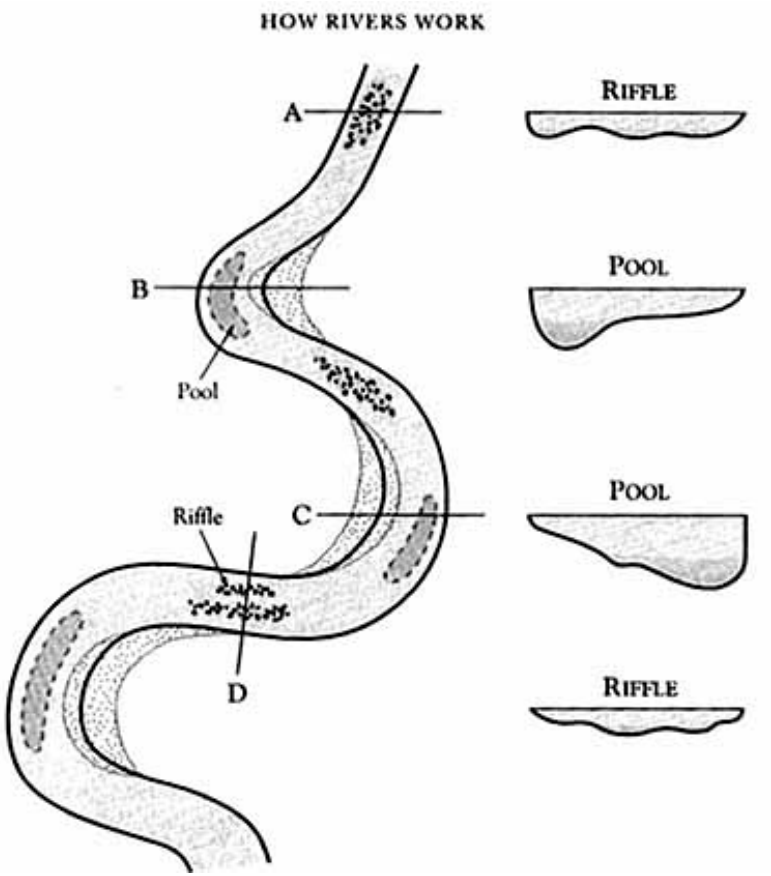
- Enhance the DEM for the Nile Valley and Delta
- Review and Update the Land Use Maps
- Production of Cross-sections of the Nile river and the Flood Plain





Adapt the River flow Model (SOBEK)

- SOBEK is one dimensional model developed by the Netherlands Public Works Department and Delfet Hydraulics
- Estimating of the water levels along the Nile River course
- The schematization of the Nile River described as a system of reaches interconnected by nodes

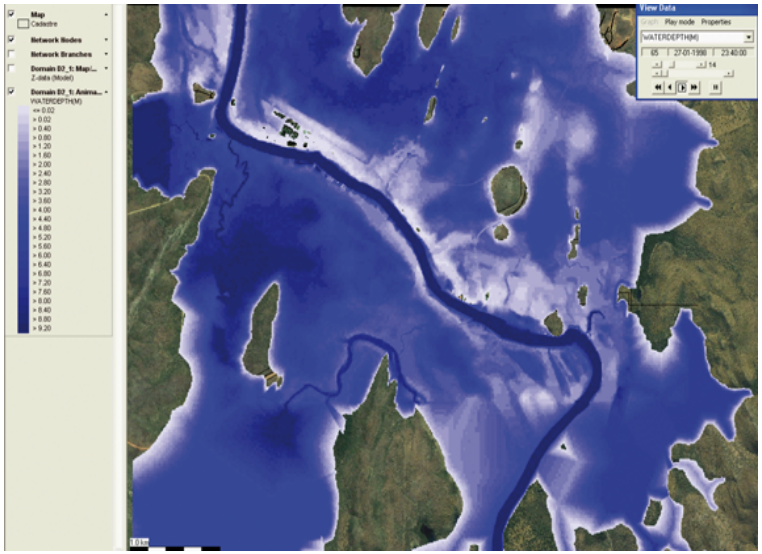


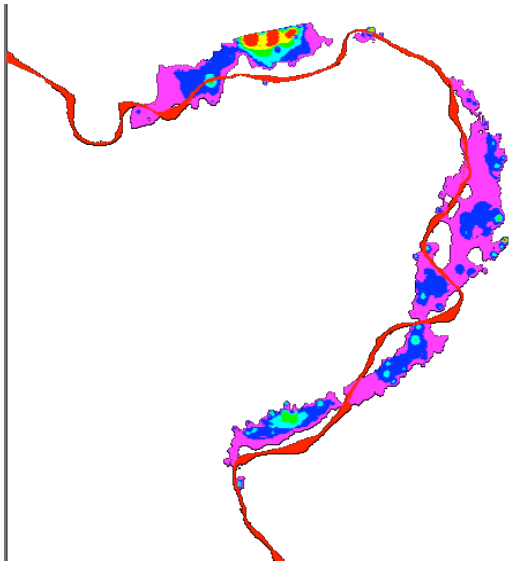
Calculate the potential damage from Flood water

- The SOBEK model results will be converted into depths of water using model called Flood extend mapper
- determine the area of land that will be affected by this water in the river valley and Delta
- The Interpolation of cross-section averaged water levels to the DEM grid points and produces the first draft of the flood map by subtraction of terrain elevations from water surface
- Overlap the Land use layers over the DEM layer

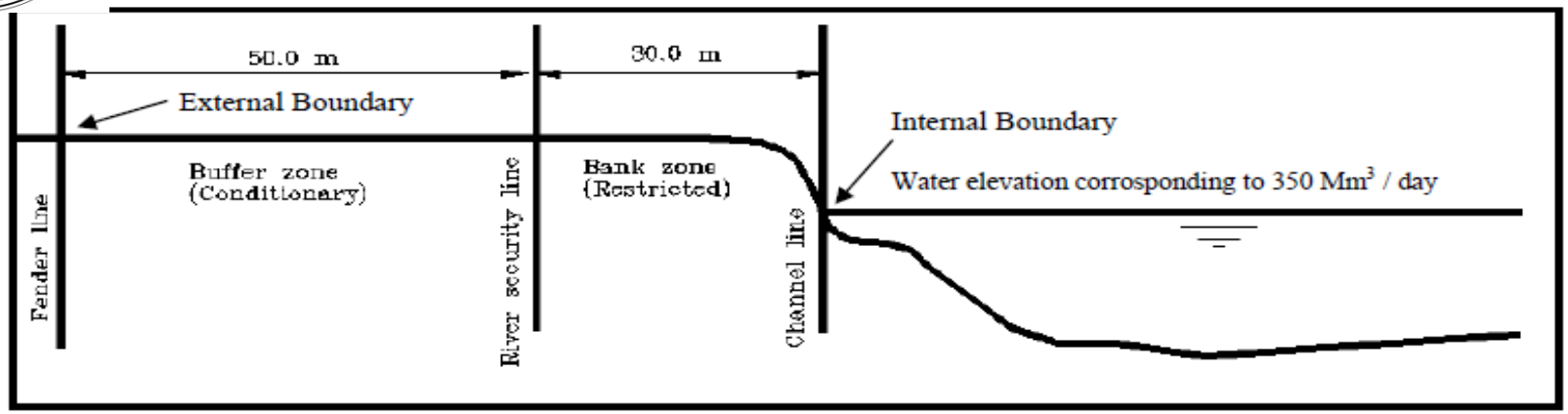
Risk Assessment Tools

- Data collection for flood damage model
- Definition of damage types
- Estimation of maximum damage per type
- Prepare report on flood damage modeling
- Meetings to discuss the damage modeling concept and content
- Functional design of cost-benefit assessment tool





The River Cross-section Buffering zones



- **Channel Line** is the line that defining the point of intersection of water surface corresponding to the passing discharge of 350 million m3 /day (max. allowable Discharge).
- **River Security Line** is the located line at 30 m distance from the Channel Line.
- **Bank Zone** is the located land between River Security Line and Channel Line which is prohibited for any type of constructions.
- **Fender Line** is the located line at 50 m distance from the River Security Line.
- **Buffer Zone** is the located land between the Fender Line and River Security Line where the construction and activities are conditioners

UNDP/GEF EU
KURA ARAS
IWRM ACADEMY
INTEGRATED WATER RESOURCES MANAGEMENT
COORDINATION FOR A SUSTAINABLE FUTURE

Thank you !!!

Empowered lives.
Resilient nations.