Greater Accra Resilient and Integrated Development Project –

Modelling from Risk Mitigation Strategy to Investment Planning to Project implementation

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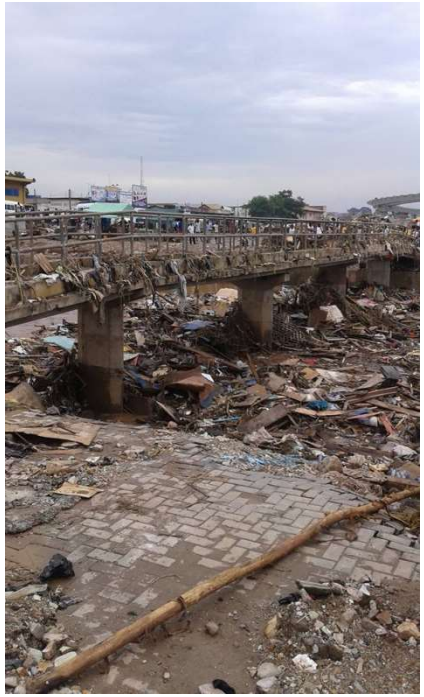
Trigger and Precedence

- June 3rd flood event
- Post-disaster impact assessment (damage & repairs)
- City Strength diagnostic
- Greater Accra Climate & Disaster Mitigation Strategy & Investment Planning
- GARID project
- Phase 1 – Odaw Basin (271km^2)

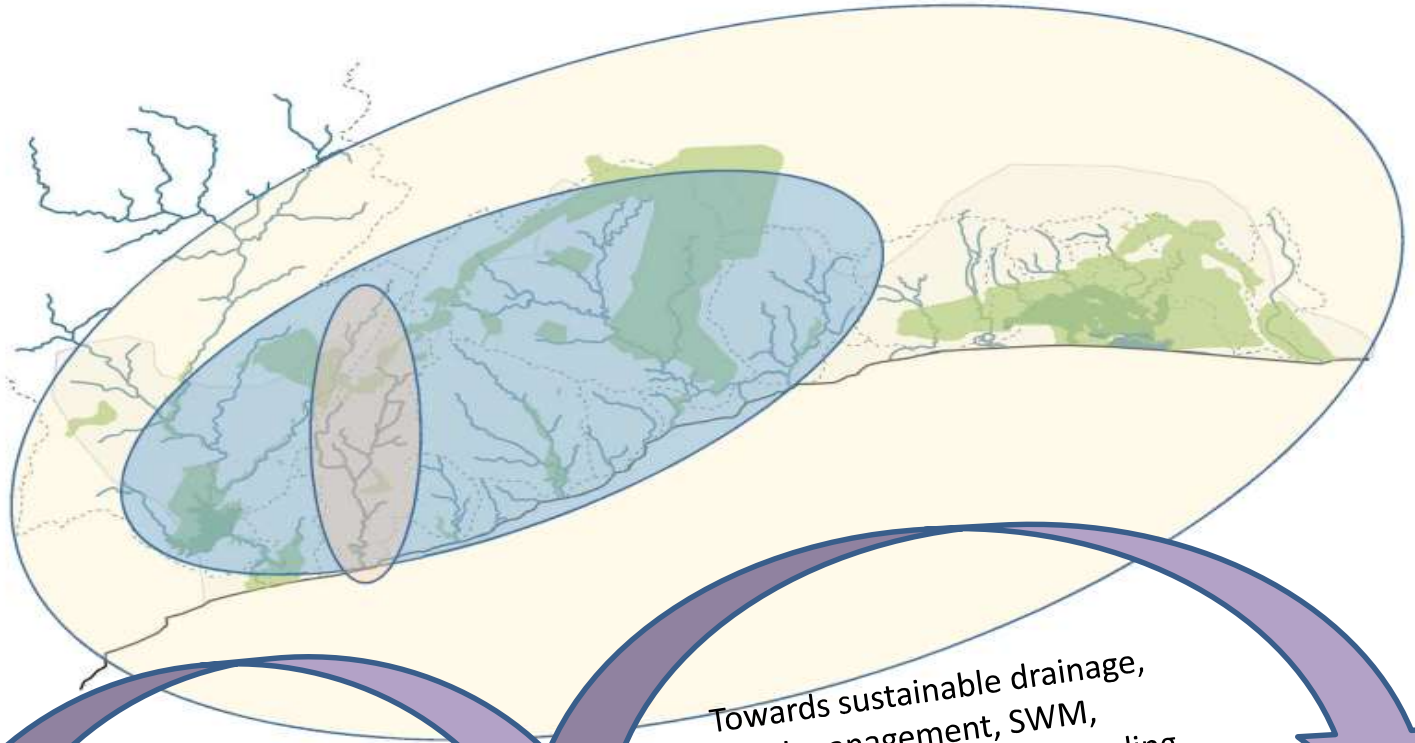


MINISTRY OF WORKS
AND HOUSING

MINISTRY OF SANITATION
AND WATER RESOURCES

- GARID has 4 components:
  1. Flood protection
     a. Structural (drainage infrastructure for flood protection)
     b. Non-Structural (Flood early warning system)
     c. Flood protection component was developed within the project: Greater Accra Climate and Disaster Risk Mitigation Strategy and Investment Planning (GARID-FP)
  2. Waste management
  3. Slum upgrading and metropolitan planning and coordination.
  4. Project management

Program Approach: Series of projects



Scale up to Greater Accra, Tap into increased confidence of private sector and other donors

Towards sustainable drainage, flood management, SWM, informal settlements upgrading & metropolitan systems

II-Scale up in Greater Accra Region – IDA, Private Sector, Donors

1b- Odaw basin – GCF potentially

III- Scale up, Systems; - IDA, Donors, PPP, Guarantees

1a- Odaw basin – IDA/SECO/AFD/ Dutch

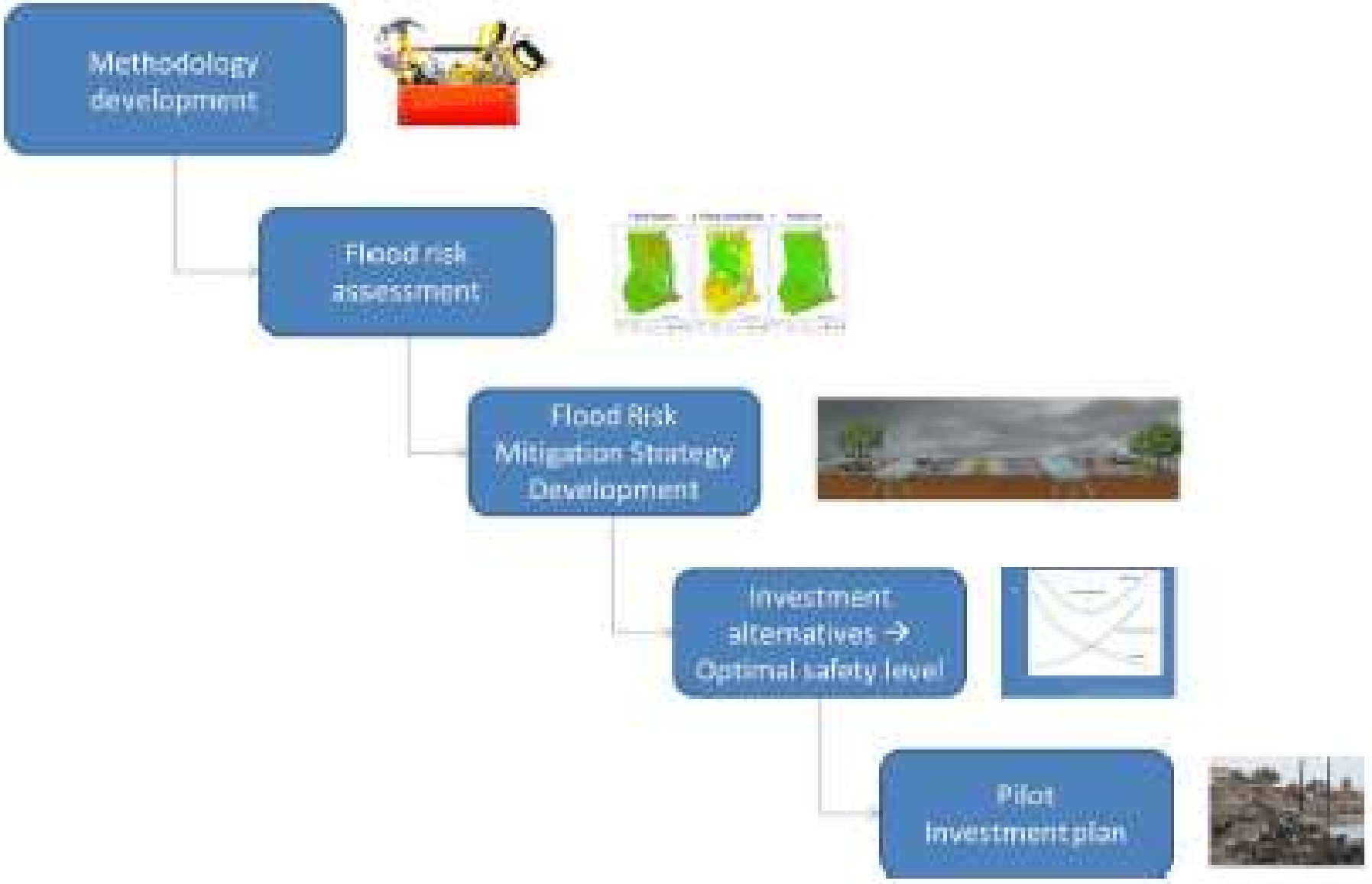
IDA - Donors – Private sector –

YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	YR11	YR12

GARID-FP main objectives

- Develop an **objective** evidence based decision making framework for flood mitigation interventions in Accra (Odaw basin)
  - science, data and model based
  - quantified cost benefit analysis (economic impact)
  - Multi Criteria Analysis with many stakeholders
- Develop a realistic pilot **investment plan** (with a set of measures)
  - main conditions used
    - Budget, and
    - Safety level (at least 1:10 years safety against floods)

GARID-FP Method



Models developed

- Flood model of Odaw (including high flood risk areas)
- Damage model of Odaw
- Climate and urbanisation model

- Main source of data: June 3rd flood event , including findings from impact assessment directly after the disaster

Main challenge: how to calibrate or validate the models?

Models developed

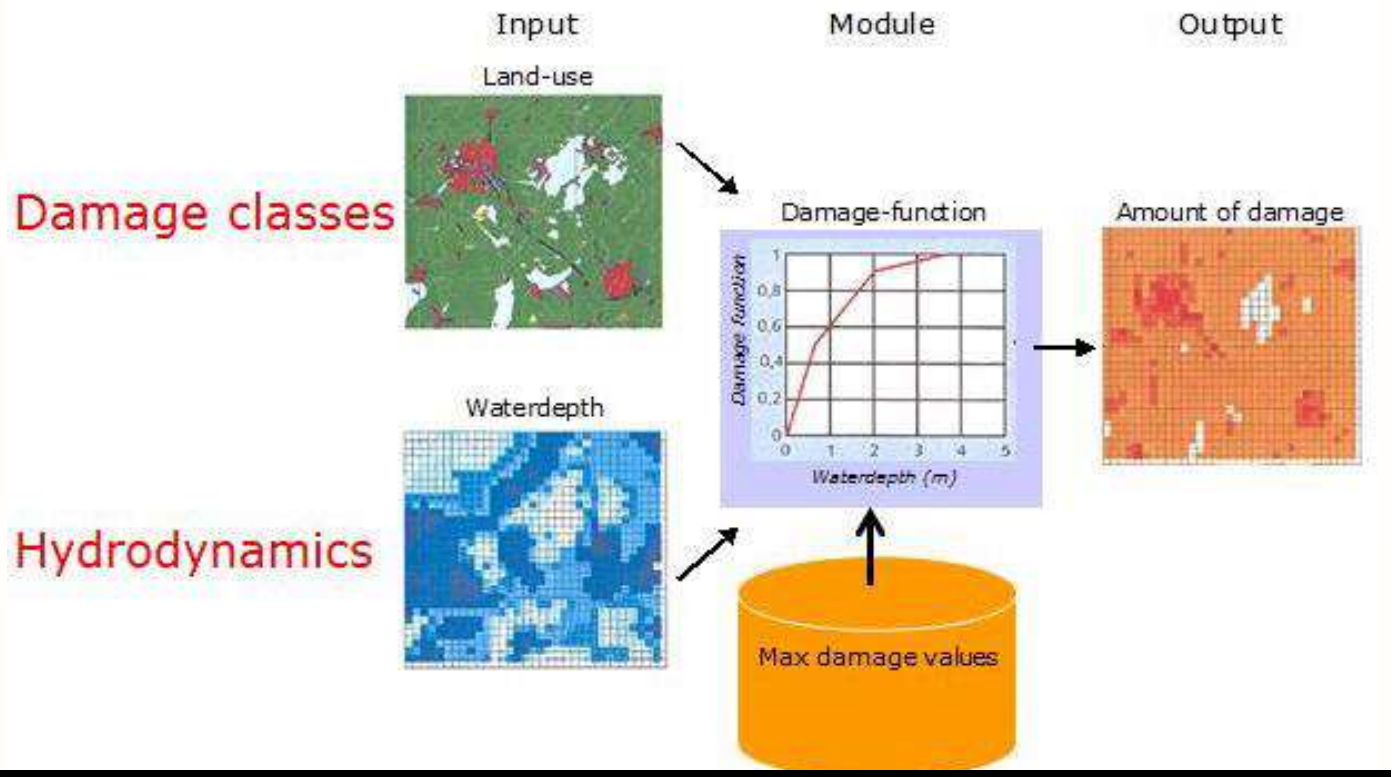
Flood model of Odaw (including high flood risk areas)

- Main source: June 3rd flood event , including elaborate impact assessment directly after the disaster
- Data used:
  - Elevation model to capture the runoff and inundations (Level 2)
    - No LiDAR
    - DTM purchased (World DEM)
    - No recorded data on water levels or discharges measured since early 1990s.
  - Drain geometry to capture the hydraulic processes in the drains
  - Meteo data: observation 2015 and statistical data from GMET (Intensity Duration Frequency Curves)
  - The flood model was calibrated for the 2015 event using the following info:
    - Experts (who where there)
    - Photos, videos, internet
    - Interviews, field visits

Models developed

Damage model of Odaw

- Data used:
  - Impact assessment 2015 event (including damages and people affected)
  - Different types of economic figures validated by national experts



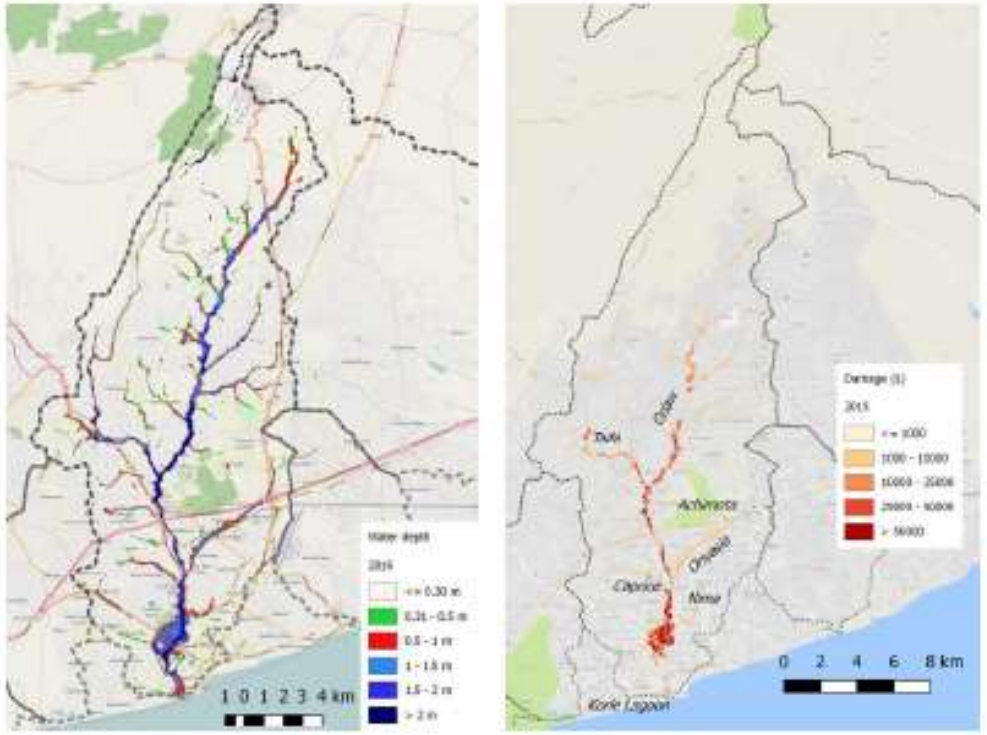
Models developed

Climate and urbanisation model

- World Bank climate portal for climate scenarios
- Urban growth model in GIS

Result

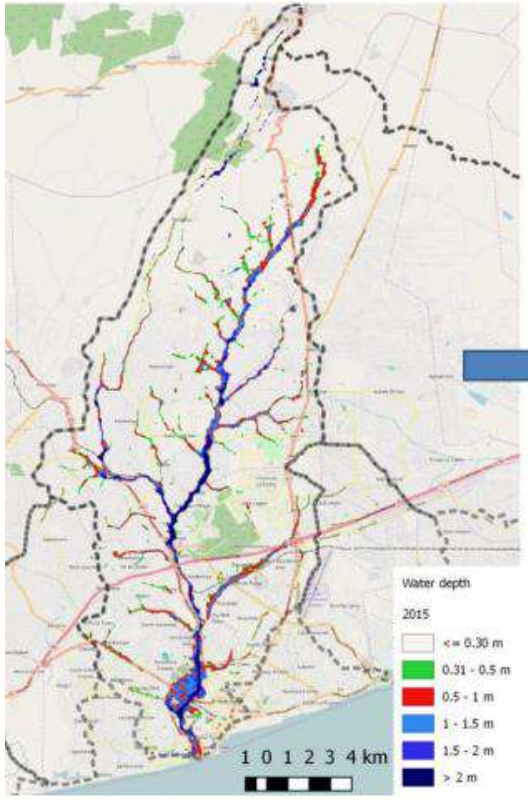
- Accepted set of modelling tools that represent the impact of the flood event of 2015
- Accepted set of scenarios for different return periods and climate scenarios
  - 1:10; 1:25; 1:50



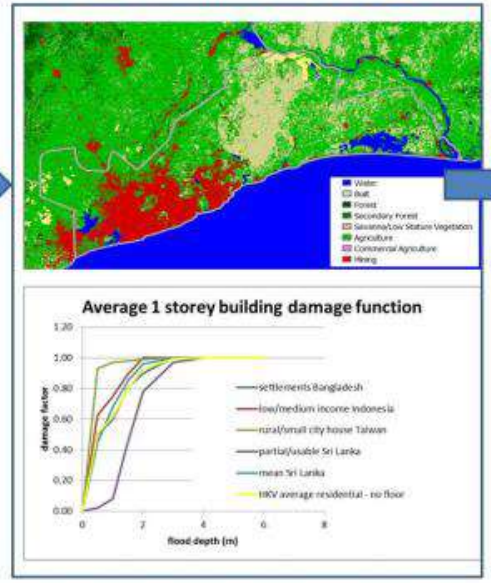
Result

- Modelling tools used to determine the risk reduction caused by interventions

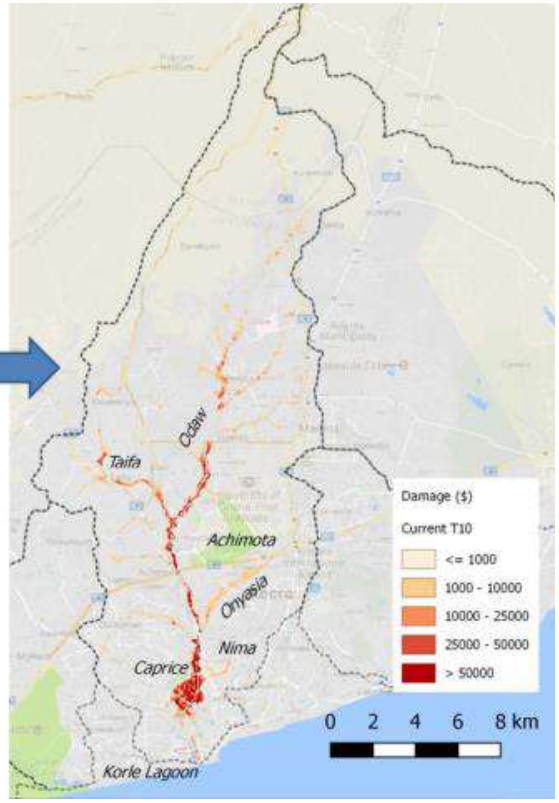
Flood model



Damage model



Risk (damage $/year)



Conclusions

- Successful assessment as it led to an approved loan
- Recent disaster (2015) and impact assessment right after the disaster was invaluable
- Good cooperation between consultants and national experts (public service)
  - Local expertise limited (found in Universities than consulting firms)
- Pragmatic and effective use of data (relative cheap elevation data and local expertise) combined with state of the art tools (hydraulic flood model and damage model)

Lessons learnt

- Flood / disaster assessment directly after event
- An expert assessment of the data needed for a particular assessment can save a lot of money and efforts: tailor the data and tools to the study objective
- Local institutes should store and collect data before during and after floods (drains, geometry, flood marks and so on):
  - Go into the field and start observing and surveying.
  - Simple tools like QGIS, GPS and camera help a lot
  - Metropolitan level coordination more cost effective

Next Steps

- Engineering Consultant being recruited to undertake detailed engineering designs for interventions in Odaw Basin only
  - validate modelling results
  - LiDAR (March 2020)
  - Detailed engineering design
- Model for entire watershed hydrology of Greater Accra (8 other basins), including upstream and downstream areas and possible tidal influence, has not yet been developed
  - Phase 2 & 3 focus (3,428km^2)