ASSESSMENT OF CLIMATE CHANGE IMPACTS AND ADAPTATION MEASURES TO MALWATU OYA RIVER BASIN IN NORTH CENTRAL PROVINCE OF SRI LANKA

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Outline of the Presentation
• Malwatu Oya River Basin
• Flood and Drought in Malwatu Oya Basin
• Flood and Drought Risk Analysis of the Basin
• Proposed Interventions
• Conclusion

Malwathu Oya Basin Description
➢ Annual discharge to sea: 192 MCM
➢ Administrative Districts: 4 (Anuradhapura, Mannar, Vavuniya, Matale)

Malwatu Oya Basin - Major Reservoirs

Malwatu Oya Basin
• North Central, Northern and Central provinces
• Catchment area - 3,187 km²
• Main River - 164 km
• Second Largest River Basin
• Large no of Minor reservoirs - 1,450
• Average rainfall - 1,200 mm

Irrigation systems in Lower Basin

Thakham Anicut
Irrigable Area - 17,000 ha
No of Major tanks - 62
No of Minor tanks - 201
Middle Basin - Anuradhapura City

- The main land use change - historical conversion of lowland forest to agriculture and regrowth vegetation by shifting cultivation.
- Conversion to commercial agriculture.
- Main land use issues are related to the relatively heavy use of agrochemicals and the potential for nutrient accumulation.
- Lowering of the water table by dry season extraction.
- Results in water shortages in the Yala season and inland salinization.
- The main source for water supply in basin is groundwater.
- 2011 census, around 75% of people depend on groundwater from dug wells and tube wells.

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Flood & Drought in Malwatu Oya Basin

- Historically the Malwatu Oya basin has been subjected to droughts.

Historical Flood Level at Thekkam

- Lower annual cropping intensity
- Lower yields
- Increased crop insecurity
- Conflict among sectors

Agricultural Productivity of the basin
Flood & Drought Risk Analysis in the Malwatu Oya Basin

- Economic cost of climate change in the Malwatu Oya basin - calculation of Annual Average Damage (AAD).
- Damage values for the categories of economic assets - public infrastructure (roads, railways, flood embankments), agriculture, building fabric, building contents and vehicles.
- Flood hazard maps - powerful tool to assess the current and future risk of flooding.
- Used to support strategic policy decisions for prioritizing investment.

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<th>Case</th>
<th>Climate Condition</th>
<th>Basin Condition</th>
<th>Flood Risk Annual Average Damage USD M</th>
<th>Drought Risk Annual Average Damage USD M</th>
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Proposed Interventions

- Nachchaduwa Reservoir –
  - Increased spill gates discharge capacity into the Malwathu Oya.
  - Intervention comprises the replacement of the existing hydraulic gates with larger gates (wider and deeper gates with lower sill levels).
  - To maximize the potential to drawdown Nachchaduwa Reservoir prior to flood event.
  - Operational regime changes to include drawing down reservoir levels prior to large rainfall / storm events.

Conclusions

- Proposed interventions – need to tested at the feasibility stage.
- Optimizations – based on cost and benefits.
- Nachchaduwa reservoir operations can be further improved with the accurate quantitate rainfall forecast.
- Then, develop the reservoir operation rule curves.
- Technically and economically viable, and also the environmental and social impacts are low.