

Middle Basin - Anuradhapura City



3rd World Irrigation Forum
1-7 September 2019, Bali, Indonesia

7

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10

Malwatu Oya Basin

- 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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8

Historical Flood Level at Thekkam



11

Flood & Drought in Malwatu Oya Basin

- Anuradhapura, the ancient capital city of Sri Lanka has experienced severe floods in 1923, 1957, 1979, 2011, 2014 and 2016.
- Historically the Malwatu Oya basin has been subjected to droughts.
- Such events were recorded in 1947/48, 1952/53, 1955/56, 1972/73, 1978/79, 2003/04, 2012, 2014 and 2016.

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9

Agricultural Productivity of the basin

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



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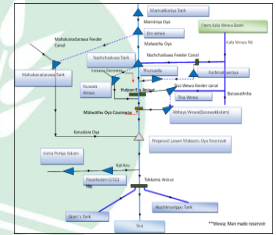
12

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.

Proposed Interventions

- Nachchaduwa Reservoir –
 - Increased spill gates discharge capacity into the Malwatu 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.

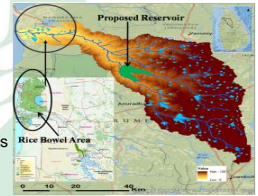


Flood and Drought Risk Analysis in the Malwatu Oya Basin

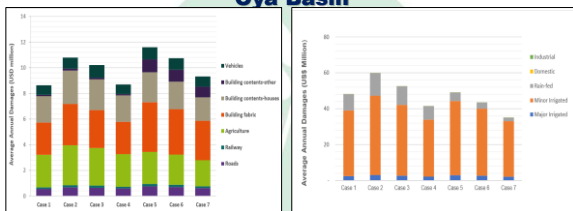
Case	Climate Condition	Basin Condition	Flood Risk Annual Average Damage USD M	Drought Risk Annual Average Damage USD M	Total Annual Average Damage USD M
1	current	current	8.6	48	56.6
2	2040 – Pessimistic	current	10.8	60	90.8
3	2040 – Average	current	10.2	53	63.2
4	2040 – Optimistic	current	8.7	42	50.7
5	2040 – Pessimistic	with planned development	11.6	49	60.6
6	2040 – Average	with planned development	10.8	43	53.8
7	2040 – Optimistic	with planned development	9.3	35	44.3

Proposed Interventions

- Construction of new reservoir with a 209 MCM at the middle basin, below the Anuradhapura town
- To mitigate impact of the flood and drought at lower Malwatu Oya basin.
- It will be beneficial to increase cropping intensity of lower basin irrigation schemes (Giants tank and Akathiemuruppu),
- To ensure the drinking water facilities around the areas and lower basin.



Flood and Drought Risk Analysis in the Malwatu Oya Basin



Flood Risk Annual Average Damage & Drought Risk Annual Average Damage under basin condition and climate change scenario

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

