

"Mainstreaming Climate Change into EIA/SEA: Case Study of Flood and Drought Mitigation Investment Plans in Sri Lanka"

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Abstract

Sri Lanka being a small island in the Indian Ocean faces significant threats from climate change and resultant extreme weather events. This is evident by increased frequency of catastrophic weather events such as cyclones, droughts and unprecedented rain in the country. While this affects almost all the economic sectors in the country, farmers and agricultural workers face the worst impacts of this variability. The frequency of flood and drought incidents has been increasing remarkably during the last ten years in Sri Lanka. In May 2017, heavy rainfall due to the South-West monsoon resulted in severe flooding and landslides affecting 15 out of 25 districts in Sri Lanka. A total of 595,554 persons were affected, 213 people died and 79 people reported missing.

Hence one of the major problems Sri Lanka currently faces is the flood management of major river basins. The widely adopted temporary flood proofing method is the traditional sand bag dike which is inadequate to serve for the purpose. Hence proper river basin investment plans to mitigate flood and drought is an arguent requirement at present. However the nature of these proposed interventions may lead to the irreversible changes to the existing environment. Hence carrying out a SEA prior to finalizing the river basin investment plans will be ideal.

This article describes a case study from the SEA carried out for the development of Flood and Drought Mitigation Investment plans for the Mundeni Aru River Basin in Sri Lanka. The SEA study has broadly examined in an integral manner the linkages and cumulative impacts of the proposed interventions of the basin plan on ecological, hydrological, social and other environmental aspects.

1. Introduction

1.1 Back ground to the SEA process in Sri Lanka

In Sri Lanka, project level Environmental Impact Assessment has been effectively implemented since 1993. Although EIA is effective in addressing environmental impacts at the project level, it often fails to take in to account cumulative, synergistic and long term impacts of projects. EIAs often address only limited range of impacts such as project's direct impacts, because EIAs take place once many strategic decisions have already been made. SEA can deal with many of these difficulties. Hence realizing the importance of introducing and implementing SEA in Sri Lanka, a cabinet decision was taken in May 2006 to direct all government agencies to undertake SEA for all national policies, programs and

plans before implementation. The Central Environmental Authority was instructed to prepare guidelines for Strategic Environmental Assessment and implement the guidelines under the provisions of the National Environmental Act.

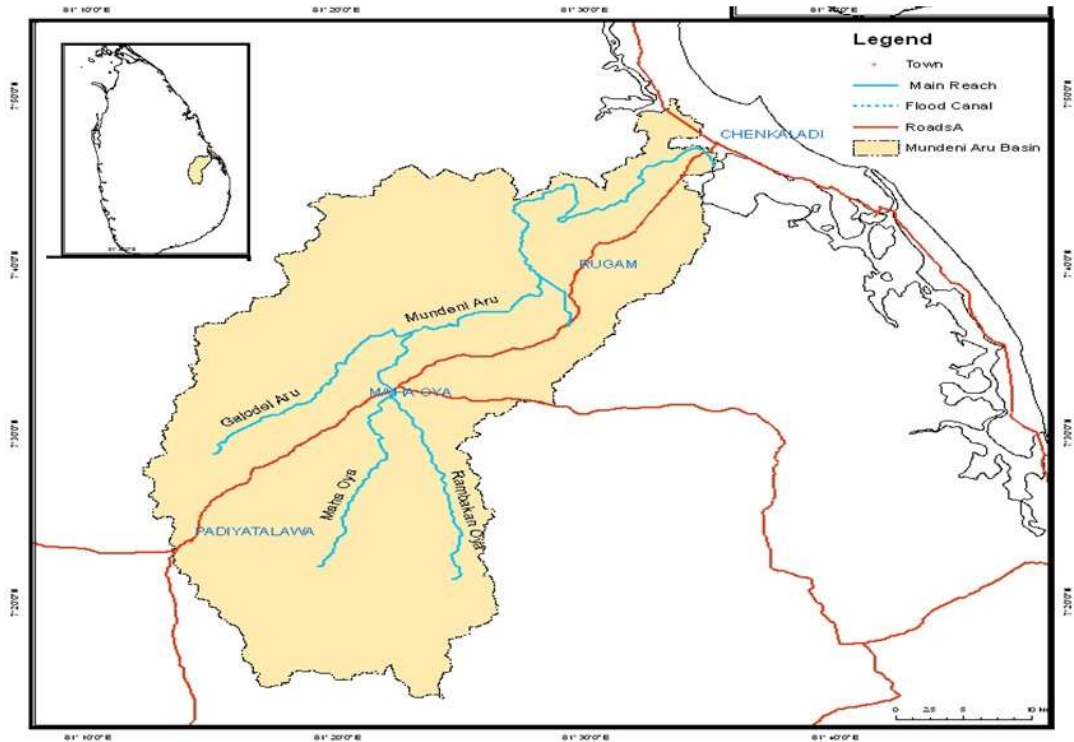
Although SEA is not a mandatory requirement in the country several SEA studies have been carried out in Sri Lanka as per the cabinet decision. However these studies were basically carried out for preparation of land use plans.

1.2 SEA for the Basin Investment Plan for Flood and Drought Mitigation of Mundeni Aru River Basin

The study was initiated by the Climate Resilience Improvement Project which functions under the Ministry of Irrigation and Water Resources Management with funding from the World Bank. The overall objective of the SEA is to ensure that environmental and social concerns are appropriately and adequately integrated in the prioritization, planning and implementation of structural and non structural interventions for flood and drought risk mitigation proposed in the basin investment plan.

Hence the study was focused on following aspects

- Identify, assess and describe the likely significant effects on the environment of the basin in implementing the basin investment plan.
- Provide the government agencies/implementing agencies with relevant knowledge and information (both qualitative and quantitative) to assess the adequacy of environmental considerations and safeguards measures to be incorporated with the proposed interventions of the basin investment plan.
- Assess the degree to which the existing policies, laws and regulations and the institutional capacities of government of Sri Lanka applicable to address major environmental sustainability challenges related with the flood and drought risk mitigation.
- Recommend at strategic level on how potential, negative social and environmental effects can be minimized and how positive effects can be optimized.



Location Map of the Mundeni Aru River Basin

1.3 Mundeni Aru River Basin

Mundeni Aru River Basin is located in the Eastern Province of Sri Lanka covering Ampara and Batticaloa Districts. The River basin consists of a watershed area of approximately 1,350 sq km in extent. The river flows to the sea from the shores of the Batticaloa lagoon and Valachchanei Lagoon. The river carries a large part of its annual rain flow during the North – East Monsoon period, resulting in the flooding in the valley and downstream.

Three types of flooding have been identified in the Mundeni Aru River Basin

1. Flooding due to river flooding
2. Flooding due to swelling of lagoons
3. Flooding due to direct rainfall (Local inundation due to short heavy storm events)

The majority of people living in Mundeni Aru River Basin area are farmers. They are also severely affected by droughts during dry period from April to September. Water shortage is experienced for both domestic and agricultural purposes. People utilize dug wells, tube wells, common wells, water holes and agricultural wells to fulfill their domestic water requirements.

1.4 Proposed interventions

Proposed interventions for flood and drought mitigation could be summarized as follows.

1. Increasing flood detention in the upper part of the catchment through construction of new reservoirs/tanks (Galode Reservoir, Maha Oya Reservoir, Magalwathuwan Reservoir & Kalugal Oya reservoir)
2. Increasing capacities of existing reservoirs. (Amalgamation of the Kitul Wewa and Rugam Reservoirs & raising the spillway of the Maduru Oya Reservoir)
3. Increasing the discharge from the Baticaloa and Valachchanei lagoons through dredging and construction of diversion canals.
4. Protection of vulnerable areas through construction of flood bunds at selected location of river banks.
5. Implementation of non structural measures such as zoning, awareness creation & flood warning

2. Methodology adopted

2.1 Environmental baseline

Present status of the Mundeni Aru River basin was studied using existing special and non special data. These included the river system and the tank system in the Mundeni Aru basin, hydrology, geology and soil, climate aspects, terrestrial, aquatic and marine eco systems including lagoons, villus, mangroves and estuaries within the river basin. Several legally protected areas which have been declared as conservation forests, national parks such as Maduru Oya, and Gal Oya National Park located within this region were also studied. Field surveys were carried out to verify the information collected. In order to analyze the impacts of interventions on the basin as a whole, the maps of the proposed interventions was overlaid with the maps of the environmentally sensitive areas including forests areas, protected wildlife areas geology soil, archaeology sited etc. In addition social impacts due to involuntary relocation and loss of lively hood during the implementation of proposed interventions have been considered. A comprehensive social assessment was undertaken, following the accepted assessment approaches and a participatory consultation plan was drawn up with a view to creating a community awareness regarding the basin investment plan in selection locations with the participation of the relevant key stake holders.

In addition existing legal frame work in the country for flood and drought risk mitigation was reviewed and institutional capacities and mechanism to implement the proposed interventions was also analyzed.

2.2 Scoping study

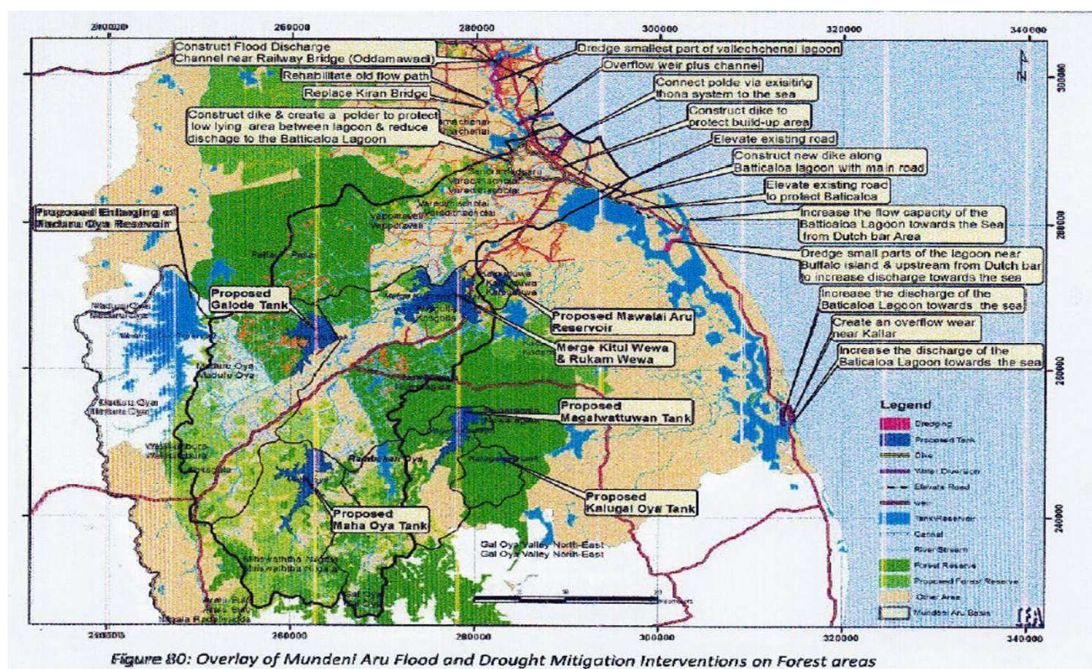
A scoping study was carried out to decide the scope of the report and following impacts have been identified as the major impacts on the river basin from implementing the proposed flood and drought mitigation interventions.

- Impacts on terrestrial and marine ecology, protected areas and sensitive habitats
- Impacts on hydrology and hydrogeology
- Social impacts including loss of livelihood and involuntary relocation of people
- Impacts on agriculture
- Beneficial impacts due to flood and drought mitigation and increased agricultural production

The above mentioned areas have been focus on the SEA report and major impacts due to proposed interventions and some of the mitigations suggested are summarized below.

3. Environmental impacts and mitigation measures

3.1 Loss of forests



Overall loss of forests due to the proposed interventions is inevitable and irreversible. Construction of Maha Oya Reservoir (80 MCM) will inundate approximately 40 ha from Ellegoda Forest. Construction of proposed Galode Aru Reservoir (75 MCM) will inundate approximately 900 ha. of the Maduru Oya National Park which includes dry forests, grasslands and riverine vegetation. Much of the area inundated under the Magalwattuwan

reservoir will comprise rural home gardens and cultivations hence no serious forest loss would occur. Short riverine forest located in between the two existing reservoirs will be permanently inundated as a result of the amalgamation of Rugam-Kitul Reservoirs (65MCM). The removal of forest and riverine vegetation will result in permanent loss of feeding, roosting and nesting habitat of wildlife, which will have adverse long term impacts

Mitigation

Overall loss of forests due to proposed intervention is inevitable and irreversible. National parks should not be disturbed or if social benefits override ecological benefits should be reduced to the bare minimum. Diversion canals should not be widened and should always only be constructed in migratory paths not used by animals. Replanting native trees in abandoned areas particularly adjacent to the affected forests and along the water channels would with time provide refuge for the displaced wildlife.

3.2 Aggravation of Human – Elephant Conflict

Elephant herds are more abundant in close proximity to the forest areas of Mundeni Aru River Basin. At present most lands are not cultivated during the Yala season because of the scarcity of irrigation water and elephants use fallow lands during the non cultivating season. With the proposed augmentation of the irrigation water supply to these areas farmers would cultivate their lands in both Yala and Maha Season. This situation may lead to human-elephant conflict specially, in the dry season as the elephants would be attracted to palatable crops when the fodder in the dry forests becomes scarce.

Mitigation

Mitigation the human elephant conflict has become virtual impossibility. The best way to avoid this or minimize is to prevent the impingement of their territories or to create more habitats and migratory pathways for the elephant to move unhindered.

3.3 Pressures on protected areas

Many Chena cultivations are found within protected areas. However these are at present not as detrimental since farmers move out from their temporary shelters during the prolonged dry season when they do not have any crops. Many of these are on state lands and are operated on a permit system although some are illegal. However the situation would become detrimental when water provisions enable cultivation throughout the year.

Mitigation

Chena cultivation within forested areas should be discouraged. The farmers should be moved to lands outside the reserves and strict buffer zones should be put in place. Incentives and attractive relocation schemes may also help.

3.4 Impacts on dredging

Dredging has been proposed in Batticaloa and Valachchanei Lagoons will affect the benthic flora and fauna and lagoon fishery. In addition dredging may affects the water quality of lagoon. Disposal of dredged material is also a problem as it may badly impact on sensitive habitat such as sea grass beds mangroves etc.

Mitigation

Dredging of the lagoon should be done only after the proper modeling as well as proper cost benefit analysis conducted. It is important to adopt recently innovative dredging designed to minimize environmental impacts and enhance the ecological settings of the lagoon.

3.5 Hydrological Impacts

Most of the hydrological impacts are positive because of the interventions which leads flood and drought mitigation and overall hydrology of the area will be improved.

3.6 Social & Agricultural Impacts

A total of 683 families will be displaced due to proposed interventions. However the proposed reservoirs will expand the irrigable area of the country by about 5,760 ha and in addition water will be supplied to another 3,240 ha of paddy fields to cultivate 2 seasons per year accordingly additional 81,000 Mt will be added to the national production.

The cattle keeping system in the areas will be seriously affected by the proposed reservoirs. About 50,000 will lose nearly 7,000 ha of scrub and forest lands and 6,400 ha of seasonal harvested paddy lands with the commencement of the project.

Mitigation

Displaced people will be relocated at suitable sites and provided with irrigable lands assuring 2 season cultivation. Declaration of common grazing lands in villages where large cattle herds are available prior to commencing of the proposed interventions.

4. Conclusion

The SEA has revealed that the major impacts of proposed inventions for flood and drought mitigation are on ecology, agricultural aspect as well as social impacts due to resettlement and loss of livelihood. The proposed reservoirs will contribute to both flood and drought mitigation. Construction of the reservoirs will also have substantial benefits in terms of agricultural production as large extent of new lands could be irrigated in addition to increasing of cropping intensity of existing lands. Except in the case of proposed new Galode Reservoir which will result in the inundation of the considerable extent of the Maduru Oya National Park, the impacts arising from the other reservoirs would be avoided or mitigated to acceptable level. The proposed dredging of Batticaloa and Valachchanei

lagoons could negatively affects the lagoon bio diversity and water quality in particular. The proposed flood bunds at vulnerable areas have no severe impacts in the environment.

It is also revealed that the existing legal framework in the country is sufficient to tackle the environmental issues that may arise during the implementation of the proposed interventions. Most of the interventions suggested required to undergo full scale EIA/IEE According to the legal provisions in the National Environmental Act and the Coast Conservation Act. The SEA study has identified most significant impacts of the proposed interventions and it is expected that the EIAs will study these issues comprehensively and recommends appropriate mitigation measures to avoid or mitigate such issues.

References

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