

# SRI LANKA

## Climate Resilience Multi Phased Programmatic Approach (CRes MPA)

### Disclosure of Safeguard Instrumentation—Executive Summaries

1. CRes MPA Social Management Framework
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Climate Resilience Multi Phased Programmatic Approach  
(CRes MPA)

# Social Management Framework

Ministry of Agriculture, Rural Economic Affairs,  
Livestock Development, Irrigation and  
Fisheries & Aquatic Resources Development

Sri Lanka

January 2019

# Executive Summary

## Introduction

Climate-related hazards pose a significant threat to economic and social development in Sri Lanka. The 2019 Global Climate Risk Index Report, launched at the Climate Summit in Katowice (COP 24), ranks Sri Lanka second among the countries most affected by extreme weather events. During the 2010 to 2018 period, 13.7 million people were affected by floods and 11.7 million by droughts. Available data shows an increasing trend in the frequency of flood occurrences in many parts of Sri Lanka, with 87 percent of Sri Lanka's population living in moderate or severe hotspots<sup>1</sup>. Sri Lanka's economy is also severely affected by extreme weather events, and as per current estimates, by 2050, potential impacts due to climate change are foreseen to lead to as much as 1.2 percent loss of annual GDP.

To support the GoSL's commitment and strategy relating to flood risk mitigation and enhancing resilience in prioritized basins, a Climate Resilience Multi Phased Programmatic Approach (CRes MPA) will be implemented in three Phases over a period of eight years, with objectives as follows:

- Phase I (Flood Early Warning and Upper Kelani Basin Flood Risk Mitigation Project, US US\$326 million): To enhance the capacity of the GoSL to deliver improved weather and climate forecasting and early warning system, and to reduce flood risks in the lower Kelani basin (Hanwella to Kaduwela);
- Phase II (Kelani Basin Flood Risk Mitigation Project, US\$169 million): To reduce flood risks in the lower Kelani basin (Hanwella to river mouth);
- Phase III (Basin Flood Risk Mitigation and Reservoir Project, US\$295 million): To reduce flood risks in the upstream Kelani and lower Mundeni basins.

It is envisaged that such a multi-phased approach will allow the GoSL to make required investments capable of assuring protection up to a 1 in 100-year return period event in the Kelani basin while allowing for greater adaptability through a forward-looking learning agenda.

### **Phase I of the MPA: Flood Early Warning and Lower Kelani Flood Risk Mitigation Project**

To enhance the capacity of the GoSL to deliver improved weather and climate forecasting and early warning and to reduce flood risks in the lower Kelani basin (Hanwella to Kaduwela), interventions under Phase I includes: (i) comprehensive structural and non-structural flood risk mitigation investments in the Kelani basin (Hanwella to Kaduwela); (ii) modernization of hydro-meteorological information and services, forecasting and early warning systems and improved dissemination of weather, climate and hydrological forecasts, and warnings and advisory information to key end-users and communities through continuous institutional strengthening; and (iii) development of a real-time flood operational guidelines and establishment of institutional arrangements and capacity for early warning and flood risk management.

Phase I of the MPA has five main components and will be implemented over a period of five years:

- Component 1: Flood Forecasting and Early Warning in Priority Basins (US\$ 47.4M);

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<sup>1</sup> South Asia's Hotspots, The World Bank, Spring 2018  
(<https://openknowledge.worldbank.org/bitstream/handle/10986/28723/33179.pdf?sequence=2&isAllowed=>)

- Component 2: Flood Mitigation Investments in the lower Kelani Basin (US\$ 204M)<sup>2</sup>;
- Component 3: Land Acquisition, Resettlement Assistance, and Safeguards Implementation (US\$ 65M);
- Component 4: Project Management (US\$ 5M);
- Component 5: Contingent Emergency Response Component (CERC) (US\$ 5M).

### **Objective of the SMF**

The purpose of this Social Management Framework (SMF) is to outline a framework for preparing site-specific/sub-project specific social assessments and management plans to ensure that the social risks and potential impacts associated with each phase and components of the MPA are identified, and all the key principles and policy requirements for the sound management of these risks and impacts are in place to ensure that the programme is carried out in a sustainable manner, and in accordance with the national as well as World Bank's social safeguards policies.

It is envisaged that the investments under Phase I will have to comply with the World Bank's Operational Policies, OP 4.01 (Environmental Assessment), OP 4.11 (Physical Cultural Heritage), and OP 4.12 (Involuntary Resettlement). However, since the detailed preparation of Phase II is expected to start in 2019, Phase II will have to comply with the World Bank's newly introduced Environmental and Social Framework (ESF) and Environmental and Social Standards (ESS). In addition to this SMF, a separate Environmental Assessment and Management Framework (EAMF) and a Resettlement Policy Framework (RPF) have been prepared as part of the safeguards instruments to be adopted under the Project.

### **Prevailing Socio-Economic Conditions**

*Project Area:* The Kelani River Basin area covers seven Districts, 38 Divisional Secretariat Divisions (DSDs), and 1,091 Grama Niladhari Divisions (GNDs), on 234,010 hectares of land area. Although there are 1,091 GNDs in the Kelani River Basin area, only 98 GNDs of the 13 DSDs of Colombo, Gampaha, and Kegalle Districts are affected by the MPA.

*Land Use Patterns:* Colombo lies in the Kelani river basin and is the largest commercial and administrative hub of the country. Significant climatic and topographic variation is observed throughout the watershed resulting in entirely different land use systems. The upper catchment area is more rural and is used primarily for plantation and agricultural land, and the lower catchment area is built-up land with modern towns and cities. Notably, except for areas near Colombo, large scale human settlement activities did not take place in this area for a long time due to flood risks; but this situation has changed during the last three or four decades with the establishment of the Free Trade Zone (FTZ) in the area, declaration of Sri Jayawardanapura Kotte as the Administrative Capital of the country, and the construction of factories and warehouses surrounding the FTZ. Changes in land use from agriculture to industrial, commercial and

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<sup>2</sup> This component will finance the flood mitigation investments in the lower Kelani basin between Hanwella and Kaduwela for approximately 15 km. The investments will include: (i) construction of flood embankments along the main river; (ii) river bank protection and river training works; (iii) installation of pumps and gates for tributary flood; and (iv) replacement of the existing salinity barrier at Ambatale with a permanent gated structure. The remaining flood protection works from Kaduwela to the sea outfall and upstream of Hanwella up to Ranwala will be financed under Phase II.

residential activities, has mostly been haphazard thus leading to heavy property damage even after a minor flood and other extreme weather events.

*Characteristics of the Households:* Approximately 76,300 households are estimated to be living in the impacted area of the Kelani River Basin which constitutes 15% of the total number of households in the respective DSDs of the various districts. The highest percentage of individuals in the project area represent the age group of 35-59 years (32%) but dependent population, comprising children below four years old and elders above 60 years old, constitutes a significant, 21% of the population. In terms of religion and ethnicity, the area is predominantly Sinhalese (81%), followed by Tamils (10%), and Sri Lanka Moors (8%). Likewise, 72% of the population are Buddhists followed by 9% Muslims, 6% Hindus and 10% Roman Catholic. While the Sinhala/Buddhist culture dominates the basin area, impacts of the Tamil/Hindu culture is more pronounced in the plantation areas, and through relatively small, the impacts of Islamic culture are very strong in the areas where the Muslims live.

*Socio-Economic Status of Households:* The majority (approximately 97%) of the population is educated, and only 3% have no schooling/formal education attainment. More than 43% of the households derive their income from wage earnings, 4% from agriculture, and 54% from non-agricultural activities. The average income in the project affected district is higher than the national average presumably due to the commercial and industrial activities in the area. Yet, 18% of the total households in the impacted area are Samurudhi beneficiaries.

*Gender and Vulnerability:* While the status of women, especially in terms of education attainment and labor force participation rate in the project area is comparable to the national data, women are more vulnerable to the consequences of natural disasters compared to men due to differences in employment status, income, gendered social roles, social norms, and restrictions governing their behavior. Likewise, vulnerable groups in the project area comprise: women-headed households, persons below the poverty level, the unemployed population, population who did not attend schools, differently abled population, children below four years old, and the elderly.

*Commercial, Industrial and Other Development Activities:* Altogether, there are 9,777 industries and 2,666 registered commercial units in the impacted area of the Kelani River Basin. The river basin is also famous for gem and sand mining and clay extraction, though most of these extractions, particularly sand mining, are illegal and cause heavy damage to river embankments, the river bed, and even to water extraction facilities. Major ongoing development interventions in the basin area include flood protection works (dykes, bunds and gates), expansion of roads network, water intake structures, urban housing schemes, and drainage systems.

### **Project related impacts**

The MPA, via its three consecutive but overlapping phases, is expected to bring overall positive social and environmental benefits to the programme areas by ensuring a holistic and sound system for the management of floods and climate change related impacts. Positive impacts of the MPA include: (i) more accurate and timely weather and flood forecasting; (ii) enhanced inter-agency co-ordination; (iii) a service-delivery business model approach; (iv) better decision-making of government and citizens before and during disasters; and (v) increased protection of people and assets. Each phase and the overall programme will generate social and economic benefits as per the GoSL's vision to protect life and assets while transitioning to a middle-income country status.

However, construction of new infrastructure and the upgrading of existing ones under the MPA are likely to result in significant social impacts that will need to be mitigated during the design and implementation phases of the investments. Project interventions, including the construction of flood embankments and the reservoirs in the mid-upper catchment, will require some acquisition of private land and the displacement of people that have encroached onto the Irrigation Department reservation<sup>3</sup> alongside the Kelani river. As mentioned under Component 3 of Phase I of the MPA, one of the objectives of land acquisition and resettlement financed under the project is to enhance the safety and security of communities living along the riverbanks from the perennial risks of floods and other extreme weather events but adverse impacts on households and businesses due to land acquisition and other project-related activities will be significant. Notable will be disruption on the activities of large and small-scale industries, commercial units, and agriculture and plantation sectors, which will also lead to loss of income, livelihood and employment for households dependent on these sectors.

Likewise, impacts on existing infrastructure and facilities, including roads located close to the riverbank, water treatment plants, electricity supply, water supply lines, etc., and community resources such as bathing sites, public water facilities, etc., are also envisaged. Sites of cultural, archaeological and religious significance, including the prominent ones like the Kelaniya temple, Thalwatta temple, the Kovil at Peliyagoda, and the “Red Church” at Biyagama, will also be affected.

While there are no indigenous communities located in the intervention areas, vulnerable persons and households such as women-headed households, those living below the poverty line, households with disabled family members, may suffer disproportionately due to resettlement and/or loss of livelihoods. Construction works is also likely cause rapid migration to and settlement of workers and ‘followers’ in the project area which can lead to increased risks of social conflict, illicit behaviour, burden on and competition for public service provision, risk of communicable diseases, and gender-based violence, particularly in the form of inappropriate behaviour on the part of the laborers. Similarly, construction-related impacts such as traffic congestion, dust, noise, vibration are common issues that are likely to affect families/persons living in the immediate vicinity of the construction sites.

### **Policy, Regulatory and Institutional Framework**

Sri Lanka has a complex legal system to manage land acquisition, regulate land use, address the issues of gender equality and inclusion, and consultations and information disclosure. Likewise, World Bank Operational Policies which are relevant to the project include: OP/BP 4.01: Environment Assessment, OP/BP 4.12: Involuntary Resettlement and World Bank Environmental and Social Framework. While some gaps exist between the GoSL’s national legislation and systems, and the World Bank’s requirements, all activities under the MPA will be consistent with the legal/regulatory framework of Sri Lanka and aligned with the World Bank policies and guidelines.

### **Gender and Inclusion**

Issues relating to gender, vulnerability, and inclusion will be considered from various perspectives within the context of the MPA and this SMF, including: (i) gender-sensitive analysis and identification of risks and benefits associated with activities under the MPA; (ii) Project-specific gender considerations to enhance benefits to women, vulnerable groups, and local community members; (iii) measures for ensuring that any risks and impacts arising from proposed interventions that have differential impacts on women and

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<sup>3</sup> In the project affected area this reservation has not been properly demarcated.

other vulnerable groups, are identified and mitigated; (iv) enhancing the voice and representation of women, especially through continuous engagement and consultations with women, and (v) gender-disaggregated monitoring indicators.

Specifically, as part of the implementation plan, a detailed baseline analysis will be carried out to understand how communities obtain climate and disaster related information, and how these different communities, including women, people with disabilities, the elderly, or any other such vulnerable groups, can be effectively informed about such information availed through the MPA. Based on the findings of the assessment, an action plan for addressing inclusion issues, including gender, will be prepared. Activities to enhance gender considerations into the MPA include: information focused information dissemination and awareness raising for female citizen on flood early warning and impact-based forecasting; support for the preparation of community disaster management plan in the project sites; use of citizens' monitoring committees that review and follow up on quality, safety, and progress aspects of the interventions; options for women to have joint ownership or independent ownership of the land and house among the resettled households; orientation trainings on gender for the PMU and other decision-makers; and development of a robust Grievance Redressal Mechanism (GRM) that is sensitive to the needs of women and other vulnerable groups.

### **Managing the Risks of Adverse Impacts from Labour Influx**

To address the impacts from labor influx on communities, the project will: tap into the local workforce, to the extent possible; assess and manage labour influx risks based on appropriate instruments; and incorporate social and environmental mitigation measures, including those relating to GBV, into the civil works contract. Further, it will be the contractor's obligation to prepare and submit a plan that outlines code of conduct for workers, worker camp management plan and measures to address GBV. Prior to starting construction, the Contractor will also be required to prepare and submit its own ESMP/SIMP that will provide a detailed explanation of how the Contractor will comply with the Project's safeguards documents, including the RAP, ESMP, and SIMP, and demonstrate that sufficient funds are budgeted for that purpose. The Contractor's ESMP/SIMP will include management plans for: (i) work activities; (ii) traffic management; (iii) occupational health and safety; (iv) environmental management; (v) social management; (vi) labour influx and worker camp management plan; (vii) code of conduct for workers, including measures to address GBV; and (viii) chance-finds, where relevant.

### **Social Management Planning**

Social management planning includes developing strategies and principles for: identifying project affected individuals, families, and communities; assessing potential social impacts of sub-projects; and suggesting measures to avoid/minimize and manage any adverse impacts. For all physical activities carried out under the Project, an Environment and Social Management Plan (ESMP) or a Social Impact Mitigation Plan (SIMP) that also includes monitoring indicators will be developed. Such safeguards management plans will address the relevant findings and draw on the conclusions of the screening/assessments as they relate to non-land related impacts of the project interventions. The SIMP will describe and prioritize the actions needed to implement mitigation measures, corrective actions, and monitoring measures necessary to manage the impacts and risks identified in the assessments. These actions will be costed and reflected as part of the contractual documents of the civil works contractors, wherever relevant. Further, for activities that involve land-based losses, a separate A-RAP or RAP will be prepared in accordance with the RPF developed under the Project. All the safeguards instruments prepared under the project will be reviewed and cleared by the head of the SRU and the World Bank before the start of the civil works.

## **Consultations, Information Disclosure, Grievance Redress Mechanism**

Consultations were carried out in 21 Divisional Secretary Divisions (DSD), representatives from eight national agencies, and the affected community to disseminate information about the MPA, understand the socio-economic situation in the project areas, seek inputs for the safeguards management plans, and verify the roles and responsibilities of various stakeholders in the project. Similar consultations with affected parties and other relevant stakeholders will be carried out throughout the project cycle. During project implementation, up-to-date information will be provided on the Project website, social media and local radio and TV stations. A Public Information Booklet (PIB) will be delivered to each household in the immediately affected area which will include among others relevant information on the project and the rights of the affected people, including the compensation and rehabilitation measures, and provide information on who to contact in case of doubts or queries. The PIB will be translated into Sinhala and Tamil.

A three-tiered grievance handling mechanism will be established for receiving and resolving complaints through a process of mutual understanding and consensus with the relevant parties. These would function at the local/site level (Grama Grama Niladhari level), regional level (Divisional Secretariat level), with recourse to a national-level body for appeal and for ensuring high-level government commitment, policy support, and co-ordination. The GRM for the project will be in addition to the formal legal channels for resolving unsatisfied appeals from the public.

## **Implementation Arrangements and Monitoring**

The PMU set up for the MPA will be responsible for the overall social safeguards management. A Social and Resettlement Unit (SRU) will be established under the PMU that will be responsible for managing land acquisition, resettlement activities, and other social impact mitigation strategies, etc., at each stage of the project. The SRU will be adequately staffed with experienced, as well as new staff, who will be responsible for co-ordination with the relevant ministries and affected parties, and management of the day-to-day activities related to land acquisition and resettlement. Field offices will be set up at the start of the sub-projects to facilitate resettlement activities and to provide easy access for people who have concerns or grievances, or who want to discuss specific aspects of the land acquisition and resettlement programme. The field offices will be staffed by land acquisition assistants, resettlement assistants, and community development assistants from the social/resettlement unit of the PMU and may be supported by consultants. Additionally, a National Project Steering Committee (NPSC) will also be established to (i) monitor the overall implementation of ongoing sub-projects, based on progress reports; (ii) resolve problems of implementation; and (iii) co-ordinate with other national government agencies connected to project implementation.

A monitoring system comprising both internal monitoring as well as external monitoring and evaluation, will be established to track the progress on social management, including land acquisition and resettlement programmes. The MIS system will be designed such that it can generate real-time consolidated reports on the land acquisition, resettlement programmes, and other type of social impact mitigation activities. The system will be housed in the offices of the PMU but will be accessible from the Project's site offices. Consolidated reports on the progress of the land acquisition and resettlement programmes will be made available in the project website and also shared with the World Bank on a regular basis.

This SMF was disclosed in the project website and the World Bank's external website on 23 January 2019.





Climate Resilience Multi Phased Programmatic Approach (CRes MPA)

# Resettlement Policy Framework

**Ministry of Agriculture, Rural Economic Affairs,  
Livestock Development, Irrigation and Fisheries &  
Aquatic Resources Development**

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## Executive Summary

### Introduction

Climate-related hazards pose a significant threat to economic and social development in Sri Lanka. The 2019 Global Climate Risk Index Report, launched at the Climate Summit in Katowice (COP 24), ranked Sri Lanka second among the countries most affected by extreme weather events. During the 2010 to 2018 period, 13.7 million people were affected by floods and 11.7 million by droughts. Available data shows an increasing trend in the frequency of flood occurrences in many parts of Sri Lanka, with 87 percent of Sri Lanka's population living in moderate or severe hotspots.<sup>4</sup> Sri Lanka's economy is also severely affected by extreme weather events, and as per current estimates, by 2050, potential impacts due to climate change are foreseen to lead to as much as 1.2 percent loss of annual GDP.

To support the GoSL's commitment and strategy relating to flood risk mitigation and enhancing resilience in prioritized basins, a Climate Resilience Multi Phased Programmatic Approach (CRes MPA) will be implemented in three Phases over a period of eight years, with objectives as follows:

- Phase I (Flood Early Warning and Upper Kelani Basin Flood Risk Mitigation Project, US\$326 million): To enhance the capacity of the GoSL to deliver improved weather and climate forecasting and early warning system, and to reduce flood risks in the lower Kelani basin (Hanwella to Kaduwela);
- Phase II (Kelani Basin Flood Risk Mitigation Project, US\$169 million): To reduce flood risks in the lower Kelani basin (Hanwella to river mouth);
- Phase III (Basin Flood Risk Mitigation and Reservoir Project, US\$295 million): To reduce flood risks in the upstream Kelani and lower Mundeni basins.

It is envisaged that such a multi-phased approach will allow the GoSL to make required investments capable of assuring protection up to a 1 in 100-year return period event in the Kelani basin while allowing for greater adaptability through a forward-looking learning agenda.

### Phase I of the CRes MPA: Flood Early Warning and Lower Kelani Flood Risk Mitigation Project

To enhance the capacity of the GoSL to deliver improved weather and climate forecasting and early warning and to reduce flood risks in the lower Kelani basin (Hanwella to Kaduwela), interventions under Phase I includes: (i) comprehensive structural and non-structural flood risk mitigation investments in the Kelani basin (Hanwella to Kaduwela); (ii) modernization of hydro-meteorological information and services, forecasting and early warning systems and improved dissemination of weather, climate and hydrological forecasts, and warnings and advisory information to key end-users and communities through continuous institutional strengthening; and (iii) development of a real-time flood operational guidelines and establishment of institutional arrangements and capacity for early warning and flood risk management.

Phase I of the MPA has five main components and will be implemented over a period of five years:

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<sup>4</sup> South Asia's Hotspots, The World Bank, Spring 2018  
(<https://openknowledge.worldbank.org/bitstream/handle/10986/28723/33179.pdf?sequence=2&isAllowed=>)

- Component 1: Flood Forecasting and Early Warning in Priority Basins (US\$ 47.4M);
- Component 2: Flood Mitigation Investments in the lower Kelani Basin (US\$ 204M)<sup>5</sup>;
- Component 3: Land Acquisition, Resettlement Assistance, and Safeguards Implementation (US\$ 65M);
- Component 4: Project Management (US\$ 5M);
- Component 5: Contingent Emergency Response Component (CERC) (US\$ 5M).

### **Objective of the RPF**

As the WB has in principle agreed to finance these interventions under CRes MPA, it is important that the project interventions comply with the World Bank's environment and social safeguards policies. It is envisaged that the investments under Phase I will have to comply with the WB's current policies, including the Operational Policies OP 4.01 (Environmental Assessment), OP 4.11 (Physical Cultural Heritage) and OP 4.12 (Involuntary Resettlement). However, since the detailed preparation of Phase II is expected to start in 2019, Phase II will have to comply with the Bank's newly introduced Environmental and Social Framework (ESF) and Environmental and Social Standards (ESS).

The overall objective of the Resettlement Policy Framework (RPF) is to establish the standards and provide guidance for all the interventions that will take place under the project, especially under Phases I and II of CRes MPA. The principle set out by the RPF is to ensure that the impacts of land acquisition and resettlement are either avoided, minimized or mitigated, allowing people affected by the project to improve or, at the very least recover their livelihoods and previous standards of living. The resettlement programs will be executed as sustainable development programs and will ensure that people affected by the project are given the opportunity for meaningful consultation and are able to participate in the planning and implementation of the resettlement plans. The RPF is based on the Sri Lankan laws and regulations pertaining to Land Acquisition (LA) and resettlement, and the World Bank's policies including OP 4.12 on Involuntary Resettlement, OP 4.01 on Environment Assessment, and OP 4.11 on Physical Cultural Heritage.<sup>6</sup>

In addition to the RPF, a Social Management Framework (SMF) to address non-land related impacts, an Environmental Assessment and Management Framework (EAMF) for managing environmental risks and impacts, and a more detailed Resettlement Action Plans (RAP) to cover the areas affected under Phase I

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<sup>5</sup> This component will finance the flood mitigation investments in the lower Kelani basin between Hanwella and Kaduwela for approximately 15 km. The investments will include: (i) construction of flood embankments along the main river; (ii) river bank protection and river training works; (iii) installation of pumps and gates for tributary flood; and (iv) replacement of the existing salinity barrier at Ambatale with a permanent gated structure. The remaining flood protection works from Kaduwela to the sea outfall and upstream of Hanwella up to Ranwala will be financed under Phase II.

<sup>6</sup> Principles and guidelines set out in the World Bank's Environmental and Social Framework (ESF), 2016, which include Environmental and Social Standards (ESS) for Labor and working conditions (ESS2), and Community health and safety (ESS4) are also as guidelines in the RPF and the accompanying SMF.

from Hanwella Bridge to Kaduwela based on conceptual design for the flood defense system, have also been prepared.

### **Prevailing Socio-Economic Conditions**

*Project Area:* The Kelani River Basin area covers seven Districts, 38 Divisional Secretariat Divisions (DSDs), and 1,091 Grama Niladhari Divisions (GNDs), on 234,010 hectares of land area. Although there are 1,091 GNDs in the Kelani River Basin area, only 98 GNDs of the 13 DSDs of Colombo, Gampaha, and Kegalle Districts are affected by the CRes MPA interventions.

*Land Use Patterns:* Colombo lies in the Kelani river basin and is the largest commercial and administrative hub of the country. Significant climatic and topographic variation is observed throughout the watershed resulting in entirely different land use systems. The upper catchment area is more rural and is used primarily for plantation and agricultural land, and the lower catchment area is built-up land with modern towns and cities. Notably, except for areas near Colombo, large scale human settlement activities did not take place in this area for a long time due to flood risks; but this situation has changed during the last three or four decades with the establishment of the Free Trade Zone (FTZ) in the area, declaration of Sri Jayawardanapura Kotte as the Administrative Capital of the country, and the construction of factories and warehouses surrounding the FTZ. Changes in land use from agriculture to industrial, commercial and residential activities, has mostly been haphazard thus leading to heavy property damage even after a minor flood and other extreme weather events.

*Characteristics of the Households:* Approximately 76,300 households are estimated to be living in the impacted area of the Kelani River Basin which constitutes 15% of the total number of households in the respective DSDs of the various districts. The highest percentage of individuals in the project area represent the age group of 35-59 years (32%) but dependent population, comprising children below four years old and elders above 60 years old, constitutes a significant, 21% of the population. In terms of religion and ethnicity, the area is predominantly Sinhalese (81%), followed by Tamils (10%), and Sri Lanka Moors (8%). Likewise, 72% of the population are Buddhists followed by 9% Muslims, 6% Hindus and 10% Roman Catholic. While the Sinhala/Buddhist culture dominates the basin area, impacts of the Tamil/Hindu culture is more pronounced in the plantation areas, and through relatively small, the impacts of Islamic culture are very strong in the areas where the Muslims live.

*Socio-Economic Status of Households:* The majority (approximately 97%) of the population is educated, and only 3% have no schooling/formal education attainment. More than 43% of the households derive their income from wage earnings, 4% from agriculture, and 54% from non-agricultural activities. The average income in the project affected district is higher than the national average presumably due to the commercial and industrial activities in the area. Yet, 18% of the total households in the impacted area are Samurudhi beneficiaries.

*Gender and Vulnerability:* While the status of women, especially in terms of education attainment and labor force participation rate in the project area is comparable to the national data, women are more vulnerable to the consequences of natural disasters compared to men due to differences in employment status, income, gendered social roles, social norms, and restrictions governing their behavior. Likewise, vulnerable groups in the project area comprise: women-headed households, persons below the poverty level, the unemployed population, population who did not attend schools, differently abled population, children below four years old, and the elderly.

*Commercial, Industrial and Other Development Activities:* Altogether, there are 9,777 industries and 2,666 registered commercial units in the impacted area of the Kelani River Basin. The river basin is also famous for gem and sand mining and clay extraction, though most of these extractions, particularly sand mining, are illegal and cause heavy damage to river embankments, the river bed, and even to water extraction facilities. Major ongoing development interventions in the basin area include flood protection works (dykes, bunds and gates), expansion of roads network, water intake structures, urban housing schemes, and drainage systems.

### **Project related impacts**

The CRes MPA, via its three consecutive but overlapping phases, is expected to bring overall positive social and environmental benefits to the programme areas by ensuring a holistic and sound system for the management of floods and climate change related impacts. Positive impacts of the CRes MPA include: (i) more accurate and timely weather and flood forecasting; (ii) enhanced inter-agency co-ordination; (iii) a service-delivery business model approach; (iv) better decision-making of government and citizens before and during disasters; and (v) increased protection of people and assets. Each phase and the overall programme will generate social and economic benefits as per the GoSL's vision to protect life and assets while transitioning to a middle-income country status.

However, construction of new infrastructure, especially the flood defense system, and the upgrading of existing ones are likely to result in significant social impacts that will need to be mitigated during the design and implementation phases of the investments. Specifically, project interventions, including the construction of flood embankments and the reservoirs in the mid-upper catchment, will require some acquisition of private land and the displacement of people that have encroached onto the Irrigation Department reservation<sup>7</sup> alongside the Kelani river. In principle, the objectives of land acquisition and resettlement activities financed under the project is to enhance the safety and security of communities living along the riverbanks from the perennial risks of floods and other extreme weather events but adverse impacts on households and businesses due to loss of land, structures and assets, will be significant. Notable will also be the disruption on the activities of large and small-scale industries, commercial units, and agriculture and plantation sectors, which will also lead to loss of income, livelihood and employment for households dependent on these sectors.

Likewise, impacts on existing infrastructure and facilities, including roads located close to the riverbank, water treatment plants, electricity supply, water supply lines, etc., and community resources such as bathing sites, public water facilities, etc., are also envisaged. Sites of cultural, archaeological and religious significance, including the prominent ones like the Kelaniya temple, Thalwatta temple, the Kovil at Peliyagoda, and the "Red Church" at Biyagama, will also be affected.

While there are no indigenous communities located in the intervention areas, vulnerable persons and households such as women-headed households, those living below the poverty line, households with disabled family members, may suffer disproportionately due to resettlement and/or loss of livelihoods. Construction works is also likely cause rapid migration to and settlement of workers and 'followers' in the project area which can lead to increased risks of social conflict, illicit behavior, burden on and competition for public service provision, risk of communicable diseases, and gender-based violence, particularly in the form of inappropriate behavior on the part of the laborers. Similarly, construction-related impacts such

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<sup>7</sup> In the project affected area this reservation has not been properly demarcated.

as traffic congestion, dust, noise, vibration are common issues that are likely to affect families/persons living in the immediate vicinity of the construction sites.

### **Policy, Regulatory and Institutional Framework**

Sri Lanka has a complex legal system to manage land acquisition, regulate land use, address the issues of gender equality and inclusion, and consultations and information disclosure, including the Land Acquisition Act of 1950, Land Acquisition Regulations of 2008, the National Involuntary Resettlement Policy of 2001, Crown Land Ordinance of 1947, State Lands Act of 1949, State Lands (Recovery of Possession) Act of 1979, and Land Development Ordinance of 1935. Besides these laws relating directly to private land acquisition and the recovery of state and other public land, there are also policies and regulations that relate to public infrastructure and services like the Urban Development Authority Law of 1978, Road Development Authority Act of 1981, Municipal Council Ordinance of 1947, and the Sri Lanka Land Reclamation and Development Corporation Act of 1968, wherein some of the areas where the project interventions will be carried out are under the jurisdiction of these state agencies thus necessitating compliance as well as close coordination with the said authorities.

World Bank's Operational Policies which are relevant to the project include: OP/BP 4.01: Environment Assessment, OP/BP 4.12: Involuntary Resettlement and the World Bank's Environmental and Social Framework, the latter relevant for Phases II and III of the CRes MPA. Despite the elaborate legal system to manage land acquisition for development purposes, some gaps exist between the GoSL's national legislation and systems and the World Bank's requirements, especially in matters relating to exploring project alternatives to avoid or minimize impacts, compensation for non-titled persons affected by the interventions, consultations with affected persons on resettlement options, livelihood restoration and rehabilitation measures. As elaborated in this RPF, all activities under the CRes MPA will be consistent with the legal/regulatory framework of Sri Lanka and aligned with the World Bank policies and guidelines.

### **Resettlement Planning: Preparation, Review and Approval of RAPs**

The key steps in resettlement planning are: social screening, social impact assessment, inventory and valuation, determining eligibility and entitlements, consultation and disclosure of findings, preparation of resettlement instruments (abbreviated or full resettlement action plan), consultation and finalisation of the RAPs, development of resettlement sites, disclosure of the final RAP (which analyses and describes the impacts, entitlements, implementation agencies and schedule, list of eligible APs, grievance redress mechanisms (GRMs), initiation of the land acquisition process; disbursement of compensation and the RR&R entitlements, relocation planning and actual relocation, resolution of grievances if any, site clearance, site handover to contractor for civil works; post resettlement support measures, monitoring and evaluation).

The process of resettlement planning will start with a screening, assessment and categorization of impacts. If the Social Screening indicates that the intervention involves risks and impacts associated with 'involuntary resettlement,' the PMU will carry out a Social Impact Assessment including 100% census survey of affected households once the cut-off date has been announced prior to the beginning of the census survey. The SIA will provide information on the losses and damages incurred by individuals or households, and communities, impacts on women and vulnerable communities, etc. The census and socio-economic surveys will also involve systematic consultation, disclosure, orientation, and coordination with the Divisional Secretaries, Planning Directors, Grama Niladharis, Community Based

Organizations, Non-Governmental Agencies, and community members, including women and other vulnerable groups.

A full or an abbreviated Resettlement Action Plan (A/RAP) will be prepared for each phase of the MPA, including all relevant interventions. Among others, the A/RAP will include brief description of the project and subproject, types of impacts expected, analysis of alternatives to avoid or minimize land acquisition and resettlement, compensation policy, entitlements and provisions for livelihood restoration, measurement/valuation of losses, grievance redress procedures, implementation schedule and budget. Consultations will be held with the affected persons, especially over resettlement options, during the preparation of the RAP as well as prior to its finalization. The draft RAP will be reviewed and approved by the PMU, and will form part of the land acquisition request proposal to be submitted to the Ministry of Land and the clearance from the Central Environment Authority. The draft RAPs will also be submitted to the World Bank, which will review compliance with Bank's policy OP 4.12 prior to granting clearance for the RAP. The approved RAPs by both the GOSL and the Bank, will be uploaded in the project website as well as the World Bank's external website.

### **Analysis of Alternatives, Asset Valuation, Compensation and Entitlements**

*Alternatives for land acquisition:* Given the complexity of the areas that will be affected, the design teams will consider following options to avoid or minimize resettlement and other impacts on existing infrastructure.

- Construction of sheet pile flood defense structures at the river bank rather than construction of earth embankments further back from the riverbank
- Allowing owners or tenants to continue farming in the non-residential areas located between the riverbank and the earth embankments
- Acquiring servitude rights (easements) rather than acquisition of the land needed for the earth embankments
- Utilization of available flood defense structures to the extent possible
- Design of flood defenses to avoid existing roads and ensure continued access to the river for various usage, including the salinity barrier of Ambatale water treatment plant
- Agreement (e.g., MoU) with large facilities such as Coca Cola Beverages Sri Lanka Ltd., to allow the project to utilize the strip of land needed for the flood defense structure without affecting the activities of the plant and while also avoiding land acquisition
- Coordination with the UDA and the Ministry of Megapolis and the Western Development to identify areas that would be covered under the existing Metro Colombo Urban Development Project and the Urban Regeneration Program to identify the areas that would be covered under these programs thus minimizing the land and resettlement requirements under the CRes MPA.

*Entitlements:* The entitlements, compensation and eligibility, including preparation of the EM, is based on the provisions in the LAA of 1950 and LAR of 20008, together with the principles of the NIRP and the relevant WB policies. The EM also draws from the practices and entitlements that have been applied in other projects that are already in execution in the Kelani River Basin, including the New Kelani Bridge project funded by JICA and implemented by the RDA, as well as other ongoing and recently completed projects in Sri Lanka. The EM is mainly applicable to the affected residential, agricultural (including

plantations) and small to medium scale businesses and industries, and considers the loss of land, assets, accommodation, businesses, access to sources of livelihoods, income, and crops and trees.

*Valuation and Compensation:* Sri Lanka has an advanced system for valuation of properties, and there are state and registered private valuation officers. Compensation for all the losses will be at replacement cost as per LAR 2008 and the World Bank's guidelines, as laid out in the EM. 'Replacement cost' includes compensation of statutory and non-statutory payments and ex gratia payments including: current market value without depreciation, any other injuries affectation, severances, interest accrued, transitional and restoration costs, disturbances cost, and any other applicable payments. Ex-gratia payments mentioned in the EM are based on 2016 amendments to LAR 2013. provisions to determine compensation for non-land economic displacements such as in the case of recovery of possession of state land occupied by tenants, mobile vendors, squatters etc. for their economic activities. In the circumstances, this vacuum will be filled by an Entitlement Assessment Committee (EAC) to be established for CRes MPA and incorporated into its RPF

Alongside the entitlements and compensation, if after acquisition of the land parcel required for the project, the remaining plot is severed and becomes non- viable for any productive use, the claimant is entitled to receive compensation not only for the part of the land that was acquired but also for severance and other injury which may cause to the remaining land formerly held with it. Further, for project activities where taking possession of the land is not required, servitude rights will be acquired for the development of the land while allowing the respective owners to keep possession of land ownership intact but limiting their user rights. Similarly, if only part of the structure is acquired, the floor area to be considered for payment will be calculated up to the structural support points. If after acquiring the affected portion, the reminder portion becomes structurally unsustainable, compensation will be paid as per the LAA for the entire structure. For damages of the government property, no cash compensation will be paid but the Project will take on the responsibility for rebuilding and restoring damaged structures.

*Eligibility:* All project affected persons will be informed about the project and the RAP process, and a cut-off date will be established as part of determining APs eligibility. Under this Project, the cut-off date for eligibility of entitlements is either the start date of the census survey of the affected population or the date of Section 2 notification under the Land Acquisition Act No. 9 of 1950. The cut-off date will be publicly announced and there will be continuous public dissemination of information on the area delineated to prevent further population influx. Persons who encroach on the area after the cut-off-date will not be entitled to claim compensation or any other form of resettlement assistance. Likewise, fixed assets such as built structures or planted trees after the cut-off date will not be covered and compensated. Non-title residential squatter or encroached households residing in the sub project areas prior to the cut-off date and verified to be in the displaced category during social impact survey, will be provided with assistance as per the LAA 1950 and LAR 2008. Commercial non-title holders on State lands will receive compensation for their affected structures at replacement value and rehabilitation assistance to continue their livelihood. The non-title holders however will not receive any compensation for land.

### **Site selection, preparation and relocation**

Land for land compensation is a feasible option for some villages located on the riverbank, such as Malwana (Right Bank) and Ranala (Left Bank) under Phase I. Likewise, the option of urban resettlement at sites that could be developed by the project or in the housing schemes that are being constructed within Metro Colombo area by the Urban Development Authority (UDA) are also options for resettlement of the large-scale informal and underserved settlements in the Phase 2 area. The PMU will be responsible



for identifying the alternative areas that could be developed as resettlement sites using the following considerations:

- The land to be provided to the affected persons will be of similar quality and extent, if not better than the land acquired by the project.
- Criteria for site selection will be developed and discussed in detail with the affected people, their representatives, local officials and other relevant persons.
- Affected people will be consulted in regard to different relocation options, such as relocation on the remaining areas of the lands that will have to be acquired, purchase of plot in immediate vicinity, where their relatives are living, self-relocation, and relocation to a site selected by the agency implementing the subproject.
- A feasibility study will be carried out to assess the potential of each proposed resettlement site to ensure that it is suitable for the type of resettlement proposed (agricultural settlement, residential and business, apartment blocks, etc.) and has the infrastructure and other facilities that are needed as well as connectivity with markets and other towns.
- Wherever possible, the selected sites will be close to the affected areas, to allow people to continue with their current employment and schools, to retain existing clients and networks in the case of businesses, and to remain close to their friends, families and community. It is preferred if the relocation sites could be found within a radius of 1-1.5 km from the present habitats of the affected communities.
- The resettlement sites that will be developed for residential purposes will have the necessary infrastructure in place before any families move, including road access, potable water, sewerage, storm-drainage, electricity, schools, health care facilities and market buildings. As far as possible, these facilities will also be extended to the host community as means of encouraging social harmony and integration.

The CRes MPA will ensure that full compensation and other resettlement benefits and assistance are paid/granted to the displaced persons/households prior to their displacement. The payment of compensation will be made under Section 17 (award) of the LAA, and the Acquiring Officer will determine the date on which the compensation will be awarded in accordance with Section 38(a) of the LAA. Where it is necessary for affected persons to vacate the affected area before the date specified in the Section 38(a) order, an allowance for temporary accommodation will be provided as set out in the Entitlement Matrix. The affected persons who are relocated will also be provided with additional allowances such as for transport of their household goods and materials, vulnerability allowances etc. as stipulated in the 2008 Regulations and as set out in the Entitlement Matrix. The PMU will coordinate with the Divisional Secretaries in which the resettlement sites are developed, or with the UDA, in the case of housing units, in order to provide the resettled households with certificates of ownership. This activity will take place in parallel to the activities related to payment of compensation.

The relocation of businesses will follow the same procedures as set out above for households. However, some businesses may be entitled to additional allowances such as for transport of goods and materials, restoration of utility services, re-fixing of fixtures and fittings, advertising etc. as well as allowances to be paid to the employees as specified in the Entitlement Matrix.

The relocation of infrastructure facilities and public utility services will be undertaken by the agencies responsible for them (e.g. National Water Supply and Drainage Board in the case of water distribution lines) but with funds provided by the project. The PMU will inform the public prior to the relocation of those utility services in order to avoid/minimize any inconveniences and will also monitor the progress of the reconstruction and will coordinate closely with the relevant agencies to ensure that the works are completed as quickly as possible within an agreed timeframe. Relocation of cultural heritage sites and sites of cultural and/or religious significance.

The initial review of the Phase 1 and 2 areas suggests that there are no major cultural heritage sites that would need to be relocated due to the project interventions. However, there are some small shrines, graveyards and other sites that may be affected. The project will consult the design teams to avoid any impacts on such social and religious sites. If unavoidable, measures that are required to be implemented for their relocation will be discussed and closely coordinated with the religious authorities and the communities that worship or use these sites. The project will also make available adequate funds required for their relocation such as for acquiring alternative land/sites, construction of shrines and graveyards, rituals and ceremonies to be performed during relocation etc.

### **Consultations, Information Disclosure, Grievance Redress Mechanism**

Consultations were carried out in 21 Divisional Secretary Divisions (DSD), representatives from eight national agencies, and the affected community to disseminate information about the CRes MPA, understand the socio-economic situation in the project areas, seek inputs for the safeguards management plans, and verify the roles and responsibilities of various stakeholders in the project. Similar consultations with affected parties and other relevant stakeholders will be carried out throughout the project cycle. During project implementation, up-to-date information will be provided on the Project website, social media and local radio and TV stations. A Public Information Booklet (PIB) will be delivered to each household in the immediately affected area which will include among others relevant information on the project and the rights of the affected people, including the compensation and rehabilitation measures, and provide information on who to contact in case of doubts or queries. The PIB will be translated into Sinhala and Tamil.

A three-tiered grievance handling mechanism will be established for receiving and resolving complaints through a process of mutual understanding and consensus with the relevant parties. These would function at the local/site level (Grama Grama Niladhari level), regional level (Divisional Secretariat level), with recourse to a national-level body for appeal and for ensuring high-level government commitment, policy support, and co-ordination. The GRM for the project will be in addition to the formal legal channels for resolving unsatisfied appeals from the public.

### **Implementation Arrangements and Monitoring**

The PMU set up for the CRes MPA will be responsible for the overall social safeguards management. A Social and Resettlement Unit (SRU) will be established under the PMU that will be responsible for managing land acquisition, resettlement activities, and other social impact mitigation strategies, etc., at each stage of the project. The SRU will be adequately staffed with experienced, as well as new staff, who will be responsible for co-ordination with the relevant ministries and affected parties, and management of the day-to-day activities related to land acquisition and resettlement. Field offices will be set up at the start of the sub-projects to facilitate resettlement activities and to provide easy access for people who have concerns or grievances, or who want to discuss specific aspects of the land acquisition and

resettlement programme. The field offices will be staffed by land acquisition assistants, resettlement assistants, and community development assistants from the social/resettlement unit of the PMU and may be supported by consultants. Additionally, a National Project Steering Committee (NPSC) will also be established to (i) monitor the overall implementation of ongoing sub-projects, based on progress reports; (ii) resolve problems of implementation; and (iii) co-ordinate with other national government agencies connected to project implementation.

A monitoring system comprising both internal monitoring as well as external monitoring and evaluation, will be established to track the progress on social management, including land acquisition and resettlement programmes. The MIS system will be designed such that it can generate real-time consolidated reports on the land acquisition, resettlement programmes, and other type of social impact mitigation activities. The system will be housed in the offices of the PMU but will be accessible from the Project's site offices. Consolidated reports on the progress of the land acquisition and resettlement programmes will be made available in the project website and also shared with the World Bank on a regular basis.

This RPF was disclosed in the project website on 23 January 2019 and the World Bank's external website on 23 January 2019.



THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 MINISTRY OF IRRIGATION & WATER RESOURCES MANAGEMENT



**CRIP**

**Climate Resilience  
 Improvement Project**

**STRATEGIC  
 ENVIRONMENTAL  
 ASSESSMENT**

**STRATEGIC ENVIRONMENTAL ASSESSMENT  
 OF DEVELOPMENT OF RIVER BASIN LEVEL  
 FLOOD AND DROUGHT MITIGATION  
 INVESTMENT PLANS (DBIP)**

**EXECUTIVE SUMMARY**

**JANUARY 2019**

**MUNDENI ARU RIVER BASIN**



**Consulting Engineers & Architects Associated (Pvt.) Ltd.**  
 No 500/5, Thalapathpitiya Road, Madiwela, Kotte, Sri Lanka

## Executive Summary

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The impacts of global warming and climate change are now a reality, and its effects are being felt mostly in small island nations such as Sri Lanka. The increased frequency of catastrophic weather events such as cyclones, droughts and unprecedented rain is being experienced in many countries including Sri Lanka.

The impact of droughts and floods in Sri Lanka causes a colossal damage and incurs a heavy cost to the Government, amounting to billions of rupees for flood and drought relief almost every year. In view of this, finding a permanent solution to flood and droughts in major river basins is an imperative.

The Climate Resilience Improvement Project (CRIP) is an ongoing project implemented by the Ministry of Irrigation and Water Resources Management (MIWRM) with funding support from the World Bank. The objective of the project is to “Reduce the vulnerability of exposed people and assets to climate risks and to improve the Government’s capacity to respond effectively to climate disasters”

Ten river basins have been selected to be studied under the CRIP. The ten river basins include the Mundeni Aru, Kelani River Basin, Attanagalu Oya basin, Gal Oya, Maha Oya, Kala Oya, Deduru Oya, Malwatu Oya, Gin Ganga and Nilwala Ganga. Out of the ten river Basins selected under the project, four river basins, namely Kelani, Attanagalu Oya, Mahaweli and Mundeni Aru have been selected as needing interventions on a priority basis.

Of the two major investment components of CRIP, Component 1 aims to improve the understanding of climate risk, enhance the country's knowledge base and capacity, and develop a long-term investment plan to mitigate floods and drought risks in ten river basins. The final output of this Component would be the development of basin investment plans comprising of detailed structural and non- structural drought and flood risk mitigation proposals, together with the flood and drought risk knowledge bases, for the ten basins. In addition, feasibility studies for a selected set of structural interventions in each basin will also be completed as an output of Component 1. These investment plans and feasibility studies are expected to serve as guiding documents for major investments for long term flood and drought mitigation interventions to be funded by the government and donors, including the World Bank.

The nature of these proposed interventions are such that their implementation may lead to irreversible changes to the existing environment. In order to support the investment decisions and plan and implement the prioritized interventions in a socially and environmentally sustainable manner, the basin investment plans must be complemented with Strategic Environmental Assessments (SEAs) in the context of flood and drought risk mitigation of the ten river basins. The present SEA study is for the Mundeni Aru basin area.

Given that the SEAs will serve broader and strategic purposes for the planning and implementing of the basin investment plans, it is required to complete the SEA for the Mundeni Aru basin area as a priority, in order to prepare Social and Environmental Management Plans for the selected priority interventions for flood and drought mitigation.

The proposed Flood and drought mitigation proposals for the Mundeni Aru consist of a four pronged approach as follows;

- Increasing flood detention in the upper part of the catchment through new Reservoir construction and increasing the capacity of existing reservoirs
- Increasing the discharge from the Batticoloa and Valachchenai lagoons through Dredging, and construction of Diversion Canals
- Protection of areas with high flood risk through construction of Polder Dykes ( Flood Bunds)
- Implementation of non-structural measures (e.g. Zoning, Awareness creation, flood warning etc )

The interventions proposed under the four categories above include the Construction of new upstream reservoirs and increasing the capacity of existing reservoirs, Construction of overflow weirs, Dredging of the Batticoloa and Valachchenai Lagoons and parts of Mundeni Aru, Construction of dykes to protect vulnerable areas from floods and raising of existing road segments susceptible to flooding, as well as the replacement of selected bridges. Feasibility studies have been carried out for these proposed interventions.

Some of these interventions have environmental and social impacts which require to be identified early on, in order to either avoid or mitigate them to acceptable levels. Almost all of the proposed flood and drought mitigation interventions will require undergoing an Initial Environmental Examination (IEE) or a full scale Environmental Impact Assessments (EIA) under the provisions in the National Environmental Act or the Coast Conservation Act depending on the scale and location of the proposed intervention. Detailed investigations on the potential environmental and social impacts will therefore be necessary at the EIA stage for all these interventions.

According to the Terms of Reference, the main objective of the Strategic Environmental Assessment for the Flood and Drought mitigation proposals for the Mundeni Aru is to;

- Identify, assess and describe the likely significant effects on the environment of the basin implementing the basin investment plans as well as the most important environmental and natural resource-related constraints bearing on the implementation of any related structural and non-structural intervention.
- Provide the GoSL agencies and development partners with relevant knowledge and information (both quantitative and qualitative) to assess the adequacy of environmental considerations and safeguard measures to be incorporated with the proposed interventions of the basin investment plan. This information should help ensure that environmental concerns are appropriately integrated in the decision-making processes at the stages of programming, planning, implementation and monitoring of the interventions.
- Assess the degree to which the existing policies, laws, regulations and the institutional capacity of the GoSL applicable to address the 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. Particular focus will be given to the adequacy of institutional structure and capacities at the national and local levels, as well as of the regulatory framework, to address key environmental concerns associated with the proposed basin investment plans.

The Strategic Environmental Assessment study has revealed that the major impacts due to the proposed flood and drought mitigation proposals are on Ecology, Hydrology and Hydrogeology, Agriculture, Aesthetics as well as social impacts due to involuntary relocation and loss of livelihood. These areas were considered comprehensively in the SEA. In addition to this the Regional Planning perspective was also considered comprehensively as described in chapter 7 of the report.

With respect to the construction of new reservoirs and modification of existing reservoirs, It is noted that the construction of upstream 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 extents of new land could be irrigated in addition to increasing the cropping intensity of existing lands. Some of the proposed reservoirs under the CRIP, such as the Kalugal Oya Reservoir, Maha Oya as well as the amalgamation of Kitul and Rugam Reservoirs are already in the process of being implemented.

The impacts arising from the construction of the remaining new reservoirs could be avoided or mitigated to acceptable levels through the adoption of suitable mitigation measures. Considering the overall beneficial impacts, particularly the increase in agricultural output and the benefits of flood and drought mitigation, it could be concluded that the construction of the new reservoirs, could be recommended for implementation, provided that comprehensive Environmental Impact assessments and extended cost benefit analysis are carried out and the suggested mitigation measures are fully implemented. Even in the case of the proposed Galode Aru reservoir, which will result in the inundation of a considerable extent of the Maduru Oya National Park if implemented according to the original plan, could be implemented if modifications to the original plan are made and the implementation of the suggested mitigation measures, are fully implemented, thereby significantly reducing the negative impacts of the project especially on Maduru Oya National Park.

Gal Ode Reservoir could be recommended under following conditions;

1. Reservoir area to be suitably downsized to minimize the inundation of forest area. This may be achieved by increasing the dam height and having saddle dams if feasible.
2. A Dry Dam/Small Reservoir combination will be practical.
3. A run of the river anicut could also be considered to fulfill the irrigation requirement. However, an anicut will not have the capacity for flood control.

The other flood Mitigation proposals such as the construction of flood discharge channels near railway bridge and near Santhiveli, replacing of Kiran Bridge with a larger bridge, construction of dykes near Sittandy built up area, and near paddy fields, elevation of the existing A-15 road and connection of existing Thona system with low lying areas could also be implemented subject to Environmental Assessments including cost benefit analysis, as some of these measures are relatively costly interventions.

The proposal to raise the Maduru Oya reservoir by 2.5 m should be rechecked for its practicality, as the original proposal was only for 1m spill raising. 2.5m raising of the reservoir would have impacts on the Maduru Oya National Park and should therefore be reconsidered.

It is also noted that there is no conclusive assessment with regard to the interventions associated with the Batticoloa and Valachchenai lagoons especially with respect to the construction of the proposed weirs near Kallar and Dutch Bar. Since the construction of the weirs will be a relatively costly exercise and are also expected to cause a substantial environmental impact on the ecology of the lagoons, these interventions should be studied further in order to assess the exact flood mitigation capacities and be considered only as last resort interventions if all other proposals fail to deliver the expected results.

The Batticoloa lagoon is the largest lagoon in the district. Hence, unless proper mitigation measures are adopted, building a weir at the mouth of the Batticoloa lagoon may impose long term impacts on lagoon fishery. This coupled with the loss of mangroves may hinder recruitment of fish. This issue can be managed if salinity changes and hydrology and fish movement patterns could be facilitated as usual. It is recommended that these issues are studied in detail, in addition to the efficacy of the proposed weirs for flood control purposes.

The proposed dredging of Batticoloa and Valachchenai Lagoons could negatively affect lagoon bio diversity, water quality and fisheries in particular. The old bathymetric surveys should be compared and checked with current ones to ascertain whether the lagoon has undergone siltation prior to implementation of lagoon dredging. If dredging is found to be a mandatory intervention, a detailed Environmental Impact Assessment requires to be carried out and the suggested mitigation measures implemented fully in order to ensure minimum damage to the sensitive eco systems of the lagoons and to fisheries in particular. The fisherman who are temporarily affected by the dredging may require to be compensated for their loss.

With respect to the existing legal framework in the country for dealing with Floods and droughts, there are existing provisions available for flood and drought mitigation under the Irrigation Ordinance No 32 of 1946 and Flood Protection ordinance No 4 of 1924 Amended by Act no 22 of 1955. The existing provisions in these acts which are outdated are totally inadequate in order to deal with floods and droughts effectively. Both of the above-mentioned acts are now being replaced by an Act to amend the Irrigation Ordinance (chapter 453) and the new Flood Risk Management Act.

An evaluation of the existing Policies, laws and regulations and institutional capacity to address environmental issues and major sustainability challenges, reveals that the existing legal framework in the country is sufficient to tackle the environmental issues that may arise during the implementation of the flood and drought mitigation proposals. The proposed flood and drought mitigation projects are located within areas which come either under the jurisdiction of the Central Environmental Authority and the Coast Conservation Department. Both the National Environmental Act no 47 of 1980 as well as the Coast Conservation Act No 57 of 1981 has provisions for conducting Environmental Impact Assessment for the proposed flood and drought mitigation proposals prior to implementation. EIA is a legal requirement under these two Acts and therefore detailed environmental Assessments in the form of Initial Environmental Examinations or Full scale Environmental Impact Assessments will be required for all the proposed interventions along with formal environmental approval from one of these two agencies depending on the location of the proposed intervention.



As far as regular monitoring of these projects are concerned, although there is an existing procedure at the CEA for the monitoring of projects approved subsequent to an EIA, the efficacy of such monitoring including the frequency of monitoring is hampered by the lack of adequate human and other resources such as vehicles.

It is therefore proposed that a Project Coordination and Monitoring Committee consisting of the following organizations is set up under the Department of Irrigation for the purpose of planning as well as monitoring the implementation of the proposed interventions.

- Irrigation Department (to chair the meeting)
- CRIP Project
- Central Environmental Authority
- Coast Conservation Department
- Department of Agriculture/ Ministry of Agriculture
- Ceylon Electricity Board
- District/Divisional Secretaries of the relevant districts
- Relevant Local Authorities
- Forest Department
- Department of Wildlife Conservation
- Department of Archaeology
- Urban Development Authority
- Provincial Irrigation Engineers
- Department of Agrarian Development
- Road Development Authority

It is also proposed that a fully-fledged Environmental Unit is established at the Irrigation Department manned by suitably qualified environmental professionals. This could be done by strengthening the existing Environmental Unit in the Department by staffing it with qualified environmental professionals. Setting up of such a unit at the irrigation Department would be a useful exercise as the Irrigation Department is involved in the planning many of the largest projects in Sri Lanka, which often have many environmental impacts. Setting up of the environmental unit will result in environmental inputs being provided to projects at the planning and design stage itself, thereby avoiding potential issues arising at the EIA stage. The proposed unit could take up the task of regular monitoring of the proposed projects under the CRIP along with independent monitoring by the Central Environmental Authority and Coast Conservation Department in order to ensure compliance with EIA approval conditions.



THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
MINISTRY OF IRRIGATION & WATER RESOURCES MANAGEMENT

**CRIP**

Climate Resilience  
Improvement Project



# STRATEGIC ENVIRONMENTAL ASSESSMENT

STRATEGIC ENVIRONMENTAL ASSESSMENT  
OF DEVELOPMENT OF RIVER BASIN LEVEL  
FLOOD AND DROUGHT MITIGATION  
INVESTMENT PLANS (DBIP)

EXECUTIVE SUMMARY

## KELANI RIVER BASIN

JANUARY 2019



Consulting Engineers & Architects Associated (Pvt.) Ltd.  
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# Executive Summary

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The impacts of global warming and climate change are now a reality, and its effects are being felt mostly in small island nations such as Sri Lanka. The increased frequency of catastrophic weather events such as cyclones, droughts and unprecedented rain is being experienced in many countries including Sri Lanka.

The impact of droughts and floods in Sri Lanka causes a colossal damage and incurs a heavy cost to the Government, amounting to millions of rupees for flood and drought relief almost every year. In addition to this, there is loss of life and property. In view of this, finding a permanent solution to flood and droughts in major river basins is an imperative.

The Climate Resilience Improvement Project (CRIP) is an ongoing project implemented by the Ministry of Irrigation and Water Resources Management (MIWRM) with funding support from the World Bank. The objective of the project is to “Reduce the vulnerability of exposed people and assets to climate risks and to improve the Government’s capacity to respond effectively to climate disasters”

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Of the two major investment components of CRIP, Component 1 aims to improve the understanding of climate risk, enhance the country's knowledge base and capacity, and develop a long-term investment plan to mitigate floods and drought risks in the ten river basins. The final output of this Component would be the development of basin investment plans comprising of detailed structural and non- structural drought and flood risk mitigation proposals, together with the flood and drought risk knowledge bases, for the ten basins. In addition, feasibility studies for a selected set of structural interventions in each basin will also be completed as an output of Component 1. These investment plans and feasibility studies are expected to serve as guiding documents for major investments for long term flood and drought mitigation interventions to be funded by the government and donors, including the World Bank.

In order to support the investment decisions and plan and implement the prioritized interventions in a socially and environmentally sustainable manner, the basin investment plans must be complemented with Strategic Environmental Assessments (SEAs) in the context of flood and drought risk mitigation of the ten river basins. The present SEA study is for the Kelani River Basin.

Given that the SEAs will serve more broad and strategic purposes for the planning and implementing of the basin investment plans, it is required to complete the SEA for the Kelani

River Basin area as a priority, in order to prepare Social and Environmental Management Plans for the selected priority interventions for flood and drought mitigation.

The proposed Flood and drought mitigation proposals for the Kelani River Basin consist of the following proposals;

1. Flood walls or levees constructed on either side along the Lower Kelani from Hanwella to Colombo, offering protection upto a 1:25 year flood. Three possible bund configurations have been considered as follows;
  - Zero bund line option
  - 50ft bund line option
  - Flexible bund line option

Out of these three options the flexible bund line option is the most likely to be selected for implementation.

2. The second proposal consists of one or more upstream reservoirs to raise the level of protection up to a 1:100-year Flood. Four reservoirs, namely Holombuwa, Wee-Oya, Nawata and Rucastle have been proposed.
3. Another potential intervention has been added later, namely the diversion of excess Kelani River water from the Norton Bridge area in the Kelani Ganga to the Diyagala area of Mahaweli Ganga during the wet season.

Some of these interventions have environmental and social impacts which require to be identified early on, in order to either avoid or mitigate them to acceptable levels. Almost all of the proposed flood and drought mitigation interventions will require to undergo full scale Environmental Impact Assessments (EIA) under the provisions in the National Environmental Act No. 47 or 1980. Detailed investigations on the potential environmental and social impacts will therefore be necessary at the EIA stage for all these interventions.

According to the Terms of Reference, the main objective of the Strategic Environmental Assessment for the Flood and Drought mitigation proposals for the Kelani River basin is to;

- Identify, assess and describe the likely significant effects on the environment of the basin in implementing the basin investment plans as well as the most important environmental and natural resource-related constraints bearing on the implementation of any related structural and non-structural intervention.
- Provide the GoSL agencies and development partners with relevant knowledge and information (both quantitative and qualitative) to assess the adequacy of environmental considerations and safeguard measures to be incorporated with the proposed interventions of the basin investment plan. This information should help ensure that environmental concerns are appropriately integrated in the decision-making processes at the stages of programming, planning, implementation and monitoring of the interventions.

- Assess the degree to which the existing policies, laws, regulations and the institutional capacity of the GoSL applicable to address the 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. Particular focus will be given to the adequacy of institutional structure and capacities at the national and local levels, as well as of the regulatory framework, to address key environmental concerns associated with the proposed basin investment plans.

The Strategic Environmental Assessment study has revealed that the main impacts due to the proposed flood and drought mitigation proposals are on Hydrology and Hydrogeology, Ecology, Agriculture, Aesthetics as well as social impacts due to involuntary relocation and loss of livelihood. The flood bunds in particular have a major hydrological impact and special attention has been paid to this aspect in the SEA. In addition to this, as required by the Terms of Reference, the Regional Planning perspective was also considered comprehensively as described in chapter 7 of the report.

The SEA study has revealed that there are both positive and negative impacts of the proposed reservoirs and flood bunds.

In general reservoirs offer multiple benefits such as Irrigation, Hydropower, Flood Protection and Drought Control. The positive impacts of the reservoirs include;

- (1) Reduction of flood discharge due to flood routing through reservoirs.
- (2) Reduction of flood level in the downstream areas due to upstream reservoirs.
- (3) Increase water retention of groundwater discharge in the reservoir bed and command areas
- (4) Drought mitigation

One of the potential negative hydrological impacts of the proposed reservoirs is that, a potential dam breach could advance a flood wave downstream, resulting in very severe damage. Dam breaches are however extremely rare and the probability of a dam breach is very low. The possibility of this could be further reduced by carrying out dam break model studies and through routine standard dam maintenance.

Although the proposed reservoirs will reduce upstream discharge input to flood dykes, the water level impact on the distal downstream may be low or insignificant. The reduction of discharge input to the downstream flood plain due to the construction of the reservoir/s should be determined as accurately as possible prior to their implementation.

As for the ecological impacts of the proposed reservoirs, the loss and fragmentation of riverine forests is of concern and clearance of riverine vegetation should be avoided. In cases where this is unavoidable, measures must be taken to replant a thick strip bordering the river and the reservoirs to ensure continuity of the riverine strip. The most important direct negative impact

would be the loss and fragmentation of the protected rainforests as a result of the proposed Nawatha reservoir.

In addition to the loss of forest areas, reduced down stream flow, particularly during the dry season, would inevitably occur with the construction of the upstream reservoirs, with consequential impacts on fish migration, drying of river banks and downstream salinity intrusion. The latter is currently hampering the ability of the river to supply drinking water to the Colombo area. Therefore, measures must be in place to address each of these issues.

As far as the social impacts are concerned, out of the identified Interventions, the measures to increase upstream flood detention by construction of 4 reservoirs have positive impacts in general, owing to their effects on flood mitigation and providing of possible power generation, enhancing or augmenting irrigated agriculture and maintaining a high-water table for upland cultivation of small plantation holding and homestead nature, as a whole. The negative impacts on the other hand are derived mainly from the displacement of present prime agricultural lands (Tea, Rubber, Coconut, MEC, Paddy, & livestock) and some settlements.

With regard to impacts on archeological sites, the residents living in the proposed Holobuwa Reservoir area has viewed negatively on potential damages to the archeological site at Dadigama Kotawehera, which need to be looked into at a detailed SIA process (Re. Case -1 in the communication Section).

The 4 reservoir Interventions will result in considerable relocation, resettlement and inundation of present plantation, homestead farming and some grazing lands, in the Kegalle District. Of the 4 Reservoir, Holobuwa is located in Warakapola and Galigamuwa DSD, Wee Oya in Bulathkohupitiya DSD, Nawata in Yatiyantota DSD and Rue Castle in Deraniyagala DSD.

In relation to the second intervention, which are the proposed flood bunds, the positive impacts include the provision of good protection on the flood plains for the floods under the design return period and reduce flood damage substantially in congested areas. The confinement of the flood spread within the dykes will therefore convert the areas beyond the dykes to a flood free zone for the floods of under the design return period. In addition, due to the provided Free Board, the dykes could confine flood of even higher return period up to the top level of the dyke occupying the Free Board zone.

The positive social impacts of the flood bunds are that, frequent flood victims in the Lower Kelani Basin will be relieved from floods, unhygienic practices relating to toilet waste disposal and garbage dumping will be halted / minimized and the previously flood vulnerable area, as a whole, will be safer than before for socially and economically feasible livelihoods and land use practices.

There are however, major hydrological impacts of the proposed flood dykes since the flood dykes are long and run continuously from Hanwella to the outfall as a flexible line varying between 0ft and 50ft. There will be flood impacts immediately upstream of the starting point of the flood dykes as follows;

1. Flood lift due to dykes (backwater effect)
2. Longer inundation time of a threshold
3. Longer recession time
4. Higher spatial flood spread (inundation of an extra area which is normally inundated)

The flood bunds will create considerable backwater upstream and will impact existing bridges due to high velocity and backwater. The flood dykes could also get overtopped by floods of a higher return period which will create a disaster situation. In addition to this, pumping stations will be required in order to drain local catchment flows.

These issues require to be very carefully studied in order to ensure that the measures adopted in order to mitigate the floods in one location do not result in transferring the problem to another location. The variation of the flood lift reaches its peak around 23km chainage within the flood bunds. Flood lifts are low near the sea and near Glencourse river gauging station. However, the flood lifts corresponding to 50 and 100-year return period at the beginning of the flood bunds at Hanwella are 1m and 1.9m and such flood lifts are critical as according to most international guidelines on flood lifts, the maximum allowable flood lift is 0.3m.

Another issue is that Extreme rain events in Colombo generally coincide with high water levels in the Kelani River, thereby hindering the storm water drainage into the river. This coincidence means that most of the time both “High Kelani” and “High Colombo” water levels occur, warranting the need for pumping stations for the Colombo Catchment. The proper functioning of pumping stations is crucial in times of high rainfall and high Kelani water in order to prevent flooding of Colombo. There are many issues related to the maintenance of such pumps as well as the assurance that they perform during high rains and stormy weather as there are potential power outages at such times.

As for the ecological impact, the construction of the flood bunds could have an adverse impact on the Colombo wetlands. At the lower reaches the creation of the bund may hinder the flow of water to and from the elaborate channel network which originates or drains into the Kelani River. The dependency of the Colombo wetlands, which are now considered important in terms of its ecosystem services and biodiversity conservation, is linked to the river and its tributaries. Special attention should therefore be paid to the maintenance of the existing hydrological regimes, through the creation of adequate water flow channels where needed.

As for the social impacts of the Flood embankments, it will result in a reduction in social costs due to displacement and distress (including loss of life) caused by flooding. These positive impacts will, however, be offset by the costs of land acquisition and the high cost of construction of the flood bunds. Furthermore, due to the loss of assets and livelihoods, compensation payments will have to be made to local households and businesses adversely affected by the construction activities.

A large number of inhabitants (both squatters & private owners) occupying the most vulnerable areas adjacent to the Lower Kelani River Bank will need to be relocated and compensated while

a considerable area presently under cash crops (Coconut, Rambutan, Minor Export Crops & Vegetable) and unprotected forest, will be lost due to Flood Bund construction.

The Flood Bunds are also seen as an artificial construction that will take away the scenic beauty of the river basin, and will hinder the free access to the natural water body.

In relation to the potential impacts on archeological and cultural sites, there are a total of 65 such sites spread in the four main districts of the Kelani Basin. These sites include ancient temples, rock temples, cave paintings, protected monuments, ancient forts and dikes, ancient Buddhist campuses and others.

A preliminary evaluation of impacts on archaeological sites using GIS data does not show any major impacts on archaeological monuments or sites. However, a more detailed study of the area in question will be required during the social study and EIA in order to determine whether any undocumented cultural, religious or historical sites will be affected. Furthermore, there are some religious buildings and associated land that may be affected that would also require further investigation during the EIA stage.

With respect to the existing legal framework in the country for dealing with Floods and droughts, there are existing provisions available for flood and drought mitigation under the Irrigation Ordinance No 32 of 1946 and Flood Protection Ordinance No 4 of 1924 Amended by Act no 22 of 1955. The existing provisions in these acts which are outdated are totally inadequate in order to deal with floods and droughts effectively. Both of the above-mentioned acts are now being replaced by an Act to amend the Irrigation Ordinance (chapter 453) and the new Flood Risk Management Act.

An evaluation of the existing Policies, Laws and Regulations and Institutional Capacity to address environmental issues and major sustainability challenges, reveals that the existing legal framework in the country is sufficient to tackle the environmental issues that may arise during the implementation of the flood and drought mitigation proposals. The proposed flood and drought mitigation projects are located within areas which come either under the jurisdiction of the Central Environmental Authority. The National Environmental Act no 47 of 1980 has provisions for conducting an Environmental Impact Assessment for the proposed flood and drought mitigation proposals prior to implementation. EIA is a legal requirement under this Act, and therefore detailed environmental Assessments in the form of Initial Environmental Examinations or full scale Environmental Impact Assessments will be required for all of the proposed interventions, along with formal environmental approval from the Central Environmental Authority.

As far as regular monitoring of these projects are concerned, although there is an existing procedure at the CEA for the monitoring of projects approved subsequent to an EIA, the efficacy of such monitoring, including the frequency of monitoring is hampered by the large number of projects requiring to be monitored, along with the lack of adequate human and other resources such as vehicles.



It is therefore proposed that a Project Coordination and Monitoring Committee consisting of the following organizations is set up under the Department of Irrigation for the purpose of planning as well as monitoring the implementation of the proposed interventions.

- Irrigation Department (to chair the meeting)
- CRIP Project
- Central Environmental Authority
- Department of Agriculture/ Ministry of Agriculture
- Ceylon Electricity Board
- District/Divisional Secretaries of the relevant districts
- Relevant Local Authorities
- Forest Department
- Department of Wildlife Conservation
- Department of Archaeology
- Urban Development Authority
- Provincial Irrigation Engineers

It is also proposed that a fully-fledged Environmental Unit is established at the Irrigation Department manned by suitably qualified environmental professionals. This could be done by strengthening the existing Environmental Unit in the Department by staffing it with qualified environmental professionals. Setting up of such a unit at the irrigation Department would be a useful exercise as the Irrigation Department is involved in the planning many of the largest projects in Sri Lanka, which often have many environmental impacts. Setting up of the environmental unit will result in environmental inputs being provided to projects at the planning and design stage itself, thereby avoiding potential issues arising at the EIA stage. The proposed unit could take up the task of regular monitoring of the proposed projects under the CRIP along with independent monitoring by the Central Environmental Authority, in order to ensure compliance with EIA approval conditions.

In conclusion, possible other options for flood mitigation in the Kelani River should be fully investigated for their feasibility and cost, prior to implementing the proposed flood bunds, which have been shown to have several adverse impacts if implemented in the present form. Adoption of other flood control measures as indicated below, could result in the reduction of the length and height of the flood bunds or eliminate them altogether. It is recommended that the following alternate options for flood control are fully investigated for their feasibility prior to deciding on the best option or combination of options.

- a) Trans-basin diversions whereby the use of flood water in drought-stricken areas, will be optimized, resulting in gainfully utilizing the flood waters rather than simply sending it to the sea, thereby gaining maximum returns on investment to the national economy. In this regard it is strongly recommended that the proposed intervention to divert Kelani Water at Norton Bridge to the Mahaweli is investigated fully for its flood reduction

potential as well as for potential environmental and social impacts, in order to decide on the most cost effective and sustainable solution.

The following options should also be investigated in order to arrive at the optimal solution with the least environmental and social cost and the highest benefits.

- b) Redirecting the settlements in the flood plain to new areas including the new economic centers planned by the Ministry of Megapolis and Western Development.
- c) Construction of smaller reservoirs upstream at suitable locations (useful also for mitigating drought)
- d) Creating flood bypass channels (E.g. green channels to bypass meanders)

The best option or combination of options should be selected only after a comprehensive Environmental and Economic Analysis, including an Extended Cost-Benefit Analysis of each option has been completed. The optimum solution should be that with the least environmental, social and ecological impacts, incurring the lowest monetary cost and highest benefits.

According to the provisions in the National Environmental Act, all the proposed interventions are “Prescribed Projects” which require full scale Environmental Impact Assessments. Since the study of alternatives is a prerequisite of the EIA process, the above-mentioned study of all potential alternatives for flood control in the Kelani River Basin, will also result in fulfilling this essential requirement of the EIA process.

# CLIMATE RESILIENCE MULTI-PHASED PROGRAMMATIC APPROACH ENVIRONMENTAL ASSESSMENT AND MANAGEMENT FRAMEWORK (EAMF)

## EXECUTIVE SUMMARY



**Ministry of Agriculture, Rural Economic Affairs, Livestock  
Development, Irrigation and Fisheries & Aquatic Resources  
Development**

**Sri Lanka**

**January 2019**

## CHAPTER 1: INTRODUCTION

### 1.1 Introduction to the Climate Resilience Multi Phased Programmatic Approach (CREMPA)

#### 1.1.1 Sectoral and Institutional Context

**Climate-related hazards pose a significant threat to economic and social development in Sri Lanka.** The changing climate has increased the frequency and severity of extreme events<sup>1</sup> in Sri Lanka over the past two decades. During 2000-10, floods cumulatively affected more than 8.5 million people, while droughts affected more than 5 million<sup>2</sup>. During the 2010 to 2018 period, 5.2 million people were affected from floods and 6.7 million from drought.

**Sri Lanka has experienced increasing and unplanned expenditure for recovery and reconstruction efforts due to these recurrent disaster events.** After the country suffered from a numbers of events in 2011, 2012, 2014<sup>3</sup>, most recently, the floods and landslides consecutively hit the country in May 2016 and 2017, and resulted in estimated reconstruction needs of US\$ 960 million and US\$ 790 million. In May 2016, Tropical Storm Roanu hit the country and caused widespread flooding and landslides in 24 out of 25 districts in the country. An estimated 500,000 people were affected by this disaster, including at least 21,484 people who were displaced from their homes. As a result of the events, 623 houses were completely destroyed, and more than 4,400 homes were damaged. In May 2017, a southwest monsoon brought heavy rains and strong winds which provoked flash floods and landslides in 15 out of 25 districts. Approximately 230,000 families got affected, and 88,000 houses were partially or fully damaged. Lately, the country observes slow onset and evolving impact of drought in Northern, Eastern and Central regions, and estimated affected population has reached more than 1,900,000 people in 17 districts as of September 2017. This exacerbation of risk and increase in recovery costs visibly pressured national economy. This was reflected in the Global Climate Risk Index (CRI). While Sri Lanka ranked only 48th place on the average CRI ranking from 1997 to 2016, the most recent 2018 ranking puts Sri Lanka in 4th place largely due to the floods in 2016. Potential impacts due to climate change are foreseen as a 1.2 percent loss of annual GDP by 2050, direct economic impacts in various sectors.

**The Sri Lanka Fiscal Disaster Risk Assessment (2016) estimates, in the long term, the government needs to allocate at least US\$ 380 million each year to deal with natural disasters<sup>4</sup>. Almost two thirds of this annual allocation would be required for flood related events.** However, when infrequent disasters such as cyclones or severe floods occur, their economic footprint is much larger than the annual allocation. To mitigate the increasing costs of disasters among many other reasons, investment in disaster risk reduction, therefore, is a critical area for priority. Otherwise, the progress and gains to accelerate poverty eradication and to boost shared prosperity would also be jeopardized.

**Recent floods left distinct impacts on key economic sectors.** Recent floods impacted Agriculture, Transport, Irrigation, Industry and Commerce sectors, following the impact to the housing sector the most<sup>5</sup>. Loss in such sectors, predominantly private sector, directly impacted the quality of lives of those living on these sectors. Agriculture sector was significantly impacted due to drought, combined with floods. The rice production in 2017 during the Maha and Yala seasons, the main cropping seasons in

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<sup>1</sup> The National Adaptation Plan for Climate Change in Sri Lanka (2016-2025)<sup>1</sup> highlights that three major types of changes the country is facing: a) gradual increase in ambient air temperature; b) changes in distribution pattern of rainfall; and c) increase in frequency and severity of extreme weather events. In addition, changes in oceanic environment, such as sea level rise, seem to create significant impacts over Sri Lanka.

<sup>2</sup> Program Document On a Proposed Development Policy Loan with a Catastrophe Deferred Drawdown Options (<http://documents.worldbank.org/curated/en/444991468303013994/pdf/862250PAD0P146010Box385166B00UO090.pdf>)

<sup>3</sup> The estimated economic impact of the flood and landslide events during last three from 2011, floods affected more than a million people in the Northern, North Central and Eastern provinces, and caused more than US\$ 600 million in direct damages. Floods in 2012 and 2014 affected nearly a half a million and 1.2 million people.

<sup>4</sup> <https://www.gfdr.org/sites/default/files/publication/fiscal-disaster-risk-assessment-financing-options.pdf>

<sup>5</sup> Two PDNA reports in 2016 and 2017 in the above footnotes.

Sri Lanka, was halved compared to previous years, assessed as a result of disaster events.

### Institutional context

**The Ministry of Irrigation, Water Resources and Disaster Management (MIWRDM) is the government ministry mandated for policy guidance and oversight for disaster management of the country.** It implements its mandate through four leading government agencies, which have mandates and responsibilities to provide timely, accurate and useful forecasts and warnings of hydrological and meteorological hazards in Sri Lanka: i) the Department of Meteorology (DoM) for managing Sri Lanka's meteorological network, monitoring weather, forecasting extreme weather events, and early warning services on meteorological hazards and tsunamis; ii) the hydrology division of the Irrigation Department (ID) for managing Sri Lanka's Hydro-Meteorological Information System (HMIS), observation network, and data base and issuing flood forecasts and warnings on major rivers; iii) the National Building Research Organization (NBRO) for landslide monitoring and risk mitigation; and iv) Disaster Management Center (DMC) for disaster early warning and disaster management, including floods.

**Modernization of Hydro-Meteorological Systems to strengthen hydrological and meteorological forecasting, disaster early warning systems and weather services is an urgent priority in the face of the increasing climate change and its increasing damages and losses and impacts on the economy and people.** There is a strong demand for better meteorological and hydrological services evidenced by the responses from disaster management, water management, hydropower, agriculture, health and other clients following the impact of the 16 May 2016 flood event and related landslides. At present, many constraints hinder efficient and effective hydro-meteorological services, including early warning on extreme weather events and disasters to different economic sectors of the country and communities. The meteorological and hydrological services have limited capacity and capability to provide quantitative information to guide timely decision making in disaster management. A major reason is the inadequacy of the technological capabilities, staff capacities and skills in the mandated institutions in forecasting and early warning that are in line with standards of many developed and developing countries. There is an urgent need to adopt state-of art technology and available international products by the country to ensure trustful and accurate early warning to public and economic sectors and appropriate public response to extreme weather events, in order to ensure appropriate public response to warnings.

**There is an urgent need to establish and operationalize a user driven, long-term national strategy for meteorological and hydrological services.** Early warning services in Sri Lanka remain separate within the four agencies and uncoordinated. Close coordination among the four lead agencies is necessary to access the up to date, real-time meteorological and hydrological data and information for successful and effective impact based forecasting and early warning to minimize adverse impacts of extreme weather events to the economy, infrastructure and people of extreme weather events. Moving beyond weather and hydrological forecasting to provide efficient early warning services requires effective partnerships not only among the four government agencies mentioned above but also with many other different government agencies, as well as civil society organization, non-governmental organizations, and communities.

**A World Bank assessment (2016) of meteorological and hydrological services of Sri Lanka concluded that Sri Lanka's investment in its national meteorological and hydrological services (NMHS) is very low compared with other developing and developed countries.** Most NMHS are funded in the range of 0.01-0.05 percent of GDP with a global average of 0.02 percent of GDP. The investment on NHMS in Sri Lanka is 0.002 percent of GDP, which is ten times below the global average. This low level of investments on NHMS has been a primary reason that constrained the DoM in meeting its national public good obligations effectively. The DoM as well as the hydrology division of the ID face difficult challenge to modernize its capabilities because of low annual funding levels for operations and maintenance and a workforce that needs to rapidly develop new skills to use modern observing, forecasting and services. The assessment recognized the needs that: a) it would be desirable to increase investments to ensure capacity and effectiveness of NHMS to support economic development by minimizing the adverse impact of hydro-meteorological hazards; b) a systematic and sustainable improvement in meteorological and

hydrological forecasting and warning capacity of the DoM and hydrology division of the ID is of paramount importance; c) as a first step Sri Lanka should begin with the full use of products and services available from the World Meteorological organization (WMO) centers and more advanced NHMS of other countries and upgrading the national observing and forecasting infrastructure; and d) investments are necessary to build staffing skills and capacity of the Hydrology division of the ID, the DoM, the DMC and the NBRO; e) the capacity of the hydrology division of the ID needs strengthened for the application of hydrological modeling and the use of quantitative precipitation forecasts in association with the DoM; and f) the DMC and the NBRO will have to acquire skills in interpreting meteorological and hydrological forecasts for early disaster warning.

**The Government is keen and committed to take proactive actions for flood and drought risk mitigation in the country over the coming years.** The MIWRDM is currently carrying out comprehensive flood and drought risk modeling in ten river basins<sup>6</sup> which are most vulnerable to flood and drought risks under the ongoing Climate Resilience Improvement Project (CRIP) funded by the World Bank, leading to the development of basin level flood and drought risk mitigation investment plans. It also plans to extend the basin planning to carry out feasibility studies of most urgent flood risk interventions in critical basins, beginning with the studies for the two reservoirs of the upper Kelani basin recommended in the basin planning for the Kelani basin. The MIWRDM plans to extend the flood and drought risk modeling to several other basins to prepare investment plans for those basins. In addition, the Bank supported the MIWRDM to complete a pre-feasibility for flood risk mitigation in Mundeni Aru basin. The Government intends to complete detailed engineering designs supported by a feasibility study to be able to implement feasible interventions in parallel with more broader water resources development interventions in the basin for agriculture development and drinking water supply.

**Historically, the ID has a proven track record and experience in the design, construction, operation and maintenance of large flood control projects, and continue to enhance its attention to address flooding in major river basins.** The existing flood protection works of the Kelani river basin has been a long-standing product of the ID. However, it had been designed to provide a much lower level of protection in the lower Kelani basin at a time when the basin is less developed and inhabited. The capital city of Colombo and its sub urban areas of the lower Kelani basin has rapidly developed over the last 2-3 decades, making the area as the center of gravity of trade and commerce and home for a large population. This pace of development is likely to continue and if not accelerate over time. The Ministry of Megapolis and Western Region Development has future plans to undertake several social and economic development plans in the lower Kelani basin. With these expectations and the escalated frequency of flooding in the lower Kalani basin and resulting average annual loss to the economy over the recent years, the MIWRDM and the ID, under the direction of the high levels of the Government, are looking forward to increasing the level of protection in the lower Kelani basin with the flood risk mitigation interventions proposed under this MPA. In the 1980s and 1990s, the ID successfully implemented the construction of two large flood control projects in Gin ganga and Nilwala ganga basins and is currently responsible for their O&M. The MIWRDM/ID are completing the flood and drought risk mitigation basin plans for these two basins under the ongoing CRIP, with a long-term view to upgrade the level of protection in those two basins to appropriate levels with new flood protection interventions as the funding is available.

**The ID has taken further initiatives recently to enhance its capacity and effectiveness in flood and drought risk management to be able to meet the challenges of increasing incidence of flood hazards.** The ongoing preparation of flood and drought risk mitigation basin investment plans for ten vulnerable basins is a major initiative toward this end. In addition, during the foregoing years the hydrology division of the ID strengthened its hydro-meteorological information system under the Dam Safety and Water Resources Planning Project (DSWRPPP), funded by the World Bank. It is gradually building capacity of a group of young engineers for state-of-art flood and drought risk modeling by engaging them as full-time counterpart staff over the last three years to work with the international consultant of CRIP preparing basin investment plans for the ten river

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<sup>6</sup> The ten river basins are Kelani ganga, Attanagalu Oya, Mahaweli ganga, Malwathu oya, Gin ganga, Nilwala ganga, Kala oya, Deduru oya, Maha oya and Gal oya.

basins. The MIWRDM and the ID are preparing a new Flood Management Act, replacing the outdated Flood Protection Act no 22 enacted in 1955 to cater to the present and future flood management requirements. It recently established a new flood control and drainage unit within the ID to enhance its effectiveness in flood risk management.

#### DRM as a national priority

**Addressing these evolving impact of climate-induced disasters, the Government set high priority for disaster management to underpin sustainable development, and highlighted in Vision 2025<sup>7</sup>, the Government's latest development planning document. The GoSL partnered with the Bank to further improve fiscal and physical resilience of the nation.** To address comprehensive DRM challenges, the GoSL designed Climate Resilience Multi-phased Programmatic Approach (CRESMIPA) to scale up the precedent efforts implemented as the Comprehensive Climate and Disaster Resilience Program (which aimed at fundamental changes in and mainstreaming of disaster risk management (DRM) practices in priority sectors to improve the resilience of the country. The program integrated two Bank-financed lending and several technical assistance (TA) activities whose synergies maximize the overall outcomes and strengthen the resilience of Sri Lanka. To operationalize this program, the Bank approved two projects in 2014: a) CRIP and b) Development Policy Loan with a Catastrophe Deferred Draw-Down Option (CatDDO) (US\$102 million) which is a contingent line of credit to provide the country with access to immediate financial resources during a major disaster to enable efficient response and recovery. The DPL with CATDDO closed in May 2017, after the successful withdrawal of full loan amount following the floods and landslides in 2016<sup>8</sup>. Building on the initial outputs, the GoSL and the Bank has advanced the dialogue to mainstream DRM further into various sectors. To strengthen the fiscal resilience, a new Advisory Services and Analytics (ASA): Disaster Risk Financing and Insurance in Sri Lanka (P166332) has started to strengthen disaster risk financing and support sustainable instruments to manage disaster related contingent liabilities. Similarly, another ASA: Adaptive Social Protection System (P166770) was initiated to advance the design of a disaster-linked social protection mechanism, which would allow the Government to quickly identify, enroll and compensate the disaster-affected households.

**This project will increase weather and climate change adaptation and resilience – better managing water resources – through non-structural and structural measures investment measures** as well as the modernization of Sri Lanka's weather, water and climate services infrastructure, leading to improved monitoring, prediction and assessment of severe weather events, and climate variability and change. The project will have social and economic benefits by managing flood risks in prioritized basins and providing information for more efficient operation of weather- and climate-dependent sectors. This would be achieved by strengthening the capacity of the institutions responsible for production and delivery of weather, climate and hydrological information and services, institutions which are the main users of this information and end-users, in particular women and vulnerable communities.

### **1.1.2 Program Development Objective**

The Program Development Objective of this MPA is to enhance Sri Lanka's climate and disaster resilience.

### **1.1.3 Program Framework**

#### **(i) Program Framework**

**The program is designed with three phases for the period of five years with overlap between phases.** The Program will start the activities for the Kelani river basin, which is the highest priority for the GoSL. Due to the highly built-up and complex ground situation, the construction of the flood mitigation infrastructure in the Kelani river basin is divided into two phases in sequential manner with

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<sup>7</sup> [http://www.pmoffice.gov.lk/download/press/D0000000061\\_EN.pdf](http://www.pmoffice.gov.lk/download/press/D0000000061_EN.pdf)

<sup>8</sup> <http://documents.worldbank.org/curated/en/674381528124689623/pdf/ICR00004342-05312018.pdf>

overlapping years. The detailed design for the whole target reach is ready, however, longer time is expected for the land acquisition and safeguards implementation for the lower reach to the river mouth due to the highly built-up situation. Therefore, this program plans to commence the land acquisitions and safeguards implementation as well as construction works in the upper reach which is less populated.

**The design of each subsequent phase will consider the capacity of existing institutions, impacts of mitigation measures in place, contributions of other development partners and technical and monitoring challenges.** The phasing is modular; overlap ensures that essential activities in each phase will continue without interfering with other phases, while fully complementing each other. The first phase is described in detail in this document. The scope of the subsequent phases may change based on experience and lessons learned from the preceding operations and priorities of the GoSL. Since this will be the first program to be supported by the MPA, the Bank will work closely with the client to monitor and document lessons learned from this approach. The MPA is currently envisioned to be a series of three IPFs.

**Two river basins, namely Kelani and Mundeni Aru river basins were prioritized by the GoSL through the consultation among the key government stakeholders:** Ministry of Irrigation and Water Resources Management and Disaster Risk Management (MIWRDM) and Department of National Planning (NPD). The prioritization exercise was based on basins with the highest probability of occurrence of climate related disaster losses, the value of exposed assets at risk, and considerations following the latest flood event that occurred in May 2016, as well as May 2017.

**The structural investments proposed under Phase I and Phase II for Kelani basin were identified through the analytical work and hydrological modelling undertaken in CRIP.** The investments proposed under Phase III were identified at pre-feasibility level through similar analytical work and hydrological modeling undertaken by the Irrigation Department (ID), supported by the Bank and Global Facility for Disaster Reduction and Recovery (GFDRR). Currently, the GoSL is conducting a feasibility study and detailed design Mundeni Aru basin with the Government budget, which will be prepared as an investment through the World Bank financing under the Phase III. During the Phase I, the GoSL will conduct feasibility studies and detailed designs for the construction of upstream reservoirs in the Kelani river basin.

**Each Phase Development Objective (PDO) are defined to achieve the overall PDO.**

Table 1: Phase Development Objectives

Phase #	Phase Development Objectives
I	To enhance the forecasting and warning capacity for reducing social and economic impacts of floods
II	To enhance the flood mitigation capacity in the Kelani river basin for climate and disaster resilience
III	To enhance the flood mitigation capacity in the Mundeni Aru river basin for climate and disaster resilience

## 1. The program activities are structures as follows:

- (a) **Phase I: Flood Early Warning and Upper Kelani<sup>9</sup> Flood Risk Mitigation Project (US\$ 294.8M)**
- Component 1: Flood forecasting and early warning, and Flood and Drought Modelling for priority basins (US\$ 47M)
  - Component 2: Flood mitigation interventions upper reaches of the embankment (12km), pumping stations along the tributaries and salinity barrier and design for reservoirs (US\$ 162.5M)

<sup>9</sup> Upper Kelani flood protection investments include the physical infrastructure from Hanwella to Kaduwela (approx. 12 km)



- Component 3: Land acquisition, Resettlement and Safeguards Implementation (US\$ 80.3M)
  - Component 4: Project Management (US\$ 5M)
  - Component 5: Contingent emergency response component (CERC) (US\$ 0M)
- (b) **Phase II: Kelani Basin Flood Risk Mitigation Project<sup>10</sup>** (US\$ 364.7M)
- Component 1: Flood risk mitigation investment (Kaduela to river mouth) (US\$ 114M) and Flood Risk Mitigation Investment from Hanwella to Ranwella (US\$ 50M)
  - Component 2: Land acquisition, Resettlement and Safeguards (US\$ 180.5M & 15.2M)
  - Component 3: Project Management (US\$ 5M)
  - Component 4: CERC (US\$ 0)
- (c) **Phase III: Mundeni Aru Basin Flood Risk Mitigation & Reservoir Project** (US\$ 295M)
- Component 1: Flood risk mitigation investment and safeguard compliance (US\$ 40M)
  - Component 2: Construction of 2 reservoirs (US\$ 250M)
  - Component 3: Project Management (US\$ 5M)
  - Component 4: CERC (US\$ 0M)

Expected program outcomes are defined as follows:

(a) **Phase I**

**Intermediate Outcomes:** Develop and operationalize flood forecasting and EWS; Construct physical flood risk mitigation infrastructure to provide flood protection up to 1 in 50 years events in part of the lower Kelani river basin; and complete detailed designs for remaining lower Kelani river basin and Mundeni Aru river basin. Design two upstream reservoir to enhance flood protection level of the Kelani river basin up to 1 in 100 years events

**Outcomes:**

Citizen have access to floor forecasting information with high accuracy in advance, and can take necessary risk mitigation actions based on early warning messages; impact of floods reduced and flood water retention capacity increased in upper reach of the planned flood mitigation infrastructure.

(b) **Phase II**

**Intermediate Outcomes:** Complete physical flood risk mitigation infrastructure to provide flood protection up to 1 in 50 years events in the entire lower Kelani river basin.

**Outcomes:**

People's lives and assets in Kelani river basin become safer against the floods; fiscal and physical impacts of floods in Kelani river basin reduced.

(c) **Phase III**

**Intermediate Outcomes:** Construct physical infrastructure in the downstream of Mundeni Aru basin to provide flood protection up to 1 in 25 years events.

**Outcomes:**

People's lives and assets in Mundeni aru river basin become safer against the floods; and fiscal and physical impacts of floods in Mundeni aru river basin reduced

Table 2: Program Framework

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<sup>10</sup> Kelani phase II flood protection investments include the physical infrastructure to be built from Kaduwela to the river mouth.

Phase #	Sequential or Simultaneous	Phase's Proposed DO/a	IPF or PforR	Estimated IBRD Amount (\$ million)	Estimated Other Amount (\$ million) <sup>11</sup>	Estimated Total Amount (\$ million)	Estimated Approval Date	Estimated Environmental & Social Risk Rating
I	Sequential with a few years of overlapping	To enhance the forecasting and warning capacity for reducing social and economic impacts of floods	IPF	294.80	0.00	282.50	May 2019	Category A
II		To enhance the flood mitigation capacity in the Kelani river basin for climate and disaster resilience	IPF	364.70	0.00	376.70	January 2020 (Tentative)	High Risk classification as per the Environmental and Social Management Framework
III		To enhance the flood mitigation capacity in the Mundeni Aru river basin for climate and disaster resilience	IPF	295.00	0.00	300.00	April 2020 (Tentative)	High Risk classification as per the Environmental and Social Management Framework
<b>Total</b>				954.50	0.00			
Estimated for the entire MPA Program				\$ 954.50				

a/ Include country name in case of multiple borrowers

If there are changes in the MPA Program framework, the subsequent phase's PAD would include the original program framework as well as the revised one.

#### Learning Agenda

**This program would be the first and largest flood embankment construction in Sri Lanka, and land acquisition and safeguards implementation needs careful coordination with relevant agencies and well-advanced planning.** As part of the program preparation, the GoSL conducted a large-scale communication campaign and community consultation to inform the investment plan for the Kelani river basin. The Project Management Unit (PMU) has confirmed the necessary procedure for the land acquisition, and prepared the Resettlement Action Plan, informed by the Social Impact Assessment (SIA). It's critical for the MIWRDM and PMU to learn the lessons through the Phase I, before the same actions are to be started in the complex part of the Kelani river basin in the Phase II.

### **1.1.4 Detailed Project Description of Phase I**

#### **1.1.4.1 Project Development Objective**

The Project Development Objective of the first phase is to enhance the capacity of the GoSL to forecast and warn flood risk and increase the flood mitigation capacity in the Kelani river basin.

<sup>11</sup> This program is co-financing with Asian Infrastructure Investment Bank (AIIB), with equal amount of financing by the AIIB and the Bank.

The PDO will be achieved through: 1) comprehensive structural and non-structural flood risk mitigation investments in the Kelani river basin; 2) modernization of hydro-meteorological information and services, forecasting and early warning systems and improved dissemination of weather, climate and hydrological forecasts, warnings and advisory information to key end-users and communities; and 3) developing real-time flood operational guidelines and establishing institutional arrangements and capacity for early warning and flood risk management.

## 1.2 Project Components

**Component 1: Modernization of Hydro-Meteorological Systems (Total US\$47 million; of which 100% is IBRD financing).** The objective of this Component will be two-fold: (i) to enhance the capability and thereby the performance of the Irrigation Department (ID) and the Department of Meteorology (DoM) to understand and make use of hydrological and meteorological information for decision making and; (ii) to upgrade and expand the hydrological and meteorological observation networks to ensure that these networks are well functioning and interoperable. This objective will be achieved, in line with international best practices, through investments in strengthening the institutional setup and building capacity of human resources at ID and DoM. The bulk of the activities in this component, however, will be the procurement and installation of goods, such as monitoring equipment and ICT, as well as the financing of a new flood forecasting center building.

**Component 1 has 4 sub-components:**

- (i) ***Sub-Component 1.1: Institutional Strengthening, Capacity Building and Project Management (US\$8.8 million).*** This sub-component will support MIWRDM in the training of technical personnel, evaluation of opportunities to introduce new and innovative sustainable business models, training support for main stakeholders and training activities for end-users, including agriculture, water resources, disaster risk management, energy and health.
- (ii) ***Sub-Component 1.2: Modernization of the Observing, forecasting and communication systems infrastructure (US\$21.3 million).*** This sub-component will aim to upgrade and expand the meteorological and hydrological observation networks and ensure that these networks are well functioning and interoperable; modernize data management, communication and information and communication technology (ICT) systems; improve weather and hydrological forecasting processes and numerical prediction systems and refurbish DMC, DoM and NBRO offices and facilities.
- (iii) ***Sub-Component 1.3: Enhancement of Service Delivery Systems (US\$7.4 million).*** This component will introduce severe weather and hydrological services and enhance end-to-end early warning systems and services, including impact-based flood forecasting services, flash flood guidance system, the establishment of a digital library of climate-relevant information for Sri Lanka, development of agriculture and climate advisory services and the creation of a National Framework for Climate Services. The WMO Strategy for Service Delivery and its Implementation Plan<sup>12</sup> provides in-depth and step-by-step guidance for the enhancement and development of service delivery. This component will be essential in improving the credibility and penetration of MIWRDM's services to the public and decision makers and potentially generate new sources of revenues in the future. In addition, improving information customization and dissemination to address the needs of consumers is expected to produce climate change adaptation co-benefits in terms of reducing vulnerability and improving preparedness to adverse hydro-meteorological events. Priority target end-users would initially include: (a) agro-meteorological information services, (b) food security; (c) emergency and disaster risk management; (d) water resource management; and (e) aviation.

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<sup>12</sup> WMO Strategy for Service Delivery and its Implementation Plan (WMO 2015) WMO-No.1129

- (iv) **Sub-Component 1.4: Flood and drought risk modelling (19.3 million).** This sub-component will support in carrying out flood and drought risk assessments in selected river basins, identify structural and non-structural risk mitigation interventions and develop investments plans in the selected river basins, carry out feasibility studies for the prioritized interventions and develop effective warning and risk communication tools in order to facilitate the use of such information for development planning purposes. Moreover, this component will finance costs of feasibility studies, detailed engineering designs, social and environmental assessments and preparation of social and environmental management plans for the interventions proposed in Mundeni Aru river basin under Phase III of the MPA.
2. **Component 2: Flood Risk Mitigation Investments in the Kelani Basin (Total US\$68 million; of which 100% is IBRD financing).** The objective of Component 2 is to reduce flood risks in surrounding communities, personal assets and public infrastructure in the main Kelani river and its tributaries for an approximate length of 12 km between Hanwella and Kaduwela. To achieve this objective, this component will primarily support the construction of different types of embankments at high risk sites along the lower Kelani Basin for protection against riverine floods, the construction of pumping stations in 19 tributaries, the replacement of the salinity barrier and the detailed designs of two reservoirs upstream. This component would be the main focus of Phase I of the MPA, and can only begin after successful completion of land acquisition and resettlement supports (Component 3).
  3. With respect to the infrastructure investments, the MIWRDM has developed a long list of investments based on a consultative process involving inputs from relevant stakeholders.

**Component 2 has 3 sub-components:**

- (i) **Sub-component 2.1: Construction of Flood Protection Works** This sub-component will finance construction of all civil works required for flood protection between Hanwella and Kaduwela (Tranche 1). The primary works along the main river course will include earthen embankments, concrete flood walls, river bank erosion control and protection structures, and limited river training works. The embankment trace along the two banks of the river for Tranche 1 have been informed and finalized by a comprehensive feasibility level flood modeling. The designs for these works have been based on detailed geotechnical investigations and other considerations. In addition, this sub-component will finance works related to river bank erosion control and protection, river training, flood proofing of selected settlement areas and assets along the tributaries, improving flood retention areas, and improving storage capacity and conveyance efficiency of local storm water and agriculture drainage ways. It will also finance replacement and improvements of civil and electro-mechanical works that will be affected by the construction of primary flood protection works. The typical works would include: a) modifications to existing public utilities (telecommunication, power supply, water supply, and sewerage lines etc.) b) replacement and reconstruction of existing public assets (offices, religious places, cemeteries etc.), and c) structural improvements to existing infrastructure such as local government roads, highways, culverts and bridges. Construction level design details for these works will be finalized at the detailed designs stage.
- (ii) **Sub-component 2.2: Installment of Pumping Stations along the Tributaries.** This sub-component will finance all costs associated with the installment of pumping stations along the tributaries for pumping water from tributaries to the main river channel when the flood water levels of the main river and individual tributaries do not allow gravity flow. Typical works will include: pumps; hydraulic control structures such as gates and associated electro-mechanical devices for operation of gates at the tributary outlets, and; training bunds and embankments surrounding pump houses. The required pumping capacity at each tributary outlet into the main river have been determined on basis of a comprehensive model

study which resulted in the development of a strategy for flood management in the tributaries. The design of required pumping arrangements, pump sizes, locations and pumping station designs have been informed by a further hydrological and cost optimization study supported by the model.

- (iii) ***Sub-component 2.3: Replacement of the Salinity Barrier*** This sub-component will finance the construction of a gated barrage across the main Kelani river replacing the existing temporary structure at the main drinking water supply intake to Colombo city located at Ambatale, 16 km upstream of the sea outfall. The existing salinity barrier at this location is a pair of concrete filled sheet pile walls across the river with a pile of moveable sand bags on top of it to raise the water level upstream of the barrier. The existing salinity barrier had been constructed to address the threat of salinity intrusion to the water supply intake during dry weather and low downstream river flow periods. However, the modeling results indicate that the barrier causes a sizable increase of flood water levels upstream with its impact propagating several kilometers upstream of Ambatale before reducing to zero. It is now proposed to replace this structure with a barrage with flap gates which will allow rapid river discharge during floods and arrest salinity intrusion during dry weather. The proposed new gated barrage (new salinity barrier) will be designed to serve as a major flood control structure, a salinity barrier, and a regulator to flush off salinity downstream of the intake during low flow periods.
- (iv) ***Sub-component 2.4: Detailed designs of reservoirs*** This sub-component will finance the consultancy services for detailed designs of Weeoya and Roucastle reservoirs in the upper Kelani river basin. These two reservoirs are two major flood risk mitigation interventions for the Kelani river basin in order to provide 1:100 year protection in the lower Kelani basin, after the construction.
- (v) ***Sub-component 2.5: Design and construction supervision and other necessary services:*** This subcomponent will finance all costs associated with detailed engineering designs, construction supervision and contract management, and for activities required to ensure compliance with social and environmental safeguards related to the implementation of the flood protection works. The project would finance several consultancy services: i) detailed geotechnical investigations and design of flood protection works (embankments, pumping stations and river bank erosion works etc.) for the remaining river reach of the lower Kelani basin covering the area between Kaduwela and sea outfall plus the area affected by back water impact of upstream of Hanwella (Tranche II); ii) consultancy firm to act as “Engineer” to the Client (MIWRDM) for contract management, construction supervision and quality assurance, compliance with Environmental Management Plans (EMPs) for the flood protection works, and preparation and systematic archiving of as-built drawings and records of the completed flood protection works to support post-project operation and maintenance; iii) consulting service to plan and implement the public communication and outreach required for the planning and implementation of the RAP and the flood protection works construction program; and iv) independent consultants to monitor compliance with project’s social and environmental safeguards of the flood protection work program.

**Component 3: Land Acquisition and Resettlement (Total US\$75 million; of which 100% will be IBRD financing).** The objective of Component 3 is to acquire necessary area for construction (including temporary use) and to relocate affected communities to safe alternative sites. Land acquisition of about 104 ha is required and will affect around 400 structures, of which 84% comprise residential and 16% comprise commercial. The Social Framework has identified 8 category impacts and affected people include owners, tenants, leaseholders, farmers, share croppers, fishermen and women, sand-miners, operators of registered and non-registered businesses, employees and mobile vendors. Due diligence has been conducted to appropriately compensate the Project Affected Persons (PAP) by taking into account the following: land value, structural value, loss of income and loss of livelihoods (if any) as well as restorations. The compensation formula has incorporated gender considerations and takes into account an allowance for vulnerable communities (elderly, sick, people

with disabilities, women head of households, etc.). Success of this component is crucial to improve affected people's lives as well as to commence the physical works under Component 2.

**Component 4: Project Management Support (Total US\$5 million; of which 100% will be IBRD financing).** This component will provide the necessary enabling environment to support project implementation. This will include support for the following: project management, monitoring and evaluation of the implementation of resettlement action plan, and construction, supervision and quality assurance of the civil works by independent parties. This would also cover the cost of running Project Management Unit.

**Component 5: Contingent Emergency Response Component (CERC) (Total US\$0 million).** This component will support preparedness and rapid response to a natural disaster, emergency, and/or catastrophic event as needed. The provisional zero cost for this component will allow for rapid reallocation of loan proceeds from other components under streamlined procurement and disbursement procedures. Following an adverse natural event that causes a major natural disaster, the Government of Sri Lanka may request the Bank to re-allocate project funds to this component (which presently carries a zero allocation of loan proceeds) to support response and reconstruction. The component would hence allow the Government to request the Bank to re-categorize and reallocate financing from other components to partially cover emergency response and recovery costs. In the Sri Lanka portfolio, CERC is now embedded in all Investment Project Financing (IPF) across sectors. CERC was activated and utilized in the ongoing CRIP, following floods and landslides in 2017.

Disbursements under Component 5 will be contingent upon the fulfillment of the following conditions: (i) the Borrower as determined that an Eligible Crisis or Emergency has occurred and the World Bank has agreed and notified the Borrower; (ii) the Government of Sri Lanka has prepared and adopted the Contingent Emergency Response (CER) Implementation Plan that is agreed with the World Bank; and (iii) the Government of Sri Lanka has prepared, adopted, and disclosed safeguard instruments required, as per Bank guidelines, for all activities from the CER Implementation Plan eligible for financing under Component 5.

Disbursements will be made against a positive list of critical goods or the procurement of works, and consultant services required to support the immediate response and recovery needs. All expenditures under this component, should it be triggered, will be in accordance with BP/OP 8.0 and will be appraised, reviewed and found to be acceptable to the Bank before any disbursement is made.

Retroactive financing will also be available for payments made under the contingent emergency response component, up to 12 months prior to the activation of the Component. The amount available for retroactive financing will be up to 40 percent of the contingent component amount (after reallocation, if any.) The eligibility of expenditures that are claimed under this facility will be subject to the corresponding terms for retroactive financing included under the legal agreement.

### **1.3 Objective of the Environmental Assessment and Management Framework (EAMF)**

Projects and Programs financed with World Bank resources need to comply with World Bank Operational Policies. Therefore, components and related activities eligible for funding under this project will be required to satisfy the World Bank's safeguard policies, in addition to conformity with environmental legislation of the GoSL.

However, since details of sites and specific investments of the project are not available at this stage, site-specific Environmental and Social Assessments cannot be conducted. What is possible at this stage would be to carry out an identification of generic issues that are typically associated with activities that would potentially be funded by the project and apply the information to site specific environmental assessments, as and when the need arises.

Therefore, the purpose of this document is to outline a framework for environmental assessment and management, giving details of potential environmental issues and guidelines on what type of environmental assessment tools to be applied for various sub-project activities. This will serve as the

basis in the preparation of, site-specific specific Environmental Assessments (EAs) and/or Environmental Management Plans (EMPs). As stated earlier, it is being submitted in lieu of a project environmental and social assessments and has formed the basis for appraising the environmental and social aspects of the project. It will be made available for public review and comment in appropriate locations in Sri Lanka and in World Bank's Public Information Center in accordance with World Bank's policy of Access to Information.

It is expected that detailed environmental assessments for sites and/or for activities will be carried out (in accordance with this Framework) by the implementing agencies and will be reviewed and cleared by the Central Environmental Authority (CEA) where applicable, or any other agency, as applicable, under prevailing national environmental legislation in Sri Lanka.

In addition, for all physical activities, prior to the approval of disbursement of funds, the World Bank will also clear all safeguards documentation including site specific EAs and EMPs.

#### **1.4 Applicability of thr EAMF to the CRES MPA**

While the net environmental benefit of the program is expected to be positive, the project activities are likely to have significant environmental risks unless properly planned and executed. The construction of new and rehabilitation of existing flood mitigation infrastructure will lead to potential hydrological changes to the natural regimes, possible inundation of associated lands due to backwater effects; clearing of significant amounts of land; the need for extensive amounts of construction material, displacement and resettlement of people, and clearing conversion of areas which are associated human settlements, natural habitats and physical cultural resource, as well as environmental health and safety and construction related impacts, such as localized dust, noise and public and occupational health and safety, during sub-project implementation, across the three phases.

Strategic Environmental Assessments (SEAs) have been completed for both the Kelani and Mundeni Aru River Basin in conjunction with the Basin Development Plans under the CRIP 1 Project. The SEAs have facilitated the identification, assessment and establishment, of likely significant effects on the environment in both project basins associated with the physical implementation of the basin investment plans as well as the most important environmental and natural resource-related constraints bearing on the implementation of any related structural and non-structural interventions at a broader level.

The two SEAs have informed the preparation of a program specific Environment Assessment and Management Framework (EAMF) for the CRESMPA which outlines the processes and serves as a guideline to undertake site specific environmental screening, preparation of environmental assessments (EAs) and/or environmental management plans (EMPs) and other safeguard assessments, for all project investments across its Phases, as well as layout a stringent monitoring program. The EAMF has been prepared in line with the World Bank's safeguard policies, World Bank Group Environmental Health and Safety Guidelines as well as National Environmental Regulations of the GoSL.

The objectives of this Environmental Assessment and Management Framework are:

- a. To establish clear procedures and methodologies for environmental and social planning, review, approval and implementation of subprojects to be financed under the Project
- b. To carry out a preliminary assessment of environmental and social impacts from project investments and propose generic mitigation measures.
- c. To specify appropriate roles and responsibilities, and outline the necessary reporting procedures, for managing and monitoring environmental and social concerns related to subprojects
- d. To determine the training, capacity building and technical assistance needed to successfully implement the provisions of the EAMF
- e. To provide practical resources for implementing the EAMF
- f. To outline and sequence safeguard activities that will commence with project implementation

Since details of sites and specific investments of the project are not available at this stage, site-specific Environmental and Social Assessments cannot be conducted. What is possible at this stage would be to carry out an identification of generic issues that are typically associated with activities that would

potentially be funded by the project and apply the information to site specific environmental assessments, as and when the need arises.

Therefore, the purpose of this document is to outline a framework for environmental assessment and management, giving details of potential environmental issues and guidelines on what type of environmental assessment tools to be applied for various sub-project activities. This will serve as the basis in the preparation of, site-specific specific Environmental Assessments (EAs) and/or Environmental Management Plans (EMPs). As stated earlier, it is being submitted in lieu of a project environmental and social assessments and has formed the basis for appraising the environmental and social aspects of the project. It will be made available for public review and comment in appropriate locations in Sri Lanka and in IDA's Public Information Center in accordance with World Bank's policy of Access to Information.

## **1.5 Structure of the EAMF**

The EAMF has 6 chapters including the first chapter is an Introduction that provides the background to the program, program structure and objectives, program phases and a detailed description of the phase 1 project, with component descriptions and the reason for the preparing an EAMF. The chapters 2-6 covers the following:

- Environmental baseline conditions for the Kelani River Basin and the Mundeni Aru Basin
- Environmental legislation, regulatory and institutional framework in Sri Lanka
- Applicability of World Bank's environmental and social safeguard policies
- Potential environmental and social impacts and mitigation measures associated with the proposed program
- The Safeguards due diligence process to be followed within the framework of the operation.
- Implementation arrangements under this project

It also includes supportive Annexes that provides further information and guidance including the following:

- Annex 1: Suggested Format for Environmental Screening Form
- Annex-2: Policy Framework: Environmental Assessment and Impact Mitigation
- Annex 3: Basic Information Questionnaire for the CEA
- Annex 4: Generic Terms of Reference for Environmental Assessment
- Annex 5: Terms of Reference for Environmental Assessment for sub-projects involving major dredging
- Annex 6: Generic Terms of Reference for Strategic Environmental Assessment (SEA) to be undertaken for Basin Investment Plans
- Annex-7: Format for Environmental Management and Monitoring Plan (EMMP)
- Annex 8: Generic Environmental Management Plan (EMP) for Construction of Flood Mitigation Infrastructure and Works on Existing Structure on Water Ways.
- Annex 9: Generic Environmental Management Plan (EMP) for Construction of Ancillary Facilities as New Infrastructure and/or Rehabilitation of Existing Infrastructure such as office buildings and pump houses.
- Annex 10: Guidance Note on Selecting Mitigation Measures to be Included in the Environmental Management Plan for Construction Projects in Sri Lanka
- Annex 11: Guidelines for the Rehabilitation of Burrow Pits
- Annex 12: Environmental Guidelines for Decommissioning and Demolition of Existing Buildings



- Annex 13: Guidelines for Health and Safety of Workers, Communities and Visitor
- Annex 14: Guidelines for the relocation of living and non-living articles of conservation value
- Annex 15: Procedures for Physical Cultural Resource Impact Screening, Assessment & Management
- Annex 16: Guidance Document on Managing Environmental Impacts via Design Recommendations for Physical Interventions on Water Ways
- Annex 17: Guidance Note on Identifying Human Elephant Conflict Issues and Recommended Actions
- Annex 18: Special Monitoring Checklist for Ensuring Safe Conditions for Workers and Public.
- Annex 19: Format for Environmental Management and Monitoring Plan
- Annex 20: Generic Monitoring Plan for Environmental Parameters for Construction Phase of Subprojects
- Annex 21: Terms of Reference for Recruitment of Contractor Environmental Safeguard Officer
- Annex 22: Terms of Reference for the Project Level Environmental Audit
- Annex 23: Environmental Safeguards Preparatory Tasks Tracking Sheet
- Annex 24: Generic Session Plan for Project Implementation Agency Staff Training on EMF and Environmental Safeguard Instrument Implementation, Monitoring and Reporting.
- Annex 25: Example of Disclosure Advertisement for Safeguards Instrument
- Annex 26: Consultation Notes on EAMF Consultations

## **2 Chapter 2: Introduction to Prevailing Environmental Conditions in Project Area**

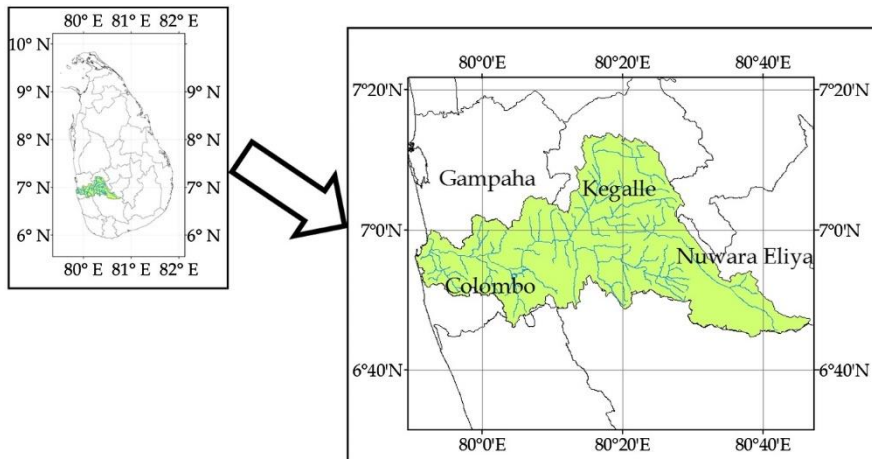
### **2.1 Chapter 1: Baseline Information of the Kelani River Basin<sup>13</sup>**

#### **2.1.1 Geographic Location and Salient Features**

The Kelani River is a 145-kilometre-long (90 mi) river in Sri Lanka. Ranking as the fourth-longest river in the country, its basin stretches from the Sri Pada Mountain Range to Colombo. It flows through and in some locations borders the districts of Nuwara Eliya, Ratnapura, Kegalle, Gampaha and Colombo. The river flows through the capital of Sri Lanka, Colombo, ending at the coast in Modara.

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<sup>13</sup> Chapter 4, has been informed by the baseline studies conducted under the Strategic Environmental Assessment of Development of River Basin Level Flood and Drought Mitigation Investment Plans-Kelani River Basin completed in June 2018



The Kelani River is a 145-kilometre-long (90 mi) river in Sri Lanka. Ranking as the fourth-longest river in the country, its basin stretches from the Sri Pada Mountain Range to Colombo. It flows through and in some locations borders the districts of Nuwara Eliya, Ratnapura, Kegalle, Gampaha and Colombo. The river flows through the capital of Sri Lanka, Colombo, ending at the coast in Modara.

Kelani basin can be divided into three distinct topographical units of lower (below 100m AMSL), middle (100 to 300m AMSL) upper peneplains (above 300m AMSL). The Kelani River Basin landforms vary significantly and includes 11 landforms, namely, Mountain, Escarpment, Hill and Ridge, Ridge and Valley, Hill and Valley, Mantled Plain (gently undulating to rolling plains), Rock Knob Plain (rough and broken relief of extensive tracts), Erosional Remnant (isolated, steeply rising bedrock controlled hills and ridges), Flood Plain, Coastal Plain, Sand Dune and Beach (Cooray, 1984). Slope steepness in the Kelani River Basin ranges from steep slopes with 25- 30% slopes in the Eastern parts to flat terrain in the lower Western portions.

The Kelani basin can be divided into three distinct topographical units that encompasses three peneplains i.e. lower (below 100m AMSL), middle (100 to 300m AMSL) upper (above 300m AMSL) (Cooray, 1984). This topographical variation occurring from the interior hilly terrain to coastal flat lands has resulted in the Kelani River Basin covering a range of land forms, from hillocks, ridges in its upper reaches to flood plains and coastal plains in the lower reaches. Although the flow of the river is influenced by the rainfall and tends to be torrential during the monsoonal periods, since the river basin is located within the wet zone there is considerable flow throughout much of the year in the main river as well as in its tributaries.

The area where the proposed interventions would occur falls primarily within the districts of Kegalle, Gampaha and Colombo. The fact that the entire area lies within the wet zone and spans across an elevational gradient, means that the Kelani river basin supports three main vegetation formations i.e. tropical wet evergreen forest (lowland rainforests) in its lower to mid reaches, and the sub-montane and montane forests at higher elevations (Jayasuriya, Kichener & Biradar, 2006). Rainforests are markedly stratified and characterized by tall and dense canopies. Lianas are an essential floral component here, while epiphytes, mainly composed of ferns, orchids, lichens, fungi and bryophytes, are also abundant. Numerous epiphyllous mosses and liverworts add diversity to its plant life forms. The sub-montane forests have less distinct strata. Species here are more or less those found in the lower regions. Montane forests occur above 1500 m in the Central Highlands in the Upper Kelani river basin. Thus, cool and wet conditions that prevail here along with abundant mist, relatively strong winds and elevated solar radiation determine the nature and form of the vegetation at the higher altitudes. The trees are generally short in stature and branched and have microphyllous and leathery leaves (Rajakaruna, 2015).

The Kelani River is the third largest watershed in the country. The importance of the river in terms of habitats and biota, is partly due to its spread through a multitude of streamlets and smaller tributaries which in turn nourishes and creates smaller river basins. It is reported that around 117 micro-catchments are supported by the Kelani River. Many of the streams and river networks are lined by strips of riverine vegetation. The lower reaches include areas within the Colombo district which passes through Kaduwela, Sri J'pura Kotte and Kolonnawa. These areas comprise low lying flood retention zones which

are essentially marsh habitat. The sustenance of these urban wetlands is heavily dependent on the inflow from the Kelani River. These lowland areas wetlands are now severely fragmented.

Apart from the natural land use types, many anthropogenic land use types are found in the area. Among these are rural home gardens (mainly in mid and upper reaches), settlements in the lower reaches and plantations consisting paddy, rubber and tea and other minor crops. Several large and medium scale privately owned tea and rubber estates are located in the Kelani river basin. Further, there is a large number of small and medium scale plantations of coconut and cloves located within the Kelani river basin. Rambutan and Durian are two of the major fruit crops grown in the Kelani valley. Additionally, banana, pineapple and a range of other vegetables are grown in the Kelani river basin. About 34 % of the Kelani river basin falls within the Western Province, where the population density is at its peak. Therefore, in comparison to the other areas of the basin, here a significant proportion of the natural habitats have been cleared for human settlements, roads and infrastructural facilities.

As is the case in the entire wet zone, much of the natural habitats, particularly the lowland rainforests, are highly fragmented and remain as pockets in an urbanized landscape. Any remnant forest patch here would hold high levels of biodiversity and hence warrants strict protection. Many of the forests here are under the Jurisdiction of the Forest Department or the Department of Wildlife Conservation (DWC). Overall the Kelani catchment has three wildlife sanctuaries (7,518 ha), 16 proposed forest reserves (11,423 ha), 13 forest reserves (2,585 ha) and a catchment area of 2,304 ha allocated for drinking water reservoirs. The majority of these are under the jurisdiction of the Forest Department which is also said to be in the process of expanding these reservations. At the lower most extreme, particularly within the Colombo area, the SLLRDC proposes to holistically manage the urban wetlands as a protected area, particularly to safeguard flora and fauna displaced as a result of urbanization.

Throughout the Kelani river basin, progressive expansion of human settlements, industries and the road network has resulted in the replacement of natural habitats by human modified environments. The population in the western parts of the basin is expected to expand with the new development initiatives including the Western Region Megapolis Plan. Low lying areas will be increasingly filled for settlements and for infrastructural facilities such as roads and bridges. While such alterations within the river basin are inevitable, the sustainability of the natural resources and ecosystem services would be vital to ensure the sustainability of the new initiatives. This would therefore, necessitate more stringent conservation actions. The loss of biodiversity and the displacement of fauna together with other issues such as the spread of invasive, soil erosion and pollution are also increasingly threatening the remnant natural habitats and water courses particularly within the lower reaches of the Kelani River Basin.

### **2.1.2 Socio Economic Environment**

By catchment area Kelani Ganga Basin is the seventh largest watershed in Sri Lanka, extending over three provinces, Western Province covering 773 km<sup>2</sup> or 34 percent of the basin area, Central Province, covering 419 km<sup>2</sup> or 19 percent of the basin area, and Sabaragamuwa Province covering 1,100 km<sup>2</sup> or 47 percent of the basin area.

The KRB contains varying proportions of the administrative districts of Kegalle, Colombo, Nuwara Eliya, Gampaha, Ratnapura, Kalutara and Kandy. It is apparent that almost half of the basin is in Kegalle District. Almost the whole of the basin is within the four Districts of Kegalle, Colombo, Nuwara Eliya and Gampaha, while Ratnapura, Kalutara and Kandy combined constitute only 3 percent of the basin area.

The demographic and socio-economic data was collected and analyzed by district and divisions, aggregating GN Division-wise data that fall into for the Kelani River Basin (KRB) area. This information is based on several sources, which include Census & Statistics Department 2011, District Statistical Handbook 2015-2016, and Divisional Level Resource Profiles 2015-2016. Other relevant information was gathered from data sheets provided by the line Departments of Agriculture, Agrarian Services, Forest, and Disaster Management Units of the 3 main districts falling into the Basin.

In accordance with availability of segregated data, the vital statistics were collected by total land area falling into 7 Districts, 35 DS Divisions and 1088 GN Divisions belonging to the KRB,

The tapering Upper Kelani Basin is mainly located in Ambagamuwa DSD of Nuwara Eliya District while the bulk of the broader Middle Kelani Basin is spread over 9 DSDs coming under Kegalle district. Being the most vulnerable and critical area, the Lower Kelani Basin drains through 17 DSDs falling into Colombo and Gampaha Districts. The total land area of the Kelani basin is 2,985 sq.km which accounts for 4.6 percent of the total land area of Sri Lanka.

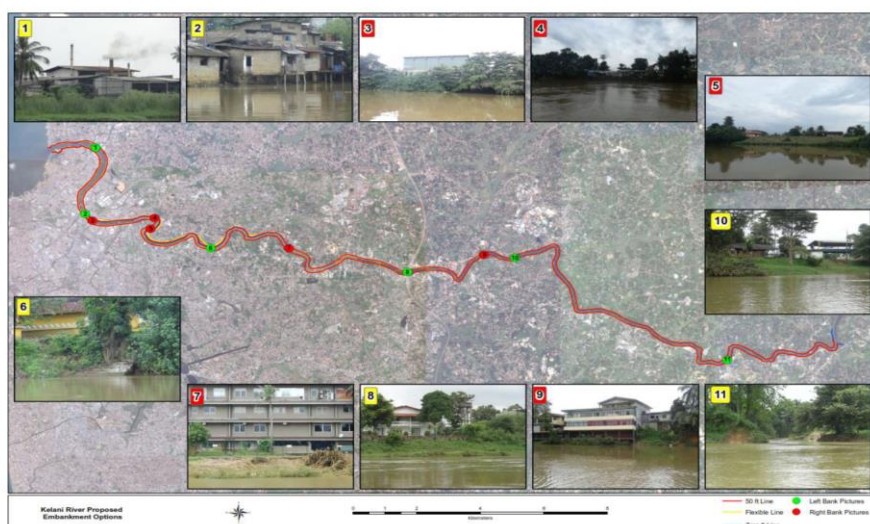
The total population in the basin is over 3.02 million, with an average density of 1012 person per sq.km in 2011. The total population in the basin by 2017, at an average annual growth rate of 1.0 (mid 2015) stands grossly at 3.21 million persons, which is an overall increase of 6.3 percent in 6 years. Population density gradually rises along KRB from upper to lower basin, showing a range of 100 – 600 persons per sq.km in both upper and middle basin areas while a range of 1,000 – 8,000 persons per sq.km are recorded in the lower basin, where the vulnerability is very high.

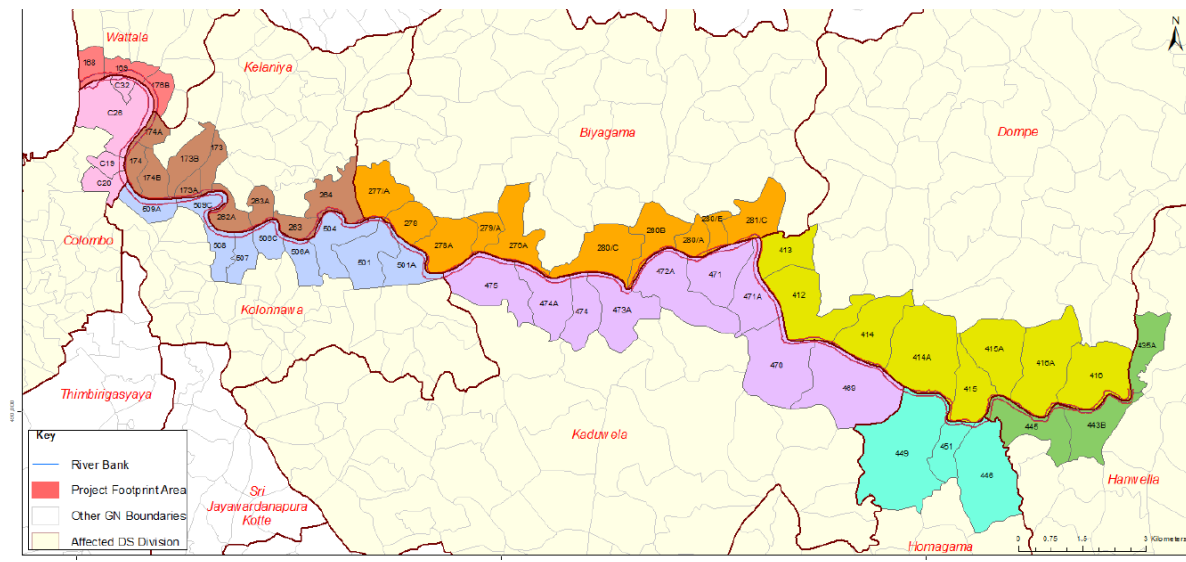
Most highly populated DS divisions in the lower Kelani are Thimbirigasyaya (8,173 per km<sup>2</sup>), Kolonnawa (7,327), Sri Jayewardenepure-Kotte (6,326 per km<sup>2</sup>), and Maharagama (4980 per km<sup>2</sup>) in the Colombo district and Kelaniya (6,203 per km<sup>2</sup>), Ja-ela (3,959 per km<sup>2</sup>), Wattala (3,935 per km<sup>2</sup>), Biyagama (3,099 per km<sup>2</sup>) and Mahara (3,070 per km<sup>2</sup>) in the Gampaha District.

### 2.1.3 Generic Salient Features of the Area from Hanwella to the River Mouth

The Area from Hanwella to the river mouth, is fairly built up with anthropogenic land use along the 40km corridor of the project area currently proposed. Within the project footprint area the land use varies significantly however, the majority of the land is residential in particular private dwellings and houses. As you move downstream the density of the built up area along the embankments increase, with low income housing and privately owned commercial buildings and housing, including home gardens. Other significant land uses include agriculture and small plantations, manufacturing plants and low income housing. Two land uses that are sensitive in particular include land belonging to religious establishments and cemeteries. Several cemeteries are located on the river bank. The river is also used as the key water source for the CMR, there is one existing water treatment plant at Ambatale, and a proposed new one at Biyagama, as well as three river gauging stations, at Hanwella Ambatale and Nagalagam Street. Those who live close to or on the river bank use the river for several purposes. Some of these uses include small scale fishing, bathing, relaxation, washing clothes, washing vehicles. Bank areas close to the sea are also used as docking points for fishing boats and small yachts. Locals require access to the river for all these activities and several steps and paths accessing the river. Some of these access points are also depicted below.

**Map Showing the Proposed Corridor for Embankment Protection Work and Work on Tributaries**





### 2.1.3.1 Key Environmental Issues in the Area from Hanwella to the River Mouth

While slope steepness varies from 0-5 along the lower Kelani basin, frequent flood incidents and fluctuations in flow levels and speeds, have led to erosion of the river banks. Some areas of the banks have been impacted by erosion with some locations already having bank protection in place to prevent further erosion, however there have not been comprehensive management of erosion along the river banks which has added to the sediment loads. Conversion of low lying land, such as wetland along the bank via filling for other uses is also commonly practiced.

However, the main environmental issue in the lower reaches of the Kelani is water pollution. In addition to sedimentation from infrastructure development and run off from areas along the banks as well. According to the Central Environmental Authority (CEA), most of the pollution comes from liquid waste discharged by the rapidly expanding industries that operate alongside the river, as well as agricultural runoff and domestic and municipal waste. Sewage from low-income settlements and industrial effluents (especially from tanning and metal finishing and processing industries) from a large number of industries are discharged conveniently to the Kelani River. An estimated 3,000 businesses that are required to have an environmental pollution license are located on the banks of the river. According to water tests conducted by the CEA near industrial locations, basic safe water quality limits are constantly exceeded, including chemical oxygen demand (36-37% over acceptable standards), dissolved oxygen (27-43% over acceptable standards), biological oxygen demand (7-13% over), and heavy metals (7% over). Despite this growing threat, local industries need to do more to comply with regulations to ensure waste water discharged into the river is safe. While existing policy and legislation for curtailing industrial pollution exists in Sri Lanka, more effective enforcement is needed, as well as highly stringent monitoring mechanisms to verify that all standards are met. The discharge of wastewater into the environment from industrial activities is regulated by the Environmental Protection Licenses (EPL) schemes implemented under the provisions of the section 23 (a) of the National Environmental Act of 1980. As specified in the Act it is mandatory to obtain an EPL to discharge wastewater into the environment from an industry. Industries which discharge wastewater into the environment are required to treat their wastewaters up to the relevant standards to be qualified basically to obtain an EPL. The licenses so issued will specify the standard and criteria to be met by the respective industry discharging its effluent into the environment. Even though the industries are covered with environmental protection licensing schemes, there is no regular monitoring mechanism to evaluate their meeting of discharge criteria and to control the pollutant loads discharged into the Kelani river. Studies conducted over the last decade have confirmed that while the 40-kilometer stretch between the town of

Avisawella and the river outfall north of Colombo as the most polluted area, there is a fair amount of dilution that does not impact the water quality at one given point as would be expected, 150 sources of pollution, primarily from industries involved in tanning, oil refining, beverages, textiles and clothing, rubber, ceramics, food production, fertilizers, and plastics were identified.

This remains a serious concern, as major part of the demand for pipe borne drinking water supplies of Colombo. Kelani River is an important source of drinking water for the Colombo District and there is a water supply intake point at Ambatale, 14 kilometers from the river mouth. Furthermore, the lower reach of the river has been subject to saline water intrusion from the ocean making the water non-potable due to excessive sand mining and lowering of river beds at the lower reaches in the Kelani River, where sand mining is particularly severe with the salt wedge has extended inwards to Ambatale (about 14 km from its point of discharge) on several occasions. This is a serious concern as much of the potable water supply for Colombo is extracted from the Kelani River at Ambata in the Kelani River Basin.

## **2.2 Description of Salient Features of the Mundeni Aru River Basin**

### **2.2.1 Geographic Location and Salient Features of the Mundeni Aru Basin**

Mundeni Aru River Basin is located in the South-East region of Sri Lanka, covers the districts of Ampara and Batticaloa in the Eastern Province. The basin can be divided into three distinct topographical units of lower, middle and upper penplains. More than 90% of the basin consists of flat and gently undulating land at an elevation below 100m AMSL. Many fertile flood plains of alluvial deposits, level valleys and coastal features such as bars and ridges exist in this area. Number of inselbergs and strike ridges are present towards the North-Western side of the study area. Headwater at southern part of the study area consist of hills and mountains of up to 870m high (udaperuwa hela). Komana, Amune hela, Madiyagala, Udaperuwahela and kokangalla are some of the hills which have an altitude above 750 meters AMSL.

Precambrian high-grade metamorphic rocks covered the 90% of the island of Sri Lanka and rest is sedimentary. Metamorphic terrain is subdivided into four main units depending on metamorphic facies. These units are Highland complex, Vijayan complex, Wannu complex and Kadugannawa complex. Basement rock of the study area is composed with Vijayan complex rocks. Most abundant rock types in the area are hornblende-biotite bearing sequence of granodioritic to granitic orthogneiss. Intrusive rock of Dolerite can be observed in Maha oya area.

The most common soil types of the Mundeni Aru Basin include Non-Calcic Brown (NCB) soils and Low Humic Gley (LHG) soils in undulating terrains; Reddish Brown earths (RBE 25-35% of the extent) at lower elevations and Immature Brown Loams (50-70%) on upper elevations in rolling, hilly and steep terrains on Southern and Eastern part of the Mundeni Aru Basin and Non-Calcic Brown soils, soils on old alluvium and Solodized solonchek in undulating terrains in the Northern part among a few.

The forests in the basin have been heavily damaged due to fire-fallow cultivation that has been practiced over the past few decades. Dry monsoon forest layer is limited to the North Western, Southern, South Western and South-Eastern edges of the basin and can be found in varying degrees.

The annual rainfall in the area is uni-modal in distribution. The main rainy season (Maha) commences with the inter-monsoonal convectional thunderstorms in September - October which is immediately followed by the North-East monsoon rains that sometimes continue almost to the end of April, with a slightly reduced rainfall in March. The dry season that follows lasts up to the end of September over a period of about 6 months. The temperature in the area remains high and unchanging.

Daily maximum sunshine hours in stations located in and around the basin show that the actual sunshine hours seldom reach the maximum possible value of 12 hours. Monthly sunshine hours show a seasonal pattern. It reaches highest in the month of March and starting to decrease from September. It reaches a very low level from October to December.

The wind speeds are highest from January to February and then May to end of September of the year. The wind speeds are comparatively low during the inter-monsoon and North-East monsoon periods.

Batticaloa's climate is classified as tropical. The average temperature in Batticaloa is 27.4 °C. In a year, the average rainfall is 1756 mm.

Mundeni Aru by itself is a watershed (i.e. one of the river basins of Sri Lanka out of 103 basins). The following surrounding main basins are important for Mundeni Aru basin hydrologically as all these basins discharge water to Mundeni Aru Lagoon.

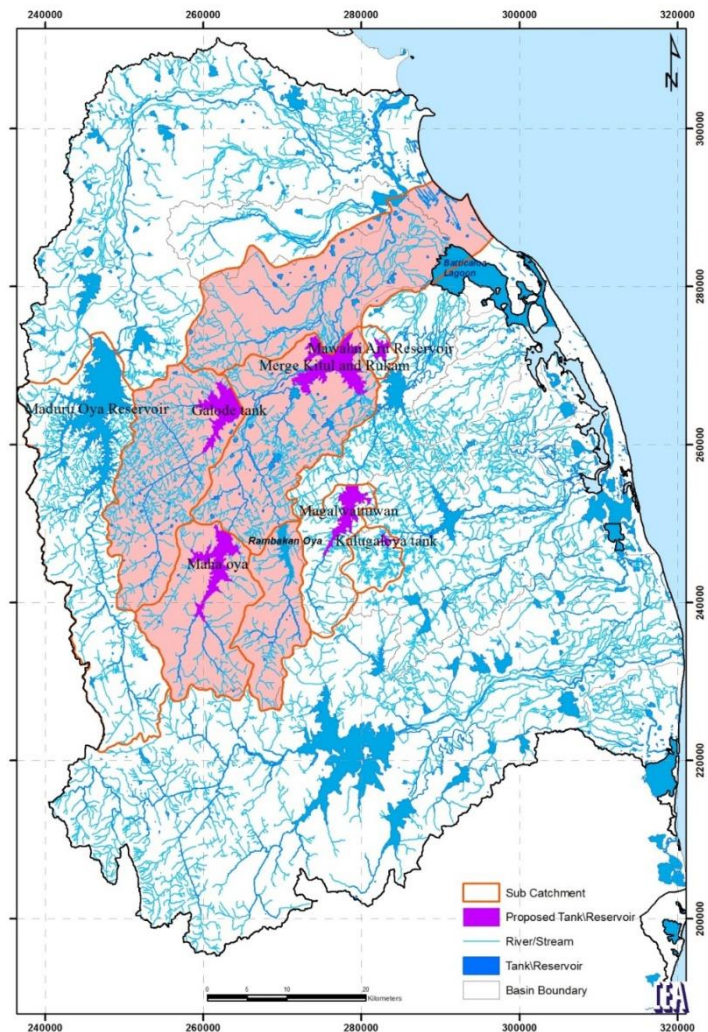
- a) Gal Oya
- b) Andal Oya
- c) Magalawettuwan
- d) Maduru Oya

The important sub basins for Mundeni Aru Basin are the sub basins encompassed by the existing reservoirs and the proposed reservoirs. Limited water resources and the prevailing climate have an impact on agriculture in the region.

Paddy is the main crop cultivated during Maha Season under irrigation. In addition, maize, manioc and groundnut is also being cultivated in highlands under rain fed-conditions during the Maha season. In the Yala season only Paddy is grown under tank irrigation and rain-fed crops are not grown during this season due to harsh wind conditions (Kanchan winds) during June- August period. Farmers are heavily affected from Kanchan winds and avoid cultivation during this period. There are many abandoned small tanks along the Galodai Aru and the lower part of Maha Oya and Rambukkan Oya.

The Mundeni Aru river basin falls within the two districts of Ampara and Batticaloa, both located within the dry zone of Sri Lanka. The climate of the area comprises a wet season during North-East monsoonal (November to February) characterized by high mean precipitation ( $1250 \pm 230$  mm), and a dry season during the South-West monsoonal (May to August) marked by low mean precipitation ( $300 \pm 23$  mm). In between two inter monsoonal periods are first inter monsoon (March to April) and second inter monsoon (September to October).

Biogeographically the area is in the Dry and Arid Lowlands Floristic zone. Thus, the terrestrial, semi-aquatic and aquatic vegetation formations and the associated ecosystems found in the upper and mid reaches of the Mundeni Aru basin, are representative of those typically found in this bioclimatic region. In the lower reaches, however, the proximity to the coast has resulted in the formation of coastal, marine and brackish water ecosystems, particularly the Valachchenai and Batticaloa lagoons, and the associated habitats. Thus, overall the entire river basin shows considerable variation in terms of the abiotic components, biotic assemblages and the ecosystem services they offer.



The Batticaloa District faces floods frequently during the north-east monsoon season and water stress during the south west monsoon. The Mundeni Aru is one of the major rivers contributing to floods in the district. Valachchenai and Batticaloa lagoons and surrounding areas have high risk during flood events.

The Mundeni Aru basin connects with the sea through Valachchenai and Batticaloa Lagoons in the east coast of Sri Lanka. There is sand bar formation at the mouth of lagoons, making them seasonal lagoons in contrast to perennial lagoons, where mouths remain open throughout the year. The Batticaloa lagoon is the second largest brackish water system in Sri Lanka. As with most other lagoons, the mouth is quite fragile and the sand bar is breached at regular intervals by the force of lagoon waters, especially after monsoonal rains. This natural process allows optimal conditions for lagoon productivity by facilitating seawater-freshwater exchange. Biologically, both lagoons are rich in biodiversity and play key roles as breeding, nursery and feeding grounds for many organisms' mostly immature stages, eventually immensely supporting fisheries.

Both Valachchenai and Batticaloa lagoons are very productive ecosystems and play an important role serving as flood retention areas; as filters for sediments, nutrients and pollutants; as refuges for many species of vertebrates and invertebrates; and as sources of raw material for various industries. Coastal and marine habitats such as salt marshes, mudflats, mangroves, coastal forests and littoral vegetation are found in areas in close proximity to the coast. Both lagoons support livelihood to many fishing communities surrounding as well as some tourism. The lagoons are the second income source in the district after the agriculture. Around 70 % of Batticaloa's population depends on agriculture and fishing activities linked to the lagoon as their primary source of income.

The postwar era in Eastern Sri Lanka, as in the North and Northeast, has seen tremendous development resulting in the loss of natural habitats. Large extents that were originally covered by dry zone forests were cleared for settlements, agriculture and infrastructure development. Recent surveys estimate around 40 % of the land in the Eastern Province to be under natural vegetation cover, which include dry monsoon forests and scrublands. But many of these areas are not protected and are therefore exposed to anthropogenic pressures. The practice of shifting cultivation, illegal encroachment and clearing of lands for roads and buildings are the major reasons that have contributed to forest loss. The loss of biodiversity and the displacement of fauna together with other issues such as the spread of invasive, soil erosion and pollution are increasingly threatening the remnant natural habitats.

The East is said to have had about 28 – 40 % of the mangroves of the country. In 1997 the extent of mangrove cover in Batticaloa alone was reported to be around 1491 ha which had reduced to about 1398 ha in 2001 (Nadarajah and Jayasingham, 2001). Many patches observed today are much lesser than 5 ha. In 1997 this area was identified as a special area for Management (SAM). However, subsequently large strips of mangroves were destroyed by the Tsunami in 2004 while after the war, continuous clearance for development has resulted due to anthropogenic causes such as the conversion of land for settlements, construction of bridges and roads, extraction of firewood and the degradation caused by pollution. These trends have continued to the present day threatening the ecological potential of these habitats to sustain marine, brackish and terrestrial biodiversity.

## **2.2.2 Social Economic Environment**

According to the estimated population figures for 2015, Batticaloa district male population ratio is 47.6 percent for male and it is 52.4 for female, while ratios for Ampara District are 48.3 male and 51.7 for female respectively.

The number and percentage distribution of population by age under 18 years is 39.9 percent and 18 years and above are 60.1 percent in the Batticaloa district, while respective figures are 37.5 percent and 62.5 percent for Ampara District. The DSD level figures too shows a similar pattern, as revealed in the By ethnicity, MRB area has an interesting feature when compare the district-wise figures of the 2 districts as well as the division-wise figures of the 7 DSDs<sup>14</sup>.

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<sup>14</sup> Source: <http://www.statistics.gov.lk/PopHouSat/Preliminary%20Reports%20Special%20Enumeration%202007>



It was found that all 3 components of agriculture, namely crop cultivation, livestock and fisheries are the principle occupation activity of the watershed. Percentage of wage labour and foreign employments is much higher in Eravur Paththu DS division compared to other DS divisions. Compare to other DS divisions agriculture related employments is much higher as 65 percent.

Agriculture alone takes almost 41 percent of the total occupation while wage labor is the next largest category being 24 percent of the total, and majority of the waged labour is employed in the broad category of agriculture. Next important two categories of occupations are government employments (12.6%) and Foreign Employments (9.8%).

While the principal occupation of people in basin is agriculture, the available literature indicates that IL<sub>2</sub> area is most suitable for quality fruits and sugarcane production in comparison to other IL<sub>2</sub> regions of the country. Similarly, the North Eastern DL areas have been documented as giving the highest paddy yields in Sri Lanka. Most of the cultivations are carried out under rainfed condition and only small extents of irrigated agriculture are reported under a few major and minor irrigation schemes.

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In addition, cattle and buffaloes keeping are a common agricultural enterprise in the basin area. It has been reported by some companies that their highest daily milk collections comes from this area. According to the Department of Animal Production and Health, there is programme for upgrading the cattle herds by means of AI and the service of Stud Bulls, under which target of coverage is 10 percent of the cattle population mainly in rural DSDs of the Batticaloa District.

Goat rearing is also a common animal husbandry activity in this area especially in North Eastern part, and there is recent tendency for other animals like Ducks, Turkey, Jungle-poultry and quills rearing in some areas of Eravur Pattu and Mahaoya divisions.

Although the potentials and opportunities are as such any responsible party has not appropriately looked in to make use these opportunities for the betterment of national and regional development. Therefore, any development intervention must pay to tap these opportunities while conserving environment and improving the living condition of the people of the area.

Institutional Framework in Sri Lanka

### **3 Chapter 3-Overview of Environmental Legislation**

Sri Lanka is one of the leading countries in the South Asian region in enacting environmental legislations. Its concern for environment dates back to over two and a half millennia. The constitution of the Democratic Socialist Republic of Sri Lanka under chapter VI Directive Principles of State policy and Fundamental duties in section 27-14 and in section 28-f proclaim “The state shall protect, preserve and improve the environment for the benefit of the community”, “The duty and obligation of every person in Sri Lanka to protect nature and conserve its riches” thus showing the commitment by the state and obligations of the citizens.

The overall environmental concerns are addressed by the National Environmental Act No. 47 of 1980 (and subsequent amendments by act no 56 of 1988 and act no 53 of 2000). It is the umbrella legislation

for environmental protection in the country. In addition, several other sectoral legislative enactments are in place. The national organization that has the mandate to protect and take measures to safeguard the environment is the Central Environmental Authority. It currently operates in the entire country except in the North Western Provincial Council (NWPC), where the NWPC has enacted a separate statute under the 13th amendment to the Constitution of Sri Lanka and had created a separate provincial institute.

There are several other key national agencies with a mandate for environmental management and protection. The Forest Department, the Department of Wildlife Conservation, Department of Archeology, Department of Coast Conservation and Coastal Resources Management, Disaster Management Center and Geological Survey and Mines Bureau have their regional offices and staff to cater to and monitor the environmental safeguards as per the policies and regulations governing them. In addition, there are several national agencies that are impacting on the environment and adopting environmental safeguards as well. They are the Sri Lanka Land Reclamation and Development Corporation, Urban Development Authority, Water Supply and Drainage Board, Water Resources Board and Irrigation Department.

The Local Authorities (LA) are also have provisions under their respective acts to safeguards and provide useful facility and maintain the same for the convenience of the public in their respective areas. The Municipal Council (MC) Act No. 19 of 1987 & Urban Council (UC) Act No. 18 of 1987 provide for the establishment of MCs and UCs with a view to provide greater opportunities for the people to participate effectively in the decision making process relating to administrative and development activities at a local level and it specify the powers, functions and duties of such LAs and provide for matters connected therewith or incidental thereto. These acts contain sixteen and eight parts respectively, several schedules and 327 & 249 sections respectively. The MC act, spell out its status, powers & functions in Section IV, Section V and Section VI in sections 34 to 154 and covers public health, drainage, latrines, unhealthy buildings, conservancy & scavenging, nuisance etc. Further the respective local authorities have mandate regionally to implement the project activities and monitor the progress of compliance work.

### **3.1.1 World Bank Safeguard Policies**

The World Bank has a number of Operational Policies (OPs) and Bank Procedures (BPs) concerning environmental and social issues, which together are referred to as the Bank 's Safeguard Policies'. If, during the development of a project, it is considered that it is possible that a proposed project activity could be the subject of one of the safeguard policies, that policy is considered to have been triggered '. In the subsequent development of the project, that activity must be considered in more detail to determine whether it is actually of no concern or adequate mitigation can be applied to address the concern, or the activity should be removed from the project (or the whole project should be dropped). The sections below address those Safeguard Policies that have been triggered by the program under review, and the actions that have been taken to ensure that the requirements of those policies will be satisfied in the further development of the project.

The Multiphase program under CRESMPA is categorized as an Environmental Category A project based on the potential risks associated with project interventions that would involve both the construction of and further feasibility assessment for flood mitigation infrastructure identified for the management of flood associated risks in both the Kelani Basin and the Mundeni Aru Basin across its three phases. While the overall program is environmentally beneficial as the major investments aim at mitigating basin-level flood risks, ensuring asset management and public safety, and reducing water induced hazards to the physical environment, the construction of new infrastructure and upgrading of existing infrastructure are likely to result in significant environmental impacts that will need to be mitigated across the detailed design and implementation phases of the investments. The following environmental safeguard policies are applicable under the project, Environmental Assessment OP/BP 4.01, Natural Habitats OP/BP 4.04, Forests OP/BP 4.36, Physical Cultural Resources OP/BP 4.11 and Safety of Dams OP/BP 4.37.

Safeguard Policies Triggered by the CRESMPA	Yes	No
<b>Environmental Assessment (OP/BP 4.01)</b>	√	
<b>Natural Habitats (OP/BP 4.04)</b>	√	
Pest Management (OP 4.09)		√
<b>Physical Cultural Resources (OP/BP 4.11)</b>	√	
<b>Involuntary Resettlement (OP/BP 4.12)</b>	√	
Indigenous Peoples (OP/BP 4.10)		√
<b>Forests (OP/BP 4.36)</b>	√	
<b>Safety of Dams (OP/BP 4.37)</b>	√	
Projects in Disputed Areas (OP/BP 7.60)		√
Projects on International Waterways (OP/BP 7.50)		√

## 4 Chapter 4: Assessment of Environmental Impacts

### 4.1 Overview

The program, via its three consecutive phases, is expected to bring an overall positive environmental benefit to the program areas through ensuring a holistic and sound system for the management of floods and climate change related environmental impacts. While the overall program is environmentally beneficial as the major investments under each of the phases aim at mitigating basin-level flood risks, ensuring asset management and public safety, and reducing water induced hazards to the physical environment, the construction of new infrastructure and upgrading of existing infrastructure are likely to result in significant environmental impacts that will need to be mitigated across the detailed design and implementation phases of the investments.

In addition, there is also the uncertainty regarding the exact locations of activities to be carried out under the project and project interventions that will involve physical alterations to the environment, especially in the case of interventions in the Mundeni Aru Basin for which only a River Basin Level Flood and Drought Mitigation Investment Plan is currently available. For the Kelani Basin investments, the priority investments are pre-identified via the River Basin Level Flood and Drought Mitigation Investment Plan and incorporated in to the initial phases of the program. The project is expected to fund further study and prioritization of the most suitable interventions out of those proposed under the plan for Mundeni Aru and for the upper catchment of the Kelani Basin.

This EAMF has been designed to achieve sound environmental practice within the purview of the CRESMPA. The EAMF provides the mechanism to allow program implementation by screening out or enhancing acceptability of sub-projects based on environmental criteria. By a simple process of elimination, the first step in the screening process is to identify subproject activities not suitable for funding. All processes described in the EAMF can be adjusted based on implementation experience. The EAMF will be a living document and will be reviewed and updated periodically as needed and updated at each Phase.

It is recommended that the following types of subprojects are not financed and therefore should be considered as a "Negative List":

- Sub-projects that involve the significant conversion or degradation of critical natural habitats such as documented sensitive ecosystems.

- Activities that could lead to invasion or spread of weeds and feral animals or the use of toxic chemicals, intensive use of pesticides and activities that generate large quantities of pollutants.
- Activities that could dangerously lead to the exposure of sensitive/critical/vulnerable habitats
- The reclamation of Wetlands
- Construction of large/new infrastructure within or directly adjacent (in buffer zones) to the following
  - Designated Protected Areas including marine protected areas.
  - Designated Sites of Cultural heritage- Sacred Cities/ UNESCO World Heritage Sites
  - Known Elephant Corridors
- Illegal Activities as defined specifically under the Forest Ordinance and Fauna and Flora Protection Ordinance, as outlined in Chapter 3

## 4.2 Program Specific Preliminary Assessment of Environmental Impacts, Proposed Management Actions and Time Line

	Project Phase and Components	Potential Environmental Impacts	Nature of Study and Instruments Required	Time Line
1.	<b>Phase I: Flood Early Warning and Upper Kelani<sup>15</sup> Flood Risk Mitigation Project (US\$ 294.8M)</b>			
1.1.	<p><b>Component 1:</b> Flood forecasting and early warning, and Flood and Drought Modelling for priority basins (US\$ 47M)</p>	<p>Establishment of the flood forecasting and early warning system and associated capacity building of ID and other relevant agencies will have many positive environmental impacts on responding to incidents of intensive climate change.</p> <p>Overall, the process of conducting flood and drought modelling will lead be followed by the development of investment plans that will facilitate to identify investment options to mitigate flood and drought related risks and complete the hydrological risk mapping of the north-eastern districts in the country, which will be environmentally beneficial in the long run.</p> <p>The process of flood and drought modeling will be supplemented with the completion of basin-level Strategic Environmental Assessments (SEAs) which will be also undertaken and integrated as part of the mitigation measures to reduce impacts to critical environmental resources and further degradation of the environment.</p> <p>The institutional strengthening activities under this component will also involve the construction of an additional building for the operation of the systems being developed. The building construction will lead to site-specific and temporary impacts associated with construction work, <b>highlighted in detail in Section 4.3,</b></p>	<p>The EAMF presents a generic term of reference for SEAs in <b>Annex 6</b>. Once the full scope of the basin investment plans is in place, the terms of reference will be updated and agreed with World Bank prior to undertaking the assessments.</p> <p>It is expected that the additional building for the operation of the system to be constructed will be on land within the existing premises of the relevant agencies compound and thus not require an EA, however an EMP must be completed for the construction of the building post the completion of an Environmental Screening Report as guided by this EAMF.</p>	<p>The SEAs will be undertaken during project implementation when priority basins are identified, and flood and drought modelling has been completed and draft plans are available.</p> <p>The Environmental Screening Report and EMP for the building will be completed once designs have been finalized.</p>

<sup>15</sup> Upper Kelani flood protection investments include the physical infrastructure from Hanwella to Kaduwela (approx. 12 km)

	Project Phase and Components	Potential Environmental Impacts	Nature of Study and Instruments Required	Time Line
		and impacts due to use of construction material such as sand, gravel and metal.		
1.2.	<p><b>Component 2:</b> Flood mitigation interventions upper reaches of the embankment (12km), pumping stations along the tributaries and salinity barrier and design for reservoirs (US\$ 162.5M)</p>	<p><b>Subcomponent 2.1 (Construction of Flood Protection Works) and Sub-component 2.2 (Installment of Pumping Stations along the Tributaries)</b> will include physical interventions that will facilitate flood management in the lower reaches of the Kelani River from Kaduwella to Hanwella. Key investments will involve, resettlement of identified areas, primary works along the main river course will include earthen embankments, concrete flood walls, river bank erosion control and protection structures, and limited river training works. Interventions will also include works, modifications to existing public utilities (telecommunication, power supply, water supply, and sewerage lines etc.), replacement and reconstruction of existing public assets (offices, religious places, cemeteries etc.), structural improvements to existing infrastructure such as local government roads, highways, culverts and bridges. Construction level design details for these works will be finalized at the detailed designs stage. Typical works in relation to the installation of pumping stations will include pumps; hydraulic control structures such as gates and associated electro-mechanical devices for operation of gates at the tributary outlets, and; training bunds and embankments surrounding pump houses.</p> <p><b>Ecological impacts:</b> While no positive ecological impacts were identified, potential negative impacts possible from the proposed works on strengthening flood mitigation infrastructure involve the potential arrestment of recharge to wetlands and other low-lying ecosystems in the</p>	<p>An SEA was carried out and completed for the Kelani Basin Level Flood and Drought Mitigation Investment Plan in June 2018. The SEA identified the highlighted potential impacts as those that can result from the proposed interventions to be financed under Component 2.</p> <p>The findings from the SEA and recommendations have already been imported by the ID in to the process of feasibility modeling and physical intervention and operational designing processed areas that would face potential resulting hydrological impacts, identified via the SEA process, have been included as part of the project area as well.</p> <p>Site specific EA are required to further study the nature of potential impacts under <b>subcomponents 2.1,2.2,2.3 and 2.4</b> that occur based on the designs of the activities that are to be undertake as specific project locations, when they are identified, and designs have been completed.</p>	<p>A site-specific EA for the Kelani flood mitigation interventions under <b>subcomponents 2.1, 2.2 and 2.3</b> from Hanwella to the River Mouth and Ambatale salinity barrier to be financed under Component 2 will commence as soon as preliminary designs for project interventions are completed in <b>January 2019</b>. To be completed by <b>April 30<sup>th</sup> 2019</b>, prior to project appraisal. The EA will inform the detailed design as well as assist in identifying in detail impacts relevant to the core project area.</p> <p>The EA will be updated once detailed designs are available and actual resettlement areas have been demarcated are available to facilitate the completion of a set of detailed EMPs specific to the project contract packages for each respective intervention from Kaduwella to Hanwella. This process will be finalized during project implementation.</p>

	Project Phase and Components	Potential Environmental Impacts	Nature of Study and Instruments Required	Time Line
		<p>catchment. There also lies the potential hinderance to existing storm water drainage and impacts on aquatic species and fish migration along the tributaries in the and river/stream network of the Kelani catchment.</p> <p><b>Hydrological impacts:</b> The main positive impacts of the interventions will be flood alleviation and alleviation of associated impacts. However the SEA identified the potential impacts upstream due to strengthening of the infrastructure downstream, which include impacts such as upstream backwater effects leading to inundation of additional areas, delayed flood recession and potential bridge scour due to velocity increase to highlight a few. In addition, there also are the potential impact on natural flood plain developments and meander formation and on shallow groundwater recharging process. These activities can also have downstream impacts unless all associated structures have the conveyance capacity to respond to high precipitation events.</p> <p><b>Impacts of Dredging, dewatering and disposal of bottom sediments-</b> these activities can lead to the degradation of water quality; reduce pore pressure build up, slope instability and transport of fines; surface ponding of removed water; stock piling of dredged material, soil, debris; blocking of surface drainage paths causing localized flooding; odor problems; smothering of benthic fauna and thus have to be managed stringently. All dredging activities, based on the nature and scale will be subject to stand alone EAs and specific actions in EMPs or standalove EMPs.</p>		<p>The <b>EA for subcomponent 2.4</b> should be undertaken soon as preliminary designs are available,</p>

	Project Phase and Components	Potential Environmental Impacts	Nature of Study and Instruments Required	Time Line
		<p><b>Specific Intervention related impacts:</b> Activities such as the construction of flow guidance walls for bank protection (Sheet pile walls, gabion walls etc.) and reinstatement of storm water drainage connections through protection walls can lead to environmental impacts such as the erosion of soil embankments, loosening bank support and weakening of the interlocking of rubble used causing immature failure of gabion structure and inconvenience to present residents and pedestrians can occur if they live in close proximity to these structures. Backfilling of banks behind gabions, turfing and replanting of trees can cause differential settlements causing the gabion walls to misalign and fail and thus will need to be designed and managed accordingly.</p> <p><b>Socioeconomic impacts and associates environmental impacts-</b> the project interventions will involve the involuntary relocation / resettlement of some families and induce changes in livelihoods of some segments of people, however these actions will assist in minimizing the loss of lives &amp; properties due to intensive flooding in the area. Movement of people to newer areas have the potential to induce stresses due to enhanced load on existing environmental conditions, land and water use. The works associated with these activities will also generate site-specific and temporary impacts associated with demolition and removal of damaged structures in areas that will require resettlement.</p> <p><b>Impacts specific to Sub-component 2.3: Replacement of the Salinity Barrier-</b> the proposed site in Ambatale has been anthropogenically altered via the construction of a weir, used for extraction of water to the Colombo</p>		



	Project Phase and Components	Potential Environmental Impacts	Nature of Study and Instruments Required	Time Line
		<p>metropolitan region. The existing salinity barrier at this location is a pair of concrete filled sheet pile walls across the river with a pile of moveable sand bags on top it to raise the water level upstream of the barrier. The existing salinity barrier had been constructed to address the threat of salinity intrusion to the water supply intake during dry weather and low downstream river flow periods. However, the modeling results indicates that the barrier causes a sizable increase of flood water levels upstream with its impact propagating several kilometers upstream of Ambatale before reducing to zero. It is now proposed to replace this structure with barrage with flap gates which will allow rapid river discharge during floods and arrest salinity intrusion during dry weather. The proposed new gated barrage (new salinity barrier) will be designed to serve as a major flood control structure, a salinity barrier, and a regulator to flush off salinity downstream of the intake during low flow periods. This will have positive impacts on the ecosystem as it will ensure that the impacts of salinity intrusion are managed. Potential environmental impacts due to the structure include potential hinderances to movement of aquatic species and fish migration and requires specific design measures to be incorporated to ensure there are no access restrictions. <b>Annex 16</b> presents guidance on the design of structures to mitigate potential impacts on fish and fish migration in water ways.</p> <p><b>Construction stage impacts:</b> All physical interventions under sub-components 2.1, 2.2 and 2.3 will lead to site-specific and temporary impacts associated with construction work, <b>highlighted in detail in Section 4.3</b>, and impacts due to use of construction material such as sand, gravel and metal.</p>		

	Project Phase and Components	Potential Environmental Impacts	Nature of Study and Instruments Required	Time Line
		<p>Some of the requirements identified for investments are also due to inadequate operation and maintenance of infrastructure. Hence there is a necessity to develop and agree on an operation and maintenance system that is cost-effective and includes a plan to obtain regular resources for the purpose.</p> <p><b>Subcomponent 2.4</b> will finance the detailed designs for the Wee-Oyaand and Roucastle tanks in the upper catchment of the Kelani river. The SEA has identified preliminary impacts as detailed below</p> <p><b>Wee-Oya Reservoir</b>  Wee-Oya Reservoir is the smallest of the four reservoir interventions proposed to construct across Wee-Oya tributary of Kelani River with a catchment area of 53 km<sup>2</sup>, it is in North-East of Kelani River Basin and is smaller in size in comparison to other reservoirs presented in flood. Wee-Oya basin also has the similar rural agriculture setting. It is a rather small size reservoir and has a positive impact in the form of relieving the flood victims in the downstream to a limited extent and maintain a high-water table in the surrounding area making it suitable for agro-based livelihoods in the immediate surroundings. The main negative impacts include the following; clearance of a significant area of land, loss of limited agricultural area of around 162 ha, presently under Paddy, Rubber, Minor Export Crops and Homesteads, relocation of 550 persons (110 families) taking away their present livelihoods, which call for systematic resettlement, and loss of 4 commercial buildings and 110 residential buildings.</p>		

	Project Phase and Components	Potential Environmental Impacts	Nature of Study and Instruments Required	Time Line
		<p><b>Rucastle Reservoir</b></p> <p>The Rucastle Reservoir is a medium size reservoir intervention proposed to be constructed across Seethawaka River (a main Tributary of Kelani River) with a catchment area of 184 km<sup>2</sup>; it is located in South of Kelani River Basin, in Deraniyagala DSD. Rucastle has the similar rural agriculture setting of plantation nature (Rubber, MEC), paddy and mixed garden and, on the left bank of the river. Being a medium size reservoir, it has positive impact in the form of relieving the flood victims in the downstream and maintain high water table in the surrounding area making it suitable for agro-based livelihoods for the potential inhabitants.</p> <p>The main negative impacts include, loss of vast agricultural area of over 2,681 ha, presently under Paddy, Rubber, Minor Export Crops and Homesteads, b) relocation of 9,550 persons (1,950 families) taking away their present livelihoods, which call for systematic resettlement, and c) loss of 692 commercial buildings and 1,910 residential buildings.</p>		
1.3.	<p><b>Component 3:</b> Land acquisition, Resettlement and Safeguards Implementation (US\$ 80.3M)</p>	<p>The component will finance costs of land acquisition and resettlement in areas identified as per the project's Resettlement Action Plan from Hanwella to Kaduwella. It will also finance the completion of environmental safeguards studies as per the overarching EAMF for the program, including requisite studies for proceeding phases.</p> <p>No environmental impacts are attributed to the activities to be undertaken under this component.</p>		
1.4.	<p><b>Component 4:</b> Project Management (US\$ 5M)</p>	<p>No environmental impacts are attributed to the activities to be undertaken under this component.</p>		

	Project Phase and Components	Potential Environmental Impacts	Nature of Study and Instruments Required	Time Line
1.5.	<b>Component 5:</b> Contingent emergency response component (CERC) (US\$ 0M)	While no-specific activities are identified at this point, this component will support recovery and reconstruction activities followed by a natural disaster event. In such situations the project will use generic EMPs to undertake reconstruction work of the first year following the disaster event and any activity that will be financed the second year onwards will follow the requirements laid out for the nature of interventions as per the EAMF. However, in the event a dam is breached based on the scope and complexity of the dam, the requirements described under OP 4.37 will need to be followed.		
<b>2. Phase II: Kelani Basin Flood Risk Mitigation Project<sup>16</sup> (US\$ 364.7M)</b>				
2.1.	<b>Component 1:</b> Flood risk mitigation investment (Kaduella to river mouth) (US\$ 114M) and Flood Risk Mitigation Investment from Hanwella to Ranwella (US\$ 50M)	The potential environmental impacts, nature of studies and instruments requires and time line for completion will be similar as those presented for point 1.2. for Component 2 of Phase I of the program as the nature of interventions and environment of the project area are similar.  The EA will be updated once detailed designs are available and actual resettlement areas have been demarcated from Kaduwella to the River Mouth are available to facilitate the completion of a set of detailed EMPs specific to the project contract packages for each respective intervention from Kaduwella to the River Mouth This process will be finalized during project implementation.		
2.2.	<b>Component 2:</b> Land acquisition, Resettlement and Safeguards (US\$ 180.5M & 15.2M)	The component will finance costs of land acquisition and resettlement in areas identified as per the project's Resettlement Action Plan from Kaduwella to the River Mouth. It will also finance the completion of environmental safeguards studies as per the overarching EAMF for the program, including requisite studies for proceeding phases.  No environmental impacts are attributed to the activities to be undertaken under this component.		
2.3.	<b>Component 3:</b> Project Management (US\$ 5M)	No environmental impacts are attributed to the activities to be undertaken under this component.		

<sup>16</sup> Kelani phase II flood protection investments include the physical infrastructure to be built from Kaduwella to the river mouth.

	Project Phase and Components	Potential Environmental Impacts	Nature of Study and Instruments Required	Time Line
2.4.	<b>Component 4:</b> CERC (US\$ 0)	While no-specific activities are identified at this point, this component will support recovery and reconstruction activities followed by a natural disaster event. In such situations the project will use generic EMPs to undertake reconstruction work of the first year following the disaster event and any activity that will be financed the second year onwards will follow the requirements laid out for the nature of interventions as per the EAMF. However, in the event a dam is breached based on the scope and complexity of the dam, the requirements described under OP 4.37 will need to be followed.		
<b>3.</b>	<b>Phase III: Mundeni Aru Basin Flood Risk Mitigation &amp; Reservoir Project (US\$ 295M)</b>			
	<b>Component 1:</b> Flood risk mitigation investment and safeguard compliance in Mundeni Aru (US\$ 40M)	The exact interventions to be finance under this component have not been identified at this stage and will be identified at a later stage in the program. These interventions will be identified from the Kelani Basin Level Flood and Drought Mitigation Investment Plan	An SEA was carried out and completed for the Munedni Aru Basin Level Flood and Drought Mitigation Investment Plan in March 2018.  The findings from the SEA and recommendations will need to be taken in to consideration during feasibility studies, modeling of physical intervention and operational designing process.  Site specific EA are required to further study the nature of potential impacts under this component and will be based on designs of the activities that are to be undertake as specific project locations, when they are identified, and designs have been completed.	The EAs should be undertaken soon as preliminary designs are available
	<b>Component 2:</b> Construction of 2 reservoirs (US\$ 250M)	Potential impacts associated with the construction of the Wee-Oya and Rouecastle reservoirs are presented in detail under those for subcomponent 2.2 that will finance the details designs for the interventions.	EAs will be undertaken for these interventions during Phase I, when preliminary designs are available under the activities specified for Component 2.4 of the Phase I.	The EA will be updated once detailed designs are available and actual resettlement areas have been demarcated and are available to facilitate the completion of a set of detailed EMPs specific to the project contract packages for each

	Project Phase and Components	Potential Environmental Impacts	Nature of Study and Instruments Required	Time Line
				respective intervention from Kaduwella to Hanwella. This process will be finalized during project implementation under this component under Phase III.
	<b>Component 3:</b> Project Management (US\$ 5M)	No environmental impacts are attributed to the activities to be undertaken under this component.		
	<b>Component 4:</b> CERC (US\$ 0M)	While no-specific activities are identified at this point, this component will support recovery and reconstruction activities followed by a natural disaster event. In such situations the project will use generic EMPs to undertake reconstruction work of the first year following the disaster event and any activity that will be financed the second year onwards will follow the requirements laid out for the nature of interventions as per the EAMF. However, in the event a dam is breached based on the scope and complexity of the dam, the requirements described under OP 4.37 will need to be followed.		

### 4.3 Construction Phase Impacts

#### 4.3.1.1 Impacts on soil at construction and material extraction sites and yard

Impact description	Duration of the impact	Level of impact
Loss of productive top soil due to site preparation work	Long-term	Moderate
Soil erosion caused by clearing and grubbing operations which removes the vegetative cover in the immediate surroundings	Long-term	High
Soil erosion caused by mining and quarrying operations for material-	Long-term	Moderate
Contamination of soil by heavy metals and chemicals discharged by construction vehicles and from material storage sites	Short-term	High
Erosion of uncovered temporary stock piles and soil dumps	Short-term	Low

#### 4.3.1.2 Impacts on surface and ground water sources occur due to following activities

Impact description	Duration of the impact	Level of impact
Siltation of waterways due to modifications to surface water flow and drainage patterns	Long-term	Moderate
Degradation of surface water quality due to equipment and material piling on the site	Short-term	Low
Degradation of water quality due to waste water from worker camps	Short-term	Moderate
Degradation of water quality in water bodies in the vicinity of quarry and borrow sites	Short-term	Moderate
Reduction in groundwater recharge due to drainage and excavation, especially in dry areas	Long-term	High

#### 4.3.1.1 Impacts on ambient air quality and noise within construction sites, material extraction sites and yards

Impact description	Duration of the impact	Level of impact
Operation of construction vehicles and plants (AC plant and concrete batching plants) that emit obnoxious gases	Short-term	Moderate
Exposure of soil surface due to excavation, clearing of surface vegetation which generates dust	Short-term	Moderate
Mining operations of metal and gravel for construction material will emit dust and other particulate matter	Short-term	Moderate

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Improper storage of chemicals that could emit fumes of stored chemicals	Short-term	High
Increased noise nuisance and vibration issues to public living close to construction areas and quarries	Short-term	Moderate

#### 4.3.1.2 Impacts on ambient air quality and noise within construction sites, material extraction sites and yards

#### 4.3.1.3 Impacts on ecosystems, fauna and flora

Impact description	Duration of the impact	Level of impact
Clearing of vegetation for construction activities may lead to disturbance to natural habitats (wetlands, forest areas, lagoons, etc.)	Long-term	High
Clearing of surface vegetation in quarry sites and burrow sites may lead to the loss of land/ natural habitats	Long-term	High
Loss of important fauna and flora due to construction works	Long-term	Moderate
Disturbance to animal migration routes and patterns	Long-term	High
Changes to aquatic ecosystems due to siltation of waterways, changes to speed and volume of water flow	Long-term	High
Contamination of biota by emissions to air, water and soil during construction and material extraction works	Short-term	Moderate
Loss of standing crops, fruit trees and commercially valuable trees due to construction works close to home gardens, chena lands and paddy fields	Long-term	Moderate

## 5 Chapter 5: Environmental Management Framework

### 5.1 Environmental Safeguards Processing Steps

Implementation of environmental requirements will follow the following steps closely linking with activity planning, design and implementation steps.

1. Step 1: Environmental Screening of Identified Physical Subprojects
2. Step 2: Preparing Environmental Safeguard Assessments, Management and Monitoring Instruments
3. Step 3: Concurrence and Clearance
4. Step 4: Inclusion of Environmental Specifications and Environmental Management Plan in bid documents
5. Step 5: Environmental Method Statements and ESHS Performance Clauses (for large investments)
6. Step 6: Compliance Monitoring and Reporting

### 5.2 Environmental Screening of Identified Physical Subprojects

Environmental screening is counted to be a useful tool in identifying safeguard issues in large investment programs consisting of many sub-projects. The main objective of Environmental screening of sub-projects will be to (a) determine the anticipated environmental/social impacts, risks and opportunities of the sub-



project (ii) determine if the anticipated impacts and public concern warrant further environmental/social analysis, and if so to recommend the appropriate type and extent of assessments needed.

At the national level, screening is the process by which proposed developments are reviewed to determine the level of environmental and social assessment to which they should be subjected, which could range from none up to a full Environmental Impact Assessment (EIA). At the project level, screening is the process of reviewing a proposed activity against a checklist of factors to determine whether it is likely to have adverse environmental and social effects, and if so, what mitigation measures should be applied.

The main objective of Environmental Screening of sub-projects will be to (a) determine the anticipated environmental impacts, risks and opportunities of the sub-project (ii) determine if the anticipated impacts and public concern warrant further environmental analysis, and if so to recommend the appropriate type and extent of Environmental Assessment needed. The previous chapter provides recommendation on the level of environmental analysis for selected activities as broad guidance; however, the final judgment will be made post the screening exercise. Screening should go hand in hand with project concept development. This way environmental opportunities and risks can be appropriately and easily integrated into subsequent design stages, rather than being brought in at the last minute. The environmental screening report should be prepared by the environmental expert/s of the PMU with field visits and available data and information (*implementation arrangements are given in the subsequent chapter*). Where required they may seek the assistance of expert environmental consultants to facilitate the screening process. Once the report is ready it will be made available to the project implementing agency to take necessary actions particularly in relation to the recommendation given in the report. All Environmental screening reports are subject to world bank review and clearance prior to the preparation of identified instruments.

### **5.2.1 Screening Method**

Preparation of the screening reports will be conducted in four distinct stages, namely (i) field visits, data collection and stakeholder consultation; (ii) data analysis and interpretation; (iii) impact identification; and (iv) filling the screening including recommendations for next steps.

## **5.3 Preparing Environmental Safeguard Assessments, Management and Monitoring Instruments**

### **5.3.1 Environmental Assessment (EA)/Initial Environmental Examinations (IEE)**

EA and IEEs are effective tools for evaluating the environmental risks and opportunities of project proposals and improving the quality of outcomes. Ideally the EA/IEE should be carried out at the end of the preliminary design phase so that the impacts of each planned activity can be evaluated, and alternatives can be worked out for activities that have major impacts. The outcomes of the EA/IEE should then be used to finalize the project design which should ensure that the impacts of the given project are minimal. The importance of this management tool as means of foreseeing potential environmental impacts caused by proposed projects and its use in making projects more suitable to the environment has been highly effective. Since its introduction in 1969 in the US, many countries and international organizations have accepted EIA as an important planning and environmental management tool.

If a specific subproject requires environmental assessment the first step will be to provide CEA the preliminary information on the proposed project, in order for the process to be initiated (**Annex 3-4** of the EAMF presents the description of major steps of the environmental assessment process with responsibilities and time frames). The best time for a project proponent to submit the preliminary information on the proposed project is as soon as the project concept is finalized, and the location of the project is decided.

Once the environmental screening is conducted for the subproject the following steps need to be taken.

- For sub-projects that require EA\ IEE as per NEA the Terms of Reference issues by the CEA will be reviewed by the World Bank's Task Team and World Bank safeguards requirements as per the EMF will be included in the same TOR to align the processes and ensure there is no replication of instruments.

- For projects that do not require EA/IEE as per NEA but warrant Environmental Assessment as per World Bank Policy OP4.0, the PMU Safeguards team in collaboration will produce a Terms of Reference which will be reviewed and cleared by the ISA Task team prior to commencement of the study.

### **5.3.2 Strategic Environment Assessment (SEA)**

Development agencies have years of experience in using environmental impact assessment (EIA) to integrate environmental concerns into their funding programs. EIA procedures, methods and techniques, used to address environmental impacts of development projects, will continue to be applied. However, EIA has limited utility when applied to the more strategic levels of development assistance such as policies, plans and programs, as these are also influenced by political bargaining in addition to technical criteria. Further, significant indirect or secondary environmental effects can arise as a result of changes in people's behavior induced by policy reforms. But these changes, and their environmental consequences, are extremely difficult to predict. For these reasons, SEA has been developed and is being increasingly used as a tool to be applied at the level of policies, plans and programs.

An SEA is not an alternative to EIA and it does not replace the need to do project specific environmental assessment. A good SEA can reduce the scope of EIAs within its geographical scope and make it limited to specific project level issues. The SEA ideally will identify opportunities to minimize the range of environmental issues that will have to be dealt at the project level.

The process of flood and drought modeling, to be undertaken under Component 1 of Phase I, will be supplemented with the completion of basin-level SEAs which will be undertaken and integrated as part of the mitigation measures to reduce impacts to critical environmental resources and further degradation of the environment.

### **5.3.3 Environmental Management Plans (EMPs)**

Certain activities will have explicit impacts on the natural environment and thus require a specific plan to institute and monitor mitigation measures and take desired actions as timely as possible. An Environmental Management Plan (EMP) must be kept as simple as possible, clearly describing adverse impacts and mitigation actions that are easy to implement. The scale of the subproject will determine the length of the EMP. A small-scale subproject's EMP can be elaborated in a few paragraphs or in tabular format, keeping it as simple as possible with concrete mitigation actions, timelines and responsible persons.

The basic elements of an EMP are;

- a. A description of all possible significant adverse impacts that are likely to arise due to the project that the EMP is intending to deal with;
- b. A description of planned mitigation measures, and how and when they will be implemented;
- c. A program for monitoring with measurable indicators that will allow to determine the effectiveness of the mitigation actions
- d. A description of who will be responsible for implementing the EMP
- e. A cost estimate and source of funds

It is essential to involve local communities during the development of the EMP since they are likely to be the most affected parties due to the proposed development. Further, most of the local knowledge is important in identifying, designing and planning the implementation. In addition, the success of the implementation of the EMP will depend on community support and action.

The PAA will request the project proponent to prepare an Environmental Management Plan (EMP), to address any potential environmental and social issues as well as incorporate the PAA/CEA's approval conditions. Ideally, all EIAs and IEEs which identifies adverse environmental impacts should prepare an EMP as part of the report.

In World Bank, funded projects, a standalone EMP is only considered appropriate in situations where a detailed environmental analysis is not required.

As per the nature of the physical interventions identified, it will be Mandatory that all proposals/ physical interventions implemented will require an EMP to mitigate sub-project specific impacts identified during the screening exercise. EMPs are to be prepared at the stage of project design and included in bidding documents, to be costed for accordingly, and will be part and parcel of contract documents. Activities outlines in the EMPs will be implemented by the respective contractors implementing the subproject and monitored accordingly by the project implementing agency during the construction phase.

In addition, EMPs will require to have specific impacts identified regarding operational impacts that may occur during the operation of solid waste management A comprehensive set of Generic EMPs and guidelines to facilitate sound EMP preparation during the project implementation stage are presented in **Annex 8** through **Annex 9** of the EAMF.

In addition, the Annex 10 through 17 provide guidance on identifying potential impacts and mitigation measures as well as outline requisite standards to be maintained in terms of environmental management during the implementation of activities under the program.

### **5.3.4 Concurrence and Clearance**

#### **5.3.4.1 Environmental Clearances**

As per National Regulations: As per the regulations, presented in Chapter 3 when working in specific project locations, such as coastal zones, heavy urbanized areas and environmentally sensitive areas there will be the need to seek specific environmental clearances from relevant authorities

#### **5.3.4.2 Clearance Procedures with the World Bank**

All safeguards instruments listed below will be subject to World Bank prior review and clearance by the World Bank safeguards specialist assigned to the CRESMPA. Only cleared safeguards instruments can be included in bidding documents and other procurement instruments. No work can commence on project sites without due clearance of the respective safeguards instrument.

- All Environmental Screening Reports
- All TORs for EAs
- All EAs, and EMPs
- Panel membership names for any Dam Safety Panels established.

Upon project commencement the safeguards specialist will be required to prepare a table, tracking all requisite safeguards instruments for sub-projects. This sheet should be continuously updated and managed by the project PMU and shared with the World Bank safeguards specialist every quarter or when requested.

### **5.4 Inclusion of Environmental Specifications and Environmental Management Plan in bid documents**

It is important to ensure the environmental specifications and EMP are included in the bid documents prior to commencement of the bidding process. It will be necessary to include a provisional sum for the EMP as part of the Bill of Quantities for those mitigations measure that are not part of the engineering costing. The environmental specifications should also include penalty clauses for non-compliance, specifically for complex and large contracts. The procurement staff of the relevant implementing agency and PMU together with environmental officer(s) will be responsible for this step.

With the revision to the World Bank's Standard Bidding Documents in January 2017, Environmental and Social Health and Safety (ESHH) requirements are now more clearly defined in the document and there is also the need for a ESHS Performance Security to be incorporated in to the requirements from potential bidders for implementation of works under project financing. This revision incorporates changes to enhance environmental, social, health and safety performance. A positive measure that is intended to enhance the

commitment of a given contractor towards sound environmental and social management which clearly define what the expectation is from them as an implementing entity during project execution and reporting.

## **5.5 Compliance Monitoring and Reporting**

Supervision of final EMPs for subprojects, along with other aspects of the project, will cover monitoring, evaluative review and reporting in order to achieve, among others, the following objectives:

- Determine whether the project is being carried out in conformity with environmental safeguards and legal agreements
- Identify issues as they arise during implementation and recommend means to resolve in time

Recommend changes to the proposed concept and the project design, as appropriate, as the project evolves or circumstances change; and identify the key risks to project sustainability and recommend appropriate risk management strategies. An appropriate environmental supervision plan will be developed aiming to ensure the successful implementation of the EMP across the project and will be shared with the World Bank.

The environmental specialist and the environmental safeguards team based in the PMU will be responsible for overall monitoring of the EMPs up to the project closure and transfer for management to the designated authority.

It is expected that the sub-project will be implemented via a “design and build” contract. In addition, there will be a supervision consultancy firm appointed for overall supervision of the closure activities on ground. The recruitment of an environment safeguard expert, with the stipulated minimum qualifications requirements outlined in the Addendum document, will be a requirement under the contract of the supervision consultant. The supervision consultants will be responsible for all aspects of the project including environment and safeguard compliance and reporting to the PMU, while the overarching monitoring responsibility and reporting to the World Bank will remain with the PMU.

The PMU Environment-safeguards team will confirm the performance of the supervision consultants by regularly visiting the project site during the implementation stage and providing guidance on corrective measures on any lapses as required.

Compliance monitoring comprises of on-site inspection of the construction activities to verify that measures identified in the EMP are included in the clauses for contractors are being implemented. This type of monitoring is similar to the normal technical supervision tasks ensuring that the Contractor is achieving the required standards and quality of work. Photographic documentation of non-compliance as well as best practices will be used as a means of recording implementation conditions efficiently, in addition to written evidence

Regular World Bank missions will include specialists to monitor the project’s compliance with World Bank safeguard policies. The progress of environmental monitoring will be formally communicated to World Bank through regular progress reports and updates as per the compliance monitoring agreement made during project implementation.

Compliance monitoring reports should be submitted to the World Bank on a quarterly basis from the commencement of the contract.

### **5.5.1 Environmental Monitoring During Construction**

Monitoring is the continuous and systematic collection of data in order to assess whether the environmental objectives of the project have been achieved. Good practice demands that procedures for monitoring the environmental performance of proposed projects are incorporated in all relevant environmental management instruments. Monitoring provides information on the occurrence of impacts. It helps identify how well mitigation measures are working, and where better mitigation may be needed. Each respective safeguard instrument prepared will require a monitoring program to be included for the respective activities. The monitoring plan should identify what information will be collected, how, where and how often. It

should also indicate at what level of effect there will be a need for further mitigation. How environmental impacts are monitored is discussed below.

- Responsibilities in terms of the people, groups, or organizations that will carry out the monitoring activities be defined, as well as to whom they report amongst others. In some instances, there may be a need to train people to carry out these responsibilities, and to provide them with equipment and supplies;
- Implementation Schedule, covers the timing, frequency and duration of monitoring are specified in an implementation schedule, and linked to the overall sub project schedule;
- Cost Estimates and Source of resources for monitoring need to be specified in the monitoring plan;
- Monitoring methods need to be as simple as possible, consistent with collecting useful information, so that the sub project implementer can apply them.
- The data collected during monitoring is analyzed with the aim of:
  - Assessing any changes in baseline conditions;
  - Assessing whether recommended mitigation measures have been successfully implemented;
  - Determining reasons for unsuccessful mitigation;
  - Developing and recommending alternative mitigation measures or plans to replace unsatisfactory ones; and
- Identifying and explaining trends in environment improvement or degradation.

### **5.5.2 Ensuring Compliance with Safety of Dams (OP 4.37)**

For any large dams (which are normally 15 meters or greater) and dams below that height but are considered to be complex from a design and management point of view either be rehabilitated or constructed under the program, as per OP/BP 4.37 requires that investigations, designs, construction and operation of the dam be reviewed by an independent panel of experts.

1. The panel should also review detailed preparation and implementation plans, construction supervision plans, quality assurance plans, O&M plans and an emergency preparedness plan. The panel's inputs will be required for prequalification of bidders and during procurement as well as for periodic safety inspections after the completion of the civil works.
2. The Panel will consist of three or more experts, appointed by GoSL and acceptable to THE World Bank, with expertise in the various technical fields relevant to the safety aspects of the particular dams. The primary purpose of the panel is to review and advise the implementing agency of GOSL on matters relative to dam safety and other critical aspects of the dam, its appurtenant structures, the catchment areas, the area surrounding the reservoir and downstream areas. The Panel should also review and evaluate the implementing agency's operation and maintenance procedures and recommend improvements if necessary.
3. The ID, one of the concerned dam owner agencies is also the responsible implementing agencies of CRESMPA and has prior experience under the DSWRPPP on carrying out similar work thus should lead the process on bringing the panel together.
4. Once the panel membership is established, it should be sent for World Bank clearance and concurrence.

### **5.5.3 Project Level Environment Audit**

Most of the development projects in Sri Lanka follow EMFs and develop EMP's that need to be implemented ardently at the end which will render the entire process either a success and futile. Therefore, monitoring of the project during the construction and implementation phase is a must to ensure

environmental compliance of a project. This could be achieved through regular environmental audits which will look at the experience of incorporating environmental safeguards to the solid waste management sector and the level of impact it has had on ensuring the sound environmental management of solid waste operations, specifically.

The purpose of the environmental audit is to

- Collect, analyze and interpret monitoring results to detect changes related to implementation and operation of specific activities
- To verify the monitoring parameters are in compliance with national set standards
- To compare the predicted impacts with actual impacts and evaluate the accuracy of predictions
- To evaluate the effectiveness of implementation of the EMPs
- To identify shortcomings in the EMPs if any and incorporate it into the EMPs if deemed necessary
- To identify and report if there is non-compliance with the EMPs

The auditors must first develop a structured questionnaire based on the EMPs for the purpose of conducting the audit. Then during the site visit data can be collected using this questionnaire through interview surveys of officers responsible for implementation of the EMPs and site records, logs etc., The audits can be carried out at regular intervals or on *ad hoc* basis or when mitigation is not carried out as defined by the EMP leading to public concern.

Expected outcomes of the Environment Audits are

- Ensure that EMPs are implemented properly
- Ensure that the mitigation measures are effectively minimizing the identified impacts as well as identify new impacts that may have been excluded in the EMPs that require mitigation. Then make necessary adaptive changes to the EMPs to ensure that the all significant impacts are effectively mitigated.
- Identify noncompliance with EMPs if any and provide recommendations as to how to deal with such non-compliance to further strengthen the success of project activities.

An environmental audit for CRESMPA will be conducted, twice during the project implementation period. Once prior to the project Mid Term Review and a year from the projects stipulated closing date. The audit will entail to cover all activities outlined in the EAMF. review a sample of (i) the screening forms prepared by each project implementing agency (ii) standalone environmental assessments/management plans (iii) application of the NEA and its clearance procedures followed by the project, as the case be, and based on site visits ensure conformity with conditions, guidelines and comments stipulated in these and other related documents.

#### **5.5.4 Information Disclosure**

Disclosure of relevant project information will help affected communities understand the risks, impacts and opportunities of the Project. The implementing agency will publicly disclose the EMF and all Environmental Assessment documentation, including EAs, REAs and EMPs, for public review and comments in appropriate locations in the Project area. These include the project websites, social media, project offices and local authority offices to ensure all layers of the community have due access. Executive summaries of all EAs and REAs are to be translated to the local languages of Sinhala and Tamil.

All documentation will also be made available on the implementing agencies web site both in English and in local languages. Newspaper and other media outlets will alert the community to the availability of the

documentation. The website will also enable the community opportunity to provide comment electronically.

All safeguards Documentation will also be made available in the World Bank Info shop and Sri Lanka World Bank external website.

### **5.5.5 Grievance Redressal Mechanism**

The implementing agencies, both the PMU and IAs, will establish a grievance mechanism to receive and facilitate resolution of the affected communities' concerns and about the implementing agency's environmental and social performance during project implementation.

The EMP and its management program will establish a mechanism to address concerns raised promptly that is readily accessible to all segments of the affected communities, at no cost and without retribution.

For the grievances, the project implementation and/or supervision team at site will keep a feedback register and let the local stakeholder know that they can register their project related complaints or comments or suggestions. The project team will review the feedback and take appropriate actions. The overall environmental grievance process will be in line with the social grievance process proposed.

### **5.5.6 Handling Written and Verbal Complaints and Reporting of Incidents during Implementation**

All sub-project specific complaints incidents reported received during the implementation need to be managed according to the following steps.

- A register will be maintained of all complains received on sub-projects under the program during project implementation.
- The complaints register will be prepared subproject wise and each complaint recorded should be supplemented with copies of the letters received or signed note of the complaint, if the complaint is made verbally.
- Times, dates, names of complainant, nature of complaint should be recorded, and complaints should be graded as per the severity of the nature of the complaint.
- A complaint file, with hard copies and a complaint file of scanned soft copies on an electronic folder will be maintained. These files will be presented to the World Bank for supervision when requested.
- Once a complaint is received the following timelines are to be managed on providing resolutions:
- Feedback on agreed actions in relation to complains should be provided to the concerned parties within a period of 10 days.
- If complains take longer than the stipulated period to handle, weekly updated should be provided in writing indicating the reasons for delay.
- A summary sheet of all complaints received and resolved should be shared with the World Bank Task Team with environmental safeguards monitoring updates.
- Any complaint or incident categorized as high risk should be reported to the World Bank Task Team immediately.

### **5.5.7 Consultation Plan**

The CRESMPA has undertaken several consultations during project preparation on the overall planned interventions to be financed by the project. Instrument wise consultations need to be taken around each project site and as well as consultations on the EAMF. These should be duly documented in the respective outputs of the consultancies. In addition, PMU and IAs will conduct continuous consultations with

stakeholders and report as part of safeguards monitoring. In this line at project implementation a detailed consultation plan will be prepared and endorsed by the World Bank task team.

The plan will outline dates of consultations, locations and other information as relevant to the subprojects and the consultation notes will be documented and shared with World Bank. Consultations programs should first provide information in the form of briefs and relevant documents to the group being consulted at minimum at least 2 weeks prior to the date of consultation. The feedback and concerns raised on environmental safeguards issues, during consultations are to be thoroughly evaluated and any issues and concerns, once verified and where practically possible in the context of the project, should be mitigated via the relevant environmental safeguards instrument.

Consultations are inbuilt in the project planning, design and implementation approach. Prefeasibility and feasibility team will conduct and record consultations with the local stakeholders and project affected persons. During construction, the site supervision team will consult regularly with the affected people/community as well as local stakeholders for their observations and feedback.

Consultations were conducted on the EAMF among stakeholders in the both basins in December 2019 and consultation notes have been included in the document. Extensive stakeholder consultations were also conducted during the SEA Process.

## **5.6 Sequence and Action Plan of Safeguards instruments for subprojects to be financed under the project.**

### **5.6.1 Typical Timeframe for planning and carrying out safeguards assessment**

Timely planning and execution of environmental screening and follow up assessments/plans for sub-project investments would be crucial in achieving the overall project implementation and completion targets. Any delay in obtaining relevant environmental approvals/clearances would hold back commencement of sub-project activities thus causing project implementation to be delayed. Such delays can be costly in terms of project time as well as resources. Hence, it is extremely important that the PMU initiates sub-project specific screening and follow up assessments as soon as the concept designs become ready. All environmental assessments/plans should be completed by the time of tendering and the EMPs should be a part of the bidding document so that the contractor is made duly aware of his commitments towards environmental safeguards management under each sub-project.

The PMU will prepare and share a project specific timeline with the World Bank during project implementation.

## **5.7 Safeguards Training**

The Environmental and Social Coordinator will be trained by the Environmental Specialist and Social Specialist of the WB project team on the EMF implementation, safeguards and procedural requirements of the WB.

Training will be provided for the Implementing Agencies on how to monitor and report on environmental and social safeguards requirements by the E&S Coordinator. They will be also provided training on the use of Grievance Redressal mechanism, consultations.



All contractors are expected to disseminate and create awareness within the workforce EMP compliance, and any staff training necessary for their effective implementation. Where contractors do not have existing environmental staff, the PMU Senior Environment Specialist and Safeguards Coordinator (SESSC) and IAs will plan for adequate capacity building within the workforce to be involved.

Training on safeguards regarding operation of waste management systems and facilities and associated safeguards will be provided to the designated authority officials who will in due course manage the operation and are inbuilt in to the project modality.

## **6 Chapter 6: Institutional Arrangements for Implementation of the Project**

### **6.1 Overall Project Institutional Arrangements**

The Ministry of Irrigation, Water Resources and Disaster Risk Management with the ID as its major implementing arm, is the key ministry responsible for flood forecasting, early warning and flood control and protection in Sri Lanka. Therefore, the overall responsibility and accountability of the project will rest with the MIWRDM project.

The MIWRDM will engage the Director General of the ID to assign various specialized units of the ID to take responsibility for assuring technical diligence in the engineering designs, procurement administration, contract management, construction supervision and quality of the civil and mechanical works financed by the project. The Director Hydrology of the ID will be designated as the Deputy Project Director (DPD) for Component 1 and will be responsible for the implementation of Component 1. The Director, Flood Management and Drainage will be designated as DPD for Component 2 and will be responsible for the implementation of Component 2. The Project will provide reinforce the capacity of these two units of the ID with additional technical and support staff to be able to carry out their tasks. The two DPDs will also be responsible for securing technical support from other specialized units of the ID as well as from the Regional Director of Irrigation of Colombo for the planning, implementation and monitoring of the project. On behalf of the MIWRDM, a full time Project Management Unit (PMU) reporting directly to the Secretary of the MIWRDM, will manage the project on day to day basis. The primary responsibility of the PMU will be to ensure that the project will be implemented by the ID in line with its design and provisions of the financing agreement, produce the expected outputs and results within the stipulated time period, and oversee financial accountability of the project. For this purpose, the PMU will be overseen and guided by a National Project Steering Committee (NPSC) chaired by the Secretary of the Ministry of Policy Planning and Economic Affairs. It will be represented by the Secretaries of MIWRDM, Ministry of Disaster Management, Ministry of Provincial Councils and Local Government, Ministry of Megapolis and Western Region Development; heads of the ID, NPD, ERD, National Budget Department, CEA, Meteorology Department, Land Reclamation and Drainage Board, and UDA, and district secretaries of Colombo and Gampaha districts. In addition, a project operation committee (POC), chaired by the Secretary, MIWRDM will be responsible for day to day progress control and monitoring. The Project Director of the PMU will act as Secretary of both the NPSC and the POC.

The PMU will be staffed with a full time Project Director and a full-time team of senior specialists of engineering, procurement administration, contract management, financial management, stakeholder communication, social development, resettlement, environmental management, and monitoring and evaluation together with junior professional staff and support staff. The existing PMU of CRIP will be extended and reinforced with additional staff as necessary for this purpose.

### **6.2 Institutional Arrangement for Implementation of the EAMF**

The PMU to be established within the MIWRDM will need to second/hire environmental specialists to focus on the tasks and responsibilities outlined in the EAMF in the role of an Senior Environmental Specialist and Safeguards Coordinator (SESSC).

***The SESSC the PMU;*** He/She will report to the Project Director (PMU), under the Secretary (MIWRDM) and will be responsible for the overall management of environmental safeguards of the project and the implementation of the project specific safeguards instruments. The safeguards instruments include the EAMF and all subsequent EAs, EMPs and safeguard instruments prepared during project implementation. He/she will be in charge of the overall management of safeguards that will be implemented by the implementing agencies and will partake in the following responsibilities;

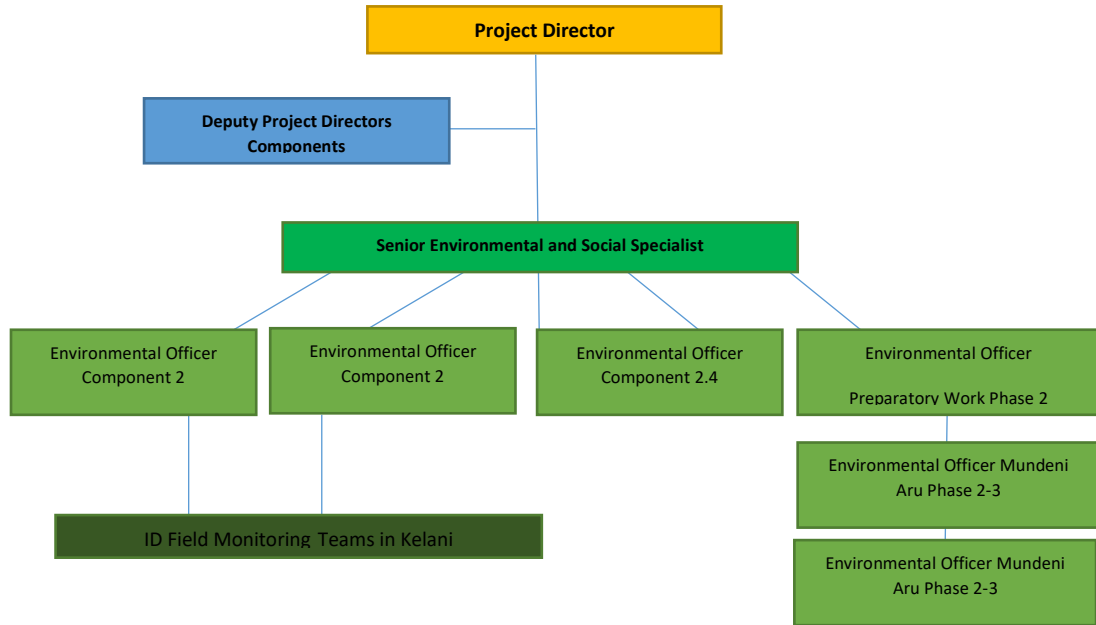
- Provide overall policy and technical direction for safeguards management under the Project, as defined by the project environmental and social safeguards instruments.
- Co-ordinate closely with the Environmental Officers in the team and ID in planning and managing project implementation as per the safeguards instruments; and provide necessary technical assistance to facilitate the implementation, management and monitoring of environmental and social safeguards\
- Agree on work programs with the Environmental officers of the team.
- Ensure environmental due diligence is carried out for each sub-project as soon as conceptual technical design and scope have been defined, as outlined in the safeguards instruments.
- Closely co-ordinate with the PMU Social Safeguards, procurement and technical teams and ID technical colleagues for timely preparation of Environmental/Social Assessments/Management Plans for sub-projects, as necessary (depending on screening outcome); co-ordinate for hiring technical assistance, where necessary, and for review and endorsement of these safeguard documents
- Conduct environmental screening for subprojects in collaboration with the team.
- Ensure consistency of safeguard documents with national environmental regulations and world bank policy requirements as defined in this EMF; work with the PMU to obtain necessary clearances from local environmental/archaeological regulatory authorities for sub-projects, where applicable.
- Prepare terms of references to undertake requisite safeguards assessments for complex activities that will warrant EA as per the environmental screening conducted and obtain necessary clearances from the World Bank and/or designated project approving agencies.
- Manage the consultants hired to undertake the preparation of environmental safeguards instruments, including environmental assessments, site contamination audits and other safeguards assessments, where applicable, and provide coordination support with implementation agencies and individuals
- Review draft and final environmental safeguard instruments for quality and obtain necessary clearances as per the safeguards instruments.
- Ensure that applicable measures in the EMPs are included in the design, and conditions on compliance with EMPs are included in the bidding documents.
- Liaise closely with the procurement team of the PMU on the above.
- Develop, organize and deliver environmental training programs and workshops for the Implementing Agencies at the field level, contractors, field supervision staff and other implementing agency officials as needed, on safeguard requirements and their management
- Ensure compliance with EMPs during the construction period and maintain close co-ordination with the technical teams of the IDs, and/or supervision consultants who will conduct monitoring of the implementation.
- Prepare additional technical guidelines, if necessary, to support the safeguards instruments in order to strengthen the implementation of environmental and social safeguards.
- Ensure adequate public consultation during the preparation of safeguards instruments

- Ensure public complaints relating to nuisance and inconvenience caused by sub-project implementation are addressed with corrective action and adequately documented
- Report to the Project Director, Secretary of MIWRDM and the World Bank on the overall environmental performance and compliance of the project as part of PMU's periodic progress reporting.
- Maintain close cooperation with ID to monitor the O&M during the operation of the project;
- Hold regular review meetings with the safeguards officers of the ID and visit selected project sites to monitor implementation of the safeguards instruments.
- Prepare routine monitoring reports, in collaboration with the IAs as set forth in the safeguards instruments.
- Liaise closely, where technical guidance is required, with the Environmental Specialists of the World Bank task team.
- Promote community participation in the process of planning, management and monitoring of environmental/social impacts of sub-projects; provide guidelines on community participation in environmental/social monitoring to the ID.
- Prepare terms of references for the systemic environmental audits for all project components and obtain clearances.
- Review and comment on audit reports, take necessary actions to address audit issues raised and obtain comments from World Bank.

The SESSC will have three environmental officers assigned to assist in coordination and requisite field reviews etc. The PMU will require to hire these individuals who will share the role explained below, each officer will conduct the following tasks.

***Environmental Officers at PMU;*** Will have the following key roles and responsibilities to support the SESSC and will report directly to the SESSC. 4 Environmental Officers will be hired, 2 will specifically focus on the subprojects for the Kelani Basin, while one officer will assist the SESSC on the requisite actions with regard to the Component 2.4 and the fourth officer will focus on all preparatory tasks associated with preparations for

- Work with SESSC conducting environmental screening and field monitoring and will prepare the environmental screening reports assigned and take part in other tasks assigned during EAMF implementation.
- Will conduct the necessary field work/ data collection for completion of environmental screening reports during sub project preparation and monitoring reports during sub project implementation.
- Will coordinate with the project partner agencies to ensure timely delivery of safeguards instruments and monitoring updates. Will visit all project sites during implementation and prepare a monthly monitoring updates to be shared with the SESSC.
- Will follow up with the ID field staff, contractors and supervision consultants on handling of complaints and grievances on project monitoring.
- Will conduct training on environmental safeguards requirements for contractors and contractor staff.



Organogram of Environmental Safeguards Team in PMU

***Environmental Safeguards Focal Points at IAs;*** These focal points will be staff seconded by the relevant IA to the project implementation Cells to be established. They will be responsible for ensuring activities implemented by their respective IAs as per the EAMF are well managed and report to the EHSC based in the PMU. They will assist in providing data and the timely completion of environmental screening reports and instruments and will collaborate with the PMU ESSO to ensure these assessments are completed in a timely manner. The Implementing Agencies are responsible for managing procurement and implementation of subprojects assigned to them while overall supervision will be conducted by the PMU.

He/She will take proactive efforts during monitoring/reporting on compliance of due diligence mechanisms set forth in the EMF. As these officers, will be based in the IAs they will be required to conduct regular monitoring visits and facilitate good communication between contractors and PMU on safeguards issues and provide guidance to the contractors. In addition, they will also conduct awareness and training programs among the contractor staff and labors on EMP implementation.

The MoIWRM and ID has good capacity in terms of technical aspects as well as management and implementation of safeguards drawing from both the experience of implementing two complex projects operations, namely the Climate Resilience Improvement Project (CRIP) and The Dam Safety and Water Resources Planning Project (DSWRMP) and a host of other Bank and donor funded projects within the ministry. Both projects have also ensured ample training on World Bank safeguard policies and overall environmental management have been provided to the Irrigation Engineers and other decision-making levels within in the ID.

***Contractors:*** Implementation of measures laid out in the EMPs from the preconstruction, during, and to the close of construction will largely be the contractor’s responsibility (apart from those provisions relating to technical designs and other specified tasks indicated in the EMPs) and for this the contractor will nominate a safeguard officer (as requested in the EMP) as the focal person who will be directly responsible for ensuring compliance with the EMP during construction.

**Consultants:** The PMU will hire environmental consultants to provide technical support the PMU where specialized services are required. Some of the consultancies identified include:

- Preparation of EAs, EMPs, SEAs and other requisite safeguard assessments for sub projects as outlined in the EAMF and finalized via the Environmental Screening to be conducted for each activity.
- Conducting two systemic Project Level Environment Audits outlined in the EAMF

### **6.3 The Roles and Responsibilities of World Bank**

The World Bank project task team, specifically the environmental specialists, will provide close supervision and necessary implementation support by reviewing and providing guidance on conducting screening, and the preparation of relevant safeguard instruments as well as providing training for trainer's programs for the SESSC and team and other programs identified in the EAMF;

- Undertake prior review and provide feedback on all safeguards instruments, review of monitoring updates and other relevant safeguards documents.
- Ensure regular missions to review overall safeguards performance and provide further implementation support
- Share knowledge on technologies and best practices
- Provide guidance on handling complaints and grievances from a technical standpoint.
- Provide training support on Bank's safeguard policies and requirements of the project.

### **6.4 Rough Cost Estimates for EAMF implementation for Phase I**

Drawing from the project experience and current indicative costs of Category A projects tin Sri Lanka the EAMF also provides a rough estimation of costs for safeguard management and EAMF implementation under Phase I of the program. The total cost is estimated at US\$ 918,500.

In terms of costs, competition and an increase in the number of players in the consultancy market within the country has led to drops in preparation costs since 2016 when done by local consultants. All safeguards instruments have been inbuilt in to the project modality and will be financed via the project and detailed project cost tables will include the necessary costs accordingly. Updated cost tables will be prepared when the EAMF is updated at each Phase of the program.

The associated cost to implement EMPs as well as training for project staff, contractors etc. have been integrated into the project budget. The project will ensure that all works contracts will include the EMP, and the cost of implementing the EMP will be identified as an item in the Bill of Quantities.