

# **GANGEWADIYA**

## **Environmentally Sensitive Area Co-Management Plan**



**Co-Management Plan  
Gangewadiya Environmentally Sensitive Area  
Wanathavilluwa Divisional Secretariat Division  
Puttalam District, Sri Lanka**



# GANGEWADIYA

## Environmentally Sensitive Areas Co-Management Plan



**Enhancing Biodiversity Conservation and Sustenance of Ecosystem Services  
in Environmentally Sensitive Areas (ESA) Project**

Ministry of Environment and Wildlife Resources &  
United Nations Development Programme

## Message from the Wanathavilluwa Local Management Committee

The *Gangewadiya* Environmentally Sensitive Area (ESA) Co -Management Plan is the precious outcome of an extensive study and the participatory planning process.

Being bordered by the *Wilpattu* Protected Area (National Park), *Puttalam* Lagoon, Villu Ecosystem and the *Virakkodichole* Protected Area, this ESA is rich diverse ecosystems like Mangroves, Sea Grass Beds, Sand Dunes and Salt Marshes and provides habitat of endemic flora and fauna species and therefore, considered as the ecological heart of *Wanathavilluwa* Divisional Secretariat Division.

Based on the assessment of biodiversity baseline survey, consultations with Government and Non-Government stakeholders, community and Civil Organizations, the necessary administrative procedures and social measures were strategized through a Co-Management Plan in order to achieve the socioeconomic development while conserving biodiversity and mitigating threats to the biodiversity in the *Gangewadiya* ESA.

This co-management plan has paved the way for sustainable development in the *Gangawadiya* ESA. Therefore, it is the shared responsibility of all of us to extend our commitment to implement this Co-Management Plan.

The *Wanathavilluwa* Local Management Committee would like to convey sincere thanks to all those who contributed to the process of developing this plan.

Chairman

*Wanathavilluwa* Local Management Committee

Divisional Secretariat , Civil Societies and Community, Local Environment Groups, the Forest Department , the Department of Wildlife Conservation, Central Environmental Authority, Coastal Conservation Department, Department of Agriculture, Department of Agrarian Services, Land Use Policy Planning Department, Pradeshiya Sabhava , Marine Environment Protection Authority, Survey Department, Sri Lanka Police, Sri Lanka Navy , Cashew Corporation, Coconut Development Board , Representatives of Farmer Organizations, Private Institution, *Samurdhi* Development Authority



**Co-Management Plan**  
**Gangewadiya Environmentally Sensitive Area**  
**Wanathavilluwa Divisional Secretariat Division**  
**Puttalam District**  
**Sri Lanka**

**May 2020**

*Local Management Committee*

**Wanathavilluwa Divisional Secretariat Division**

*In Collaboration with*

**Enhancing Biodiversity Conservation and Sustenance of Ecosystem  
Services in Environmentally Sensitive Areas (ESA) Project**

**Ministry of Environment and Wildlife Resources**

**&**

**United Nations Development Programme**

## Abbreviation

BR	Breeding Residence
BRMS	Bar Reef Marine Sanctuary
CR	Critically Endangered
CR/PE	Critically Endangered/Possibly Extinct
CWR	Crop Wild Relative (CWR)
DD	Data Deficient
DSD	Divisional Secretariat Division
DWC	Department of Wildlife Conservation
EN	Endangered
EPA	Environmental Protection Areas
ESA	Environmentally Sensitive Areas
FD	Forest Department
GND	Grama Niladhari Division
KOB	Kala Oya Basin
LC	Least Concern
LKOB	Lower Kala Oya Basin
LMC	Local Management Committee
NE	Not Evaluated
NT	Near Threatened
NTFP	Non Timber Forest Products
UNDP	United Nations Development Programme
VU	Vulnerable
WNP	Wilpattu National Park

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# Gangewadiya ESA Co-Management Plan



## 1. Introduction.

### 1.1 Introduction to ESA

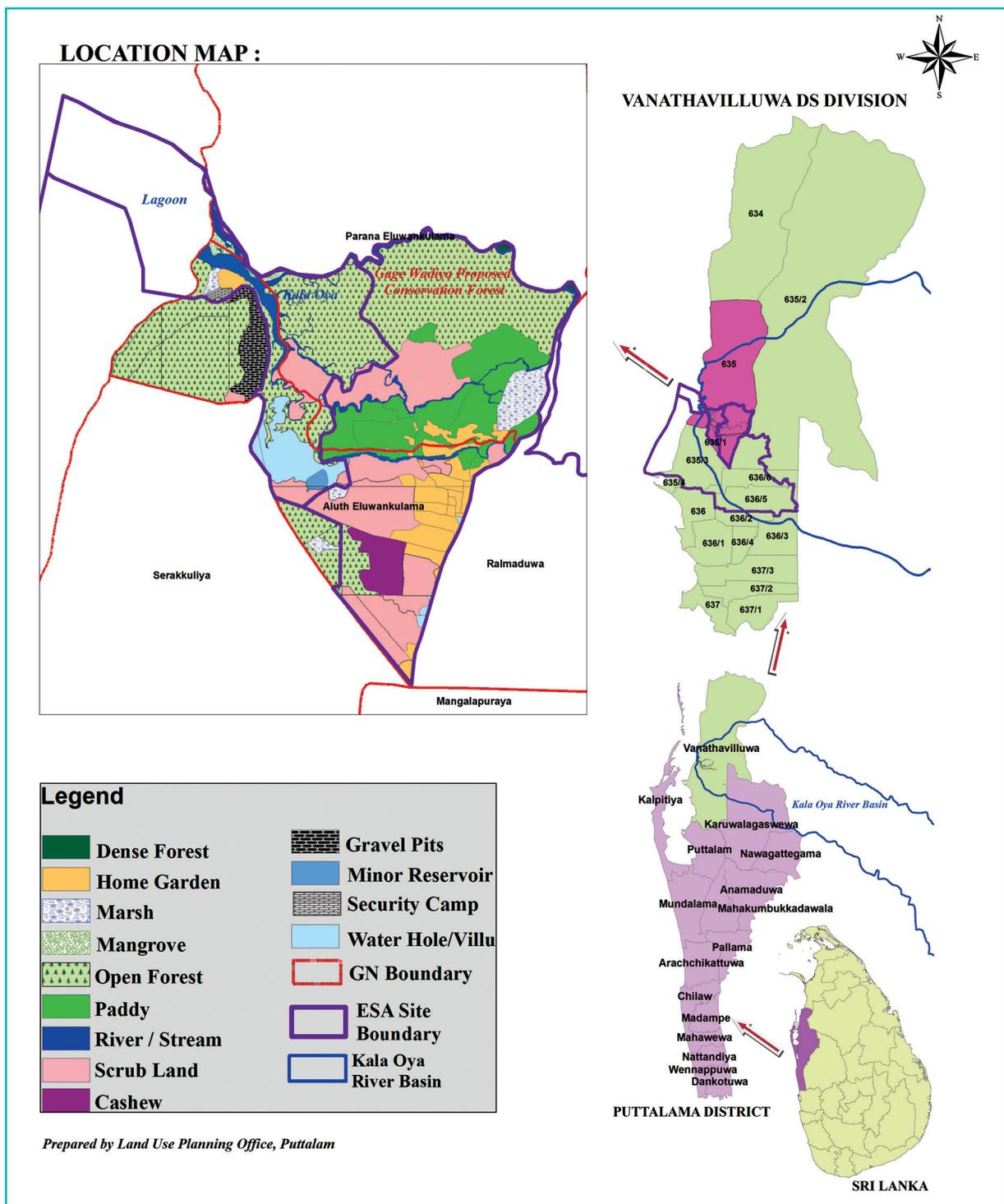
An Environmentally Sensitive Area (ESA) is a landscape element or an area with high biodiversity value, located outside of a protected area, and which needs to be managed through a co-management modality to conserve biodiversity and sustain ecological, environmental and socioeconomic benefits to the local communities as well as the nation and the globe at large. The primary purpose of the ESA is to achieve environmental sustainability in the country and minimize the threats to biodiversity depletion and sustenance of ecosystem services, specifically, in the selected area/targeted sites and incorporation of environmental values including ecological values, water quality and soil quality into the location based on other activities such as development and livelihood practices.

The ESA can also be seen as an area that is vital for the long-term maintenance of biodiversity and its evolutionary potential and/or the productivity of water, soil and other natural resources that provide ecological, environmental, economic and/or cultural benefits/ services primarily to the local community which requires co-management as applicable.

## 1.2 Gangevadiya ESA

Identified (and declared) *Gagevadiya* Environmentally Sensitive Area (ESA) is located in *Parana Eluwankulama* (635) and *Aluth Eluwankulama* (635/1) *Grama Niladhari* Divisions (GND), in *Wanathavilluwa* Divisional Secretariat Division in Puttalam District in Sri Lanka, and adjoining the Lower *Kala Oya* River basin, and beyond the existing and gazetted Protected Area network of *Wilpattu* National Park (WNP) and *Weerakkodicholai* Reserved Forest and Bar Reef Marine Sanctuary (BRMS). This ESA covers 2290.47 hectares; 17.2% of *Parana Eluwankulama* GND (1210.47 ha) and 1080.05 hectares of *Aluth Eluwankulama* GND.

Figure 1: Map of Geographical positioning and boundaries of Gangevadiya



As shown in Table 1, the total population of the ESA is 1,810 in 434 families and the average population density is 22.5 persons per square kilometer. This area consists of mixed ethnic groups with the majority of the population being Muslims, secondly the Sinhalese and thirdly the Tamils. 41% of the population is under the age of 16 years, 54% of the population between the age of 16 to 60 years and 5% of the population is over 60 years. 78% of the population studied up to grade 5 or GCE Ordinary Level.

52% of the population come under the labour force, out of which 86% engage in employment at local level and 14% in foreign employment. Monthly income of the majority of the families is reported to be less than LKR 32,000 and 12% of the population receives government welfare assistance such as *Divinaguma*, *Samurdhi* and other.

Majority of total families, namely, 56% as a whole are engaged in self-employment sectors, out of which around 31% of the families are engaged in agriculture, 16% in fishing, 4% in animal husbandry, 3% in carpentry & the construction field and 2% engaged in small business activities in the area. Rest of the families (44%) are engaged in daily labor at cashew and coconut plantations, paddy fields, public and private sector jobs and depend on government subsidies. While paddy farming in *Parana Eluwankulama* is done under major irrigation, in *Aluth Eluwankulama* farming is done with rainfed and minor irrigation schemes. In addition to coconut and cashew cultivation (1/4 ac. to 5 ac.) in the area, vegetable, fruit planting and Other Food Crops (OFC) cultivation continue at home garden level.

Drinking water scarcity is the major problem in the area and all families obtain water from unprotected water sources (open dug wells and river water). Housing/electricity and telecommunication facilities of the majority of families are at basic level. Land ownership of this area is based on the government permit at period level basis and/or fulltime.

There are two farmer organizations in *Eluwankulama* area and community development societies, women development societies are available as social networking mechanism.

Table 1: The Demographic data of the ESA Gangewadiya.

GN Division	Total extent (ha)* of the GND	Extent of ESA (ha)	Families	Total population**	Population density/km2
635 Parana Eluwankulama	7037.64	1210.47	73	292	7.0
635/1 Aluth Eluwankulama	1080.05	1080.05	361	1,518	38.0
<b>Total</b>	<b>8117.69</b>	<b>2290.52</b>	<b>434</b>	<b>1,810</b>	<b>22.5</b>

Source: \*Land Use Planning Office, Puttalam; \*\*Resource Profile, Wanathavilluwa DS, 2018

This ESA is situated in the dry zone, where the period between September to December is the rainy season while inter-monsoonal rains are expected between the months from March to May. The annual temperature is between 27°C to 30°C and its annual rainfall is approximately 900 mm. The period of drought in the area extends from June to early September. The ESA is exposed to climate related natural hazards including prolonged droughts and frequent flash floods that negatively impact on livelihood of villagers as well as on the biodiversity. Prolonged droughts lead to reduction in mudflat areas and most of the tanks and water bodies dry up, while high rainfall results in the inundation of the mudflats and other habitats.

Main livelihood of the area population is agriculture, while the coastal area population involves in lagoon fisheries. Animal husbandry (cattle, goat and poultry) is the secondary income source of some families (23% Poultry, 10% goat and 3% cattle) while rest of families are engaged in daily labour in coconut and cashew plantations.

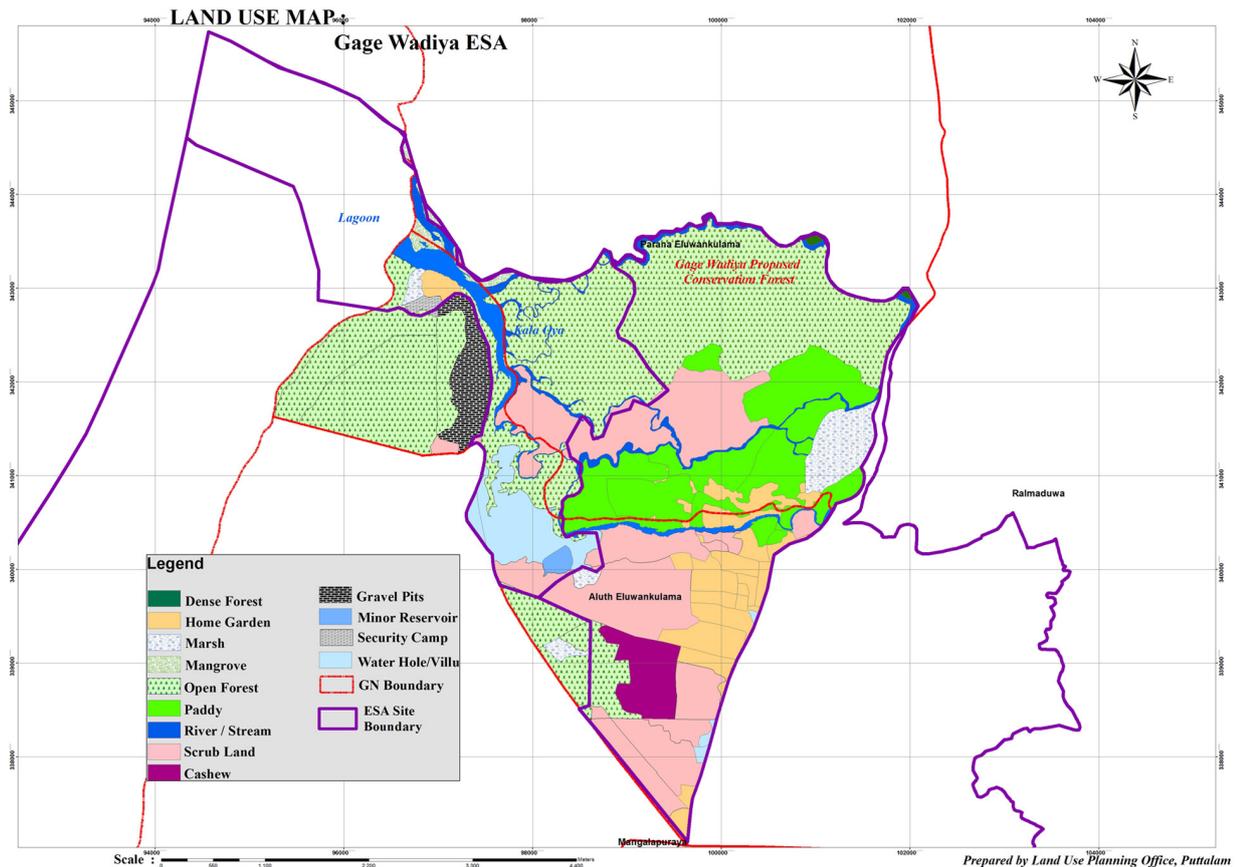
*Eluwankulama* entrance of the Wilpattu National Park is located at Parana *Eluwankulama* GND and it has been reported that around 11,000 people entered the park in 2018 using this entrance. River and estuary associated nature-based tourism is becoming increasingly popular within this area. As a result, several tourist establishments have been constructed and a number of people have changed their major employment into tourism related activities.

Present land use pattern of the ESA *Gangewadiya* is shown in Map 2. Accordingly, the main land use within the area is forests (68 %) which consist of open forests (1026.6 ha), followed by scrub land (430.79 ha) and dense forest (13.35 ha). Agricultural land is reported as the second highest main land use (14%), with land under coconut cultivation (18 ha), paddy cultivation (273.11 ha), and cashew (51.67ha). More details of land use patterns are shown in Map 2 and given in Table No. 2.

Table 2: Main land uses/ land cover and their approximate extents in the ESA *Gangewadiya*.

Land Use	Aluth <i>Eluwankulama</i> (ha)	Parana <i>Eluwankulama</i> (ha)	Total (ha)	Sector Total (ha)	%
<b>Agriculture</b>				<b>324.78</b>	<b>14%</b>
Paddy	28.38	244.73	273.11		
Cashew	51.67	0	51.67		
Home garden	134.97	22.45	157.42	157.42	7%
Navy Camp Land	5.48		5.48	5.48	0.002%
Mining area	51.4	0	51.4	51.4	2%
<b>Forest</b>				<b>1551.94</b>	<b>68%</b>
Dense forest		13.35	13.35		
Open forest	368.92	657.68	1026.6		
Marsh	15.95	47.74	63.69		
Mangrove	4.93	12.58	17.51		
Scrub land	280.14	150.65	430.79		
<b>Water bodies</b>				<b>198.74</b>	<b>9%</b>
Minor reservoir	6.93	0	6.93		
River	36.87	59.37	96.24		
Stream	13.25	0.85	14.1		
<b>Total</b>	<b>1080.05</b>	<b>1209.71</b>		<b>2289.76</b>	<b>100%</b>

Figure 2: Map of land use pattern on Gangewadiya ESA



*Gangewadiya* mangrove is one of the largest intact mangrove ecosystems in Sri Lanka with the presence of threatened mangroves with mangroves and salt marshes acting as the barrier between land and sea. *Gangewadiya* is also located in the periphery of *Wilpattu* National Park (WNP) and it serves as an influential zone of the Bar Reef Marine Sanctuary (BRMS) area at *Kalpitiya* and is a landing site for migratory birds. The area is the main fishing ground of the local community and towards 1.5 km of the upper reaches of Navy cause way, *Kala Oya* is the main source of potable water for *Gangewadiya* community.

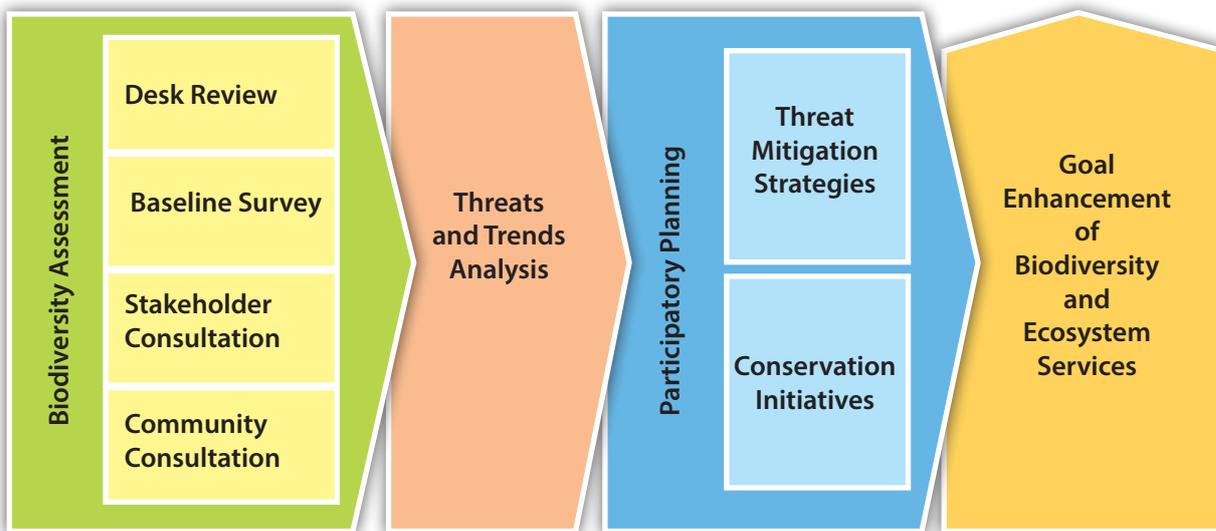
### 1.3 *Gangewadiya* ESA Co-Management Plan Development Process.

Protection and conservation of biodiversity in an ESA entirely rely on the culture of natural resource management, which includes consideration of intergenerational needs and rights. Therefore, ESA management requires consent, commitment and contributions of individuals and institutions in and around the ESA. Following the above-mentioned principles and as indicated in Figure 1, the ESA Co-Management Plan was developed with the participation of communities concerned and the relevant government institutions.

The Co-Management Plan development process consists of three layers as detailed in Figure 3, namely, biodiversity assessment, threats and trends assessment and participatory planning. The biodiversity assessment was carried out in four stages, consisting of (i) the desk review – reviewing of various reports pertaining to the biodiversity in the area, (ii) the biodiversity baseline survey done by the biodiversity experts under the coordination of Biodiversity Secretariat, (iii) stakeholder consultations with government and non-

government actors, and (iv) community consultations. The details of stakeholder consultations and community consultations are included in Annexure 1 of this Co-Management Plan.

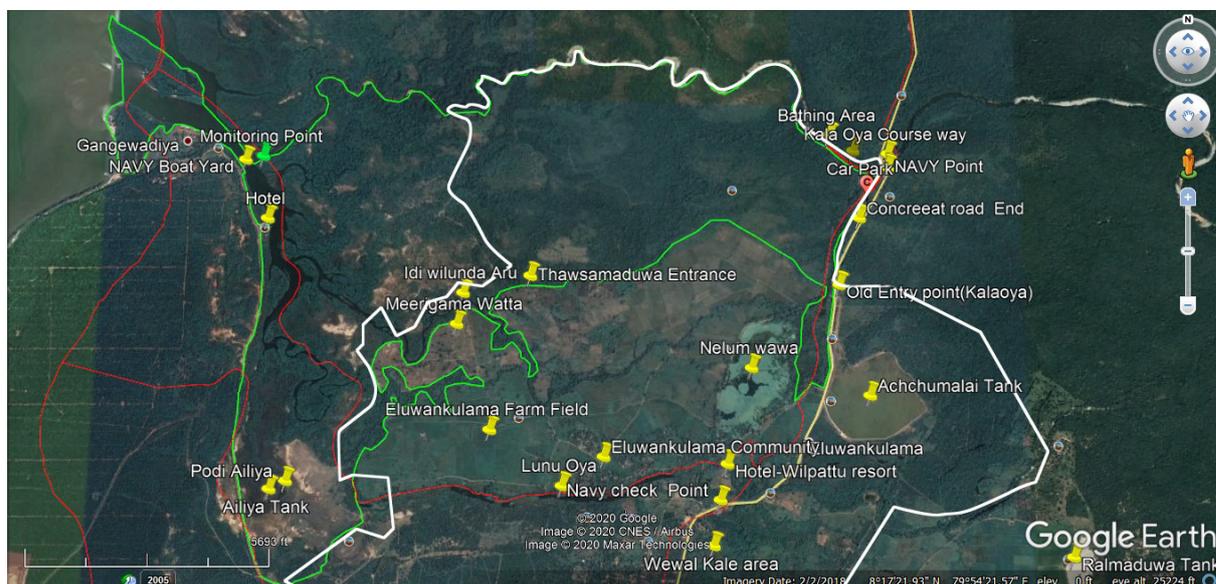
Figure 3: Diagram of Management Plan Development Process.



Source: ESA Co-Management Plan, Ipalogama, 2019

Natural and anthropogenic threats were identified in consultation with stakeholders and communities and based on the scientific review of existing data. Meanwhile, the trends of socioeconomic and environmental risk to the biodiversity were assessed with previous incident timeline and forecasted considering natural phenomena and changes in population, economy and social development. Participatory planning was done to enhance biodiversity and ecosystem services in the ESA through threat mitigation strategies and conservation initiatives and aligned with the 2030 Visionary Planning Framework of the *Wanathavillurwa* Divisional Secretariat Division. The Co-Management planning process was administrated and approved by the Local Management Committee (LMC) of the DSD.

Figure 4: Satellite image of Lower Kala Oya Basin



## 2. Biological Diversity in Gangewadiya ESA

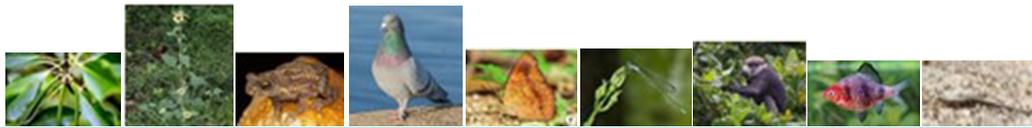
### 2.1. Biodiversity Profile and Conservation Status of Species of the ESA

The Lower *Kala Oya* Basin (LKOB) is home to unparalleled biodiversity and is rich with both terrestrial, marine and brackish water flora and fauna. Rich species diversity in adjoining terrestrial protected areas, and known for high species richness, with endemic and threatened species, the ESA holds high importance in conservation aspects of globally threatened species. Having intermediate salinity between salt and freshwater, "brackish water" is a main characteristic of this ecosystem. Mangroves, sea grass beds, sand bars and saltmarshes are prominent ecosystems within this ESA. Being fulfilled the Ramsar criterion for identifying wetlands of international importance, this area is included within boundary of Wilpattu Ramsar Wetland cluster.

Mangroves occur along sheltered inter tidal coastline in association with the estuary and provide nursery ground for fish and other invertebrates. The river mouth and the associated tributaries (*Lunu Oya*) contain one of the largest intact mangrove ecosystems in Sri Lanka. Sand bars, salt marshes and the near shore environment (sea grass beds) provide important feeding grounds, breeding residence for migratory birds, marine turtles as well as dugongs and commercially important fish species including juvenile stages of commercially important crustaceans such as *Penaeus* spp., and *Macrobrachium* spp.

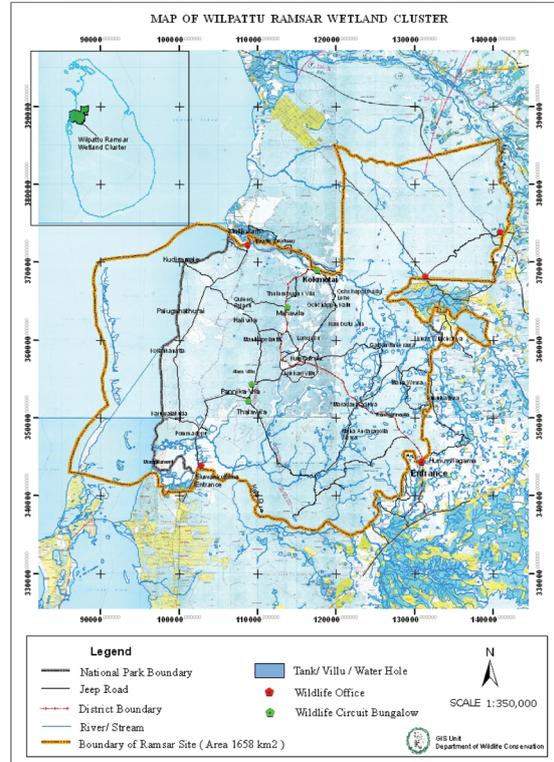
Further, this ESA connects WNP with adjacent *Kala Oya* freshwater floodplain ecosystem and *Thabowwa*, *Weerakkodichole* etc. and acts as terrestrial animal migratory routes and facilitates ecological connectivity within the area.

Figure 6: Species Diversity in ESA Gangewadiya.



	True Mangroves & M. associates	Plants	Amphibians	Birds	Dragonflies	Butterflies	Mammals	Fish	Reptiles	Total
# of species	(14 +16)	509	19	191	40	36	30	22	44	921
# of endemic species	0	26	04	09	02	0	03	0	09	53

Figure 5: Map of Wilpattu Ramsar Wetland cluster



The Biodiversity Assessment 2017<sup>1</sup> reveals that 921 species are available in ESA *Gangewadiya*, out of which, 53 are Endemic Species (Plants 26 + Amphibians 4 + Birds 9 + Dragonfly 2 + Mammals 3 + Reptiles 9), 526 Indigenous Species (411 Plants + 15 Amphibians + 38 Dragonfly + 27 Mammals + 35 Reptiles ) and 38 exotic species in the ESA<sup>2</sup>. Further, 39 Migratory Birds have been reported. Identified breeding residences at the ESA host 142 birds including of 4 critically endangered, 1 endangered and 6 vulnerable.

Accordingly, out of all reported species 6% are endemic and most of them are plants. *Semnopithecus vetulus* (Purple-faced leaf monkey), *Diyaminauclea zeylanica* (Hook.f.) Ridsdale (Diya mee), *Achyranthes diandra* Roxb., *Dioscorea trimenii* Prain & Bukill and *Abutilon subumbellatum* Philcox are among the endemic and endangered. The list of reported endemic species is given as Annexure 2 in this Management Plan.

6% Endemic  
10% Endangered

### 2.1.1. Gene Diversity

*Gangewadiya* ESA hosts high biodiversity due to the variety of ecosystems. Many of those ecosystems undergo severe environmental conditions. Species within the ecosystems host strong gene diversity. Genetic diversity is the total number of genetic characteristics in the genetic makeup of a species or is simply the variation of genes within species. Individuals within each species have a particular genetic composition and carry out a gene pool. In order to survive, some species show adaptations to the changing environment and mutations. This causes changes in genes of species and, therefore, offer new genetically improved individuals within the population, and different populations carry different genetic compositions.

Estuaries represent spatially discrete habitats, isolated from each other by barriers to dispersal or physiological tolerance. Estuarine environments tend to restrict gene flow and impose distinct selective regimes, generating physiologically adapted populations divergent from their marine counterparts, and the potential for in situ speciation incomplete or partial isolation.

The baseline surveys did not cover genetic diversity studies, but there are records of Crop Wild Relative (CWR) of Rice reported in the *Wanathavilluwa* Divisional Secretariat, namely, *Sethuvilluwa*, *Iranavilluwa* and 15 mile-post *Villuwa*. These areas have been declared as Environmentally Protected Areas (EPAs) to conserve the wild rice varieties such as the threatened species of *Oryza nivara* and the endangered *Oryza rhizomatis*.

### 2.1.2. Species Diversity

Approximately 509 flowering plant species were recorded from the *Gangewadiya* ESA. *Hibiscus panduriformis* a rare shrub species of the Family *Malvaceae* which has been found only in very few locations in Sri Lanka was recorded near the *Eluwankulama* causeway.

1. The Biodiversity Assessment was carried out by Biodiversity expert group lead by Green Tech Consultants (Pvt.) (Ltd.), in 2017, under the coordination and supervision of the Biodiversity Secretariat of the Ministry of Mahaweli Development and Environment for the Environmentally Sensitive Areas Project.
2. The species status 89 species (Mangroves 30 + Fish 22 + Birds 1 + Butterfly 36) are yet to be confirmed. Among them, 1 endangered mangrove, 4 vulnerable (Mangrove 2 + Butterfly 2), 58 least concern (Mangrove 20 + Fish 4 + Birds 1 + Butterfly 33) and NE = 18 (Fish 18) not evaluated.

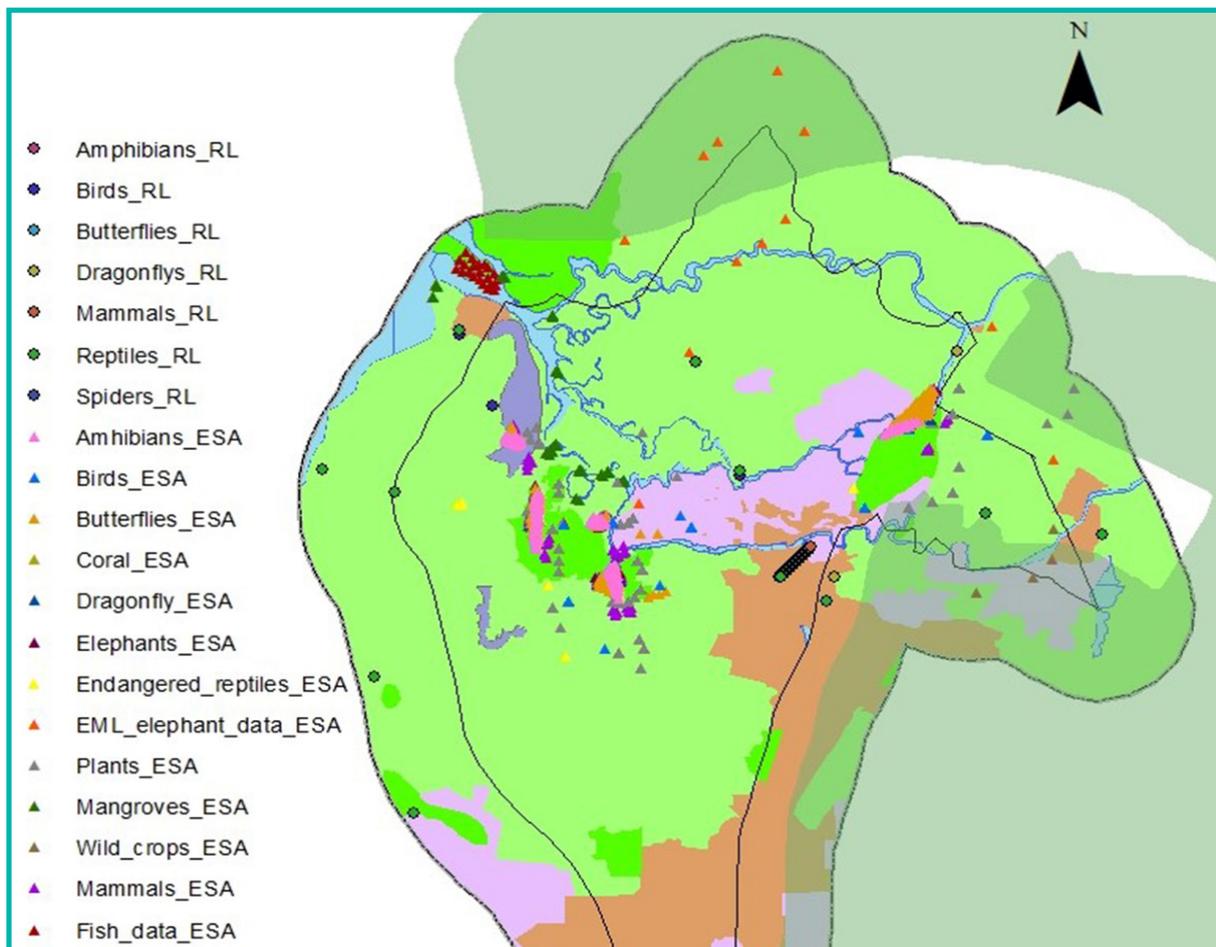
LKOB has a high vertebrate diversity with conservation values as indicated in Table 3. Of the 30 mammalian species recorded, three species (*Macaca sinica*, *Semnopithecus vetulus hartii*, and *Moschiola meminna*) are endemic. Mega herbivores such as elephants are found migrating between protected areas and the river basin, especially between *Aruwakkalu* and WNP as well as between WNP and the *Thabborwa* Sanctuary.

*Gangewadiya* ESA is home to a significant diversity of birds including nationally and globally threatened *L. javanicus*. 39 migrant bird species, 142 breeding residents have been identified in *Eile* tank associated mangrove and salt marsh areas, indicating this area as an important feeding ground for the waders. The Islands adjacent to the BRMS in *Puttalam* contains large roosts of sea birds and many of these birds use the area for resting, feeding and breeding. A total of 63 (19 amphibians and 44 reptiles) herpetofauna species were recorded from *Eile* area, while 38 (19 amphibians and 19 reptiles) were observed from *Parana Eluwankulama*.

*Aluth Eluwankulama* area hosts 36 species of butterflies, but no endemic species have been recorded. The Common Caster, a vulnerable species, has been recorded only once in *Eile* area. The *Eile* area's salt marshes and seasonal water holes provide an ideal habitat for approximately 40 species of dragonflies. Individuals of species have been recorded and the populations of two endemic species, *Pseudagrion rubriceps* Selys, 1876 (Orange-faced Sprite) and *Prodasineura sita* (Stripeheaded Threadtail) have been recorded in *Eile* and *Parana Eluwankulama* area, respectively. Refer Annexure 3 for the Summary of assessment of the biological wealth of *Gangewadiya* ESA.

The blow Map 3 showcases the locations of endemic species in the ESA.

Figure 7: Distribution map of the reported species within *Gangewadiya* ESA



The data also reveal that 94 (10%) of the species reported are endangered. The details of reported threatened species are given as Annexure 2. Table 3 and Figures 7 and 8 showcase the numbers of reported species categories and conservation status.

Table 3: Species at Gangewadiya ESA and Conservation Status .

Conservation Status	Mangrove	Plants	Amphibians	Birds	Butterfly	Dragonfly	Mammals	Fish	Reptiles	Total
CR/PE	0	1	0	0	0	0	0	0	0	1
Critically Endangered	0	3	0	4	0	0	0	0	0	7
Endangered	1	15	0	1	0	0	5	0	3	25
Vulnerable	2	42	1	6	2	2	1	0	6	61
Near Threatened	7	63	1	19	1	8	3	0	6	109
Least Concern	20	303	15	160	33	30	21	4	29	615
Data Deficient	0	7	2	0	0	0	0	0	0	9
Not Evaluated	0	3	0	1	0	0	0	18	0	22
		72								72
<b>TOTAL</b>	<b>30</b>	<b>509</b>	<b>19</b>	<b>191</b>	<b>36</b>	<b>40</b>	<b>30</b>	<b>22</b>	<b>44</b>	<b>921</b>

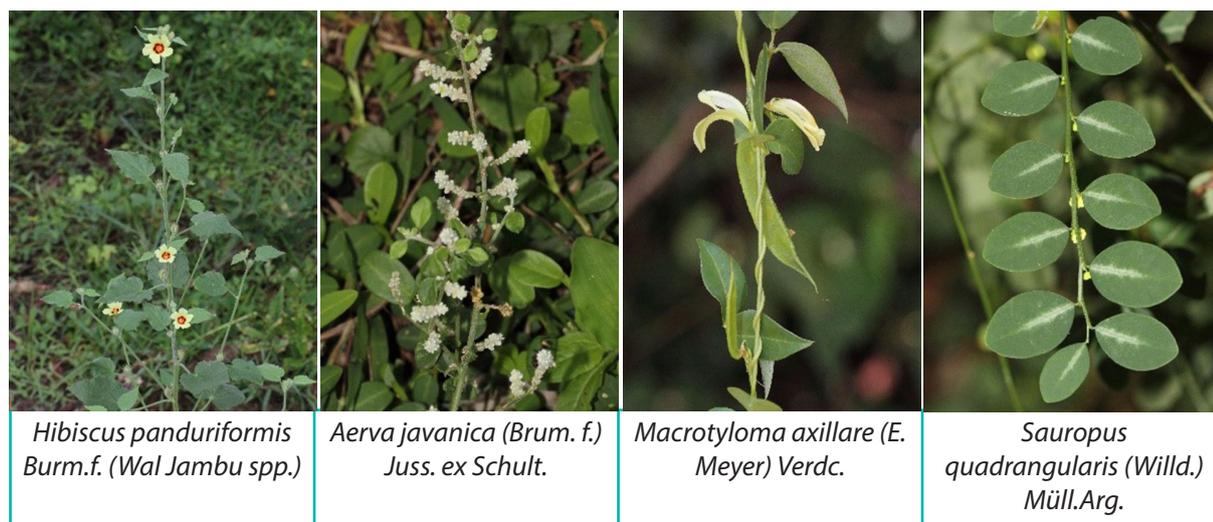
Figure 8: Endemic Species according to the Conservation Status.

EN 5 (Mammal 1 + Plant 4)
VU 7 ( Plant 5 + Reptile 2)
NT 8 (Amphibians 1 + Bird 1 + Plant 5 + Reptile 1)
LC 31 (Amphibians 2 + Birds 7 + Dragonfly 2 + Mammals 2 + Plant 12 + Reptiles 6)
DD 1 (Amphibians 1)
NE 1 (Bird 1)

Figure 9: Indigenous/Native Species according to the Conservation Status.

CR/PE 1 (Plant)
CR 3 (3 Plants)
EN 18 (11 Plants + 4 Mammals + 3 Reptiles)
VU 45 (1 Amphibians + 2 Dragonflies + 1 Mammals + 37 Plants + 4 Reptiles)
NT 74 (8 Dragonflies + 3 Mammals + 58 Plants + 5 Reptiles)
LC 375 (13 Amphibians + Dragonflies 28 + 291 Plants + 19 Mammals + 23 Reptiles)
DD 8 (1 Amphibian + 7 Plants)
NE 3 (Plants)

Figure 10: Critically Endangered Species in Gangewadiya ESA.



Details of categories of species, species status and conservation status have been included in the management plan as Annexure 2.

### 2.1.3. Ecosystem Diversity

The *Gangewadiya* ESA represents a wide array of vegetation types covering Terrestrial, Brackish water and Coastal ecosystems. Terrestrial ecosystems include, Riparian forest, Scrub forest, Thorn scrub forest, Dry-mixed evergreen forests and Brackish water and Coastal ecosystems include varied biotopes such as mangroves, Salt marshes, Sea grass beds, Sand bars, Lagoon and the Estuarine system. A brief description of the most important ecosystems found within the area and the various ecosystem services provided by them are described in Table 4.

Table 4: Ecosystem Services of the Gangewadiya ESA

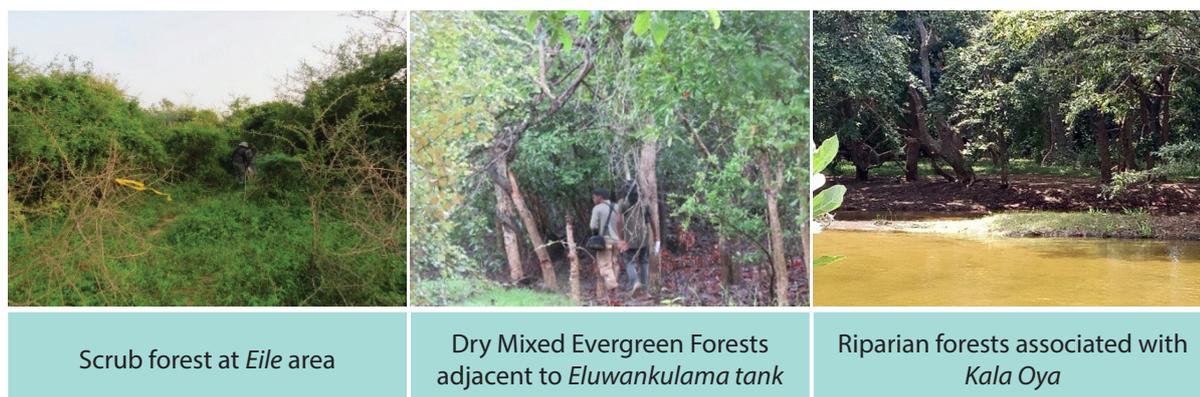
Ecosystem Service Category	Service Types	Description
Provisioning services	Fisheries Resources (coastal and near-shore fin fish and shellfish)	Communities in <i>Gangewadiya</i> depend on estuarine fishery resources for livelihood.
	Non-timber forest products	Wild varieties of fruits, leafy vegetables and medicinal plants associated with villus, tanks and forests.
	Drinking water for local communities, domestic cattle, and other wildlife	Lower <i>Kala Oya</i> (>1.5 km towards Navy causeway)/ margin of ESA boundary provides drinking water for <i>Gangewadiya</i> community, <i>Lunu Oya</i> provides water for Agriculture activities and domestic cattle feeding
	Fodder for domestic cattle and goats	Free roaming cattle and goats feed on grasses and other plants associated with tanks, villus, salt marshes and forests

Supporting Services	Sustenance of a rich biodiversity	Provides a habitat for over 412 species of fauna and 509 species of flora including nationally and globally threatened species.
	Improve productivity of the system	Salt marsh plants provide detritus for the estuarine food web Few grazers on blades (< 10% of biomass) Large detrital biomass supports broad food web Biological productivity: amount of carbon produced per m <sup>2</sup> per unit time 3 kg (ash free dry weight)/m <sup>2</sup> /year Limiting factors include nutrients, light
	Breeding grounds for freshwater and marine fish and facilitate breeding residents among birds	Mangroves associated with the estuary are important breeding grounds for many fish species and other invertebrates and salt marshes, tanks host 142 breeding residents
Regulating services	Ground water recharge	The streams, tanks, water holes scattered in the area contribute towards groundwater recharge.
	Climate regulation	Saltwater intrusion could also harm coastal fisheries. Mangroves and estuaries can withstand high salinities in the short-term.
	Protection from storm surges	Mangroves protect the coastline from erosion
Cultural services	Recreation	<i>Kala Oya</i> and mangroves associated tourism, birdwatching at salt marshes

### 2.1.3.1. Forest Ecosystems.

Few remnants of the dry mixed evergreen forests still remain within the *Gangewadiya* ESA, and most of them are not properly demarcated or protected, some examples being the riverine forests associated with *Kala Oya*, dry-mixed ever green forest patches and scrub forests. Common dominant canopy species are *Drypetes sepiaria* (Weera), *Mischodon zeylanicus* (Tammenna), *Lepisanthes senegalensis*, *Diospyros ebenum* (Ceylon Ebony), *Diospyros ovalifolia* etc. In the riparian habitats, the canopy is dominated by *Terminalia arjuna* (Kumbuk) together with some riparian species such as *Diospyros malabarica* (Malabar ebony).

Figure 11: Forest ecosystems in Gangewadiya ESA



Scrub forest associated with tank catchment

### 2.1.3.2. Coastal Ecosystems (Estuary, lagoon, Mangroves, Salt marshes and Sea grass beds)

Estuaries are formed in places where rivers enter the sea. Intermediate salinity between salt and freshwater (commonly termed "brackish water") is the main characteristic of this ecosystem. Lagoons are salt or brackish water coastal wetlands separated from the sea by a low sand bank with one or more narrow permanent or seasonal outlets to the sea. These harbor other coastal wetland types such as mangroves, mud flats and sea grass beds.

*Kala Oya* estuary supports a healthy mangrove ecosystem distributed over a wide area along the banks of *Kala Oya* and *Lunu Oya* and other small streams. This mangrove forest is the largest in the country and extends upstream about 2 km from the river mouth and mainly borders the *Wilpattu* National Park, the remaining comes under the preview of Forest Department, and this area is proposed to be gazetted as Conservation forest and considered under ESA.

Figure 12: Coastal ecosystems



Picture: Mangrove patches at river islets

As in many other mangrove ecosystems in the dry coastal regions of Sri Lanka, *Rhizophora mucronata* and *Avicennia marina* are the major constituent species. Presence of threatened species such as *Scyphiphora hydrophyllacea*, *Bruguiera cylindrica* found in good numbers in some islands also can be seen.

A few small patches of Sea grass are found on the landward coast of *Puttalam* lagoon between *Gangewadiya* and *Kalpitiya*. These are small in extent and are usually located in small sheltered sections of the coast.



Pictures: Eile Tank and Associated Coastal Wetlands and Salt marshes

Salt marshes are communities of emerged halophytic vegetation in areas that get alternately inundated and drained by tidal action. Salt marshes protect shorelines from erosion by buffering wave action and trapping sediments. They reduce flooding by slowing and absorbing rainwater and protect water quality by filtering runoff, and by metabolizing excess nutrients, and the fresh water and salinity are regulated and provide habitats for breeding residents and migratory birds. Coastal wetlands are scattered providing habitat for birds, mammals and reptiles.

## 2.2 Threats to Biodiversity in Gangewadiya ESA.

The 5.9 km stretch between the river mouth at *Gangewadiya* and the Navy point at *Eluwankulama* is endowed with rich forest cover including mangroves, riverine forest, marsh related vegetation and dry mixed forests. The primary resources associated with the estuarine environment are the fish stocks, sea grass beds and mangroves. Due to their biological value, the Forest Department is in the process of declaring 850ha of this area as the *Gangewadiya* Conservation Forest. Part of this area had already been demarcated with the support of the ESA project.

Threats to biodiversity in the ESA are not limited to the anthropogenic and natural causes within the ESA as this area is located in the very end of the KOB and the threats such as flooding occurs due to releasing of excess rainwater/spill over from upstream reservoirs including of *Rajanganaya*.

This ESA is a popular tourist destination, especially during the drier months of the year. Activities such as lagoon tours and night camping at riparian forests of Kala oya in the banks of islets fringed with mangrove areas are observed. Further, increase in the number of visitors entering the WNP through *Eluwankulama* entrance has resulted in increasing of new tourist establishments within the one-mile restricted development zone.

The number of people using the lower reaches of Kala Oya water for bathing purposes (up to *Eluwankulama* entrance of WNP) increases significantly during holiday season (April, August and December) as well as during the annual church festivals such as the St. Anthony's shrine at *Pallekanal* festivities held in mid-July. People enter this area using various routes and as a result the tree cover had depleted. Use of open fires for cooking purposes had affected the survival of Kumbuk trees. There are no sanitary facilities as well as waste management facilities in the area and irregular waste dumping has caused environmental pollution.

Figure 13: Existing tourism practices at Kala Oya River and adjacent riparian forest at Gangewadiya ESA



Presently the tourism activities associated with the estuary and the mangroves are unregulated. Further these speed boats cause riverbank erosion and destruction of fish breeding grounds while emission of fuel and waste oil from these boats cause water

pollution. A large number of boats bring tourists to this area from the *Kalpitiya* peninsula and as a result there is a tension between the two communities, namely, the tour operators of *Kalpitiya* and *Gangewadiya*.

Large herds of free roaming cattle are found within this ESA and they pose a main threat to the regeneration of forests as well as competing for fodder with other wildlife. Another threat is the haphazard sand mining taking place, mainly at *Thausamadurwa* area, which might have repercussions on the water table as well as land stability.

When considering the estuarine ecosystem of the ESA, it is reported that fish productivity has been decreased in terms of fish yield, as sea grass beds have been extensively destroyed, and critical fish habitats are no longer preserved, due to various reasons. Shrimps being the most profitable resource, are unsustainably harvested. Clearing of mangroves for fuel and timber and the use of detrimental fishing tools and practices (push nets etc.) have very often had a strong bearing on their low productivity. Mangrove bark, particularly of *Rhizophora mucronata* is extracted from mangroves for tanning fishing nets such as beach seines.

Over the past few decades, *Kala Oya* basin has undergone considerable changes in its hydrology with the diversion of water from *Mahaweli* river basin for irrigation. Shifting the Water table towards the surface, increased volume of freshwater in *Kala Oya* and declined salinity in estuarine waters are salient among changes. Increased presence of freshwater plant species such as *Typha angustifolia*, *Nymphaea sp.* and terrestrial plants such as *Diospyros sp.*, *Terminalia arjuna* and *Manilkara hexandra* among mangrove plants provide testimony to this change (Perera et al, 2013). Improvements of roads to *Gangewadiya* from *Eluwankulama* have increased the access to *Kala Oya* estuary and this is a potential threat to the survival of the mangroves.

Frequent flooding is another issue faced by *Gangewadiya* area. Further, excessive sediment loading during the rainy season is also a concern, and as a result, the estuary is becoming unsuitable for brackish water fisheries. This has caused the river mouth area to decrease from 15 feet to two feet within a 30-year span. Blocking the river mouth with sand bars affect the breeding pathways of *Modha* and other fish species. These sand beds in the river mouth has attracted sand miners since a long time and several attempts had been made over the years to dredge the resource. However, interventions by DWC and FD had prevented it. A scientific assessment will be required before any mining is undertaken.

Unsustainable harvesting of bivalves from the mangrove areas also threatens the estuary.

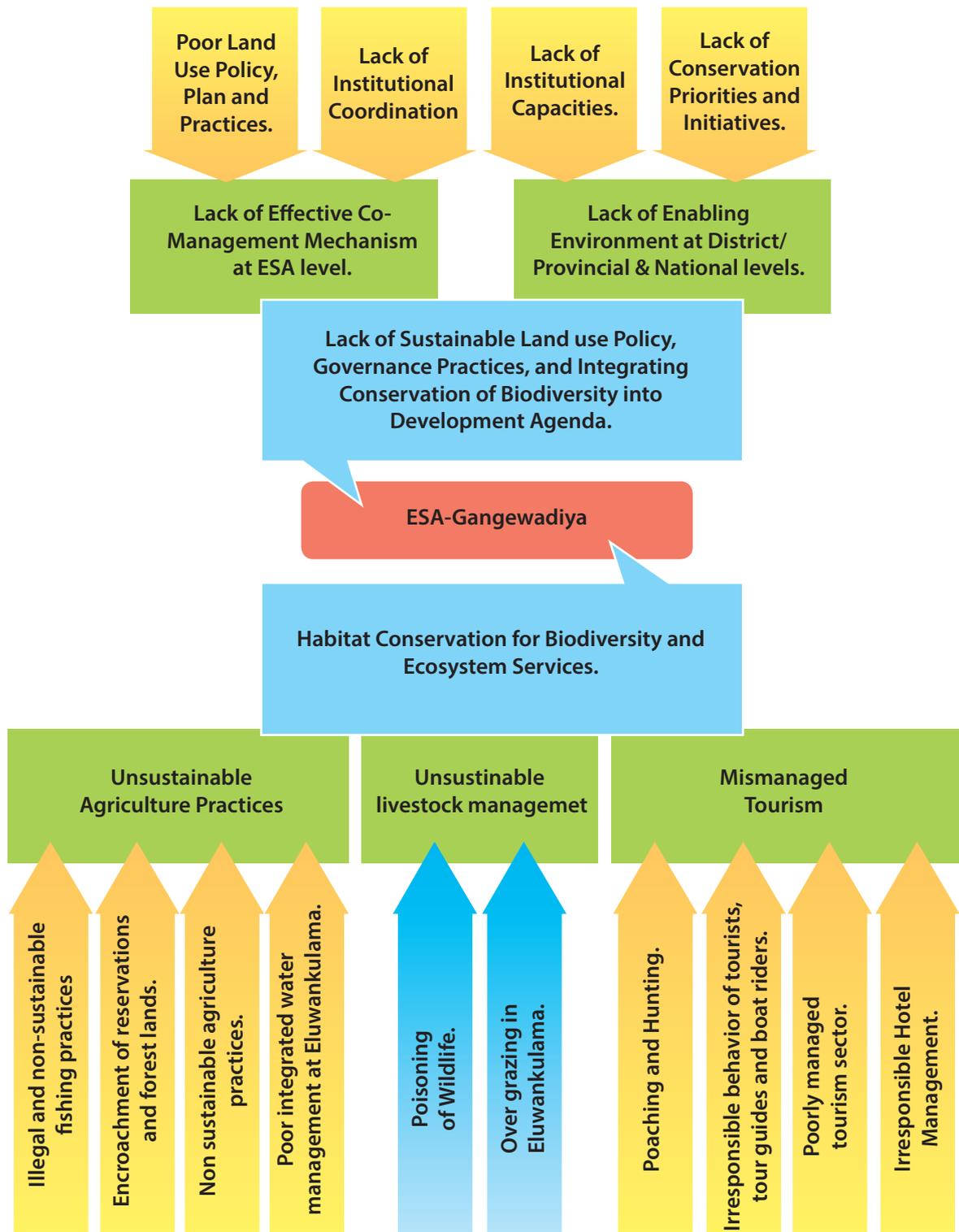
Climate change has created warmer temperatures in the coastal zone; it leads to increase in evaporation, decrease in dissolved oxygen (DO) in the water, increase of soil salinity and these could threaten plant and animal species. Species who have a short range of tolerance may become extinct. Sea-level rise has already caused saltwater intrusion into the estuary and has threatened freshwater in several parts of low-lying areas. This will shift their ecology and affect species.

Spread of exotic and invasive species which can tolerate harsh conditions results in quick population increase of generalists and this will be a threat to native fauna and flora.

Table 5: Major Threats leading to natural resource depletion in Gangewadiya ESA.

Threats/issues	Reasons
<p>Unsustainable activities (especially haphazard tourism) leading to destruction of mangroves and riverine forests in <i>Gangewadiya</i> to <i>Eluwankulama</i></p>	<ul style="list-style-type: none"> <li>• Camp fires in close proximity to Kumbuk trees and trampling of seedlings,</li> <li>• Use of high speed boats damage the river and estuarine banks, while disturbing the breeding areas of fish,</li> <li>• Haphazard disposal of solid waste,</li> <li>• Noise pollution (music with high volumes),</li> <li>• Poaching of wildlife and collection of wild plants,</li> <li>• Illegal constructions such as hotels at river banks,</li> <li>• Releasing of oil and other chemicals to <i>Kala Oya</i> during car washing,</li> <li>• Haphazard sand mining in <i>Thausamaduwa</i> area,</li> <li>• Large cattle herds affecting the forest regeneration.</li> </ul>
<p>Depletion of Puttalam Estuarine biodiversity</p>	<ul style="list-style-type: none"> <li>• Use of illegal fishing gears and practices,</li> <li>• Heavy sedimentation and sandbar development disrupting the hydrological patterns and blocking the movement of fish species,</li> <li>• Mangrove destruction due to increased fresh water inputs and climate change related issues,</li> <li>• Algal bloom formation due to heavy agrochemical usage,</li> <li>• Spread of aquatic weeds,</li> <li>• Haphazard disposal of by-catch leading to pollution (especially dead fish and shells are dumped beside the estuary).</li> </ul>
<p>Accelerating Human Wildlife conflict, especially Human-Elephant Conflict</p>	<ul style="list-style-type: none"> <li>• Loss of the migratory corridors and elephant habitats due to deforestation and encroachment of forests</li> <li>• Haphazard construction of elephant proof trenches and electric fences around privately owned large plantations blocking elephant migration routes.</li> <li>• Unsustainable cattle management. Over 2000 stray cattle are released to existing PAs for feeding purposes leading to depletion of fodder and water for wildlife.</li> <li>• Lack of natural predators leading to increase in species such as Peacocks leading to crop destruction.</li> </ul>
<p>Climate change related floods and droughts and unplanned upstream development activities</p>	<ul style="list-style-type: none"> <li>• Extensive drought period leading to drying up of tanks, villus and mudflats,</li> <li>• Uncontrolled spill of flood water from upstream, especially <i>Rajanganaya</i> Reservoir leading to flooding,</li> <li>• Clearing of natural forest cover for agriculture and settlements leading to increased soil erosion leading to siltation of the river mouth and the estuary,</li> <li>• Increased inputs of solid waste as well as agrochemicals from settlements and agricultural lands,</li> <li>• Saltwater intrusion into the estuary</li> </ul>
<p>Lack of institutional collaboration and knowledge base.</p>	<ul style="list-style-type: none"> <li>• Ad hoc development initiatives implemented by different government stakeholders and political interferences in land issues.</li> <li>• Lack of awareness among the policy makers and the local communities on the importance of biodiversity into land use planning.</li> <li>• No baseline information is available for management planning and monitoring.</li> </ul>

Figure 14: Interlinked Anthropogenic, Natural and Systemic threats to ESA Gangewadiya



### 3. Co-Management Plan for Enrichment of ESA

#### 3.1. Goal and Strategic Interventions for Management of Biodiversity in *Gangewadiya* ESA

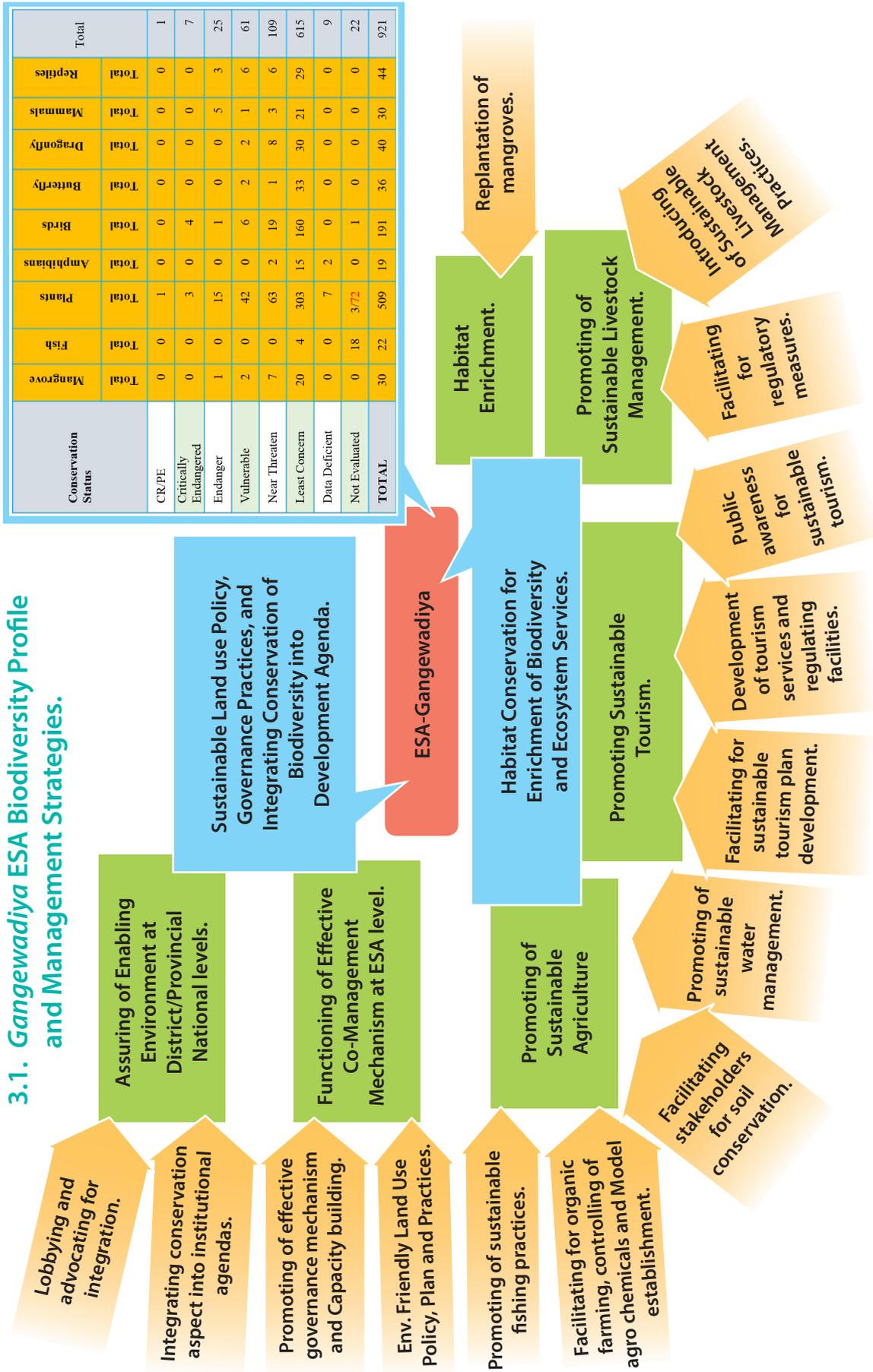
The co-management plan is implemented with the goal of introducing an enhanced governance mechanism on conservation of biodiversity through sustainable natural resources management for Conservation of biodiversity and ecosystem services in *Gangewadiya* Environmentally Sensitive Area. It is expected to achieve through two outcomes: (i) Sustainable Land use Policy, Effective Governance Practices, and biodiversity conservation aspect integrated Development Agenda, and (ii) Enhanced Biodiversity and Ecosystem Services of *Gangewadiya* Environmentally Sensitive Area through Habitat Conservation. There are five interventions under these two outcomes.

Table 6: Strategic interventions for *Gangewadiya* ESA management

No.	Level	Description	Indicators
	Goal	Enhanced biodiversity and ecosystem services in <i>Gangewadiya</i> Environmentally Sensitive Area that contributes to sustainable and healthy living condition of people and planet.	<ul style="list-style-type: none"> <li>• Extent of improvement in habitat in <i>Gangewadiya</i>.</li> <li>• Extent of impact of the especial measures taken to conserve threatened species.</li> <li>• Extent of effective contribution of stakeholders.</li> </ul>
1.0	Outcome 1	Sustainable Land use Policy, Effective Governance Practices, and biodiversity conservation aspect integrated Development Agenda.	<ul style="list-style-type: none"> <li>• Extent of availability, integration and implementation of area based – biodiversity friendly land use policy, plan and practices.</li> <li>• Amount of budgetary allocations made for conservation of biodiversity in ESA by stakeholders.</li> </ul>
1.1	Strategic Intervention 1	Assuring of Enabling Environment at divisional and District /Provincial/ National levels.	<ul style="list-style-type: none"> <li>• Numbers of forums/ decisions/plans at District/ Provincial /National levels that considered and taken ESA <i>Gangewadiya</i> favorable decisions.</li> <li>• Amount of budgetary allocations made by the District/Provincial / National level agencies for conservation of ESA <i>Gangewadiya</i>.</li> </ul>

1.2	Strategic Intervention 2	Enhancing Effectiveness of Co-Management Mechanism at ESA level.	<ul style="list-style-type: none"> <li>• No. of relevant officials capacitated on ESA co-management,</li> <li>• Identification and declaration of the ESA <i>Gangewadiya</i> by the co-management authorities,</li> <li>• Extent of integration of the interventions of ESA co-management plan into the sectoral/ institutional plans.</li> </ul>
2.0	Outcome 2	Enhanced Biodiversity and Ecosystem Services of <i>Gangewadiya</i> Environmentally Sensitive Area through Habitat Conservation.	<ul style="list-style-type: none"> <li>• Extent of species found at baseline survey remain healthy.</li> <li>• Degree of reduction of habitat destruction and degradation,</li> <li>• Extent of control of IAS.</li> </ul>
2.1	Strategic Intervention 1	Promoting of Sustainable Agriculture to mitigate agriculture related threats.	<ul style="list-style-type: none"> <li>• Percentage of ESA adjacent agriculture land transformed for sustainable agriculture.</li> <li>• Degree of reduction of encroachment, forest fire and illegal tree felling,</li> </ul>
2.2	Strategic Intervention 2	Promoting of Sustainable Tourism in and around <i>Gangewadiya</i> ESA for maintaining healthy forest ecosystems and sustainable livelihoods.	<ul style="list-style-type: none"> <li>• Availability and acceptability of Sustainable Tourism Plan for <i>Gangewadiya</i> ESA,</li> <li>• Extent of implementation of sustainable tourism plan <i>Gangewadiya</i>.</li> </ul>
2.3	Strategic Intervention 3	Promoting of Sustainable Livestock Management to safeguard the ESA habitats.	<ul style="list-style-type: none"> <li>• Availability of area based sustainable livestock management plan.</li> <li>• Extent of implementation of sustainable livestock management plan,</li> <li>• Degree of reduction of poaching,</li> <li>• Degree of improvement of livestock induced income of beneficiary families,</li> </ul>
2.4	Strategic Intervention 4	Facilitating for stakeholders for enrichment of habitat in ESA.	<ul style="list-style-type: none"> <li>• Number of threatened species conserved under especial conservation measures,</li> </ul>

Figure 15: Biodiversity profile and management strategies at Gangewadiya ESA



### 3.2. Proposed Policy Framework for Conservation of Biodiversity in Gangewadiya ESA.

1. In alignment with the sustainable development principle, an environmentally sound, community centered and futuristic development-oriented divisional land use Policy shall be developed in consultation with relevant stakeholders and adhered, and land use zonation will be done and practiced.
2. In the zonation, due priority shall be given to maintain the minimum land extent of forest to maintain the environmental and biodiversity values, buffer zones, reservations, ecological connectivity and agriculture areas - including traditional Chena cultivation as appropriate and considering the resource equality and intergenerational equality.
3. Acknowledging the value and the responsibility of wise use of natural resources management for ecological, environmental and economic benefits for all, including the future generation, land utilization zones connected to the *Gangewadiya* ESA shall be followed as in Table 7.

Table 7: Proposed Land Use Utilization Zones.

Zone	Area	Allowed Activities	Activities that should be prohibited
<b>Multiple use</b>	Settlements, industrial and agricultural area	Settlements, sustainable agriculture, mining, other sustainable/ green industries	Expansion or opening of new settlements or agricultural areas, or construction of any structures except through proper approvals as per existing legislations
<b>Recreational/ Tourism potential</b>	Estuary and river mouth and other selected locations for camping /bathing	Subject to carrying capacity: Boat rides, trekking, bird watching, elephant watching, bathing, camping, Japanese- forest bathing	Littering, noise, poaching, bathing and cooking at unauthorized locations, breaking empty liquor bottles leaving a mess Cutting/ Felling/ setting fire to threatened tree species, collecting threatened plants and body parts of all fauna species
<b>Requiring Strict protection</b>	Selected sites of Mangroves, Riverine forests, estuary	Scientific research, Education and awareness, sustainable tourism with permits	Cutting/ felling trees, encroachment for agriculture or housing, release of cattle, poaching, entrance without a valid permit
<b>Special land use zones</b>	Tank and villu reservations, restricted development zone of WNP, coastal zone, Environmental Sensitive Areas identified by NEA under EIA regulations	Sustainable extraction of Non Timber Forest Products (NTFP), permitted constructions and activities	Encroachment, illegal construction, illegal fishing practices
<b>Human-Elephant co-existence zones</b>	Identified zones of elephant existence including migration	Activities that reduce Human Elephant Conflict (HEC) including selected type of agricultural activities	Haphazard constructions including elephant ditches, forest clearing

4. In allocation of land for individuals for agriculture purposes, it will adhere strictly to the government land regulations; especially on maximum land area to ensure equitable access to natural resources for all.
5. Priority will be given for demarcation of reservations of all watersheds: rivers, reservoirs, villu, etc. as a strategy for threat mitigation, and participatory conservation activities will be implemented.
6. Conditions will be imposed over the government land given on permit/lease for agriculture purposes to maintain at least 10 % of the land as natural/plantation forest in each land given.
7. Area based sustainable water and soil management regulations shall be developed in consultation with the relevant authorities and imposed over the government land given on permit/lease for agriculture purposes.
8. Sustainable agriculture practices shall be promoted, facilitated and allowed and over-usage of agrochemicals will be regulated through increasing of community awareness and accountability, promoting of good agriculture practices, effective law enforcement, implementing minimum conditions by the banking services, effective monitoring, etc.
9. Sustainable livestock management shall be promoted, facilitated and allowed through zonation, passing of by-laws through the local government authority, and capacitating of government institutions for increasing effectiveness of regulatory measures.
10. A Farmers' Information System will be developed, with linkages to government incentive/assistance schemes, to manage cultivation, usage of agrochemicals, market facilities, etc.
11. Promoting of Sustainable Tourism in and around *Gangewadiya* ESA for maintaining healthy forest ecosystems and sustainable livelihoods shall be done through developing and managing of a Sustainable Tourism Management Plan for *Gangewadiya*, and local government by-laws shall be passed in enforcing sustainable tourism in the area.
12. Renewable energy and integrated water management, including rainwater harvesting, will be promoted, facilitated and applied in domestic and industrial purposes. In supporting integrated water management, appropriate by-laws shall be passed by the local government authority.
13. Waste management will be given high priority at all spheres: domestic, institutional and industrial, and effective by-laws shall be passed by the local government authority, and domestic, institutional and industrial waste management shall be promoted and facilitated innovatively.

## 4. Project Log frame

Table 8: Log frame on project implementation

NO	Description	ESA Budget							Key Agencies	Time Line -2020							
		Up to 2020	Total Budget	Community Contribution	Private Sector Contribution	Government Contribution	ESA Project	Total		May	June	July	Aug	Sep	Oct	Nov	Dec
1	Promoting Sustainable Tourism.																
1.1.	Facilitating for sustainable tourism plan development. (Stakeholder consultation, and divisional sustainable tourism plan development) (PI see the Wanathavilluwa ESA Plan)	-	-	75,000.00	250,000.00	350,000.00	1,500,000.00	2,175,000.00	LMC/DS/PS/ FD/DWC/ NWT/SLIDA								
1.2.	Facilitating to introduce regulations including local authority by – laws.	-	-	10,000.00	20,000.00	50,000.00	50,000.00	130,000.00	LMC/PS								
1.3.	Eluwankulama Entry point Infrastructure facility establishment (Construction of entry point with an office, cooking places, water and sanitary facilities, access road, and Waste management)	3,502,017.00	3,502,017.00	50,000.00	50,000.00	1,000,000.00	4,226,146.08	5,326,146.08	PS/LMC/ DWC/ SLNAVY/FD								
1.4.	Gangewadiya Monitoring point & Infrastructure facility establishment (Construction of entry point, office, information center, water and sanitary facilities, access road, and Waste management)		-	50,000.00	150,000.00	3,000,000.00	5,227,917.72	8,427,917.72	PS/LMC/ DWC/ SLNAVY/FD								
1.5.	Introducing of Eco-friendly Boat service and regulating of gasoline boats. (Introducing of renewable energy boats and fix term conditions for transforming to renewable energy boats.)		-	100,000.00	250,000.00	50,000.00	1,000,000.00	1,400,000.00	PS/LMC/ DWC/ SLNAVY/FD								
1.6.	Displaying of Bill boards (Displaying BD profile boards and Regulation Boards at ESA entry points)		-	50,000.00	25,000.00	100,000.00	250,000.00	425,000.00									
1.7.	Preparing of leaflet/ posters on biodiversity profile of the ESA and conditions for tourism.		-	75,000.00	100,000.00	275,000.00	500,000.00	950,000.00									

NO	Description	ESA Budget							Key Agencies	Time Line -2020								
		Up to 2020	Total Budget	Community Contribution	Private Sector Contribution	Government Contribution	ESA Project	Total		May	June	July	Aug	Sep	Oct	Nov	Dec	
1.7.a	Enrichment of BD in ESA		-	100,000.00	50,000.00	500,000.00	0.00	650,000.00	SLNAVY/ DWC/MEPA/ FD/LMC/ PS/CO.									
1.7.b	Mangrove nursery		-	75,000.00	100,000.00	200,000.00	250,000.00	625,000.00										
1.7.c	Mangrove Replantation		-	50,000.00	75,000.00	150,000.00	75,000.00	350,000.00										
1.7.d	River bank conservation activity (erosion controlling and habitat conservation)		-	75,000.00	200,000.00	150,000.00	150,000.00	575,000.00										
1.7.e	Studying and initiating precautionary actions against harmful IAS and Algae		-	25,000.00	25,000.00	200,000.00	250,000.00	500,000.00										
1.7.f	Re-planting native trees along the Eluwankulama-Gangewadiya road (Mee, Munamal, Madan, Magul karanda, etc.)		-	100,000.00	150,000.00	200,000.00	75,000.00	525,000.00										
2	Promoting of Sustainable Agriculture																	
2.1.	Discouraging use of harmful fishing gears and nets in ESA area for conservation of fish breeding grounds/ habitat		-	100,000.00	20,000.00	200,000.00	150,000.00	470,000.00	NARA/ NAQDA/ Fishery Dep.									
2.1.a	Coordinate further research on Conservation Status of Not Evaluated, Indigenous aquatic fauna which are having economical demand.		-	50,000.00	25,000.00	175,000.00	250,000.00	500,000.00										
2.2.	Facilitating for organic farming, controlling of agro-chemicals and Model establishment.		-	200,000.00	100,000.00	250,000.00	500,000.00	1,050,000.00	DAD/ NWPDoA will implement and provide technical assistance ,M&E									
2.2.a	Introducing and establishing of composting paddy farming models in Eluwankulama.		-	200,000.00	75,000.00	275,000.00	0.00	550,000.00										
2.2.b	Introducing Drought/ Flood resilient and high yield paddy seed varieties.		-	250,000.00	100,000.00	350,000.00	500,000.00	1,200,000.00										
2.2.c	Introducing Seed bank concept and initiate 20 farmers seed bank.		-	100,000.00	150,000.00	300,000.00	500,000.00	1,050,000.00										

NO	Description	ESA Budget							Key Agencies	Time Line -2020								
		Up to 2020	Total Budget	Community Contribution	Private Sector Contribution	Government Contribution	ESA Project	Total		May	June	July	Aug	Sep	Oct	Nov	Dec	
2.2.d	Introducing and promoting of water management technologies in 650 acers of paddy farming at Eluwankulama			300,000.00	100,000.00	400,000.00	2,500,000.00	3,300,000.00	DAD/ NWPDa will implement and provide technical assistance ,M&E									
2.2.e	Conduct 2 School Awareness programs for Eluwankulama Schools on Living in ESA area			-	-	60,000.00	50,000.00	110,000.00										
2.2.f	Replicate Agro-chemical controlling model for Morandanveeli area and refresher program Eluwankulama area			100,000.00	50,000.00	150,000.00	250,000.00	550,000.00										
2.3.	Facilitating for 100 farmers to undertake soil quality based agriculture practices.			100,000.00	50,000.00	150,000.00	200,000.00	500,000.00	DAD/ NWPDa will implement and provide technical assistance ,M&E									
2.3.a	Soil testing at Eluwankulama paddy land, (100 acers)			50,000.00	10,000.00	150,000.00	120,000.00	330,000.00										
2.3.b	Introducing chemical/ fertilizer usage guide or monitoring system.			50,000.00	75,000.00	75,000.00	150,000.00	350,000.00										
2.3.c	Introducing economically viable Home garden models at Eluwankulama			150,000.00	25,000.00	100,000.00	500,000.00	775,000.00										
2.4.	Public awareness raising and sensitization on the conservation of biodiversity of ESA and agriculture. ( leaflets / posters)			25,000.00	25,000.00	75,000.00	250,000.00	375,000.00	DAD/ NWPDa will implement the campaign through Farmer organization									
2.5.	Re-Planting of Kumbuk/ Mee tree belt at the border of Eluwankulama paddy lands as a line to electric fence.			50,000.00	20,000.00	50,000.00	75,000.00	195,000.00	DAD/ NWPDa will implement ,coordinate and Monitoring the events									

NO	Description	ESA Budget							Key Agencies	Time Line -2020											
		Up to 2020	Total Budget	Community Contribution	Private Sector Contribution	Government Contribution	ESA Project	Total		May	June	July	Aug	Sep	Oct	Nov	Dec				
3	Promoting of Sustainable Livestock Management																				
3.1.	Facilitating for regulatory measures.			100,000.00	100,000.00	175,000.00	500,000.00	875,000.00	FD/LMC/ DWC/ Vet. Dep/PS												
3.1.a	Developing an area-based land use policy and plan on sustainable Livestock management to protect ESA areas.			25,000.00	25,000.00	300,000.00	500,000.00	850,000.00													
3.1.b	Introducing of regulations including local government authority by-laws related to Livestock management in the area.			50,000.00	50,000.00	200,000.00	250,000.00	550,000.00													
3.2.	Introducing of ESA friendly, low cost and productive Livestock Management.			500,000.00	150,000.00	1,000,000.00	1,500,000.00	3,150,000.00	FD/LMC/ DWC/ Vet. Dep/PS												
3.2. a	Conducting of Cattle farmers' survey and creating of farmers'/ land data base.			50,000.00	25,000.00	150,000.00	0.00	225,000.00													
3.2. b	Facilitating for transforming to ESA-friendly and productive cattle farming.			30,000.00	50,000.00	175,000.00	0.00	255,000.00													
	<b>Total</b>		3,502,017.00	3,315,000.00	2,670,000.00	10,985,000.00	22,299,063.80	39,269,063.80													

## Annexures

### Annexure 1

#### Details of stakeholder consultations and community consultations.



Empowered lives.  
Resilient nations.

### Enhancing Biodiversity Conservation and Sustenance of Ecosystem Services in Environmentally Sensitive Areas (ESA)

#### Summary information on Stakeholder Consultation:

Biodiversity Cluster (Terrestrial & Water)  
Industrial Development Cluster & Agriculture Cluster  
Regional Development and Disaster Management

#	Institution	Clusters and Workshop Date		
		Biodiversity cluster Terrestrial & Water 08th August 2019	Industrial Development & Agriculture 15th August 2019	Regional Development and Proposal Development 05th September 2019
1	District Planning Secretariat	Yes	Yes	Yes
2	Forest Department	Yes	Yes	Yes
3	Department of Wildlife Conservation	Yes	Yes	Yes
4	Central Environment Authority	Yes	Yes	Yes
5	District Disaster Management Co. Unit			
6	NW Provincial Agriculture Department	Yes	Yes	
7	District Agriculture Department		Yes	
8	Agrarian Service Department - DO	Yes	Yes	
9	Archaeology Department	Yes	Yes	
10	Police -Wanathavilluwa	Yes	Yes	Yes
11	Geological Survey Mines Bureau	Yes	Yes	

12	Local Government Authority (Pradesiya Sabhawa Wanathavilluwa) - 02	Yes	Yes	Yes
13	Department of Community Water Supply Services	Yes		
14	Officers of Community based water projects (Wijaya Pura North CBO)	Yes		
15	Inland Fisheries Society Leaders	Yes	Yes	Yes
16	Irrigation Department (Provincial and National), AD	Yes	Yes	Yes
17	Fisheries Department - Puttalam	Yes		Yes
18	NAVY- Gangewadiya	Yes		Yes
19	NAQDA - Puttalam	Yes		
20	NWS & DB - Puttalam	Yes		Yes
21	MEPA	Yes		
22	Coast Conservation Department	Yes	Yes	Yes
23	NARA			
24	DS office Wanathawilluwa - ADP and 06 EDOs	Yes	Yes	Yes
25	Ministry of Mahaweli Development and Environment	Yes	Yes	
26	Tourism Sector (Tour Boat Association/ Thambapanni Hotel Association)	Yes	Yes	
27	Thambapanni Landowners' Association	Yes	Yes	
28	CBO-NGO participation	Yes		

### Community Consultation Program and Participation Summary List

#	GN Division	Conducted Date	Total Participation	Men	Women
1	635- Parana Eluwankulama	18th July 2019	56	24	32
2	635/3- Serakkuliya	18th July 2019	43	18	25
3	635/1- Aluth Eluwankulama	19th July 2019	38	9	29
4	636/6- Mangalapura	19th July 2019	41	11	30
5	636/5- Bandaranayakapura	19th July 2019	34	16	18
6	635/2- Ralmaduwa	19th July 2019	30	12	28

## Annexure 2

### List of reported Endemic Species in Gangewadiya ESA.

GND | Sublocation | Scientific Name | English name | Sinhala Name | Tamil Name | Conservation Status

GND	Sublocation	Scientific Name	English Name	Sinhala Name	Tamil Name	Conservation Status
<b>Mammal 01</b>						
Aluth Eluwankulama	Eile Wewa Area	<i>Semnopithecus vetulus</i> (Erxleben, 1777)	Purple-faced leaf monkey	කළු වළුරා	ஊதா முகம் கொண்ட இலை குரங்கு	Endangered
Parana Eluwankulama	Eluwankulama Area					
<b>Plant 04</b>						
Aluth Eluwankulama	Eile Wewa Area	<i>Abutilon subumbellatum Philcox</i>				Endangered
Parana Eluwankulama	Eluwankulama Area	<i>Achyranthes diandra Roxb.</i>				Endangered
		<i>Dioscorea trimenii Prain &amp; Bukill</i>		දෙහිය අල	சுண்ணாம்பு உருளைக்கிழங்கு	Endangered
		<i>Diyaminauclea zeylanica (Hook.f.) Ridsdale</i>		දිය මී	நீர் எருமை	Endangered
<b>Reptile 02</b>						
Aluth Eluwankulama	Eile Wewa Area	<i>Eutropis madaraszi (Méhely, 1897)</i>	Spotted skink	පුල්ලි නිකනල	புள்ளியிடப்பட்ட தேரால்	Vulnerable
Aluth Eluwankulama	Eile Wewa Area	<i>Cyrtodactylus triedrus (Günther, 1864)</i>	Spotted bowfinger gecko	පුල්ලි වකඳියනුන	புள்ளியிடப்பட்ட மடிந்த விரல்	Vulnerable
<b>Plant 05</b>						
Aluth Eluwankulama	Eile Wewa Area	<i>Chionanthus albidiflorus Thwaites</i>		අලුලි කොරකන, තක්කඩ ගස්	புளிப்பு கொற்கை, முரட்டு மரங்கள்	Vulnerable
Parana Eluwankulama	Eluwankulama Area	<i>Dendrophthoe ligulatus (Thwaites) Tiegh.</i>				Vulnerable
		<i>Painteria nitida (Vahl) Kosterm.</i>				Vulnerable
		<i>Rhinacanthus flavovirens Amaras. &amp; Wijes.</i>		අනිට්ට	வேறு	Vulnerable
		<i>Triumfetta glabra Spreng.</i>				Vulnerable

GND	Sublocation	Scientific Name	English Name	Sinhala Name	Tamil Name	Conservation Status
<b>Amphibians 01</b>						
Aluth Eluwankulama Parana Eluwankulama	Eile Wewa Area Eluwankulama Area	<i>Duttaphrynus atukoralei</i> (Bogert & Senanayake, 1966)	Atukorale's dwarf toad	අතුකෝරලගේ කුරු ගෙමිඩා	குள்ள தேரை	Near Threaten
<b>Bird 01</b>						
Aluth Eluwankulama Parana Eluwankulama	Eile Wewa Area Eluwankulama Area	<i>Galloperdix bicalcarata</i> (J. R. Forster, 1781)	Sri Lanka Spur fowl	ශ්‍රී ලංකා හඬනේ කුකුළා		Near Threaten
<b>Plant 05</b>						
Aluth Eluwankulama	Eile Wewa Area	<i>Dicliptera neesii</i> (Trimen) L.H. Cramer				Near Threaten
Parana Eluwankulama	Eluwankulama Area	<i>Drypetes gardneri</i> (Thwaites) Pax & Hoffm.		ගල් වීර, අට වීර, යකිල්ල	கல் வீர மரம், யக்கில்த	Near Threaten
		<i>Murraya gleniei</i> Thwaites ex Oliv.				Near Threaten
		<i>Pavetta gleniei</i> Thwaites ex Hook.f.		ගල් හැඹැරුල්ල, වීළ තෙරන	கல் குவியல், மாட்டு சாணம்	Near Threaten
		<i>Strychnos benthami</i> C.B. Clarke				Near Threaten
<b>Reptile 01</b>						
Parana Eluvankulama	Eluwankulama Area	<i>Calotes ceylonensis</i> Müller, 1887	Painted lip lizard	තොල වීසිතුරු කටුසීසා	வரணம் பூசப்பட்ட லிப் பல்லி	Near Threaten
<b>Amphibians 02</b>						
Aluth Eluwankulama	Eile Wewa Area	<i>Hylarana serendipi</i> (Biju et al., 2014)				Least Concern
Parana Eluwankulama	Eluwankulama Area	<i>Polypedates cruciger</i> : Blyth, 1852	Common hour-glass tree frog	සුලභ පහිඹු ගස් මැඩියා		Least Concern

GND	Sublocation	Scientific Name	English Name	Sinhala Name	Tamil Name	Conservation Status
<b>Birds 07</b>						
Aluth Eluwankulama	Eile Wewa Area	<i>Gallus lafayetii Lesson, 1831</i>	Sri Lanka Junglefowl	ශ්‍රී ලංකා වළිකුකුළා	இலங்கை காட்டு கோழி	Least Concern
Parana Eluwankulama	Eluwankulama Area	<i>Megalaima rubricapillus (Gmelin, 1788)</i>	Sri Lanka Small Barbet	ශ්‍රී ලංකා මල් කොට්ටෝරුවා, ශ්‍රී ලංකා හීන් කොට්ටෝරුවා	இலங்கை சிறிய பார்பெட்	Least Concern
		<i>Ocyrcos gingalensis (Shaw, 1811)</i>	Sri Lanka Grey Hornbill	ශ්‍රී ලංකා අළු කෂදැන්නා	இலங்கை சாம்பல் ஹார்ன்பில்	Least Concern
		<i>Pellorneum fuscocapillus (Blyth, 1849)</i>	Sri Lanka Brown-capped Babbler	ශ්‍රී ලංකා හීස බෙර දෙමලුවා	இலங்கை பிரவுன்-மூடிய பாப்லர்	Least Concern
		<i>Pycnonotus melanicterus (Gmelin, 1789)</i>	Sri Lanka Black-capped Bulbul	ශ්‍රී ලංකා හීස කළු කොණ්ඩියා	இலங்கை கருப்பு மூடிய புல்பூல்	Least Concern
		<i>Tephrodornis affinis Blyth, 1847</i>	Sri Lanka Woodshrike	ශ්‍රී ලංකා වන සරට්තා	இலங்கை மரம்கொத்தி	Least Concern
		<i>Treron pompadora (Gmelin, 1789)</i>	Sri Lanka Green-pigeon	ශ්‍රී ලංකා බටගොයා	பச்சை புறா	Least Concern
<b>Dragonfly 02</b>						
Aluth Eluwankulama	Eile Wewa Area	<i>Prodasineura sita (Kirby, 1894)</i>	Stripe-headed Threadtail	හීස් ඉර් ඉරටුකූරා	கோடுள்ள வாலுடைய வகை	Least Concern
Parana Eluwankulama	Eluwankulama Area	<i>Pseudagrion rubriceps Selys, 1876</i>	Orange-faced Sprite		செம்மஞ்சள் முகமுடைய பூச்சிகள்	Least Concern
<b>Mammals 02</b>						
Aluth Eluwankulama	Eile Wewa Area	<i>Macaca sinica (Linnaeus, 1771)</i>	Sri Lanka toque monkey	ශ්‍රී ලංකා රීළුවා	தொகுயி குரங்கு	Least Concern
Parana Eluwankulama	Eluwankulama Area	<i>Moschiola meminna (Erxleben, 1777)</i>	Sri Lanka mouse-deer	ශ්‍රී ලංකා සුදු හිත් මීමින්නා	இலங்கை சுட்டி-மான்	Least Concern

GND	Sublocation	Scientific Name	English Name	Sinhala Name	Tamil Name	Conservation Status
<b>Plant 12</b>						
Aluth Eluwankulama	Eile Wewa Area	<i>Cassine balae Kosterm.</i>		නෙරළු	நீர்ப்பாசனம்	Least Concern
Parana Eluvankulama	Eluwankulama Area	<i>Derris parviflora Benth.</i>		කල වැල්ල, සුදු කල වැල්	கறுக்கப்பட்ட கொடிகள், வெண்மையாக்கப்பட்ட கொடிகள்	Least Concern
		<i>Diplodiscus verrucosus (Thwaites) Kosterm.</i>		දික්වැන්න, දික් අඳව්ද		Least Concern
		<i>Hydnocarpus venenata Gaertn.</i>		මකුළු, මකුල, මකුල්ල, මකිරිය	சிலந்தி	Least Concern
		<i>Mallotus eriocarpus (Thwaites) Müll. Arg.</i>		බුළු පෙත්ත, වැල් කැප්පෙටියා		Least Concern
		<i>Memecylon capitellatum L.</i>		දැදි කහ, දොඩන් කහ, වැල් කහ, වැලි කහ, ඉදුල් ගහ, අඳුන්, කායම්	மஞ்சள், கொடியின் மஞ்சள், மணல் மஞ்சள், ஐடல் மரம், எறும்பு, உடல், தோடம்பழ மரம்	Least Concern
		<i>Micromelum minutum Wight &amp; Arn.</i>		වල් කරපිංචා	காட்டு கறிவேப்பில்லை	Least Concern
		<i>Murdannia spirata (L.) G.Brückn.</i>				Least Concern
		<i>Premna procumbens Moon</i>		ලේ කොළ පළා	உள்ளூர் இன இலைவகை	Least Concern
		<i>Rhinacanthus polonnaruwensis L.H. Cramer</i>				Least Concern
		<i>Uvaria sphenocarpa Hook. f. &amp; Thomson</i>				Least Concern
<i>Vernonia zeylanicum (L.) Less.</i>		හීන් බෝවිටිය, පුපුල, වල් පුපුල,	மெல்லிய படகு,	Least Concern		

GND	Sublocation	Scientific Name	English Name	Sinhala Name	Tamil Name	Conservation Status
<b>Reptiles 05</b>						
Aluth Eluwankulama Parana Eluwankulama	Eile Wewa Area Eluwankulama Area	<i>Hemidactylus depressus</i> Gray, 1842	Kandyan gecko	කේලිගෙ නූනා		Least Concern
Aluth Eluwankulama	Eile Wewa Area	<i>Hemidactylus lankae</i> Deraniyagala, 1953	Termite hill gecko	නුමිස් නූනා	மலை நரி	Least Concern
Aluth Eluwankulama Parana Eluwankulama	Eile Wewa Area Eluwankulama Area	<i>Lissemys ceylonensis</i> (Gray, 1856)	Flapshell turtle	කිරි ඉඩ්ඩා	பால் தவளை	Least Concern
Aluth Eluwankulama	Eile Wewa Area	<i>Rhinophis oxyrhynchus</i> (Schneider, 1801)	Schneider's earth snake	උල් තුඩුල්ලා	பூமி பாம்பு	
Aluth Eluwankulama	Eile Wewa Area	<i>Xenochrophis cf. piscator</i> (Schneider, 1799)	Checkered Keelback	දියබරියා		Least Concern

**DD01  
(Amphibians 1)**

**NE 01 (Bird 1)  
Summary sheet**

Endemic Species Vs Conservation Status Summary											
		Mangroves	Fish	Plants	Amphibians	Birds	Butterfly	Dragonfly	Mammals	Reptiles	Total
Endemic Species 53 (Plants 26 + Amphibians 4 + Birds 9 + Dragonfly 2 + Mammals 3 + Reptiles 9)	CR/PE	0	0	0	0	0	0	0	0	0	0
	Critically Endangered	0	0	0	0	0	0	0	0	0	0
EN 5 (Mammal 1 + Plant 4)	Endanger	0	0	4	0	0	0	0	1	0	5
VU 7 ( Plant 5 + Reptile 2)	Vulnerable	0	0	5	0	0	0	0	0	2	7
NT 8 ( Amphibians 1 + Bird 1 + Plant 5 + Reptile 1 )	Near Threaten	0	0	5	1	1	0	0	0	1	8
LC 31 ( Amphibians 2 + Birds 7 + Dragonfly 2 + Mammals 2 + Plant 12 + Reptiles 6)	Least Concern	0	0	12	2	7	0	2	2	6	31
DD1 (Amphibians 1)	Data Deficient	0	0	0	1	0	0	0	0	0	1
NE 1 (Bird 1)	Not Evaluated	0	0	0	0	1	0	0	0	0	1
	TOTAL	0	0	26	4	9	0	2	3	9	53

## Annexure 3

### Biological wealth of Gangewadiya ESA

Conservation Status		CR/PE	Critically Endangered	Endanger	Vulnerable	Near Threatened	Least Concern	Data Deficient	Not Evaluated		TOTAL
Mangrove	Endemic	0	0	0	0	0	0	0	0		0
	Indigenous	0	0	0	0	0	0	0	0		0
	Sps Status Not Given	0	0	1	2	7	20	0	0		30
Total		0	0	1	2	7	20	0	0	0	30
Fish	Endemic	0	0	0	0	0	0	0	0		0
	Indigenous	0	0	0	0	0	0	0	0		0
	Sps Status Not Given	0	0	0	0	0	0	4	18		22
Total		0	0	0	0	0	0	4	18	0	22
Plants	Endemic	0	0	4	5	5	12	0	0		26
	Indigenous	1	3	11	37	58	291	7	3		411
	Sps Status Not Given	0	0	0	0	0	0	0	0		0
	Exotic								0	72	72
Total		1	3	15	42	63	303	7	3	72	509
Amphibians	Endemic	0	0	0	0	1	2	1	0		4
	Indigenous	0	0	0	0	1	13	1	0		15
	Sps Status Not Given	0	0	0	0	0	0	0	0		0
Total		0	0	0	0	2	15	2	0	0	19
Birds	Endemic	0	0	0	0	1	7	0	1		9
	Indigenous	0	0	0	0	0	0	0	0		0
	Migratory	0	0	0	0	2	37	0	0		39
	BR	0	4	1	6	16	115	0	0		142
	Sps Status Not Given	0	0	0	0	0	1	0	0		1
Total		0	4	1	6	19	160	0	1	0	191
Butterfly	Endemic	0	0	0	0	0	0	0	0		0
	Indigenous	0	0	0	0	0	0	0	0		0
	Sps Status Not Given	0	0	0	2	1	33	0	0		36
Total		0	0	0	2	1	33	0	0	0	36
Dragonfly	Endemic	0	0	0	0	0	2	0	0		2
	Indigenous	0	0	0	2	8	28	0	0		38
	Sps Status Not Given	0	0	0	0	0	0	0	0		0
Total		0	0	0	2	8	30	0	0	0	40
Mammals	Endemic	0	0	1	0	0	2	0	0		3
	Indigenous	0	0	4	1	3	19	0	0		27
	Sps Status Not Given	0	0	0	0	0	0	0	0		0
Total		0	0	5	1	3	21	0	0	0	30
Reptiles	Endemic	0	0	0	2	1	6	0	0		9
	Indigenous	0	0	3	4	5	23	0	0		35
	Sps Status Not Given	0	0	0	0	0	0	0	0		0
Total		0	0	3	6	6	29	0	0	0	44
TOTAL		1	7	25	61	109	611	13	22	72	921

## Annexure 4

### List of Threatened Species in ESA Gangewadiya.

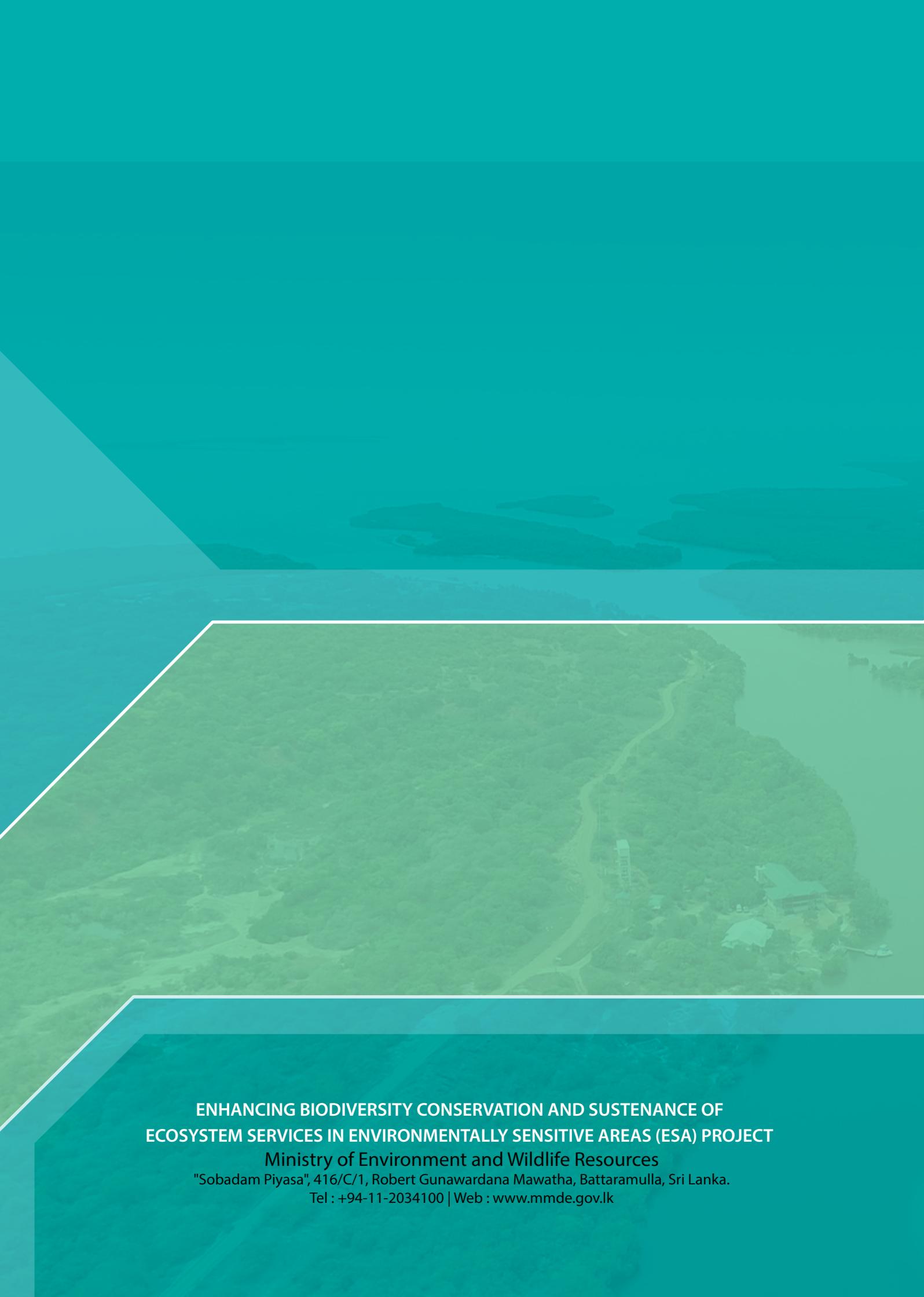
GND	Location/ Sub-basin	Scientific Name	English Name	Sinhala Name	Tamil Name	Species Status	Conservation Status
Aluth Eluvankulama	Eile Wewa Area	<i>Semnopithecus vetulus</i> (Erxleben, 1777)	Purple-faced leaf monkey		ஊதா முகம் கொண்ட இலை குரங்கு	Endemic	EN
Aluth Eluvankulama	Eile Wewa Area	<i>Eutropis madaraszi</i> (Méhely, 1897)	Spotted skink	පුල්ලි හිතලා	புள்ளியிடப்பட்ட தோல்	Endemic	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Cyrtodactylus triedrus</i> (Günther, 1864)	Spotted bowfinger gecko	පුල්ලි වකිලි ඉනා	புள்ளியிடப்பட்ட மடிந்த விரல	Endemic	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Triumfetta glabra</i> Spreng.				Endemic	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Dendrophthoe ligulatus</i> (Thwaites) Tiegh.				Endemic	VU
Parana Eluvankulama	Eluwankulama	<i>Chionanthus albidiflorus</i> Thwaites		අලුල් කොරකහ, තක්කඩ ගස්	புளிப்பு கொறகை, முரட்டு மரங்கள்	Endemic	VU

GND	Location/ Sub-basin	Scientific Name	English Name	Sinhala Name	Tamil Name	Species Status	Conservation Status
Parana Eluvankulama	Eluwankulama	<i>Hibiscus panduriformis</i> Burm.f.				Native	CR(PE)
Aluth Eluvankulama	Eile Wewa Area	<i>Aerva javanica</i> (Brum. f.) Juss. ex Schult.		පොල්කුඩු පළා, පොල්පළා	தேங்காய் கீரை	Native	CR
Parana Eluvankulama	Eluwankulama	<i>Macrotyloma axillare</i> (E. Meyer) Verdc.				Native	CR
Aluth Eluvankulama	Eile Wewa Area	<i>Panthera pardus</i> (Linnaeus, 1758)	Leopard		சிறுத்தை	Indigenous	EN
Aluth Eluvankulama	Eile Wewa Area	<i>Prionailurus rubiginosus</i> (l. Geoffroy Saint-Hilaire, 1831)	Rusty-spotted cat		அடர்ந்த புள்ளியுடைய பூனை	Indigenous	EN
Aluth Eluvankulama	Eile Wewa Area	<i>Prionailurus viverrinus</i> (Bennett, 1833)	Fishing cat		மீன்பிடி பூனை	Indigenous	EN
Aluth Eluvankulama	Eile Wewa Area	<i>Elephas maximus</i> Linnaeus, 1758	Elephant		யானை	Indigenous	EN
Aluth Eluvankulama	Eile Wewa Area	<i>Crocodylus porosus</i> Schneider, 1801	Saltwater crocodile / Estuarine crocodile	ගැට කිඹුලා	நீர் முதலை	Indigenous	EN

Aluth Eluvankulama	Eile Wewa Area	<i>Chamaeleo zeylanicus Laurenti, 1768</i>	Sri Lankan chameleon	බෝදුලිමා / බෝදුලියා	இலங்கை பச்சோந்தி	Indigenous	EN
Aluth Eluvankulama	Eile Wewa Area	<i>Eutropis beddomii (Jerdon, 1870)</i>	Beddome's stripe skink	විසිරනි හිකනලා	கோட்டை தோல்	Indigenous	EN
Aluth Eluvankulama	Eile Wewa Area	<i>Oldenlandia ovatifolia (Cav.) DC.</i>				Native	EN
Parana Eluvankulama	Eluwankulama	<i>Croton caudatus Geiseler</i>		වැල් කැප්පෙටියා		Native	EN
Parana Eluvankulama	Eluwankulama	<i>Diospyros ebenum J.Koenig ex Retz.</i>		කළුවර	இருள்	Native	EN
Parana Eluvankulama	Eluwankulama	<i>Ormocarpum sennoides (Willd.) Brenan &amp; J. Leonard</i>		සුදු අවරිය	வெள்ளை	Native	EN
Aluth Eluvankulama	Eile Wewa Area	<i>Duttaphrynus melanostictus (Schneider, 1799)</i>	Common house toad	සුලබ ගෙයි ගෙමිඩා	பொதுவான வீட்டு தேரை	Indigenous	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Lutra lutra (Linnaeus, 1758)</i>	Otter			Indigenous	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Acrochordus granulatus (Schneider, 1799)</i>	Wart snake	දිය ගොයා / රෙදි නය	மரு பாம்பு	Indigenous	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Echis carinatus (Schneider, 1801)</i>	Saw scale viper	වැලි පොළොලා	அளவு பார்க்கும் வைப்பர்	Indigenous	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Eryx conicus (Schneider, 1801)</i>	Sand boa	වැලි පිඹුරා, කොට පිඹුරා	மணல் போவா	Indigenous	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Dendrelaphis caudolineolatus (Günther, 1869)</i>	Gunther's bronze back	වීරි නාල්දුණ්ඩා	குந்தரின் வெண்கலம்	Indigenous	VU
Aluth Eluvankulama	Eile area	<i>Aciagrion occidentale Laidlaw, 1919</i>	Asian Slim			Indigenous	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Senna auriculata (L.) Roxb.</i>		රණවරා	ரணவரா	Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Manilkara hexandra (Roxb.) Dubard.</i>		පළි		Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Indigofera oblongifolia Forssk.</i>		නරි මුං		Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Coffea wightiana Wall. ex Wight &amp; Arn.</i>				Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Dyschoriste litoralis (L.f.) Nees</i>				Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Strychnos potatorum L.f.</i>		ඉඟිනි		Native	VU

Aluth Eluvankulama	Eile Wewa Area	<i>Abelmoschus ficulneus (L.) Wight &amp; Arn.</i>				Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Margaritaria indica (Dalzell) Airy Shaw</i>		කරව්, මහ කරවු		Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Erigeron sublyratus Roxb. ex DC.</i>				Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Corchorus olitorius L.</i>		සහි	ඡුරියන්.	Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Nymphaea nouchali Burm.f.</i>		මානෙල්	මානෙල්	Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Gymnema sylvestre (Retz.) R.Br. Ex Sm.</i>		මස් බැද්ද, බිම් හුග	இறைச்சி உருண்டைகள், தரை ஜாதிக்காய்	Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Trichodesma indicum (L.) Lehm.</i>				Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Ipomoea tuberculata Ker Gawl.</i>				Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Chloroxylon swietania DC.</i>		බුරුන	சாமுன்	Native	VU
Aluth Eluvankulama	Eile Wewa Area	<i>Derris benthamii (Thwaites) Thwaites</i>		හන් කල වැල්	தொங்கிய கொடிகள்	Native	VU
Parana Eluvankulama	Eluwankulama	<i>Dyschoriste erecta (Brum.f.) Kuntze</i>				Native	VU
Parana Eluvankulama	Eluwankulama	<i>Gymnopetalum scabrum (Lour.) W.J. de Wilde &amp; Duyfjes</i>				Native	VU
Parana Eluvankulama	Eluwankulama	<i>Abelmoschus ficulneus (L.) Wight &amp; Arn.</i>				Native	VU
Parana Eluvankulama	Eluwankulama	<i>Pachygone ovata (Poir.) Diels</i>				Native	VU
Parana Eluvankulama	Eluwankulama	<i>Drosera burmanni Vahl</i>		වටසේස		Native	VU
Parana Eluvankulama	Eluwankulama	<i>Mollugo nudicaulis Lam.</i>				Native	VU





**ENHANCING BIODIVERSITY CONSERVATION AND SUSTENANCE OF  
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