



Wilpattu National Park Management Plan 2019 – 2024

APPROVAL PAGE

The Wilpattu National Park Management Plan 2019-2024 is developed and approved as per the conditions laid out under the Section 2A of the Fauna & Flora Protection Ordinance.

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EXECUTIVE SUMMARY

Wilpattu National Park (WNP) is Sri Lanka's largest protected area covering an area of 131,678 ha. It enjoys high biodiversity value, unspoilt coastline to the West, protected forest to the North and sanctuaries to the North and South forming a single flourishing ecosystem facilitating the movement of larger mammals. WNP and adjacent shallow marine areas also enjoy the status of a Ramsar site due to its unique villu and other wetland ecosystems. Wilpattu has been under various forms of protection for over 100 years. Between 1905 and 1938 it consisted of a Game Sanctuary and Sportsman Reserves concluding in 1938 to its present-day designation as a National Park.

Wilpattu has a historical and cultural heritage going back to the earliest habitation by humans almost 2,500 years ago. This is evident by its archaeological sites and artifacts. Today, around 34,000 people live in the park's periphery and derive their livelihoods from a variety of occupations, mainly subsistence level agriculture. The area has been identified by the Government of Sri Lanka as a priority region for nature conservation and rural development with a high potential for increased tourism.

WNP faces many threats and challenges, namely; illegal land encroachment, poaching of wildlife and plants, land grabbing, damage to archaeological sites, spread of invasive species, degradation of the marine environment, human-wildlife conflict and climate change related droughts and floods. Large areas of forests adjoining the park had been cleared due to expansion of human settlements, especially in southern and eastern boundaries as well as some parts of the northern boundary. There is also a general lack of coordination between competing Government departments each with their own agenda leading to ad hoc interventions within the influence zone.

Having been closed for almost 30 years during the war when much of the parks infrastructure and management ability was lost, WNP was reopened in 2010 and is now ready to regain its status as an important conservation area and a premier visitor destination. Over the past eight years the Department of Wildlife Conservation (DWC) has made great strides in improving park management and administration and has received significant support from national and international agencies. However, there has been no management plan for WNP to follow, until now. The creation of the Management Plan will accelerate increased support as well as improved management of the park.

To this end, in 2017 began the Management of WNP and Influence Zone Project. The term Influence Zone includes adjacent protected areas and other land use designations such as villages that have an influence on the park. The project was implemented under the authority of the Ministry of National Policies and Economic Affairs as Executing Agency (MNPEA) with the Ministry of Tourism Development, Wildlife and Christian Religious Affairs (MTDWCRA) as the implementation partner at the technical level, while the executive responsibility rested with the DWC.

The German Ministry of Economic Cooperation and Development (BMZ) provided financial support with implementation by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH who contracted GOPA Worldwide Consultants to work with DWC in implementation of the project.

GOPA Worldwide Consultants assembled a team of both full time and short-term international and national consultants all experts within their field. Since April 2017 the team has compiled existing physical, biological and social data in which to make management recommendations and are presented in Part 1 Description of this Management Plan. Extensive consultations

have been done with relevant Government Departments and Agencies, Non-Government Organisations, Community Based Organisations, individuals and community members as well as reviews of academic papers. All this was undertaken in close cooperation and coordination with DWC and WNP staff. The WNP Management Plan 2019 – 2024 is the first phase and output of this project and will form the basis for implementation and coordination with national projects operating within the area.

The Wilpattu National Park Management Plan has multiple goals, including maintaining and managing the park, while considering the influences from the periphery as an unspoilt representation of Sri Lanka biodiversity while reversing the trend of habitat and biodiversity loss. The Management Plan promotes the well-being of local communities as well as wildlife by reducing conflict and resource dependency while supporting non-destructive livelihood practices and behaviour.

- **The vision** of WNP is inspirational and strives towards:

“WNP will conserve its biodiversity and cultural heritage for present and future generations”

The Management Plan has been presented in a commonly used format with a logical presentation and ease of use. It is divided into two Parts:

- **Part 1:** A description of the present physical, biological, administrative and social condition of the park and its Influence Zone.
- **Part 2:** Prescribed management interventions for four programmes with objectives and actions necessary to meet the present and future needs and place these into context
- **Annexes:** Contains background information and maps.

Within **Part 2: Prescribed Management** there are four Programmes:

- **Programme 1:** The Park Operations Programme covers many management functions such as administration, field operations, infrastructure and human resources development.

The goal of this programme is:

“To improve the administrative and operational activities of WNP so that it maintains the integrity of the park and its biodiversity in the long term “

- **Programme 2:** The Tourism Development and Visitor Use Programme is concerned with improving the visitor experience without compromising the parks’ conservation objectives.

The goal of this programme is:

“To transform WNP into a world class tourist destination by providing diverse and unique visitor experience on its natural and cultural heritage in ways that will not compromise the conservation goals”

- **Programme 3:** The Environmental Management Programme will fill the gaps in our knowledge of ecological processes and biodiversity. This programme covers habitats, species and matters relating to ecosystems.

The goal of this programme is:

“To improve scientific fact-based management of WNP and its Influence Zone through research, monitoring, management actions and communications that target conservation priorities and provide the information needed to solve conservation problems.”

- **Programme 4:** The Outreach Programme is an essential park management function that provides the foundation for engagement with communities and other organisations which is essential to reach the management goal. The goal of this programme is:

“To influence the activities and opinion of the people and agencies within the Influence Zone such that they benefit both biodiversity and the quality of life of the people themselves”

The intended impact of implementation of this Management Plan is:

- Ecosystems will be protected and their processes maintained, to preserve the ecological character, as specified under the Fauna and Flora Protection Ordinance, the Ramsar Convention, Convention on Migratory Species and Convention on Biodiversity and the UN Framework Convention on Climate Change.
- Habitats and species will be protected and monitored in such a way that management programmes can be applied to their benefit where necessary.
- Provision as a refuge for wildlife in a broader landscape that has lost this capacity.
- Alien invasive species will be controlled or eradicated.
- Scientific research and monitoring of ecology and species are initiated.
- Creation and maintenance of further management zones in the Influence Zone that support the movement of wildlife within WNP and associated protected areas.
- Historical and cultural importance of the WNP and its Influence Zone are protected.
- Tourism activities will be upgraded while not compromising biodiversity conservation or aesthetic principles.
- Recreation opportunities in the Influence Zone will complement those in the national park.
- Information will be made available to local communities and to visitors to highlight the biodiversity values of the WNP and Influence Zone.
- Park administration, law enforcement and general operational capacity will be enhanced to enable park staff to effectively implement the Management Plan.
- In the Influence Zone, residents and business will be involved proactively with management to ensure long-term preservation of biodiversity values and realization of the economic potential.
- Communities will be involved actively in mitigating existing issues, notably human-wildlife conflict.
- Communities will be facilitated to engage in environmentally friendly practices.
- The implementation of this management plan will adhere into all relevant legislation and policies including the FPPO, National Environmental Act, the Forest Conservation Ordinance and the Fisheries and Aquatic Resources Act.

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ABBREVIATIONS

ADB	Asian Development Bank.
BRMS	Bar Reef Marine Sanctuary
BDS	Biodiversity Secretariat
CBD	Convention on Biological Diversity
CBO	Community Based Organisations
CCD	Coast Conservation and Coastal Resource Management Department
CMS	Convention on Migratory Species
CF	Conservation Forest
DFAR	Department of Fisheries and Aquatic Resources
DS	District Secretariat
DWC	Department of Wildlife Conservation
ERV	Exceptional Resource Value
ESCAMP	Ecosystem Conservation and Management Project
FARA	Fisheries and Aquatic Resources Act
FO	Forest Conservation Ordinance
FD	Forest Conservation Department
FEO	Federation of Environmental Organisations
FFPO	Fauna and Flora Protection Ordinance
FOGSL	Field Ornithology Group of Sri Lanka
FMA	Fisheries Management Area
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GND	Grama Niladari Division
ID	Irrigation Department
IUCN	International Union for Conservation of Nature
IZ	Influence Zone
MBZ	German Ministry of Economic Cooperation and Development
MEPA	Marine Environment Protection Authority
MNPEA	Ministry of National Policies and Economic Affairs
MTDWCRA	Ministry of Tourism Development, Wildlife and Christian Religious Affairs
NAQDA	National Aquaculture Development Authority
NARA	National Aquatic Resources, Research and Development Agency
NEA	National Environmental Act
NP	National Park
NTFP	Non-Timber Forest Products
PMU	Park Management Unit
RDZ	Restricted Development Zone
RF	Reserved Forest
SF	State Forest
SLN	Sri Lanka Navy
SLTDA	Sri Lanka Tourism Development Authority
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WNP	Wilpattu National Park
WRWC	Wilpattu Ramsar Wetland Cluster

THE MANAGEMENT PLANNING PROCESS

In compliance with the Fauna and Flora Protection Ordinance (AMENDMENT) ACT, No. 22 of 2009 (FFPO), a Management Plan is to be prepared for every National Reserve by the DWC taking into consideration of the prevailing circumstances. The objective of the Management Plan is to ensure the protection, conservation and management of the protected area concerned in a manner, which is consistent with the objectives of the FFPO.

Methodologies for developing a Management Plan vary but there are several key steps that have been followed in the preparation of the Management Plan for the WNP. The first step was to identify the planning and implementation team to prepare the Management Plan. GOPA Worldwide Consultants assembled a team of both full time and short term national and international consultants, all experts within their field.

The team reviewed all available data on legislations, biophysical features, cultural resources and socio-economics. This information was collected from various sources including literature reviews, office files and interviews, consultations with knowledgeable people and institutions. The Strategic Management Framework prepared under the Enhancing Biodiversity Conservation and Sustenance of Ecosystem Services in Environmentally Sensitive Areas project: GEF funded and supported by UNDP was also refereed for the preparation of this Management Plan.

An inventory of resources in the field was undertaken to check and update existing data to develop an information base needed to make informed management decisions. Attention was given to biological resources as well as cultural, historical, visitor use, road networks, infrastructure, law enforcement and the attitudes of local people. Collection of this information was not exhaustive but targeted to meet the needs of compiling the Management Plan.

This Management Plan has been developed through a participatory planning process involving a cross-section of stakeholders within national and local government, village communities, WNP staff and national and international organisations and individual experts within their respective fields. Extensive consultations were held with a broad range of Government agencies, community organisations and individuals. Of the 47 Grama Niladari Divisions (GND) surrounding the park, 37 CBOs, mainly lead by women, were consulted on a range of topics. The Women's Leadership Training Course identified many challenges faced by women in the Influence Zone and these have been reflected in the Management Plan. The staff of WNP has been consulted both formally and informally to discuss the content of the Plan.

Based on the findings, four management programmes have been developed with objectives and actions to meet the goals. These actions are realistic and achievable within the 5-year scope of this Management Plan. Once the Management Plan reached a draft stage it was offered for review to key stakeholders.

One of the most significant meetings was the Local Consultative Committee meeting held at the end of October 2018 to receive input from the widest range of stakeholders. Outcomes of this meeting have been addressed in the Management Plan.

In early November 2018, the Management Plan was presented to staff of DWC then validated by an expert panel consisting of representatives from a broad range of sectors within Sri Lanka.

PURPOSE AND SCOPE OF THE MANAGEMENT PLAN

The role of this Management Plan is to guide those who are responsible for the park's integrity and management through the general long-term goals, and the specific short-term objectives and actions in a manner that is both practical and easy to understand. Such a plan is for use, not merely for the shelf, and the prescriptions for action that it contains should be applied adaptively.

Vision

“Wilpattu National Park will conserve its biodiversity and cultural heritage for present and future generations.”

INTRODUCTION

With 131,678 ha, Wilpattu National Park is Sri Lanka's largest National Park and lies within the dry zone of the country. The vegetation is mainly dry, mixed evergreen forest and dry thorn forest. WNP contains rivers, streams, many tanks and unique villu ecosystems that are rich in biodiversity. The park is bordered by several other protected areas including the large Mavillu Conservation Forest to the North, while the western border is the coast where valuable marine ecosystems including large extents of unspoilt mangrove forests are found. The Government of Sri Lanka has identified this North Western part of Sri Lanka as a priority for development including the development of its protected areas of which WNP is just one although its status is enhanced by being a Ramsar Site due to its unique wetland habitats. WNP does not only have high biodiversity value but also provides home to leopards, elephants and sloth bears and has a great cultural and historical value with human habitation recorded for more than 2500 years.

WNP has previously been known as one of the islands' premier wildlife viewing destinations but after 30 years of war, much of the infrastructure and management ability was lost. One year after the end of the war the Park opened again for visitors in 2010 with a steady increase in the number of visitors and an increase in management ability. In 2017 over 80,000 people visited the Park, 65% from within Sri Lanka and the remaining international visitors who provided 90% of the visitor revenue.

Despite its high biological importance, WNP faces many of the challenges, namely illegal encroachment, poaching of wildlife and resources and of course climate change as evident by increasing periods of drought. These threats are a result of the unrelenting pressure humans are placing on natural ecosystems and natural resources. The challenge is to implement management actions that protect biodiversity while supporting communities to live in greater harmony with the environment. DWC has a responsibility to secure this unique example of Sri Lanka in a way that does justice to the people who strive for its protection and the people who live beside wildlife both now and in the future. In this regard DWC needs to coordinate and collaborate with agencies and communities who live in the periphery of the park. This Management Plan therefore promotes such coordination, collaboration and the promotion of environmentally friendly activities within the Influence Zone.

To assist the DWC to strengthen the status of WNP as an important protected area that is rich in biodiversity while empowering the surrounding communities to live in harmony with nature, the German Federal Ministry for Economic Cooperation and Development (BMZ) is providing financial support to produce this Management Plan and then assist on the implementation of the Plan 2019 – 2024.

The project is implemented under the authority of the Ministry of National Policies and Economic Affairs as Executing Agency (MNPEA). The implementation partner at the technical level is the Ministry of Tourism Development, Wildlife and Christian Religious Affairs (MTDWCRA) while executive responsibility rests with the DWC. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH will facilitate with the DWC in the implementation of activities. The first phase of the project was from April 2017 to December 2018, where the WNP Management Plan was prepared, while phase two will be the assistance on the implementation of the plan between March 2019 and January 2022.

The preparation of the Management Plan followed a participatory approach where consultations were held with a broad range of stakeholders. This document is fact based and describes the existing physical, biological and social situation and prescribes management objectives and actions to achieve the goals.

Significance of Wilpattu National Park

WNP has a vital role in the conservation of Sri Lanka's biodiversity by promoting the protection and wise use of a representative portion of the North Western part of the country. The habitats range from shallow marine environments to a variety of terrestrial and freshwater wetland biotopes, including evergreen dry forest, dry monsoon forest, scrub and thorn forest and grassland. Among the wetlands, sea grass beds, mangroves, freshwater tanks and villu are of considerable importance. While most wilderness has been destroyed to the South and East of WNP, in the North there are extensive forest areas that form a continuous and connecting habitat for wildlife in an arc that encompasses much of northern and eastern Sri Lanka. This potentially connects wildlife between scattered protected areas and the connectivity is essential for the conservation of such large and wide-ranging and low-density species as elephants, leopards and sloth bears.

Historically, the park has had an important place among the values of Sri Lankan citizens in that it preserves a last vestige of the wilderness that once invested the whole island and where, in more recent times, people could visit to experience the wild fauna and flora, especially leopards. The park was abandoned during the recent war and suffered damage to its biodiversity and infrastructure.

WNP attracts local, national and international tourists and the trends indicate increasing popularity, highlighting the potential for income benefits to local people, albeit small. Various economic activities of the Influence Zone are either potentially sustainable or could be replaced by sustainable activities.

WNP and adjoining protected areas and management zones will only retain significant biodiversity values if the local people support them. This support will only be forthcoming if the people benefit from the protected areas. There is a potential for innovative agreements on land and marine resource use between management agencies and local people, to the benefit of both community livelihoods and to biodiversity conservation. These should be investigated and promoted where benefits to both are possible. Therefore, open and positive partnerships must be developed between the people and the DWC, Forest Conservation Department (FD), Ministry of Fisheries and Aquatic Resources (MFAR), and Coast Conservation & Coastal Resources Management Department (CCD).

International context

WNP hosts many species that are endemic to Sri Lanka. It also shares species with Southern India that are found nowhere else. Some of these may, with further taxonomic study, be described as distinct species in both countries. During the northern winter, many species of birds visit the park from breeding areas as far North as the Arctic. Some of these birds spend the winter in the park while others pass through to areas further South. The wellbeing of these bird populations is therefore a shared concern among many countries. This is acknowledged by Sri Lanka's membership of the CMS and Ramsar Conventions. The shallow waters of the Puttalam Estuary and mangroves are nursery areas for certain fish species that live in the open sea, and are a shared fishery resource with other nations, notably India. The globally endangered Dugong and Olive Ridley are recorded from the near shore waters, while several other globally threatened species are also found in terrestrial habitats.

National Context

WNP and its surrounding landscape is representative of the biodiversity and character of the Dry Zone of North Western Sri Lanka (IUCN 2006), and of shallow seas with barrier islands (Wetland

Conservation Project 1994). The area is also the only place in the Ceylonese Monsoon Forest bio ecoregion and unique to Sri Lanka where the 'Villu' wetland system is found.

WNP is the largest and one of the oldest National Parks in the country that includes important coastal habitats. While the levels of endemism in most taxonomic groups are modest, when compared to endemism in the Wet Zone of Sri Lanka, the occurrence of many other species is nonetheless of significance at a national level. The presence of wildlife and wild resources in these protected landscapes naturally has an impact on the lives and livelihoods of people living within the zone of influence.

Local Context

WNP is surrounded by Conservation and Reserved Forests, Sanctuaries and other state and publicly owned land. The presence of wildlife and natural resources in these areas naturally has an impact on the lives and livelihoods of people living within the zone of influence.

PART I. DESCRIPTION

1.1 Location

The Wilpattu National Park, located in the dry lowland zone of Sri Lanka spans across the North Western, and North Central provinces, 30 km West of the ancient city of Anuradhapura and 183 km North of Colombo. WNP is contained by 80° 40' 0" N and 79° 50' 0" E to 80° 15' 0" N and 80° 10' 0" E; 958197 N and 371643 E to 912032 N 408221 E (Map 1 – Annex 8).

The park is bounded by the main roads from Puttalam to Anuradhapura, from Anuradhapura to Vavuniya, and from Vavuniya to Mannar. A further road passes through the park between Puttalam and Mannar. Access for visitors to the park is via the headquarters at Hunuwilagama, and the subsidiary gate at Eluwankulama. Two further gates, at Mullikullam and Tanthirimale, are not open to visitors. In addition, there are numerous smaller roads that also give access to the park (Map 2 – Annex 8).

1.2 Influence Zone

This Management Plan concerns WNP and its influence zone, which comprises of 1.6 km restricted development zone of the park and the boundaries of adjoining villages and other protected areas (Map 3 – Annex 8). In this context of WNP, the Influence Zone contains different categories of land use including human settlements and protected areas that are found fully or partially within this zone. The marine Influence Zone consists of the marine section of the Wilpattu Ramsar Wetlands Cluster Site, which coincides with the 6m low-tide depth contours just west of the main barrier islands and Northern part of the Kalpitiya peninsula. This comprises the Northern half of the Puttalam Estuary, the Dutch Bay and Portugal Bay. Consequently, this Management Plan gives due consideration to the needs of other land users outside the park and the biodiversity that this land contains.

1.3 Legal Protection status of Wilpattu National Park

Wilpattu's legal protection dates back to 29th May 1903, when the land called Wilpattu in Wilachchiya Korale in the North Central Province was proclaimed as a Reserved Forest under the Section 19 of the Forest Ordinance No.10 of 1885 (Gazette no: 5924). As per the information given in 1907 administration report of the Forest Conservancy, on 15th September 1905, the areas of Crown Forests in Anuradhapura (25,899.8 ha) and Puttalam (30,325 ha) were declared as the Wilpattu Game Sanctuary (GS) to curtail the accelerating game hunting in the country. Steps were taken to demarcate and reserve "surrounds" to the Game Sanctuary as Resident Sportsmen Reserves (RSR), where shooting game was permitted with a license during the open season. All fauna and flora within the GS were considered "forest produce" and protected. The Government Agents of the area with the assistance of game watchers were in charge of protecting the GS and RSRs. With the enactment of the Fauna and Flora Protection Ordinance No. 2 in 1937 (FFPO), the Wilpattu GS was designated as the Block I of the present day WNP in February 1938, while the RSR were declared as Intermediate zones, where hunting was allowed with a permit during the open season (Map 4 – Annex 8). The status of these protected area categories changed drastically during the past few decades due to changing policies in Wildlife Conservation as well as agriculture development. After the declaration of Block I (54,976 ha) in 1938, another 4 blocks and an extension to Block III took place between 1967-1973 period enlarging WNP extent to 131,656 ha (Refer to Table 1 and Annex 1 for details).

In 1952, around approximately 1,619 ha of land of the Wilpattu East Intermediate zone was excised to provide land for colonists under the newly restored Wilachchiya tank. Water from Modragam Aru was diverted to feed the tank and it led to reduced water flow in the river during

the dry season. When the issue of licenses for game hunting was completely terminated in Sri Lanka from 1st November 1964, the altered East Intermediate Zone as well as the Wilpattu South Intermediate Zone was amalgamated into the WNP as blocks III and II. On 5th October 1973 an extent of 189 ha (forested land in Hunuwilagama area) was added to Block III of WNP. This enabled the relocation of the park entrance from Maradanmaduwa to Hunuwilagama (Saparamadu, 2006).

The Wilpattu West Sanctuary was separated by an excised road (old Mannar road) from the Block I of WNP. Pilgrims to the Pallekandal church and shrine within often used this road as well as peddlers carrying their products from Chilaw and Puttalam. Large areas of this reserve were also given for lease permits for cultivation (Pakeer, 1974). As per the Gazette notification on 7th December 1973, when upgrading this sanctuary as the Block V of the WNP, three fishing villages in the coastline were excluded (Palugathurai, Pukkulam and Wellamudal). Pukkulam had about 30 families permanently living there, while Palugathurai is with few migrant fishing families and a church. Wellamudal was inhabited with a dozen families (Saparamadu, 2006).

Date and Gazette Number	Designation	Extent (ha)	Remarks
25/2/1938 (8356)	Wilpattu National Park Block I	54,953.00	The game Sanctuary upgraded into Block I of WNP
	Wilpattu South Intermediate Zone	7,021.30	Upgraded into Block II of WNP in 1967
	Wilpattu West Sanctuary	21,497.00	Upgraded in to Block V of WNP in 1973 exclusive of Palugathurai, Pukkulam and Wellamudal fishing villages
	Wilpattu North Sanctuary	1,877.74	Boundary altered in 1947
27/5/1938 (8370)	Wilpattu East Intermediate Zone	28,277.00	Boundary altered in 1952
7/11/1947 (9794)	Boundary alteration of Wilpattu North Sanctuary	627.27	
22/2/1952 (10357)	Boundary alteration of Wilpattu East Intermediate Zone	24,443.01	Upgraded in to Block III of WNP in 1969
28/4/1967 (14746)	Wilpattu National Park Block II	7,021.30	
27/6/1969 (14860)	Wilpattu National Park Block III	22,791.90	Boundary extended in 1973
05/12/1969 (14883)	Wilpattu National Park Block IV	25,252.38	
05/10/1973 (80)	Boundary alteration to WNP Block III	188.988	
07/12/1973 (89)	Wilpattu National Park Block V	21,448.34	

Table 1: Chronological order of the evolution of Wilpattu National Park and the North Wilpattu Sanctuary

As indicated in Table 1, WNP went through eight gazette notifications during 1938-1973 period to achieve its present status and it had been revealed that there are several boundary disputes that need to be investigated. The report of the committee for the Formulation of a National Policy

for the Preservation of Fauna and Flora of Sri Lanka too recommends recovery of encroached ten square miles in Tanthirimale area, and the minor encroachments near the Kudavilachchiya colony. The report further states that the ten temporary fishing camps at Palugathurai, Wellamudal and any others along the Western coastline of the park should be removed and closed permanently, while this boundary should extend up to the low tide mark of the sea. Further, any roads leading through the National Park, such as Arippu road and to recurring suggestions to reactivate the old Mannar road, should at all times be under the control of the DWC (Dayaratne et al, 1985).

In today's context, Wilpattu is the largest National Park in Sri Lanka and its area is located within two districts (Puttalam and Anuradhapura) while its Influence Zone extends into two additional districts: Mannar (in the North) and Vavuniya (in the East). This land component is a considerable proportion of Sri Lanka's jurisdiction. It is important to look at all gazette notifications to fully understand if those boundaries are compatible with the present WNP boundaries and whether a new gazette notification should be issued indicating the present PA extent and boundaries. Encroachment issues pertaining to WNP will be discussed in detail in section 7.1.

1.4 Adjoining protected area designations and their legal status

Presently, the WNP's Influence Zone contains several protected area categories that have been established under six legislations and are governed by different agencies (Table 2). The adjacent seascape including Dutch Bay and Portugal Bay have been proposed as a marine extension to the park, largely to protect the Dugongs and is presently declared as two Fishery Management Areas under the Fisheries and Aquatic Resources Act (FARA). The Environmentally Sensitive Areas (ESA's) concept, currently under development, is of considerable potential importance to the status of the Influence Zone; this and other circumstances may need further supportive legislation in order to improve conservation aspects.

Legislation	Responsible Government Agency	PA category/s
Fauna and Flora Protection Ordinance 1937 and its amendments	Department of Wildlife Conservation	3 Sanctuaries
The Forest Ordinance No. 16 of 1907 and its amendments (latest being the Act No. 65 of 2009)	Forest Department	Conservation Forests, Reserved Forests, and Other State Forests
Fisheries and Aquatic Resources Act, No. 2 of 1996	Fisheries Department	Fishery Management Area
Coast Conservation Act 1981 and Amendment) Act No 49 of 2011	Coast Conservation and Coastal Resources Management Department	Special Management Areas
Antiquities Ordinance of 1940, amended by the Act No. 24 of 1998	Archaeology Department	Archaeology reserves and monuments
North Western Province Environmental Statute No. 12 of 1990	North Western Provincial Environmental Authority	Environmental Protection Areas

Table 2: Legally declared protected area categories within the Influence Zone

Wilpattu North Sanctuary (WNS)

WNS, declared on 25th February 1938, was 1,878.5 ha in extent (Refer Table 1), situated in Mannar district, it is contiguous with the park, the intervening boundary being marked by the Moderagam Aru and the western boundary being the ocean. A large section of the sanctuary was under cultivation under the Moderagam Aru anicut scheme. For the greater part of the year the area was inaccessible due to the overflow of the river. In 1947, 1,246.9 ha of this Sanctuary was unreserved and as a result the present day sanctuary is 627 ha in extent. No human settlements exist within this sanctuary, but extensive paddy farming is taking place. DWC had filed court cases against several individuals for cultivating within the state lands of the PA. Further, increased incidents of human-elephant conflicts are being reported from the area, especially with regard to destruction of paddy cultivation.

Tabbowa Sanctuary

Tabbowa Sanctuary was declared by Gazette Notification bearing No. 1245/31 dated July 19, 2002. Situated adjoining to the southern boundary of WPN, the two protected areas are separated by the Kala Oya. Illegal activities including clearing of the forest area had been reported while invasive *Prosopis juliflora* had invaded several parts of the sanctuary. Further, this sanctuary boundary overlaps with the Reserved Forests that are under the jurisdiction of FD.

Bar Reef Marine Sanctuary (BRMS)

Bar Reef Marine Sanctuary (30,670 ha), declared in 1992, is the largest marine protected area in Sri Lanka. The BRMS is a complex of offshore continental shelf patch reefs constituting one of the largest coral reef systems in the county. The marine sanctuary includes shallow coral reefs and sandstone habitats located deeper than the true coral reefs. The sanctuary is located offshore of the Puttalam estuarine system which includes Dutch Bay and Portugal Bay. 122 species of stony corals belonging to 54 genera have been recorded from the reef while over 400 species of reef and reef-associated fish have also been documented. Despite the protected status, there has been virtually no management and it is under threat both from natural enemies (crown-of-thorns starfish, coastal erosion and sedimentation) and from human activity. A Special Area Management Plan was prepared under the Coastal Resources Management project for the BRMS and Kalpitiya area in 2005 by the Coast Conservation Department. However, resource extraction has continued due to lack of enforcement of sanctuary regulations (Wilkinson 2002; 2008). Mass bleaching in 2016 had harmed the live coral cover in the area drastically.

Conservation Forests

Conservation Forests are areas where extractive activities are strictly prohibited, and thus they may not accommodate access for local needs and only tourism can be promoted. As per Forest Amendment Act No. 65 of 2009, or the Forest Conservation Ordinance (FO), no person is allowed to enter a Conservation Forest other than under the authority of a permit issued by the Conservator General of Forests or a person authorized by him in that behalf for the purpose of engaging in scientific research, observing the fauna and flora or implementation of the activities prescribed in the Management Plan.

The 40,030.525 ha Mavillu Conservation Forest (MCF) was declared in March 2017. MCF borders parts of northern and western boundaries of the WNP and is continuous with the Blocks III and IV of the park as well as the Wilpattu Northern Sanctuary. MCF was declared to pacify the public protests in the destruction of the forest complex. This area includes five previously declared Reserved Forests: Mavillu was legally declared as far back as in 1921, while three of the Reserved Forests were more recently declared (in 2012 and 2013 respectively). Mavillu Conservation Forest has a conservation status equivalent to that of a national park but its management is not as advanced in respect of access to visitors. It is administered from the

Divisional Forest Office at Mannar Range and Madu Road Range.

MCF is relatively un-disturbed and acts as a vitally important part of the Influence Zone and is therefore important as habitat for many species of flora and fauna, elephants in particular. The forest type is classified as dry monsoon forest, which is degraded by years of neglect. The threats to MCF are the same as for the park and include; illegal felling of mature trees, illegal sand mining, poaching of wildlife, invasive species, illegal cattle grazing, forest fires, agricultural encroachment and issue of illegal land tenure and a poorly demarcated boundary.

Reserved Forests

Three Reserved forests are located adjacent to the southern boundary: Weerakkulicholei, Vanniyagama and Ipalogama (Table 3). Presently under the World Bank funded ESCAMP project, parts of Weerakkodicholai and Vanniyagama Reserved Forests are being developed for nature-based tourism activities (Galwila Ecopark). Under this initiative habitat enrichment is taking place to control the spread of invasive species including *Prosopis juliflora*, which is limiting the feeding habitats of mega herbivores including elephants. Around 1,500 ha of forest area in Gangewadiya Thawusamaduwa is to be declared as a Reserved Forest.

Name	Designation	District	Area (ha)
Weerakkulicholei	Reserved Forest (28/10/2013)	Puttalam	22,764
Vanniyagama	Reserved Forest (08/07/2013)	Puttalam	11,693
Ipalogama	Reserved Forest (12/11/2012)	Puttalam	2,676
Gangewadiya-Thawusamaduwa	Proposed Reserve	Puttalam	1,500
Musalkutti	Proposed Reserve	Vavuniya	Unknown

Table 3: Reserved Forests in the Influence Zone of the Wilpattu National Park

Fishery Management Areas

Under Section 31 of the Fisheries and Aquatic Resources Act, No.2 of 1996 (FARA), the Minister of Fisheries and Aquatic Resources has the powers to designate prescribed areas of Sri Lanka waters or land adjacent as Fisheries Management Areas (FMA). FMAs are declared for the sustainable management of the fisheries resources. Amendments to the FARA in 2013 (Amendment Act No.35 of 2013) provide provisions for establishment of a Fisheries Management Coordinating Committee in an FMA, with the inclusion of a wide range of fishery as well as non-fishery stakeholders. Presently there are two FMA's within the marine waters, which also include the fishermen living in Palugathurai and Pukkulam (coastal belt of Block V):

- Puttalam Lagoon 2010: 27 GND areas in Kalpitiya DSD, 1 GN area in Mundalama DSD, 11 GN areas in Puttalam DSD and 9 GN areas in Wanathawilluwa DSD (including Pukkulam GN) – Gazette No 1665/17
- North West Coast (Puttalam and Mannar Districts) 2010 - landward coastal stretch from Mampuri (Puttalam District) to Talaimannar (Mannar District) with the seaward boundary along the 30m depth contour (excluding Dutch Bay and lagoon) - No. 1665/18

There is an on-going debate about the jurisdiction of the above FMAs and part of the coastal belt of WNP is not covered by either of these FMAs. As per discussions held with the Assistant Director/Fisheries Puttalam, the Puttalam lagoon seaward limits are from an imaginary line drawn from Uchchamunai in Kalpitiya Peninsula to Karavalkuda in WNP (this definition is

as per the Puttalam lagoon fishing regulation gazette in 1981) and as a result, fishermen in Palugathurai and Pukkulam are defined as “marine fishers”. Yet the fishermen are of the view that they are undertaking lagoon fishing.

Two freshwater tanks (Mahawilachchiya and Tabbowa) situated within the Influence Zone of the WNP were declared as FMAs in 2005. Fisheries in these two tanks are regulated by the Inland Fishing Operation Regulations 2011 under the FARA (Gazette No. 1733/24). Introduction of fingerlings and management of the tanks comes under the responsibility of the National Aquaculture Development Authority (NAQDA).

- Mahawilachchiya tank falls within 7GNs: Helebawewa, Oyamaduwa, Krialpetiyawa, Pemaduwa, Randuwa, Ethadathkalla, and Navodgama
- Tabbowa tank (seven GNs): Marukkuwatawala, Tabbowa North and South, Thenuwara, Karuwalagaswewa, Thambapanniya and Kudamedawachchiya

Archaeological Monuments and Reserves

According to both the CBD and IUCN definitions of Protected Areas, cultural and historical features are also included as protected. The Department of Archaeology (DA) was established in 1890 and the primary statute dealing with the protection of cultural heritage is the Antiquities Ordinance of 1940, which was significantly amended by the Act No. 24 of 1998. This legislation identifies preserved articles remnants which belong to end of Kandyana era which is marked as 02 March 1815. Further by Gazette notification any physical or human remnant older than 100 years could be declared as an ancient monument (state lands), protected monuments (private land) and archaeological reserves for the preservation of the cultural and historical wealth of the country (Gunaratne, 2005).

The bisikotu, two sluices, wave breaker (Relapanava), the spill gates (pitavana) and the stone inscription on it, ruins of the buildings on the reservoir dam of Kuda Vilachchiya Tank partially falling within the WNP had been declared as an Ancient Monument in 2013. Further several sites situated in the influence zone have been declared as archeological reserves.

- Thanthirimale Raja Maha Viharaya and surroundings is maintained as an archeological reserve since 1973
- Ancient Monastic Complex at Wilandagoda was excavated and conserved by the Archeological Department in 2012

Section 4 provides more details on the archaeological and cultural heritage of the WNP.

1.5 Wilpattu Ramsar Wetland Cluster

Wilpattu Wetland Cluster was declared as an internationally important wetland under the Ramsar Convention in 2013 (Map 6 – Annex 8). The area covered by the Ramsar site is 165,800ha, of which WNP is the major component, while it also includes marine wetlands on the western coast up to 10 km, Kala Oya estuary, Modaragam Aru estuary and Mahawilachchiya fresh water reservoir. The Ramsar site is larger and extends beyond the National Park, especially on the seaward side.

Wilpattu functions as a unique ecosystem that consists of a mixture of natural coastal and inland wetlands, terrestrial natural vegetation types, and ancient man-made irrigation systems.

The Ramsar site is also the only place in the Ceylonese Monsoon Forest bio ecoregion and in Sri Lanka where the unique ‘Villu’ wetland system are found. Wilpattu supports two types of villu units, brackish and freshwater, and they are juxtaposed in the central part of the site making the area conducive for a large array of wild fauna and flora. The marine portion of the Ramsar Site

includes the tidal reaches of the Kala Oya, the northern part of the Puttalam Estuary and extend seawards of the northern barrier beach sand spit of the Kalpitiya Peninsula and the barrier islands to the 6m depth contour (at low tide).

1.6 Policies and Laws that are relevant to sustainable utilization of natural resources in the Wilpattu National Park and its Influence Zone

The main environmental concerns in the WNP and its Influence Zone include both natural and anthropogenic issues. Deforestation, wildlife populations threatened by poaching and haphazard tourism development, coastal resource degradation, spread of alien invasive species, ongoing and planned mining activities and infrastructure development (including roads and irrigation structures) are the major threats to the natural resource base. Natural disasters including floods and droughts are also affecting the WNP and its surroundings. Several policies and legislations assist in mitigating the above-mentioned threats.

In terms of protecting and managing environment and natural resources, 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 proclaims; “The state shall protect, preserve and improve the environment for the benefit of the community”. And it is “the duty and obligation of every person in Sri Lanka to protect nature and conserve its riches”. These two statements show the commitment of the state and obligations of the citizens.

Conventions, policies and legal instruments operating within the landscape of WNP and its Influence Zone are given in Annex 2.

2 PHYSICAL ENVIRONMENT

2.1 Climate

Wilpattu National Park lies entirely within Sri Lanka's Dry Zone, from sea level to 240m above sea level, where the climate is characterized by alternating wet and dry seasons. Mean annual rainfall is approximately 1000mm distributed between a long wet season from September to December, and a short, wet season from March to April. An extensive dry period lasts from May to mid-September. The area has been subject to decreasing rainfall in recent years, lengthening the dry seasons and causing droughts. For Sri Lanka as a whole there has been a decrease in mean annual rainfall of 7% since 1900. In recent years, this pattern has been less consistent, with total rainfall declining and timing becoming less predictable, leading to the seasonal drying out of some wetlands that were usually perennially flooded.

The mean annual temperature is 27°C (Mueller-Dombois & Sirisena 1968). Relative humidity varies between 75% and 85%. Winds vary from negligible to strong. Wind is much more significant in the marine and coast areas and is strongest during the months of May to September when it blows from the southwest and reaches an average of 12km/h in August. Weaker winds from the northeast occur between December and February. Cyclones with heavy rain and exceptionally high winds are occasional.

2.2 Landscape, geology and soils

The landscape is mostly of low relief, ranging from sea level in the West to a maximum altitude of 240m in the West, though mostly below 100m. The underlying rocks break the surface only locally, in some cases as small inselbergs, or in coastal cliffs. Geology and geomorphology are described by Cooray (1967) and Katz (1975). The marine portion of the landscape comprises the northern half of the Puttalam Estuary, which opens northwards into the Gulf of Mannar through a wide mouth, which is bounded on the West by sandy barrier islands.

The coast at the Puttalam Estuary is an advancing coastline and estuarine development is progressive. The potential effects of rising sea level caused by climate change have not been assessed in this respect. Nonetheless, declining rainfall is likely to have some impact on the geomorphology. The Puttalam Estuary, which opens northwards through a 16km-wide mouth, is mostly less than 6m deep and is bounded on the West by sandy barrier islands. The coastal strip of the park consists of unconsolidated Quaternary littoral sands, clays and other sediments overlying sandstones and limestone.

Most of the western half of the national park consists of poor soils (red-yellow latosol) with mantle grey-massive Miocene limestone as a result of weathering. The limestone, which locally grade laterally into sandstone and conglomerate, overlie Pre-Cambrian basement rocks comprising hornblende-biotite gneisses and grey-pink granites of the Vijayan Series.

Erosion of the limestone by ground water has at numerous locations caused local subsidence and the formation of basins, shallow lakes known as *villu*. These wetlands, which may be either permanent or seasonal, are an essential and exceptional component of the ecology of WNP. The shallowest *villu* tend to be seasonal and owe their existence to being lined by clays, which impede drainage, concentrated there by sorting from the residual and overlying sand. These *villu* are, in effect, perched water tables. Water collects from the immediate surroundings only, since there are no surface streams. Where clay has not accumulated to form an impervious layer, the dolines (*villu*) are dry since water drains away through cracks in the limestone. Sorting has retained areas of sand on the surface and these are obvious around many *villu* where they appear to have been concentrated by seasonal winds in low dunes in a North easterly direction.

Deeper *villu* appear to be connected to the ground water where this rises through the limestone, without an intervening clay layer, and appear to be permanent.

The geology of the eastern half of the park is of the same Pre-Cambrian basement gneisses and granite without overlying sedimentary rocks. They are mantled by reddish brown earths derived from the rocks by weathering, supporting dry evergreen monsoon forest. Here the surface drainage is via seasonal streams and rivers.

2.3 Hydrology and surface water

Natural surface freshwater comprises permanent and seasonal rivers and streams, tanks, *villu*, and seasonal and permanent swamps and water holes (Annex 8, Map. 7). Surface water is widely available in the wet seasons and following heavy and long-lasting rains there is extensive flooding. In some years, a lack of rain can lead to drought and a shortage of surface water for both wildlife and people.

The main surface water drainage is in four river catchments: Mei Oya in the South; the Kala Oya along the southern boundary of the park; the Modaragam Aru at the centre, and the Aruvi Aru in the North. The first two flow into the Puttalam Estuary and the second two into the Gulf of Mannar. The Mei Oya, flows through the Tabbowa Sanctuary in the southern Influence Zone and enters the Puttalam Estuary to the south of the protected area. The Aruvi Aru enters the Gulf of Mannar North of the protected area. A tributary of the Kala Oya, the Pomparippu Aru, forms a subsidiary delta separate from and Borth of the main Kala Oya delta at Gangewadiya. While the Kala Oya is a perennial river, albeit impounded upstream of WNP, the other three are seasonal. The tributaries of all four rivers are seasonal. There are plans to impound the Malwatu Oya, a tributary of the Aruvi Aru East of the park. Saline water extends some way up the main rivers from their estuaries in the dry season when downstream flow ceases. The Puttalam Estuary is a marine environment continuous with the open sea.

The main rivers Kala Oya and Modaragam Aru are impounded and their flows are diminished in the sections running through the park, when compared to the natural flows. This reduction in flow has occurred despite diversion of water into the Kala Oya basin from the Mahaweli project (Wetland Conservation Project 1994).

The reduction in flow has caused sandbanks to build up at the mouth of the Kala Oya, which formerly had a deep channel. Natural flows of the rivers have not been described.

However, current average flow of the Kala Oya has been estimated at 8.1 m³/ second, and of the Mei Oya 2.2 m³/ second. EML (2005) recommended that flows towards the Kala Oya river mouth should be maintained to support dependent wildlife, although acknowledging that flows in the lower river were not monitored.

No assessment has been made of the effect of impoundment on biodiversity, nor how feasible it would be to restore some of the natural flow to the Kala Oya. The Mei Oya, which is impounded at Tabbowa, flows through part of the Influence Zone in the South. Surface water is also found in shallow lakes, *villu*, that are widespread but concentrated in the northern coastal section and centre of WNP. These shallow wetlands receive water from rainfall in their very limited catchments, or from rainfall and groundwater. Some are seasonal and most are surrounded by grasslands. Kokkare Villu is fully saline (similar to seawater); Lunuvila and Dematavila are brackish, while the remaining *villu* contain either lime-rich or soft freshwater (de Silva, 1971). The origin of the salinity is not definitively known but is probably derived from groundwater since there are intrusions of salt water in the limestone layers. Elephant and sambar seem to be tolerant of drinking brackish water, while Axis deer and water buffalo are less so. The *villu* and their associated grasslands are considered to comprise one of WNP's outstanding biodiversity values.

In addition to the natural surface waters, there are more than 100 irrigation impoundments (tanks) constructed with earth banks, together with associated and now abandoned paddy fields, some 1000 years old. Some tanks still retain water, including those that have been restored recently, but in most the earth dam (*bund*) has been breached for many years and the wetlands are now seasonal and more limited in extent. In some cases, the limited catchment of a *villu* has been supplemented with a bund. In addition to the breaching of the *bund*, tanks also lose the capacity to hold water due to siltation. The concentration of tanks is greatest to the northeast of Maradanmaduwa, elsewhere they occur sparsely.

The breaching of abandoned tanks is followed by a sequence of drying and vegetation colonization that is consistent and repeated. The reduction in size of wetlands and seasonal drying out allows the colonization of terrestrial grasses, which are favoured food for grazers such as deer and elephants. Progressively, however, in the absence of either fire or flooding, the tank beds are colonized by deciduous thorn thicket. Ultimately, the thorn thicket is replaced by evergreen dry forest. To promote biodiversity, and to increase grazing, a rehabilitation programme for tanks is proposed such that it restores the wetland-grassland-scrub-forest cycle.

In some years rains are scarce, leading to drought, causing water holes and *villu* to dry out completely and causing mortality in water-dependent wildlife. Park management has constructed many small concrete-lined ponds to provide water for wildlife during drought. During drought, water is brought by bowsers to each pond, so they are situated close to tracks. This allows wildlife to remain relatively spaced rather than concentrating on a very few persistent natural waterholes. These artificial water holes include some that are constructed by upending and lining concrete culvert pipes. These are a danger to small animals falling in and becoming trapped. It is proposed that this design should be discontinued, and those ponds removed.

Groundwater basins have been identified in the southern Influence Zone, and to the North of the project area, in the so-called Deep Confined Aquifer Region coinciding with the Miocene limestone (Survey Department 2007, in IUCN/Miththapala 2011). Further inland of the latter region the Shallow Regolith Aquifer region is situated, coinciding with the crystalline basement rocks. A borehole to service the bungalow at Weewala is dry. Most outstations and bungalows have deep wells for water supply. Two wells at Panika Villu do not hold water, those at Tala Villu and Mana Villu do, that at Mahawewa is strongly alkaline, and those at Manikapola Uttu and Kokmote are intermittent.

2.4 Marine environment

The marine area of WNP coincides exactly with the marine section of the Wilpattu Ramsar Wetland Cluster Site and is the northern half of the Puttalam Estuary, which opens to the sea between the northern tip of Bathalangunduwa and Kudiramalai Point. The seaward limit of this area is defined by the 6m-depth contour which lies just to the West of the barrier islands and the northern sand spit of the Kalpitiya Peninsula. The southern boundary connects the mouth of the Kala Oya with the base of the Kalpitiya sand spit, while the northern boundary corresponds approximately with the mouth of the Puttalam Estuary between Bathalangunduwa and the mouth of the Modaragam Aru. Therefore, the main part of the marine area is mostly shallower than 6m, with two small areas reaching 40m in depth.

The Barrier Islands on the seaward side, and the Kalpitiya Peninsula to the southwest, provide shelter from the full force of the strong Southwesterly winds that prevail for the majority of the year. Salinity level of the water is the same as that in the open sea. However, close to the mouth of the Kala Oya, the salinity can be much less, approaching zero in strong floods. Since 1976, when the Kala Oya received canalized water from the Mahaweli Project, flows in the Kala Oya

have increased, though this has not yet been quantified. However, they do not extend to the mouth of the river where flows are reportedly still lower than expected for an unmanaged river (Wetland Conservation Project 1994).

The considerable productivity of the marine ecosystem is a consequence of the large quantity of nutrients in the water from those rivers entering the Puttalam Estuary. These waters originate in a catchment containing much intensive cultivation, where soil work and the addition of fertilizer are disturbances that promote the loss of nutrients and soil in runoff following rainfall. There are also sewage and other effluents from urban centres further up the estuary. The increased nutrient load from the rivers combined with strong wave action in the shallow waters in some seasons account for algal blooms and the general turbidity of the waters of the Puttalam Estuary. The effects of these aspects need to be studied. The annual wind regime also accounts for seasonal deep-water upwelling just off shore along the continental slope, to the West of the estuary.

Two main barrier islands exist on the western edge of WNP, just at the western edge of the Wilpattu Wetland Cluster Ramsar Site and East of the Bar Reef Sanctuary. The islands are the larger Karativu (also known as Bathalangunduwa and which consists of three islands that have coalesced: Bathalangunduwa, Paliwatte and Paramunai) at the North end, and the smaller Mukulai to the South, which may have disappeared. Further South is located the much smaller and apparently ephemeral Kumbulbokka (also known as Velai).

The islands form the western boundary of Portugal Bay and are exposed on their seaward sides to the full force of the Indian Ocean.

Within the bay there are also the more sheltered sandy islands of Ippantivu, Periya Arichchal and Sinna Arichchal. Within this landscape is the northernmost part of the Kalpitiya Peninsula, the barrier beach sand spit Rodhapaddu, in line with the barrier islands.

While there are breaks between the barrier islands and the peninsula, these are guarded by sand bars covered by water only 1-1.5m deep. The mouth of the Puttalam Estuary, through which flows the effluent of the rivers Kala Oya and Mi Oya, is to the North and opens into the Gulf of Mannar.

The coastal and marine Influence Zone of the WNP is rich in biodiversity, harbouring several important ecosystems: Large extent of intact mangroves, seagrass beds, salt marches and coral reefs off Kalpitiya. Yet these systems are threatened by uncontrolled and harmful fishing activities, unsustainable tourism and many other land-based issues. The challenge faced is to maintain the habitat connectivity, heterogeneity as well as the dynamics between them. It is obvious that the present management of the marine and coastal Influence Zone is done in an ad hoc manner without considering the ecosystem approach for management. Many of the management plans (which are overlapping) had been prepared under donor funded projects and after the closure of each project, most of activities identified had not been taken forward as they have not been sufficiently incorporated into the plans of stakeholder institutions. It is necessary to consider the Puttalam lagoon, Dutch Bay, Portugal Bay as one management unit while treating the Bar Reef Marine Sanctuary as a separate conservation management unit. Any intervention needs collaboration with all the relevant stakeholders. The most relevant institutions and their roles are indicated in Table 4. For further details refer to Annex 3.

Institution	Responsibility
Department of Wildlife Conservation	Protection of Wildlife and sustainable management of the PAs
Department of Forest Conservation	Protection and sustainable use of Forest Resources and rehabilitation of mangroves
Department of Fisheries and Aquatic Resources	Sustainable utilization of fishery resources
Coast Conservation and Coastal Resource Management Department	Conservation and management of the resources within the coastal zone
Sri Lanka Tourism Development Authority	Promoting tourism activities
Marine Environment Protection Authority	Marine Pollution Prevention
NAVY	Coastal defence
Police	Keeping social security and preventing illegal activities
Geological Survey and Mines Bureau	Licensing mining activities
Dept. of Archeology	Protection and conservation of artifacts
CBOs and NGOs	Community management aspects of the resources
National Aquatic Resources Agency	Research
Provincial, District and Divisional Administration	Collaboration of ground level management intervention, especially regarding the land use issues
Private Sector (tour operators, mining etc.)	Sustainably utilizing the resources

Table 4: Relevant stakeholders for coastal and marine resources management

3 BIOLOGICAL ENVIRONMENT

Biodiversity is the term given to the diversity of life, collectively comprising species diversity, genetic diversity within species, and ecosystem diversity. The management of WNP and its Influence Zone aims to maintain this biodiversity. Wilpattu is part of the Indo-Malayan biogeographic realm (Udvardy 1975) and classified as representative of the Tropical and Subtropical Dry Broadleaf Forests Ecoregion (Olson et al. 2001). Tropical and Subtropical Dry Forests are under threat worldwide wherever they are found and, in that context, Wilpattu is a very valuable conservation area.

As a conservation area, WNP consists of an exceptional gradient from the 6m-depth contour West of Karativu Island to forested land at 240m, also called a “ridge-to-reef” system. This system continues West through the adjacent Bar Reef Sanctuary to the continental slope, which provides habitat to diverse pelagic biodiversity, including the blue whales, and to the North and East to other extensive Dry Zone forest and wetland ecosystems. There are few places remaining in the world where wild elephants can be found undisturbed on a coastal beach, and Wilpattu is one of them.

3.1 Ecology and ecosystems

The ecology of the park is influenced by the alternating wet and dry seasons, and by the existence of the long dry season. The two periods of high rainfall determine the distribution of surface water and, to a great extent, the reserves of subsurface water. The wet periods are characterized by increased primary production, while the dry season is progressively a period of low primary production and increased dormancy. The characters of soils with respect to water, and the soil nutrients, determine the potential vegetation for each soil type. Most of the rivers and streams are seasonal but water may persist in subsurface pools. The flow of the largest river, the Kala Oya, is strongly affected by the Rajanganaya dam that regulates the river’s flow artificially, partly to support the cultivation of paddy. It has been noted that the current distribution of deciduous thorn forests and grassland in the area may coincide largely with previous cultivation and other disturbances by man through history.

The activities of elephants and other herbivores may affect the direction of plant succession in these secondary vegetation types. Certainly, fire has had a long use and effect on vegetation dynamics and may have contributed to maintaining some of the grasslands in WNP. Lack of a fire policy may have contributed to the increase in shrub and decrease in grassland. However, the incidence and effects of fire are recorded incompletely within the park and further discussed under a separate section.

Ecological fragmentation has occurred to a large degree to the South and East of WNP, in which natural vegetation has been replaced progressively by farmland and disturbed ecosystems. While connection to extensive natural ecosystems persists to the North and North East of WNP, settlement by people and conversion to agricultural land is proceeding rapidly, threatening this connection. In this way WNP itself is in danger of becoming a fragment. Fragmentation prevents dispersal of many animal species. The division of populations into smaller units is a potential problem since these may lose genetic variation and become vulnerable to extinction in the long term as a result of environmental stress.

Major Habitats

The landscape of most of the park consists either of dry evergreen monsoon forest on reddish brown earth soils, deciduous thorn forest and scrub or dry evergreen scrub forest on red-yellow latosol soils interrupted by extensive open plains and some 40 major water holes known as Villus. Former cultivation areas, coinciding with wetlands and former tanks and their stream floodplains tend to be on clay soils. Much of the deciduous thorn forest and the short grasslands associated with it probably owe their existence to settlements, cultivation and other human activities, including regular seasonal burning of the grass. However, in the Influence Zone, wherever the non-indigenous invasive grass *Panicum maximum* is dominant, fires are frequent. During exceptional drought, fire may also enter dry forest and it may then be fatal to many trees and cause the conversion of forest to grassland.

Coastal vegetation consists of several littoral communities, defined by high salt content of the environment. These include the vegetation of beach environments, intertidal environments with mangrove woodland and sea grass beds, and salt marshes. IUCN (2006) defined fourteen biotopes on the basis of vegetation. Several of these have two or more sub-types. This classification is presented in Table 5.

Vegetation type	Vegetation sub-type
Forests and related ecosystems	
Tropical dry mixed evergreen forest (DEF)	Tall forest
	Medium height forest
	Dwarf forest
	Rock outcrop forest
Tropical deciduous thorn forest (scrublands)	
Riverine forest	
Dry patana grassland	
Inland wetland ecosystems	
Flood plains	
Swamps	Swamp forest
	Herbaceous swamp
Streams and rivers	
Reservoirs and ponds (RP)	Occasionally/seasonally flooded edge forest
	Occasionally/seasonally flooded dry land grassland
	Seasonally flooded damp grassland
	Swamp community
	Marsh community
	Lentic community
Wet Villu Grasslands (VL)	Occasionally flooded edge forest
	Occasionally flooded dry land grassland
	Seasonally flooded damp grassland
	Swamp community
	Marsh community
	Lentic community

Vegetation type	Vegetation sub-type
Coastal and marine ecosystems	
Mangroves	
Salt marshes	
Sand dunes and beaches	
Sea grass beds	
Lagoons and estuaries	

Table 5: Vegetation classification of Wilpattu National Park

Grassland and deciduous thorn forest are sub-climax vegetation types, which exist because of disturbance. Elephants maintain deciduous thorn forest in a more open state by heavy browsing wherever they occur in high densities. However, in Wilpattu, elephant densities are only locally high, for example around Pomparippu.

Other biotopes, except within the marine area, occupy smaller areas (e.g. villu, tanks, rock outcrops etc.) or were disturbed by human activities in the past. Much of the biotope diversity of WNP is a result of past disturbance caused by humans: tanks, grasslands and thorn shrub. Much of this disturbance was likely the use of fire, either regularly in grassland, or sporadically in forest.

The seabed in the marine zone is assumed to currently be in a highly disturbed state following continuous illegal trawling. This destroys the habitat of many species. Prevention of trawling is likely to restore the original habitats, but the rate at which they recover needs to be monitored. Physical disturbance is particularly damaging to sea grass beds.

One of the conspicuous artificial disturbances that were historically imposed on Wilpattu was the building of irrigation reservoirs (tanks), of which some may be up to 1000 years old. Many of these tanks are located in the northeastern quadrant of the main part of the reserve, situated on drainage lines. The presence of these artificial wetlands increases biodiversity and improves the food supply of the large grazing herbivores (Jayakody & Amarathne 2017; Ranaraja et al. 2017) that are one of the main biodiversity values of the park. Some have suggested that manipulating grazing by rehabilitating tanks may also encourage elephants to remain in the National Park rather than breaking through the perimeter fences to raid crops. The greater availability of grass and water would support more elephants and deer, and the latter would support an increased leopard population. Wetland and grassland specialists would also benefit, since they rely on those relatively scarce habitats in the project area.

3.2 Flora

Within the park area, 623 flowering plant species belonging to 123 plant families have been recorded. Among them, 27 plants were endemic and 21 plants were recorded as threatened (DWC, 2007). A survey undertaken in Thelbepu tank area in 2017 revealed that this habitat is dominated by the typical dry zone forest species *Drypetes sepiaria* together with *Mischodon zeylanicus*. Canopy cover is mostly 80 % to 90 %. Sub canopy mainly consisted of *Diospyros ovalifolia*. Undergrowth layer is moderately thick, which doesn't allow free movement across the forest. Shrublands in this cluster have evolved due to the physical conditions of the environment, irrespective of human involvement. This habitat was found adjacent to rock outcrops, which have a thin soil layer of mainly sand. Shrub species that evolved in harsh conditions were found in this area. Many present herbaceous species, which grow only for a few wet months of the year and give a pleasant sight in their flowering. This includes *Platostoma menthoides*, *Chamaecrista*

mimosoides, *Evolvulus alsinoides* and *Hybanthus enneaspermus*, which has white, yellow, blue and rose coloured flowers respectively. The orchid species *Vanda spathulata* is a unique species for this microhabitat in WNP (MOE/UNDP, 2017).

Mangrove vegetation in almost pristine condition appears extensively in the Kala Oya mouth area: Kala Oya, Pomparippu and Lunu Oya. Mangrove ecosystems along Lunu Oya are not disturbed. It appears that fishermen do not come as far as Lunu Oya for fishing, indicating low abundance of commercially important species (e.g. Shrimp) in these waters. In freshwater villus such as Nelum wila, Panikkawila and Talawila, the plant assemblage is similar. These villus are shallow and contain water in the peak of the dry season and they appear to be connected hydrologically after heavy rains. Sedges and grasses dominate the peripheral herbaceous vegetation and a considerable diversity exists among aquatic plants. Flora of the peripheral areas comprises mainly of *Eleocharis spp*, *Eriocaulon spp* and *Fimbristylis spp*. The dominant aquatic plant species include *Potamogeton nodosus*, *Nymphaea hydrophylla*, *Aponogeton crissipus*, *Aponogeton natans*, *Limnophyton obtusifolius*, *Blyxa sp*, *Commelina diffusa*, *Hydrilla verticillata*, *Marsilia quadrifolia*, and *Otelia alismoides*.

Kokkarevillu is a brackish water villu for which in August the surface salinity was recorded to be 5 ppm. Emergent herbaceous vegetation was confined to the peripheral areas and in the deeper parts of the waterhole, dead clumps of *Najas marina* entangled with a mat of Cyanobacteria were found. Patches of *Typha anugustifolia* and *Fimbristylis* species, with *Cyperus spp*, *Bacopa monnieri*, *Tamarix indica*, *Clerodendrum inerme*, occupied the periphery. In addition, *Phyla nudiflora* was also recorded. The plant diversity was markedly poor (MASL, 2005).

WNP is a remarkable live gene repository for a number of economically and scientifically important plants indicated in Table 6 and as follows:

- **Medicinal plants:** *Asparagus facatus* (Hathawariya), *Coccinia grandis* (Kowakka), *Crinum defixum* (Goda Manel), *Eclipta prostrata* (Kiridi), *Gymnema sylvestra* (Mass badda) *Tylophora indica* (Thathathakinda)
- **Crop wild relatives:** *Oryza eichingeri* and *Oryza perrinnis* (Wild rice)
- **Food and fruit plants:** *Schleichera oleosa* (Kon), *Syzygium cumini* (Madan), *Tamarindus indica* (Siyabala), *Walsura trifoliolata* (Kiri kon), *Ziziphus rugosa* (Maha eraminiya)
- **Dryzone timber:** *Chloroxylon swietenia* (Burutha), *Diospyros ebenum* (Kaluwara) *Manilkara hexandra* (Palu)

Group	Species	Location
Rice	<i>Oryza nivara</i> "Uru wi"	Manikkapola Uttu, Ilanganmotee, Nelumwila
	<i>Oriza rhizomatis</i>	Maradanmaduwa
Legume	<i>Vigna trilobata</i>	Kubukwila, Manikapola Uttu
	<i>Rhyncosia minima</i>	Manikapola Uttu, Percibadiwewa
	<i>Cajanus scaraboides</i>	Modaragam Aru
	<i>Cajanus rugosa</i>	Modaragam Aru
	<i>Canavalia ensiformis</i> "Awara"	Borupanwila
Yam	<i>Dioscorea bulbifera</i> "Udala"	Modaragam Aru
Mango	<i>Mangifera zeylanica</i> "Etamba"	Panikkawila

Table 6: Some wild crop relatives recorded from the Wilpattu National Park

Reference: MASL (2005).

Two Baobab trees (*Adansonia digitata*), which are believed to be introduced by the Arabian traders are found within WNP and they are presently popular tourist attractions (Photo 1). A smaller tree is found in Kollankantha, while to see the much larger Baobab at Kuburawa one has to take a boat from the lagoon end.



Photo 1: Baobab tree found at Kollankantha

3.3 Fauna

The most comprehensive research in WNP was carried out by IUCN for the preparation of a resource inventory of the park under the Protected Area Management and Wildlife Conservation project in early 2000. This survey did not cover all segments of the park including the area North of Modaragam Aru river, part of the northeast area and part of the southwest area (between Pomparippu, Talawila and Alimaduwa). As per the Resource Inventory produced under this activity, a total of 284 faunal species belonging to 101 families were recorded from WNP, amongst which there were 21 endemic and 30 nationally threatened species (DWC, 2007). See also Table 7.

	No of species	No of Families	Endemic	Nationally Threatened
Mammals (terrestrial)	41	21	4	6
Birds	149	53	7	3
Reptiles	56	15	8	15
Amphibians	17	4	3	1
Fish (fresh water)	29	9	2	2
Butterflies	86	5	1	13

Table 7: Composition of Fauna

Source: DWC (2007).

While most species found naturally in WNP and its Influence Zones occur in population sizes that are strongly viable, several species will need special management if viable populations are to survive. Some species exist at low densities either naturally or, as in the case of the dugong, because numbers have also been depleted by illegal hunting, and therefore their populations have been artificially depressed. In the cases of elephant, leopard and sloth bear, conservation will necessitate the preservation and wise management of corridors connecting WNP with other areas of extensive natural habitat, both inside and outside protected areas. Crimson-backed woodpecker and spot-breasted eagle owl, of which the status is unknown in WNP, are probably also dependent on habitat corridors (Map 8 – Annex 8). Corridors are only realistic in the north, where there are three still in existence. In the South and East the connections with other equivalent areas have been cut, mostly by the expansion of agriculture. These connections with other habitats are important primarily for maintaining gene flow between different populations of each species. Long-distance movements of individuals may also be of importance. Sri Lanka provides one study showing the necessity of protection and connectivity in maintaining leopard populations (Kittle 2017). The warning implicit in those results should be seriously heeded. A survey estimated 105 adult leopards in WNP, which is the most secure part with the most available prey species (Watson 2016).-

Considering the minimum viable population rule of thumb that suggests several thousand breeding individuals are needed for survival over the long term, one understands that WNP needs physical connections to other habitat areas.

The management of elephants, of which there may be more than 400 roaming throughout the landscape (including the IZ), is especially challenging. While they frequently move along traditional paths between different parts of their range, most do not range far, remaining within a relatively restricted home range. However, the combination of highly attractive crops and electric fences of which design and maintenance are insufficient to prevent elephants breaking through, ensures that human elephant conflicts will continue to be the main species management issue throughout the landscape in the foreseeable future, and certainly within the period of this Management Plan. Cultivators along the boundaries of the park state that most elephants raid crops from within the protected areas, and less so from pockets within the areas of cultivation. For elephants, it is essential that fences are not aligned across the corridors left for their passage and that, as much as possible, their entire remaining habitat is enclosed by such fencing and not divided. The cultivation of palatable crops close to the fence is also unwise. In practice, where elephants exist on both sides of a fence aimed at restricting their movement the breeding males will always attempt to break through to reach females on the other side. Management of elephants will need considerable communication with and cooperation between local people.

In addition to its need for connectivity to other significant leopard populations, the Wilpattu leopard population is probably suppressed in the peripheral areas of WNP by livestock-rearing interests. Reports have been received of leopard poisoning by livestock holders. Overt anti-predator attitudes and actions are a widespread problem in conservation, especially among livestock herders. That, and the suppression of prey populations by people overhunting them, has caused many large carnivore populations to vanish. This issue needs to be tackled soon if WNP is to remain a viable part of this species' range. There are several techniques in practice for reducing carnivore kills of domestic stock and these are to be tested around the park.

Peripheral leopard populations also may be affected negatively by diseases carried by domestic dogs and cats, both of which leopards are prey on. The disease risk needs to be assessed and consequent actions need to be taken to protect the remaining leopard population. It is essential that all the different threats to leopards (reduced connectivity and below minimum viable population, mortality from conflict, mortality from disease) be addressed since it has been shown in populations of other carnivores that the effects tend to be cumulative, not compensatory.

Improving the attitudes of people towards leopards will be essential.

The extent to which livestock diseases affect wild herbivores and their predators is unknown. A veterinary assessment of this is urgently needed, given the high densities of livestock in the North and Southwest of land adjoining the park.

The details of ecological requirements, potential populations, movements, and even life cycles are not known for all the species under risk, although for some we can make educated guesses. Both dugong and Indo-Pacific humpback dolphin need considerable studies if we are reliably to conserve their populations, although immediate actions to reduce losses due to nets should be possible without research. The whereabouts of breeding colonies of lesser adjutant storks that use the park are not known. This vulnerable species needs to be studied to discover its status and to understand the needs for its full life cycle. Studies are most useful if they are carried out before the species' numbers become critically low.

Low-density birds such as Crimson-Backed Woodpecker and Spot-Breasted Eagle Owl are rarely observed but exist at low population densities. The habitat of both has declined rapidly in recent decades. WNP holds many species endemic to Sri Lanka and many more endemic subspecies. The status and ecological requirements of each need to be understood better so that the role of WNP can be assessed in the light of those species' protection.

Internationally important migrant species population trends and requirements also need to be monitored in the context of international conventions (Ramsar). Existing knowledge mostly concerns birds, fish and marine mammals, but some species of micro chiropteran bats and insects also migrate and their migration need to be described.

In the case of birds, their habitat relationships have been analyzed by Weerakoon & Goonatilleke (2007) with survey work also carried out by Thilarathne 2014). Dragonfly survey has been carried out by Herath 2015. In most cases, surveys have produced lists of species that have been recorded in WNP, some species-habitat data, but little else in the way of biological information. Surveys have rarely been extended outside the National Park boundaries, and little information and no formal survey exists for areas North of the Modaragam Aru.

Fragmentation of natural ecosystems, as is occurring widely in the region surrounding Wilpattu, threatens WNP with isolation. While this will affect all species to some extent in the long run, animals that live at low density and that breed at a relatively slow rate, such as large mammals, will be disproportionately affected by isolation from other populations. The only remaining significant connections with substantial intact natural ecosystems are at the northern and northwestern boundaries of WNP.

Comprehensive surveys of fauna and flora of Wilpattu National Park is limited, and Section 3.8 will discuss this important issue

Terrestrial Mammals

Over 41 species of mammals belonging to 21 families have been recorded from WNP. Three endemic species *Macaca sinica* (Sri Lanka toque monkey), *Moschiola meminna* (Sri Lanka mouse-deer) and *Semnopithecus vetulus* (Purple-faced leaf monkey) were observed during 2018.

Elephas maximus maximus, *Melursus ursinus* and *Panthera pardus* are some of the globally threatened species found in this protected area (DWC, 2007). Personal observations and discussions with park officials indicate that the park is home to more than 200 elephants on seasonal basis, while permanent residents are less. Pomparippu and Mailavillu are the two

important feeding grounds in the western section of the park, while Mahawilachchiya tank just outside the park boundary, is a favorite gathering point of the elephants in the eastern section. Considerable numbers of elephants are also found at Hunuwilagama tank, Pasi Bedi Wewa and Mahawewa tank.

Determining occupancy, abundance and population structure of an endangered apex predator, the Sri Lankan leopard (*Panthera pardus kotiya*) was undertaken in the later part of 2015 with remote camera trapping being carried out for a total of 836 trap days/nights. The study area was a 500 km² area in the central core of the park, which was accessible. A total of 49 individual leopards were identified within this study period. The estimated total density for the study area was 16.2 leopards per 100 km² or an adult density of 8.2 leopards per 100 km². This density falls between the recorded leopard densities for Yala National Park and Horton Plains National Park. A sex ratio for this population of 1M: 1.75F was observed. On-going prey analysis shows that barking deer, sambar, wild boar and axis deer are the primary available prey species but more in-depth analysis is required to indicate prey preference (Watson, 2016).

The Sri Lanka Sloth Bear (*Melursus ursinus inornatus*) is a subspecies, which is endemic to the island. Field studies that has been carried out for 28 months has recorded a total of 58 individuals, through various survey techniques; mainly camera trapping, spot light census, track census and direct visual encounters (BEAR, 2015).

Marine Mammals

Sixteen species of marine mammal have been recorded within the Northwestern maritime zone of Sri Lanka (Illangakoon 2004, and de Vos et al. 2003). Many researchers have documented cetaceans in and around the Bar Reef Marine Sanctuary (Leatherwood et al. 1984; Alling 1986; Leatherwood and Reeves 1989; Alling et al. 1982; Illangakoon 2002). Of particular significance is the population of the globally endangered Dugong (*Dugong dugong*), which has been documented within the extensive sea grass beds North of the Kalpitiya peninsula (Illangakoon 2004). A survey carried out in the Bar Reef Sanctuary, indicated that it supports a year-round species richness of marine mammals and suggests that the northern and central area may be considered a cetacean 'hotspot' (Illangakoon 2005). Additionally, a previous survey conducted within the southern Gulf of Mannar during the Voyage of the Odyssey (2003) highlighted the possibility that this area may be a breeding ground for at least one species of large whale (de Vos et al., 2003). See Table 8.

No comprehensive long-term marine mammal surveys have been conducted within the Gulf of Mannar to date.

Scientific name	Common Name	Global IUCN Red list Status
<i>Balaenoptera musculus</i>	Blue Whale	En
<i>Balaenoptera acutorostrata</i>	Minke Whale	LC
<i>Megaptera novangliae</i>	Humpback Whale	LC
<i>Physeter microcephalus</i>	Sperm Whale	VU
<i>Kogia sima</i>	Dwarf Sperm Whale	DD
<i>Lagenodelphis hosei</i>	Fraser's Dolphin	LC
<i>Pseudorca crassidens</i>	False Killer Whale	DD
<i>Peponocephala electra</i>	Melon-headed Whale	LC
<i>Sousa chinensis</i>	Indo-Pacific Humpback Dolphin	NT
<i>Delphinus delphis</i>	Common Dolphin	LC

<i>Stenella longirostris</i>	Long-snouted Spinner Dolphin	DD
<i>Stenella attenuate</i>	Pan-tropical spotted Dolphin	LC
<i>Stenella coeruleoalba</i>	Striped Dolphin	LC
<i>Tursiops truncates</i>	Bottlenose Dolphin	LC
<i>Orcinus orca</i>	Killer Whale	DD
<i>Dugong dugon</i>	Dugong	VU

Table 8: Checklist of marine mammals recorded from the Gulf of Mannar Region

Dugongs, formerly common, are now rare visitors on a seasonal basis to the Puttalam Estuary where they feed on sea grass beds, their main food. Dugongs declined from hunting, but their numbers are reported also to have crashed and not recovered after the cyclone of 1954. Death from drowning after being caught accidentally in fishing nets is a current feature although it is not known whether this has contributed to the decline. It is likely that, for this rare and slow breeding species, even small losses to hunting and fisheries by-catch may be sufficient to depress or further reduce their population. Many dugongs die in nets set for rays in the deeper water off the barrier islands, where there are also sea grass beds. It is claimed that many of the ray fishermen would prefer to fish for prawns in the sheltered waters of the bays, but that fishery has been destroyed by the illegal trawl net fishers. Dugongs spend the daylight hours in the deeper water off the barrier islands, where the ray nets are set, and enter the bays after dark.

Dugongs are probably migratory to some degree between Sri Lanka and India, moving to take advantage of shelter as the prevailing winds change over the year. The exact movements are not known and could be studied by telemetry, using techniques recently developed for dugongs in Australia. DWC runs the Sri Lanka branch of the GEF Dugong and Seagrass Conservation Project, which has investigated dugongs and seagrass in the Puttalam Estuary (Ekanayake 2016a, 2016b; Silva 2017). So far, this project has been active mostly in that part of the Puttalam Estuary to the South of the Wilpattu project area.

Dugongs are severely threatened by hunting and by accidental drowning in fishnets. The species is a slow breeder and migrates through and to areas away from relatively safe havens. Nets set to catch rays, mostly outside the project area, catch dugongs unintentionally, causing them to drown, and are implicated in the most recently recorded losses.

It has been pointed out that many of the ray fishermen, who operate in the exposed conditions of the open sea, would prefer to catch prawns in the relatively sheltered waters of the Puttalam Estuary.

However, illegal trawling is destroying the prawn fishery there. Indirect action against by-catch in the ray fishery, through preventing trawling and restoring the prawn fishery, is needed for dugong conservation, as well as advocacy for the dugong among the fishermen.

The same may be the case for the Indo-Pacific humpback dolphin. However, the species is unlikely to be naturally common in the area and its estuarine habitat is sparse and scattered in Sri Lanka. It is also a slow breeder and losses cannot be sustained indefinitely. More information is needed both within the park and over its wider range in northwestern Sri Lanka and southern India.

3.4 Invasive Alien species

Many biotopes are affected negatively by invasive non-indigenous plant species. The incidence of invasive non-indigenous animal species is less well known. The non-indigenous species, in the absence of many of their natural herbivore predators, parasites and diseases, frequently outcompete the indigenous ecological equivalents, invade their space, thereby replacing them and are acknowledged now as one of the most serious challenges to biodiversity worldwide, including in the project area.

There are over 20 listed species of alien invasive plants and four species of alien invasive animals in WNP and its Influence Zone. Details of Invasive Alien Species (IAS) at WNP and its Influence Zone are given in Annex 4. This is probably not an exhaustive list and more species can also be expected to become established in the future. There is currently neither control programme for any of these invasive species nor any plans to control them within WNP. There appears to be little understanding of, or concern for, the presence of invasive species among the government agencies or residents of the Influence Zone.

Several alien species appear to have become dominant in their adoptive plant communities, presumably at the expense of indigenous species, causing notable (but not yet quantified) ecological effects. Of those species listed in Annex 4, the following are locally or widely dominant in and around WNP: *Chromolaena odorata*, *Lantana camara*, *Eichornia crassipes*, *Salvinia molesta*, *Opuntia spp.*, and *Prosopis juliflora*. *Prosopis juliflora* is a very serious threat and already becoming dominant in the Tabbowa and Eluwankulama areas in the South and around Vankalai in the North. It appears to be spreading rapidly. Not only will it damage biodiversity, it will also invade rangelands that are the essential pastures for domestic livestock. A species that has not yet been recorded from WNP, but which is established elsewhere in Sri Lanka and is a serious threat to wetlands, including mangroves, is the Pond Apple (*Annona glabra*). Its establishment should be prevented where possible.

The Tilapia (*Oreochromis mossambicus*) is the only species of animal listed as invasive in WNP, where it was introduced by the Park authorities, but its effects on wetland ecosystems is unstudied. African Giant Snail (*Lissachatina fulica*) has been observed in Anuradhapura (30km to the East) where it is common and may already have colonized widely. The ecological effects of these species are potentially serious. Further Water buffalos (*Bubalus bubalis*) are listed as potential IAS in Sri Lanka as there are evidence of hybridization of this species with the wild buffalo (*Bubalus arnee*). According to Deraniyagala 1964, this hybridization has probably led to the local extinction of genetically pure populations of the wild water buffalo in locations such as the Wilpattu National Park. Over 100 Buffalos were recorded at Mahawewa. They migrate between the tank and Kukulkatuwa Beat Station area (Photo 2). During WNP staff meeting it was revealed that the Tank Cleaner (*Pterygoplychthys multiradiatus*) was recorded from the following water bodies: Nelumwila, Mahawewa, Telbepu wewa and Makalan maduwa.

Domestic dogs have been recorded at Maila Villu Beat Station and Naval Camp, near Maradanmaduwa, Pukkulam, Palugathurai, Karawalakuda and Kolankanate. On the park boundary, dogs are resident at Mollikulam and Eluwankulama Beat Stations, and Hunuwilagama Gate and have been recorded just outside the boundary at Alivardiya Beat Station. Dogs have been seen at many points along the eastern and southern boundary, associated with the camps and residences of cultivators. Their signs are seen along the boundary trace and tracks indicate that they habitually enter the park, presumably to hunt. Dogs at Maila Villu Beat Station subsist by hunting in the surrounding bush and return to the station for security, e.g. from leopards. The effects of hunting by dogs on wildlife populations are not known. The disease status of dogs, and therefore potential threats to wild carnivores, is not known.



Photo 2: Buffalos recorded at Mahawewa.

There is wide experience elsewhere of attempting to control IAS, including most of those species established in and around the park. Control usually requires very great effort and a continuous programme will be needed to prevent reduced species from recovering their former abundance, or to prevent eradicated species from recolonizing. The work is often labour-intensive and also needs to be highly accurate in order to prevent recolonization by a few survivors. It cannot be seriously attempted without a well-trained and full-time team. All methods of control should be considered, but the application of best practice is essential, especially if applying biological control since that would necessarily involve the introduction of at least one further non-indigenous control species per invasive species. It is also essential to collaborate with other agencies and communities in this activity, and for the control programme to receive regular independent evaluation.

3.5 Ecology of fire

Fire, where it occurs, can be more extensive in its effects in converting forest to grassland, and in maintaining grassland, than elephants. Its use should be considered seriously in preventing the progression of vegetation to the climax in at least several areas. This will ensure that the variety of vegetation types, with their overall consequent higher biodiversity, is maintained.

There is a no fires policy within the park, in contrast to the unprotected Influence Zone, where it frequently appears in the dry season, especially in the long-grass areas dominated by *Panicum* maximum in the East and South. The general policy of no fires in DWC and Forest Department needs to be reviewed but there is no functional fire control capacity. At the same time, there is no policy to use fire for any purpose. Lack of fire appears to be correlated with (1) large populations of ticks, (2) encroachment of woody vegetation into grasslands, and (3) the succession of thorn scrub to dry forest, although these need to be studied for confirmation of the effects.

As regards management, there is neither monitoring of the timing, extent and effects of fire, nor has there been any assessment of the role of fire in the ecology and conservation management of WNP. The use of fire in manipulating vegetation succession and the extent of grasslands and in maintaining open habitats in the Influence Zone needs to be assessed. There has never been a fire management plan for WNP but a no-burning policy.

3.6 Ecological connectivity, fragmentation and High Value Habitat

Fragmentation of wilderness is a significant risk for Wilpattu, especially concerning the populations of species that live at low density and that need continuous habitat to maintain contact between populations. Small populations of certain species tend to become isolated as their habitats fragment with no realistic prospects of ecological connectivity across their range.

Birds, bats and many insects may be independent of this effect because they can fly, but even some of these may be reluctant or unable to cross areas lacking suitable habitat. Small populations are at serious risk of going extinct, putting the total population under similar risk. In Wilpattu's case, connectivity to other areas of extensive habitat has been cut by agriculture to the South and East of the park. Only in the North there are three remaining potentially viable corridors of wilderness connecting other similar areas. These corridors now assume considerable significance, and all are under severe pressure of encroachment by agriculture and other developments. Plans to develop a large North-South highway through the last main East-West connection in this northern area further threaten connectivity.

The three remaining habitat corridors to the North of the park area are acknowledged in the draft elephant management plan, but no practical conservation actions had been carried out, and the elephants survive largely by default. The ecological relevance of connectivity and the remaining corridors for the most affected species (elephant, leopard and sloth bear) has not yet been studied in detail, but preliminary work on leopards has demonstrated that, together with protection status, connectivity supports leopard populations, while fragmentation depresses them.

Corridors are not only important for the movement of individuals but, more importantly, they maintain genetic continuity between sub-populations of a species and ensure that populations are larger than the minimum required for viability. Apart from elephant conservation, the necessity of habitat corridors is not acknowledged in national policy or conservation action in the vicinity and contiguous wilderness. Conservation of WNP and the wider landscape will need proactive promotion of ecological corridors by DWC.

Currently, there is little community or inter-sectorial acknowledgement of the need for or benefits of corridors of habitat, or of the factors causing their decline. Conversely, many people erroneously think that WNP, as the largest National Park in Sri Lanka, must itself be large enough for all the species that inhabit it. A concerted programme of corridor conservation will be needed to maintain the remaining connections, and this programme will necessarily involve inter-sectorial agreements and the cooperation of communities.

3.7 Gaps in Scientific Research and Existing Knowledge

WNP has not been fully surveyed until now, and the main reasons were security concerns and lack of suitable access road/pathways to carry out such activity. Therefore, the existing data does not represent the actual biological wealth of the park. It should be noted that the studies in WNP has been episodic rather than continuous and there are many gaps in knowledge on the biological wealth as well as other aspects. Available information provides an insufficient basis for precise conservation management decisions. This will need to improve if conservation management is to be supported into the future. Scientific knowledge of WNP and its Influence Zone is based on research described in the publications listed in Table 9.

Subject	Publications*
Geology	Deraniyagala (1955); Cooray (1967); Katz (1974)
Soils	Cooray (1967); Panabokke (1967)
Climate	Mueller-Dombois (1968); Mueller-Dombois & Sirisena (1968)
Hydrology	Wilson (2014); Silva (No date)
Vegetation	Gaussen et al. (1964); Fernando (1968); Mueller-Dombois & Fernando (1970)
Ecology	Eisenberg & Lockhart (1972)
Biogeography	Greller & Balasubramaniam (1993)
Biodiversity	IUCN (2006): including flowering plants, mammals, birds, reptiles, amphibians, freshwater fish and butterflies.
Marine	Blue Swimming Crab Fishery Bulletin (1-7) (2015-2017);
Mammals	Eisenberg & McKay (1970); Barette (1975; 1977; 1991); Ilangakoon et al. (2008); Watson 2016; Kittle et al (2017); BEAR 2015;
Birds	Weerakoon & Goonatileke (2007); FOGSL (No date); Thilarathne (2014)
Dragonflies	Herath (2015)
Fungi	Ankenda (2015)

Table 9: Published scientific knowledge on Wilpattu National Park and Influence Zone

Basic knowledge on climate, geology, physical geography and vegetation was largely collated and published in the 1960s. Ecological surveys and research followed, being published in the 1970s. However, during the years of civil insecurity, little scientific research and no ecological monitoring were carried out. Exceptions were studies on deer ecology, and the biodiversity survey of IUCN (2006), which is still the only systematic survey of biodiversity in the park. Subsequent research has been narrower and more specific on leopards, sloth bears, dugong, water quality, grazing quality and fisheries. DWC has a programme of small research projects by DWC staff of which 15 such projects have been completed since 2003. A vegetation map exists for parts of WNP (Mueller-Dombois & Fernando 1970).

Present research projects being undertaken in the park are (1) a study on leopards using camera traps to identify individuals and (2) a botanical survey. The current programme of scientific research does not meet the needs of WNP management since it addresses only a few of the questions that need to be answered to support management decisions. The lack of ecological monitoring, including of population sizes of key species, is a notable omission.

Park managers will need the results of an ecological monitoring programme, combined with the results of targeted research, to put into practice or adapt conservation actions. Monitoring is also needed in connection to obligations under international conventions. Equal emphasis should be given to marine and terrestrial ecosystems. The existing biodiversity inventory is limited to flowering plants, vertebrates, butterflies, dragonflies, and to marine invertebrates of economic value. The surveys provide lists of species and international threat status, but rarely more information than numbers on population size, habitat and seasonal occurrence. Neglected taxonomic groups and biotopes need to be surveyed, especially insects, fungi and marine communities.

Species of all taxonomic groups need more comprehensive descriptions of habitat requirements, population dynamics and behavioural ecology. The vegetation particularly needs more accurate description, including accurate mapping, and a more complete understanding of the ecology of

the different plant communities. The extension of ecological studies will hopefully help to identify keystone species and important areas within WNP.

At 131,667 ha, the terrestrial portion of WNP is certainly too small to support long-term viable populations of elephants in isolation. The effective population sizes of these species need to be larger than can occupy the project area, resulting that connectivity is needed to allow gene flow with other populations. Studies about the remaining forest connections in the North, conservation weaknesses & potential improvements, and also the ranging requirements of the species are urgently needed to back up decisions on these species in WNP.

Further work on life cycles and ecology of individual species may help to identify critical habitats. This is especially so for such animals like the colonial breeding waterfowl, seabirds, wintering waders, marine turtles, dugongs and Indo-Pacific humpbacked dolphins. The lesser adjutant stork, which occurs in Wilpattu, is globally endangered and yet we know nothing of its breeding requirements in Sri Lanka. There is little or no information on invertebrates and ecological processes. One such ecological process is the change in biota that is associated with maturity, senescence and death of forest trees, since elsewhere this is known to be the basis for a large proportion of biodiversity.

In order to achieve success in surveying biodiversity, it is essential that genuinely experienced specialists are recruited for the jobs, since only they will record the full range of species and provide comprehensive coverage. Survey teams should be led in the field by active, experienced and knowledgeable biodiversity specialists.

There is a need for taxonomic reviews of many species. Modern taxonomic methods tend to recognize many cryptic species that were hitherto unknown. This is a countrywide imperative and it is essential that WNP is included in these assessments. Without full knowledge of its biodiversity, Wilpattu will continue to be undervalued.

Collaboration of university departments and other technical institutions will be essential to initiate a reasech and to carryout a systematical study in the park area. This collaboration, and the required funding for the research projects, must be sought proactively. As with most researches, an international dimension will allow access to key experts and improve the results.

There are several areas of high biodiversity value in the Influence Zone that may need more protection from legislation. These include for example mangroves, salt marshes and grasslands in the Southwest and grassland and thorn scrub in Musali. Biodiversity assessments need to be made and evaluated so that recommendations for conservation can be made. There is an ever-increasing need for this task, given that natural ecosystems are being degraded and destroyed rapidly. As a result of the former security situation and lack of research, there are many more gaps in scientific knowledge of WNP and its Influence Zone than described in this section. A more complete list of research priorities is summarized in Table 10.

Subject	Project type	Duration
Invertebrate diversity	Survey	At least one year
Microchiroptera (bats) diversity	Survey	At least one year
Marine biodiversity	Survey	At least one year
Fill gaps in biodiversity inventory	Survey	5 years
Distribution of invasive species	Survey	24 months
Ecological effects of terrestrial invasive species	Ecological assessment	2 years

Subject	Project type	Duration
Ecological effects of aquatic invasive species	Ecological assessment	2 years
Species-habitat distributions and relationships	Survey	4-year survey
Map biotopes, heterogeneity of WNP and IZ	Survey & mapping	3 years
Biodiversity of northern Wilpattu National Park	Survey	At least two years, all seasons
Ecological effects of invasive species	Ecological assessment	At least two years, all seasons
Range requirements of sloth bears, leopards, elephants in relation to food, habitat, behaviour	Telemetry, camera trapping, genetic studies	At least 3 years, all seasons
Ecological requirements of lesser adjutant stork	Telemetry, ecological assessment	5-year project, initially
Sea turtle breeding ecology	Beach, predation survey	At least 3 years
Dugong ecological requirements	Telemetry	5-year project, initially
Endemic & threatened species	Survey	5-year project
Kala Oya mangrove ecosystem	Ecological assessment	3 years
Coral reef ecology	Ecological assessment	3 years
Sea grass bed ecology	Ecological assessment	3 years
Reservoir-forest cycle	Modeling	24 months
Dynamics of grassland, scrub, forest	Ecological assessment	5-year project, initially
Large mammal ecology	Ecological assessment	3 years, compare earlier work
Birds of prey ecology	Ecological assessment	5-year project
Wetland ecology	Ecological assessment	5-year project, initially
Mature-dead forest tree ecology	Ecological assessment	5-year project, initially
Effects of dams on river ecology	Ecological assessment	3 years
Diseases carried by dogs	Veterinary assessment	1 year
Diseases carried by livestock	Veterinary assessment	1 year
Ecological monitoring programme	Monitoring	Continuous
Ecological baselines for WNP	Ecological monitoring	Continuous
Vegetation changes with season and climate fluctuation	Ecological monitoring	Continuous
Primate distribution and ecology	Behavioural, ecology and ranging study	3 years
Describe & map temporal & spatial distributions	Ecological assessments	5-year project
Impacts of people on wildlife	Monitoring	Continuous
Survival of wildlife in the Influence Zone	Monitoring	Continuous

Subject	Project type	Duration
Limnology & ecology of wetlands	Ecological assessment	5 years
Assess climate change effects on biodiversity	Ecological monitoring	5 years
Human-elephant conflict studies-	Monitoring	3 years
Human-wildlife conflict	Monitoring	3 years
Tourist impacts on wildlife	Ecology, behaviour study	3 years
Natural resource dependency of people in Influence Zone	Socioeconomic study	3 years
Ecotourism potential of prime areas in Influence Zone	Biodiversity & socio-economic study	2 years
Breeding ecology of endemic and vulnerable birds and reptiles	Ecological assessment	3 years
Distribution and status of critical species habitats	Ecological assessment	3 years
Seasonal surface water conditions	Monitoring, mapping	Continuous
Taxonomic reviews	Collaboration	Opportunistic
Assess biodiversity values of unprotected land	Survey, evaluation	3 years

Table 10: Scientific research requirements for Wilpattu National Park and its Influence Zone

4 HISTORICAL AND ARCHAEOLOGICAL HERITAGE

Much legend and history are associated with the park and its immediate surroundings. Tammanna Nuwara, where King Vijaya is said to have landed in about 500BC and founded the Sinhalese race, is said to be between Kudiramalaya point and Moderagam Ara mouth in Wilpattu. According to legend, Vijaya married Kuveni, the Yaksha Princess, whose palace lies in ruins at Kali Vila and ruins near the Kokmotai bungalow are also known have been sojourned by Kuveni. Galbendi Neeravia which is located northeast of Maradanmaduwa tank, is supposed to be the place where the Prince Saliya, son of King Dutugamunu, lived with his bride, Asokamala, some 2000 years ago (Samaraweera, 1970). Modder (1908) provides very detailed records including legends of this area. For an example, Annius Plocamus, during the reign of Emperor Claudius of Rome, is known to have visited Kudiremalai, or “Hippurus protum”. Several tribal groups such as Mukuwas have also made this area their home (Ramsar information sheet, 2013) and are extremely rich in archaeological terms housing a number of ruins and artifacts dating back to various periods of history. The proximity to the ancient city of Anuradhapura has also been a factor contributing to the rich archaeological heritage of the area. A study carried out by IUCN in collaboration with DWC in 2005-2006 recorded a total of 68 archaeologically important sites from the park. These can be divided into five major categories based on the artifacts which were found at them: Fossil sites, prehistoric sites, proto-historic sites, historic monastery sites and irrigation or agricultural sites. At several of the sampling locations, the survey team record evidence of two or more archaeological finds from the above five periods. Most of the recorded monuments had been excavated and destroyed by treasure hunters and several sites need immediate conservation action. The team was unable to survey several sections within the park due to lack of access and security concerns (Gunatilake, 2006; DWC, 2007).

Treasure hunters have damaged many, if not all, archaeological sites. The looting of artifacts is presumed to have occurred, but its actual extent is not known. The vehicle track at Kuveni’s palace has been aligned through the archaeological site with unmeasured consequences, although the features affected appear mostly to have been destroyed historically. There seems to be neither consistent policy with respect to maintenance, repair or otherwise interfering with archaeological sites in WNP, nor for genuine archaeological excavation. Collaboration activities with the Archaeological Department are necessary to protect and rehabilitate the archeological heritage of the park.

4.1 Fossil sites

Tertiary rocks of the Miocene (26 -27 million years old) are found along the sea coast (Deraniyagala, 1955). Miocene fossil sites have been identified at the top of the Kudiramalaya point, the Palugahatura fishing campsite, the Aruwakalu quarry site, Arnakallu beach, Uchchamunai and Karativu islands, and at several sites in and around the peninsula and the islands. Over 60 fossilized gastropods, corals and vertebrate species have been identified along these Miocene sea beds (Cooray 1984; Deraniyagala, 1955; Goonatilake, 2006).

The Miocene limestone underlying this region is rich with marine invertebrate and vertebrate fossils (Cooray, 1968). The largest Miocene fossil deposits in Vanathavillu DSD and Aruvakkalu have been commercially exploited since 1970s. However, the Miocene fauna in these deposits have been hardly studied. Excavated cement quarry sites along the Aruvakkalu mount provide good opportunities to observe fossilized invertebrates and vertebrates. The famous Anakallu fossil site is also situated bordering the lagoon but is presently eroded. Twenty-four vertebrate species which belong to cartilaginous fishes, bony fishes, marine reptiles, and marine mammals had been recorded from a single location at Anakallu beach at Aruvakkalu. Invertebrates such as annelids, gastropods, corals and echinoderms had been recorded from Anakallu

and several Miocene deposits along the Gulf of Mannar coastal belt (Deraniyagala, 1955; Goonatilake, 2001). Miocene invertebrate and vertebrate fossils are exposed along the coast of Uchchamunai, and Karativu Island. Most of these sites are exposed to the lagoon beach and are continually eroding. Palugahatura and Kudiramalai also have fossils of the Miocene period. As these sites are in the WNP, it will be well preserved for future studies. Kal Aru riverbed near the old Mannar-Puttalam road causeway has exposed a Miocene bed, which can be easily recognized. The fossilized corals will provide more information about this site. In 1958, Deraniyagala recorded a submerged forest from Puttalam Lagoon, which has been dated to the Pleistocene period. Four Miocene fossil sites were identified in the park: At the top of the Kudiramalai point, Palugathurai campsite, Palugathurai beach site near the fishing huts and Pan Ela right bank. Fossilized gastropods, corals and vertebrate parts were observed from these sites.

4.2 Prehistoric sites

Eleven of the sites belonging to the prehistoric periods (upper Paleolithic or Mesolithic) have been recorded from WNP. Stone tools made by Cherts, clear quartz and pebbles were recorded among the open sandy dunes, open scrublands, and around the natural and artificial water bodies.

4.3 Protohistoric sites

Protohistoric sites were also further divided into megalithic burial and Black and Red Ware (BRW) sites. Pottery fragments, burials, iron slag, ruin structures of the monasteries, belonging to proto-historic and historic period, were found within the 43 sites. However, without further investigation, it is difficult to clearly separate artifacts to the two main periods. Most of these sites disperse in the open scrub and near the water bodies. In between the Alam Vila and Eranapala Moat there is a large iron extraction site and iron slag remains are widespread throughout the area.

Seneviratne (1984) recorded four megalithic BRW and Burial sites within the park; Tekkama (urn burial site), Pomparippu (urn burial site), Karaban Kulama (urn burial site) and Aluthbobuwa (cist burial site). Pottery was also recorded from the left bank of the Pomparippu Ara, where the present Baobab (*Adansonia digitata*) tree is located nearly 2 km from the estuary. Several meters upstream from this site, undamaged pots as well as fragments of potteries could be traced near the water level as the site is washed out by fast flowing water. This can be speculated to be the ancient seaport village of Uruvela.

4.4 Monastic sites

Eleven ruin monasteries were recorded from forest areas associated with large rocks of which two sites (Ochchappu Kallu and Veheragala) contained inscriptions. Ochchappu Kallu, an ancient Buddhist shrine consisting of ancient drip ledge caves, remains of stupas which have been destroyed by treasure hunters, rock cut bases of buildings, moonstones, balustrades (korawakgal) and scattered pieces of rock pillars over a vast area which had held the buildings of this complex can be found. It is considered the largest monastery complex and just before the main ruins area is a large drip ledge cave with an inscription written in early Brahmi style describing the donation of this cave to Buddhist priesthood (Photo. 3).

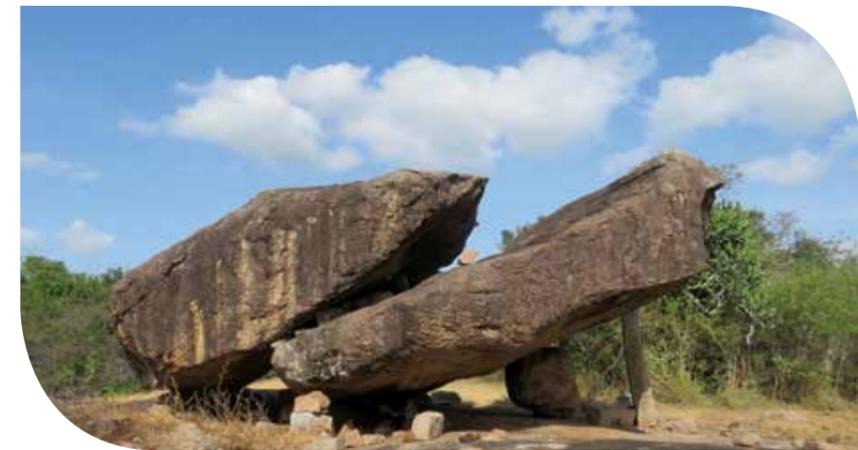


Photo 3: Ruins in Ochchappu Kallu, Wilpattu National Park

Veheragala and Naypena Guhawa are somewhat far (southwards) from the present road network and hence these sites are more vulnerable. According to locals, a large ruined monastery is situated near Andaragollaewa, called Araliyagala. Weeransole ruins near the Paluvilandawa tank consisted of three destroyed Buddha statues, including two seated (Samadhi) and one standing statue. A well-preserved seated (Samadhi) statue was brought to the Park entrance (Hunuwilagama) during the 1980s by army officers, which can be seen at present in the image house (Photo 4).



Photo 4: Samadhi Statue at the Park main entrance

Galge Viharaya has been a large Aramaic complex in the past with ruins covering a large area including a rocky outcrop inside the park. Number of drip ledge caves, some with still existing clay walls, ruins of stupa and bricks and rocks are scattered all over this area. A rock inscription of the site has placed this Aramaic complex to 1st century BC. Yet no proper study or restoration has been carried out by the Archaeology Department. Legend says that ruin pillars near the

Kali villu are the palace of Kuveni. During the survey the consultants were able to locate a ruin stupa few meters North of the pillars. Present road network runs through the site and near the stupa the road goes through the foundation of the structure. Therefore, immediate action has to be taken to prevent further destruction to this site. Wilandagoda monastic complex (Photo 5) and Salawana Viharaya is about 4 km from the Southern border of WNP, while the Tantarimala Temple (Photo 6) is located in the eastern border of the park.



Photo 5: Ancient Monastic Complex at Wilandagoda.

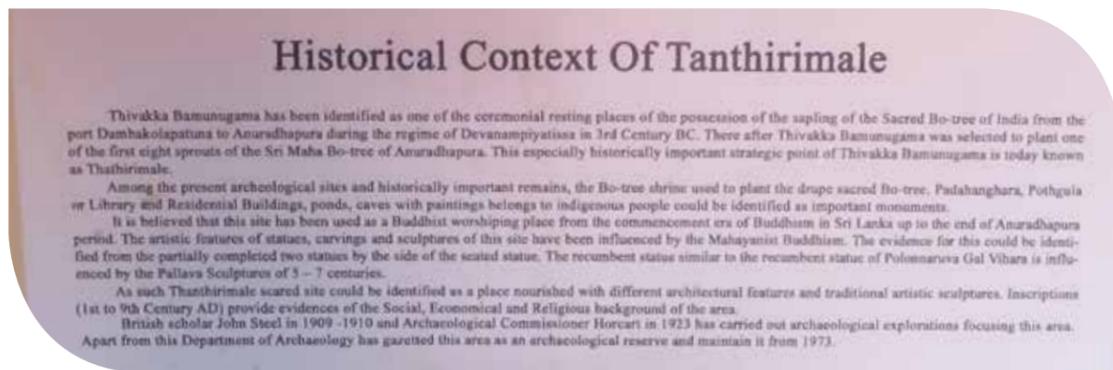


Photo 6: Historical context of Tanthirimale.

4.5 Irrigation and agricultural sites

Twenty-six sites of irrigation structures, including ruined tanks were recorded during the survey. Several bunds are breached and abandoned, while park authorities renovated several and few can be seen still functioning deep in the forest. Periya villa is erroneously identified as a Vila or Villu, but this is a man-made tank. Its bund and spill canal can be identified and it fed the paddy fields, which are presently known as Periya Naga Villu area.

Mahavilachchiya tank constructed around 140 BC by damming Thalawa Oya, which is a tributary of Modaragam Aru, was abandoned for many years and was included in the Wilpattu East Intermediate Zone declared in 1938. The land surrounding the tank was degazetted in 1952 and the reservoir was reconstructed in 1955 mainly for irrigated agriculture. Based on a plaque at the tank installed during a renovation in 1955, the reservoir has a capacity of 32,500-

acre feet (40 million m³) of water and covers approximately 10.5 km² of land when full. It has a capacity to support over 2500 acres of paddy land. The water is provided to the nearby farmland through two canals on the left and the right banks. During the past three years the tank capacity had drastically dropped, due to lack of rain and as a result paddy cultivation had become problematic. Water from Mahavilachchi tank is used by over 100 elephants during drought period and is a home for numerous water birds. The tank bed is used for grazing by livestock during the dry season when it is not full, and a thriving fishery is being practiced.

Kuda Wilachchiya is yet another ruined ancient reservoir believed to have been built by King Wasaba (67-111 AD). The ruins of the ancient earth embankment, sluices, spill in the midst of WNP and the Irrigation Department had undertaken feasibility investigations and surveys to restore the ancient abandoned reservoir. Once restored, this will serve for the domestic needs in Wilachchiya area, augment the irrigation supply to tail end of Maha Wilachchiya scheme, and most importantly, it will be a perennial water source to the wild animals in the Wilpattu NP. Yet it is important to undertake environmental impact studies before any construction takes place.

5. SOCIO-ECONOMICS AND COMMUNITIES

There are an estimated 34,000 people (approximately 6000 households) living within the Influence Zone and they depend mostly on seasonal rain-fed cultivation for subsistence and a modest cash income. Locally, where irrigation is associated with dams, there is paddy cultivation. Due to increasing occurrence of drought, paddy is becoming less popular. In the North, the Southwest and sparsely elsewhere in the Influence Zone, grazing of livestock (cattle, goats and sheep) is important.

Fishing, both for subsistence and sale, is common along the coast and at the larger tanks. Commercial plantations are increasing along the southern boundary of WNP, mainly coconut and a large commercial cashew plantation run by the Cashew Corporation exists to the northwest. The towns of Puttalam, Anuradhapura, Vauniya and Mannar within the periphery of the park have considerable influence socioeconomically as commercial centers.

Two language groups are recognized: Sinhala-speaking people of the South and the Tamil-speaking people of the North and Northeast. The language groups are more mixed in the West. Social identity is also conferred by religious affiliation, there being four religions: Buddhist, Hindu, Muslim and Christian.

The residents of the Influence Zone are mostly cultivators or livestock herders, or are employed by government or elsewhere, depending on the community. There is a high level of dependence on rain-fed cultivation among the communities of the eastern and Southern Influence Zone. The government, especially in the Department of Civil Defence, employs many men while others move further in search of employment. This tends to leave the women in the community as the sole cultivators, where previously it was a husband and wife team. This places an additional burden on women.

The availability of drinking water is a problem in most communities and particularly in Anuradhapura and Vavuniya Districts. Impurities in the ground water are thought to be the cause of widespread chronic kidney disease. Therefore, people who want to avoid kidney disease, purchase filtered water, but at an inflated price. The solution to this is for communities to install their own water filtration equipment. The use of filtered water for drinking and cooking stabilizes kidney disease and can reduce it in the longer term, and young people no longer run the risk of being affected. The installation of filters in affected communities, with the collaboration of the District Offices, is an activity that should be investigated if pilot programmes are found to be successful. The private sector is increasingly active in establishing water purification plants at an average cost of 2 LKR per liter.

5.1 Settlement and land tenure

Many communities have settled within the past 70 years in the Influence Zone. In recent years, settlement has been promoted by government and political agencies in the Influence Zone, in some cases at the expense of existing forest and wilderness. For example, the replacement of forest by agricultural land has been continuing rapidly on the National Park boundary between Tanthirimale and the Vavuniya border.

Land ownership is not clear in some places where cultivators have illegally encroached into state forest. This has occurred recently North of Tanthirimale to the Vavuniya boundary, and in Nochiyagama DS at Ranorawe. The land tenure status of much of the land in the Influence Zone is not universally clear. Different consultations in preparation for this Management Plan have supported different conclusions. However, it is likely that a large proportion of the cultivators and

particularly in Anuradhapura District have cleared State Forest and are cultivating illegally. The process of regularization, in which deeds of the land are issued to such squatters, is not likely to take place in these areas, according to the Forest Department.

The displacement of original land owners away from their land, the settlement of others, either under official schemes or opportunistically, and the widespread use of fraudulent documents ensures that this will be a chronic problem for some time.

Land tenure disputes are dealt with under formal processes, through the courts in the case of private land, and through a government body in the case of State Land.

While land tenure problems need to be solved to ensure that land owners feel they are secure and are confident in their investments in the conservation process, it is a process that is beyond the remit of DWC and the other land and sea management authorities to address. Nonetheless, while people remain unsure of their security, they will be unlikely to collaborate whole-heartedly with the conservation process.

While the various protected areas, as described in Table 2, are under state control through the respective legislations, the Influence Zone has varied land tenure. This land is mostly the responsibility of the Forest Department or State Land subject to allocations to cultivators. In the Northwest, there is a plantation administered by the Cashew Corporation and in the Southwest an area administered by the commercial company Siam City Cement. The Sri Lanka Navy took over 700 acres at Mullikullam during the war and maintains a base there for the purposes of security and law enforcement. Community consultations indicate that villagers previously on this land have been relocated to another area in the GN Division.

Within the Influence Zone, boundaries are unclear between private, public and state land. This means that permits cannot be granted to individuals for the use of land. Consequently, there is a high level of illegal encroachment into forest land for agriculture. Land registration and the issuing of land titles are very slow due to its complexity and government procedures. In addition, land ownership is unclear, often disputed and often lacks transparency. This combination of circumstances ensures that a high proportion of land in the Influence Zone is unregistered. For example, in Mannar District, this situation is severely affected due to security reasons. Many people left their land during the war and have been slow to return. In their absence, people displaced from elsewhere have occupied their lands and consider them to be their own, even though they hold no title deeds. There are many fraudulent deeds in circulation as originals were lost or destroyed during the war. Consequently, in addition to general disputes in ownership, there are also disputes on the location of boundaries. Official allocations of land to displaced people were made on Forest Department land, currently in the Mavillu Conservation Forest. These allocations have been the subject of court action and discussions are ongoing.

Women are disproportionately affected by land tenure problems. As a consequence of the loss of their husbands during the war, there are many households headed by women. In addition, land ownership was registered at a time when the laws discriminated against women and many titles do not acknowledge the equal rights of women.

5.2 Cultivation

Rainfed cultivation is the main livelihood pursued in the southern and eastern parts of the Influence Zone, but much less important in the North. Rainfall in recent years has been scarce and ill timed, not coinciding with the usual pattern of monsoons. In the South and East largely, women whose husbands are most likely to be elsewhere on employment are involved in rainfed cultivation. This situation has been exacerbated by several consecutive years of drought forcing

men to go elsewhere including to Colombo for paid work. Not only the growing of seasonal crops have been difficult or impossible due to lack of rain, but the drought has also caused the death of coconut trees, which has affected many people.

The most valuable crops, depending on location, are rice, maize, chilies and vegetables. The prices that can be achieved for crops are not always sufficient to make it worth harvesting them, since transport to the market may exceed the value.

This was the case for pumpkins in 2018. Agricultural subsidies are available to cultivators who can demonstrate that they have rights to the land, but not to those without such documentation.

By their proximity to the protected areas, the crops of cultivators in the Influence Zone are vulnerable to destruction by several species of wildlife such as peacock, giant squirrel and primates, which ordinarily reside in the forest but leave at night to forage in the crops. Of these, elephants are by far the most problematic because they not only have a large feeding capacity, but they can also be dangerous to humans.

5.3 Livestock

Domestic livestock, including mostly cattle, some goats, poultry and water buffaloes, are found associated with several boundaries of the park and within some of the other designated protected areas. The highest densities are found in the North and within the Southwest borders. In these areas, a minority of the people are carrying out livestock husbandry, but the numbers are growing as markets for meat and dairy products increase. The full value of livestock in livelihood terms has not been evaluated, but cattle and buffaloes in the South and East are raised mostly for milk, which is sold to cooperatives, while in the mostly Christian and Muslim areas of the North and Southwest they are kept mainly as a source of meat. Chickens, kept for eggs and meat, also support significant businesses.

In Musali DS, herds are usually owned by several individuals but managed by only one of them. While there are proportionally many small herds, large herds contain a large proportion of the total. Of 1016 herds of cattles, 47% are contained in only 8% of herds, while for 595 herds of goats/sheep 11% of herds contain 41% of animals.

Meat is the main product of livestock in Musali: 11,000kg of beef and 600kg of mutton in June 2018. However, milk from cattle is also significant with, for example, 40,000 liters produced in June 2018 of which 75% is collected by processing companies.

Livestock diseases are monitored by the Livestock Department. Diseases are a chronic problem in Musali. The following are noted: ovine babesiosis, mastitis, ephemeral fever and helminthiasis, paramphistomiasis in cattle; mastitis, helminthiasis, contagious pustular dermatitis and cerebro-spinal nematodiasis in goats and sheep.

Grazing lands usually consist of a mosaic of grassland and thorny shrub. In protected areas in the North, the illegal entry of cattle to graze is frequent. Damage to the forest is acknowledged but not quantified. The maintenance of grazing lands is assisted using fire, which reduces the woody vegetation and promotes grassland. It is a common complaint that there is not enough grazing for all livestock. The presence of ticks that carry livestock diseases necessitates dipping with acaricides.

Similar to other societies, herd livestock is in the range of large carnivores; in this case leopards, and therefore the livestock owners have an antipathy towards the carnivores. They claim that they are losing cattle due to leopard, although these incidents are not quantified. Compensation claims for lost livestock due to these predator attacks are rarely made to DWC. There are also records of herders poisoning leopards, which is illegal but practicing by them with

easy accessible agricultural chemicals which are lethal to these big cats. Few claims on livestock damages that are recording with DWC, may indicate the rarity of these incidents, or it may imply that the herders take matters into their own hands and retaliate against these predators directly.

5.4 Marine and coastal artisanal fisheries

Many artisanal fishermen use the marine area adjacent to the park legally in support of their livelihoods. The area is part of a Fisheries Management Area of the Department of Fisheries and Aquatic Resources. Most of artisanal fishermen use a design of fibre-reinforced plastic dinghy powered by a single 40-hp outboard motor. Fishermen are obliged by regulation to register and operate in certain ways, through Fisheries Management Committees and become members of Fishing Associations. In theory, fisheries are co-managed by artisanal fishermen with DFAR.

There are various markets for seafood, which many fishermen tend to access opportunistically. However, this is the only part of the Wilpattu Influence Zone that has a coherent resource management strategy, albeit for a single resource: the blue swimming crab fishery, which is managed through a cooperative by the fishermen themselves (Pelagikos 2017). There are other resources, notably fish and other seafood resources that are not managed sustainably.

Each village tends to specialize in one or a few species, and these activities are organized through village-level CBOs known as Fishing Associations. Apart from the Blue Swimming Crab fishery, fisheries are not managed sustainably and where they persist it is by default only. The success of the Blue Swimming Crab fishery is based on good marketing. Through the setting up of a cooperative with no middlemen, better prices are received for crabs and the fishermen's income has improved. Scientific monitoring of the crab population and by-catch, and agreed rules which prevent overfishing, allow the crab to be sold in certified markets which raise a premium price. A management plan for the fishery includes agreed rules whereby overfishing, always a threat in commercial fisheries, is prevented and this is applied by the fishermen themselves.

There is chronic illegal trawl net fishing in the Portugal Bay sector of the Puttalam Estuary by 25 commercial boats (larger than the artisanal fishermen possesses) out of Kalpitiya. Trawling is illegal in Sri Lanka. Letters from the fishing communities to the Director-General of Fisheries have not been acknowledged and the activity continues. There is illegal bottom fishing for prawns, which are valuable on the export market. The trawling is both destroying the bottom habitats and has overfished the prawns to the extent that the catch now consists almost entirely of by-catch. Some fishermen, mostly based at Kalpitiya, take tourists on boat tours in the Puttalam Estuary where they formerly fished, and this activity is progressively replacing fishing as their livelihood. Tourism is increasing in Kalpitiya and has further potential, especially for wildlife viewing. Tourists to Kalpitiya also take tours to Wilpattu, hiring the same former fishing boats to take them to Gangawadiya and transferring to jeeps there.

There are two official settlements (Palugathurai and Pukkulam) on the WNP shore, both in exclaves and accessible from the sea. These villages were allowed to remain when the coastal block was incorporated into the National Park because their use was seasonal, and access was allowed by sea only. Later these residents became permanent and there is an increasing of use of access roads through the park, both circumstances being contrary to the original intention. Most also have residences in Kalpitiya or on Karativu. There is a third enclave at Karawalakuda that was formerly occupied by a seasonal fishing village but is now occupied by a naval camp.

A further unofficial, and presumably illegal, fishing settlement is found on the coast at the park's southern boundary, at the mouth of the Kala Oya. Coastal and marine Influence Zone of the WNP present status and management concerns are given in Annex 4.

5.5 Inland artisanal fisheries

Inland fisheries are important to communities around the two large reservoirs, Tabbowa and Mahawilachiya. These fisheries take freshwater fish for sale, mostly using nets. There are 680 members of the Mahawilachiya Wewa fisheries society of which only 35 are women. However, three years of drought have depressed the water levels, and fish populations have not recovered in the absence of high waters. Many fishermen, who are almost exclusively men, have left the area to look for work. Both Tabbowa and Mahawilachiya reservoirs receive water from the Mahaweli Project when there are surpluses further South.

5.6 Forest utilization

There are many forest products that have subsistence and cash value. Given the unreliability of the rainfall for cultivation and inland fisheries, the relatively low productivity of livestock, and the lack of alternative business development, there is a rather high dependency on forest products among residents of the Influence Zone. This is notable among the people living in the forested land of the northern Influence Zone where poaching for meat and collection of honey is common. Harvesting from the National Park and Conservation Forest is illegal but takes place at chronic levels where a buffer of Forest Reserve or State Forest no longer exists.

Products sought after from the forest include meat from wild animals, medicinal herbs, honey from wild bees, a range of fruits, notably those from the Palu tree (*Manilkara hexandra*) which are both common and prolific, fire wood, timber and poles for building, fencing and gardening.

The women, the majority of whom are from Anuradhapura District, who specialize in the collection and sale of medicinal herbs form a recognizable group in the Influence Zone, are familiar with forest plants and animals. There is little potential for sustainable use of wild honey, unless the traditional approach of destroying both hive tree and hive is abandoned. However, the potential is great for bee keeping, but training, mentoring, quality and other controls are essential if that industry is to succeed. The conversion of traditional honey collectors to beekeepers is not necessarily a successful mechanism, although it can be attempted. Potentially the greatest value of forest products, at least locally, is not through harvesting but through tourism. The demand and potential benefits of leases for private tourism camps and other facilities should be explored.

Access to the remaining Influence Zone forests, and the harvesting of forest products, should be subject to co-management agreements between the relevant government organisations and the communities. At the same time, use must be controlled by rules that ensure the sustainability of the resource.

5.7 Livelihoods and business development in the Influence Zone

Beyond agriculture there is little effort to promote alternative livelihoods in the Influence Zone. Vocational training tends to lead to youth emigration from the Influence Zone.

Honey is a traditional cash commodity around Wilpattu, being harvested opportunistically from wild hives. Wild bee populations suffer from the harvesting techniques, which tend to destroy hives, so that they have little potential to increase. There is considerable interest in increasing honey production by husbandry and this will need training, mentoring and support in marketing and other business aspects if it is to succeed. The WNP Community Outreach Programme has already sponsored some residents to receive training in bee-keeping and honey production. The same applies to village-based wildlife tourism that also has some potential.

People's expectations of benefits from various activities and businesses, especially tourism appear to be inflated and unrealistic and these need to be moderated by discussions of costs and competitive pricing. Basic business practice needs to be taught to those entering new businesses, or for improving existing businesses. The development of the supports for new businesses is probably best mediated through community-based organisations (CBOs), which are under the supervision of the Divisional Secretaries.

The chena cultivation cycle, also known as shifting or slash-and-burn cultivation, can no longer be applied over most of the cultivated area because there are too many cultivators and it is now illegal. Cultivators must continue to cultivate the same plot and to maintain its fertility. Biodiversity is almost destroyed on cultivated land and is not restored unless the land is abandoned, as with the traditional chena system.

Since many local people, particularly women, are interested only in cultivation and not on alternative livelihoods, it is essential that information on viable alternatives are given and supported. In the East and South, few women are interested in pursuing alternative livelihoods in the non-growing season, such as mat making, which is pursued reluctantly to earn cash during droughts. However, in the North women have been keen to take part in business activities, such as manufacture and sale of crafts, when they are supported. Near Hunuwilagama, the main entrance for visitors to the National Park, women are engaged in tourism-related activities. It is clear that. When viable opportunities exist, women might take part in businesses, but they may be reluctant to risk taking part in an activity they are unfamiliar with, or where the benefits are not satisfactory.

It is essential that the people make their own decisions regarding the activities they pursue for a living. However, there is a lack of information on the options. Support of the rural communities of the Influence Zone should start with a discussion of possible livelihoods and the practicalities, and the potential benefits or drawbacks, of each alternative. Such an approach should encourage realistic expectations rather than the unrealistic ideas that currently prevail and lead to sensible livelihood decisions. Such discussions should precede discussions on support from DWC or other agencies, and discussions on rules that apply (e.g. sustainable use and penalties for not keeping to the rules). The application of rules is essential if the chosen livelihoods are not to be used as vehicles for illegal activities such as poaching. Therefore, it is essential to formulate village development plans in facilitating livelihoods for the influence zone communities.

There is an emerging trend to support the development of small-scale non-agricultural business of women, especially in Vavuniya. The support comes from NGOs and government departments. A Government poverty alleviation programme known as "Samurahi" was promoted but has not yet been implemented.

The issues related to construction of hotels and other tourism facilities, and the development of commercial farming, within the 1.6 km Restricted Development Zone need to be resolved as such developments are illegal.

5.8 Social issues

One aim of the Management Plan is to promote participatory conservation, in which communities can contribute to both decision-making and actions. In doing so it is essential that all people equally can participate. One area where participation is clearly unequal in many aspects of society, including in and around Wilpattu, is gender. Without the full participation of both men and women in the conservation programme, it is likely to fail since each gender makes up approximately half the residents of the Influence Zone. The South and West of the area are most

affected by gender inequality. Therefore, the Management Plan proposes several activities to close the gap between the genders in both participation and activity.

Women are active in setting up groups and carrying out community activities, despite a lack of experience and training. However, women tend to be unaware of the government services available, for example for those affected by domestic violence.

Both women and men tend to marry early. This places pressure on women to stay at home to fulfil domestic obligations, even if there are other opportunities. While women have generally completed O-level education, they tend to stay at home and assist with cultivation and domestic chores. There are few other opportunities. However, tourism services, such as driving jeeps and guiding, are male-dominated but could as easily be carried out by women.

Unemployment and illegal earnings

Consultations have highlighted several social issues that tend to be general in communities but are acute in certain villages. One is the alcoholism, which is exacerbated by illegal distilling of alcohol. This leads to violence, often domestic, and causes community dysfunction. The growing use and trading of drugs is another illegal activity that harms the communities. Children are frequently used as the runners to deliver drugs to the clients or to the middlemen. Relative roles of men and women in these issues, and their causes and consequences, need to be addressed, but one aspect is clearly the lack of opportunities for gainful employment of young men. Since women are disproportionately affected by these activities, women's groups have become active in lobbying the police to act.

Involvement of men in illegal activity (production and consumption of illicit liquor & Marijuana business and consumption) has risen during the recent drought years. It has a severe impact on the peripheral villages in Anuradhapura and Puttalam Districts, e.g. liquor stilling takes place near Kala Oya at the WNP boundary in Karuwalagas Wewa Divisional Secretariat

However, the authorities have not often responded. Involvement of men in illegal activity has risen during the recent drought years.

Community dysfunction interferes with applying conservation, so National Park outreach will need to promote discussions, activities and courses that address these challenges to community participation. One approach that has piloted is the holding of women's leadership courses in part of which husbands also attend. Equivalent discussion groups for men, especially adolescents and young men, will be beneficial. It is recommended that the Outreach Programme organizes and supports these activities.

Other economic considerations

Residents of the Influence Zone admit to using many natural resources for both subsistence and commercial purposes. Some of this use is legal, some illegal. The use of natural resources has been listed but not quantified. Natural resource use includes collection of firewood, wild herbs for medical uses, wild fruits, honey and fish. Inland fisheries form an important commercial and subsistence sector in the reservoirs at Tabbowa and Mahawilachiya. It is not usual for grazing land to be considered as bearing an economic value, but it must be so. Those areas of grassland interspersed with forest and thorn thicket that persist are essential to livestock owners.

Sand mining, though illegal and destructive of wildlife habitats in both marine and terrestrial situations and along watercourses, is a persistent activity. Law enforcement data of Forest Department of Mannar District indicates that this is an increasing issue in Musali Divisional Secretariats. During the preparation of this Management Plan, a Local Consultative Committee meeting (LCC) was held with participants representing all 4 districts and the issue was

discussed. It was understood that there is a huge demand for sand in the district, it is because of the consequence of banned for providing license for legal sand mining by government. Discussing the issues among the relevant line departments, possible solution, which could reduce illegal sand mining, was proposed at the LCC. There is a great demand for sand from the construction industry, which ensures that this is always likely to be a problem. Locally, there are also quarries for rock, which is also in demand for construction.

There are two public roads through WNP, one in Mavillu CF, and varying access to the remaining protected areas. Public access of this nature is not only a resource with an economic value but it also imposes costs on the protected area, either indirectly by allowing access for harmful activities such as poaching, or directly as when wildlife is killed by speeding vehicles. The construction of public access to one of these roads, that between Eluwankulama and Mullikullam is disputed officially, and it is currently used daily by hundreds of vehicles.

The forests and soils are assumed to contain significant quantities of carbon. In the context of climate change, intact forests and grasslands provide a considerable environmental service by storing carbon in wood and soils. Their loss would contribute further to an increased release of greenhouse gases and consequently to climate warming. The situation is assumed to be stable. The trend in the Influence Zone, in contrast, is one of declining forest and increasingly disturbed soils caused by expanding agriculture. Under these conditions, carbon is quickly lost to the atmosphere as carbon dioxide, contributing to climate warming.

Forest is mostly destroyed or degraded in the East and South. Reforestation, by allowing natural regeneration in areas abandoned by agriculture, would favor carbon sequestration in trees and, eventually, in soils.

The presence of forest is known to be beneficial in watershed management. The contributions of the parks seasonal streams to the main drainage have not been studied, but the moderating influence of the forests on run off and flow rates must be considerable.

The southern part of WNP also possesses an intact floodplain of the Kala Oya, on to which the river may flood without restriction. In times of high rainfall this must be a valuable environmental service to people living to the South. Cultivators may receive subsidies to produce crops. Since biodiversity conservation is the core activity of the WNP and is also important within the Influence Zone, the environmentally friendly cultivations should be promoted and based on which the subsidies can be derived.

Vocational training in the Influence Zone

People of the Influence Zone are over-dependent on rain-fed cultivation. During the last three years of drought they could not engage in agricultural practices. As a result, the cultivators looked for other alternative job opportunities locally, but failed. Hence, they have tended to look for work outside the village. However, they could not succeed due to lack of skills needed in the wider job market.

In the South and East, training opportunities are being provided by the Divisional Secretariats for women on self-employment opportunities. Yet most women are unable to take advantage of this opportunity due to domestic obligations. In Mannar and Vavuniya in contrast, women are enthusiastic participants in small businesses and are being facilitated by courses provided by the Divisional Secretariats.

Anuradhapura district has several vocational training opportunities, but due to lack of awareness/misconception in the peripheral villages on demanded training courses hinders their involvement. However, jobs offered by the garment factories are well known among the youth

and more girls are getting jobs in these factories where they get limited income with long working hours. There are some agencies providing vocational training courses, but the youth are not interested in them as there is no connection between the trainings and the job markets available locally.

Vocational training, awareness creation in the peripheral communities will help to reduce economic and resource dependency which should be facilitated by DWC Outreach and Extension Division. It should include school students, school dropouts, youth groups, parents, school administration and industrialists. This would need a system to help the trainees to access job markets, or to use their new skills to set up local businesses.

Existing Community Outreach

The WNP Outreach Programme currently has a focus on improving livelihoods among the people of the Influence Zone, but the programme is under-resourced and is at an early stage. It intends to improve livelihoods by promoting training, e.g. bee keeping for the commercial production of honey. Members of other communities have received training in bee keeping independently of the Outreach Programme. The Outreach Programme will need to carry out post-training monitoring.

The Outreach Programme develops the village development plan (VDP) using participatory rural appraisal (PRA), which identifies areas requiring support and potential alternative livelihoods. Currently, DWC has completed VDPs for two villages in the Influence Zone. In areas where cultivation is prominent, human-elephant conflict (HEC) is usually recognized as a problem as well as chronic kidney disease (CKD) caused by chemicals in the drinking water is also significant. The acuteness of CKD in many villages and the slowness of response from relevant authorities mean that the purchase and installation of water purification equipment could be a potential intervention by the DWC.

The Community Outreach Programme of DWC for WNP is small and under-resourced and had worked so far with only a few peripheral villages. At present only one Community Outreach Officer is available from DWC to cover the entire IZ. The workload is consequently too much for one person and is a serious under-investment in conservation. In summary, there is insufficient communication with the communities of the Influence Zone to address the problems of wildlife and people. During consultations it became clear that there was little understanding of the national park and the relevance of its protection among the local communities. In future, the Outreach Programme should organize more awareness tours, enabling people from the park surroundings to actually get to know Wilpattu and its value and to intensify the interactions between DWC and the locals. For conservation management, there is an urgent need to improve the information provided to the communities with regard to the role and value of the Park and to the potential benefits of wildlife.

It is recommended that the greatly expanded Community Outreach Programme in WNP should be led by a second Deputy Warden under the Park Warden, in complement to the existing Deputy Warden who would continue to cover activities within the National Park. The two Deputy Wardens should collaborate on Law Enforcement outside the National Park. In addition, recruitment to expand the team should be proactive, building by the end of the five-year period to a total of five Outreach Officers, six assistants and four education staff under the lead of the Deputy Warden in charge of Outreach. The number of Tamil speaking officials in DWC is limited especially in Mannar and Vavuniya Districts which needs to be addressed. The Forest Department's Community Extension Section is responsible for liaising with communities who live within or on the margins of forest area and therefore there is a need for collaborative activities between the two agencies.

Education and knowledge

A survey conducted in 2018 by GOPA on the residents of the Influence Zone indicated that in most areas people had not reached O-level standard and that tertiary level education had been received by very few. In some divisions up to 25% had not received any education. There is also some indication that teachers are not enthusiastic in their jobs, and that parents are not proactive in promoting their children's education. The children of economic migrants, working abroad, often lodge with grandparents who are even less influential at promoting children's education.

The DWC Community Outreach Programme has taken on an educational role, incidentally to its main current role of promoting livelihoods, since discussions on livelihoods often revolve around conservation. There are few environmental NGOs active in the Influence Zone and their influence is mostly local.

6. THE VISITOR EXPERIENCE IN WNP

6.1 Visitor Numbers

Wilpattu National Park was renowned internationally as one of the best places in the world to observe leopards in the wild. Past administrative reports of the Department of Wildlife Conservation indicates that the visitor number to the park increased from 133 in 1951, 1,900 in 1958 to 7,490 by 1968 and 22,076 by 1978 (Nikcolos, 1953; Packeer, 1962 and de Alwis, 1982). In early 1980s the park received around 25,000-30,000 visitors annually. Subsequently, the war caused the park to be closed to visitors for over 20 years between 1985 and 2010. Visitor numbers have risen progressively since WNP was again reopened to the public in 2010 and it received 84,766 visitors in 2017, of which 33% were foreign which contributed 90.5% of the income in 2017 (Fig 6.1.1). The proportion of foreign tourists has been rising. Of the foreign tourists, the majority are from Europe with the remainder mostly from Asia. Of the Sri Lankan visitors, 86% are residents of Colombo. Notably, only 5% of visitors are children. It is also notable that visitor numbers are still much less when compared with few other Sri Lankan national parks (Refer Annex 5 for details).

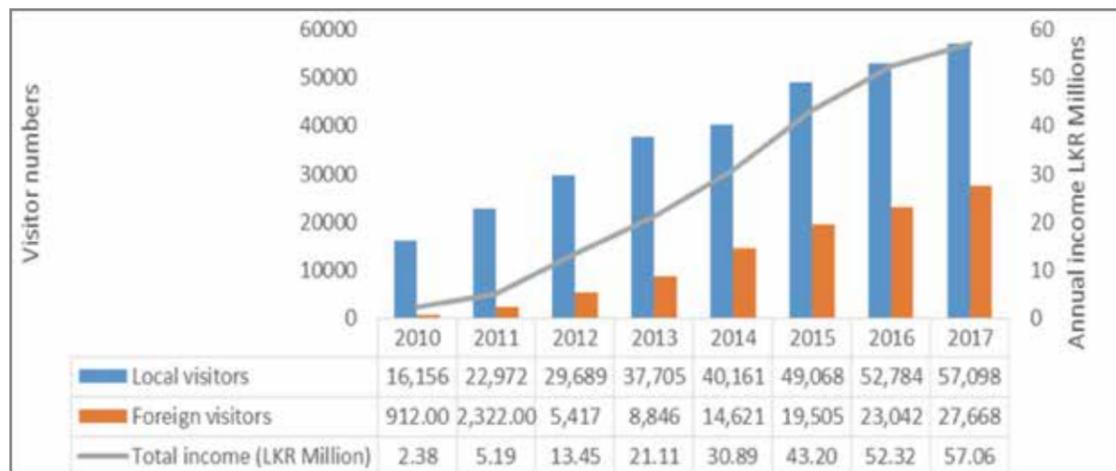


Figure 6.1.1: Annual visitor arrivals and income at Wilpattu National Park (Source: DWC)

Analysis of monthly visitor data for the past 4 years indicates that the highest number of visitors come to the park during August and December. Local visitor arrivals are high during the school holidays (April, August and December), while foreign visitors seem to prefer July-August and February to March (Fig.6.1.2). In 2018, 102,347 tourists have visited the park, and when this figure is compared with the 2017 visitor arrivals 17,581 additional visitors had entered the park in 2018.

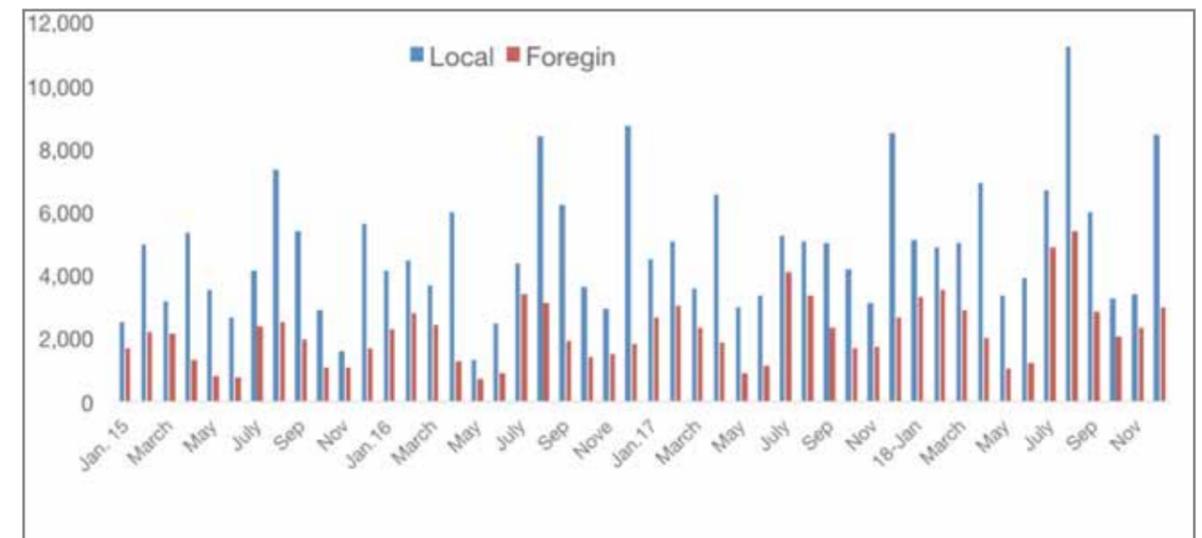


Figure 6.1.2: Monthly visitor arrivals at the Wilpattu National Park (Source: DWC)

As stipulated by FFPO, visitors pay for a permit to enter the National Park and observe the wildlife: Single-day entry fee for a Sri Lankan is LKR60, and for a foreigner USD15 (LKR 2700). As entry to the park is only permitted by 4WD, visitors have to hire a commercial safari jeep for the cost of LKR 4,500 to 5,000 for a half-day tour, while for a full-day the cost is LKR 8,500 to 9,000. Visitors are allowed in the park only between 6am and 6pm so they have no opportunity to view nocturnal wildlife. Most visitors enter the park for a half-day tour that can last from 2 to 5 hours, while fewer stay for the whole day. Those occupying bungalows and camp sites spend more than one day. A survey indicated that 65% of visitors are visiting the park for the first time (including most foreigners), while some that revisit (most Sri Lankans) have done so on average six times in the past five years. It also revealed that 88% of visitors to the National Park had come to the region solely to visit Wilpattu and not to combine their trip with visits to Kalpitiya and Anuradhapura. Of the visitors, 65% are visiting the park for the first time. Apart from experiencing nature, there is some awareness among local visitors of WNP as a significant location in Sri Lanka's history, and there are some prehistoric and many archaeological sites. Most of these sites are not conspicuous or accessible, nor do they have the type of interpretive material that would make them intelligible to visitors.

6.2 Safari Jeep Drivers and Volunteer Guides

Around 100 commercial safari jeeps bring tourists to Wilpattu National Park. Out of those the majority (90) of jeeps enter from Huniwilagma entrance, while the remaining enters the park from Eluwankulama. Presently there are two safari jeep drivers, associations for Hunwilagama entrance: The Wilpattu Jeep drivers association which was formed in 1990s, while the Hunuwilagama jeep drivers, association was initiated in 2003 due to practical problems of the jeep drivers living near to Hunwilagma park entrance and due to conflict situation among the two groups.

DWC has mobilized educated young residents in the fringing villages of wildlife-protected areas, as volunteer guides for the relevant national parks. These volunteer guides are deployed for the interpretation activities at the national parks. They accompany the private vehicles that enter the park as well as bungalow and camp visitors who stay inside the park overnight. Presently there are 21 such guides at the Park. The guides are paid a daily allowance of only LKR 700 for the days they work. However despite the small amount of payment from DWC these guides are very dependent upon tips from tourists which provides a substantial proportion of their

income. Consequently, the guides mainly aim to satisfy tourists by providing close encounters with wildlife to maximize the tips. The quality of guides is variable, although in terms of spotting wildlife and knowledge about wildlife most are satisfactory, and some are good in guiding and interpretation. Also, few commercial tourist establishments provide their own naturalists for their visitors who are more experienced and knowledgeable on wildlife and biodiversity. However, guides are limited in number and variable in quality. In the absence of guides, safari jeep drivers are expected to provide interpretive services, yet private vehicles will not be permitted to enter the park without a guide. As a result, park guards and rangers are also utilized as guides when visitor traffic is high.

Apart from volunteer guides there are no dedicated information staff. Most guides have received some training, and most are enthusiastic about their roles. However, there are some who lack motivation and recent recruits have not received training. The Outreach Officer covers the information transfer function for the communities on an incidental basis, in addition to his many other duties. A basic Code of Conduct exists for visitors and is printed on the published park map that is provided for no charge but is not made readily available to the tourists. Jeeps were relatively rarely seen to transgress the code of conduct. Transgressions are more frequently observed among private vehicles. Discourteous behaviour, for example blocking the view of another group is also less common among Jeep Drivers than private vehicles. Each jeep owner is a member of one of three associations, which promotes the owners' interests. The drivers are universally male, although the activity is equally suitable for women. This gender imbalance needs to be addressed.

6.3 Visitor facilities and interpretation

WNP has a diverse and spectacular fauna in a wilderness setting and, the single greatest attraction is to view leopards. There is some awareness among Sri Lankan visitors of WNP as a significant location in Sri Lanka's history, and that there are some prehistoric and many archaeological sites. Most of these sites are not conspicuous or accessible, nor do they have the type of interpretive material that would make them intelligible to visitors. Domestic visitors to the park also prefer having a bath either at Kudarimale (sea) and Kala Oya.

Presently seven circuit bungalows, one dormitory and three campsites are being operated by the park to provide accommodation to visitors up to a maximum of three nights. These serve relatively few visitors and approximately 5% of the total tourists who entered the park in 2017 utilized the facilities. Weewala bungalow and Wellamunala campsite which were constructed recently had not been utilized, while two more bungalows (Kali villu and Makalanmaduwa) and several campsites had been abandoned due to various reasons, mainly due to lack of water. Bungalows need better maintenance protocols since it was noted that on many occasions, requests for repairs were not immediately attended to. The main challenge for bungalows is in providing a reliable year-round water supply, while lack of good toilet and bathrooms was also highlighted as a setback by a majority of visitors. It is clear also that the older design of single-story bungalow is more appropriate than the newer designs and is more acceptable to visitors. Bungalows are booked online through DWC Headquarters on a first-come-first-served basis, a system that seems to be effective. However, notice of bookings to the WNP administrative staff seems to be haphazard and, occasionally, not at all. Bungalows are usually booked at weekends and public holidays, less during the week. A detailed account of issues related to accommodation facilities inside the WNP is provided in Annex 6.

Interpretive facilities are few, consisting of a poorly maintained and outdated museum, and services are limited to a small team of guides with variable aptitude, motivation and training. A map, with the full code of conduct, free of charge is available at the gates, but notably it receives a low rating among visitors. Otherwise there are no interpretive facilities.

The lack of a brochure and guidebook is conspicuous, and this deficiency should improve as soon as possible. Visitors frequently suggest that more information should be provided about the National Park and its wildlife. There is simple direction signage in the park at some track intersections, and the names of some locations are also signed.

Information needs to be made available to the public. This satisfies two requirements:

1. That people's awareness of the value of biodiversity and the need for its conservation increases, and,
2. That a high-quality visitor experience is maintained.

The first requires an education programme; the second requires an interpretive programme. Interpretive facilities for the public visitor are rather limited and not readily available or sign-posted. Information at WNP HQ Hunuwilagama is in the form of a museum with photos and posters. It is out of date and not of sufficiently good quality to provide positive impact. Furthermore, DWC has observed that the gate is not a suitable location for an interpretive center, a lesson that has been learned both in WNP and other National Parks in Sri Lanka.

Information for visitors would best be made available at a dedicated center. The main gate is not an appropriate location for an interpretive center. A site should be sought between Hunuwilagama Gate and at an attractive resting place for such a facility such as Kumbuk Vila Resting Place.

The resting area at Kumbuk Vila, and any further resting areas developed, would be suitable locations for such an Interpretation Centre within the National Park, to supplement the information given by guides. Information boards, depending on the location, should cover biodiversity, ecology, geology, prehistory and history, and conservation.

There is neither an affordable guidebook to WNP nor any brochure, a situation that should be rectified as soon as possible. There are only two printed documents available to visitors to WNP: A map of the main part of WNP that includes the Code of Conduct is available at the gates at no charge and an illustrated guide and checklist to the birds of WNP published by the Field Ornithology Group of Sri Lanka (FOGSL No date) that is not available at the gates.

There is also a short illustrated book (Weeratunga 2007), aimed at the public, describing WNP but it is on sale to the public only through the IUCN office in Colombo.

The DWC website is informative at a basic level and provides a service for the booking of bungalows and campsites. The private website www.wilpattu.com provides much information on natural history and the National Park in general.

There is no formal systematic education and awareness programme on biodiversity, conservation, and human-wildlife conflict mitigation or on the role and importance of WNP. The Outreach Officer provides information on a limited and ad hoc basis as an incidental part of his interactions with the communities. A dedicated education and awareness programme, providing information on biodiversity, ecology, conservation and the benefits of these to society, is an urgent need among the residents and institutions of the Influence Zone.

The reach of a well-developed education programme should eventually be much further than the Influence Zone itself, especially among schools, colleges and other institutions. If an Interpretive Center is developed, it should double as an education center, providing a service also to the communities of the Influence Zone and further afield, and a venue for training courses.

It is proposed in this Management Plan that interpretive services are provided through the Visitor Management Programme, and education is provided by the Outreach Programme. Some of the infrastructure and personnel required can be shared between the two Programmes.

6.4 Spreading the visitor load

While over 84,000 visitors entered WNP in 2017, the numbers exceeded one hundred thousand in 2018 (102,347). As per the traffic data provided in DWC website, the number of vehicles entering the park for a day can vary between 12 -124. Crowding was not notable, except occasionally where a leopard or bear is sighted close to the road. Tourists and jeep drivers seek after these two species and guides usually inform each other of sightings, facilitating the arrival of others. Many cars can then quickly develop to an unacceptable degree, diminishing visitor experience. Yet by the end of 2018 the visitor numbers are expected to exceed one hundred thousand with increase in coming year if the political stability of the country is maintained.

Most visitors enter the National Park at the main Hunuwilagama Gate in the Southeast and approximately 11% entered from the Eluwankulama Gate in the Southwest, though the trend is increasing due to the proximity of Kalpitiya on the coast, where marine tourism has developed rapidly. Although, two more ticketing points at Mullikulam (Mannar side) and Tanthirimale (Block IV) were constructed in 2012, they are yet to be operationalized. There is also a proposal to open a new ticketing point at Cheddikulam to cater the tourist entering from Northern Province. Access to some WNP roads is controlled in an ad hoc way, or because they become impassable due to rain, but control could be more systematic in a manner that disperses visitor use more evenly. Many tracks became unserviceable when management was unable to maintain them during the security crisis, and those have been encroached to varying degrees by woody regrowth. These tracks are progressively being restored to use, but there is still a considerable length of track that needs repair. When this is achieved it will allow for the dispersal of visitors even more, further minimizing congestion.

The main area of interest to tourists, and where unacceptable congestion could develop, is the central villu zone where high prey densities support many leopards. Scenically, this is also the most attractive area in the National Park. The coastal section has few tracks and none in poor condition but, except for Kudremalai, it receives few visitors. With its different scenery, its historical sites, its characteristic fauna and its characteristic wildlife, it has the potential to absorb some visitor pressure. The Southern portion of the park has several tracks that could be improved, especially to make them less affected by rain, but there are few grasslands or wetlands to be seen from the tracks, although small spurs and realignments could improve this. The Northeastern section of the main part of the park has many broken tanks and tracks in poor or unusable position. This latter area could provide a second circuit, especially if some tanks are rehabilitated as proposed in the Environmental Programme. This would double the current visitor capacity and halve the visitor pressure. It is interesting from visitor feedback surveys that improvement of road surfaces and an increase in the road network is frequently suggested. However, improved road surfaces tend to lead to speeding, which can be difficult to control.

Visitors need stops to alight from the vehicle, to use toilet facilities and to stretch their legs. The only toilet facilities are at Kumbuk Vila and only two further alighting points exist; Kudiramale and Marai Villu. Such stops in the itinerary of a jeep incidentally will slow down the flow rate and reduce the numbers arriving at a congestion point. To increase the time spent at stops and to improve the experience, a short walking trail at each for watching butterflies, birds and general natural history would be beneficial. It is recommended that further resting points with toilets and interpretation boards are installed at Kudiramale, Marai Villu and Pomparippu.

Congestion is a serious risk and, with the potential for attracting many more visitors to WNP, there is an urgent need for management to prepare a policy and protocol for minimizing it. It is

essential that the problem of visitor overcrowding is not allowed to develop as it has elsewhere (e.g. Yala National Park). Presently access to certain areas such as Block IV is not provided, yet there is no initiative to limit numbers on a quota basis, unless it is to prevent access in the interest of the wildlife because of drought, as happened in 2017.

6.5 Tourism outside WNP

WNP is bounded mainly by three districts: Anuradhapura, Puttalam and Mannar, while a very small area in the North is situated adjacent to Vavuniya district. Presently both Anuradhapura and Kalpitiya (Puttalam district) are popular tourist destinations with well-established tourism facilities. Kalpitiya has a growing tourism industry based on such activities as kite-surfing, viewing marine mammals and snorkelling on coral reefs, while Anuradhapura is more popular for culture based tourism. Dolphin and whale watching is subject to regulations by DWC under the FFPO and issue of permits for this activity is undertaken by the Kalpitiya Range office, which comes under the preview of Puttalam Assistant Director. There are approximately 90 boats taking out visitors from Kalpitiya, half of which specialize in this activity while the remainder also spend time fishing. The Tourism Boat Owners' Society coordinates their interests. Visitor numbers peaked at 18,048 in 2015, but has declined to 13,415 by 2017 and out of that 28.6% are foreign visitors. Income in 2017 exceeded LKR 40 million. In the first five months of 2018, 14,546 people had visited the area. The peak visitor arrivals are from December to April, while the onset of southwest monsoons in May reduce the visitor numbers drastically. This area is not visited by tourists from June to September due to rough sea conditions (Refer Fig.6.5.1).

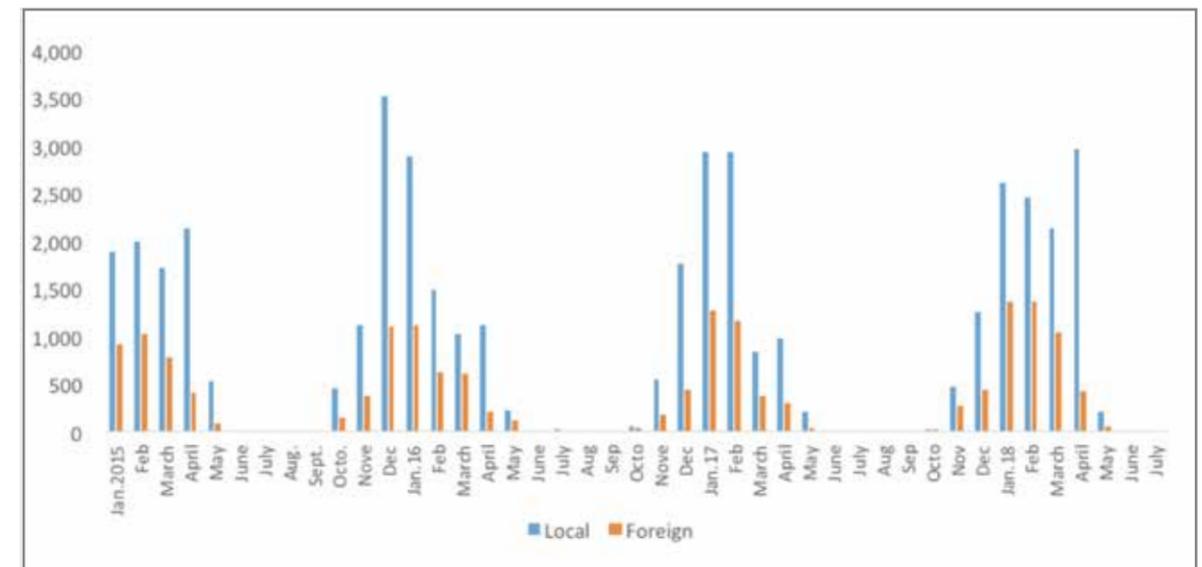


Figure 6.5.1: Monthly visitor arrivals for marine mammal watching

During this rough period, boat trips in the Puttalam Lagoon becomes a popular alternative and this also offers the opportunity to bring visitors from Kalpitiya peninsula by that means to Gangewardiya where they can connect with jeeps and continue into the National Park through the Eluwankulama Entrance. There are proposals to construct a wharf at Gangewardiya to cater for these visitors. Lagoon tours and night camping in the beaches of islands fringed with mangrove areas are very popular, especially among the locals. During weekends and holidays large numbers gather in these small beaches and the boats bring in the visitors from Gangewadiya as well as Kalpitiya peninsula. Further boats take tourists to see Kudarimale point, which is believed to be where King Vijaya landed. Presently this activity is unregulated and several issues including solid waste management, illegal entering to the WNP, especially to observe the Baobab tree as well

as poaching of wildlife is reported. The roots of the Baobab tree are exposed and the coastline is eroded, and this might endanger its long term survival. Discussions with boat operators at Gangewadiya highlighted the importance of awareness and education on lagoon resources. There are currently at least 40 businesses providing overnight accommodation in the 10km strip along the Southern boundary of WNP between Hunuwilagama Gate and Gangewadiya on the coast. The income of tourism service facilities in the vicinity of the park is thus far unmeasured but its potential may be considerable. Wildlife habitats outside WNP, where they persist, can potentially support tourism, but in most locations in the South and Southeast there is little wildlife habit remaining with the spread of agriculture. Presence of tanks that support considerable wildlife population such as Hunuwilagama and Mahawilachchiya in the eastern border, as well as Vinayadikulm associated with the Wilpattu North Sanctuary provide opportunities to promote nature-based tourism in these peripheral areas. The Mavillu Conservation Forest, which is continuous with the northern broader of WNP is yet to develop its tourism potential.

Beyond the Influence Zone, there are several protected areas in the North and coastal features such as coral reefs and mangroves, dolphins and large whales are found in the marine environment adjoining the western border of the park. The presence of these significant wildlife areas suggests that wildlife-based tourism has much potential in the area. However, except for Kalpitiya, Anuradhapura, and the accommodation services along the Southern boundary, the sorts of services usually required by visitors are lacking.

Location	Wildlife	Visitation
Vankalai Sanctuary (Ramsar Site)	Waterfowl, Waders, mangroves	Few
Viddataltivu	Waders, Waterfowl, seagrass	Few
Giant's Tank Sanctuary	Waterfowl	Few
Madhu Road National Park	Evergreen Dry Forest	Few
Adam's Bridge National Park	Coral reefs, seabirds	Few
Anuradhapura Sanctuary	Wetlands, Waterfowl, Waders	Few

Table 11: Wildlife attractions outside the boundary of Wilpattu National Park and Influence Zone

There is already considerable tourism attracted to the historical and cultural aspects of Anuradhapura. In the case of WNP, 88% of visitors admitted to being in the area solely to visit the park. This is interesting since it suggests little connection between WNP and the other two tourism centers. Notwithstanding a possible seasonal bias in the survey, improved connections between all three could help to increase not only the numbers of visitors to the National Park but also to the Influence Zone.

Since visitors to WNP are not allowed to alight from the vehicle to walk around, there is no opportunity there for trekking, bird watching and other specialized nature activities and even general natural history. The rule is necessary for minimizing disturbance to wildlife, and to maximize the chances of seeing leopards, the park's main attraction. Watching the large mammals, and the waterfowl and waders on the wetlands is the only high-quality wildlife experience that is feasible in WNP from a jeep. The other experiences are of marginal quality by comparison, given the prohibition on walking. However, judging by comments from visitors, this situation can be frustrating and one suspects that there is potential to conduct trekking, bird watching tours and other wildlife experiences in areas without these restrictions outside the National Park. In addition to wildlife, there are historical sites of interest in the Influence Zone, such as in Thabowa Sanctuary and at Tanthirimala.

Therefore, wildlife-based tourism in forest, wetlands and other areas adjoining village land, seems to be an opportunity with potential, complementing visits to WNP. Such tourism could combine trekking, bird watching and photography with low-key accommodation and transport facilities, giving access to people on lower budgets as well as visitors with specialized interests. Much of the remaining forest is under the management of the Forest Department, or DWC in the case of Sanctuaries, so co-management arrangements would need to be pursued if local people wished to pursue wildlife tourism in those areas. Residents of the Influence Zone have shown an interest in starting such ventures, and a few businesses are already in operation. However, encouraging people into tourism will need to be preceded by comprehensive discussion of the alternative incomes to be made before decisions can be made.

Small tourist businesses will need support to allow them to develop acceptable standards. This should include appropriate training and help to set up the required catering, communications and logistics systems. The domestic nature of catering, and the good mobile phone coverage suggests that accommodation and communications are unlikely to be large challenges. Guiding will need more specialized training and should be used as an opportunity to achieve gender equality in this activity from the start. The model of guides at Sinharaja Forest Reserve should be studied because it not only provides an example of high-quality guiding, in that case mostly for bird watchers, but can also highlight the pitfalls to be avoided.

There is also potential for medium and high-end tourism through the setting up of hotels and camps by private business. However, this should avoid the present problem created by businesses developing infrastructure illegally in the Restricted Development Zone. Camps and hotels would also benefit from co-management agreements between communities and government authorities on access to wildlife habitats for tourism.

The main issues affecting sustainable tourism at Wilpattu National Park and its Influence Zone can be summarized as follows:

- External factors (political instability, civil conflicts, climate related issues such as droughts and floods)
- Lack of tourism infrastructure (access roads, bridges and culverts, tourist-stop overs, accommodation etc.)
- Inadequate Interpretation facilities and services with limited conservation awareness programme for visitors and communities
- Lack of support services facilities (restaurants, souvenir shops)
- Tourism is leopard-centric and only by means of safari jeeps (limited opportunities for walking/trekking)

7. CONSERVATION THREATS

While protected under the law, WNP has several current threats to its integrity as a conservation area, and these make themselves felt at various levels. For more than twenty years during the war, law enforcement was impossible or inadequate over much of the National Park. Poaching of wildlife was a serious problem and many wildlife populations declined during that period. Illegal access and various illegal activities are an on-going problem for WNP and Influence Zone.

Presently, poaching for meat, timber extraction and other illegal activities are ongoing inside the park. Overfishing and the use of destructive fishing methods has been reported from the Puttalam Estuary and Bar Reef and these affect fishing pressures in the Influence Zone both directly and indirectly. By-catch mortality is another problem and threatens the existence of the reduced population of dugongs. Chena cultivation inside the ranging routes of elephants disturb their movements, while leopard poisoning is reported from the peripheral villages. The threats from spread of invasive species were discussed in Section 3.4.

7.1 Wildlife offences

The most common forms of illegal activity in the park and its Influence Zone are:

- Poaching
- Sand mining
- Entering the park without permission and/with a weapon
- Destruction of archaeological sites
- Land encroachment
- Theft of bird eggs
- Clearing land for construction without permission
- Illegal fishing along the park's coastline
- Unauthorized establishment of large-scale tourism related businesses in the 1.6 km Restricted Development Zone

Home District	Poa- ching	Sand mining	Illegal entry	Entry with weapon	Destruc- tion of sites	*Other offences	Total	% of Total
Anuradhapura	11	6	2	1	1	2	23	60
Mannar	1	0	0	0	0	0	1	3
Puttalam	8	3	2	0	1	0	14	37
Vauniya	0	0	0	0	0	0	0	0
Total	20	9	4	1	2	2	38	
% of Total	53	24	10	3	5	5		100

*Other categories of offence: Tree-felling (1); Fishing (1); Obstructing DWC officer's duty (0); Encroachment (0); Poaching of bird eggs (0); Illegal clearing and/or construction (0).
Source: WNP Warden Office

Table 12: Convictions for wildlife offences within WNP until mid-2017

According to the data from the WNP Park Warden Office, poaching is by far the most common among the prosecuted illegal activities, constituting between 40% and 53% of all convictions

between 2015 and 2017 (Table 12). Another offence leading to convictions and prosecution is the illegal entry to the park (5% to 10% of all convictions). Especially in 2016 and 2017, more people have been convicted due to sand mining within the park (12% and 24% respectively). In 2015, the number of illegal constructions within the park periphery has been remarkably high – amounting to 18% of all convictions in that year. Other frequent offences have been the entry with weapons (3% to 7% of all convictions), the destruction of archeological sites (5% in 2017) and the poaching of bird eggs (9% in 2016). The illegal distilling of alcohol and the growing of marijuana has been reported within the WNP and the IZ.

Looking at the districts of the lawbreakers (Fig7.1.1) the data suggests that most crimes are committed from the population in Anuradhapura. Their share in the last three years ranged between 53% and 86% of all prosecutions. Second is Puttalam, where between 11% and 38% of all prosecuted offenders came from. The fact that Anuradhapura has the highest rate of convictions does not necessarily need to be correlated with a higher number of criminals but could also mean that a) data for this district are easier to be collected, b) data is more carefully collected due to the proximity to the WNP main gate, and/or c) better law enforcement of this district. Another important aspect is very likely the number of peripheral villages for each district: Anuradhapura district has 20, Puttalam 7, Mannar 17, and Vavuniya only 4 peripheral GN divisions. With this characteristic in mind, it is no surprise that Vavuniya has far less offenders than Anuradhapura.

Discussions and consultations indicate that a poor relationship exists between DWC and the community of the Influence Zone over resource use and elephant conflict. Essentially, residents of the Influence Zone resent the conservation laws being enforced in favor of wildlife and consider elephants to be a nuisance that should be eradicated. It becomes clear that systematic data collection of wildlife offences is deficient. DWC does not systematically collect data specific to locations in the Influence Zone but for the entire districts. Definite conclusions about the status regarding wildlife offences in WNP's Influence Zone can thus not be drawn. It is necessary to monitor the data more strategically in order to take adequate measures for the reduction of offences (Annex 6).

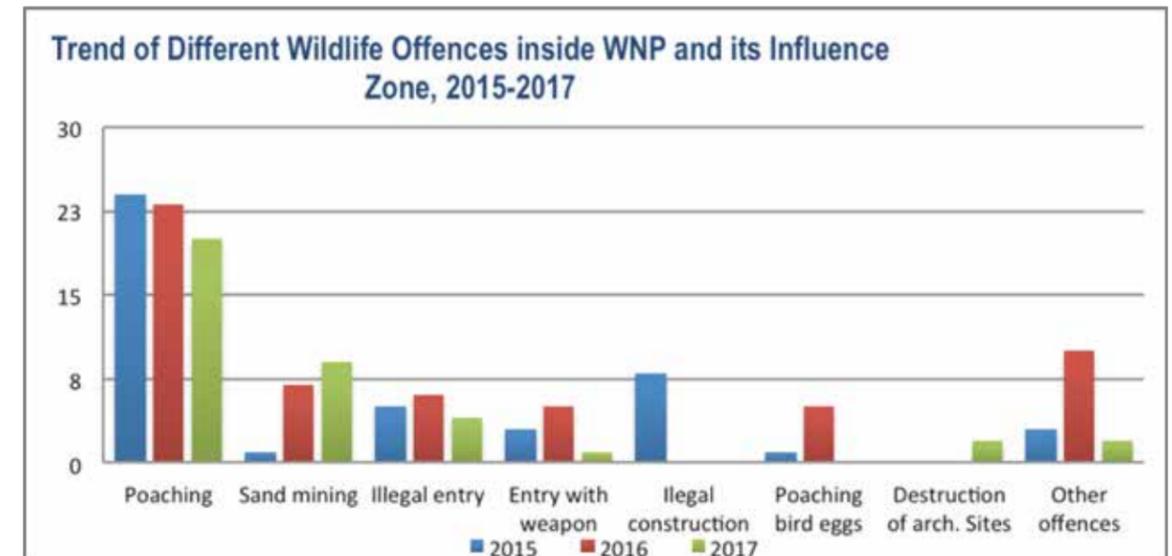


Figure 7.1.1: Trend of different Wildlife Offences

Poachers set static trap guns on trails to kill animals, mostly for meat. They are set so that a deer or boar that pushes the cord strung across a trail will fire the gun. Guards carry out patrols on foot, but the suspicion remains that the fear of trap guns deters park staff from patrolling the areas worst affected by poaching. The Deputy Warden of WNP, for example, was injured by walking into a gun trap.

The Park Warden acts on information received from community or other sources on an opportunistic basis. Poachers are reported to come not only from the adjoining communities, but also from other parts of the region. Therefore, information from a wider network is essential in law enforcement. Deterrents to poachers are not great since convictions lead to light fines only. Equipment (such as vehicles, chainsaws) confiscated from timber poachers is usually sold at public auction. Divisional Secretariat report that encroachment into the park is increasing and this is a serious threat to the integrity of the park. This is a result of lack of enforcement by DWC and local government.

The staff is insufficient to implement a comprehensive law enforcement operation within the park and IZ. Rangers report that, while they go on overnight patrols on a regular basis, they have inadequate field equipment and weapons. Therefore, more beat stations with adequate staff and equipment is required for a better coverage of patrolling. This is based on the observation that opening a beat station, for example at Kukulkatuwa, has reduced poaching in that area. Further, poaching in the Pomparippu area has increased since the army vacated the area and a new range station was constructed to address this issue.

Law enforcement and its needs require continuous evaluation since conditions change with its application. Poachers and others respond by changing their behaviour once law enforcement becomes successful. Therefore, law enforcement should be governed by an adaptive management approach, taking advantage of a recording and analysis system such as SMART for field patrols.

Encroachment

Encroachment of forestlands, mostly other state forest by cultivators, has occurred widely in the eastern and southern parts of the Influence Zone. As a result, an edge effect develops in which biodiversity values are eroded within the National Park along its boundaries, wherever there is no buffer zone of wilderness. This brings the problems of human wildlife conflict and overuse of natural resources right up to the boundary of the National Park. Encroachment of the park by the communities has taken place in several small enclaves (Table 13) including settlement by the SL Navy, fishermen and two religious' institutions.

Locality	Threat	Nature of encroachment
Tanthirimale	Cultivation in NP	Agriculture in NP encouraged by temple
Pallekandal	Church at Pomparippu	Seasonal camps in NP
Coastal section	Public road through NP	Road built without proper clearances
Pukkulam	Permanent fishing camp on NP border	Formerly seasonal, now permanent; building within RDZ*
Marichikaddi	Settlement in CF	Settlement and agriculture (Mavillu CF)
Wanathavilluwa	Hotel in RDZ	Construction in RDZ
Wanathavilluwa	Agriculture in RDZ	Commercial farm Construction in RDZ
Gangewadiya	Hotel in RDZ	Construction in RDZ

Locality	Threat	Nature of encroachment
Tabbowa, Karuwalagas Wewa	Clearing and construction without permit in RDZ	Commercial farm construction in RDZ
Kala Oya, Karuwalagas Wewa		Commercial farm construction in RDZ
Tabbowa, Karuwalagas Wewa		Hotel construction in RDZ

Table 13: Threats to the integrity of WNP in the Restricted Development Zone.

Under provision of FFPO a restricted development zone of 1.6 km from the boundary of the National Park exits where development activities are regulated. However, several developments in the WNP RDZ had taken place without adhering to the procedres. In addition, small-scale agriculture has encroached extensively up to the National Park boundary in such a way that negative edge effects are now being observed.

The St. Anthony's Church at Pallekandal, in the WNP has apparently been at that location for 300 years. There is an annual festival held there with 20,000 people attending. Consequently, the church has greatly expanded its infrastructure and causes a great deal of destruction to the habitats. Further expansion needs to be avoided.

A road (B 379 Puttalam-Marichchulckaddi Road) was illegally constructed in 2010 though the Wilpattu National Park. In 2013, the Supreme Court issued an interim order directing authorities to maintain the status quo of the road, where no further development activities would take place especially with regard to the tarring of the road. Supreme Court decision is still pending.

Other designated conservation areas within the IZ have also suffered from encroachment, notably the Marichikaddi/Karadikkuli sector of the Mavillu Conservation Forest.

Unsustainable and destructive fishing practices

All the fisheries in the Puttalam Estuary are for wild species with limited control. It is estimated that these artisanal fisheries either approach or exceed the maximum sustainable yield of the fishery (Miththapala 2011). There is illegal trawl netting for prawns in the Puttalam Estuary. Prawns are valuable on the export market. The trawling is both destroying the bottom habitats and also has overfished the prawns to the extent that the catch now is almost entirely by-catch. An initiative is needed to prevent this fishing method, allow the prawn populations and seabed to recover, and encourage artisanal fishermen to manage the fishery for their own benefit.

Dugongs are rare visitors on a seasonal basis to Portugal Bay to feed on sea grass beds. Formerly they were more common, but it is reported that their numbers crashed after the cyclone of 1954 and have not noticeably recovered subsequently (Wetland Conservation Project 1994). They were always hunted and have more recently suffered from fisheries by-catch (drowning in nets), which may have hindered population recovery. Dugongs are probably migratory to some degree between Sri Lanka and India, perhaps moving in response to the prevailing winds, which cause rough water in Bar Reef and the Puttalam Estuary, a favored feeding ground. Most of the dugongs die in nets set for rays in the deeper water off the barrier islands, where there are also sea grass beds. Dugongs spend the daylight hours in deeper water and tend to enter the bays to feed after dark.

Land mines

Land mines were placed in parts of Wilpattu National Park during the war period. Teams are still removing some of these, as for example at Tanthirimale. It is likely that demining will continue to take place in the region for some time, as mines are still being located. The possibility that land mines are present, serves as a disincentive to conservation, as staff are reluctant to patrol in areas that they are not familiar with.

Quarrying and mining

Demand for building materials is high, especially for sand. Illegal sand mining is a persistent and destructive activity that has affected the main rivers and streams. However, it seems to be less common now than in the past. A large limestone quarry (owned by the company Siam City Cement (Lanka)) for cement production exists in the southwestern part of the Influence Zone. Part of this quarry has been exhausted and will be used as a dump for waste from Colombo. The threat of leaching of toxic materials from this dump has been assessed in the EIA report (EML 2015). Currently, there is interest from the company Iluka Lanka PQ (Pvt) Ltd in opencast mining for limonite especially, and zircon and rutile in the sand deposits within the quarry area. Assessment of the deposit is taking place prior to extraction.

7.2 Human-wildlife conflict

Conflict between people and wildlife is widespread wherever peoples' interests are threatened by their proximity to wildlife. In Wilpattu, with its varied large mammal populations, this conflict involves several species that feed on crops, but mostly concerns elephants raiding cultivation and food stores in buildings. In livestock areas, especially, there is also conflict with leopards. Conflict with bears is also noted and, with increasing interest in bee keeping, there is potential for conflict with this species to escalate.

DWC is responsible for dealing with the depredations of elephants and other wildlife. Human-wildlife conflict is a source of considerable pressure and disruption of other essential conservation and management tasks. DWC dispense compensation for loss of life or injury from wildlife, although there is dissatisfaction at the slowness of the process. There is government compensation scheme for crop losses from wildlife, but only to those cultivators who can prove they own the land by showing the title deeds.

Elephants

Humans and elephants share a preference for cleared forestland, especially for lands with the best soils that provide the best quality food. According to the available records of the DSDs, most damages occur in the southern, southeastern and northeastern border areas of WNP (Puttalam, Anuradhapura and Vavuniya), affecting approximately 111 villages from 26 out 35 GND (Annex 7).

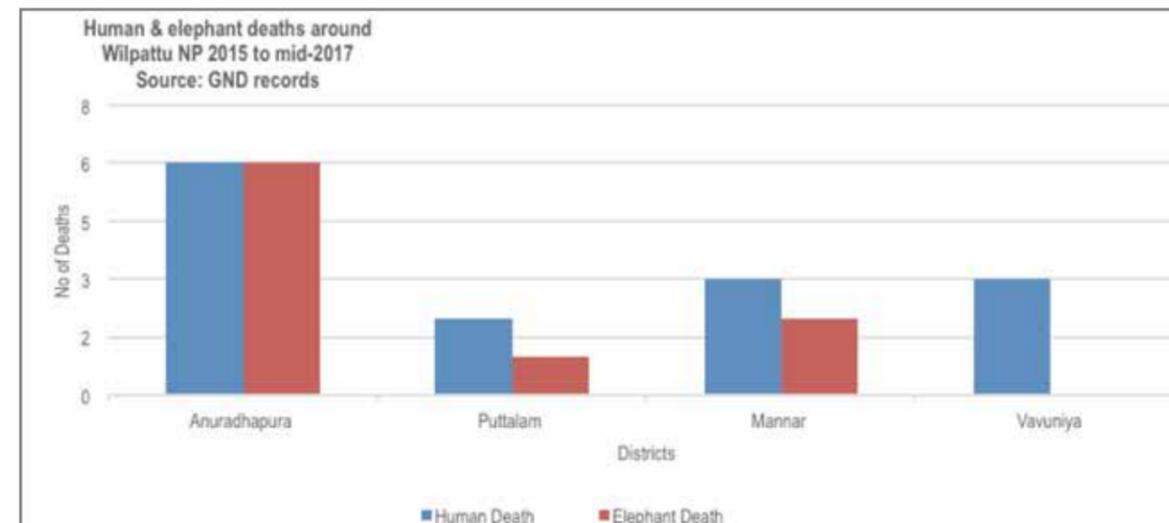


Figure 7.2.1: Human and elephant deaths 2015 – 2017.

The highest number of elephant and human deaths (Fig 7.2.1) were recorded along the southeastern and northeastern borders of WNP, notably in Hunuwilagama (Nochchiyagama DSD) and Thanthirimale (Mahawillachchiya DSD), both in Anuradhapura District. According to DSD information, sixteen people and ten elephants were killed in human-elephant disputes between 2015 and 2017. Frequent causes of deaths, besides the HEC seem to be train accidents with 8 elephant deaths in Mannar (Madhu DSD) in the past four years. For the same period, Cheddikulam DSD in Vavuniya District reported that 736 acres of cultivation were destroyed by elephants out of which 187 acres belonged to 4 peripheral GNDs in the Influence Zone of WNP. Most damaged crops were paddy and coconut.

There is no systematic data collection on HEC and its damage in terms of death, injuries, and crop and house damages. The Divisional Secretariat Divisions (DSD) of WNP's Influence Zone and DWC collect different information separately and do not coordinate with each other. In addition, data is not stored in a comprehensible way, ready for analysis. Most DSDs get first-hand information about HEC incidents but do not have a dedicated section to deal with the information.

Elephants eat crops such as rice, bananas, pumpkins, papaya, maize, coconut and others, which provide them with a concentrated and high-quality food supply, and which people cultivate for subsistence and as cash crops. Naturally, cultivators resent the loss of crops since it impacts their livelihoods in a negative way. Some elephants even damage buildings in order to raid food stored inside, potentially a very dangerous situation if the food is stored in a dwelling housing a family. The dry season (August-November) is the period of greatest conflict. Therefore, in most circumstances around WNP, where cultivation is the most prevalent land use, elephants and people cannot easily coexist. Therefore, local people occasionally kill elephants. The methods of illegal killings are various, but most often seems to be by putting out edible baits in which explosives have been placed which, when they explode, cause fatal injury. Nine elephants were killed this way between 2015 and 2017 using this method.

During consultations with peripheral communities, the population expressed their dissatisfaction with the time it takes DWC to handle compensation claims for the deaths, injuries, or house damages. The similar issues were raised at the Local Consultative Committee meeting by the District Secretariat representatives. The communities further complain that the DWC does not provide necessary resources (e.g., firecrackers) for the defence against elephants. Due to the

lack of personnel and transport resources, DWC staff is often not able to come to the places of conflict occurrence. In Puttalam District, communities are becoming more cooperative in their response to elephants, with the encouragement and support of DWC and they may take over the responsibility of fence maintenance from the Department of Civil Defence.

Electric fences are aligned along much of the eastern and southern National Park boundaries, between the protected areas and cultivation. However, existing electric fencing in most instances are not effective in keeping the elephants away from the agricultural lands. Following the awareness raising in the community consultations, parts of the population have realized that they should not cultivate crops that are attractive to elephants. To that end, some people - especially in Anuradhapura District - have planted citrus trees, pomegranate and bitter gourd on a small scale. Citrus fruit production needs to be linked to the market throughout the year and some women are already involved in producing citrus fruits as a cash crop. Furthermore, the DWC Outreach Programme has started providing bee keeping training to some peripheral communities. Overall, the peripheral communities are often unwilling to abandon cultivation because of the unknown risks associated with changing livelihood activities.

Most of the perimeter of WNP in the South and East has now been fenced by DWC, but in the North and northeast, fences are absent. Fences are frequently aligned such that there is forest and elephants on both sides, rather than separating elephants from cultivation. Such a circumstance is conspicuous between Eluwankulama and Gangewadiya for example and presumably was not the original aim of the fencing. Maintenance of DWC fencing is by the Department of Civil Defence. However, having had maintenance carried out by civil defence personnel, many cultivators are reluctant to take over the responsibility again. Nonetheless, the inconsistent standards of maintenance by the Department of Civil Defence are a major source of complaint from cultivators and others.

Cultivators often use a single strand of pale string to exclude elephants from crops and, where the animals have experience of electric fencing, this can be effective in reducing or preventing crop raiding. Small cultivators rarely use a lower tech, temporary or movable electric fence, nor do they construct and pay for their own fence. Therefore, cultivators are resorting to this in frustration at the ineffectiveness of the main fences. However, larger commercial cultivators do erect electric fencing at their own expense, for example along the southwestern boundary where commercial agriculture is expanding, confining elephants increasingly to the National Park.

There is clearly a need to develop a more effective design of electric fence and for DWC to adopt this. If such a design could be discovered, and demonstrated to be effective, it might be installed more widely to great benefit. People talk a good deal about introducing new crops that do not attract elephants and this needs to be assessed.

Compensation claims for death or injury to wildlife are processed and paid for by DWC. Claimants complain that the period of processing these claims is too long.

Elephants and Mahawillachchiya tank

Mahawillachchiya tank is situated in Anuradhapura District and within the Ramsar Wetland Cluster. This tank was constructed in about 140 BC with a capacity of 40 million m³ and covering an area of 10.5 km² with subsequent renovation in 1956. The tank is regularly used by up to 100 elephants and it is thought that they use the tank not only for water and fodder but also as a gathering ground. Elephants access the tank from the park using a 4 km wide corridor of forest that falls under the jurisdiction of the Forests Department. Illegal encroachment is threatening this forest corridor. It is important that this forest corridor is properly protected to allow continued habitat and safe passage for elephants. It is strongly recommended that DWC work closely with FD to demarcate this area, evict illegal occupants and provide a permanent FD/DWC presence.

Leopards and livestock

Considerable numbers of cattle and goats, and some water buffaloes, are kept on a free-range basis. Livestock herders complain of predation of their livestock by leopards. Livestock is allowed to roam with little supervision during daylight hours. At night they are returned to their yard/cattle shed. Local people have reported cases of leopards being targeted with poison baits by herders. The scarcity of leopards along the edges of WNP suggests that poisoning is widespread, but the situation needs to be clarified. Leopard surveys have tended to concentrate on the center of the park and camera trapping to survey for leopards along the edges of the protected areas and in the Influence Zone has been proposed but not yet carried out.

Sloth Bear

Sloth bears are known to attack people who enter the forest, mostly when they have been disturbed at rest, or when they are foraging at fruiting trees. People enter the forest to harvest the fruit of Palu, Manilkara hexandra, which is a favored alimentation of bears. This seems to be a case of competition and people approaching a tree where a bear is feeding may be attacked. Bears can cause serious injuries and people are rightly wary of them.

Beekeeping is an activity with considerable potential in the project area and its development could contribute greatly to incomes in the Influence Zone. However, sloth bears are predators of bees' nests and greatly attracted to honey. Concentrations of beehives may also be attractive, and the potential of conflict needs to be considered carefully so that preventive measures can be developed to protect hives and to avoid conflict.

Herbivores

Several other herbivores are mentioned as damaging crops: Axis deer, wild boar, porcupine, monkeys and peafowl are among the most frequent, especially where crops are grown along the immediate boundary of the National Park. However, their numbers are mostly low along the boundaries (though peafowls are widespread) and traditional methods of disturbance are effective at reducing crop losses.

7.3 Limited inter-agency and other stakeholder coordination

There is a tendency for government departments with responsibility for different sectors to work independently. In the case of WNP, this is worsed by the fact that biodiversity conservation is the main goal, which is different to the agenda of most other agencies. Interagency coordination and agreement are required for biodiversity conservation in WNP and its Influence Zone. While the Outreach Programme promotes WNP on a PR basis to interact with communities, there must also be mechanisms to encourage and collaborate with agencies and Government departments to ensure coordination at the district level.

In local government and communities, the connection with DWC is through the District and Divisional Offices, which have responsibilities for village-level societies, and other NGOs. The village societies are a key focus for outreach.

It is also essential to maintain good relations with institutions such as the Navy as well as the private sector and community-based groups including the religious establishments.

8. EXISTING MANAGEMENT OF WILPATTU NATIONAL PARK

8.1 Management effectiveness

Wildlife management was formerly the responsibility of the Forest Department, which declared an area of Wilpattu as a Reserved Forest in 1903. Since the enactment of the Fauna and Flora Protection Ordinance (1937), DWC has been responsible for all wildlife management and conservation. The relationship of WNP management to DWC is presented below.

An assessment of the parks operational capacity was carried out in July 2017 using the standard Management Effectiveness Tracking Tool (METT).

1. WNP's Legal status: WNP has been legally gazetted (3).
2. WNP regulations: WNP is regulated under the Fauna and Flora Protection Ordinance (FFPO). It describes all the mechanism to control inappropriate land use activities and is effectively being implemented by the Wildlife Officers (3) although there is some political interference and cultural differences (3).
3. Law enforcement: The staff has acceptable capacity/resources to enforce the protected area legislations, but occasional lack of personnel and budget hinders the work (2).
4. Objectives for the WNP: WNP is established based on clear objectives, mainly wildlife protection and visitor use. The park is managed according to the agreed objectives under FFPO (3).
5. Design of the WNP: Zoning of the park is not in line with the objectives but could be improved under a new plan (2).
6. Boundary of the WNP: The boundary of the WNP is not well demarcated and largely unknown by the management and residents. Some sign boards have been erected and a few activities such as in fishing villages are having some disagreement with tenure affecting the park (3).
7. Management Plan for WNP: No management plan is available, but a strategic framework has been prepared. Present project is in the process of preparing one (1).
8. Regular work Plan: Regular work plans for the park exist but there is room for greater improvement (1).
9. Resource Inventory: The Park has some resource inventories but these are outdated and not according to the management requirement. Information on critical habitats is not available (1).
10. Research: There is some ad hoc research work taking place but uncoordinated. Universities and NGOs are working according to their own objectives and not according to management objectives of the park (1).
11. Resource management: The park is managed to achieve various types of objectives. However, requirements for active management of the critical habitats, ecosystems, species and cultural areas are known but are not being addressed (1).
12. Staff numbers: Staff numbers are well below the required number for critical activities (2).
13. Personnel Management: Personnel Management is excellent and helps the achievements of the major management even though numbers and training are low (3).
14. Staff Training: Staff training and skills are low relative to the management needs of the park. A few training programs are conducted at Giritale Training Centre. TNA is needed (1). Professional interventions are needed.

15. Current budget: Budget is acceptable but could be further improved to meet fully achievable and effective management and frequent approval for even minor expenditure must be obtained from Colombo (2). Consideration of decentralization of authority is needed.
16. Security of the budget: There is a yearly allocated budget and can improve depending on the situation (3). Extra budget to meet development objectives of the park is needed.
17. Budget management: Budget management is adequate but needs improvement to increase the authority on limitation of purchases (2).
18. Equipment: There is some equipment but not adequate (1). There is a need for basic field and maintenance equipment (1).
19. Maintenance of equipment: There is no maintenance of equipment and facilities (0).
20. Education and awareness programme: There are a limited and ad hoc education programme and no overall planning for education (1). Outreach/Education Officer is important for the park to handle education awareness aspects.
21. State and commercial neighbors: There is regular contact with neighboring communities/ Officials, land users and have a reasonable cooperation (3).
22. Indigenous people: Not applicable here. But some traditional migratory fishermen are there.
23. Local Communities; Local communities have very little input in the management of the park. However, there is a trust and open communication between local stakeholders and Park Management, mainly along the main roads to entrances (1).
24. Visitor facilities: There are visitor facilities and services, but not appropriate for current levels of visitation (1). Improvement and planning according to current environmentally friendly requirements are needed.
25. Commercial tourism: There is a limited cooperation between managers and tourism operators to enhance visitor experience (1). Cooperation to reduce the impact of visitors on the park is needed.
26. Fees: Although, fees are collected, they do not flow into the parks' use, but goes to central government allocations.
27. Condition assessment: Biodiversity is intact to a great extent except under a few locations. Some programme is there for restoration (3+ 1).
28. Access assessment: Protection system is very effective but needs resources to enhance and maintain it (3).
29. Economic Benefits: There is some flow of economic benefit to the local communities living along the access roads to the park entrances, but it is limited and isolated.
30. Monitoring and evaluation: There is some ad hoc monitoring and evaluation but no overall strategy to collect the results (1). Official committees to monitor and implement the work programmes need to be established.

The total score received for METT was 57 out of 96 and therefore the effectiveness is around 59% for the WNP, which is ranked as moderately satisfactory.

SWOT analysis was performed and it revealed the following outcomes:

Strengths

1. Well established Institution (DWC)
2. Trained and enthusiastic staff
3. Institution intent on improving conservation outputs
4. Defined objectives and policies
5. Established legal status and regulation
6. Security of the available budget
7. Cooperation with adjacent land users
8. International recognition and assistance
9. Large PA with high biodiversity value, in relatively good ecological condition
10. Much experience on best practices in HEC
11. Public interest in wildlife conservation

Weaknesses

1. Insufficient staff and freeze on recruitment
2. Inadequate professional training for the staff
3. Non-availability of proper management plan or action plans
4. Limitation on objective oriented research, resource management and resource inventory
5. Insufficient equipment and maintenance capacity
6. Inadequate monitoring and evaluation of progress
7. External influences and interferences
8. Inconsistent development initiatives
9. Limited interagency and other stakeholder cooperation
10. Poor communication with communities
11. Insufficient funds for ground level operational activities
12. Limited information on wildlife-based opportunities available for communities
13. PA has lost most of its buffer zones
14. Poor maintenance of electric fences
15. Conservation civil groups with differing agendas
16. Too many and uncontrolled entry points to PA
17. Unskilled jeep operators/guides/bungalow keepers
18. Lack of promotion of alternative touristic routes and attractions
19. Inadequate sanitary facilities and resting areas for visitors

Opportunities

1. Attractive to tourists
2. Close to main tourism center (Anuradhapura and Kalpitiya)
3. Small-scale wildlife tourism from villages under developed
4. Rural communities interested in developing small businesses
5. Possibility of turning wildlife from a pest to an asset (responsible tourism)
6. PA not greatly developed so correct decisions on quality and direction can still be made
7. Some forest outside PAs exists that could be consolidated for wildlife tourism and elephant management

Threats

1. Loss of forest and wildland outside PA
2. Habitat degradation within the park
3. Buffer zone lost, edge effects intrude on NP
4. Not enough elephant habitat outside NP, CF, corridors cut
5. Encroachment into NP & CF
6. Poaching
7. Illegal timber felling
8. Illegal gathering of forest products
9. Illegal entry of NP
10. Unsustainable fisheries within the marine IZ
11. Fisheries by-catch (especially dugong, humpback dolphin)
12. Communities unsympathetic to conservation
13. Development within IZ regardless of conservation needs
14. Subsidized agriculture
15. Increasing livestock industry leads to conflict with/eradication of large predators (leopard, bear)
16. Insufficient knowledge on how wildlife trade affects (e.g. tortoises, pangolins, bushmeat)
17. Limited updated baseline data
18. Issues associated with climate change (droughts and floods)
19. Spread of invasive species
20. Human Wildlife Conflict
21. Obstructed migratory paths
22. Vandalism/damaging the archaeological sites & removing the artefacts
23. Insufficient communication between stakeholders

24. Boundary disputes and land encroachment
25. Poverty related natural resource dependency
26. Market for wild products and species
27. Lack of continuous funding for research and monitoring
28. Increasing human population and changing demographics of IZ communities
29. Release of captured wild animals from elsewhere into NP
30. Erosion along coastline

8.2 Infrastructure

WNP has a number of buildings for staff accommodation, offices and storage (Map 9 – Annex 8). It also has visitor facilities in the form of bungalows and campsites (Table 14). Most of the bungalows are in good to moderate condition and require only superficial but regular maintenance. The bungalow at Makalanmaduwa should be rebuilt. New bungalows should not be considered until the existing ones have a reliable water supply and other basic facilities. A new range office and new staff quarters at Pomparippu need to be constructed. Further new beat stations are required at Karawalakuda, Kuda Willachiya Wewa, and one at each of the corners of the northern extension (Map 10 – Annex 8). On the road to Mannar from Wilachchiya entrance a new office is required to accommodate both wildlife and forest officials (Mavillu Conservation Forest). Similar set up is proposed for Gangewadiya for the conservation of mangroves and other coastal resources.

There are also several buildings that are unused and mostly derelict. This includes structures at Hunuwilagama, two at Maradanmaduwa, and one at Maha Wewa. The unfinished bungalow at Kalivillu is derelict and with no prospects should be removed. There are also old ruined quarters at Panikavila and Manavila that should be removed.

There are six established camp sites, only two are functional, that at Maila Wewa and Kokmote. The others need some development, notably the building of toilets and/or water supply. The development of two further camp sites should be considered: at Makalanmaduwa and at the coastal belt.

A single resting area for visitors exists at Kumbukvila, although Marai Villu and Kudiramalai also function as resting areas but lack facilities, notably toilets. The two latter and Pomparippu should be developed as fully equipped resting areas for visitors, with interpretative displays.

Type	Location	Condition	Action
Range Office	Oyamaduwa	Good	
	Eluwankulama	Good	
	Mollikulam	Good	
	Tanthirimale	Good	
	Hunuwilagama	Good; some derelict	Remove ruins
Beat Station	Maila Villu	Good	
	Thekkama	Good	
	Kukulkatuwa	Good	
	Kadupath Wewa	Good	
	Aliwadiya	Good	
	Andaragollaewa	Ruined	
	Nadunavila	Derelict	Rebuild
	Pomparippu	New	Construct office

Type	Location	Condition	Action
Bungalow	Talavila	Good	
	Panikavila	Good; 1 derelict	Remove ruin
	Manavila	Good; 1 derelict	Remove ruin
	Kokmote	Good	
	Lunu Wewa	Good	
	Manika Pola Uttu/ Manikwila	Good	
	Maha Wewa	Good; 1 Derelict	Repair building
	Weewala	Subsidence; no water	Repair; supply water
	Makalanmaduwa	Ruined	Rebuild
	Kali Villu	Unfinished, Derelict	Remove ruins
	Maradanmaduwa	2 Derelict	Repair 2 buildings
Dormitory	Maradanmaduwa	Good; 2 Derelict	Repair old buildings
Camp site	Kokmote 1	Water	Build toilet
	Kokmote 2	Water; no toilet	Build toilet
	Maila Wewa	Good	
	Paluilandiga Wewa	Good; no water	Supply water
	Andaragolla Wewa	No toilet	Build toilet
Resting area	Kumbuk Vila	Needs Interpretation	Install Interpretive display
	Marai Villu	Derelict	Renovate sit down area
Power hut (Electric fence)	Hunuwilagama- Kukulkatuwa		
	Hunuwilagama- Kadupath Wewa		
Radio Repeater Station	Near Maradanmaduwa	Good	Convert to digital
Bear enclosure	Maragolla Wewa	New	

Table 14: Range Stations, bungalows, campsites and other field buildings in WNP

Roads are unsurfaced, ranging between graded with a camber to simple bush tracks. A wide network of tracks was in place until the security situation prevented management, and a significant proportion of these are still unserviceable. Mostly, they have been encroached by trees, saplings and shrubs, and in some the crossings of streams have also become unserviceable. The park management has already brought some of the roads closed back into use. Some of the roads are passable only in the dry season but most are passable all year, though many have one or more difficult sections when water has been lying for a period. Concrete drifts have been constructed at a few stream crossings, but culverts are more usual.

Water supply is a widespread problem and needs to be improved greatly, leading to the necessity of supplying both stations and bungalows by bowser in the dry season, or even closing bungalows. A water pipeline is under construction to supply Pomparippu from Eluwankulama Gate, pumping water from the Kala Oya. In other locations wells are used, Maila Villu Beat Station has a tank, and, in the case of at least two bungalows, water is pumped directly from the nearby wetland. The bungalow at Weewala has no water at all, the borehole being dry. Choices must be explored on supply and storage (pipelines, roof catchments, boreholes, open wells; storage tanks, underground cisterns). Special arrangements need to be made for catching and storing rainwater for drinking since ground water is unsuitable. The range station at Eluwankulama gate is subject to flooding each wet season, such that it has to be evacuated for some weeks to an alternative office in Eluwankulama town.

The new structures at Pomparippu will help maintain a presence in that section of the park during the wet season. There is a need for visitor services, notably toilets for at least 3 new resting areas at Marai Villu, Kudiramalai and Pomparippu. An interpretive center is needed, ideally combined with toilet and refreshment facilities. DWC considers the main gate to be an unsuitable site for the interpretive center. It would be the experience of many protected areas that too many developments at the main gate should be avoided, otherwise it will become urban, a source of extra management problems, with increasing negative impact on biodiversity and aesthetic qualities. The buildings should be of an aesthetically pleasing design. A site with established large trees would be ideal, and supplementary planting of further indigenous trees might be feasible with a view to establishing sufficient shade and a pleasant environment. Once the issue of the main Eluwankulama-Mollikulam road has been resolved, an aesthetically pleasing gate should be designed and built at each entrance, with the appropriate facilities for controlling entry.

8.3 Access points

Nine road entry points provide access to WNP. This is far too many for a small protected area such as Wilpattu and decisions on the future of some of these crossings and their continued existence need to be made.

Of the nine entry points, five are controlled, but only two are official entry points for the park visitors (Hunuwilagama and Eluwankulama). Public vehicles pass during daylight hours through Eluwankulama and Mollikulam entrances without being required to stop, although the Navy monitors vehicle registration numbers at Eluwankulama. The same applies to the track to Mannar through the northern extension where the northern boundary of the park (30th mile post) is indicated only by a forest department sign for Mavillu Conservation Forest. The track past Thekkama Beat Station is controlled only if staff is in the station but the gate at Mahawilachiya on the eastern boundary is not manned and the park can be entered by disconnecting the elephant fence and raising the gate. Access at Kukulkatuwa is controlled only so long as there is staff present. There is a disused road entering and leaving the park and passing just inside the boundary between Kukulkatuwa and Kudawillachiya but is unserviceable.

Otherwise, access on foot across most of the boundary is unrestricted anywhere, except by law, and almost the whole coastline is accessible by boat. The coastline is under surveillance by the navy who has law enforcement as well as a security function.

The public road between Eluwankulama and Mollikulam is subject to discussion between government agencies, since its construction and alignment was not in keeping with strict procedure. Its presence, and the rapid passage of hundreds of cars daily, weakens the conservation of the National Park and the control of access considerably. A resolution to the problem is required. If the road remains, it will necessitate increased patrol efforts for its entire length and more control of vehicles entering and leaving.

8.4 Administration

Formerly WNP was under direct supervision of the Director General of DWC in Colombo. This ensured that the National Park had priority management in keeping its status as the largest National Park in Sri Lanka. However, its remoteness was a challenge. Currently, the park is under the supervision of the Assistant Director (AD) of Anuradhapura district. This has the advantage of being close to the field but removes the park from daily view in headquarters. Further, the coastal border of the park and the southern part of the Influence Zone is being administered by the Assistant Director Puttalam district.

Park operations are the responsibility of the Park Warden, based at WNP headquarters at Hunuwilagama. The organogram (Fig 8.4.1) shows the relationship of each staff position within WNP with respect to DWC as a whole. Written reports from the warden are provided to the AD. WNP has full-time staff, divided between administrative, field and support roles, and volunteers, mostly guides and bungalow keepers. Staffing levels are too low to achieve all functions and this has been identified by the DWC management.

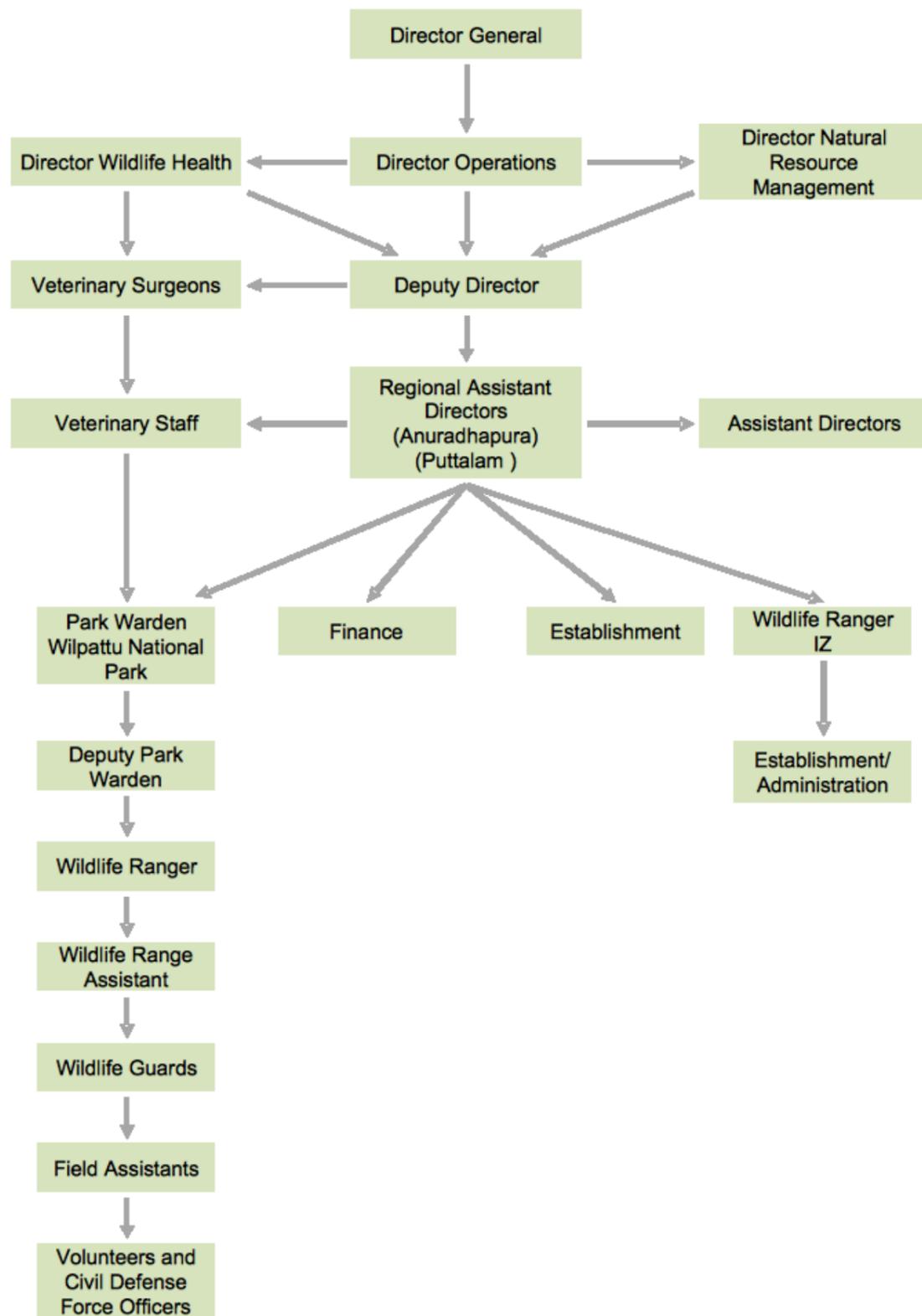


Figure 8.4.1: Organogram showing staffing structure of DWC as it relates to WNP

Volunteers, who are not permanent staff of DWC, but are being paid a daily allowance by the department are used for guiding visitors to the park. Visitors are obliged to take a guide when they enter the park. Not all guides originate locally, some having learned their trade at other national parks.

While WNP carries out many management functions, maintenance and construction of infrastructure may be tendered out to private enterprises. There has also been a fruitful collaboration between DWC and the Irrigation Department in the maintenance of the large permanent reservoirs, using that department's expertise, machinery and staff to carry out works.

An assessment of how best to use field staff would be beneficial. It is also recommended that a second deputy warden be recruited to lead the enlarged park-centered Community Outreach Programme.

8.5 Park personnel recruitment, training and career development

WNP is unable to achieve many functions because of low staffing levels and a lack of suitably trained staff. There is currently insufficient budget to recruit more staff and to train any new recruits and existing staff. To put this in perspective, there is currently a shortfall of over one thousand staff in DWC countrywide. There is clearly a need to recruit more field staff, and others to develop an enlarged Community Outreach programme under a second deputy warden, and the proposed interpretive, scientific and invasive species control programmes. Table 15 shows the existing numbers of staff and the requirement for recruits

Ranger and Beat Stations	Ranger	Ranger assistant	Game Guards	Field Assistant	CDF	Driver	Volunteers	Bungalow keeper	BK assistant	Clerical
Hunuwilagama	2 (2)	2 (4)	5 (8)	6 (10)	6 (6)	4 (2)	20 (10)	7 (4)	3 (4)	5 (4)
Kukulkatuwa	0	0 (1)	1 (2)	1 (2)	3 (6)	0	0 (2)	0	0	0
Kala Oya	1	1	0 (4)	1 (3)	0 (3)	0 (1)	0 (2)	0	0	0
Kadupathwewa	1	1	1 (2)	1 (2)	0 (6)	0	0 (2)	0	0	0
Aliwadiya	1	0 (1)	1 (4)	1 (3)	3 (6)	0 (1)	1 (2)	0	0	0
Eluwankulama	1 (1)	0 (2)	4 (4)	2 (6)	2 (6)	1 (2)	0 (6)	0	0	0 (2)
Mollikulama	1 (1)	1 (2)	2 (4)	2 (6)	0 (6)	1 (2)	0 (6)	0	0	0 (2)
Thekkama	0	0 (1)	0 (4)	0 (4)	0 (4)	0 (1)	0 (2)	0	0	0
Tanthirimale	1	1 (1)	1 (3)	2 (4)	3 (4)	1 (2)	0 (5)	0	0	0
Mahawilachchiya	1	1 (1)	1 (3)	1 (4)	5 (2)	1 (1)	1 (5)	0	0	0
TOTAL	9 (4)	7 (13)	16 (38)	17 (44)	22 (49)	8 (11)	22 (40)	7 (4)	3 (4)	5 (8)

Table 15: Field cadre of Wilpattu National Park (The requirement for recruits are in bracket)

While a strengthening of the main field functions is required, specialized teams are needed to carry out a more ambitious Community Outreach Programme, scientific research and monitoring, invasive species control and implement a diversified interpretive programme that will also coordinate an enlarged guide team. The current situation, in which one Community Outreach Officer must cover four districts alone, is inadequate. The programme needs to be led by a deputy warden. A viable Community Outreach team needs to be established with the recruitment of at least five additional personnel, one to be based in each district, and an additional assistant for the Deputy Warden. Further recruitment after year two of the plan is needed of at least five further personnel. It is essential that the team is adequately equipped with transport. The scientific team should consist of a programme leader, an assistant and eight technicians. This team will collaborate with academics and specialists from technical institutions elsewhere and will need to coordinate their activities. The invasive species control team needs to be large for this potentially labour-intensive role, and it is anticipated that numbers will swell with work groups of casual labour, assistance from other institutions and volunteers.

Some of the existing staff is untrained and others are insufficiently trained in their current roles. Staff also needs training in modern advances of techniques. There is a need for standard operating procedures to be drawn up for each staff function to define each person's daily work, responsibilities and standards. This especially applies to all staff.

The guiding of visitors is wholly the task of volunteers who act completely outside a coherent career system. They should come under the coordination of the interpretive team within the Visitor Management Programme. Continuous training and refresher courses are essential for guides who may otherwise become isolated and lose interest; a career structure should be formulated. Personnel management is subject to the standards and procedures of the Sri Lanka civil service.

8.6 Law enforcement

Illegal access and various activities are an on-going problem for WNP and the Influence Zone. Poaching for meat, timber, fish, honey, and other forest products is chronic but unmeasured. Access to the forest from along the boundary is habitual among the residents of the Influence Zone, to judge from the tracks. Poaching for animal parts (e.g. pangolin scales, bear gall bladders) and for live animals (e.g. tortoises and other reptiles and amphibians for pet and other trades) is not yet assessed or quantified.

Meat poachers frequently use homemade trap guns to kill deer and wild boar. While patrols on foot are carried out, there is the suspicion that the threat from trap guns set by poachers to kill deer and boars, deters park staff from patrolling much of the area favored by poachers. Guards have been injured by trap guns, and so have local people, so the danger is imminent.

The Park Warden also acts on information received from community or other sources on an opportunistic basis. Poachers are reported to come from a distance from the protected areas and not only from the adjoining communities. There is at least some antipathy to poaching among the communities. Deterrents to poachers are not great since convictions lead only to light fines. Equipment such as vehicles and chainsaws used by timber poachers and confiscated is usually sold at public auction.

The Deputy Park Warden has a schedule for patrolling for the rangers and guards. This involves sending between eight and eleven patrols out either once or twice per month. Staffing levels are insufficient to implement a comprehensive law enforcement operation, but the impression gained is that more could be achieved if the existing field force was more actively employed, especially

if patrols were to be dropped and collected by vehicle. Patrols carry at least one firearm for self-protection and for making arrests, normally a shotgun. Most firearms are old, worn and probably unsafe, and should be replaced with new weapons.

The prevalent opinion is that more beat stations are required if a better coverage of patrolling is to be obtained, rather than by placing mobile patrols by vehicle and collecting them elsewhere at agreed rendezvous. The presence of beat stations has certainly had the desired effect, but lack of personnel has made it impossible to patrol despite the presence of an outstation (e.g. Tanthirimale). Most of guards are stationed at park headquarters or at range or beat stations and frequently are tied down by tasks other than field patrols, such as to guiding visitors. A proportion of the most junior rank has not received training and some of these, and of other ranks, have no bush sense or field aptitude, unable to carry out field patrols effectively.

Wilpattu NP is relatively small and is accessible by vehicle for most of the year. Therefore, foot patrols have rather easy access to most areas and should be conducted very frequently in all parts of the park. Rangers and guards can be dropped at strategic points by vehicle early in the morning and collected in the evening at agreed rendezvous locations after patrolling on foot in between. Such an approach is necessary pending the recruitment of more field staff and the building of further outstations.

The boundary and the areas flanking the two uncontrolled through-roads need regular patrolling. The low density of deer in these areas suggests that poaching there may have suppressed the wildlife populations. If wildlife-related tourism is to develop to the extent that we feel it could, then these wildlife populations must increase. The aim should always be for continuous patrolling to be carried out. The recruitment of twenty additional field staff would allow the patrolling of five four-man always patrols. The use of three-man patrols would increase the coverage.

The training of junior field staff in field methods is a priority. It is also essential that the more experienced field staff receive refresher training and that some also receive advanced training. The installation of a monitoring system, such as SMART, for patrols is another essential task. This is especially so if the field force continues to be understaffed, so that the Park Warden can adapt the patrol plan according to needs.

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PART II: PRESCRIBED MANAGEMENT

1.1 Effective implementation of the Management Plan

Many management plans are never used or even read once they are produced and this is therefore generally a waste of time. Several factors are to blame, namely many management plans are not written for the correct audience, i.e. the park staff, and are often too complicated and academic. Often, park staff believes that the actions are carved in stone when in practice one needs to be flexible and interpret the management plan to suit the ground realities where in this regard leadership from senior level is required.

There needs to be continuity between this version of the Wilpattu Management Plan and its successor for the subsequent five years. There should be no delay, so that one follows on immediately from the other. To this end, the process of review of this management plan and the production of the next are operational tasks that are prescribed and budgeted for within the management plan itself, to be completed in the final year.

It is assumed that review and revision will be an internal process of DWC, in consultation with the domestic partner agencies, since most of the information from monitoring and evaluation, reports and other feedback will be in the possession of DWC and these partners as a matter of course. However, it does not exclude the possibility that the DWC may commission an independent agent to carry out the tasks of review and revision. A review of the management plan should take place annually and approved by DWC.

1.2 Financing

Wilpattu National Park has an annual budget allocated through DWC. Financing WNP will be the task of DWC who will need to solicit funds from other sources to fill the gaps, potentially from the Wildlife Preservation Fund.

1.3 Monitoring and Performance

The progress of implementation of this plan should be monitored continuously. This will not only facilitate reporting but also allow for adaptive management of the plan where necessary. Monitoring must be followed by evaluation and feedback to the relevant people. A monitoring procedure will be established early in the implementation phase of this plan so that management can be adapted appropriately.

1.4 Wilpattu Steering Committee

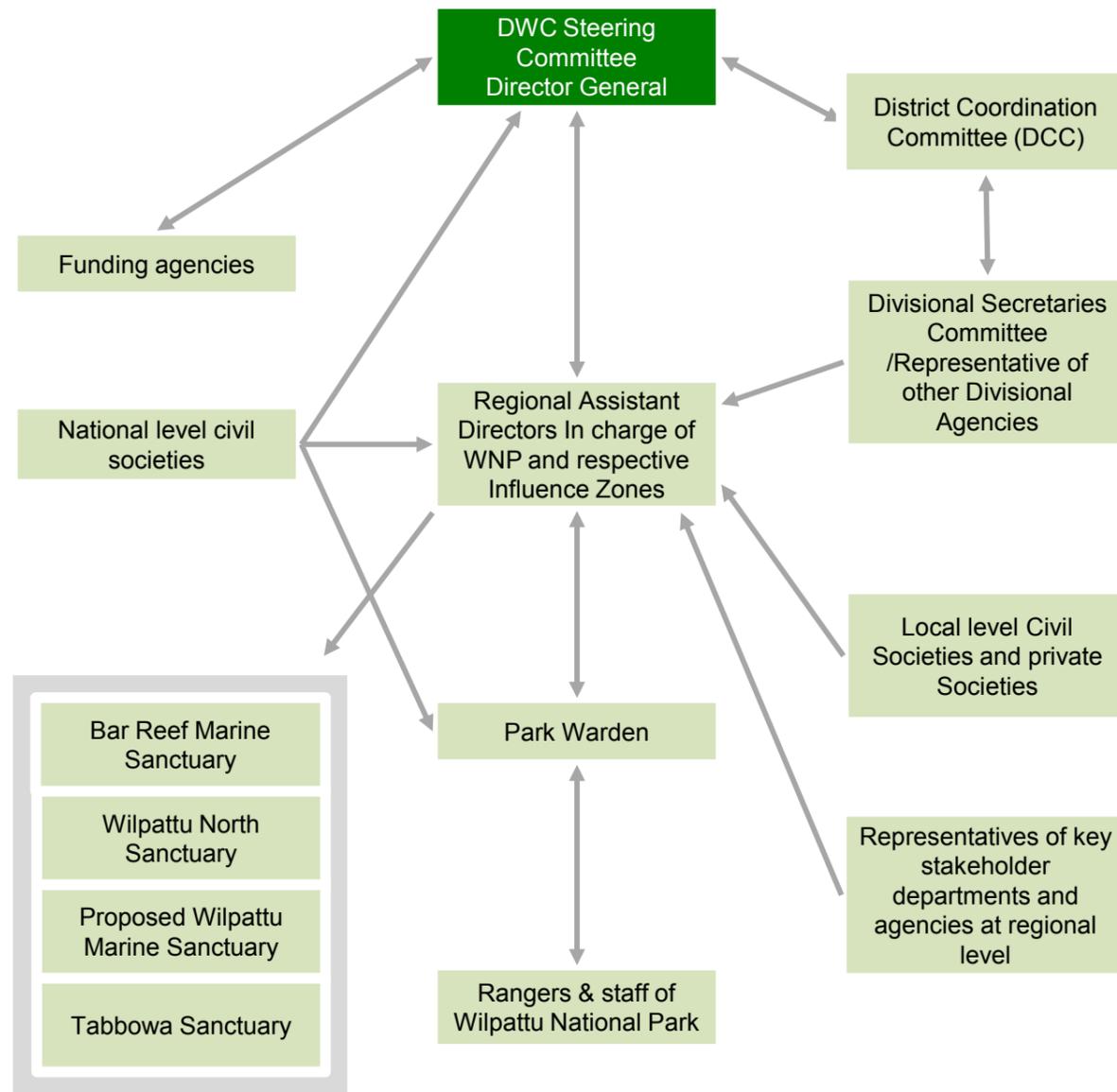
To provide high-level coordination, the WSC will be established and consist of DWC senior officials and representatives from relevant institutions and donor agencies.

1.5 Wilpattu District Committees

A further objective, but not encompassed by a separate Programme, on which the overall management of WNP and the Influence Zone depends, will be the setting up of an administrative body to coordinate actions between the various responsible agencies.

The well-established District Coordinating Committee is the most appropriate and influential forum for coordinating park centered activities and it will comprise representatives from DWC, FD, FARD, CCD, Navy, GSMB and the four District Offices, chaired by the DWC AD Anuradhapura. Its function, methods of operation, and lines of responsibility need agreement.

1.6 Prescribed organogram



2. INTRODUCTION TO THE PROGRAMMES

The Prescribed interventions of a management plan is the most important section as this will be the most commonly referred to by those responsible for its implementation. The three main target audiences for this plan are planners, local government and park managers and this has been taken into consideration by reducing the amount of technical jargon and complexity. The planning team has intentionally kept the prescribed management as simple and logical as possible in keeping with real life limitations on funding, staffing, staff expertise and resources. The simpler the plan, the simpler to implement. Complexity of detail and sophistication of approach will evolve naturally as the plan is regularly updated based on performance and Annual Action Plans are developed.

The vision for WNP has been established by DWC as “Wilpattu National Park will conserve its biodiversity and cultural heritage for present and future generations” and this will be achieved by implementation of the prescribed management actions set out in this Part.

1. The prescribed management is presented in 4 programmes, namely Park Operations, Tourism Development and Visitor Use, Environmental Management, and Outreach, each with a set of objectives put into context, to be achieved through the implementation of a series of actions. These actions are realistic, achievable and based on the reality in the field. However, it is firmly recommended that the FFPO and other relevant legislations and policies (i.e. National Environmental Act, Forest Conservation Ordinance, Fisheries and Aquatic Resources Act etc.) need to be strictly followed and adhered into in implementing actions identified in the management plan.
2. The nature of park management is such that there will always be overlaps of topics between different programmes and while this has been addressed as logically as possible, overlap can be expected. For example, the management of roads and building can equally be covered under Park Operations as well as Tourism Development and Visitor Use.
3. Often, when project funding comes to end, projects collapse or return to a previous state. To avoid this, all interventions in this plan are not wholly dependent on donor funding. Additional activities as a result of the project will be absorbed by DWC funding and a request from the Treasury for additional funding with potential links to the DWC Wildlife Preservation Fund.

The format used in each programme is as follows:

- Goal: What state are we aiming for?
- Strategy: What methodology will we use to achieve our objectives?
- Objectives: What we want to achieve, the ideal outcome.
- Context: A summary of the situation, as described and analyzed in full in earlier chapters.
- Actions: A list of actions to reach the objectives.

Programme 1: Park Operations

Introduction

This programme focuses on those field and administrative functions that are the backbone of park management and include; law enforcement, field operations and administration, which are essential for the conservation and protection of biological and physical resources of the Wilpattu National Park. Here the operational, manpower, training and administrative resources needed are outlined. These include facilities, infrastructure, maintenance, equipment and administrative procedures.

In order to effectively implement the management plan, a Wilpattu Park Management Unit will be established to include Park Warden, rangers, assistant directors and any key project staff.

Goal

“Administrative and operational capacity of Wilpattu National Park is such that the conservation goals and objectives are fulfilled in the long term”.

Strategy

“The Management Plan will be implemented in a proactive and timely fashion by the Park Management Unit (PMU), ensuring the resources, planning and leadership are available to support adaptive management of operations”.

Objective 1.1: The Park’s field administrative systems are effective.

Context

The park administration is directly responsible for the protection, management and development activities including implementation of the management plan. The number of staffs at WNP is inadequate for effective management and technical skills are largely absent. Implementation of the Research and Monitoring Programme for example will require an experienced ecologist, maintenance requires a competent engineer and field operations require an experienced operations ranger. In addition, a full range of Standard Operating Procedures (SOP) needs to be developed to cover all aspects of park management from Human Resources to Law Enforcement, Outreach and visitor management. As per DWC policy there will be equal opportunities for all ethnic and gender groups. While DWC policy is one of decentralization this has not trickled down well to the park level. There is a need to orient park staff on their more specific responsibilities and authority in the park.

Actions

- Prepare Annual Action Plan for each year of the Management Plan.
- Implement monthly work plans and reporting for each Range Station.
- Establish SOP for all park operations.
- Promote maintenance capacity to avoid the necessity of outsourcing all maintenance activities.
- Establish four WNP District Consultative Committees to include representatives from all ethnic groups and women’s groups.
- Investigate possibility of retaining a legal firm to process pending court cases.

- Review park level authority and responsibilities of the Park Warden.
- Ensure additional Treasury funding to support additional activities as a result of Management Plan implementation.
- Establish the Wilpattu Steering Committee at the highest level to provide broad direction and to deal with high-level external political interference.
- Through the Steering Committee and district meetings, engage with relevant civil society groups.

Objective 1.2: The Park has sufficient numbers of well-motivated and well-trained staff.

Context

Effectiveness of management and career development requires that individuals receive training throughout their careers, both for refresher purposes and to learn new skills. High achievers should benefit from this to rise through the ranks and contribute in proportion to their capabilities.

Many of the park staff lack adequate experience in modern techniques and do not have clear Terms of Reference or job descriptions. Improvements can be made in the appreciation of the need for work planning and meeting goals. Leadership responsibilities are unclear leading to less than effective management. Management decision-making can be decentralized from Colombo to the Park Warden. There is little opportunity for career advancement due to a lack of procedure for promotion based on ability and there is more administration staff than specialists.

The operational team is not large enough to carry out all tasks. Notably, law enforcement should improve with a larger team to cover a greater area of the park not patrolled regularly. There is the need to build specialist teams to carry out law enforcement, maintenance, scientific research, community outreach and interpretation.

Nationally DWC has a shortage of staff and WNP has only 50% of the staff needed for effective operations and no budget to allow for recruitment at this time.

Very often too few park staff is cited as a major cause of poor management and implementation. While this may be true in many cases a better allocation of staff can be equally effective. It is important to put the right person in the right job with clear responsibilities.

Actions

- Carry out a review of the ADB Training Needs Assessment to develop appropriate training opportunities.
- Clarify staff responsibilities and tasks by developing clear Terms of Reference.
- Recruit park ecologist.
- Recruit outreach officers and interpretation officers.
- Develop a training programme/refresher for all staff to include leadership and work planning.
- Provide all staff with legal training to allow them to represent DWC in court hearings.

Objective 1.3: There exists a clear inter-agency agreement on settlements within protected areas.

Context

There is a tendency for government departments with responsibility for different sectors to work independently and to largely ignore other departments. In the case of Wilpattu, this state of affairs is impaired by the fact that biodiversity conservation is the main goal, which is opposite to the agenda of most other agencies. This was clearly seen at Pukkulam fishing village where development initiatives were undertaken without giving due consideration to the sensitivity of area. Inter-sectoral harmony and agreement on the primacy of conservation in WNP and its Influence Zone will be essential if biodiversity is to survive. Partnerships between the conservation agencies and other government departments will need to be open and collaborative if they are to be effective in conservation.

Actions

- Identify all illegal settlements within the protected areas and create a database of current landowners type of land use.
- Devise mechanisms to reduce/eliminate settlements within the park in collaboration with the relevant line agencies as per the provisions provided in FFPO.
- Periodic monitoring to control and prevent further expansions

Objective 1.4: Park regulations and National laws are enforced effectively.

Context

Until community outreach activities can reverse some of the antipathy to the National Park, law enforcement efforts need to be stepped up to achieve complete patrol coverage regularly.

Poaching for meat, timber, fish, honey, and other forest products is widespread but unmeasured as is the illegal occupation of Park land. Lack of awareness on park regulations and lack of DWC presence has led to largely unrestricted access for illegal activities. Deterrents to poachers are not significant as convictions lead only to light fines and there is a long delay in hearing cases. Equipment such as vehicles and chainsaws that are confiscated, are usually sold at public auction where the original owner can recover it. Staffing levels are insufficient to implement a comprehensive law enforcement operation, but more could be achieved if the existing field force was put to better use. This is a command and control problem. While there is a need for three more beat stations, many of the law enforcement activities could be greatly improved with more equipment, work planning and leadership.

Actions

- Recruit 15 field staff to ensure park law enforcement operations are effective.
- Train all field staff in patrolling techniques and law enforcement planning.
- Establish a comprehensive foot patrol schedule in all vulnerable parts of WNP.
- Set up a recording and monitoring system for all law enforcement incidents include the SMART recording system.
- Establish SOP for all Stations placing responsibility and accountability on the range and beat station heads for implementation of range and beat activities.

- Establish a reward system for information on illegal activities.
- Establish Community 'Guardians' to observe and report on illegal/damaging practices while patrolling with DWC.

Objective 1.5: Access to the park is controlled and monitored.

Context

With nine road access points in an area of only 131,678 ha, WNP is far too accessible from the outside and needs more control of those entrances to prevent access by those who would enter illegally. WNP is accessed at nine road entry points. Of these, five are controlled, but only two strictly by Hunuwilagama and Thanthirimale and access at Kukulkatuwa, Eluwankulama, Mollikulam, and the other four in the northeastern extension are only partially controlled or at all. The gates at Eluwankulama and Mullikullam are gates in name only. Vehicles may pass without restriction during daylight hours. The Navy records vehicle number plates at Eluwankulama, otherwise, access on foot along the majority of the boundary is unrestricted everywhere, except by law, and almost the entire coastline is accessible by boat although nominally under surveillance by the Navy. All other access points into the park are uncontrolled. Where there are boundary markers they may not correspond to the official gazettelement leading to misunderstanding to the exact location of the park boundary.

Actions

- Ensure that all road entry points are manned and controlled at all times.
- Establish a system of control points and roadblocks where traffic can be halted and searched on the two through roads.
- Review the access arrangements at each access point and establish specific protocols for each.
- Construct barriers at the road entries that currently lack them.
- Control traffic speed on the two through roads with speed bumps.
- Bring the Mannar to Puttalam road under jurisdiction of DWC.

Objective 1.6: Joint conservation efforts of DWC and the Forest Conservation Department (FD) have improved.

Context

Several tracts of land under the management of the FD border WNP; the most significant is Mavillu Conservation Forest to the North. Although there has historically been some coordination between FD and DWC, this is informal and insufficient to address significant issues.

Actions

- Establish regular consultations with FD to discuss joint objectives.
- Identify priority forest adjoin the park that require closer shared management.
- Share resources and establish common procedures for management.
- Establish an agreed procedure for WNP staff to patrol with FD staff to enforce laws.

Objective 1.7: Conditions for the protection of the proposed Marine Sanctuary have improved.

Context

It is important to note that the open ocean and marine environment forms a significant portion of the IZ of the park. The jurisdiction of WNP ends on the beach at the western edge of the park. Due to severe degradation of the marine environment a more coordinated approach to management is needed in this complex management environment as several government agencies are involved. The marine unit of the DWC together with Puttalam Assistant Director's office and WNP warden need to take necessary actions to safeguard and monitor the coastal belt of the park.

Actions

- Establish regular consultations with Fisheries Department to discuss joint objectives.
- Prepare legal steps to declare the Marine Sanctuary.
- Identify priority marine environments that require closer shared management.
- Share resources and establish common procedures for management.
- WNP staff to patrol and enforce laws in the coastal belt and the proposed Marine Sanctuary based on protected species legislation.
- In collaboration with key stakeholders develop a Marine Management Plan for the protection and management of the proposed Marine Sanctuary, from beach to reef.
- Develop a tourism plan for the proposed Marine Sanctuary and coastal areas.

Objective 1.8: Boundaries of the park and neighbouring protected areas are clearly marked and understood.

Context

Despite a legal gazette of the park, adjacent sanctuaries, conservation forest, reserved forests and fishery management areas, the boundaries are not well marked leading to frequent confusion and disputes over land/sea ownership. WNP was declared in five blocks and to achieve the present status it went through seven gazette notifications during 1938-1973. It had been revealed that there are several boundary disputes that need to be investigated, especially in the eastern boundary of the park. Further, WNP shares part of its boundaries with Mavillu Conservation Forest and Gangewadiya proposed mangrove reserved forest, which comes under the purview of the Forest Conservation Department (FD). Possibility of incorporating the state lands within the Wilpattu North Sanctuary to WNP need to be investigated. The jurisdiction of WNP ends on the beach at the western edge of the park.

Due to severe degradation of the marine environment, a more coordinated approach to management is needed in this complex management environment as several government agencies are involved, including the Department of Fisheries and Navy.

A high priority is to carry out a ground truthing exercise and establishment of boundary markers and signs, working closely with FD and the DF on shared boundaries. Additionally, establishing the jurisdiction of DWC in the marine environment is an important activity.

Further as per the provisions of FFPO, a 1.6 km area is identified as a restricted development

zone and if any development takes place an EIA/IEE needs to be conducted. This zone needs to be clearly marked with signs and patrolled regularly. Several legal cases have been filed by NGOs with regard to human activities within WNP. They include: B 379 Puttalam-Marichchulckaddi Road; the Pallekandal Church expansion and festivities and development activities within Pukkulam Village bordering the WNP.

Actions

- DWC and FCD to carry out ground truthing exercise of all protected area boundaries and establish area of jurisdiction in the land/marine areas and the 1.6 km Restricted Development Zone.
- Verify with Survey Department to compare the gazette with the marked boundaries of WNP.
- Install boundary markers and signboards in local languages and indicate the 1.6 km Restricted Development Zone.
- Share boundary information, including maps with other government departments and the communities.
- Clearly demarcate the limits of expansion of Pallekandal Church at Pomparippu to restrict the expansion.
- Northern boundary of the park extended to include the state lands of Wilpattu North Sanctuary.
- In consultation with stakeholder agencies establish the limits of the marine protected area and DWC limits of jurisdiction and the possibility of extending the coastal boundary of the park as a sanctuary to protect the dugongs and sea grass beds. This covers the Fishery Management Areas as well as new areas that provide protection for dugong, dolphin and other species of interest.
- Develop a community alert system for infringements using existing CBOs.

Objective 1.9: Park infrastructure meets the present and future needs for effective management.

Context

Following a long period of insecurity and park closure, there remains unsatisfactory infrastructure that need to be rectified by implementing an upgrading and construction programme.

The Park has a total of seven range and beat stations including the park entrances. Most are in useable condition but lack sufficient maintenance procedures. There are several abandoned ranges and beat stations, some beyond repair and should be demolished.

Three new beat stations are needed on the northern boundary and in the coastal area. Roads within the park that have been graded are generally in good condition although tracks are often impassable in the monsoon. Some rivers have concrete drifts or fords, others have culverts.

Actions

- Construct Beat Stations at Palugathurai, Kollan Kanaththa and Gangewadiya, Cheddikulam.
- Construct Range Office at Pomparippu. (Pomparippu has been upgraded to Range Station).
- Construct combined Beat Stations at Mawillu and at Gangewadiya for joint patrolling and monitoring with the FCD.
- Construct staff quarters at Uchchamunai and Battlangundu points.
- Maintain road network with culverts and dams where appropriate.
- The Eluwankulama to Mannar road to be absorbed into DWC jurisdiction.
- Design and install park signage for all structures, roads and tracks.
- Design and construct entrance gates at Eluwankulama and Mullikullam and Thanthirimale.
- Demolish all derelict or broken infrastructure inside the park.
- Establish appropriate clean water for DWC offices and bungalows.
- Maintain solar systems at all Range/Beat stations and bungalows.
- Establish a road maintenance schedule.

Objective 1.10: The Park has sufficient transport and equipment to be operationally effective.**Context**

Wilpattu National Park has at present minimum levels of transport. Senior staff must share vehicles and motorcycles. There is no boat transport available to the staff of WNP for patrolling coastal areas. Because of the DWC policy, the outsourcing of all works, the park has little or no equipment to carry out works or maintenance. For WNP to be able to carry out basic park management functions, certain minimum levels of equipment need to be provided.

Actions

- Carry out equipment need assessment of all structures to ensure each has the equipment necessary to function independently.
- Establish SOP for use and maintenance of all equipment.
- Train staff in the field in correct use and maintenance of firearms.
- Supply adequate field equipment (tents, GPS, camera etc.) and train the field staff in its correct use and maintenance.
- Establish an adequate field communications system (radio, phone).
- Provide vehicles for patrolling and other maintenance work.
- Ensure all park staff has a complete uniform to promote a professional 'face' of DWC.

Objective 1.11: The Management Plan is reviewed annually and implemented with appropriate adaptive management where necessary.**Context**

Continuity of management is essential despite of and because of changing circumstances. A review and revision will ensure that any changes will be reflected in the reviewed management plan and included in the Annual Action Plan.

Management plans exist as a guide to management and once approved for implementation then work can commence without frequent referral to central DWC. As circumstances in the field often change rapidly it is necessary to be flexible and adaptive. In addition, other projects will also operate in the area covered in this Management Plan. DWC will need to establish inter-agency coordination with other agencies implementing projects that might positively or negatively affect WNP. This will ensure synergies and avoid overlapping of activities with other stakeholder or funding agencies.

A Park Management Unit (PMU) will be established and consist of senior park staff and project staff.

Strategy

"An expert management committee and inter-agency coordination committees are appointed to review the management plan annually and identifying synergies between other projects such as ESA, ESCAMP, Lower Malwatu Oya GEF/UNDP and IUCN".

Actions

- Carry out Management Plan review annually.
- Prepare Annual Action Plan.
- Coordinate with other agencies through the Wilpattu Steering Committee of DWC.
- Evaluate the effectiveness of management annually.
- Identify synergies with other projects and agencies to reduce overlap and increase collaboration.

Programme 2: Tourism Development and visitor use

Introduction

The Government of Sri Lanka has emphasized through its Tourism Development Plan the need to develop tourism as well as other sectors in the North of the country. To this end Wilpattu National Park is high on the list of protected areas for protection and improvement of visitor facilities and services. Many of the park structures that include range and beat stations and visitor bungalows are both poorly designed and badly maintained. There is very little quality interpretation of the physical or biological environment and visitors are driven around the park with the sole objective of finding leopards, elephant and sloth bear. Visitors often have long waits at entrances and have experienced difficulties in obtaining accurate information on track circuits, viewing opportunities and services available.

Outside the park there is little or no opportunity for tourism and communities rightly perceive little or no benefit from the park. To avoid overuse such as in Yala National Park, it is recommended that a cap be placed on daily jeep entry.

Goal

“To transform Wilpattu National Park in to a world class tourist destination by providing diverse and unique visitor experience on its natural and cultural heritage in ways that will not compromise the conservation goals”.

Strategy

“In order to significantly improve the standard of service to visitors, a high standard of input is required from tourism experts. This will include professional re-design of visitor infrastructure, interpretation materials and management of the bungalows”.

Objective 2.1: Visitor experience is improved through enhancement of facilities.

Context

Tourism is one of the economic sectors that was hardest hit by the nearly three decade long conflict in Sri Lanka and there have been heavy fluctuations in tourist arrivals in line with the state of the conflict. Following the cessation of the armed conflict in May 2009, Sri Lanka experienced an unprecedented growth in tourist arrivals.

Visitor numbers have risen progressively since WNP was reopened to the public in 2010. The park received 84,766 visitors in 2017, of which 33% were foreign and contributed 90.5% of the income from tourism. Visitor data for year 2018 indicates that numbers will surpass one hundred thousand by December, while foreign tourist arrivals exceeded 40% in February and July providing high revenue to the park.

Most of the visitors enter the park from the main gate at Hunuwilagama with a small but increasing number entering at Eluwankulama (11%), which gets inundated during the heavy rains. Two more ticketing points could be constructed at Mullikullam, and Tanthirimale. Operationalizing the Mullikullam and Tanthirimale entrances will be useful in visitor dispersion.

Visitors are required to use 4WD vehicles with a guide and independent travel or disembarking on unauthorized locations is prohibited. Many visitors are only in the park for half a day (lasting from 2-5 hours). The park is famous for its leopards and bears, and most visitors come to

observe and photograph them. The central villus in Block I of the Park is the main destination for most visitors due to easy accessibility and a good chance of observing animals. Full day visitors who are mainly locals visit via Kudiramalai and few ventures further to observe elephants at Pomparippu. There is very poor development of infrastructure in many parts of the park and there is extensive potential to develop the area above Modragamaru for tourism. Presently only Kubukwila is utilized as a stopover place and this is not adequate, especially for full-day visitors. Nature trails are limited to Kudiramalai, yet they are not properly maintained.

There is as an increasing interest in bird watching and the park’s ancient history. A study carried out by IUCN recorded 68 archaeologically important sites including fossils and prehistoric artifacts (e.g. Pomparippu burial grounds). Eleven ruined monasteries were found in forest areas associated with large rocks, and two sites at Ochchappukallu and Veheragala contained inscriptions. Most of these monuments have been excavated and destroyed by treasure hunters and several sites need immediate conservation action. Whale and dolphin watching is popular in the marine area bordering the park and mangrove tours within the Puttalam lagoon are also becoming a prominent tourism activity.

In 2017, around 5000 visitors stayed overnight at the park’s bungalows despite the poor quality of services and maintenance. Two new bungalows can be constructed at coastal locations. The newly constructed Weewala circuit bungalow and Vellamundalam campsite have never been used mainly due to lack of water.

The park bungalows are currently running at a loss and of poor quality of maintenance and management. DWC needs to consider outsourcing or improving the bungalow management. Present practice of garbage disposal within the WNP is commendable and should be continued and reach towards a zero-waste policy under the existing rules and regulations.

Actions

- Upgrade visitor service centers at Hunuwilagama and Eluwankulama entrances with ticketing counters, parking areas, and eating and toilet facilities.
- Under the existing regulations ensure a zero-waste management within WNP.
- Open existing Mullikullam and Tanthirimale ticketing points with the provision of appropriate visitor facilities.
- Improve the existing road network and open new jeep tracks especially above Modragamaru for visitor use (culverts and dams needed to be constructed at appropriate locations).
- Design an improved road/track network to disperse visitors more evenly around the park including one-way circuits.
- Reopen tracks, especially in the tanks zone of the northeastern section of the park.
- Establish a road link to Block IV Tanthirimale.
- Clear the undergrowth regularly on both sides of main jeep tracks to increase the wildlife observation opportunities.
- Establish a hanging bridge across Kala Oya at Eluwankulama to facilitate DWC during the rainy season.
- Establish a butterfly garden and a network of nature trails adjacent to the Hunuwilagama tank.
- Develop Karaba Wewa Tank as a new tourist destination with nature trails.

- Maintain and improve the nature trails at Kudiramalai with appropriate soil conservation measures.
- Construct a new visitor resting area at Marawila and improve the existing Kubukwila stop over.
- Improve the facilities of existing bungalows and campsites with year-round good quality water supply, toilets and bathrooms, electricity supply etc.
- Construct new circuit bungalow/s (Kollankanatha) and campsites (Malwatta Oya, Kala Oya, Kudiramalai etc.).
- Develop short walking trails at resting points to slow the circulation and reduce the pile-ups at leopard sightings and villus.
- Develop half day and full day tour itineraries capturing different aspects and routes of the park.
- Monitor visitor use of tracks, routes and preferred sites.
- Formulate a cap on the number of vehicles per day allowed to enter the park including the annual festival at the church at Pomparippu.
- Develop visitor experience in the Kala Oya mangrove and Pomparippu Oya estuaries.
- Prohibit all swimming and bathing within the park.
- Initiate a several days pass system for visitors.
- Recruit a short-term hotel management expert to advise on increasing and maintaining standards at the Bungalows.

Objective 2.2: Visitor experience has improved by implementing innovative interpretation and education services and programmes.

Context

Visitor interpretation and education assist visitor enjoyment and foster understanding, appreciation and protection of the park and its values. Presently there are inadequate interpretation services available in the park to provide good quality and effective visitor information. Interpretive facilities are limited to an outdated museum and a small auditorium at Hunuwilagama Park headquarters and few signage indicating prominent locations such as villus, bungalows and archeological monuments. Maradanmaduwa dormitory provides a venue for training and workshops.

A map, with the full Code of Conduct, free of charge is available at the gates, but notably it receives a low rating among visitors. Visitors frequently suggest that more information should be provided about the National Park and its wildlife. There is simple direction signage in the park at some track intersections, and the names of some locations are also signed but this is inadequate.

Park guides who accompany the safari jeeps are “volunteers” which means that they are not permanent. The quality of guides is variable, although in terms of spotting wildlife and knowledge about wildlife most are satisfactory, and some are good.

The most recently recruited guides have not yet received any training. However, visitors are almost universally complimentary about the guides and the service they provide, the exceptions probably referring to one or two who lack both training and motivation.

There are an insufficient number of guides to cater for all visitor needs. Guides are universally male although the activity is equally suited to women, and the imbalance might easily be addressed.

Limited conservation-oriented education programmes are carried out targeting communities and school children. Conservation education programmes and services are limited to a small team of guides with variable ability and training.

Actions

- Identify coastal sites and design infrastructure for a new Interpretive/Education facility for marine biodiversity conservation including mangroves, dugongs and turtles.
- Design high quality interpretive center and information.
- Using the interpretive programme, build an understanding and appreciation of nature that is not focused just on leopards, for example promote the enjoyment of lesser known species and environments.
- Develop tours that focus on specific topics such as villu and archeological sites.
- Consider stopping DWC recruitment and employment of guides, trackers and drivers and allowing private sector to provide these services.
- Train guides and provide basic training refresher courses to guides and jeep drivers.
- Instigate an annual jeep drivers and trackers licensing system.
- Train park personnel in interpretive presentation and delivery of environmental education services.
- Develop and implement interactive environmental education programme that will attract more school children to the park through the wildlife clubs of Sri Lanka.
- Develop and regularly update WNP website with news postings, archival information and resources.
- Organize events to celebrate biologically significant days such as World Wetlands Day on 2nd February and Migratory Bird Day to build awareness and involvement of different stakeholders.

Objective 2.3: Management of visitors achieves international standards.

Context

Apart from biodiversity conservation, the main activity within a National Park is tourism. The provision of visitor services and facilities should be undertaken such a way that they are not damaging to the ecosystems.

Around 100 commercial safari jeeps bring tourists to WNP. Out of those the majority (90) of the jeeps enter from Hunuwilagama entrance, while the remaining enters the park from Eluwankulama. Most of these vehicles are driven by hired drivers who are paid daily and during the peak tourist period drivers with less knowledge on the park are recruited.

Presently there are only 20 guides who are employed on daily payment (volunteers) and therefore assigning one guide per vehicle is a huge issue especially during the peak tourism season. This is a hindrance to visitor experience and numbers of people wishing to visit the park.

The management of visitors is inadequate to fill the need and demand is evident by frequent long queues at the Entrance Gate, often up to 20 vehicles waiting.

There is insufficient good quality bungalow accommodation in the park and while booking is done online this information is often not communicated to the bungalow managers. There is very high demand for the bungalows and this is a revenue opportunity that needs to be explored. A strict policy of remaining on the tracks and enforcement of the Code of Conduct for drivers and guides i.e. reduce overcrowding at wildlife sightings.

Certain areas of the park will be designated as 'no go areas' unless for scientific research, monitoring or park management activities. This creates an un-disturbed wildlife refuge.

Large numbers of pilgrims gather for the annual feast of St Anthony's Church at Pallekandal, which is in the Block V of the WNP. DWC also had given them permission to hold Novenas on the first Tuesday of each month. In 2018 18,549 devotees attended the annual festival, which was held on 8th July. More than 1000 people stayed in temporary tents for around three days to participate in the festival. Presently a festival committee, which include the Parish Priest and DWC, monitor the conduct of the festival.

Actions

- Develop restricted areas to spread visitors more evenly across the park and restrict access to sensitive habitats.
- Explore the necessity to close certain sections of the park to visitors in case of habitat degradation.
- Promote the introduction of a booking and payment system online that can speed up visitor entry, while retaining the option of buying entrance at the gate office.
- Relaxing the necessity of an accompanying guide.
- DWC vehicle/s to patrol the park during the peak visitor season to manage overcrowding at wildlife sightings and villus; and to ensure adherence to park rules and regulations.
- Enforce the Code of Conduct to regulate tourism activities in the park for both tourists and jeep safari drivers and distribute it widely among the relevant stakeholders.
- Enforce various fines (monetary and non-monetary) in the event of a breach or non-fulfillment of the Code.
- Register all commercial safari jeeps and their drivers in park headquarters.
- Set up a monitoring system to track the impacts on the park from tourism.
- Continuously monitor the Pallekandal church festival activities with an upper limit to the number of pilgrims that can camp inside the park during the festivities to be reached in consultation with the church authorities.

Objective 2.4: Communities in the Influence Zone offer tourism services based on wildlife experience.

Context

Wilpattu National Park is located adjacent to Kalpitiya in the South and Anuradhapura in the East where tourism is well established with several high-quality visitor facilities. Wildlife with habitats outside WNP and where they persist, they can potentially support tourism, but in most locations in the South and Southeast there is little wildlife habitat remaining due to the increase

of agriculture land. The presence of tanks that support considerable wildlife populations such as Hunuwilagama and Mahawilachchiya in the eastern border, as well as Viyayadikulam associated with the Wilpattu North Sanctuary provide opportunities to promote nature-based tourism in these peripheral areas. The Mavillu Conservation Forest, which is continuous with the northern broader of WNP is yet to develop its tourism potential.

Presently there are around 40 accommodation facilities within 10 km from the Wilpattu Park boundary, especially closer to Hunuwilagama and Eluwankulama entrances. Few hotels have been constructed within the one-mile radius of the outer boundary of WNP, which are illegal as per the provisions of FFPO. Within this one-mile restricted development zone, community based eco-tourism ventures need to be promoted. At present there is very limited coordination and collaboration between these private entities and the park.

Support for the development of tourism in the Influence Zone is to be provided under the Community Outreach Programme and Influence Zone Conservation Programme. This objective is to ensure that the links with tourism outside the National Park is positive and proactive.

Actions

- Work closely together with the private tourism sector and other relevant stakeholders to share information and to obtain their support through regular meetings and annual work plan.
- Identify community interest and capacity and provide training and networking support to businesses and communities engaging in tourism.
- Resolve issues pertaining to tourism developments in the one mile restricted development zone.
- Collaborate with the lagoon tour operations at Gangewadiya with collaboration with the Forest Department and provide training to boat-tour operators.
- Identifying local produce and marketing through and provide stalls at the park's ticketing points and Interpretation center to sell the products.
- Establish nature trails and other tourist infrastructure in appropriate locations such as tanks or archeological reserves with community participation.
- Promote homestay or campsite options and best practice management of guests.

Programme 3: Environmental Management

Introduction

The management of protected area resources requires an understanding of the specific ecological processes. An important aspect of management involves the design and development of a research and programme to meet these needs. Similarly, a monitoring programme is needed to detect problems before they arise and evaluate progress in meeting the management objectives.

While there has been ad hoc and sporadic research and monitoring activities carried out in the park over the years there is insufficient data to make management decisions. Institutions and individuals carry out research activities based on their own agenda and while this provides valuable information it usually does not contribute to management decisions. Population trends of flagship species are generally unknown and the rate of scrub encroachment has not been assessed. The park has virtually no capacity to carry out its own research or monitoring resulting in an inability to make management decisions regarding species or habitats.

Goal

“To maintain and enhance the distinct and diverse natural and cultural heritage of the WNP and its Influence Zone”.

Strategies

“As WNP lacks the capacity to carry out ecological research and monitoring activities, it is necessary to make partnerships with institutions and individuals. These partnerships will provide the necessary skills to carry out research and monitoring and transfer these skills to park staff”.

Objective 3.1: A scientific research programme is established and under implementation that supports management decisions.

Context

At present there is very limited scientific or monitoring work carried out within the park, especially on the block above Modaragam Aru. There has been some research (Eisenberg and Lockhart, 1972; IUCN Resource Inventory 2007) into flowering plants and vertebrates and monitoring of large mammals restricted to a few species. There is limited information regarding the habitat types or area needs of large mammals such as elephant, leopard and sloth bear. Surveys and data are lacking for most invertebrates, lower plants and marine and coastal species. Climate change aspects to behaviour of species and ecosystems need to be investigated and is vital to establish baseline data to predict the future scenarios. Such surveys and monitoring programmes require specialists or at least specialist supervision. Presently there is neither inadequate collaboration with universities and research institutions nor any plan for the continuation or updating of research or initiation of new research activities.

The results of scientific research and monitoring will only be of use for conservation management if they are made available to the appropriate people and agencies quickly, in a readable form and clear management interventions. The conclusion of these studies should make clear recommendations to make management decisions. Such information, results and recommendations must be communicated to communities and other relevant stakeholders.

WNP and its Influence Zone is an area with a readily identifiable suite of conservation problems. The objectives chosen to achieve the environmental management goal will enable these

problems to be addressed and will improve scientific fact-based management of the WNP and its Influence Zone and marine environment to the West.

Actions

- Collate all available information and research undertaken on WNP and surrounding areas including marine.
- Establish a good reference library for the use of park staff, researchers and students.
- Establish baselines for populations of flagship species, forest, scrub and grassland cover, mangrove and invasive species to identify changes over time.
- Carry out a gap analysis and prioritize research needs.
- Collaborate with appropriate institutions and individuals that have the necessary expertise to carry out research and monitoring activities.
- Establish both permanent and temporary research facilities for researchers to carry out field activities at Pomparippu, Maradanmaduwa and Hunuwilagama.
- Train park staff in basic biodiversity monitoring techniques.
- Undertake biodiversity surveys and habitat mapping to fill gaps and update knowledge on biodiversity and its spatial and temporal distribution.
- Carry out studies on the requirements of key ecosystems, processes and species habitat relationships with special reference to bears, leopards, elephants, primates and small cats.
- Conduct habitat carrying capacity studies.
- Carry out studies on habitat utilization of avifauna and other critical species associated with wetlands.
- Establish water resources inventory and its distribution and investigate and study the water quality parameters and the wetland cycle (dynamics, villus, rivers and tanks).
- Investigate possibilities of maintaining natural flows to the main rivers.
- Study on critical flora species and conduct germination studies.
- Carry out floral/grass composition study and identify most important species for food and shelter.
- Assess the ecological effects and conservation benefits of impounded and non-impounded rivers.
- Study the fish species associated with sub basins of the WNP.
- Carry out studies on dugongs, turtles and other marine fauna and flora including mangroves and sea grass beds.
- Carry out a full biodiversity assessment of the islands, including predator surveys within the marine Influence Zone.
- Monitor breeding attempts by sea turtles after predator eradication.
- Establish a rationale for a fire management programme and implement accordingly.
- Publish research findings on WNP website.
- Evaluate degradation of mangrove eco systems and implement a restoration programme in collaboration with FCD.

Objective 3.2: Management plans are established to provide for the needs of critical habitat and species.

Context

There is insufficient data to determine if WNP is of sufficient size to support viable populations of flagship species although it is probable that elephants require a greater range. Based on research findings, some artificial manipulation and an increase in the wilderness available for species that roam widely is a necessity, for example availability of fodder determines the movement of elephants. However, certain prevailing policies such as the 'non-manipulation' and 'no fire' policy in the park has encouraged the encroachment of woody plants into grassland and climax them to thorn scrub or dry forest. In this regard both available and data gathered through research will be used to determine if habitat manipulation is necessary.

Annually, several animals are rescued and released in safe habitats of the park. Mostly rescued species of wildlife are Indian python, mugger crocodile, spotted deer, toque monkey, purple-face monkey etc. Especially the release of monkeys to the park had caused several issues.

Actions

- Evaluate the spatial requirements of flagship species.
- Implement habitat management plan, including enrichment manipulation prescriptions for burning of grasslands and other habitats to increase the productivity.
- Prepare a species management plan for selected mammal species (critically important both terrestrial and coastal).
- Monitor the changes in plant and animal species in relation to management interventions to see the efficiency of habitat manipulations.
- Formulate a protocol for wildlife health monitoring and disease surveillance in coordination with the DWC Veterinary Section.
- Track elephant herds with GPS collars to understand their ranging patterns and habitat utilization.

Objective 3.3: The ecological characteristics of the wetlands are maintained to fulfil the requirements of the Ramsar Convention.

Context

The Wilpattu Wetland Cluster was declared as an internationally important wetland under the Ramsar Convention in 2013. The area of the Ramsar site is 165,800ha, of which WNP is the major component, while it also includes marine wetlands in western coast up to 10 km, Kala Oya estuary, Modaragam Aru estuary and Mahawilachchiya fresh water reservoir. The site is also the only place in the Ceylonese Monsoon Forest bio-ecoregion and in Sri Lanka where the unique 'villu' wetland system is found. As per the Ramsar guidelines, it is necessary to maintain the ecological character of such wetlands.

The health of wetland ecosystems depends on the hydrological regime and they are very vulnerable to certain changes including the climate.

Many of the parks 100+ tanks are in the Northeast, but most have broken bunds and have been ineffective for holding water for decades. In the wet season some of the damaged tanks hold small seasonal wetlands. The lack of water in few has led to the establishment of woody

vegetation that will in time become evergreen dry forest. Therefore, the restoration of these tank ecosystems will increase biodiversity in an otherwise dry area of the park. This wetland ecosystem will also increase plant species favored by elephants and with the extra availability of water, it will encourage elephants to remain in the park longer. Modeling of the water cycle will allow an estimate of the rate of tank restoration that will be required to maintain an approximate even spread of successional stages across the tanks available. In addition, natural surface freshwater comprises permanent and seasonal rivers and streams, villu, and seasonal and permanent swamps and water holes.

As a result of reduced water holding capacities of the tanks and villus, especially during the prolonged droughts, the park management has installed several small concrete waterholes that need to be filled daily during the dry season. However, the design of these artificial water holes needs to be investigated, as there is a danger of small animals falling in and becoming trapped. Further construction of reservoirs by diverting and damming the rivers had reduced their flow rates. As more mega irrigation projects are proposed for the two main river basins (Lower Malwatu Oya and the Neela Bamba Stage II), maintaining the water flow to the park is vital.

Actions

- Develop a long-term strategy for the conservation of wetlands, specifically addressing the management of water demand including operating rules for droughts, floods, and emergency situations when rapid decisions may need to be made.
- Initiate a detailed research programme to study the ecology of Villu wetlands and the associated wildlife with climate patterns.
- Initiate dialog with Irrigation Department to maintain environmental flow in rivers within the Park and Influence Zone.
- Maintain the river pools, especially in Modaragam Aru where river flows are minimum during the dry season.
- Rehabilitate 3 tanks each year for 5 years and monitor vegetation succession.
- Design and the positioning of artificial waterholes to be revisited.

Objective 3.4: Invasive species are removed, controlled and prevented from re-establishment.

Context

While there is a long list of exotic invasive plants species in WNP and its Influence Zone, knowledge on exotic animal species is insufficient. The following floral invasive species are locally or widely dominant in and around WNP: *Chromolaena odorata*, *Lantana camara*, *Eichornia crassipes*, *Azolla s.*, and *Prosopis juliflora*. *Prosopis juliflora* is a very serious threat and already becoming dominant in the Tabbowa Sanctuary in the South and around Vankalai Sanctuary in the North and appears to be spreading rapidly. *Opuntia dilani* is found in several coastal stretches.

The African Giant Snail *Lissachatina* has been observed in Anuradhapura, 35 km to the East, and is easily transferred incidentally. Their impact is likely to be both considerable and extensive. Domestic and feral dogs can be observed throughout the park and more commonly on the park boundary with the Influence Zone. These domestic dogs can be a great threat to the wildlife since they hunt small mammals and birds in the park. Water buffaloes (*Bubalus bubalis*) are listed as potential invasive species in Sri Lanka as there are evidence of hybridization of this species with the wild buffalo (*Bubalus arnee*) and has probably led to the local extinction of

genetically pure populations of the wild water buffalo in park. The invasive alien fish *Oreochromis mossambicus* was also observed in the villus and water holes in the park, as it was introduced to the villus of Wilpattu in 1954. Being a prolific breeder and a superior competitor for resources, this species can be a great threat to the native fish species that occur in the wetland habitats of the park. The Tank Cleaner (*Pterygoplichthys multiradiatus*) has been recorded in the following water bodies: Nelumwila, Maha Wewa, Thelbepu Wewa and Maklanmaduwa

As the entire WNP and its Influence Zone has not been surveyed up to date, the existing data does not provide comprehensive information on the threats the invasive species pose to the general health of the biodiversity and ecological integrity of the area. Identifying this threat is vital for specially maintaining the ecological character of the wetlands and to maintain the grasslands for larger herbivores.

Actions

- Prepare a map of invasive species distribution based on research findings.
- Prepare SOPs for management of each invasive species.
- Mechanical eradication of invasive species on regular basis to prevent regeneration.
- Train park staff in control and eradication of invasive species.
- Enlist the help of local communities where possible and explore the possibility of using defence forces personnel for field tasks.
- Initiate a programme to remove domesticated/feral dogs from the park.
- Develop a protocol to protect wild buffalo from gene contamination.

Objective 3.5: A habitat and species conservation programme for the Influence Zone is established.

Context

The Influence Zone of WNP contains areas of high-value biodiversity including important elephant migratory corridors, wetlands utilized by migratory and resident birds and seagrass beds that are important for globally threatened species such as dugongs and marine turtles. As these areas do not have sufficient legal protection, they are under severe pressure and are threatened with destruction if immediate actions are not taken. Threats include agriculture, use of pesticide and herbicide, irrigation, tourism and destructive fishing and mining industries. These environmentally sensitive areas (ESAs) need to be identified, mapped and management interventions including proper land-use planning, legal protection needs to be implemented. Further fragmentation of wildlife areas is leading to the loss of many species. To the North of the park three areas remain that could potentially be saved as corridors but in the South this connectivity has already been cut by intensive agriculture. The road that runs parallel to the coast is another potential threat. Corridors not only increase the wilderness available to wildlife, sustaining higher population numbers, but also link different populations enabling a greater genetic pool. There is little or no governmental or community acknowledgement of the needs and benefits of corridors to both wildlife and community health.

In the marine environment where there is virtually little understanding or enforcement of regulation, strong and immediate interventions are necessary, particularly enforcement of by-catch regulations, protection of nesting turtles and sea birds, protection of dugong and humpbacked dolphin and an end to trawling along the reef. The Barrier Islands have very high biodiversity value and are potentially important to the economy of Sri Lanka through tourism.

The involvement of all stakeholders, community and private sector is high importance for the success of this activity.

Actions

- Establish a shared vision for the management of adjacent protected areas through the District Agricultural Committee to provide continuity of habitats (e.g. Mavillu Conservation Forest, Fishery Management Areas, Bar Reef and Tabbowa Sanctuaries).
- Identify and map areas of High Biodiversity Value (HBV) areas outside the existing PA complex, including migratory corridors, especially used by elephants and other globally threatened species.
- Develop micro management plans for HBV conservation with involvement of all relevant stakeholders and implement them with public-private partnerships and community agreements.
- Initiate a dialogue to increase legal protection under conservation laws for priority areas (e.g. extending the western coastal boundary of WNP to cover Bar Reef and sea grass beds for the protection of dugongs and turtles and elephant corridors).
- Establish elephant corridors connecting WNP with following areas: Mahawilachchiya tank, Madu National Park, Lower Malwatta Oya basin and Gangewadiya.

Objective 3.6: Geological, prehistoric and archaeological sites are protected and interpreted.

Context

In addition to biodiversity values, WNP contains rich geological, prehistoric and historical heritage. These antiquities need protection and are also of interest to visitors.

There are 145 known, paleontological, prehistoric, Palaeolithic and Mesolithic and other historical sites spread throughout the park and Influence Zone. Unfortunately treasure hunters have disturbed many of these sites and removed artifacts. These sites have not been repaired. There seems to be neither a consistent policy with respect to maintenance, repair or otherwise interfering with archaeological sites, nor for genuine archaeological excavation.

Actions

- Collaboration with the Department of Archaeology.
- Develop a policy for the protection and management of paleontological, prehistoric and historic sites following DA guidelines.
- Develop Kudiramalai and Kuveni's Palace as visitor destination.
- Investigate the potential of Ochappu and Veeransolai as visitor destinations.
- Ensure that tank rehabilitation does not cause loss of historical values.
- Develop appropriate interpretive materials and displays.
- Identify and preserve protohistoric sites.

Programme 4: Outreach

Introduction

The Park cannot function in isolation and requires the support and cooperation of many stakeholders including other government agencies and communities who live and work within the Influence Zone. The Outreach Programme will work closely with these stakeholders to explain the purpose of the park and DWC and provide awareness services. Outreach explains why the park and biodiversity is important and why community support is vital. It also helps minimize conflict between DWC and communities and coordinate with other government agencies on shared challenges and concerns. The following objectives are designed to provide an appropriate level of services that minimize conflict and increase, where possible, benefits from the park and biodiversity.

Goal

“To influence the activities and opinions of the people and agencies within the Influence Zone such that they benefit both biodiversity and the quality of life of the people themselves”.

Strategy

“Officers of the Outreach Programme must be selected for their ability to effectively communicate with communities and local government. The Outreach Programme must have a clear message that is consistent and targeted at appropriate levels depending on the audience”.

Objective 4.1: The conditions for the implementation of outreach services are in place.

Context

Many of the management problems of the park originate from the communities that live near to the park boundary. It is essential to have joint programmes to both involve these people and to improve their livelihoods. While outreach or community environmental extension is within the mandate of DWC, livelihood development activities are not. This is the responsibility of local government with the support of national NGOs with expertise in livelihood activities. The goal of the outreach activities is to influence the activities and opinions of the people and agencies of the Influence Zone such that they benefit both biodiversity and the improvement of the quality of life of the people themselves.

The Outreach Programme of DWC for the park is small and under resourced (no equipment, funds, staff), with only a single Community Outreach Officer for the entire area (four Districts). There is a lack of procedural mechanisms for working with the local communities (e.g. community representatives, meeting schedules, programme agendas, etc.) and little interpretation or environmental awareness.

The result is constant miscommunication and lack of understanding within the communities regarding the purpose of the national park.

This management plan proposes a large expansion of the Outreach Programme to align WNP with best practice in protected area conservation and to fulfil the objectives of habitat management in the Influence Zone.

Actions

- Identify who will lead the Outreach programme at the field level.
- Develop an on the job training manual for outreach activities to include law enforcement, communication, conflict resolution and gender sensitivity.
- Develop ToR and recruit at least one outreach ranger (officer) per district, to be based in the respective district, and a further assistant for the office, to work under the outreach officer.
- Provide transport and equipment for outreach teams.
- Each outreach district to follow a strategic plan with clear objectives and interventions while coordinating with external implementing agencies.

Objective 4.2: Conflicts between humans and wildlife are reduced.

Context

Wildlife conflicts are a source of tension between communities and WNP and techniques should be applied to reduce this. Throughout Sri Lanka, between 250-280 elephants die each year due to those conflicts. People growing crops where has always been elephant habitat is the main cause of human-wildlife issues around Wilpattu. Humans and elephants share preference for cleared forestland with grass/shrubs/crops. Elephants are intelligent and have adapted to traditional repelling techniques.

The traditional elephant fence design does not always prevent HEC as elephants often find a way to get through, but the new “hanging wire fence” shows great potential to be effective. Elephant fences are often placed in areas that prevent elephants from reaching open areas, effectively blocking their movement. Fence placement must protect crops and not prevent the free movement of elephants.

Evidence shows that government agencies are unable to maintain these fences properly whereas community managed fences are often better maintained. DWC has procedures for responding to elephant problems and the payment of compensation but this is a slow and often ineffectual process.

There is increasing support for the movement away from an aggressive response to elephants as this encourages an angry and dangerous response from the elephants. It will be valuable to investigate the concept of a more passive, communicative approach towards elephants. Calm leads to calm.

Human conflicts with leopards and sloth bears have also been reported, resulting in people having resorted to poisoning leopards to protect their livestock.

Actions

- Realign existing fences to incorporate better design features to allow unimpeded travel for elephants based on ecological rather than administrative boundaries.
- Regularly collect data on crop damage and HWC.
- Develop a HEC database in coordination with district secretariats and DWC Elephant Unit.
- DWC Elephant Unit to develop a detailed mitigation plans for the Influence Zone.

- DWC Elephant Unit to explore mitigation methods to reduce railway deaths.
- Create a continuous habitat through the park, forestland and create corridors to link them.
- Remove all human related activities inside the corridor within a legal framework.
- Move away from an angry and antagonistic approach to a more peaceful approach to elephants.
- Explore community financed fence schemes and payments for fence maintenance.
- Accelerate the DWC compensation scheme.

Objective 4.3: Communities are familiar with environmentally sensitive livelihood practices and alternatives to damaging practices.

Context

The predominant land use within the Influence Zone is small scale, family-based agriculture with paddy as the predominant crop. After three years of drought many farmers have been unable to grow paddy and resort to alternative sources of income. The widespread use of chemical fertilizers, pesticides and herbicides is both damaging to the environment and may have led to the increased occurrence of chronic kidney disease. There are alternatives to traditional paddy and chemicals that need to be promoted to spread this risk while raising benefits albeit intangible.

Inland fisheries, mainly in tanks are a significant source of income for communities surrounding the park. These fishers face several challenges including periods of drought, over fishing and depletion of fish stocks, illegal fishing by non-registered fishers and lack of processing facilities and access to markets. Several potential activities have been identified that would benefit local fishers i.e. improved landing facilities, cage rearing, value chain improvements, stricter monitoring of licensing, and law enforcement and restocking. These tanks are often areas of high biodiversity value.

There is significant damage being done to marine fisheries resources as a result of overfishing and destructive fishing practices. While beyond the mandate of WNP it is within the mandate of DWC to work closely with the relevant authorities and organisations.

There is a large gulf in perception and values between WNP and the communities, which education and awareness may partially reduce.

There is little or no environmental awareness or education carried out by the park that focuses on communities and institutions in the IZ. As a result, there is poor understanding of the role of the park and its service and responsibilities to the public. DWC has neither the staff, capacity nor budget to be effective in interpretation and awareness. In contrast, education is an activity that aims to improve understanding, change behaviour and to win hearts and minds and, therefore, it is logical to place it under the Outreach Programme. There are obvious overlaps between these three activities allowing the share of resources. As per all activities there shall be a well-balanced proportion of women, minorities and ethnic language speakers.

Globally, local people living near a protected area seldom receive any direct benefit from that protected area. For most people, mainly women in low income communities, their only interest is in the cultivation of crops to sustain the family. If an easy alternative source of income is available, they may consider it but that often comprises illegal exploitation of the park, though there are alternative ways to generate income based in resource-friendly ways.

Actions

- Design and implement an Environmental Interpretation Programme to provide the necessary information to allow people and organisations to understand the role of the park and the conservation issues.
- Develop awareness materials in local languages.
- Organize community visits annually to WNP and improve interaction between the park administration and the adjacent villages.
- Facilitate and conduct awareness campaign on wildlife laws to the adjacent communities.
- Develop a regime of educational activities (talks, courses, secondments etc.) that assist institutions in their work and their understanding of, and involvement in, conservation projects.
- Produce an environmental manual that promotes environmentally sensitive practices for all aspects of daily life.
- Identify the main livelihood activities that are degrading the environment and are harmful to wildlife.
- Carry out awareness raising sessions with communities on the negative consequences of chemical over-use and improper waste disposal and suggest alternatives.
- Develop CBOs to lead community conservation initiatives.
- Identify biodiversity friendly activities and promote these widely i.e. bee keeping for "Wilpattu Honey".
- Establish a "Village of the Year" for the most environmentally friendly village.
- Publish awareness materials on the WNP website.
- Promote zero fire/crop burning policy in farms.
- Promote environmentally friendly family level gardens within the Influence Zone.
- Promote wood lots and tree nurseries in pilot communities.
- Promote planting in the bare forestland (no development zone) close to the forest boundary with native species to protect the forest including bee friendly flowering plants.
- Introduce soil erosion prevention methodologies.
- Promote the planting of herbs and medicinal plants.
- Promote crops that are less water dependent.
- Identify appropriate vocational training opportunities.
- Identify other income opportunities through nature-based tourism related activities.
- Develop a working relationship with NAQDA and Fisheries Department.
- Promote sustainable fisheries practices.
- Support local schools to develop classes in environmental issues.

Objective 4.4: DWC is actively contributing in District Coordinating Committee meetings.

Context

Outside of the park there are protected areas that have high biodiversity value (HBV). But also land without any protection status has biodiversity value and needs to be under a formalised management structure to ensure such habitats are not destroyed carelessly. A general lack of agency coordination has led to ad hoc development and no land use planning or zonation. The participation of DWC is a first step in coordination and cooperation to ensure land available for biodiversity is not degraded beyond repair.

Wildlife & conservation-oriented departments are often seen as the non-beneficial agencies by the communities and are not well respected. The only contact people have with park staff is when they are arrested for illegal exploitation of natural resources. The purpose of outreach is to share information and knowledge with all people and agencies living near the park and other conservation areas. Additionally, to help alleviate some of their problems associated with wildlife and assist with improving their lives. Village societies are a key focus for outreach and are the best routes for establishing rules and procedures for the transfer of support, management systems, services and materials provided in aid, and for adherence to laws and rules applying to WNP and other protected areas and management zones. Communication on all aspects of conservation must be maintained between all partners for conservation to function.

Actions

- Clarify DWC's role in the committee.
- Promote wildlife policies and requirements to other agencies.
- Feed in DWC's perspective in land use planning.
- Initiate regular coordination meetings as a platform for discussion and decision-making.
- Establish field-based field action group to address immediate problems.
- Develop a procedure for information sharing, including training and presentations to communities and other government agencies.

LOG FRAME

1. Park Operations Programme		2019	2020	2021	2022	2023
Goal: Administrative and operational capacity of Wilpattu National Park is such that the conservation goals and objectives are fulfilled in the long term".						
Strategy: The Management Plan will be implemented in a proactive and timely fashion by the Park Management Unit (PMU), ensuring the resources, planning and leadership are available to support adaptive management of operations.						
Objective	Actions	Indicator	Responsible			
1.1 The park's administrative systems are effective.	Prepare Annual Action Plan for each year of the Management Plan.	After year 1 there is an increasing in METT score.	Park Warden			
	Implement monthly work plans/reporting for each Range Station.		Park Warden			
	Establish SOP Manual for all park operations activities.		Park Warden			
	Promote maintenance capacity to avoid the necessity of outsourcing all maintenance activities.		Park Warden			
	Establish 4 WNP District Committees to (that) include representatives from all ethnic groups and women's (gender) groups.		Park Warden			
	Investigate possibility of retaining a legal firm to process pending court cases.		Park Warden			
	Review park level authority and responsibilities of the Park Warden.		PMU			
	Ensure additional Treasury funding to support additional activities as a result of Management Plan implementation.		Steering Committee			
	Establish the Wilpattu Steering Committee at the highest level to provide broad direction and to deal with high-level external political interference.		Steering Committee			
	Through the Steering Committee and District meetings, engage with relevant civil society groups.		Steering Committee			
1.2 The Park has sufficient numbers of well-motivated and well-trained staff.	Carry out a review of the ADB Training Needs Assessment to develop appropriate training opportunities.	High level meetings and coordination leads to improved holistic planning.	Dir. Research and Training			
	Clarify staff responsibilities and tasks by developing clear Terms of Reference.		Director Outreach			

Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
	Recruit Park Ecologist.	By the end of year 1 all staff recruitment is completed.	Dir. Research and Training					
	Recruit Outreach Officers and Interpretation Officers.		Head of Research and Training					
	Develop a training programme/ refresher for all staff to include leadership and work planning.	By the end of year 1 a in-house training programme is developed and approved.	Dir. Research and Training					
	Provide all staff with legal training to allow them to represent DWC in court hearings.		PMU					
1.3 There exists a clear inter-agency agreement on settlements within protected areas.	Identify all illegal settlements within the protected areas and create a database of current landowners type of land use.	By mid 2019, all settlements are identified.	Park Warden					
	Devise mechanisms to reduce/eliminate settlements within the park.	By mid 2019 an common agreement has been established.	AD / Park Warden					
	Periodic monitoring to control and prevent further expansion.	By mid 2019 a priper monitoring program to be in place .	AD / Park Warden					
1.4 Park regulations and National laws are enforced effectively.	Recruit 15 field staff to ensure park law enforcement (LE) operations are effective.	By 2020, field patrols cover 100% of the park monthly.	DG					
	Train all field staff in patrolling techniques and LE planning.		Dir. Research and Training					
	Establish a comprehensive foot patrol schedule in all vulnerable parts of WNP(and IZ PA's).		Rangers					
	Set up a recording and monitoring system for all LE (incidents (effort); include the SMART recording system.		AD/Park Warden					
	Establish SOP for all Stations placing responsibility and accountability on the Range and Beat Station Heads for implementation of Range and Beat activities.		Park Warden					
	Establish joint patrolling between DWC staff and Community Guards./Guardians	By 2020, 15 community individuals join DWC patrols.	PMU					
	Establish a reward system for information on illegal activities.		PMU					
	Establish Community 'Guardians' to observe and report on illegal/damaging practices.		PMU					

Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
1.5 Access to the park is controlled and monitored.	Ensure that all road entry points are manned and controlled at all times.	By 2020, all entry points and roads are manned and patrolled 24/7.	Park Warden		On-going			
	Establish a system of control points and road blocks where traffic can be halted and searched on the two through roads.		Ranger		On-going			
	Review the access arrangements at each access point and establish for each specific protocols.		Park Warden					
	Construct barriers at the road entries that currently lack them.		Park Warden					
	Control traffic speed on the two through roads with speed bumps.		Park Warden		On-going			
	Bring the Mannar to Puttalam road under jurisdiction of DWC.	By end 2017 DWC presents proposal to Road Development Authority.	Steering Committee					
1.6 Joint conservation efforts of DWC and the Forest Conservation Department (FCD) have improved.	Establish regular consultations with FCD to discuss joint objectives.	By 2020, and agreement (Signed) with FCD is in place and 4 joint patrols are being carried out each month.	PMU		On-going			
	Identify priority forest adjoining the park that require closer shared management.		PMU					
	Share resources and establish common procedures for management.		PMU					
	Establish an agreed procedure for WNP staff to patrol with FCD staff to enforce laws.		PMU					
1.7 Conditions for the protection of the proposed Marine Sanctuary have improved.	Establish regular consultations with Fisheries Department to discuss joint objectives.	By end of 2019, a working group has been establishment of the Marine Sanctuary..	PMU/Marine Unit					
	Prepare legal steps to declare the Marine Sanctuary.		PMU/Marine Unit		On-going			
	Identify priority marine environments that require closer shared management.		PMU/Marine Unit					
	Share resources and establish common procedures for management.		PMU/Marine Unit		On-going			
	WNP staff to patrol and enforce laws in the proposed Marine Sanctuary.based on protected species legislation.		PMU		On-going			
	In collaboration with key stakeholders develop a Marine Management Plan for the protection and management of the proposed Marine Sanctuary from 'beach to reef'.		PMU/Marine Unit					

Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
1.8 Boundaries of the park and neighbouring protected areas are clearly marked and understood.	Develop a tourism plan for the proposed Marine Sanctuary and coastal areas.	By the end of 2020, the boundary of WNP is fully marked with sign boards.	PMU					
	DWC and FCD to carry out ground truthing exercise of all protected area boundaries and establish area of jurisdiction in the land/marine areas and the 1.6 km no-development zone.							
	Verify with Survey Department to compare the gazettement with the marked boundaries of WNP.							
	Install boundary markers and signboards in local languages and indicate the 1.6 km restricted development zone.							
	Share boundary information, including maps with other Government Departments and communities.							
	Clearly demarcate the limits of expansion of Pallekandal Church at Pomparippu to restrict expansion.							
	Northern boundary of the park extended to include the state lands of Wilpattu North Sanctuary.							
	In consultation with stakeholder agencies establish the limits of the marine protected area and DWC limits of jurisdiction and the possibility of extending the coastal boundary of the park as a sanctuary to protect the dugongs and sea grass beds. This covers the Fishery Management Areas as well as new areas that provide protection for dugong, dolphin and other species of interest.							
	Develop a community alert system for infringements using existing CBOs.							
	Construct Beat Stations at Palugathurai, Kollan Kanaththa and Gangewadiya, Cheddikulam.							
1.9 Park infrastructure meets the present and future needs to ensure effective management.	Construct Range Office at Pomparippu. (Pomparippu has been upgraded to Range Station).	By the end of 2021, all new park infrastructure in use.	Range Officers					
	Construct combined Beat Stations at Mawillu and at Gangewadiya for joint patrolling and monitoring with the FCD.							
	Construct staff quarters at Uchchamunai and Battlangundu points.							

Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
1.10 The park has sufficient transport and equipment to be operationally effective.	Maintain road network with culverts and dams where appropriate.	By the end of 2019 the park has procured all necessary vehicles and equipment identified in the assessment.	PMU/Engineer					
	The Eluwankulama to Mannar road to be absorbed into DWC jurisdiction.							
	Design and install park signage for all structures, roads and tracks.							
	Design and construct entrance gates at Eluwankulama and Mullikulam and Thanthirimale.							
	Demolish all derelict or broken infrastructure inside the park.							
	Establish appropriate clean water for DWC offices and bungalows.							
	Maintain solar systems at all Range/Beat stations and bungalows							
	Establish a road maintenance schedule.							
	Carry out equipment assessment of all structures to ensure each has the equipment necessary to function independently.							
	Establish SOP for use and maintenance of all equipment.							
	Train staff in the field staff in its correct use and maintenance of firearms.							
	Supply adequate field equipment (tents, GPS, camera etc.) and train the field staff in its correct use and maintenance.							
	Ensure an adequate field communications system (radio, phone).							
	Provide vehicles for patrolling and other maintenance work.							
	Ensure all park staff have a complete uniform to promote a professional 'face' of DWC							

Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
1.11 The park Management Plan is reviewed annually and implemented with appropriate adaptive management where necessary.	Carry out Management Plan review annually.	The Management Plan is reviewed and adapted for the Annual Actions Plans.	DWC Steering Committee			Annually		
	Prepare Annual Action Plan.		PMU			Annually		
	Coordinate with other agencies through Wilpattu Steering Committee of DWC.		PMU/Steering Committee			On-going		
	Evaluate the effectiveness of management annually.		PMU			On-going		
	Identify synergies with other projects and agencies to reduce overlap and increase collaboration.		PMU/Steering Committee			On-going		

2. Tourism development and visitor use								
Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
Goal: To transform Wilpattu National Park into a world class tourist destination by providing diverse and unique visitor experience on its natural and cultural heritage in ways that will not compromise its conservation goals.								
Strategy: "In order to significantly improve the standard of service to visitors, a high standard of input is required from tourism experts. This will include professional re-design of visitor infrastructure, interpretation materials and management of the bungalows".								
2.1 Visitor experience is improved through enhancement of facilities.	Upgrade visitor service centers at Hunuwilagama and Eluwankulama entrances with ticketing counters, parking areas, and eating and toilet facilities.	All entrance points are renovated and open by end of 2019.	PMU/Engineer					
	Under the existing regulations ensure a Zero Waste management within WNP.	maintain the existing system with further improvements.	Park warden					
	Open existing Mullikullam and Tanthirimale ticketing points with the provision of appropriate visitor facilities.	All entrance points are renovated and open by end of 2019.	PMU/Engineer					
	Improve the existing road network and open new jeep tracks especially above Modragamaru for visitor use (culverts and dams needed to be constructed at appropriate locations).	The parks road network is redesigned and a map produced by end 2020.	PMU/Engineer					
	Design an improved road/track network to disperse visitors more evenly around the park including one way circuits.							
	Reopen tracks, especially in the tanks zone of the northeastern section of the park.							
	Establish a road link to Block IV Tanthirimale.							
	Clear the undergrowth regularly on both sides of main jeep tracks to increase the wildlife observation opportunities.	By mid 2020, all visitor attractions are constructed and in use.	PMU			On going		
	Establish a hanging bridge across Kala Oya at Eluwankulama to facilitate DWC during the rainy season.		PMU/Engineer					
	Establish a butterfly garden and a network of nature trails adjacent to the Hunuwilagama tank.		PMU					
Develop Karabawewa Tank as a new tourist destination with nature trails.		PMU						

Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
2.2: Visitor experience has improved by implementing innovative interpretation and education services and programmes.	Maintain and improve the nature trails at Kudiramalai with appropriate soil conservation measures.	Annual visitor surveys indicate a 5% increase in satisfaction.	PMU					
	Construct a new visitor resting area at Marawila and improve the existing Kubukwila stop over.		PMU					
	Improve the facilities of existing bungalows and campsites with year round good quality water supply, toilets and bathrooms, electricity supply etc.).		PMU					
	Construct new circuit bungalow/s (Kollankanatha) and campsites (Malwatta Oya, Kala Oya, Kudiramalai etc).		PMU/Engineer					
	Develop short walking trails at set-down points, will slow the circulation and reduce the pile-ups at leopard sightings and villus.		PMU					
	Develop half day and full day tour itineraries capturing different aspects and routes of the park.		PMU					
	Monitor visitor use of tracks, routes and preferred sites.		PMU	On going				
	Formulate a cap on the numbers of vehicles per day that are allowed to enter the park, including the annual festival at the church at Pomparippu.		PMU					
	Develop visitor experience in the Kala Oya mangrove and Pomparippu Oya estuaries.		PMU					
	Prohibit all swimming and bathing within the park including Eluwankulama.		PMU	On going				
	Initiate a several day pass system for visitors.		PMU					
	Recruit a short-term hotel management expert to advise on increasing and maintaining standards at the Bungalows.		PMU					
	Identify coastal sites and design infrastructure for a new Interpretive/Education facility for Marine biodiversity conservation including mangroves, dugongs and turtles.		Interpretation Officer					
	Design high quality interpretive center and information. Using the interpretive programme, build an understanding and appreciation of nature that is not focused just on leopards, for example promote the enjoyment of lesser known species and environments.		PMU, Architect					
	Develop tours that focus on specific topics such as villu and archeological sites.		Interpretation Officer					

Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
2.3: Management of visitors reaches international standards.	Consider stopping DWC recruitment and employment of guides, trackers and drivers and allowing private sector to provide these services.	By the end of 2019, there are at least 6 documented environmental events annually.	PMU					
	Develop and regularly update WNP website with news postings, archival information and resources.							
	Train guides and provide basic training refresher courses to Guides and Jeep Drivers.		Park Warden			Refresher		
	Instigate an annual jeep drivers and trackers licensing system							
	Train park personnel in interpretive presentation and delivery of environmental education services.		Interpretation Officer			Refresher		
	Develop and implement interactive environmental education programme that will attract more school children to the park through the Wildlife Clubs of Sri Lanka.		Interpretation Officer					
	Organize events to celebrate biologically significant days such as World Wetlands Day on 2 nd February and Migratory Bird Day to build awareness and involvement of different stakeholders.		PMU					
	Develop restricted areas to spread visitors more evenly across the park and restrict access to sensitive habitats.		PMU					
	Explore the necessity to close certain sections of the park to visitors in case of habitat degradation.		PMU					
	Introduction of a booking and payment system online that can speed up visitor entry, while retaining the option of buying entrance at the gate office.		PMU					
Relax the necessity of an accompanying guide.	PMU							
DWC vehicle/s to patrol the park during the peak visitor season to manage overcrowding at wildlife sightings and villus; and to ensure adherence to park rules and regulations.	PMU							
Enforce the Code of Conduct to regulate tourism activities in the park for both tourists and jeep safari drivers and distribute it widely among the relevant stakeholders.	PMU			On-going				

Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
	Enforce various fines (monitor and non-monitor) in the event of a breach or non-fulfillment of the Code.		PMU			On-going		
	Register all commercial safari jeeps and their drivers in park headquarters.		PMU			On going		
2.4 Communities in the Influence Zone offer tourism services based on wildlife experience.	Set up a monitoring system to track the impacts on the park from tourism.	By the end of 2019 and monitoring protocol is in place	PMU					
	Continuously monitor the Pallekandal church festival activities with an upper limit to the number of pilgrims that can camp inside the park during the festivities to be reached in consultation with the church authorities.		PMU			On going		
	Work closely with the private tourism sector and other relevant stakeholder to share information and to obtain their support through regular meetings and annual work plan.	By end 2019 a tourism related forum is established under participation of DWC.	PMU			On going		
	Identify community interest and capacity and provide training and networking support to businesses and communities engaging in tourism.		PMU			On going		
	Resolve issues pertaining to tourism developments in the one mile restricted development zone.		PMU			On going		
	Collaborate with the lagoon tour operators at Gangawadiya with collaboration with the Forest Department and provide training to boat-tour operators.					On going		
	Identifying local produce and marketing through and provide stalls at the park's ticketing points and interpretation centre to sell the products.	By early 2020, opportunities for community benefits have been identified and reported to PMU.	PMU					
	Establish nature trails and other tourist infrastructure in appropriate locations such as tanks or archeological reserves with community participation.		PMU					
	Promote homestay or campsite options and best practice management of guests.							

3. Environmental Programme								
Goal: To improve scientific fact-based management of the protected area complex and settled land through research, monitoring, management actions and communications that target conservation priorities and provide the information needed to solve conservation problems.								
Strategy : "As WNP lacks the capacity to carryout ecological research and monitoring activities, it is necessary make partnerships with institutions and individuals. These partnerships will provide the necessary skills to carryout research and monitoring and transfer these skills to park staff".								
Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
3.1 A SCIENTIFIC research program is established and under implementation that supports management decisions.	Collate all available information and research undertaken on WNP and surrounding areas including marine.	By the end of 2020, all available data is compiled and research and monitoring priorities are established.	Dir. Research and Training					
	Establish a good reference library for the use of park staff, researchers and students.		Dir. Research and Training			On-going		
	Establish baselines for populations of flagship species, forest, scrub and grassland cover, mangrove and invasive species to identify changes over time.		Dir. Research and Training					
	Carry out a Gap Analysis and prioritize research needs.		Dir. Research and Training					
	Collaborate with appropriate institutions and individuals that have the necessary expertise to carryout research and monitoring activities.		Dir. Research and Training			On-going		
	Establish both permanent and temporary research facilities for researchers to carry out field activities at Pomparippu, Maradanmaduwa and Hunuwilagama.	By the end of 2019, the park has the necessary equipment and capacity to carry out basic monitoring	Dir. Research and Training					
	Train park staff in basic biodiversity monitoring techniques	By the end of 2019, the park has the necessary equipment and capacity to carry out basic monitoring	Dir. Research and Training			On-going		
	Undertake biodiversity surveys and habitat mapping to fill gaps and update knowledge on biodiversity and its spatial and temporal distribution.	By the end of 2021, 3 research partnerships have been established.	Dir. Research and Training			On-going		
	Carry out studies on the requirements of key ecosystems, processes and species habitat relationships with special reference to Bears, Leopards, Elephants, Primates and small cats.		Dir. Research and Training			On-going		
	Conduct habitat carrying capacity studies.		Dir. Research and Training					
	Carry out studies on habitat utilization of avifauna and other critical species associated with wetlands.		Dir. Research and Training					

Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
3.4 Invasive species are removed, controlled and prevented from re establishment.	Prepare a map of invasive species distribution based on research findings.	By the end of 2020, 50% of the recommendations have been implemented and invasive species control plan is approved and under implementation.	Dir. Research and Training					
	Prepare SOPs for management of each invasive species.		Dir. Research and Training					
	Mechanical eradication of invasive species mechanically on regular basis to prevent regeneration and monitor results.		Dir. Research and Training					
	Train park staff in control and eradication of invasive species.		Dir. Research and Training					
	Enlist the help of local communities where possible and explore the possibility of using Defense Forces personnel for field tasks.		Park warden/AD					
	Initiate a programme to remove domesticated/feral dogs from the park.		Park Warden					
	Develop a protocol to protect wild buffalo from gene contamination.		Dir. Research and Training					
	Through the District Agricultural Committee, establish a shared vision for the management of adjacent protected areas to provide continuity of habitats (e.g. Mavillu Conservation Forest, Fishery Management Areas, Bar Reef and Thabbowa Sanctuaries).		PMU					
	Identify and map areas of High Biodiversity Value (HBV) areas outside the existing PA complex that will include migratory corridors, especially used by elephants and other globally threatened species.		Dir. Research and Training					
	Develop micro management plans for HBV conservation with involvement of all relevant stakeholders and implement them with public-private partnerships and community agreements.		PMU					
3.5 A habitat and species conservation programme for the Influence Zone is established.	Initiate a dialogue to increase legal protection under conservation laws for priority areas (e.g. extending the western coastal boundary of WNP to cover Bar Reef and sea grass beds for the protection of dugongs and turtles and elephants corridors).	BY end 2020 reports on all HBVs are available.	PMU					
			PMU					
			Dir. Research and Training					
			PMU					
			PMU					
			Dir. Research and Training					
			PMU					
			PMU					
			Dir. Research and Training					
			PMU					

Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
3.6 Geological, prehistoric and archaeological sites are protected and interpreted.	Establish elephant corridors connecting WNP with following areas: Mahawilachchiya tank, Madu National Park, Lower Malwatta Oya basin and Gangewadiya.	By the end of 2021, agreements in place to connect Mavillu with Madhu National Park. By the end of 2019 all sites of interest are mapped. By end 2019 all information shared on website.	PMU					
	Establish collaboration with the Department of Archaeology.		PMU					
	Develop a policy for the protection and management of protection of paleontological, prehistoric and historic sites following DA guidelines.		PMU					
	Develop Kudiramalai and Kuveni's palace as visitor destinations.		PMU					
	Investigate the potential of Ochappu and Veeransolai as visitor destinations.		PMU					
	Ensure that tank rehabilitation does not cause loss of historical values.		PMU					
	Develop appropriate interpretive materials and displays.		Interpretation Officer					
	Identify and develop protohistoric sites.							

4. Outreach Programme						
Goal: To influence the activities and opinions of the people and agencies within the influence zone such that they benefit both biodiversity and the quality of life of the people themselves.						
Strategy "Officers of the Outreach Programme must be selected for their ability to effectively communicate with communities and local government. The Outreach Programme must have a clear message that is consistent and targeted at appropriate levels depending on the audience".						
Objective	Actions	Indicator	Responsible	2019	2020	2021
4.1 The conditions for the implementation of Outreach services are in place.	Identify who will lead the Outreach programme at the field level.	By mid 2019, the Outreach programme is fully staffed and is implementing effective outreach services throughout the Influence Zone.	DWC			
	Develop an on the job training manual for outreach activities to include Law enforcement, communication, conflict resolution and gender sensitivity. Develop ToR and recruit at least one Outreach Ranger (Officer) per district, to be based in the respective district, and a further assistant for the office, to work under the Outreach Officer. Provide transport and equipment for Outreach teams. Each Outreach District to follow a strategic plan with clear objectives and interventions while coordinating with external implementing agencies.		PMU DWC PMU PMU			
4.2 Conflicts between humans and wildlife are reduced.	Realign existing fences to incorporate better design features to allow unimpeded travel for elephants based on ecological rather than administrative boundaries.	By the end of 2021, HEC data shows a 25% reduction in conflict incidents.	Elephant Unit		On-going	
	Regularly collect data on crop damage and HWC.		PMU		On-going	
	Develop a HEC database in coordination with District Secretariats and DWC Elephant Unit.		PMU			
	DWC Elephant Unit to develop a detailed mitigation plan for the influence zone.		PMU and Elephant Unit			
	DWC Elephant Unit to explore mitigation methods to reduce railway deaths.		DWC Elephant Unit			
	Create a continuous habitat through the park, forestland and create corridors to link them. Remove all human related activities inside the corridor within a legal framework.		PMU and Elephant Unit PMU			

Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
Objective 4.3: Communities are familiar with environmentally sensitive livelihood practices and alternatives to damaging practices.	Move away from an angry and antagonistic approach to a more peaceful approach to elephants. Explore community financed fence schemes and payments for fence maintenance. Accelerate the DWC compensation scheme.		PMU and Outreach Officers. PMU		On-going			
	Design and implement an Environmental Interpretation Programme to provide the necessary information to allow people and organizations to understand the role of the park and the conservation issues. Develop awareness materials in local languages. Organize community visits annually to WNP and improve interaction between the park administration and the adjacent villages. Facilitate and conduct awareness campaign on wildlife laws to the adjacent communities. Develop a regime of educational activities (talks, courses, secondments etc.) that assist institutions in their work and their understanding of, and involvement in, conservation projects. Produce an Environmental Manual that promotes environmentally sensitive practices for all aspects of daily life. Identify the main livelihood activities that are degrading the environment and harmful to wildlife. Provide the same services to government institutions e.g. police and local government. Carry out awareness raising sessions with communities on the negative consequences of over chemical use and improper waste disposal and suggest alternatives. Develop CBOs to lead community conservation initiatives. Identify biodiversity friendly activities and promote these widely i.e. bee keeping. Promote beekeeping for "Wilpattu Honey".	By the end of 2022, 80% of families have received awareness on environmentally damaging practices and alternatives.	Outreach Officer Agri Expert and Dir. Outreach Dir. Outreach		On-going			

Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
	Establish a "Village of the Year" for the most environmentally friendly village.	By end 2020, at least one school in each district has an Environmental lesson each week.	Website Administrator					
	Publish awareness materials on the WNP website.		On-going					
	Promote zero fire / crop burning policy in farms.		Dir. Outreach and Agri Expert					
	Promote environmentally friendly family level gardens within the Influence Zone.							
	Promote wood lots and tree nurseries in pilot communities.							
	Promote planting in the bare forestland (no development zone) close to the forest boundary with native species to protect the forest and bee friendly flowering plants.							
	Introduce soil erosion prevention methodologies.							
	Promote the planting of herbs and medicinal plants.							
	Promote crops that are less water dependent.							
	Identify appropriate Vocational Training opportunities.		PMU					
	Identify other income opportunities through nature based tourism related activities.							
	Develop a working relationship with NAQDA and Fisheries Department.		Dir. Outreach and Fisheries expert					
	Promote sustainable fisheries practices.							
	Support local schools to develop classes in environmental issues.							

Objective	Actions	Indicator	Responsible	2019	2020	2021	2022	2023
4.4: District communities are active in coordination park-centered activities.	Clarify DWC's role in the committee.	DWC staff are participating in 100% of District meeting from early 2019.	PMU					
	Promote wildlife policies and requirements to other agencies.		PMU			On-going		
	Feed in DWC's perspective in land use planning.		PMU			On-going		
	Regular coordinating meetings as a platform for discussion and decision-making.		PMU			On-going		
	Establish field based Field Action Group to address immediate problems.		Outreach Officer					
Develop a procedure for information sharing, including training and presentations to communities and other government agencies.								

ANNEXES

Annex 1: Legal Protected status of Wilpattu National Park and its influence zone

Introduction

Wilpattu's legal protection dates to 29th May 1903, when the land called Wilpattu in Wilachchiya Korale in the North Central Province was proclaimed as a Reserved Forest under the Section 19 of the Forest Ordinance No.10 of 1885 (Gazette no: 5924). As per the information given in 1907 administration report of the Forest Conservancy, on 15th September 1905 the areas of Crown Forests in Anuradhapura (64,000 acres) and Puttalam (75,000 acres) were declared as the Wilpattu Game Sanctuary (Campbell, 1907) to curtail the accelerating game hunting in the country (Lushington, 1936). Steps were taken to demarcate and reserve "surrounds" to the Game Sanctuary (GS) as Resident Sportsmen Reserves (RSR), where shooting game were permitted with a license during the open season. All fauna and flora within the GS were considered "forest produce" and protected. The Government Agents of the area with the assistance of game watchers were responsible for protecting the GS and RSRs (Saparamadu, 2006; Uragoda, 1994). With the enactment of the Fauna and Flora Protection Ordinance in 1937 (FFPO), the Wilpattu Game Sanctuary was designated as the Block 1 of the present day Wilpattu National Park (WNP), while the RSR were declared as Intermediate zones (Refer section under FFPO).

Presently, the WNP and its influenced zone contain several protected area categories that have been established under six legislations and are governed by different agencies (Refer Table 1). The WNP and adjacent Forests Reserves are contiguous and form a single flourishing ecosystem, while the adjacent seascape including Dutch and Portugal Bays have been proposed as a marine extension to the park, largely to protect the Dugongs. The importance of protecting at least a part of the hill at Aruwakkaru as a strict natural reserve for scientific research had been proposed, as this area is believed to be one of the four Miocene deposits in the whole of Asia, which is said to be 25 million years old (Pakeer, 1974). Further it was proposed to establish a corridor, which is a half a mile-wide reservation on the left bank of the Kala Oya to provide additional protection to the Wilpattu National Park (de Alwis, 1969).

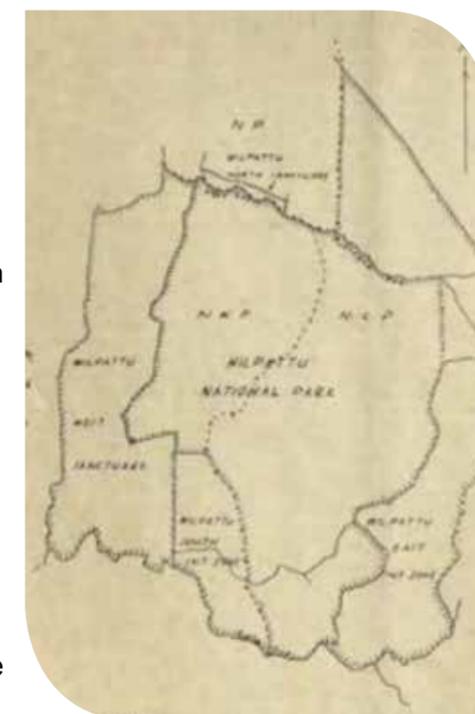
Legislation	Responsible Government Agency	PA category/s
Fauna and Flora Protection Ordinance 1937 and its amendments	Department of Wildlife Conservation	National Park and 3 Sanctuaries
the Forest Ordinance No. 16 of 1907 and its amendments (latest being the Act No. 65 of 2009)	Forest Department	Conservation Forests, Reserved Forests, and Other State Forests
Fisheries and Aquatic Resources Act, No. 2 of 1996	Fisheries Department & NAQDA	Fishery Management Area
Coast Conservation Act 1981 and Amendment) Act No. 49 of 2011	Coast Conservation and Coastal Resources Mgmt. Department	Special Management Areas
Antiquities Ordinance of 1940, amended by the Act No. 24 of 1998	Archaeology Department	Archeology reserves and monuments
North Western Province Environmental Statute No. 12 of 1990	North Western Provincial Environmental Authority	Environmental Protection Areas

Table 1: Legally declared protected area categories

Given below is a detailed description of different protected area categories established under each legislation.

Fauna and Flora Protection Ordinance

The Fauna and Flora Protection Ordinance, No.2 of 1937 (FFPO) coordinates and regulates the provisions of law relating to the protection, preservation and propagation of the fauna and flora of the island and have provisions for the proclamation of suitable areas as National Reserves (State land) and areas of land (State and private) as Sanctuaries and Managed Elephant Reserves. Under the provisions of the FFPO, five PAs were proclaimed during 1938: Wilpattu National Park Block 1; Wilpattu North and West Sanctuaries; and Wilpattu South and Wilpattu East Intermediate Zones (Refer Table 2 and Fig. 1). In the two sanctuaries considerable area of private land were included, while hunting was permitted within the two intermediate zones during the open season and in this regard a permit was required (Coomarswamy, 1939). As per past Administrative reports, even leopards and bears were killed under these permits (Refer Table 3 for details).



The status of these PA categories changed drastically during the last few decades due to changing policies in Wildlife Conservation as well as agriculture development.

Figure 1: PA complex declared by the FFPO in 1938 (Source: LORIS, 1939)

After the declaration of the Block 1 (54,976 ha) in 1938, another 4 blocks and an extension to Block III took place between 1967-1973 period enlarging WNP extent to 131,656 ha (Refer Table 2). In 1952, around 4,000 acres (approx. 1,619 ha) of land of the Wilpattu East Intermediate Zone was excised to provide land for colonists under the newly restored Willachchiya tank. Water from Modragam Aru was diverted to feed the tank and it led to reduced water flow in the river during the dry season.

When the issue of licenses for game hunting was completely terminated from 1st November 1964, this altered East Intermediate Zone as well as the Wilpattu South Intermediate Zone were amalgamated into the WNP as blocks III and II. There is a confusion on the boundaries of Block III, as the areas described in the gazettes of 1952 and 1969 are not compatible (refer Table 2). On 5th October 1973 an extent of 189 ha (forested land in Hunuwilagama area) was added to Block III of WNP. This enables the relocation of the park entrance from Maradanmaduwa to Huniwillagama (Saparamadu, 2006).

The Wilpattu West Sanctuary was separated by an excised road (old Mannar road) from the Block I of WNP. This road was often used by pilgrims to the church and shrine within it and by peddlers carrying their wares from Chilaw and Puttalam and this activity seriously disturbs the large population of its wild fauna. Large extent of this reserve has also been given out on lease on permits for cultivation (Pakeer, 1974). As per the Gazette notification on 7th December 1973, when upgrading this sanctuary as the Block V of the WNP, three fishing villages in the coastline were excluded (Palugahathurai, Pukkulam and Wellamudal). Pukkulam had about 30 families permanently living there, while Palugahathurai is with few migrant fishing families and a church. Wellamundal was inhabited with a dozen families (Saparamadu, 2006).

Date and Gazette Number	Designation	Extent (ha)	Remarks
25/2/1938 (8356)	Wilpattu National Park Block I	54,953.00	The game Sanctuary upgraded in to Block I of WNP
	Wilpattu South Intermediate Zone	7,021.30	Upgraded into Block II of WNP in 1967
	Wilpattu West Sanctuary (WWS)	21,497.00	Upgraded in to Block V of WNP in 1973 excluding 3 fishing villages
	Wilpattu North Sanctuary	1,877.74	Boundary altered in 1947
27/5/1938 (8370)	Wilpattu East Intermediate Zone	28,277.00	Boundary altered in 1952
7/11/1947 (9794)	Boundary alteration of Wilpattu North Sanctuary	627.27	
22/2/1952 (10357)	Boundary alteration of Wilpattu East Intermediate Zone	24,443.01	Upgraded in to Block III of WNP in 1969
28/4/1967 (14746)	Wilpattu National Park Block II	7,021.30	
27/6/1969 (14860)	Wilpattu National Park Block III	22,791.90	Boundary extended in 1973
05/12/1969 (14883)	Wilpattu National Park Block IV	25,252.38	
05/10/1973 (80)	Boundary alteration to WNP Block III	188.988	
07/12/973 (89)	Wilpattu National Park Block V	21,448.34	WWS upgraded to a NP exclusive of Pallugatura, Pukkulam and Vellamudal villages

Table 2: Chronological order of the evolution of Wilpattu National Park and the North Wilpattu Sanctuary

Source: Government Gazette notifications

	Permits	Game shot
1961-62 period		
Wilpattu East IZ	27	14 Spotted deer, 1 Sambhur, 10 Jungle fowls
Wilpattu South IZ	57	29 Spotted deer, 4 Sambhur, 31 Jungle fowls, 1 Bear, 12 Wild boar
1962-63 period		
Wilpattu East IZ	49	25 Spotted deer, 2 Sambhur, 2 Peafowl, 9 Jungle fowls, 2 Bear, 7 Wild boar
Wilpattu South IZ	51	33 Spotted deer, 1 Sambhur, 2 Peafowl, 23 Jungle fowls, 2 Leopards, 1 Bear, 8 Wild boar

Table 3: Game hunting at the East and South Intermediate zones

Source: Pakeer, 1963 and 1964

As indicated in table 2, to achieve the present status of WNP it went through eight gazette notifications during 1938-1973 period and it had been revealed that there are several boundary disputes that need to be investigated. The report of the committee for the Formulation of a National Policy for the Preservation of Fauna and Flora of Sri Lanka too recommends recovery of encroached ten square miles in Tanthirimale area, and the minor encroachments near the Kudavilachhiciya colony. The report further states that ten temporary fishing camps at

Palugasturai, Wellamundel and any others along the Western coastline of the park should be removed and closed permanently, while this boundary should extend up to the low tide mark of the sea. Further if any roads lead through the National Park, such roads (Arippu road and also to recurring suggestions to reactivate the old Mannar road) should at all times be under the unfettered control of the DWC (Dayaratne et al, 1985).

Yet due to closure of the park during the war period and due to other various reasons, these recommendations were not adhered to and as a result presently pressing issues with political implications had risen. For example, in 2014 the Wanathavillu Divisional Secretariat had requested DWC to release the following land for development purposes:

- 11.2009 ha of land to be given to people in Pukkulam (10 perches each family)
- 2.0029 ha of land in Palugahathurai
- 8 acres for the Pallekandal church

Eleven permanent houses had been constructed in Pukkulam and there is political pressure to develop the village infrastructure. DWC recently had filed legal cases against new constructions.

Several legal cases have been filed by NGOs (mainly by the Environmental Foundation (Guarantee) Limited) with regard to human activities within WNP. They include:

- Illegally constructed road (B 379 Puttalam-Marichchulckaddi Road) though the Wilpattu National Park: Field in 2010. In 2013, the Supreme Court issued an interim order directing authorities to maintain the status quo of the road, where no further development activities would take place especially with regard to the tarring of the road. The case is to be argued on the 8th of January 2019 before the Honorable Judges of the Supreme Court.
- The Pallekandal Church expansion and festivities - Writ Application in the Court of Appeal on the 24th of January 2018. The instigation of the case gave prominence to this issue, which in turn exerted pressure on authorities to take measures to curtail this year's festivities of the church.
- Development activities within Pukkulam Village bordering the WNP

Further recent field visits revealed the existence of an unauthorized small fishing village closer to the Kala Oya river mouth in Kuburawa area. This issue will be discussed under coastal and marine section. Also, the high speed of vehicles travelling through the Puttalam-Marichchulckaddi road was noted. The use of this road by Pukkulam fishing village and their expectations to have a bus halt in their village is an issue that needs attention. The photograph below shows a Grey langur killed by a speeding bus in this road.



Wilpattu North Sanctuary (WNS)

WNS declared on 25th February 1938 was 1,878.5 ha in extent (Refer Table 2). Situated in Mannar district, it is contiguous with the park, the intervening boundary being marked by the Moderagam Aru and the western boundary being the ocean. A large section of the sanctuary was under cultivation under the Moderagam Aru anicut scheme. For the greater part of the year the area was inaccessible due to the overflow of the river. In 1947 3,080 acres (1,246.9 ha) of this Sanctuary was unreserved (which included the coastal section) and as a result the present-day sanctuary is 627 ha in extent. No human settlements exist within this sanctuary, but extensive paddy farming is taking place. DWC had filed court cases against several individuals for cultivation within the state lands of the PA. Further increased incidents of human-elephant conflicts are being reported from the area, especially with regard to destruction of paddy harvesting. Erecting of an electric fence in consultations with the community is a priority measure to mitigate HEC. Possibility of incorporating some of these lands to the National Park should be considered.

Tabbowa Sanctuary

Tabbowa Sanctuary (not correctly gazetted) covering around 21,93 ha was declared by Gazette Notification bearing No. 1245/31 dated July 19, 2002. Situated adjoining to the southern boundary of WPN, the two protected areas are separated by the Kala Oya. Illegal activities including clearing of the forest area had been reported while invasive *Prosopis juliflora* had invaded several parts of the sanctuary. Further this sanctuary boundary overlaps with two of Forest Reserves (refer under Forest Ordinance).

Bar Reef Marine Sanctuary (BRMS)

Bar Reef Marine Sanctuary (306.7 km²) declared in 1992, is the largest marine protected area in Sri Lanka. The BRS is a complex of offshore continental shelf patch reefs constituting one of the largest coral reef systems in the county. The marine sanctuary includes shallow coral reefs and sandstone habitats located deeper than the true coral reefs. The sanctuary is located offshore of the Puttalam estuarine system which includes Dutch Bay and Portugal Bay. 122 species of stony corals belonging to 54 genera have been recorded from the reef while over 400 species of reef and reef-associated fish have also been documented. Despite the protected status, there has been virtually no management and it is under threat both from natural enemies (crown-of-thorns starfish and coastal erosion and sedimentation) and from human activity. A Special Area Management plan was prepared under the Coastal Resources Management project for BRMS in 2005 by Coast Conservation Department. However, resource extraction has continued due to lack of enforcement of sanctuary regulations (Wilkinson 2002; 2008). Mass bleaching in 2016 had harmed the live coral cover in the area drastically. Under UNDP ESA project the community has been made aware of the sanctuary laws and restriction regarding resource extraction (Refer Annex on Marine and coastal resources).

Protected Areas declared under the Forest Conservation Ordinance

Adjacent to the WNP there are several forest areas that are legally declared under the section 3 of the Forest Conservation Ordinance (Chapter 451) as amended by Acts, No. 13 of 1966, No. 56 of 1979, No. 13 of 1982, No. 84 of 1988, No. 23 of 1995 and No. 65 of 2009. These forests as well as the undeclared state forests comes under the preview of the Forest Conservation Department (FD).

Northern Boundary of WNP

The 40,030.525 ha Mavillu Conservation Forest (MCF) was declared in March 2017. MCF borders part of northern and western boundaries of the WPNS and is continuous with the Blocks III and IV of the park as well as the Wilpattu Northern Sanctuary.

MCF was declared to pacify the public protests with regard to destruction of Wilpattu forest complex, and within this area includes previously declared five Reserved Forests: Mavillu, Weppal, Karadikkuli/ Marichchakatti, Vilaththikulam and Periyamurippu. Of the five Reserved Forests, Mavillu was legally declared as far back as in 1921, while three of the Reserved Forests were more recently declared (in 2012 and 2013 respectively).

EFL and WNPS had filed a fundamental application to the Supreme courts in 2017, invoking the jurisdiction of the Court in relation to the illegal forest clearing and construction taking place within the former Reserved Forests, especially in Villaiththikulam RF. Special Audit Report on Misuse of the Villaiththikulam Forest Reserve in 2018 recommends that as the number of plots of lands in which houses had not been constructed and not settled in the houses constructed in the Villaiththikulam forest reserve represented 80 per cent of the total extent of land allocated and therefore, accordingly, action should be taken to grant other appropriate lands to the families permanently residing in the rest 20 percent of the lands and maintain the forest in its usual form.

Conservation Forests are areas where extractive activities are strictly prohibited, and thus they may not accommodate access for local needs and only tourism can be promoted. As per Forest Amendment Act No. 65 of 2009, or the Forest Conservation Ordinance, no person is allowed to enter a Conservation Forest other than under the authority of a permit issued by the Conservator General of Forests or a person authorized by him in that behalf for the purpose of engaging in scientific research, observing the fauna and flora or implementation of the activities prescribed in the management plan. For trespassing, killing animals or destroying the habitat within a CF, the offender on conviction is liable to be imprisoned for a term not exceeding seven years or to a fine not less than twenty thousand rupees and not exceeding two hundred thousand rupees or to both imprisonment and fines.

Joint management initiatives that include community empowerment is required between the DWC and FD to protect the WNP and its influence zones sustainably.

Eastern boundary of the WNP

There are no legally declared forest areas adjoining to the eastern boundary of the WNP. Forest fragments, which can be considered as Other State Forests are found in Nochchiyagama-Thabuthegama area and also in Wilachchiya. Further several forest patches are found in Vavuniya district including the Musalkutti Proposed Reserve. Many of these fragmented forest patches are vital for elephant migration, yet are being destroyed for chena cultivation and haphazard development activities including housing and irrigation projects.

Southern Boundary of the WNP

Three Reserved forests are located adjacent to southern boundary: 22,764 ha Weerakkulicholai Reserved Forest declared in 28/10/2013, 11,693.311 ha Vanniyagama Reserved Forest declared in 08/07/2013 and 2,676.205 ha Ipalogama Reserved Forest declared in 12/11/2012. Presently under the World Bank funded ESCAMP project, parts of Weerakkodicholai and Vanniyagama Reserved Forests are being developed for nature-based tourism activities (Galwila Eco park). Under this initiative habitat enrichment is taking place to control the spread of invasive species including *Prosopis juliflora*, which is limiting the feeding habitats of mega herbivores including elephants.

There is a boundary dispute in Tabbowa Sanctuary and the Weerakkulicholai and Vanniyagama Reserved Forests – DWC and FD need to work together to overcome this issue.

Mitigating the spread of invasive species and habitat enrichment activities need to be undertaken.

Around 1,500 ha of forest area in Gangewadiya Thawusamaduwa is to be declared as a Reserved Forest within this year.

Joint management between FD and DWC is required to manage the mangrove forests as well as ongoing tourism activities within Gangewadiya area.

Protected Areas declared under Fisheries and Aquatic Resources Act

Under the Section 31 of the Fisheries and Aquatic Resources Act, No.2 of 1996, the Minister of Fisheries and Aquatic Resources has the powers to designate prescribed areas of Sri Lanka Waters or land adjacent thereto or both, as fisheries management areas for the purposes of the Fisheries Act. FMA are declared for the sustainable management of the resources. Amendments to the FARA in 2013 (Amendment Act No.35 of 2013) provides provisions for establishment of a Fisheries Management Coordinating Committee in an FMA, with the inclusion of a wide spectrum of fishery as well as non-fishery stakeholders.

Presently there are two FMAS within the marine waters, which also include the fisherman living in Palugahaturai and Pukkulam (coastal belt of Block V):

- Puttalam Lagoon 2010: 27 GN areas in Kalpitiya DSD, 1 GN area in Mundalama DSD, 11 GN areas in Puttalam DSD and 9 GN areas in Wanathawilluwa DSD (including Pukulama GN) – Gazette No 1665/17
- North West Coast (Puttalam and Mannar Districts) 2010 - landward coastal stretch from Mampuri (Puttalam District) to Talaimannar (Mannar District) with the seaward boundary along the 30m depth contour (excluding Dutch Bay and lagoon) - No. 1665/18

There is an ongoing debate with regard to the jurisdiction of the above FMAs and as a result part of the coastal belt of the Wilpattu is not included in either of the FMAs (Refer Fig. 2). As per the discussions had with the Assistant Director/Fisheries Puttalam, the Puttalam lagoon seaward limits are from an imaginary line drawn from Uchchmunai in Kalpitiya Peninsula to Karavalkuda in WNP (this definition is as per the Puttalam lagoon fishing regulation gazette in 1981) and as a result fishermen in Palugahaturai and Pukkulam are defined as “marine fishers”. Yet the fishermen are in the view that they are undertaking lagoon fishing. This issue will be further elaborated under the Marine and Coastal section.

Therefore, there is an urgent need to technically assess the situation and redefine the boundaries of FMAs

Two freshwater tanks (Mahawilachchiya and Tabbowa) which are situated within the Influence Zone of the WNP had been declared as FMAs in 2005. Fisheries in these two tanks are regulated by the Inland Fishing Operation Regulations 2011 under the FARA (Gazett No 1733/24). Introduction of fingerlings and management of the tanks comes under the preview of National Aquaculture Development Authority.

- Mahawilachchiya tank (seven GNs: Helemba Wewa, Oyamaduwa, Krialpetiyawa, Pemaduwa, Randuwa, Ethadathkalla, and Navodgama)
- Tabbowa tank (seven GNs: Marukkuwatawala, Tabbowa North and South, Thenuwara, Karuwalagas Wewa, Thambapanniya and Kudamedawachchiya)

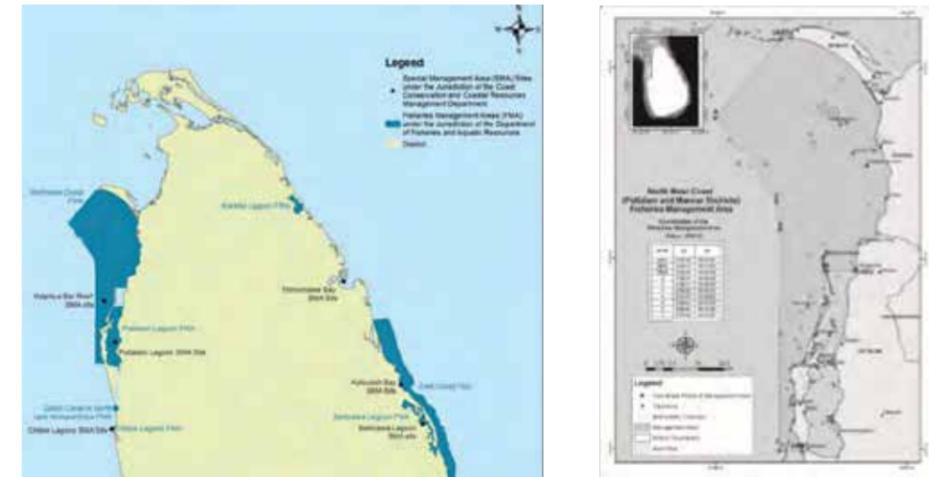


Figure 2: Puttalam and North West coast Fishery Management Areas

Source: MoE (2016); and Gazette extraordinary No. 1665/18

Protected Areas declared by the Coast Conservation and Coastal Resource Management Department (CC&CRMD)

The CC&CRMD has recognized the need for an integrated approach to coastal zone management that includes local level involvement and collaboration. Therefore, they have declared Special Management Areas (SMA) sites which recognize a set of issues within defined and manageable boundaries. The CC&CRMD is in the process of developing ecological profiles and SMA plans with the involvement of communities in these areas. With the enactment of the Coast Conservation (Amendment) Act No. 49 of 2011 (Part III, Section 22B-G), Special Management Areas received the legal backing. Following two areas of the WNP had been identified as SMA areas, yet they have not been gazetted.

- The Bar Reef SMA encompasses the northern part of the Kalpitiya peninsular, including the Mutwal peninsular, and the islands of Karaitivu. It is comprised of 11 Grama Sevaka (GS – village official) divisions (the smallest administrative division in Sri Lanka) north of the road running East-West to the Kandakuli fisheries harbor. It encompasses all the areas where human activity impinges directly on the welfare of the reef ecosystem. A management plan had been prepared under the ADB funded Coastal Resources Management Project.
- Puttalam estuary SMA – a plan is not prepared

Antiquities Ordinance

According to both the CBD and IUCN definitions of PAs, cultural and historical features are also included as protected. In Sri Lanka the Department of Archaeology (DA) established in 1890 is responsible for the excavation, protection, maintenance, conservation and restoration of historically valuable monuments. Sri Lanka is very rich in ancient monuments which bespeak of the glory of its ancient civilization and culture. The primary statute dealing with the protection of cultural heritage is the Antiquities Ordinance of 1940, which was significantly amended by the Act No. 24 of 1998. This legislation identifies preserved articles remnants which dates over Two Million years to end of Kandyan era which is marked as 02 March 1815. Further by Gazette notification any physical or human remnant older than 100 years could be declared as an ancient monument or Reserves. It provides for the establishment of ancient monuments (state lands), protected monuments (private land) and archaeological reserves for the preservation of the cultural and historical wealth of the country (Gunaratne, 2005).

As per Antiquities (Amendment) Act No. 24 of 1998, a monument means “any building or other structure or erection, or any tomb, tumulus or other place of internment, or any other immovable property of a like nature or any parts or remains of the same or any other site where the material remains of historic or prehistoric human settlement or activity may be found; and includes the sites of any monuments and such portions of land adjoining such site as may be required for fencing or covering in or otherwise preserving monument”.

The Antiquities (Amendment) Act No. 24 of 1998, and the implementing regulations published in Gazette Extraordinary No. 1152/14 of 4 October 2000 require that an Archaeological Impact Assessment is conducted in relation to every proposed development project with a land area of over 0.25 ha. The purpose of the assessment is to examine whether there are antiquities in the land, to determine the impact of the proposed development and to provide alternative measures if necessary.

Several sites inside the park and within the influence zone have been declared as archaeological reserves.

Archaeological Reserves

- Thanthirimale Raja Maha Viharaya and surroundings – maintained as an archeological reserve since 1973
- Ancient Monastic Complex at Wilandagoda was excavated and conserved by the Archeological Department in 2012

Following had been declared as Ancient Monuments (No. 1823/73 - FRIDAY AUGUST 16, 2013)

- The bisikotu, two sluices, wave breaker (Relapanava), the spill gates (pitavana) and the stone inscription on ruins of the buildings on the reservoir dam of Kuda Vilachchiya Tank (Wewa) bordering the Grama Niladhari Division of Kiralpetiyawa (GND No. 361) and the Grama Niladhari Division of Kuda Vilachchiya (GND No. 369) and the Wilpattu National Park in Vilachchiya Divisional Secretary’s Division in Anuradhapura District, North Central Province.

Pictures of Thanthirimale temple (left) and Wilandagoda (right) archeological reserve



Discussion with Archeological Department officials led to the understanding that around 13 centers of archaeological importance has been identified within the Wilpattu National Park and these include more than 32 monuments. The importance of developing an Archaeology Index for the park and the possibility of declaring WNP as a UNESCO World Heritage Site (as a mixed property containing both natural and cultural values) were also highlighted during the discussions.

North Western Province Environmental Statute No. 12 of 1990

Three Environmental Protection Areas have been identified by the NWEPA for the protection of traditional rice varieties – Setthu villu, Irana villu and 15th mile post villu.

Other designations

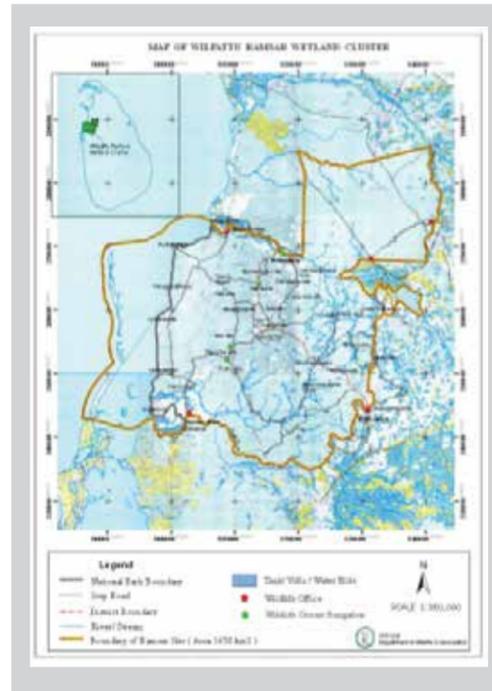
The Kalpitiya peninsula is a fast-developing Tourist Zone and the Sri Lanka Tourist Board has launched a massive Tourist Development Project based in Kalpitiya in a bid to make the area one of the most sought-after Tourist Destinations in South-East Asia by the end of the next decade. Fourteen islands within Dutch Bay and Portugal Bay are being identified by the government for tourism development under the Kalpitiya Integrated Tourism Resort Project. By the Gazette Extraordinary notification (No. 1549/7) of May 2008, 123.41 ha of land belonging to several islands (Vellai 1, II and III; Periya Arichchalai, Sinna Arichchalai, Sinna Erramutivu, Eramativu West, Kakativu) have been vested under the Tourism Development Authority under the Section 4 (1) of the Tourist Development Act No. 14 of 1968 for this purpose. Further in November 2005 under the same Act, but under Section 2 (1), allotment of lands in extent 199.86 belonging to islands of Palliyawatta, Uchchamunai, Ippantive, Eramutivu, and Mutwai also have been designated for tourism development activities (Gazette Extraordinary No. 1418/7). Of the 14 islands, 9 are state owned while six contains private lands. Extensive resort development with golf course, horse riding school etc., is recommended by the conceptual master plan of this project (SLTDA, 2008).

Sri Lanka Sustainable Energy Authority has designated several areas within Kalpitiya, Vanatavillu, and Puttalam DSDs as Energy Development Areas in 2009 (Gazette No. 1632/10 of 15th December 2009). This has been done under the Section 12 (1) of the Sri Lanka sustainable energy Authority Act, No. 35 of 2007 and with consultation with stakeholder ministries including the Environment and Natural Resources and Fisheries and Aquatic Resources, and the Chief Minister of the North Western Provincial council. Further, studies have identified Kalpitiya peninsula as the best site for wind power development in the country and several projects are under development for this site Under a BOI scheme, Seguwantivu Wind Power (Private) Limited was established and two 10 MW wind power plants (Vidatamunai and Seguwantivu are presently in operation. The plant is located adjacent to Seguwantivu CF and the turbines are presently in operation.

Wilpattu Wetland Cluster Ramsar site

Wilpattu Wetland cluster was declared as an internationally important wetland under the Ramsar Convention in 2012. The area of Ramsar site is 165,800 ha, of which Wilpattu National Park is the major component, while it also includes marine wetlands in western coast up to 10 km, Kalaoya estuary, Modaragam Aru estuary and Mahawilachchiya fresh water reservoir. The Ramsar site is larger and extends beyond the National Park, especially on the seaward side (Refer the Map). Wilpattu functions as a unique ecotone that consists of a mixture of natural coastal and inland wetlands, terrestrial natural vegetation types, and ancient man-made irrigation systems. The site is also the only place in the Ceylonese Monsoon Forest bioregion and in Sri Lanka where the unique ‘Villu’ wetland system is found. Villus are natural shallow depressions of the landscape. The shape may be circular, oval or irregular with no outlet for the accumulated water, hence villus are periodically filled with water. Wilpattu supports two types of villu units, brackish and freshwater, and they are juxtaposed in the central part of the site making the area conducive for a large array of wild fauna and flora. 23 species appear in CITES appendices, while 12 are listed in CMS.

Conclusion Recommendations



In the present-day context, Wilpattu is the largest National Park in Sri Lanka and its area is within two districts (Puttalam and Anuradhapura) while its Influence Zone extends into two more districts: Mannar (in North) and Vavuniya (in East). This land component is a considerable proportion of Sri Lanka's jurisdiction (approximately 3.5 % of Sri Lanka's land). It would be important to look at all gazette notifications to fully understand whether the present WNP boundaries are compatible with them and whether a new gazette notification should be issued indicating the present PA extents and boundaries.

- Accurately determine and demarcate the lawful extensions of the two fishing villages inside the Wilpattu National Park in view of its gazette and established boundaries
- To formulate a set of regulations providing for a comprehensive and transparent system of identifying the fishermen in these fishing camps in collaboration with the Department of Fisheries
- Initiate a dialogue about removing the fishing village at Kuburawa, which is illegal as per FFPO
- The roads need signage indicating the speed limit as well as other appropriate code of conduct for vehicles, while periodic monitoring of the vehicles by DWC officials at appropriate locations should be undertaken, speed bumps should be laid to maintain the speed limits

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Annex 2: Policies and Laws that are relevant to sustainable utilization of Natural resources in the Wilpattu National Park and its influence zone

The main environmental concerns in the Wilpattu National Park and its Influence Zone includes both natural and anthropogenic issues. Deforestation; wildlife populations threatened by poaching and haphazard tourism development, coastal resource degradation, spread of alien invasives, ongoing and planned mining activities and infrastructure development (including roads and irrigation structures) are the main threats to the natural resource base. Natural disasters including floods and droughts are also affecting the WNP and its surroundings. The policies and legislation described below assist in mitigating the above-mentioned threats.

Policies

In terms of protecting and managing environment and natural resources, **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 proclaims; "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". These two statements show the commitment of the state and obligations of the citizens.

The National Environmental Policy developed in 2003, renews the commitment of government, in partnership with the people, effectively to manage the environment for the benefit of present and future generations. The aim of this policy is to ensure sound environmental management within a framework of sustainable development in Sri Lanka. This Policy is supported by many other policies and strategies developed for other sectors.

In 2016 the Ministry of Mahaweli Development and Environment (MMDE) launched the "Sri Lanka NEXT- A Blue Green Era" programme to ensure Sri Lanka's low carbon pathways to reduce global warming with respect to the Paris Agreement.

Other relevant policies are discussed below.

National Forestry Policy – 1995: It outlines strategies for the development of the forestry sector until 2020 and was drawn up to provide clear directions for safeguarding the remaining natural forests of the country in order to conserve biodiversity, soil and water resources. In accordance with the policy, the forests under the jurisdiction of the Forest Department is being reclassified and placed under four management systems ranging from strict conservation, non-extractive use, management of multiple use forests for sustainable production of wood and management of forests with community participation. The National Forestry Sector Master Plan was developed in 1995 to implement the forest policy.

National Policy on Wild Life Conservation – 2000: The policy renews the commitment of the government to conserve wildlife resources through maintaining ecological processes and life sustaining systems, managing genetic diversity and ensuring sustainable utilization and sharing of equitable benefits arising from biodiversity. It emphasizes the need for effective protected area management with the participation of local communities.

National Policy and a Strategy for Ecotourism Development – 2003: The Policy outlines the principles, objectives and actions that are necessary to facilitate development of a sustainable tourism industry that contributes to resource conservation while optimizing economic benefits for current and future generations of Sri Lankans.

National Watershed Management Policy – 2004: Policy aims to conserve, protect, rehabilitate, sustainability use and manage the watersheds while managing their environment characteristics with the involvement of people.

National Policy on Wetlands – 2005: Main objectives of this policy are to protect and conserve wetland ecosystems, to prevent illegal utilization of wetlands, to restore and maintain the biological diversity and productivity of wetlands, to enhance ecosystem services from wetland habitats, to assure sustainable use of wetlands and traditional practices by local communities, and to meet national commitments as a signatory to the Ramsar Convention on Wetlands.

National Policy on Sand as a Resource for the Construction Industry – 2006: It defines the commitment of Government, in partnership with the people, to effectively manage the construction-sand resource for the benefit of present and future generations.

National policy for the Conservation and Management of wild elephants in Sri Lanka, 2006: The policy was developed to ensure the long-term survival of the elephant in the wild, to the mitigation of the human-elephant conflict, to adopt regulatory mechanisms when removing elephants from the wild for management purposes and to undertake scientific studies promoting elephant conservation.

National Policy on Solid Waste Management – 2007: It ensures integrated, economically feasible and environmentally sound solid waste management practices for the country at national, provincial and Local Authority level.

National Physical Planning Policy and Plan – 2007: It is a strategic document that outlines a vision for Sri Lanka to 2030. Its role is to promote and regulate the integrated planning of economic, social, physical and environment aspects of land in Sri Lanka. Another important function of the National Physical Plan is to bring the Government, stakeholders and the community together to discuss, review and then make decisions to guide the future of Sri Lanka's economy, environment and communities.

National Land Use Policy – 2007: The Policy aims to ensure proper land use, food security, economic development and the maintenance of the productivity of the land at a higher level. It also provides a path for the protection, conservation and sustainable use of the land resource of the country and offers an appropriate and ideal framework that will best meet the needs of the present generation while safeguarding the land resource for the future generation as well.

National Policy on Disaster Management – 2010: The objective of the policy is to protect Sri Lanka's people, property and environment from disaster.

The National Climate Change Policy 2010: Collaborative action at all levels is necessary to transform this policy into a meaningful set of actions to meet the challenges of climate change.

National Policy on Protection and Conservation of Water Sources, their Catchments and Reservations in Sri Lanka 2014: The primary intention of this policy is to ensure the protection and conservation of all the water sources and their source areas in Sri Lanka through an optimum management.

The National Policy on Invasive Alien Species (IAS) in Sri Lanka, Strategies and Action Plan- 2016: To minimize the risks of IAS on the biodiversity, ecosystems, economy and society, to update all the stakeholders on the national position and priorities and promote their participation in dealing with IAS related issues and to contribute to global efforts to control IAS through nationwide operations.

National Fisheries and Aquaculture Policy - 2018: Focused on the sustainable management of the fisheries industry and aquaculture farming with equitable distribution of benefits.

National Agricultural Policy (revised draft): The vision of the draft policy is to build a nation with an agricultural sector of environmentally prudent, economically productive and nutritionally sound and secured food production.

Sri Lanka's National Biodiversity Strategy and Action Plan (NBSAP), entitled Biodiversity Conservation in Sri Lanka – Framework for Action (1999): Has accorded high priority to protecting bioregions that are considered high priority for conservation. Its revised addendum produced in 2007, has emphasized several biodiversity mainstreaming activities. These include “Identify critically important biodiversity hotspots in the country outside forests and bring these under a relevant protected area category” and “Study the status/trends in wildlife areas and identify the need for wildlife corridors and linkages as an option for species conservation”.

Sri Lanka Tourism Strategic Plan 2017-2020: Defines a framework and a transformation agenda intended to expand tourism's economic footprint to underused natural, cultural, geographic and human resources in Sri Lanka.

Action Plan for Conservation and Sustainable Use of Palaeobiodiversity in Sri Lanka, 2014: Provides a holistic approach and links institutions to implement the goal of the conservation and sustainable use of palaeobiodiversity in Sri Lanka. Miocene deposits are found in Aruwakkaru area, while Jurassic deposits are found in Tabbowa area.

Legislation

There are several legislative and regulatory instruments in Sri Lanka that address environmental consideration of development activities in both general and specific terms. Among these are the 1978 Constitution of Democratic Socialist Republic of Sri Lanka and a few Acts and Regulations introduced by the government from time to time. The Acts and Regulations of relevance to the management of natural resource base within the Influence Zone are described below.

Fauna and Flora Protection Ordinance 1937 and (Amendment) Act, No. 22 of 2009: Provides for the protection and conservation of the fauna and flora of the country and their habitats. It also prevents the commercial and other misuse of such fauna and flora and their habitats. This act provides for several categories of protected areas for biodiversity conservation to be administered by the DWC. They are Strict Nature Reserves, National Parks, Nature Reserves, Jungle Corridors, Managed Elephant Reserves and Sanctuaries. Use of these areas and the produce within is subject to strict regulations. Large number of species outside the protected areas are given protection under different schedules.

Forest Ordinance No. 16 of 1907 (Chapter 451) (As amended): It has been amended by Act numbers 13 of 1966, 56 of 1979, 13 of 1982, 84 of 1988, 23 of 1995 and 65 of 2009. It is cited as the 'Forest Conservation Ordinance' according to the Act No. 65 of 2009. The four categories of forests protected by the Forest Conservation Ordinance are Conservation Forest, Reserved Forest, Village Forest and Other forests except for Conservation, Reserved and Village forests. Conservation forest is any specified area of state land declared by an Order published under section 3A of the Ordinance in the Gazette by the Minister in charge of the subject.

Reserved forest is any specified area of state lands declared by an Order published under section 3 of the Ordinance in the Gazette by the Minister in charge of the subject. According to the interpretation under section 78 "reserved forest" includes forest plantations and chenas with planted trees. Apart from that any forest declared as a reserved forest under any law before the enactment of the Forest Ordinance No. 16 of 1907 is a reserved forest.

Village forest is a specified area of state land declared by an Order published under section 3 of the Ordinance in the Gazette by the Minister in charge of the subject for the benefit of any village community or a group of village communities. Up to date no village forest had been declared.

Other forest need not be declared with specified boundaries, and they are all other state forests which have not been declared as conservation forests, reserved forests or village forests and therefore several interpretations have to be associated to better understand an 'other forest'.

National Heritage Wilderness Areas Act No. 3 of 1988: Protection of state land having unique ecosystems, genetic resources, or outstanding natural features in national heritage wilderness areas under the purview of Forest Department. Today only Sinharaja rainforest had been declared as a National Heritage Wilderness Area.

Antiquities Ordinance No. 9 of 1940: Declaration of archaeological reserves and protected monuments. As per Antiquities (Amendment) Act No. 24 of 1998, a monument means “any building or other structure or erection, or any tomb, tumulus or other place of interment, or any other immovable property of a like nature or any parts or remains of the same or any other site where the material remains of historic or prehistoric human settlement or activity may be found; and includes the sites of any monuments and such portions of land adjoining such site as may be required for fencing or covering in or otherwise preserving monument”.

The National Environmental Act No. 47 of 1980 (NEA): Makes provision for the protection, management and enhancement of the environment, for the regulation, maintenance and control of the quality of the environment, and for the prevention and control of pollution. The NEA has been amended twice to make improvements and to respond to the needs of the time; National Environmental (Amended) Act No. 56 of 1988; and National Environmental (Amended) Act No. 53 of 2000.

There are two main regulatory provisions in the NEA through which impacts on the environment from the process of development are assessed, mitigated and managed. These are:

- The environmental Impact Assessment (EIA) procedure for major development projects. Regulations pertaining to this process are published in Government Gazette Extraordinary No.772/72 dated 24 June 1993 and in several subsequent amendments.
- The Environmental Protection License (EPL) procedure for the control of pollution. Regulations pertaining to this process are published in Government Gazette Extraordinary No. 1533/16 dated 25 January 2008.

A relatively new concept in biodiversity conservation and sustainable utilization of resources was introduced in 1988 amendments of the National Environment Act of 1980 (NEA) by providing provision to declare sensitive areas outside the 'conventional' PA system. The Minister in charge of environment can declare “Environmental Protection Areas” (EPA) under the section 24C and 24 D (1) of the NEA, and thereby the planning authority of the area is under the preview of the Central Environment Authority (CEA). Having declared them protected, CEA is responsible for planning and development within such areas. Under the provisions of the Act any planning scheme or project in an EPA, which conflicts with the provisions of the NEA, are prohibited, and ceased to operate after such declaration.

North Western Province Environmental Statute No. 12 of 1990: Provides for the establishment of the North Western Province Environmental Authority for the protection, management and enhancement of the environment.

Mahaweli Authority of Sri Lanka Act No. 23 of 1979: To establish the Mahaweli Authority of Sri Lanka which shall be the authority responsible for the Implementation of the Mahaweli River Development Scheme.

Marine Pollution Prevention Act No. 59 of 1981: Amended by Marine Pollution Prevention Act, No. 35 of 2008, provides for the prevention, reduction and control of pollution in Sri Lanka waters and to give effect to international conventions for the prevention of marine pollution. The Act establishes the Marine Pollution Prevention Authority to administer the Act. In case of pollution, the owner or the operator of a ship, offshore-installation or pipeline is liable for any damage caused by the discharge, escape or dumping of any oil or other pollutant into Sri Lanka waters, to the foreshore or any interests related thereto (including fisheries activities).

The Coast Conservation Act No. 54 of 1981 and its amendment (Act No. 64 of 1988 and 49 of 2011): Provides for the survey of the Coastal zone and for the preparation of a coastal zone management plan, to regulate and control development activities within that zone and to formulate and execute schemes for coastal conservation. The Act calls for environmental impact assessment for those development activities on the coastal environment. Approval will not be granted for any development activity in National Parks and sanctuaries located within the coastal zone including WNP.

With the enactment of the Coast Conservation (Amendment) Act No. 49 of 2011 (Part III, Section 22B-G) four new PA categories have been introduced to manage and safeguard the coastal resources within the coastal zone or adjacent to coastal zone of Sri Lanka: Affected Areas, Beach Parks, Conservation Areas and Special Management Areas.

Fisheries and Aquatic Resources Act, No. 2 of 1996: Provisions for the protection and sustainable utilization of fishery resources of the country. Under FARA, prescribed areas of Sri Lanka Waters or land adjacent thereto or both can be declared as fisheries management areas for the purposes of the Fisheries Act. FMA are declared for the sustainable management of the resources. Amendments to the FARA in 2013 (Amendment Act No.35 of 2013) provides provisions for establishment of a Fisheries Management Coordinating Committee in an FMA, with the inclusion of a wide spectrum of fishery as well as non-fishery stakeholders. Further there are provisions under Section 36 of FARA for the Minister in charge of fisheries, in consultation with the Minister in charge of the subject of conservation of wildlife to declare any of Sri Lankan waters or and land adjacent, thereto, or both waters and land to be a fisheries reserve.

As per the (Amendment) Act, No. 11 of 2017: fishing operations utilizing bottom set trawlers are prohibited within the Sri Lankan waters.

National Aquatic Resources and Development Agency Act No. 54 of 1981: Enacted to establish the National Aquatic Resources and Development Agency under the Ministry of Fisheries as the national institute to carry out and coordinate research, development and management of aquatic resources of the country including oceanic resources.

National Aquaculture Development Authority of Sri Lanka Act, No. 53 of 1998; Act No 22 of 2006: Enacted to establishment of National Aquaculture Development Authority which is mandated for the task of development of the aquaculture and inland fisheries sector in Sri Lanka. Presently, it is coming under the purview of the Ministry of Fisheries and Aquatic Resources and is in charge of managing inland fisheries including fisheries in Tabbowa and Mahawilachchiya Tanks.

Department of Coastal Guard Act, No. 41 of 2009: Provisions to prevent illegal fishing in the coastal areas of Sri Lanka, protect the marine environment, prevent and combat maritime disasters.

Mines and Minerals Act No 33 of 1992: Administering a licensing scheme for the mining, transport, processing and trade of minerals.

Irrigation Ordinance No. 32 of 1946, Act No.1 of 1951 and No. 48 of 1968, Law No. 37 of 1973: Provisions for the development of land and water resources for irrigated agriculture, and drainage facilities for cultivable lands in Irrigation and drainage projects.

The Tourist Board Act No. 10 of 1966: Gives powers to the Tourist Board to acquire and alienate lands for tourist development purposes. The act gives precedence in its provisions over other laws and authorizes the Tourist Board to regulate activities including the building and running of tourist infrastructure.

Land Acquisition (Amendment) Act, No. 13 of 1986: Makes provisions for acquisition of the Lands and Servitudes for public purposes and provides for matters connected with or incidental to such provision. The owners of the lands shall be compensated the amount equal to the market value of the land.

State Lands Ordinance No. 8 of 1947: Deals with the power of the State to sell, lease, grant or otherwise dispose of State lands for management and control.

Town and Country Planning Ordinance No.13 of 1946 as amended by Act No.49 of 2000: Provisions for the establishment of National Physical Planning Department (NPPD), which is authorized to formulate and implement the National Physical Plan with the objective of promoting and regulating integrated planning of economic, social, physical and environmental aspect of lands in Sri Lanka.

The Urban Development Authority Act No. 41 of 1978: Provide for the establishment of the Urban Development Authority and to promote integrated planning of economic, social and physical development of certain areas that are declared under the act.

Agrarian Development Act, No. 46 of 2000: It offers more secure tenure rights to tenant farmers, restrict the conversion of paddy lands to other uses and to undertake various land use planning functions.

Control of Pesticides Act No. 33 of 1980: Provide for the licensing of pesticides; to regulate the import, packing, labelling, storage, formulation, transport, sale and use thereof; for the appointment of a licensing authority for pesticides; for the establishment of a pesticide formulary committee and for matters connected therewith or incidental thereto;

The Water Resources Board Act No. 29 of 1964: Has provisions to advise the Minister in charge of water resources on control of soil erosion, promotion of afforestation, prevention of pollution of rivers, and streams etc. The Board is also responsible for the management of ground water.

The National Water Supply and Drainage Board Act No. 12 of 1974: Prohibits causing any pollution of water by disposing of rubbish, dirt etc. in any water source. The Board is also required to develop and operate an efficient pipe-borne water supply for public, domestic and industrial purposes.

The Disaster Management Act, No. 13 of 2005: It provides for the establishment of the national council for disaster management; the disaster management centre; the appointment of technical advisory committees; the preparation of disaster management plans; the declaration of a state of disaster; the award of compensation and for matters connected therewith or incidental thereto.

Road Development Authority Act No 73 of 1981: Provide for the establishment of the road development authority, to specify the powers, duties and functions of such authority and to provide for matters connected therewith or incidental thereto.

The Local Authorities (LA) also have provisions under their respective Acts and Ordinances to safeguards and provide environmental services and maintain environmental cleanliness for the convenience of the public in their respective areas. The Municipal Council (MC) Act No. 19 of 1987 and 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 to specify the powers, functions and duties of such LAs and provide for matters connected therewith or incidental thereto. These Acts cover public health, drainage, latrines, unhealthy buildings, conservancy and scavenging, nuisance etc.

Multilateral Environmental Agreements

Sri Lanka has acceded or ratified around 40 Multilateral Environmental Agreements (MEA). The MEAs that are relevant to protecting and sustainably managing the resources base within WNP and its Influence Zone are as follows:

United Nations Framework Convention on Climate Change (UNFCCC): Stabilization of greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climatic systems.

Sri Lanka is also signatory to the **Paris Agreement** which aims to strengthen the global response to the threat of climate change by preventing the global temperature from rising by more than 2 degrees (Celsius) this century.

International Plant Protection Convention: To maintain and increase international co-operation in controlling pests and diseases of plants and plant products, and in preventing their introduction and spread across national boundaries

Migratory Species (CMS): To protect those species of wild animals which migrate across or outside national boundaries. Under the umbrella of CMS, Sri Lanka is also signatory to two Memorandum of Understandings (MoU) developed for protection of marine turtles in the Indian Ocean- South East Asia Region (IOSEA) and the Conservation and Management of Dugongs and their Habitats throughout their Range (Dugong MoU). These two MoUs aim to promote internationally coordinated actions to ensure the long-term survival of marine turtles and dugongs. Sri Lanka is also a range state under the MoU on marine sharks and is a party to the Central Asian flyway agreement that is being developed.

Convention on Biological Diversity (CBD): Conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including appropriate access to genetic resources and by appropriate transfer of relevant technologies and appropriate funding.

United Nations Convention to Combat Desertification (UNCCD): To combat desertification and to mitigate the effects of drought in countries experiencing serious droughts and/or desertification with the final aim being to prevent land degradation in the hyper arid, arid, and semi-arid, dry sub humid areas in the countries that are parties of the Convention

Ramsar Convention: Provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Promote the conservation and wise use of all wetlands through local, regional, and national actions and international cooperation. Sri Lanka currently has 6 sites designated as Wetlands of International Importance (Ramsar Sites), including the Wilpattu wetland cluster, which is the largest in extent. DWC is the National Focal Point.

Convention on International Trade in Endangered Species of Wild Life and Flora (CITES): Ensure that international trade in specimens of wild animals and plants does not threaten their survival in the wild. Several globally endangered species including the Sri Lankan leopard, the elephant, Bear and few marine species (e.g. Turtles) are not tradable according to CITES.

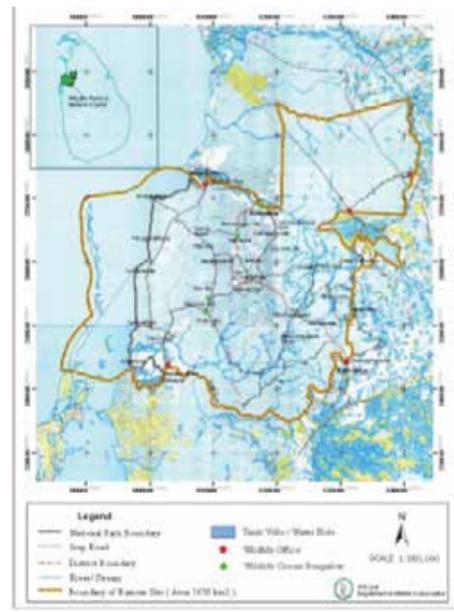
UNESCO-World Heritage: Aim is to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity. The Department of Archaeology indicated an interest in designating Wilpattu National Park and adjoining areas in Mannar district as a WHS

UNESCO – Man and Biosphere Programme: Establish a scientific basis for the improvement of relationships between people and their environments. It proposes interdisciplinary research, demonstration and training in natural resources management. This approach can be utilized in managing the Influence Zone of the WNP.

Annex 3: Coastal and marine influence zone of the Wilpattu National Park: Present Status and Management concerns

Introduction

Block V of the Wilpattu National Park is situated in the West coast of Sri Lanka, North of Puttalam Lagoon bordering Dutch Bay and Portugal Bay, including 40 km of coastline. As described in Kartz, 1975 this shore-line is fairly regular in a North-South direction and is characterized by a narrow beach with a zone of dunes to the landward side. Where the shore is embayed at Kollankanatta and at Kudremalai Point; sea cliffs of flat-lying limestones are exposed as much as 15 m high. Where this ridge intersects the coastline at embayments, sea cliffs as described above are formed. Resting on top of these ridges and sea cliffs are a deposit of varying thickness (from a meter to about 7 meters) composed of red earth enclosing at least two marine shell beds. The coastal landforms can be classified as follows: Barrier bar islands and spits; Beach and dunes; Sea cliffs; limestone ridge with mantle of red earth. Kudremalai point was the site of a very ancient settlement, which has presumably been buried under masses of sand (Swan, 1983).



Marine wetlands in western coast up to 10 km including the Battalangunduwa and Palliyawatte Islands, Kala Oya estuary and Modaragam Aru estuary is the marine portion of the Wilpattu Ramsar wetland cluster (RIS, 2013). Adjacent to this area, the Bar Reef Marine Sanctuary (BRMS), the largest marine protected area in Sri Lanka (30,760 ha) is located. BRMS and the adjacent marine waters forms an important cetacean habitat (Map 1 – Annex 8). The marine Influence Zone of WNP falls within two Divisional Secretariats of Puttalam District: Vanatavillu and Kalpitiya, while the northern border (Modaragam Aru) adjoin the Mannar district at Mullikulam (Musali DS Division).

Biological wealth

Kala Oya estuary supports the largest and least disturbed mangroves in Sri Lanka, which extends over 1,837 ha and comprises nearly 65% of the mangroves in Dutch Bay. A study highlighted that the mangrove areas located around 2 km from the estuary mouth, where the soil salinity ranged from 8-12 mg/l, was observed to be with the highest species richness and diversity, indicating its ecological and conservation significance that may be considered in mangrove management decision-making for the area. Presence of a few species of terrestrial and freshwater plants among the mangroves indicates salinity changes that would have taken place due to trans-basin diversion of water to the area for irrigation purposes (Perera, Amarasinghe & Somaratna, 2013). Part of this mangrove lies outside the boundaries of WNP and is under the jurisdiction of the Forest Conservation Department (FD). Presently FD is in process of declaring the area as the Gangewadiya –Thawusamaduwa Reserved Forest (personal communication with Puttalam District Forest officials). The fishery value of Puttalam mangrove had been estimated at US\$ 303,609 per annum, while the total economic value of mangrove would be USD 17,116,283 per annum (DFAR, 2013). Discussion with Wildlife park

officials (Mullikulam Range office) led to the understanding that there are several mangrove patches associated with Modaragam Aru river mouth. No studies had been undertaken in this area.

The continental shelf of the West coast of Sri Lanka makes a sharp turn close to Kalpitiya as it joins the Indian shelf, forming a large bay like structure with forming a terminus to the Northward flow of currents in the deeper sea regions. This feature allows creation of conditions for the formation of up-welling currents from the deep sea which feeds a system that include migration of many species of animals including marine mammals and sea birds to visit this part of the shores. The area is considered a Cetacean hotspot in Sri Lanka, with 20 species of marine mammals recorded from the area; including 19 species of Cetaceans and one species of Sirenian. There are also additional unconfirmed records of the possible presence of Irrawadi dolphins and finless porpoise and the Hump-backed Whale in the area based on several recent kill records within the bay (MOE/UNDP, 2017). A study by Illangakoon, 2006 recorded eight cetacean species, with a high density of species along the western seaward boundary of the BRMS, where there is a change in depth. *Sousa chinensis* distribution was confined to the shallow waters of the Puttalam Lagoon. A research done by The Spinner Dolphin, *Stenella longirostris* formed the most common and frequently observed species of Marine Mammal in the area. Surveys indicate that there is a resident pod of Spinner Dolphins inhabiting the continental shelf margin areas of the Kalpitiya between Norochhole and Southern reaches of the Bar-reef. The pod may be composed of up to about 2000 individuals which may break up into smaller clusters or join other visiting pods to form larger groups of about 5000 individuals occasionally (Weerakkody and Subhashana, 2011). The lagoon harbours patches of sea-grass beds that are preferred by the Dugong such as *Halodule* and *Halophila*. The Dugong visits these sea grass beds in the nearshore areas, while fishermen have also observed this species in the Lagoon area (Karunarthana et al 2011).

Three species of marine turtles have been recorded from this region. The predominant species is the Olive Ridley (*Lepidochelys olivacea*), followed by the Green Turtle (*Chelonia mydas*) and the Hawksbill Turtle (*Erytmochelis imbricata*). All three species are considered to be globally threatened. Also, their nesting areas have not been adequately documented although there are reports of nesting South of Kandakuliya to Talawila and in the Wilpattu coast (personal communication with wildlife officials).

Scientific name	Common Name	Global IUCN Red list Status
<i>Balaenoptera musculus</i>	Blue whale	En
<i>Balaenoptera acustorostrata</i>	Minke whale	LC
<i>Megaptera novaeangliae</i>	Humpback whale	LC
<i>Physeter macrocephalus</i>	Sperm whale	VU
<i>Kogia sima</i>	Dwarf Sperm whale	DD
<i>Lagenodelphis hosei</i>	Fraser's dolphin	LC
<i>Pseudorca crassidens</i>	False Killer whale	DD
<i>Peponocephala electra</i>	Melon-headed whale	LC
<i>Sousa chinensis</i>	Indo-Pacific Humpback dolphin	NT
<i>Delphinus delphis</i>	Common dolphin	LC
<i>Stenella longirostris</i>	Spinner dolphin	DD
<i>Stenella attenuata</i>	Pan-tropical spotted dolphin	LC
<i>Stenella coeruleoalba</i>	Striped dolphin	LC
<i>Tursiops truncatus</i>	Bottlenose dolphin	LC
<i>Grampus griseus</i>	Risso's Dolphins	
<i>Orcinus orca</i>	Killer whale	DD

Table 1: Marine mammals recorded from the Marine Influence Zone

The Bar Reef Sanctuary is located to the West of the Kalpitiya Peninsula and runs parallel to the Puttalam Lagoon. It extends over 306.7km² and is the largest marine sanctuary in Sri Lanka. The true coral reef covers about 70km² and comprises of well-grown coral. A total of 118 madreporian species belonging to 50 coral genera was recorded in the sanctuary. However, Acropora is the most dominant coral genera in the Puttalam area. Three hundred species of reef associated fish have been recorded in the sanctuary. Due to this abundance this area has now become a well-known tourism destination for snorkelling, scuba diving, (Ranasinghe, 2010). After the mass bleaching event in 1998, the coral reef associated with the Bar Reef Marine Sanctuary was hit for the second time by a severe coral bleaching event in 2016. Reefs disturbed by the coral bleaching are affected by invasive organisms such as Halimeda (personal communications, Arjan Rajasuriya, IUCN). Other than the Bar Reef there are several offshore reefs near to Kalpitiya and Thalawila.

The northern most area of the lagoon in Portugal Bay between Battalangundu Island and Kudiramale Point contained large tracts of thick sticky greenish muddy floors. There are significant sea grass beds lining the inner shores of most of the islands from Kalpitiya to Battalangundu. Several Islands contained large roosts of sea birds and many of these birds were observed resting and feeding in the lagoon areas as well. The roosts were composed of Heuglin's Gulls (*Larus fuscus heuglini*), Pallas's Gull (*Ichthyaetus ichthyaetus*), Brown headed gulls (*Chroicocephalus brunnicephalus*), Caspian Terns (*Hydroprogne caspia*), Lesser Crested Terns (*Thalasseus bengalensis*), Greater crested terns (*Thalasseus bergii*), Common Terns, Little Terns, Gull-billed Terns (*Gelochelidon nilotica*), Spot-billed pelicans and Gray Herons (MOE/UNDP, 2017).



Aruwakkalu deposits located in Gangewadiya area contains a wide variety of marine fossil fauna ranging from foraminifera to mammals. As this Miocene deposit contains fossils of large invertebrates and vertebrates and therefore it is of high palaeo-biodiversity value. The fossils at Aruwakkalu represents nearly 40 species consisting of gastropods, bivalves, echinoderms, marine algae, tube worms, sting rays, whales, dolphins, fish, tortoises and turtles. (Deraniyagala, 1969). Although the Biodiversity Secretariat of the Ministry of Environment together with the Department of Archaeology took some action to declare the Aruwakkalu palaeo-biodiversity site, as an Archaeological reserve, it is yet to be materialized. There is a proposal to utilize the abandoned lime pits as sanitary landfills (Ministry of Urban Development, 2015).

Puttalam estuary and the marine environment are affected by pollution and siltation from land-based activities, garbage dumping; changes in hydrology due to freshwater flows from inland irrigation schemes; sediment from soil disturbed by inland agriculture, deforestation, mining and construction; and sandbar formation either through natural or anthropogenic actions.

Present management interventions for biodiversity conservation

Department of Wildlife Conservation

Although it had been recommended that the marine areas adjacent to the WNP, the Dutch and Portugal Bays to be declared as marine extensions to the park, largely to protect the endangered Dugongs, it had not materialized due to various reasons including the civil war. In recent discussions, DWC indicated their interest in declaring a marine sanctuary.

With regard to WNP administration, the 40 km long coast is monitored by the following:

- Eluwankulama Range office – from Kala Oya estuary to Periya Uppu villu (approx. 20 km)
- Mullikulam Range office (including the Mailawilluwa beat station) – from Pukkullam to Periya uppu villu (including Pukuulam and Palugahaturai fishing villages)

These officers are situated some distance away from the coast and lack basic facilities such as boats to monitor the nearshore areas. Further WNP administration comes under the Assistant Director, Anuradhapura.

Presently the wildlife resources in this area (Puttalam estuary, Bar Reef Marine Sanctuary and other surrounding area and West coast of Wilpattu) is monitored by the Kalpitiya Range office and the Illanthandi/Norochcholai Beat office with limited number of staff (Refer Table 2), which is under the Administration of Assistant Director/Puttalam wildlife office. They also issue permits/tickets for marine mammal observations, and this will be discussed further under Tourism section.

	Kalpitiya Range office	Illanthandi Beat office
Ranger	1	0
Range Assistant	0	1
Wildlife Guard	2	1
Civil Defence Service	2	2
Volunteer/Boat operator	1	1
Total	5	5

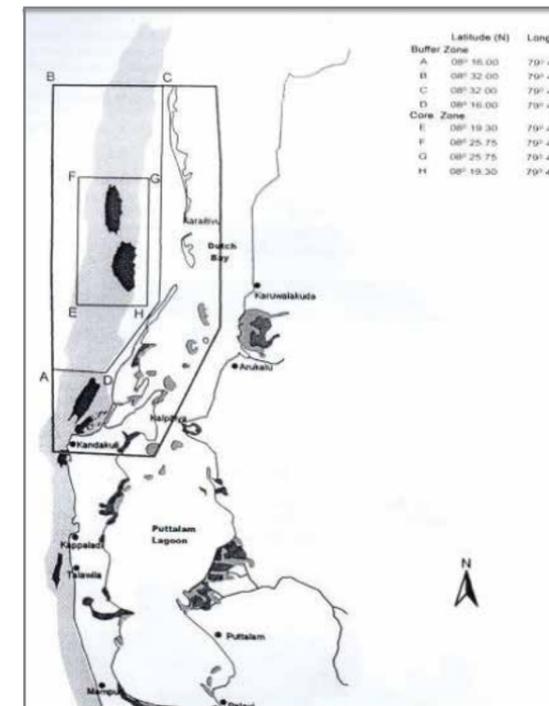
Table 2: DWC Staff availability

DWC field officials at Kandakuliya highlighted the importance of establishing new beat offices at Uchchmunai, Gangewadiya and Mullikulam (in the coast) to facilitate the conservation and monitoring activities of marine and coastal biodiversity was indicated as priority. Providing adequate staff and equipment (including boats, binoculars etc.) the new and existing two offices was also vital.

Other protected area measures

Under the Dugong and Seagrass Conservation Project, a management plan is being prepared (Geographical scope being from Kalpitiya to Jaffna islands) and a communication center is going to be established temporarily at Mullikulam and this will be shifted to Thalaimannar when a building is available at that location (Personal communication with Channa Suraweera, DWC). It was also stated that under the World Bank funded ESCP project, there is a proposal to develop the marine protected area management (to what extend need to be understood).

Further, a management plan for the Bar Reef Marine Sanctuary is being prepared (2019-2023) under the Environmental Sensitive Area (ESA) project, while a section of this protected area was demarcated with buoys and designated as a no take zone for fishers for five years (to assist in coral reef rehabilitation). The plan includes BRMS, Kalpitiya divisional secretariat, Gangewadiya area of Kala Oya estuary as these areas are the direct land bases with maximum impact to BRMS (extracts from draft management plan). Further, ESA project plan to assist the Forest Department to establish a monitoring post at Gangewadiya to protect the mangrove habitats. FD is yet to gazette their part of mangroves as a Reserved Forest, although demarcation had been undertaken.



A Special Area Management Plan for Bar reef was prepared by the Coast Conservation Department in 2005 under an ADB funded Coastal Resources Management Project. The geographical scope of this plan is as follows: Eastern side – the border between the Wanathawillu DS division and the Kalpitiya DS Division; Southern- a line from Wanatawillu- Kalpitiya DS border via the tip of Battenlangunduwa island to the Bar Reef Sanctuary Boundary; western – the Bar Reef Sanctuary boundary and continues up to Kandakuli and across the Kandakuli reef; South – horizontal line from Kandakuli up to Wanatawillu – Kalpitiya DS border – see Map below (CCD, 2005). A Community Coordinating Committee (CCC) with the Divisional Secretary of Kalpitiya as the Chairman was established for implementing the identified activities, the objectives of the CCC have never been met due to a number of constraints encountered (BOBLME, 2015). As at that point of time there was no legal backing to the process, the activity had not moved forward. Yet the 2011 amendment to the Coast Conservation Act provides provisions for declaration of Special Management Areas (refer legal section).

It should also be noted that several Navy points are found along the WNP coast as well as in Gangewadiya and Kalpitiya peninsula. Their surveillance boats assist in conserving the marine resources. How this collaborative action can be improved need to be investigated.

Collaborative management interventions between institutions are required for the sustainable management of the coastal and marine resources, and this will be discussed more under the fishery and tourism sections.

Fishery activities in the Marine Influence Zone

The near-shore marine area is a highly productive area for fisheries, while the two estuarine areas serve as important spawning areas of commercially important crustaceans such as Penaeus spp., and Macrobrachium spp, which offers refuge to their juvenile stages. The release of nutrients accumulated in the estuaries, especially during rainy seasons, assist this thriving fishing industry (RIS, 2013). The fishing crafts of the small-scale sector mainly consist of fiber reinforced plastic boats (OFRP) powered by outboard motor engines, some traditional fishing crafts such as Paru, Vallam, Madel oru and Theppam. Boat size may vary with 5-6 m in length and are mainly used for small mesh gill netting. Most common fishing gears used in the area are

gill nets, purse seines, long lines, cast nets and trammel nets while there are two types of gill nets as drift nets and bottom set gill nets. Surukku del and Laila nets were observed as a type of purse seines. Small pelagic fish species such as sardines, herrings, shads, and sprats were mainly caught using small mesh gill nets (BOBLME, 2015). A smaller fishery for Blue Swimming Crab operates in Portugal Bay, while these are also caught as part of a multi species 'lagoon fishery' in Puttalam Lagoon (Creech, 2014).

The main fisheries in the sea area include long-line fishery for Yellow-fin Tuna, and some gill net fisheries are practiced for Flying fish and demersals. Main target species in the area include Rays, Clupeid, Exocoelids and Squid. 280 boats are registered for the fishery of Sea cucumbers, Chunks and Spiny Lobsters, which are operated using locals employed as SCUBA divers. Most of the collectors receive minimal training in SCUBA and operate without adhering to any dive safety rules and working (MOE/UNDP, 207).

The main fish landing sites in the area are described below.

Gangewadiya fish landing site is located just outside the Southern WNP boundary, while Pukkulam and Palugahaturai fishing villages were exercised from the National Park boundary when the area was declared as the block V of the park in 1973. Around 130 families had requested to permanently settle in Pukkulam, while presently only 35 families are residing throughout the year (as per our questioner survey). Prior to the war, a fishing camp was also located at Vellamundalama, but presently it is a Navy post and no fisherman are found there. Presently around 11 families are residing in Palugahaturai and there are about 28 fishermen (a more comprehensive report on Paluhathurai, Pukulam and Gangewadiya will be provided separately). Refer Table 2 for Statistics).

During field visits it was observed that fisherman had built temporary shelters **at Kuburawa area (within the boundaries WNP, where the Pomparippu Aru enter the lagoon) without the permission from DWC** (Fig. 2 and 3). Discussions with the inhabitants lead to the understanding that around 12 families are occupying with them (8 from Gangewadiya and 4 from Serrakuliya), while many more fisherman use the islands of either side of the sand banks to anchor their boats when the seas are rough (especially during the North West monsoons). These fishermen mainly target crabs, while few are also undertaking crab fattening. DWC officials had request them to remove this illegal fishing camps and had requested Sri Lanka Navy for assistance. There is a belief that this site may be utilized to bring in drugs from India.

Within the Kalpitiya DS two GNS and seven fish landing sites are located as indicated in the Table below. As per the Resource profiles of the two GNs only 328 families (22 in Palliyawatte and 306 in Dutch Bay) are permanently residing, while considerable number of migratory fishermen use these fish landings. Coastal erosion is high in Palliyawatee GN. It should be noted that for the purposes of fisheries administration, this area is divided into three Fisheries Inspector (FI) divisions: Wanatavillu and Kalpitiya Islands in Puttlam district and one in Mannar district: Silawaturai.

Divisional Secretariat	Grama Seva Division	Permanent fish landing sites	No. of fishermen	Boats	Main fishery resources
Puttalam district					
Wanathavillu	Pukkulam	Palugahathurai	28	15 OFRP	Blue swimming crabs, Eels
		Pukkulam	100	55 OFRP	Shark, Sea bass
		Vellamundala	-	-	No fishing activities
	Aluth Eluwankulama	Gangewadiya	60	80 OFRP	Prawns, Crabs
Kalpitiya	Palliyawatte	Sinnagunduwa			
		Palliyawatte			
		Battalangunduwa			
	Dutch Bay	Keeramundalam			
		Sinnamunnakarai			
		Rodapaduwa			
Uchchamune					
Mannar District					
Musali	Mullikulam	Mullikulam/ Mallankadu	138	52 OFRP, 15 NTRB (Teppan)	

Table 2: Statistics on Fish landing sites surrounding the Marine Influence Zone

Source: Fisheries Department/Puttalam, Study tours



Figure 1: Gangewadiya fishing site



Figure 2: Illegal fishing camp at the coast of WNP in Kuburawa



Figure 3: Crab fattening and discussions with fishers at Kuburawa

Other than the edible fishery, marine ornamental fishery is carried out mainly on the coral reef habitats and adjacent areas. Butterfly fish (Chaetodontidae), Angelfish (Pomacanthidae), Wrasses (Labridae), Damselfish (Pomacentridae), Scorpion fish (Scorpaenidae), Gobies (Gobiidae), Blennies (Blennidae), Sea anemones and Reef shrimps (*Lysmata amboinensis*, *L. debelius* and *Rhyncocinetes uritae*) are the main species harvested from the area. They are

harvested by snorkelling or scuba diving. Collectors use a variety of nets; hand nets, moxy nets and barrier nets. In addition, divers harvest spiny lobsters, sacred chanks and sea cucumber throughout the north-western coastal waters to a maximum depth of about 35m (Dayaratne, 1997).

Illegal Fishing activities

Some fishing gears and methods such as push nets and monofilament nets banned from Sri Lankan waters are reported to be used in Puttalam Estuary due to inadequate enforcement of regulations and/or lack of awareness. Although Sri Lanka became one of the handful of countries to ban mechanised bottom trawling by the Fisheries and Aquatic Resources (Amendment) Act No. 11 of July 2017, this ban is hardly enforced within the country and trawling is practiced in the Northern, Western and North-western parts of the country, despite protests being made by small scale fishers. Presently 23/26 Bottom-set trawling is carried out in the Portugal Bay, North of Puttalam Lagoon. These trawls are operated from Kalpitya. The trawl fishery is mainly conducted targeting shrimps (comprised mainly of *Penaeus semisulcatus*, *Metapenaeus moyebi* and *M. dobsoni*) but it also exploits a reasonable amount of fish as bycatch. The pony fish (*Leiognathus* spp.) is one of the major contributors to the trawler by-catch. The bottom trawling is conducted more or less throughout the year and the period from October to April is the best fishing season for shrimps (Jayawardena and Dayaratne, 1995). These trawlers are also implicated in the damage and destruction of crab nets and are a threat to the safety of smaller Sri Lankan fishing craft (Creech, 2014). A report in 2009 recommends the establishment of a Trawl Fishery Management Committee under the umbrella of the North Western Fisheries Management Area and this committee to develop a management plan for the trawl fishery. This report further recommends that the Kalpitiya Trawlers Association levy its members and establish a joint account to be utilised at its sole discretion for funding at least part of the fishery research and management costs (Sandars and Jaysinghe, 2009).

Sangli dal (chain nets – type of a trawl net) is another harmful fishing method utilized to



capture prawns in the nearshore seagrass beds of the estuary. Although monofilament nets are prohibited under the Fisheries & Aquatic Resources Act in Sri Lanka, monofilament crab nets are used to harvest BSC. Further operating licences are issued by DFAR for some fishing operations using harmful encircling nets like "Laila". Spear fishing which is now an illegal activity is carried out regularly as there are no monitoring of boats out at sea. This activity is highly destructive on the reefs as the divers target the sensitive species and selectively kills the largest and dominant members of a population on the site.

Destructive fishing practices such as the use of explosives for blast fishing and the use of push-nets in seagrass habitats are other anthropogenic threats that cause destruction to the sensitive seagrass ecosystems that constitute the remaining dugong habitat. These practices are still



prevalent in some areas inhabited by the dugong. Further the marine turtles are a frequent by catch of these illegal fishing activities.

Around six fishermen had been caught and cases against them filed by the Mullikulam Range office of WNP for illegal fishing in the mangrove areas of Modaragam Aru river mouth (within the limits of WNP). These fishermen are requesting permission to carry out fishing activities in this area.

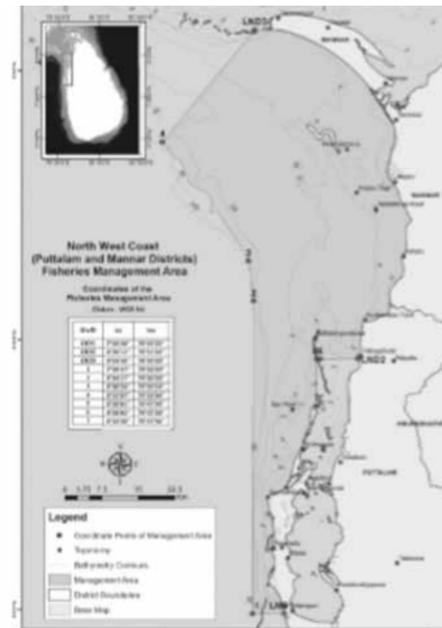
Excessive sediment loading during the rainy season is also a concern, and Gangewadiya is increasingly becoming unsuitable for brackish water fisheries due to the silting of the river. This has caused the river mouth area to decrease from 15 ft to 2 ft within a 30-year span (MOE/ UNDP, 2017). The fishermen request the removal of sand from the river mouth and in early 2018 FD and DWC officials prevented a private contractor from undertaking sand mining in the area (<https://www.lankanewspapers.com/2018/01/23/threat-fauna-flora-wilpattu-national-park-region-lid-blown-gangewadiya-sand-mining-racket-dredging-sand-big-scale-poses-grave-threat-wildlife/>). A proper study needs to be undertaken to address this issue.

Fishery management interventions

Under the Fisheries and Aquatic Resources Act, No. 2 of 1996, including all the amendments made subsequently, the Department of Fisheries and Aquatic Resources has the overall mandate for the management, regulation, conservation and development of fisheries and aquatic resources in Sri Lanka. The following regulations made under the provisions of the Fisheries and Aquatic Resources Act, No. 2 of 1996 provide for registration of fishing boats and fishers, licensing of fishing operations and establishment of Fisheries Committees and other institutional arrangements for collaborative management of fisheries. This marine influence zone is part of two Fishery Management Areas declared in 2010 under Section 31 of the Fisheries and Aquatic Resources Act, No. 2 of 1996: Puttalam Lagoon (1665/17) and the North-west coast (Puttalam and Mannar - No. 1665/18).

Presently there is an ongoing debate on jurisdictions these FMAs cover.

A Fisheries development and management plan of Puttalam Lagoon was developed by DFAR in 2013 and its jurisdiction is indicated in the Map. The northern margin of the lagoon is a



straight line extending from Uchchamunai on the seaside to Gangewadiya on the landside. Although Pukulam GN is included in the FMA, according to this definition of lagoon, the two fishing villages in the WNP coast – Pukulam and Palugahaturai are not included. Yet these fishermen describe themselves as “lagoon fishermen”. Comprehensive information on the management interventions required is available DFAR, 2013c -<http://www.fao.org/3/a-bm050e.pdf>).

As per the gazette notification the boundaries of NW marine FMA is indicated below and as indicated include Pukulam and Palugahaturai fishing villages as well as the Bar Reef Marine Sanctuary. Community are also engaged in sea cucumber and chank collection around Bar Reef area. To control these activities in management, a plan was prepared by NARA based on the resource’s assessment under CENARA project. The management guidelines formulated under this project are being implemented by DFAR to manage the resources (Dissanayake & Athukorala, 2009).



Discussion with Assistant Director/Fisheries Puttalam led to the understanding that a district level committee need to be established, while presently discussions are underway with regard to management of five fishing activities: Prawns, Lobster, Ornamental fish, Sea Cucumber and Chank. A separate management plan is available for the Blue Swimming Crab fishery in the Puttalam District.

There is also lobbying going on for the DFAR to scrap the above mentioned FMAs and make separate FMAs for the districts of Puttalam (Refer Fig) and Mannar. Thereafter relevant stakeholders can make separate plans for each fishery type or specific species. Further if required, species specific management plans for the key species targeted by Pukulam and Palugahaturai fishermen, to sustain their livelihoods can be made or fishery management plan for each village could be developed (Discussions with Steve Creech).

There is an urgent need to scientifically assess these definitions and come up with a sound solution regarding the fishery resources management in the Puttalam Lagoon, Dutch Bay, Portugal Bay and the adjacent marine water as this directly has relevance to conservation of marine biodiversity in the area.

Tourism

Various kinds of tourism activities are being under taken within the Marine Influence Zone as described below.

Lagoon tours (Fig.4) and night camping in the beaches of islands fringed with mangrove areas are very popular, especially among the locals. During weekends and holidays large numbers gather in these small beaches and the boats bring in the visitors from Gangewadiya as well as Kalpitiya peninsula. Further boats take tourists to see Kudarimale Point, which is believed to be where King Vijaya landed. Presently this activity is unregulated and several issues including solid waste management, illegal entering to the WNP, especially to observe the Baobab tree (See Fig.4) as well as poaching of wildlife is reported. The roots of the Baobab tree are exposed and the coastline is eroded, and this might endanger its long-term survival. Discussions with boat operators at Gangewadiya highlighted the importance of awareness and education on lagoon resources.



Figure 4: Lagoon tour (top left) and the famous Baobab (top right), locally known as the Elephant tree

Whale and Dolphin Watching activities at marine waters off Kalpitiya Peninsula

In the post-conflict period, Kalpitiya has become an important area of tourism development in Sri Lanka, where ocean-based attractions such as whale and dolphin watching is being promoted. Whale and dolphin watching take place within the Bar Reef Marine Sanctuary and in the adjacent sea area (Wickramasinghe, Senaratne and Rajasuriya, 2014). Issue of permits to view marine mammals by DWC in this area commenced in 2013 and the visitor entrance fees are based on the gazetted regulations on Sea Mammals observation and control regulations gazette under the Sections 30 and 71 of the Fauna and Flora Protection Ordinance. (No 1774/27, 6th September 2012). These regulations were to impose strict guidelines for those engaged in operating whale-and-dolphin watching trips. The regulations are intended to ensure

to the greatest extent, possible, the peaceful and natural existence of all marine mammals and to regulate vessels used by visitors for the purpose of observing such marine mammals in Sri Lankan waters. It covers licensing and Certificate of Fitness for vessels, insurance for vessels and passengers, onboard equipment requirements, fees to be levied, guidelines for conduct when the mammals are sighted and restrictions. Although this regulation is valid for whole of Sri Lanka, presently issue of permit through a payment is undertaken only at Kalpitiya. DWC is yet to operationalize this in other popular whale and dolphin watching hotspots in Sri Lanka such as Mirissa and Trincomalee. As indicated in MOE/UNDP, 2017, mammal tourism is still insufficiently regulated and especially on holidays, times occur where more than 30 boats could be observed to chase a single pod of dolphins for hours. The boats do not approach the mammals in an orderly manner and do not comply with whale watching guidelines. The practice will make the dolphins stressed and prevent them from engaging in their normal lifestyles.

The highest visitor number and income was obtained in 2015 (18,048) and after that there have been a slight decline (Fig. 1). In 2017, 13,415 visitors obtain permits to view marine mammals and out of that 28.6% are foreign visitors, while in the first five months of 2018, 14,546 people had visited the area. The peak visitor arrivals are from December to April, while the onset of Southwest monsoons in May reduce the visitor numbers drastically. The reef is not visited by tourists from June-September due to rough sea conditions (See Fig.2).

Whale watching tour boats regularly provide an additional trip to tourists by allowing them to snorkel at Bar-reef. This activity is unregulated and involves alighting of tourists who have minimal skills in snorkelling. While there is a high risk to the non-diver tourists in alighting at a location at a significant distance from the shore, it also causes significant damage to the reef as the non-divers tend to gather at shallowest sections of the reef crest and stand and walk on the reef causing significant trampling damage to the reef corals.

Discussions with the chairman of the Tourism Boat Operators Society revealed that there are around 99 boats registered with DWC for marine mammal watching and of them around 40 are used for both fishing activities and tourism, further these boats are also used for taking visitors in the Puttalam Lagoon (Gangewadiya), especially during the southwestern monsoon period. These boats operate primarily from Kandakuliya, and Kudawa and each boat is equipped with basic facilities to carry 6 tourists per boat. Most boat trips are aimed at encountering the resident coastal pod of spinner dolphins that range 5-8km from the shore along the continental shelf edge area, while some would venture out in to the deeper sea areas and offer encounters with Sperm whales and other species of dolphins and whale (MOE/UNDDP, 2017).

Presently three ticketing points: one in Illanthadiya /Norochcholai and two in Kalpitiya-Kandakuliya and Kudawa are being operated by DWC Puttalam range office to issue tickets to watch marine mammals. The distance between the Illanthadiya and Kalpitiya is 32 kms. As indicated by the Fig.3 more locals obtain tickets from Illanthadiya this year (it might be as it is the nearest entry point from the Puttalam-Colombo main road), while slight number of foreigners preferred the Kandakuliya area. As indicated under the Biodiversity Section of this report, there are only 10 DWC staff at both locations and during the peak tourism season six people are required to handle the 3 ticketing points.

Following are some of the issues faced by DWC officials regarding marine mammal tourism:

- No permanent location to issue tickets – the three ticketing points are temporary buildings without any facilities
- Only one boat for monitoring purposes and the number of staff is not sufficient
- Need of an environmental education center on marine mammals, turtles and marine habitats
- Lack of basic facilities such as toilets for tourists

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Kitesurfing is also becoming a popular tourism activity in this area.

The main setback preventing effective enforcement of marine conservation issues including tourism is monitoring and enforcement of regulations on the boats at sea and at the BRMS, which is virtually non-existent at present. Inadequate capacity of the DWC staff in handling marine environments is also a prevailing issue. The DWC staff at the marine protected areas need to be provided comprehensive training on swimming, snorkelling, SCUBA diving, boat handling and safety at sea in order to be comfortable and capable of working out at sea. There is also need for additional equipment including boats and diving gear etc. and sufficient running expenses to be able to run boat excursions out to sea regularly (MOE/UNDP, 2017).

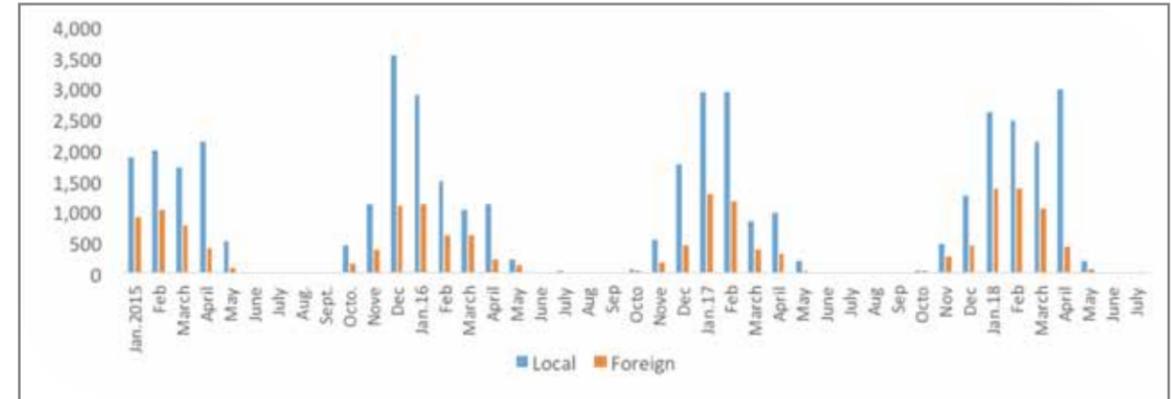


Figure 2: Monthly visitor arrivals for marine mammal watching at Bar Reef and adjoining waters

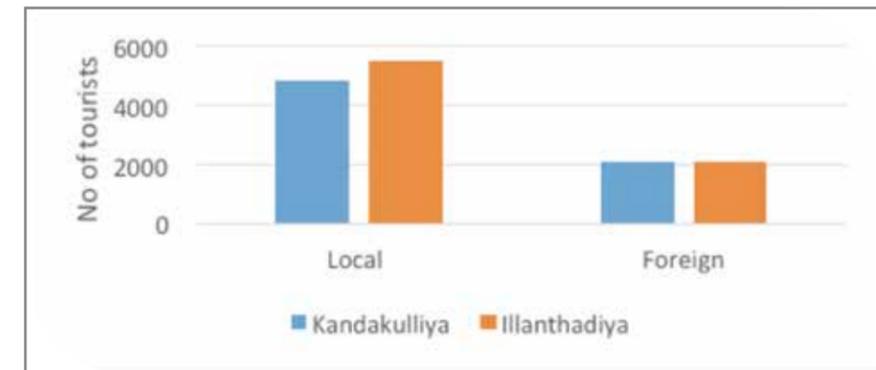


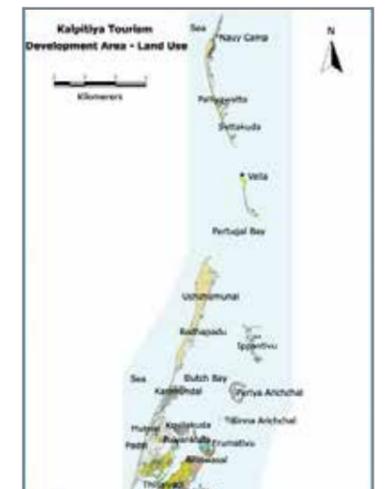
Figure 3: Comparison of tickets issues by the ticketing centers for the year 2017



Figure 1: Annual visitor arrivals and income earned from Marine Mammal viewing

Kalpitiya Tourism Development Zone

Sri Lanka Tourist Board has launched a massive Tourist Development Project based in Kalpitiya in a bid to make the area one of the most sought-after Tourist Destinations in South-East Asia by the end of the next decade. Fourteen islands within Dutch Bay and Portugal Bay are being identified by the government for tourism development under the Kalpitiya Integrated Tourism Resort Project. By the Gazette Extraordinary notification (No. 1549/7) of May 2008, 123.41 ha of land belonging to several islands (Vellai 1, II and III; Periya Arichchalai, Sinna Arichchalai, Sinna Erramutivu, Eramativu West, Kakativu) have been vested under the Tourism Development Authority under the Section 4 (1) of the Tourist Development Act No. 14 of 1968 for this purpose. Further in November 2005 under the same Act, but under Section 2 (1), allotment of lands in extent 199.86 belonging to islands of Palliyawatta, Uchchamunai, Ippantive, Eramutivu, and Mutwai also have been designated for tourism development activities (Gazette Extraordinary No 1418/7). Of the 14 islands, 9 are state owned while six contains private lands. Extensive resort development with golf course, horse riding school etc., is recommended by the conceptual master plan of this project (SLTDA, 2010).



Conclusions and Recommendations

The coastal and marine Influence Zone of the WNP is rich in biodiversity harbouring several important ecosystems: mangrove seagrass beds, salt marshes and coral reefs off Kalpitiya. Yet these systems are threatened by uncontrolled and harmful fishing activities, unsustainable tourism and many other land-based issues. The challenge faced is to maintain the habitat connectivity, heterogeneity as well as the dynamics between them. It is obvious that the present management of the marine and coastal influence zone is done in ad hoc manner without considering the ecosystem approach for management. Many of the management plans (which are overlapping) had been prepared under donor funded projects and after the closure of each project most of the activities identified had not be taken forward as they have not been sufficiently incorporated into the plans of stakeholder institutions. Therefore, it is necessary to consider the Puttalam Lagoon, Dutch Bay, Portugal Bay, the Bar Reef Marine Sanctuary and other offshore reefs as well as dolphins, whales, dugongs and fish within them as one management unit. Any intervention need collaboration with all the relevant stakeholders. The most relevant institutions and their roles is indicated in the table below, while it is vital to build up closer collaboration between DWC and DFAR in marine resources conservation and management (especially in preventing the establishment of ad hoc landing sites, use of destructive fishing methods etc).

Institution	Responsibility
DWC	Protection of Wildlife and sustainable management of the PAs
DFC	Protection and sustainable use of Forest Resources
DFAR	Sustainable utilization of fishery resources
CCD	Coastal Resources Management
SLTDA	Promoting tourism activities
MEPA	Marine Pollution Prevention
NAVY	Coastal defence
Police	Keeping social security and preventing illegal activities
GSMB	Licensing mining activities
Dep. of Archaeology	Protection and conservation of artefacts
CBOs and NGOs	Community management aspects of the resources
NARA and Universities	Research
Provincial, District and Divisional Administration	Collaboration of ground level management
Private Sector (tour operators, mining etc)	Sustainably utilizing the resources

The literature surveys and field observations indicated the following recommendations for the future sustainability of WNP marine and coastal influence zones:

- Integration of biodiversity conservation aspects into the limestone mining industry at Aruwakkalu (Kumarasinghe et al, 2013) and carefully selected areas of the Aruwakkalu forest be conserved for the sake of biodiversity conservation (Jayasuriya, 2014).
- Consider BRMS and its surroundings (especially the northern part) as a cetacean hotspot and when managing the PA take this into consideration. The core area of the BRMS to be extended and consider as a cetacean sanctuary (Illangakoon, 2006).
- The marine areas adjacent to the Wilpattu National Park, the Dutch and Portugal Bays to be declared as marine extension to the park, largely to protect the endangered Dugongs, which have been recorded from the area (Prenetta, 1994).
- Undertake a comprehensive marine turtle survey (including feeding and nesting sites and issues such as by catch).

- Empower DWC and FD to conserve the wildlife and forest resources.
- Incentives for boat operators to achieve ecotourism certification should be introduced (with regard to dolphin and whale watching, diving and mangrove tourism). In this regard a code of conduct can be introduced to the boat operators as well as the tourists themselves.
- Educate the boat operators on marine biodiversity.
- Establishment of two visitor centers – one for mangroves at Gangewadiya and another for coral reef, dugong and turtle conservation at Kalpitiya.
- What can be prioritized for the next phase of this project is to empower the marine unit at Kalpitiya and develop ecotourism activities at Gangewadiya.

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Annex 4: Invasive Alien Species at Wilpattu National Park and its Influence Zone

A considerable number of invasive alien species, especially plants have been observed in Wilpattu National Park and its influence zone and all existing literature identifies their spread as a threat to the Biological wealth of the area. As per the Wilpattu Resource inventory 2007, invasive species such as *Eupatorium odoratum*, *Chromolaena odorata*, *Imperata cylindrica*, *Lantana camara*, *Mikania cordata*, *Panicum maximum* and *Xanthium indicum* were found extensively in the peripheral areas of the water bodies, particularly around human habitations. Under brushed areas, flanking jeep tracks are gradually being invaded by species such as *Abutilon hirtum*, *Abutilon indicum*, *Ageratum conyzoides*, *Chrysopogon aciculatus*, *Croton laccifer*, *Croton officinalis*, *Cyrtococcum trigonum*, *Eupatorium odoratum*, *Hyptis suaveolens*, *Imperata cylindrica*, *Leucas zeylanica*, *Oplismenus compositus*, *Panicum maximum*, *Pavonia odorata*, *Plectrathus zeylanicus*, *Sida acuta*, *Sida cordata*, *Tridax procumbens* and *Vernonia cinerea* that are invasive or have near invasive behaviour (Refer Map 1 for details). However, it should be noted that the threat of invasive species is minimal in the terrestrial areas in relation to the threat to the water bodies. Field observations showed that those sites and jeep tracks cleared earlier and left abandoned for two decades due to park closure are healthily regenerating into natural forests devoid of invasive species; a good indication that human impact is a major causative factor behind species invasion and once this is removed the natural system has the capacity to eliminate such species (DWC, 2007).

The Strategic Management Plan prepared in 2017 states that *Prosopis juliflora* have started spreading rapidly in northern boundaries. It further identifies few main areas where invasive plants are spreading (Refer Map 2) and states that little is known about marine invasives (DWC, 2017).



Map 1 & 2: Spread of Invasive species within WNP (Source: DWC, 2007 and DWC, 2017)

The invasive alien fish Mossambique Tilapia (*Oreochromis mossambicus*) was also observed in the villus and waterholes in the park, and according to Saparamadu (2006), this species has been introduced to the villus of Wilpattu in 1954. Being a prolific breeder and a superior competitor for resources, this species can be a great threat to the native fish species that occur in the wetland habitats of the park. Presently tilapia fingerlings are being introduced to Mahawilachchiya tank to increase its fish productivity. During WNP staff meeting it was revealed that the Tank Cleaner *Pterygoplychthys multiradiatus* was recorded from the following water bodies: Nelumwila, Maha Wewa, Telbepe Wewa and Makalan Maduwa.

Further, Water buffalos (*Bubalus bubalis*) are listed as potential IAS in Sri Lanka as there is evidence of hybridization of this species with the wild buffalo (*Bubalus arnee*). According to Deraniyagala 1964, this hybridization has probably led to the local extinction of genetically pure populations of the wild water buffalo in locations such as the Wilpattu National Park. Several

specimens of domestic dog (*Carnis familiaris*) were observed around the Palugahturai and Pukulam fishing villages as well as associated with Navy check points (e.g. Maila villu). These domestic dogs can be a great threat to the wildlife since they hunt most of the small mammals and birds in the park.

As per the Biodiversity Baseline Survey for Kala Oya basin undertaken under the ESA project, spread of invasive alien aquatic plants such as *Hydrilla verticillata*, *Najas marina*, *Eichhornia crassipes* and *Salvinia molesta* and invasive alien fish such as *Oreochromis mossambicus* could cause problems to the endemic aquatic biodiversity, especially in Villus. It further reports that although *Acacia nilotica* is not identified as an IAS, this species is significantly invading the habitats of Tabbowa Sanctuary, its surroundings and extending into Wanathawillu area together with highly invasive species *Prosopis juliflora*. This report also notes that many marine reef species can become invasive over reef areas in Kalpitya when their natural densities on the reef are significantly increased. Reef organism invasive events can take two forms where they may be seasonal (or activate as short-term events triggered by an external cue) or be long term takeovers of reef substrates due to a more significant change in reef ecology. These include algae *Halimeda* spp., *Ulva* spp., *Asperogopsis taxiformis*, *Stoechospermum polypodioides*, *Padina* spp., *Dictyota* spp., *Caulerpa racemosa*, *Caulerpa averticillata* etc. and reef invertebrates including encrusting black sponge (*Terpios* sp.) Corallimorphs, Green Ascidiates (*Didemnum* sp.) and Crown of thorn sea stars etc. Most of these species are present on the Bar-reef complex and have shown to be locally invasive on occasion. The invasive events are believed to be linked to human activity including pollution/eutrophication and selective removal of adult or larval predators of the species (MoE/UNDP, 2017).

Given below are some locations found during recent field visits during the present project, where invasive species are threatening the habitat integrity.

- *Chromolaena odorata* is the most widespread IAS found in the WNP and is spread along the jeep tracks, where ever sunlight is available. It is found near to Hunuwilagama entrance, Andaragollawa tank and Palu llandagaha Wewa tank. This species is also found near to Wilachchiya entrance (Fig.1 and 2).
- *Typha angustifolia* is threatening Maha Wewa tanks water retention capacity as well as biological diversity (Fig. 2). This species is also widespread in several small tanks in the vicinity of the park (e.g. the tank near to the Teal Cottage restaurant and accommodation facility).
- *Lantana camara* (Baloliya/Hinguru/Gandapana) is widespread along the main road leading from Eluwankulma to Mannar.
- *Eichhornia crassipes* and *Salvinia molesta* are found in several tanks and villus including Pasi Badi Wewa, Maha Wewa.
- *Opuntia dellenii* (Prickly Pear) is found in the coastal stretch of Pukulam village.
- *Panicum maximum* is widespread in the influence zone of the park, especially near to Wilachchiya and Tantirimale boundaries. Abundant chena lands are covered with this grass.
- *Prosopis juliflora* is wide spread near to the southern boundary of the park, specifically in Tabbowa tank area as well as the northern (Mannar) side.

A full list of possible IAS within Wilpattu National Park and its influence zone is provided in Annex 4.1

Conclusions and Recommendations

The entire WNP and its Influence Zone (especially the Mavillu Conservation Forest) had not been surveyed up to date, main reasons being security concerns and lack of suitable access road/ pathways. Therefore, the existing data does not provide comprehensive information on the threats the invasive species pose to the general health of the biodiversity and ecological integrity of the area. Identifying this threat is vital for specially maintaining the ecological character of the wetlands, the grasslands for larger herbivores and coral reef health in the marine environment.



Figure 1: Spread of *Chromolaena odorata* at Wilachchiya entrance and Palu llandagahawewa breached tank



Figure 2: *Typha angustifolia* and *Salvinia*



Figure 3: Spread of *Salvinia* at Andragollawa tank at Maha Wewa tank



Fig. 4: *Opuntia dilani* at Pukulam fishing village



Fig 5: Feral dogs at Mailavilu Navy check point

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Annex 4.1: List of invasives recorded in Wilpattu Protected Area and its influence zone

Scientific name	Common names
Flora	
<i>Ceratophyllum demersum</i>	Hornwort, rigid hornwort
<i>Chromolaena odorata</i>	Siam weed, Christmas bush, devil weed,
<i>Eichhornia crassipes</i>	Common water hyacinth (Japan Jabara),
<i>Hydrilla verticillata</i>	Hydrilla
<i>Imperata cylindrical</i>	Cogon grass
<i>Lantana camara</i>	Big-sage, wild-sage (Gandapana)
<i>Ludwigia adscendens</i>	Water primrose
<i>Ludwigia hyssopifolia</i>	Seedbox, linear leaf water primrose
<i>Ludwigia perennis</i>	Perennial Water Primrose
<i>Leucaena leucocephala</i>	White lead tree, Subabul
<i>Mikania micrantha</i>	Bitter vine, climbing hemp vine, or American rope
<i>Muntingia calabura</i>	Calabur tree, capulin, Jamaica cherry, Panama berry
<i>Najas marina</i>	Spiny water nymph
<i>Opuntia dellenii</i>	Prickly Pear cactus
<i>Prosopis juliflora</i>	Mesquite
<i>Panicum maximum</i>	Gini grass
<i>Typha angustifolia</i>	Narrow leaf cattail (Hambu Pan)
<i>Salvinia molesta</i>	Salvinia
<i>Xanthium indicum</i>	Rough cocklebur
Fauna	
<i>Bubalus bubalis</i>	Water buffalo
<i>Oreochromis mossambicus</i>	Mossambique Tilapia
<i>Canis familiaris</i>	Feral dog
<i>Pterygoplychthys multiradiatus</i>	Tank Cleaner

Sources: RIS (2013); MOE/UNDP (2017); DWC (2007); DWC (2017) and observations during field visits and discussions with park staff

Annex 5: An Assessment of Wildlife Tourism Activities at Wilpattu National Park

The past

Wilpattu National Park was renowned internationally as one of the best places in the world to observe leopards in the wild. Past administrative reports of the Department of Wildlife Conservation indicate that the visitor number to the park increased from 133 in 1951, 1,900 in 1958 to 7,490 by 1968 and 22,076 by 1978 (Nikcolos, 1953; Packeer, 1962 and de Alwis, 1982). In early 1980s the park received around 25,000-30,000 visitors annually. Wilpattu was closed to the general public for 17 years when 24 park staff were killed on 4th May 1985 during a confrontation between the army and LTTE terrorists. The park was reopened to the public in March 2003 after the signing of the ceasefire agreement. (Weeratunga, 2009 and IUCN, 1990). In 2005, 15,659 people (including 1,105 foreigners) visited WNP (SLTB, 2005) and in 2006 the tourist numbers dropped to 3,895 (SLTB, 2006). After seven more people, including local tourists lost their lives due to a landmine inside the park in May 2006, WNP was yet again closed to the public for safety reasons. With the ending of the conflicts in May 2009, the park was re-opened to visitors on 27th February 2010.

Present visitor statistics

After its reopening in 2010, WNP is yet again becoming a popular destination among local as well as foreign visitors and as indicated in Fig. 1, visitor number as well as the income generated through tourism had increased considerably. In the year 2017, 84,766 individuals visited the park, of which 33% were foreign tourists. It should also be considered that only 5% of the tourists were children (Fig.2). The total income generated from the park for 2017 was LKR 57.06 million, of this approx. 90.5% was from revenue generated through issue of tickets to foreign tourists.

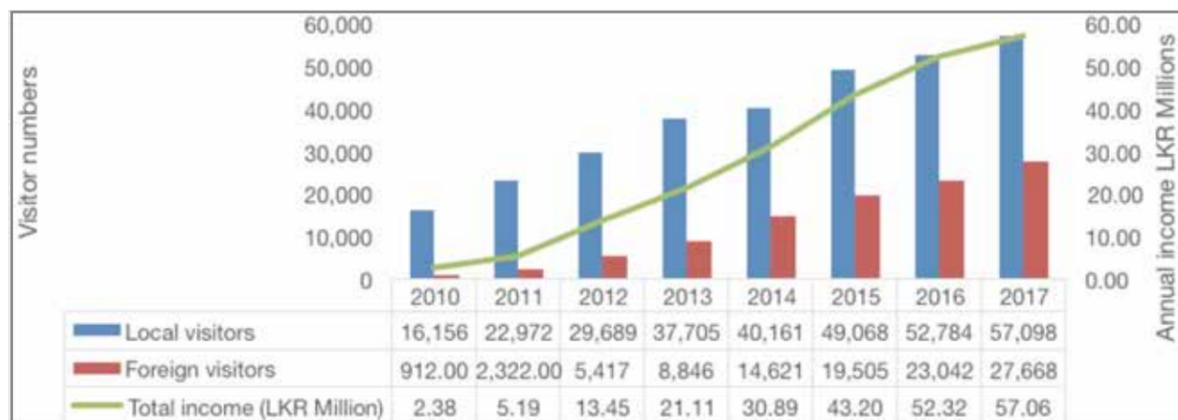


Figure 1: Annual visitor arrivals and income at Wilpattu National Park (Source: DWC)

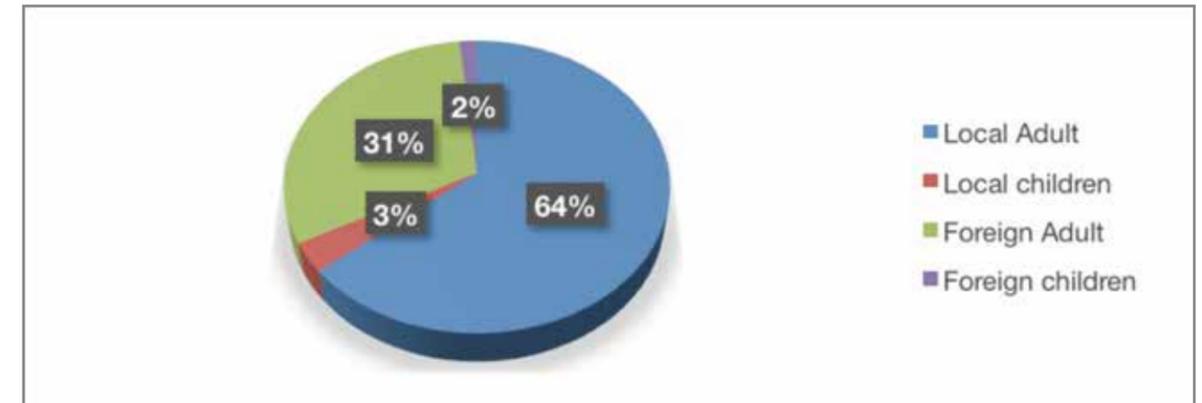


Figure 2: Visitor composition of WNP for the year 2017

Analysis of monthly visitor data for the past three years indicates that the highest number of visitors come to the park during the months of August and December. Local visitor arrivals are high during the school holidays (April, August and December), while foreign visitors seem to prefer coming to the park from July-August and February-March periods. Due to severe drought conditions experienced, DWC limited visitor entrance to the park in August and September 2017 and this resulted in low tourist numbers than previous years (Fig. 3). For the year 2018, 54,540 tourists have visited the park for the past six months (January-July), and when this figure is compared with the 2017 visitor arrivals for the same period, 7,384 additional visitors had entered Wilpattu this year. Since its reopening in 2010, the highest number of tourists, as well as highest number of foreign tourists entered the park in July 2018.

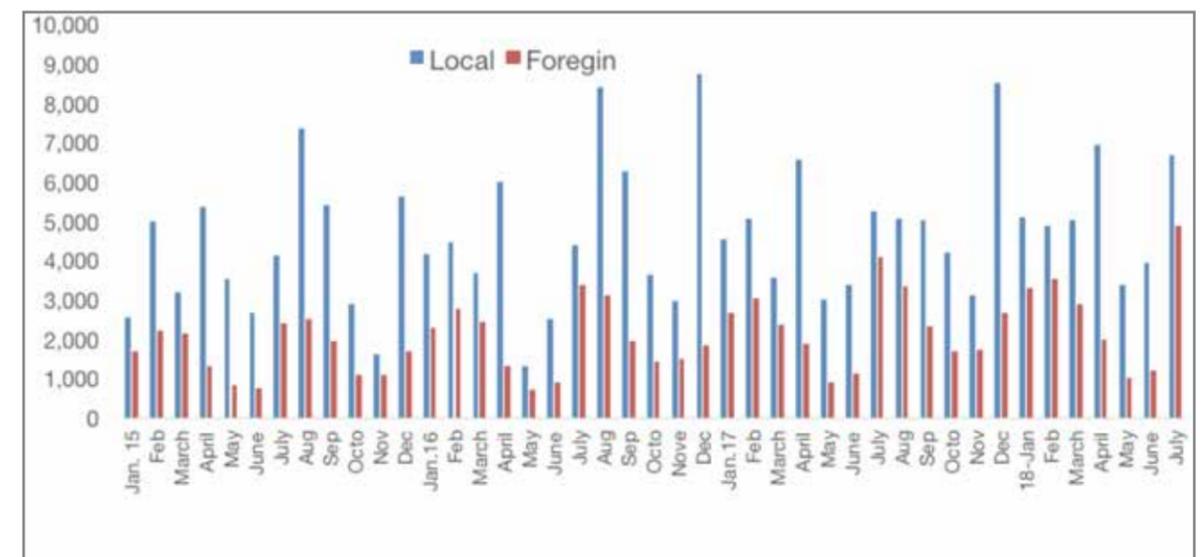


Figure 3: Monthly visitor arrivals at the Wilpattu National Park (Source: DWC)

Visitor arrivals from the two official entrances

The national park is popular among nature lovers, particularly for those interested in leopard and bear spotting. The park has a network of motorable routes mainly in the central part. Initially the park entrance had been located at Maradanmaduwa (Block I) and it was re-located to Hunwilagama (Block III) in 1973. Presently permits/tickets are issued to visitors at Hunuwilagama (Anuradhapura) and Eluwankulama (Puttalam), the latter being in operation since 2013. At first, the Eluwankulama entrance was sparsely used, but now it is becoming more popular. As of February 2018, 12.76% of the tourists entering the WNP obtain their permits from the Eluwankulam entrance yet the numbers dropped to 11.5% as this entrance was closed due to flooding of the Kala Oya. (Refer Fig. 4).

It is envisaged that the opening of Eluwankulam entrance will establish a direct link between Kalpitiya and the Wilpattu National Park to boost tourism to the area. It is also planned to establish a direct ferry service between Kalpitiya and Gangewadiya, which is the closest landing point to the Wilpattu Park. As a part of the project a new civilian jetty is also being constructed in addition to the existing navy jetty to facilitate the transportation of tourists by sea to the Wilpattu Park. The new sea/land route will drastically cut down travel time between Kalpitiya and Wilpattu from the present two and a half hours to just under an hour, offering nature and wildlife tourists a greater incentive to visit both locations. On the negative side, the Eluwankulam entrance is closed during the heavy rains, due to flooding from the Kala Oya.

Although, three more entrances for ticketing points at Mullikulam (Mannar side), Wilachchiya (Block III) Tantirimale (Block IV) were opened in 2012 (Refer Pics 1 and 2), these entrances are not presently being utilized. For these two entrances to be operationalized, it is vital to construct a bridge across Modaragam Aru, as it is difficult to cross the river for most part of the year to obtain access to the central villus of the park. Therefore, it should be noted that Block IV and a considerable area of the Block III (North of Modragam Aru) of WNP is presently not utilized for tourism purpose. It should also be noted that presently Park's archaeological and cultural value potentials are not fully utilized.



Picture 1: Wilachchiya entrance



Picture 2: Tanthirimale entrance

Comparison with other National Parks

Figure 5 provides a comparison in visitor arrivals and income generation from the facilities operated by the Department of Wildlife for the year 2017. As indicated by the yellow arrow, although being the largest National Park in Sri Lanka by extent, WNP's contribution to tourism is below in potential, when compared to parks such as Yala, Horton Plains and Udawalawe. Reviewers had provided the following comments for their poor scores:

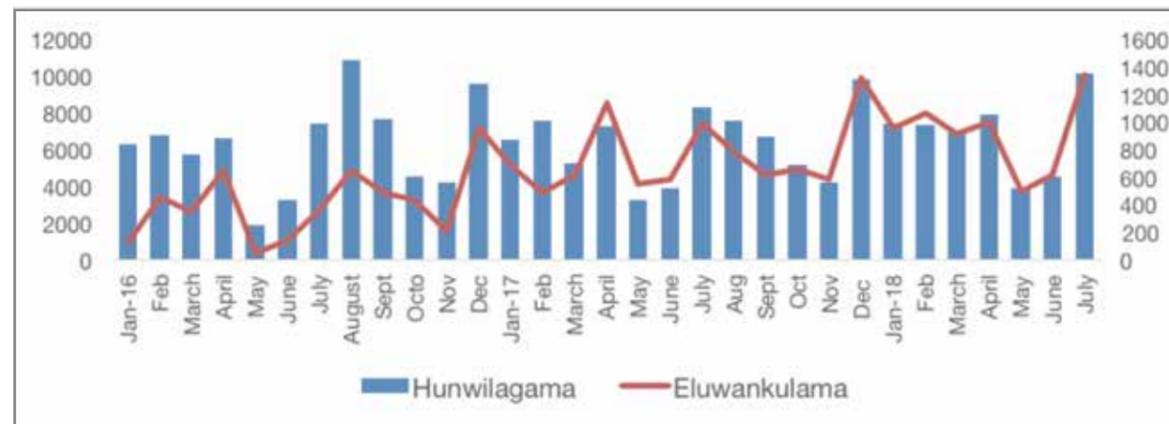


Figure 4: Comparison of visitor arrivals at two ticketing points: Hunwilagama and Eluwankulama

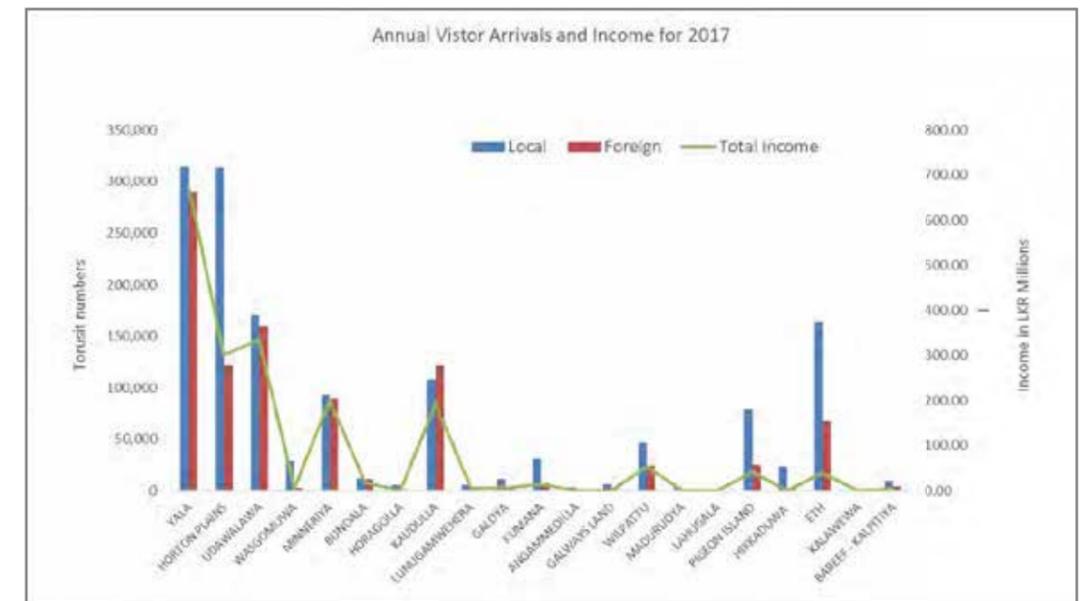


Figure 5: Comparison of visitor arrivals and income generated in National Parks for the year 2017

Source: DWC

Visitor feed backs

According to the trip advisor reviews (n=321) as of August 20th, 2018, 42% of the reviewers indicated that they had an excellent visit to the park. Yet, when compared to other popular national parks of Sri Lanka, WNP is lagging behind in providing excellent visitor satisfaction. Udawalawe National Park had the highest visitor satisfaction, with over 66% of the visitors having an excellent visit (Fig. 6), while for a terrible experience WNP and Yala National Park scores the same ratios (5%). Given below are some reasons indicated for visitor dissatisfaction regarding their experience at WNP:

- There's no guarantee of seeing any of the big three (especially the leopard) and less wildlife encountered when compared to other parks
- Confusion about the pricing - entrance fee and jeep hire etc.
- Compared to other countries standards, the park is small in size
- Bad weather (rain or drought) affecting animal sighting
- Poor information provided by the guide (lack of knowledge and poor English speaking abilities)
- No communication between guides to indicate where the animals are found (no telephone reception in most parts of the park)
- Bad road conditions and bumpy and dusty rides
- Limited options for facilities such as toilets, rest places and obtaining food and drinks as well as souvenirs
- No access from Eluwankulama entrance during rainy season

The most positive comments provided by the reviewers were as follows:

- Variety of animals (spotting leopards, sloth bears and elephants as well as birds) and good scenery
- Animal viewing not blocked by safari jeeps and less tourists compared to other parks (especially Yala NP) of Sri Lanka
- Parts of the park being dense forest make it exciting
- Availability of souvenirs (bird guides etc.) at the entrance

The trip advisor reviewers also provide several recommendations for fellow travellers:

- Travelling in a group will be less costly
- Bring plenty of food and water
- Hire a naturalist/guide to point wildlife and other interests
- Take early morning or late evening safaris
- If it is mandatory to see leopards it is not the place for you
- Use a Japanese Mitsubishi or Toyota 4WD cabs, the Indian Bolero cabs make a big engine noise scaring animals away

These comments indicate that the main reason tourists are visiting WNP is to encounter the leopard, followed by the Sloth bear. Yet as few pointed out, their experience was not the big three, but something else with a touch of class. The scenic value of the villus, and sites such as Kudarimale was also appreciated by them.

Issues in visitor management at Wilpattu NP

Volunteer guides

DWC mobilize educated youths residing in the fringing villages of wildlife protected areas as volunteer guides in national parks. These volunteer guides are deployed in interpretation activities at the national parks (DWC, 2017). They accompany the private vehicles that enter the park as well as bungalow and camp visitors who stay inside the park overnight. This number is inadequate to cater the demands especially during the peak tourism season. As a result, park guards and rangers are also utilized as guides when visitor traffic is high. These guides are also expected to ensure that tourists and safari operators observe the Park rules.

Presently there are 21 such guides at the Wilpattu National Park. The guides are paid only a daily allowance (Rs 700 per day) by the DWC only for the days they work. The small payment means that the guides are very dependent upon tips from tourists for a substantial proportion of their income. Consequently, the guides mainly aim to satisfy tourists by providing close encounters with wildlife to maximize the tips.

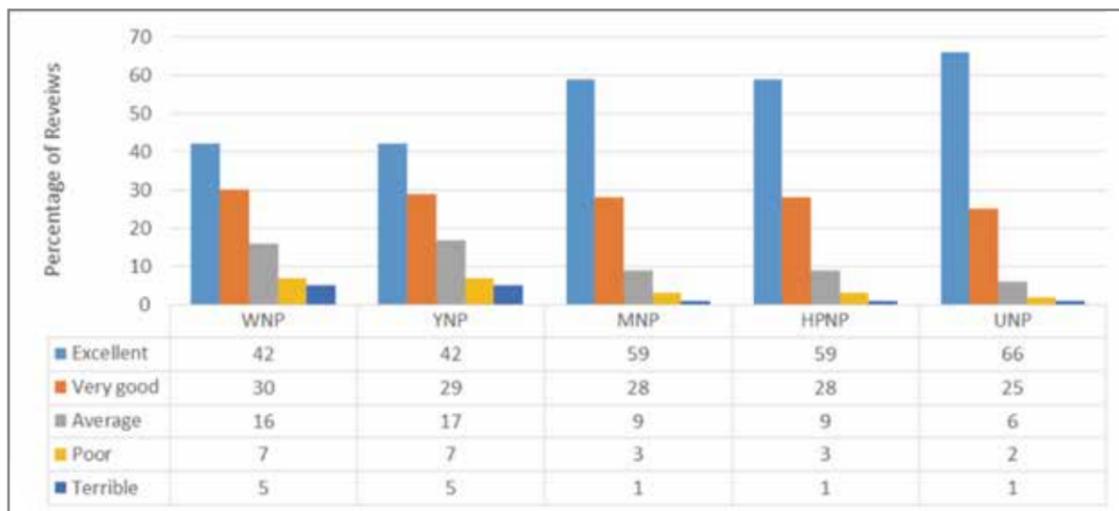


Figure 6. Comparison of visitor satisfaction (percentage) as per Trip Advisor reviews (UNP – Udawalawe National Park; HPNP – Horton Plains National Park; MNP- Minneriya National Park; YNP – Yala National Park)

Jeep Safari drivers

Around 100 safari jeeps operate to bring tourists into the Wilpattu National Park. Out of those, the majority (90) operate from the Huniwilagma entrance, while the remaining enter the park from Eluwankulama. Presently there are two safari jeep driver associations for Hunwilagama entrance: The Wilpattu Jeep drivers association which was formed in 1990s, while the Hunuwilagama jeep drivers association was initiated in 2003 due to practical problems of the jeep drivers living near to Hunwilagama park entrance. Travelling to Wilpattu Junction and back is approximately 15km and therefore it is not economically viable.



Pilgrims to St Anthony's Church at Pallekandal

Under the FFPO traditional activities can be practiced within a National Reserve without any payment, and the annual feast at St. Anthony's shrine in Pallekandal is such an activity practiced inside the park. The shrine itself predates the declaration of Wilpattu as a National Park in 1938 and according to Catholic belief is said to have existed since the time of Indian Catholic Missionary Joseph Vaz. From 1957, this shrine came under the administration of the Church of Thalawila, which later on became the Parish of Wanathavilluwa. DWC also had given them permission to hold Novenas on the first Tuesday of each month. In 2018, 18,549 devotees attend the annual festival, which was held on 8th July. More than 1000 people stayed in temporary tents for around three days to participate in the festival. Presently a festival committee, which include the Parish Priest, DWC, Wanathawillu PS looks after the conduct of the festival.



Recommendations

1. Develop a comprehensive visitor services and ecotourism plan for the park that will specify the following
 - o infrastructure requirements including visitor centers, interpreted, observation platforms, wildlife watching hides, walking trails;
 - o new recreational activities, especially the possibility of opening up Block IV for tourism;
 - o the potential for public-private and public-community operations.

2. Skill/capacity development of volunteer guides.
3. Develop a code of conduct for tourists and Jeep safari drivers (draft version of the same is attached in Annex 1).
4. Provide interpretation materials.
5. The Pallekandal church festival to be continuously monitored by the festival committee and permission should not be given to further expansion of the buildings.
6. Tourism development around the National Park should be investigated and future development in sensitive habitats should be restricted. Any construction within the buffer zone is illegal, therefore, illegal constructions should be removed.

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Visitor Information and Code of Conduct for Tourists at Wilpattu National Park

- You have to obtain a permit to enter the National Park from either of the following ticketing counters: Hunwilagma (Anuradhapura) or Eluwankulama (Puttalam)
- You are only permitted to view wildlife from 6:00 to 18:00 (If you are not using accommodation inside the park, you have to leave the park by 18:00)
- Do not feed animals or take any material from the park (including plant parts, bones, rocks etc.)
- Observe strict silence at wildlife sightings
- Do not get out of your vehicle at wildlife sightings, this includes not leaning out of the vehicle or climbing on to the roof of the vehicle
- You can disembark from your vehicle only at permitted locations - such as Kubukanwila and Kudirimale
- Do not throw rubbish out of your vehicle, take all the rubbish back with you
- Smoking inside the park is strictly prohibited
- Request your driver not to exceed the speed limits (25 km/h) - Slow driving enables you to observe small animals such as birds, reptiles and mammals
- Please ensure that your driver does not obstruct other vehicles or interfere with animal movement
- Remember to bring your own water and food as there are no cafeterias inside the park
- Tipping should be dependent on your drivers behaviour towards Wildlife and courtesy to other visitors/vehicles

The purpose of the code of conduct is to protect the valuable nature in the national park and to provide you with a memorable experience. Violations of the regulations will result in heavy fines and penalties imposed on visitors and the driver as per the Fauna and Flora Protection Ordinance.

Code of Conduct for Safari Jeep Drivers

- Do not exceed the speed limit of 25 km/h
- It is your responsibility to make sure that your passengers observe the rules of the National Park:
 - Taking all the garbage back with you
 - Not allowing them to disembark from the vehicle other than in authorized locations
 - Not making too much noise
- Slow down when approaching stationary vehicles (10 kmph from 50 meters away)
- No overtaking a stationary vehicle to take a position ahead without permission
- Do not turn your vehicle around other than at designated locations
- At wildlife sightings:
 - On two way roads, vehicles have to be parked on the left side of the road in the direction of travel (regardless to which side the animals are)
 - On one way roads vehicles observing animals can be stopped on the side where the animals are, leaving the other side clear for vehicles travelling through
 - Do not park or drive outside the road tracks and always remain on the road

- When stopped for viewing animals and birds, switch engine off – start again for moving up and switch off again when stopped
- If animals appear to be wanting to cross the road, leave a gap for them so that they can cross without being obstructed by vehicles
- When there is a limitation of viewing (viewing area cannot accommodate all the vehicles present), viewing time per vehicle is limited to 3 minutes
- Do not provoke or chase an animal
- The instructions of DWC staff have to be obeyed at all times

Violators will be penalized to the full extent of the law

Annex 6: Wildlife Offences

In conformity with the data presented in the main text, the Southwestern periphery of WNP (Puttalam and Mannar) has seen a considerable increase of clearing and construction inside the restricted development zone. Construction in these areas was started without the conduction of an Environmental Impact Assessment or the approval of the DWC Director General, which normally would be necessary. The responsible parties are either individuals from the peripheral villages (Mannar) or – in the case of Puttalam – big Sri Lankan companies. The latter have built the Governors Camp and HVA farm (hotel and business buildings) even though it is prohibited in this area. Their aim seems to be the attraction of further visitors, concentrating the activities on Tabbowa Sanctuary and Kalaoya Sanctuary. DWC has taken legal actions against the responsible parties and filed a court case.

According to the IUCN Resource Inventory of WNP (2006), poaching mainly takes places during the dry season and is committed by individuals as well as organized gangs in the Southwestern and Western part of WNP.

According to the park warden of WNP, the tendency in poaching is reduced due to newly established offices and increase DWC officers to be occupied in patrolling. Major hunting points include Anuradhapura District, Galgeviyaha, Anthargolawe, Galbanthineeraviya, Moragolle and in Puttalam District, Katakandakulam (Puttalam) and Pomparippu.

Parts of Wilpattu's Influence Zone fall under the Forest Department's responsibility and we have been told by the Forest Department that forest offences – predominantly tree felling and sand mining – do occur in all districts except Anuradhapura. The data show the same deficit as those from DWC not distinguishing between peripheral communities of WNP and the overall district figures. According to a District Forest Officer, the Forest Department lacks an efficient monitoring of the cultivation activities taking place inside the park and in the Restricted Development Zone of the park. Nevertheless, several legal cases have been filed against local communities due to encroachment.

Consultations

Throughout the discussions with the DSDs and CBOs, it became clear that the main reason for the peripheral community to commit wildlife offences is that it constitutes a source of income for their families. It is thus less for the sake of wildlife trade but rather for consumption and sale of venison why people poach. There appears to be a high demand for meat inside and outside of the villages, which makes it hard to challenge the predominant perspective of people. People mostly poach deer, wild boar and sambar deer but also crocodiles (Kadupath Wewa) for consumption.

In the community consultations in WNP's Influence Zone, wildlife offences were – understandably – a rather tricky topic. Participants were usually hesitant to comment on it; very likely due to lack of trust and the uncertainty whether any acknowledgement of wildlife offences would come along with legal consequences. Even if they themselves do not commit crimes, those informing on other cases would put themselves in open conflict with the lawbreakers. Yet, some of them did admit to committing crimes such as herb collection, bee honey collection and one person even admitted to poaching.

The fact that people poach in order to generate additional income shows that they are not aware about the necessity to conserve wildlife. The consultations also showed that most people do not care if they are using the park's resources (specifically forest) and feel like they should have the right to use them. This specifically applies to the Northern and Eastern part of the Influence Zone. In the southern parts, people appear to be slightly more aware of the value of the park's

resources maybe due to their proximity to the park entrance and the tourists who come to the park. This however, is in contrast to the higher number of wildlife offences in the southern districts.

Besides the crimes that the population themselves commit, the local people seem to be negatively affected by other peoples' crimes. For instance, people from other parts of Sri Lanka (according to the population mostly from Colombo) also commit wildlife crimes in WNP and do so for their personal entertainment. Apparently, the peripheral villages and not people from further away end up being suspected by DWC for committing these crimes. A step further goes the narrative that some local politicians use the locals who are familiar with the park and its surroundings to identify/map archaeological treasures. They keep the treasures for their own benefit but the local people end up being the ones to be convicted.

Women and wildlife offences

Over the course of the women consultations in the Influence Zone of WNP, women are generally open as to why nature needs to be conserved. Few women seem to breach the FFPO. Those who commit wildlife offences collect medicinal herbs that they sell to local healers, collect firewood, fruit and honey from WNP and its Influence Zone. Earlier, some of them were using timber and sand from the Influence Zone for their private activities, but apparently, they do not do so anymore due to law enforcement. It appears that they are more afraid of legal consequences and the costs of offences than men are. Women did confirm that peripheral communities are involved in poaching, illegal tree felling and sand mining.

Preventing crimes

Technically, patrols inside WNP should be the ones catching the offenders. One of WNP's rangers reported, that the park staff does go on regular patrols including overnight stays inside the jungle. Yet, this is perceived to be a rather risky endeavour because the equipment and weapons to defend themselves against wild animals and poachers is either not adequate or outdated. The rangers are also afraid of remaining land mines in and around WNP, which is why they are hesitant to go for the patrols. Due to DWC's shortage of staff, patrol patterns are not continuous enough and it is difficult to catch the offenders. For instance, the Park Office in Pomparippu Village (Puttalam District) has not been functioning for a long time. It has been said that poaching has increased following the absence of rangers at this entry point to the park. At present increased number of staffs provided with satisfactory resources at the Eluwankulama office (DWC officers have to travel only 7KM from the Eluwankulama Office Entrance) has improved patrolling in Pomparippu area which helps to reduce wildlife offences in Puttalam District. Further, after the completion of renovation of the Beat office in Pomparippu by GIZ / GOPA, the full coverage of patrolling could be carried out by the officers. In addition, special Flying Squad is appointed (6 person included) at the WNP park warden office by the DWC Headquarters and provided with necessary assistances (vehicle, food allowance, weapons & uniform) to be occupied to reduce wildlife offences.

DWC staff gives its staff a financial incentive to detect wildlife offences by offering reward payments. The total sum of the rewards has been increasing since 2012 and amounted to a total of 12,000,000 LKR in 2016.

Government officials of the peripheral DSDs mentioned that in 2009 the augmentation of fines for wildlife offences increased people's fear to be involved in this legal activity.

Recommendations

1. Interaction between DWC Outreach Programme and peripheral villages. Facilitators have to try to encourage people to discuss wildlife offences more openly, even with the perpetrators themselves. The implementation of an awareness programme through the DWC Outreach unit (following the pilot model implemented throughout this project) may change people's attitudes and thinking pattern towards conservation and the value of wildlife. Besides the change of mind in the offenders' but also innocent peoples' heads, the open discussions may motivate villagers to oppose the lawbreakers among them rather than keeping silent about their crimes. The main problem in this regard is the limited resources of the Outreach Programme. Only when increased is the programme likely to have a bigger impact.
2. **Promotion of alternative livelihoods.** The introduction and support for alternative income-generating activities around WNP supported by the DWC Outreach Programme can be a promising measure to reduce the occurrence of wildlife offences, as some of them seem to be committed for the increase of incomes. Alternative livelihoods are likely to reduce the population's dependence on natural resources and thus the incentive to commit wildlife crimes. If introduced, these approaches should be properly supported (including financially) and monitored. Furthermore, they need to go beyond the traditional livelihoods that foster traditional gender roles. The demands in the respective districts need to be analyzed first and people guided through the alternatives based on the findings.
3. **Data collection.** Systematic data collection specifically for Wilpattu's Influence Zone would increase the clarity about crimes committed and could increase the efficiency of the DWC Outreach Programme as well as the appropriateness of the measures taken. Trainings should concentrate on the areas identified through data collection and the success of the activities be monitored systematically.
4. Improved patrolling system inside the park:
 - Increase number of DWC officers to be occupied.
 - Modern weapons, GPS, Metal detector (this is to use to detect the trap guns), appropriate communication system inside the park should be improved (at present Walkie Talkie system is available but it is not functioning at all).
 - Capacity building on patrolling using modern equipment/GPS.

Annex 7: Human-Elephant Conflict in WNP's Influence Zone

Human-wildlife conflict and specifically human-elephant conflict (HEC) is a widespread problem in Sri Lanka and a very common issue in all WNP's peripheral communities. Clashes between humans and elephants often lead to death and injuries on both sides.

Elephants compose a particularly difficult challenge to local cultivators around WNP due to their size, intelligence and potential danger. They eat large quantities of plants and can easily destroy a crop, causing economic hardship for small rural cultivators. Especially during the dry season (August–November), there is a shortage of food and water within WNP. Consequently, damages and the level of conflict increase during this period. The animals are particularly attracted to the type of land that small cultivators cleared from the forest – covered by grass, bushes or crops. Most of the villagers depend on the cultivation of short-term crops (banana, pumpkin, cassava, maize, papaya and coconut) and paddy, which are elephants' favourite foods. This is particularly a problem in the southern and southeastern areas because the Restricted Development Zone right at the park boundary does not exist anymore/is not respected. In the north, less cultivation takes place and if so, it is further away from the park boundary.

According to GND information, the large majority of the peripheral villages South and East of WNP (Anuradhapura and Puttalam) are protected with electric fencing. Along the northeastern and northwestern boundaries (Cheddikulam DSD, Vavuniya; Musali DSD, Mannar) there are no electric fences at all. In the areas with fences, elephants easily break them due to wrong design and bad maintenance and enter the cultivation. They are intelligent animals, even learning how to access food storages.

Lack of systematic data collection

Up until now, there is no systematic data collection about HEC and its damages in terms of death, injuries, and crop and house damages. Incoherence of information thus has to be kept in mind when reading information about HEC. The Divisional Secretariat Divisions (DSD) of WNP's Influence Zone and DWC collect different information separately and do not coordinate with each other. In addition, data is not stored in a comprehensible way, ready for analysis. Most DSDs get first-hand information about HEC incidents but do not have a dedicated section to deal with the information. Only Cheddikulam DSD (Vavuniya District) systematically collects information about human deaths and crop damages (acres damaged and crop details) that are a result of incidents with elephants.

DWC collects data on the number of deaths and injuries and presents them in the annual Performance Report. However, neither do they differ between villages of WNP's Influence Zone and other villages in the entire district nor is even the differentiation of the districts clear because they are collecting the data for Sri Lankan regions, which are yet bigger areas. To be precise, data was collected for Anuradhapura and the "North-Western Wildlife Region" and it is not clear whether Mannar is included in this category and what other areas it might cover. This further aggravates the replicability of the data.

As for crop damages, data collection is deficient because the estimates of individuals are reported rather than conducting careful investigations of the amount and extent of damage. The latter is most likely due to the fact that it is not part of DWC's mandate to compensate for crop damages and thus the incentive to collect the information about the damages is low. These weaknesses in terms of data availability must be kept in mind when interpreting the numbers about HEC in and around WNP.

Latest HEC figures

According to the available records of the DSDs, most damages occur in the southern, southeastern and northeastern border areas of WNP (Puttalam, Anuradhapura and Vavuniya), affecting approximately 111 villages from 26 out of 35 GND. Data for Madu DSD has been collected at last period of the project implementation.

The highest number of elephant and human deaths were recorded along the southeastern and northeastern borders of WNP, notably in Hunuwilagama (Nochchiyagame DSD) and Thanthirimale (Mahawillachchiya DSD), both in Anuradhapura District (for further details see Annex 7 Table 1). According to DSD information, sixteen people and ten elephants were killed in human-elephant disputes between 2015 and 2017. Frequent causes of death - besides the HEC - seem to be train accidents with 8 elephant deaths in Mannar (Madhu DSD) in the past four years. Yet, these numbers are very different from those mentioned in the DWC Performance Report (2016) where only in 2016 in the district of Anuradhapura 23 elephants died due to human influence (gun shots, electrocution, poison, Haka Patas). This information for only one out of four districts suggests that the actual amount of elephant deaths may be a lot higher than assumed. Yet again, it is not clear whether all these deaths occurred in the Influence Zone and whether they can be categorized as a consequence of HEC. Equally, the number of human deaths due to elephant attacks in Anuradhapura amount to 21 only for 2015 and 2016, suggesting that the number from the DSDs may not be correct.

For the same period, Cheddikulam DSD in Vavuniya District reported that 736 acres of cultivation were destroyed by elephants out of which 187 acres belonged to GNDs (4 peripheral GNDs) in the Influence Zone of WNP. Most damaged crops were paddy and coconut. More detailed information from other districts is, as mentioned above, not being collected.

Compensation

During consultations with the peripheral communities, the population expressed their dissatisfaction with the length of time it takes DWC to handle compensation claims for the death/injuries/house damage. The maximum payment for house damages has recently been increased from 50,000 LKR to 100,000 LKR. Payments for injuries/human death go up to 500,000 LKR. People have to wait up to an additional six months until they receive the compensation.

When it comes to crop damages, no compensation at all is paid, not least because most people cultivate illegally on state land and thus do not have the necessary title deeds in order to be eligible for compensation payments. The communities further complain that the DWC does not provide necessary resources (e.g., firecrackers) for the defence of elephants. Due to the lack of personnel and transport resources, DWC staff is often not able to come to the places of conflict occurrence.

Mitigation measures

1) Fencing. One conclusion that has been drawn by all parties involved is that well-designed and suitably aligned elephant-proof fencing is probably the only effective tool available to mitigate conflict occurrence. As a result of discussions between DWC, the Biodiversity and the Communication Expert of the GIZ/GOPA project, it was decided that the northern areas of WNP's Influence Zone would be prioritized for the implementation of the first HEC measure, namely electric fencing, due to the lack of fences in this part of the Influence Zone. Cheddikulam DSD (Kappachchi village) is the beneficiary because it suffers higher damages due to elephant attacks compared to Madhu DSD. It was a pilot project and was completed successfully with the 100% contribution of the community participation.

Key importance of the fencing:

1. Total length of the fence: 4.2 km
2. It is a lightweight and hanging fence
3. The planning process of the fencing was supported by all the relevant stakeholders, such as, Wildlife & Forest Department, District and Divisional Administrative bodies, Timber Cooperation.
4. The community members were trained to build up the fencing
5. Together with the District Secretary of Vavuniya and village community have the maintenance responsibilities (finance and others), and community has trained enough to rectify technical errors.
6. It will be jointly monitored by the respective Divisional Secretariat together with Wildlife Department

In some villages, people have started to build private fences with the approval of DWC. According to them, the fencing for 1-acre costs them 60,000 LKR.

2) Alternative Livelihood. Following the awareness raising in the community consultations, parts of the population have realized that they should not cultivate crops that are attractive to elephants. To that end, some people - especially in Anuradhapura District - have planted citrus trees, pomegranate and bitter gourd on a small scale. Citrus fruit production needs to be linked to the market throughout the year and some women are already involved in producing citrus fruits as a cash crop. Furthermore, the DWC Outreach Programme has started providing bee keeping training to some peripheral communities. A strong demand for honey does exist which suggests that it could serve as a potential alternative livelihood. The success or impact of this training is unknown because the use of it is not being monitored by DWC. Overall, the peripheral communities are often unwilling to abandon cultivation because of the unknown risks associated with changing livelihood activities.

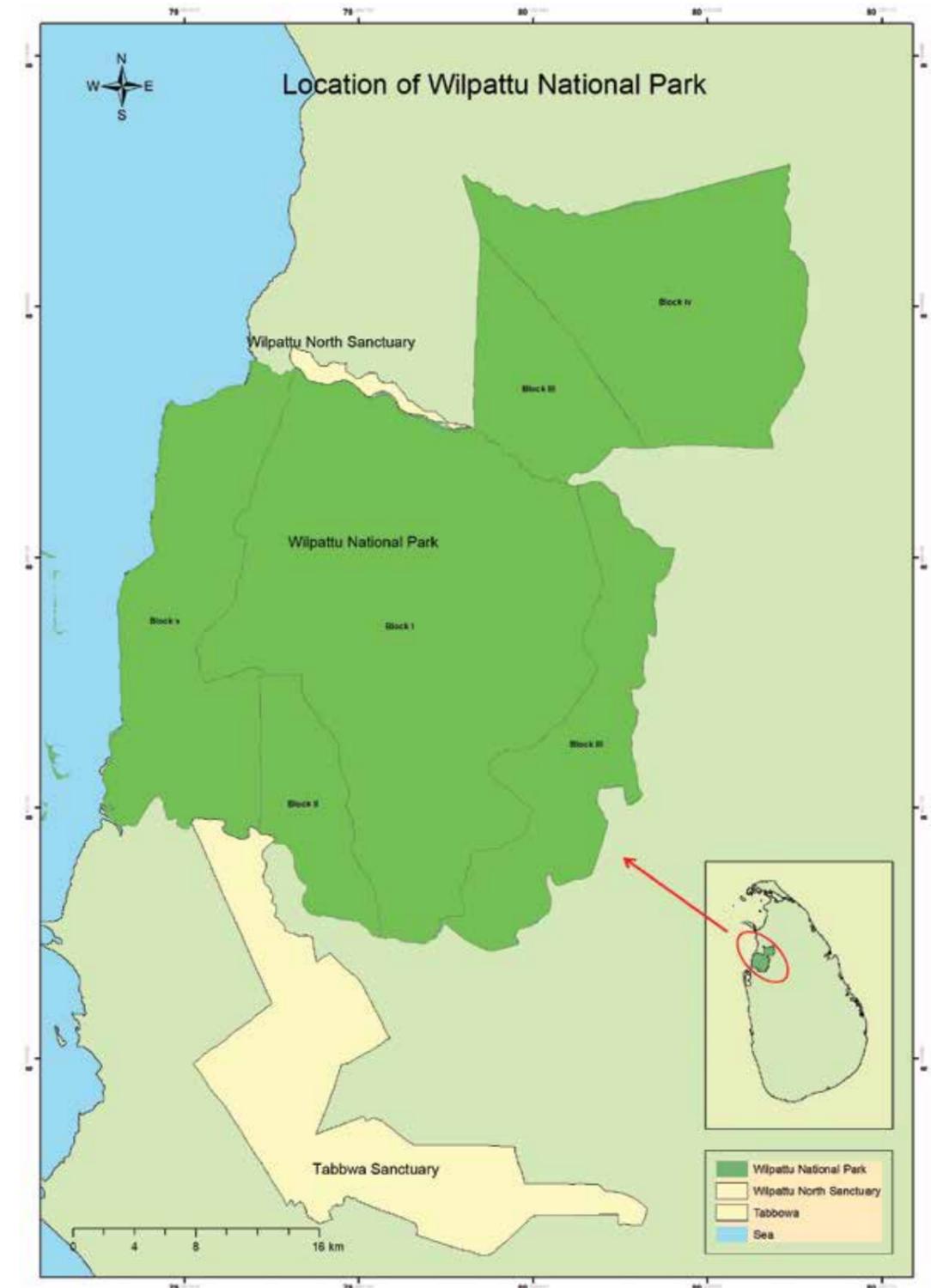
3) Local involvement. In Puttalam District, the Assistant Director of the DWC is adapting a new approach to involve the local communities in handling the HEC. The communities form interest groups with about 1000 members and a President. They are responsible for informing DWC about HEC incidents. At the same time, due to their own human resource constraints, DWC delegates the activities for elephant defence to these groups by handing them firecrackers. So far, the groups do not receive any financial benefit through this cooperation. DWC justifies this approach saying that the involvement of the village groups will have the side benefit of reducing the lack of understanding for the resource constraints of DWC.

Detail	Mannar District		Puttalam District		Anuradhapura District		Vauniya District	
	Madhu DS	Musali DS	Karuwal-agas Wewa DSK	Wanathavilluwa DS	Nochchiyagame DS	Mahawillachchiya DS	Rajakanayake DS	Cheddikulam DS
No. of GND	6	7	3	4	8	11	01	2
No. of villages		11	10	8	22	74	01	4
Level of damage in the villages								
- High	0	3	6	0	1	45	0	2
- Medium	3	4	2	1	21	20	1	1
- Low	3	3	1	3	0	9	0	1
- None		1	1	4	0	0	0	0
No. of human deaths reported	0	3	2	Nn	0	11	0	3
No. of human injuries reported	0	1	-	Nn	0	7	0	0
No. of elephant deaths reported	9 (6 by train accidents)	2	1	1	6	0	0	0
No. of villages protected by electric fencing	0	0	6	3	15	49	0	0

Annex 7 Table 1: Distribution of HEC in the IZ of Wilpattu National Park

Annex 8: Maps

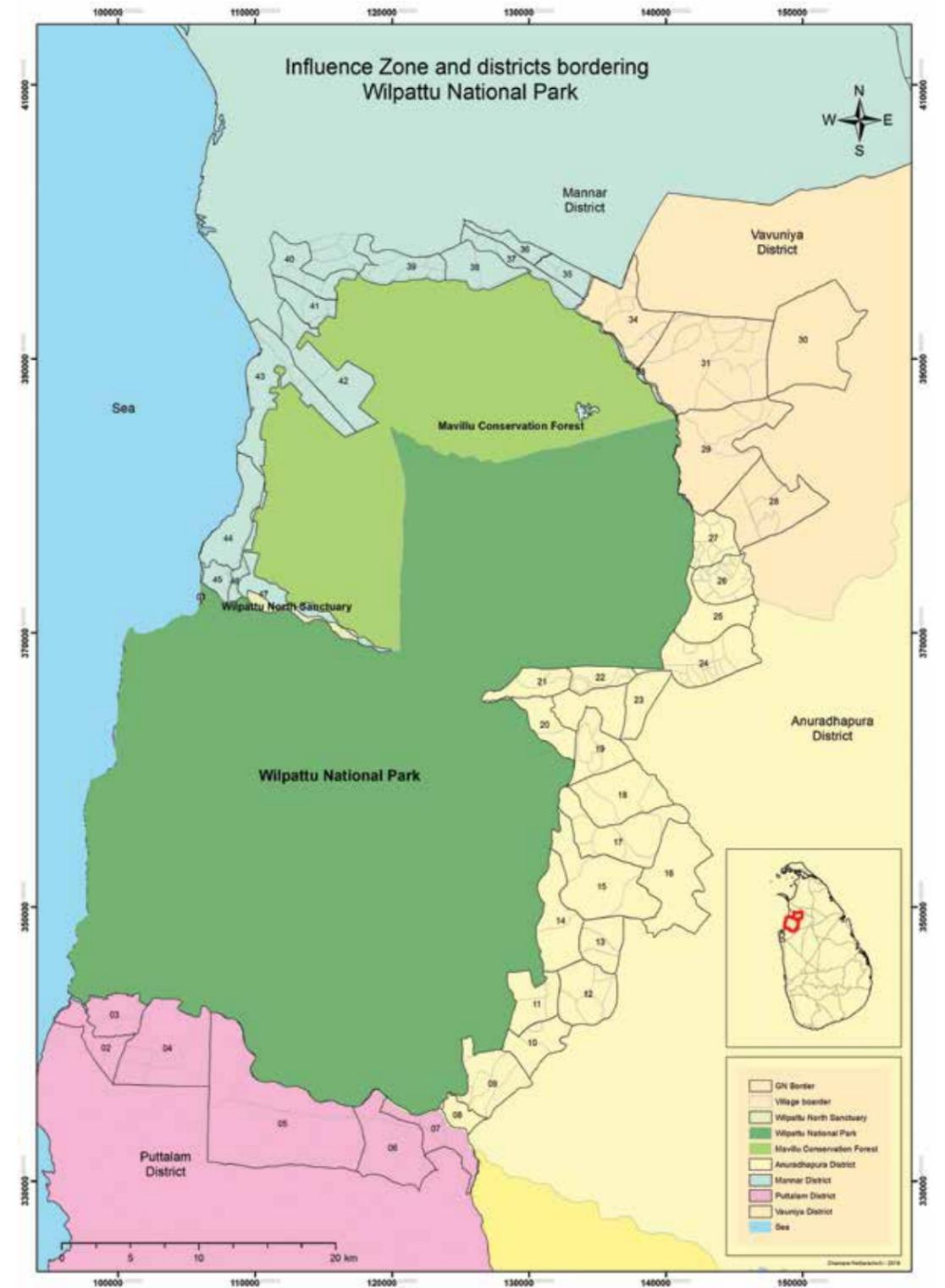
Map 1: Location of Wilpattu National Park



Map 2: Access roads to Wilpattu National Park



Map 3: Influence Zone and Districts bordering Wilpattu National Park

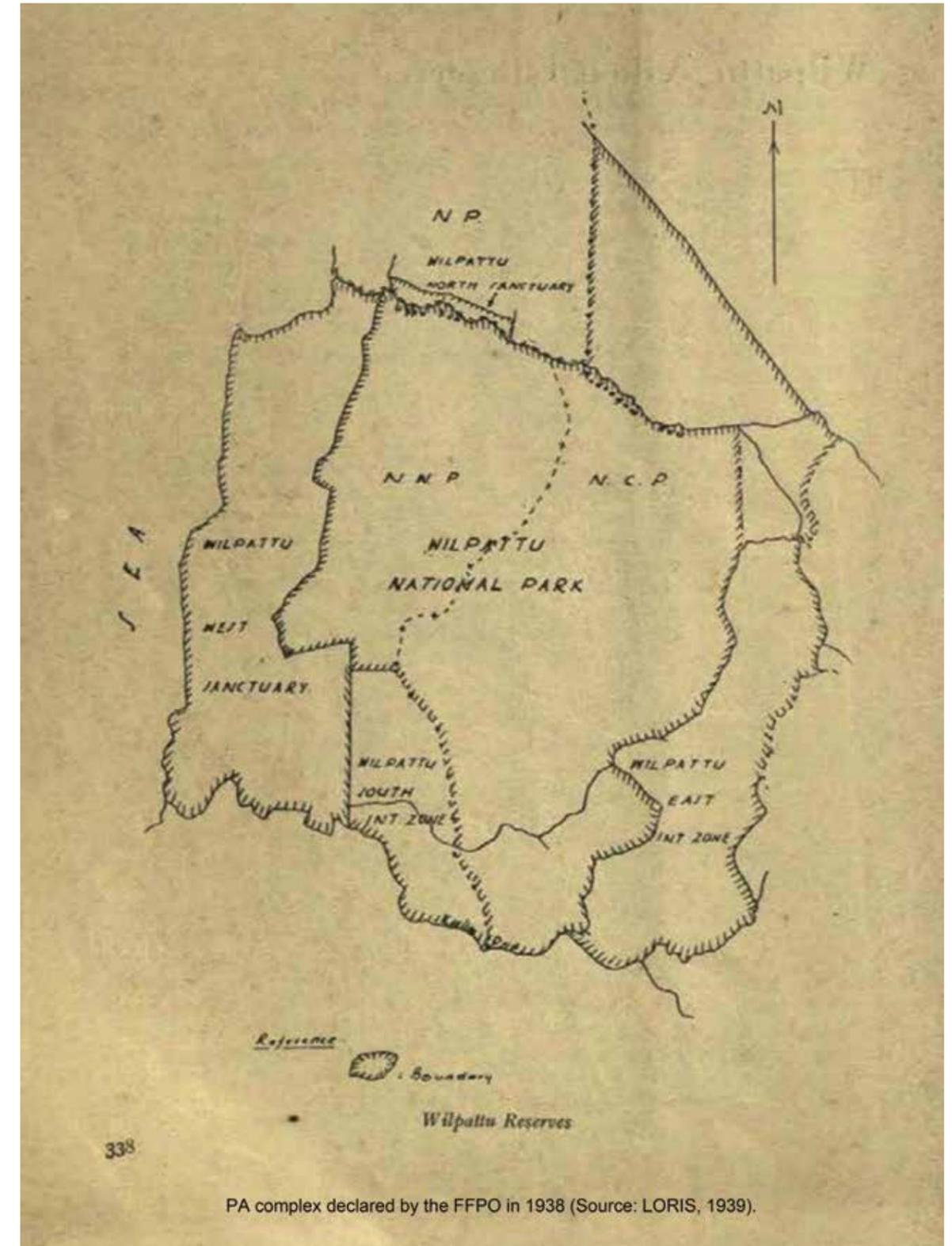


List of Grama Niladhari Divisions in the Influence Zone*

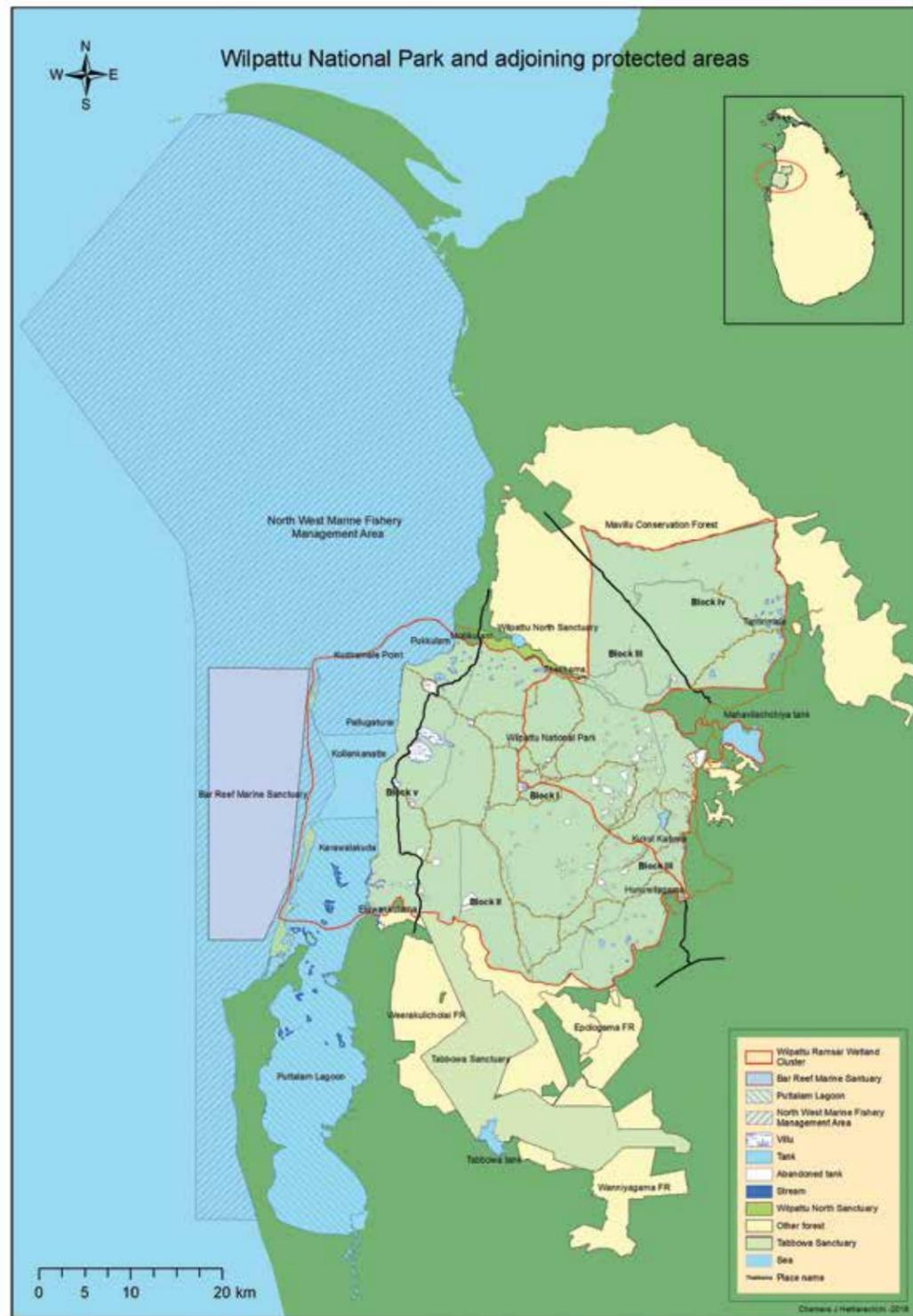
*Each GND contains many villages. Therefore, the villages that are in close proximity to the Park Boundary should be considered for the Influence Zone.

	District	Divisional Secretariat	GND Number	Name of the GND
01	Puttalam	Vanathavilluwa	634	Pookkulama
02			635/1	Aluth Eluwankulama
03			635	Parana Eluwankulama
04		Karuwalagaswewa	635/2	RalMaduwa
05			638	Pahalapuliyankulama
06			638/D	Moonamalgaswewa
07			638/A	Saliyawewa
08	Anuradapura	Rajanganaya	456	Yaya18
09		Nochchiyagama	329	Katupathwewa
10			355	Horuvila
11			327	Hunuvilagama
12			332	Thalgaswewa
13			326	Ehatuwagama
14			320	Kukulkatuwa
15			321	Ittikulama
16		Mahavilachchiya	322	Ranorawa
17			356	Dunumadalawa
18			357	Helabawewa
19			361	Kiralpetiyawa
20			360	Kudavilachchiya
21			365	Mannaram Junction
22			364	Palugaswewa
23			363	Randoowa
24			369	Sadamaleliya
25			368	Nelumwila
26		366	Tantirimale	
27	Vavuniya	Vengalacheddikulam	367	Dematamalgama
28			210	Muthaliyakulam
29			211/D	Christhokulam
30			208/A	Kurukkalputhukkulam
31	Mannar	Madhu	207	Andiyapuliyankulam
32			MN-133	Periyamurippu
33	Vavuniya	Vengalacheddikulam	MN-132	Matha Kiramam
34			207/B	Periyakadu
35	Mannar	Madhu	MN-128	Maluvarayarkaddayadampan
36			MN-130	Poomalarathan
37			MN-131	Thekkam
38			MN-129	Pannaveddukan
39			MN-139	Maruthamadhu
40			MN-142	Sinnapullachchi Potkerni
41	Mannar	Musalai	MN-143	Ahakkimurippu
42			MN-148	Kokkupadayan
43			MN-149	Kondachchi
44			MN-150	Karadikkuli
45			MN-153	Mullikkulam
46			MN-151	Marichchukaddi
47			MN-152	Palaikuli

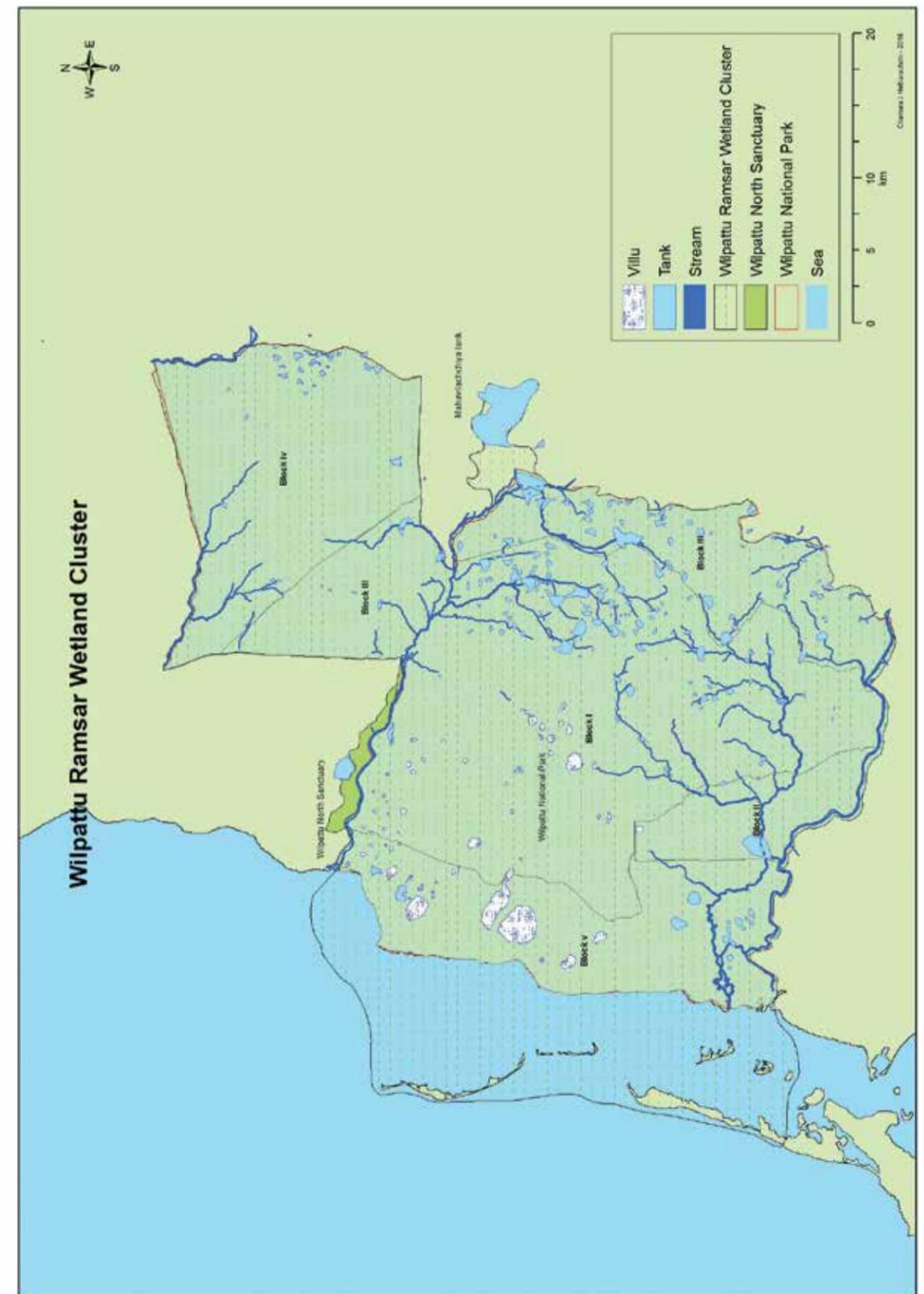
Map 4: Wilpattu Protected Area Complex established under FFPO declared in 1938



Map 5: Wilpattu National Park and adjoining protected areas



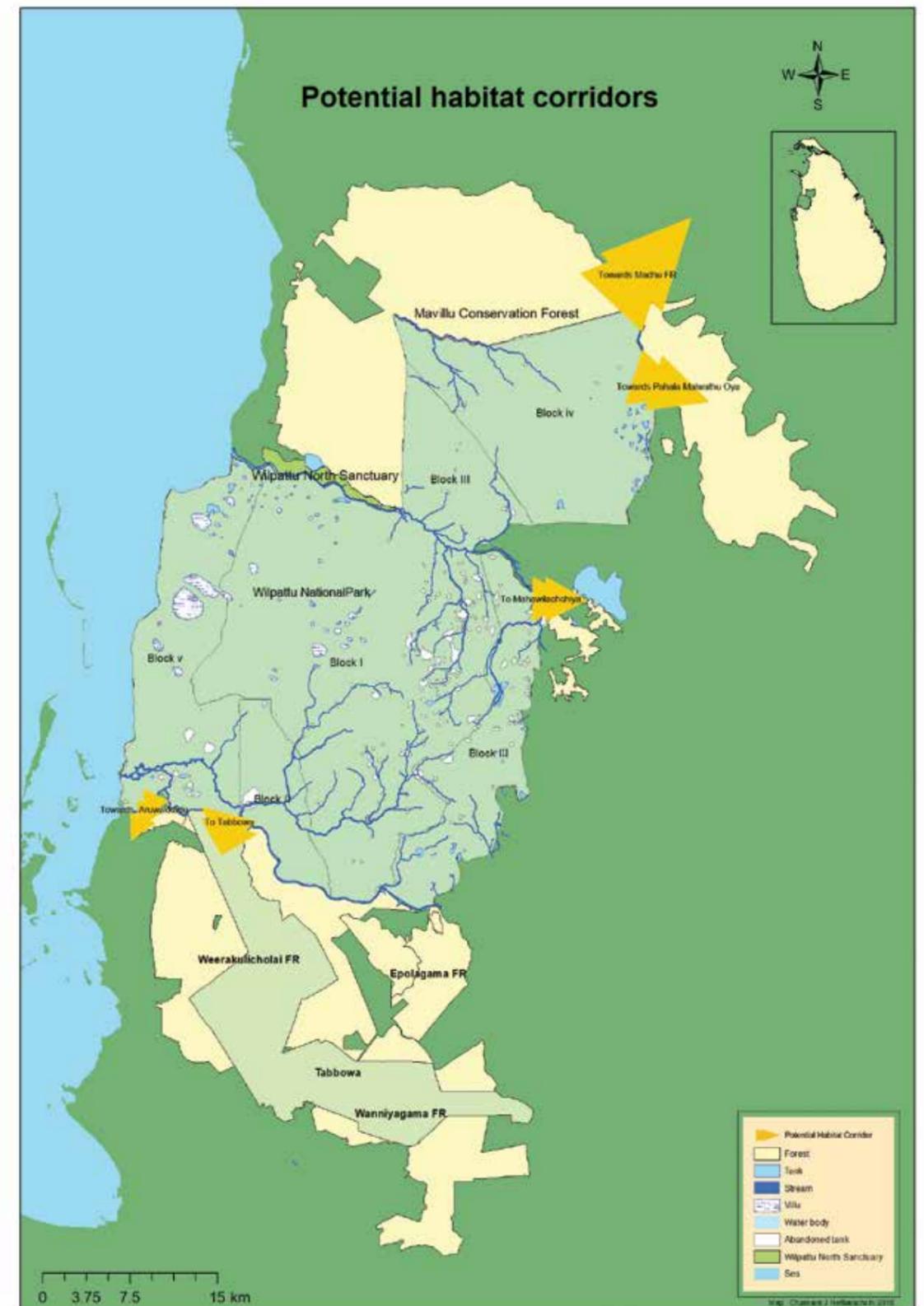
Map 6: Wilpattu Ramsar Wetland Cluster



Map 7: Distribution of villu, tanks, rivers and streams within Wilpattu National Park



Map 8: Potential habitat corridors



Map 9: Park infrastructure



Map 10: Distribution of Range and Beat Stations



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