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FLUCTUATIONS IN WATER QUALITY PARAMETERS AND DIVERSITY OF FISH IN SOME SELECTED COASTAL AND INLAND VILLUS IN WILPATTU NATIONAL PARK

A.S.C. WILSON

Department of Wildlife Conservation, Sri Lanka.

ABSTRACT

Wilpattu National Park is situated in the North-Western part of Sri Lanka, bounded to the Indian ocean of its western boundary in the dry zone of the island. The large number of saucer shaped lakes or villus is the unique feature of this park. Among these villus some villus are fresh water villus and others are brackish water. The villu wetland system was declared as " Wilpattu Ramsar Cluster" because of the international importance of its wetland characters.

While comparing the salinity levels, fresh water villus and brackish water villus are recorded close-by locations. Some saline water villus are about 16 km far away from the Indian Ocean; Eg. Kokkariyavillu. Some fresh water villus are recorded very close to the Indian Ocean. The study shows that about 60 per cent of total villu area is reduced during the dry season. During the study period, in the peak drought in September, almost all the villus had some remaining water. It was also noted that the water level fluctuations of most of villus have a similar pattern.

KEY WORDS: Water quality parameters, Fish Diversity, Villu

INTRODUCTION

Wilpattu National Park is situated in the dry zone of Sri Lanka. The park landscape is composed mainly of sand and grassland associated water holes called villus that are the unique feature of the park, dry deciduous forests with thorny scrub jungle and riparian forests. The villu system supports the water availability throughout the year and it provides the sustainability of the wetland ecosystem in this national park. The diversity of forests, forest related habitats, grasslands and villu associated habitats provide sanctuary for the precious biodiversity in the dry zone of Sri Lanka.

The park has its unique feature of having a large number of saucer – shaped lakes or villus. In Kala- Oya catchment most villus are within the boundaries of Wilpattu National Park (Conservation management plan, Wilpattu national park, CEA,1994). These saucer – shaped villus are therefore, the main water source for wildlife. In addition the vegetation is shaped by the availabilityof water and within the park dry deciduous forests with thorny scrub jungle, riparian forests as well as grasslands are found. The park itself is the home to about 42 villus including 27 main villus (Ekanayeke2007) Considering the density of the wetlands within the park, it could be considered as a wetland dominated ecosystem. Recognizing the importance of Wilpattu national Park as a wetland, the area has now been declared as Wilpattu Ramsar Cluster.

Villus in Wilpattu National Park help to sustain the rich biodiversity of the National Park. However the fluctuations in water availability and associated physiochemical characteristics and floral and faunal diversity of Villus are little known. We therefore conducted a study during rainy and dry seasons and comparisons were made accordingly.

METERIALS AND METHODS

Wilpattu National Park has about forty two villus. In this study we selected several villus. Among these, both large and small villus were selected. The data was collected during the rainy season in April to May and during the dry season in September to October in 2013. Among the selected villus some are close to the coastal belt and the rest are further away from the coast.

In all selected villus, GPS (Global Possion System) readings were taken along the water margin by walking around the periphery and accordingly, the water logged area of each villu was measured. This was re-performed during the peak dry season and the water logged area was recalculated.

The temperature of the water is measured using the thermometer during the day time. Salinity of the water is recorded and the depths of the margin turbidity are recorded. The turbidity is measured using the Secchi disk. The dissolved Ammonia, Nitrate and Phosphate in each villu had been measured.

The craft nets and hand nets had been used to fish sampling. 1.0m x 1.0m quartet was used to count flora. The plants were recorded at water-land margins away from water and in the water close to the land.

The studied villus is in dark blue colour in the map below:

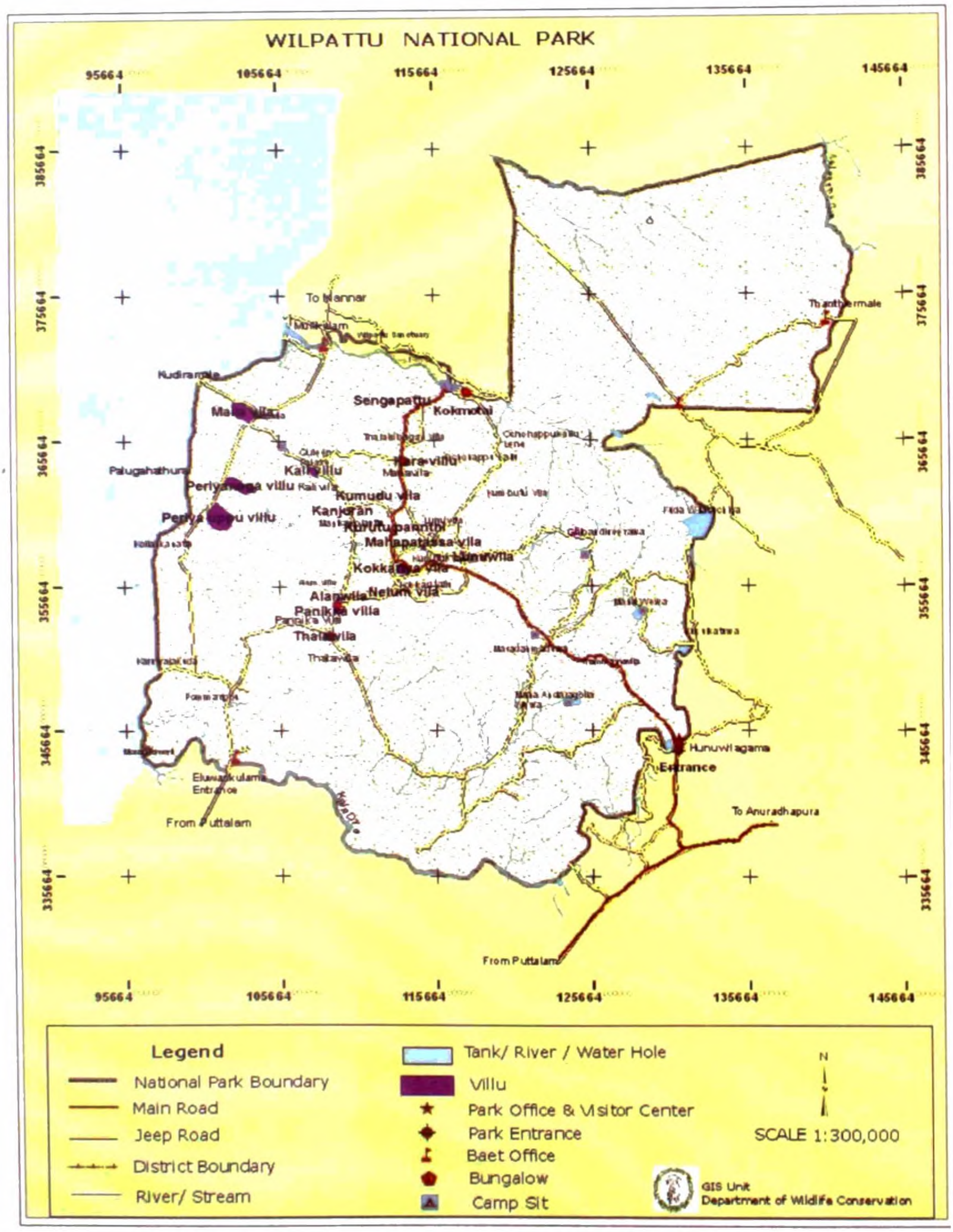

Figure 1. Map of Wilpattu National Park

RESULTS AND DISCUSSION

Table 1. The average area of the villus

Serial No.	Name of the villu	During the rainy season (ha)	During the dry season (ha)
1	Panikka villa	10.19	4.02
2	Nelum villa	8.26	3.91
3	Periyauppu villa	31.63	12.53
5	Sinnauppu villa	5.09	2.30
6	Kumbukwila	17.82	6.74
7	Kumutuwila	1.46	0.52
8	Marawila	4.21	0.01
9	Walaswila	0.14	0.00

Figure 2. Marawila in Rainy Season

Figure 3. Mahapatassa vila in Dry period

Figure 4. Kanjunan vila in Dry Season

During the peak dry period there was no water in this villu.

Figure 5. Lunuwila in peak drought season

Table 2. Some water quality data of villus

No	Villa	pH value	Temperatur	Ht, MASL	Wind velocity	Humidity
1	Kumbukvila	5	29.3C	51	2.6	81.3
2	Kokkariyavila	10	29.3C	51m	11.8kmh-1	81.3
3	Mahapatassavila	8	29.3C	52		81.3
4	Kumbukvila	9	29.3C	50		81.3
5	Periyauppuvillu	10		30		81.3
6	Periyanagavillu	10		30		81.3
7	Borupanvila	7		50		81.3
9	Timbirivila	8		51		81.4
10	Kurutupannthi	9		40		81.4
11	Kanjuran	8		40		81.4
12	Kumuduvila			50		81.4
13	Kali villu		29.3C	51		81.4
14	Dematavila		29.3C	50		81.4
15	Panikavila		29.3C	51		81.4
16	Kudapatassa		29.3C	50		81.4
17	Mailavila			51		81.4
18	Thalawila	8.3'		50	9.2	81.4
19	Panikka villa	9.2		50	14.2	81.4
20	Alanwila	8.5		50	9.5	81.4
21	Nelumvila	8		50	11.0	81.4
22	Nemadavila		29.3C	50		81.3
23	Sengapattu		29.3C			81.3
24	Kara villu		29.3C			81.3
25	Lunuwila		29.3C	51		81.3

Table 3. Salinity data in selected villus

Number	Name of the Villu	Salinity
1	Kokkariyavila	4.0
2	Kumbukvila	5.0
3	Mahapatassavila	5
4	Kumbukvila	1.0
5	Periyauppuvillu	2
6	Periyanagavillu	2
7	Lunuwila	1
8	Dematavila	1
9	Borupanvila	0
10	Mahapatassa	0
11	Timbirivila	0
12	Kurutupannthi	0
13	Kanjuran	0
14	Kumuduvila	0

15	Kali villu	0
16	Panikevila	0
17	Kudapatassa	0
18	Manikkapolaottu	0
19	Mailavila	0
20	Thalawila	0
21	Panikka villa	0
22	Alanwila	0
23	Nelumvila	0
24	Nemadavila	0
25	Sengapattu	0
26	Kara villu	0

CONCLUSIONS

It shows that about 60 per cent of the total villu area is reduced during the dry season. When water level decreases during the dry period the land is replaced by the grasses. It was also noted that the water level fluctuation of the villus are very similar.

When comparing the salinity of villu water, fresh water villus as well as saline water villus were recorded in close-by locations in the park. Some saline water villus are recorded about 16 km away from the ocean, *e.g.* Kokkariyavillu. In saline water villus also, water is available throughout the year. Some fresh water villus are found much closer to the ocean, *e.g.* Mailavila

Wild rice cultivar is recorded at most villus in Wilpattu National Park. So, the villu ecosystem is a gene bank of wild rice.

In total 149 species of birds were recorded from Wilpattu National Park, out of which three species are endemic. Most birds were found in villu ecosystems. 17 amphibian species including 3 endemic species, 57 reptiles including 11 endemic species and 86 butterfly species including one endemic species were recorded from Wilpattu national park.

Among the 29 fish species recorded in villus in Wilpattu National Park, five species are endemic. Two exotic fish species are recorded.

Comparing the water loss between the dry season and rainy season, about 60 per cent of the full water level is reduced.

The mean temperature of the villus in day time is about 29^0C. Ph value of villu water is in the range of 5-10 in the studied villus. The salinity of the villu water is in the range of 4 to 0. During the study period the average humidity at the villus is 81.35. The mean sea level of the studied villus is in the range of 30m to 51m.

There are some development projects very close to the park, but outside the National park, such as housing, agriculture and infrastructure facilities. The changes in the buffer zone habitat are adverse impacts to the national park. A recently built public mud road runs through the park in

its western boundary. It creates direct and indirect adverse impacts to the park: erosion in the park, siltation of the villus *etc.* As the animals concentrate inside the park due to the disturbances at the edges and the buffer zone of the park, the ecosystems including the villu system change.

The water quality of the Kala Oya will change due to the adjacent human activities and it will have an impact on the catchments of the villus and its connectivity.

There are lots of opportunities for research to be conducted in Villus in Wilpattu National Park. This study will be a base for further research.

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Appendix 1

Fish species recorded from Villus in Wilpattu National Park

Family	Species	Common Name	Ecological Status
Anguillidae	*Anguilla nebulosa*	Long finned eel	
	A. bicolor	Level finned ell	
	Rasboroidesatukorali	Horadandiya	Near threatened
	Labukalankensis	Lanka labuca	Endemic
	Devariomalabaricus	GaintDanio	
	Puntiusbimaculatus	Redside barb	
	Puntiuschola	Scarlet banded barb	
	P. dosalis	Long snouted barb	
	P. Sinhala	Filamented barb	Endemic
	P. sarana	Olive barb	
	P. vittatus	Silver barb	
	P. melanomculatus	Tic-tac-toe barb	Endemic
	Rasboracarverii	Caverii barb	
	Amblypharingodonmelatinus	Green carpet	
Belontidae	*Pseudopremonuscupanus*	Spiketailedparadisefish	
	Tricogasterpectoralis	Snake skin Gurami	Exotic
Bagridae	*Mystusseengtee*	GangaticMystus	
Cobitidae	*Lepidocephalicthesthermalis*	Commomspiny loach	
Channidae	*Channaara*	Gaint snakehead	Endemic
	Channapunctata	Spotted snakehead	
	Channastriata	Murrel	
Cichlidae	*Oreochromismossambicus*	Tilapia	Exotic
Claridae	*Clariasbrachysoma*	Walking catfish	Endemic
Gobiidae	*Glossogobiusgiuris*	Bar eyed goby	
	Awaousmelanocephalus	Scribbled goby	
Heteropneustidae	*Heteropneustesfossilis*	Stinging catfish	
Mastecembelidae	*Mastecembelsarmatus*	Marbled spiny eel	
Siluridae	*Ompockbimaculatus*	Butter catfish	
	Wallagoattu	Shark catfish	Vulnerable