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HABITAT USE BY LARGE MAMMALIAN HERBIVORES IN UDAWALAWE NATIONAL PARK, SRI LANKA.

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INTRODUCTION

A habitat is the sum of the environmental conditions in which an organism, population, or community lives (Rajesh Gopal, 1992). The major components of a habitat are food, water, cover and suitable space for a particular animal species. A place where all these components are present in required manner for a species is called a good habitat. The spatial and temporal distribution of these components in an area determines the quality of a habitat.

Elephant, Sambar, spotted deer and buffalo as primary consumers play an important role in the maintenance of habitats due to their direct impact on vegetation. They serve as ecological links between the producer level and all other tropic levels of the food web . Managing healthy animal populations in protected areas is a highly challenging task today due to various natural and anthropogenic factors prevailing in and around the areas. The degradation of habitats due to natural succession, invasive species, drought or/and changes in water availability and occurrence of forest fire or direct removal of vegetation (herb ivory) affects populations and communities inhabiting in the wild. In addition, availability and the quality of the habitat components mainly depend on the environmental condition. This study was focused to understand the populations of large mammalian herbivores and their distribution under different environmental conditions and, habitat use by them in Udawalawe National Park as information on these habitats are scarce in Sri Lanka (Padmalal 1993).

METHODOLOGY

Study Area:

The Udawalawe National Park is located approximately between the latitudes of 6° 25' and 6° 35' and longitudes of 80° 45' and 81° 00' (Survey Department, 2007) covering an extent of 33000ha (DWC 1998). The extent of dry land of the national park including small tanks is approximately 29,410 ha. The main objectives of the park are to provide suitable habitats for wild animals displaced by the development activities of the surrounding areas and to protect the immediate catchment of the Udawalawe reservoir. The major habitat types of Udawalawe National Park are scrub and grassland. The percentages of them are around 41.2% and 31.6% respectively. The remaining area is composed of secondary and primary forests (16.2%). The area covered with tanks and mashes is approximately 11% (DWC, 1998).

Population estimate of large herbivores (King census technique):

The sampling period was from October 1999 to September 2004. The populations of the herbivores were estimated by direct count using transects method (Davis 1982).Pre determined routes covering different habitats of the park were selected. From the collected data, the animal populations were calculated using the equation given Davis, 1982.

Habitats use by large herbivores:

Dung and pellet count method and animals encounters in different habitats were used to calculate densities and habitat use by different herbivores (Eisenberg *et al*, 1970) .Dung piles of elephants,

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buffaloes and other targeted herbivores were counted in different habitats while walking along pre-defined transect routs in different habitats.

RESULTS AND DISCUSSION

Population and habitat use by elephant:

The elephant population was high during wet environmental condition in every year under study. The lowest elephant population under the wet environmental condition was recorded in the year 2001/2002 whereas the highest population was recorded in the year 2003/2004. The values were 296±101 and 361±81 respectively. It was indicated that during wet condition the total elephant population in Udawalawe National Park was fluctuating within this range. In the years 2002/2003 and 2003/2004 the elephant populations at wet condition were almost the same. The populations were 360±105 and 361±81 respectively. Under the dry environmental condition the elephant population that could be accommodated by Udawalawe National Park was less than the population recorded under the wet environmental condition. It was indicated that the population under the dry condition in the years of 2002/2003 and 2003/2004 were almost the same. The numbers were 212±55 and 206±81 respectively. These values indicate that the maximum elephant number that could be accommodated within the Udawalawe National Park during the dry condition was 264±61. Under the extreme dry condition the elephant population was further reduced. The lowest number of animals during extreme dry condition was recorded in the year 2001/2002. Thus the number was 105±70. The highest value was 161±71 recorded in the year 1999/2000. This was the population that Udawalawe National Park could accommodate under the extreme dry condition.The population difference in wet and dry conditions is not significant ($P > 0.05$), but the elephant population recorded under the extreme dry condition at Udawalawe National Park was considerably reduced ($P < 0.05$). Density of elephant dung revealed that the Elephants used grasslands as their preferred habitat during wet environmental condition. During dry condition utilization of grasslands by elephant was comparatively low. However, elephants rarely use grassland habitats during extreme dry condition as they do during wet condition. This might be due to the non availability of high quality food, mainly the dry texture and low concentrations of nitrogen (Padmalal, 1993). The dung density in scrubland habitat was less than the densities estimated in grasslands in the park but not significant ($P < 0.05$) showing that elephants use the scrublands in the same manner under different environmental conditions.

Population and habitat use by Spotted Deer:

The highest number of spotted deer was recorded during the wet environmental condition in the year 1999/2000. The value was 563±161. The lowest number recorded under wet environmental condition was in the year 2003/2004. The value was 414±184. It was evident that the population of spotted deer at Udawalawe National Park was fluctuating within this range. During the dry environmental condition the spotted deer population was less than the population recorded under the wet environmental condition. However, the differences were not significant ($P < 0.05$). Under the extreme dry condition spotted deer population had been further reduced, but the differences were not significant. The lowest spotted deer population recorded under the extreme dry condition was 311±195. This was the population that Udawalawe National park could accommodate under the extreme dry condition.

During wet and dry environmental conditions spotted deer use grasslands as their preferred habitat. The lowest densities of pellets were recorded in grasslands during extreme dry condition. Only a very few animals utilize the forestlands when compared with spotted deer population in other habitats under all environmental conditions.

Population and habitat use by Buffaloes:

The results revealed that the number is relatively very high during all the environmental conditions under the study. Among them highest number was recorded under the dry

environmental condition in every year except the years of 2003/2004. The highest population during the dry condition was 7363±2334 recorded in the year 1999/2000 and the lowest population was 6865±2406 recorded in 2003/2004. During the wet condition the highest and the lowest buffalo populations were recorded in the years 2001/2002 and 2000/2001. The numbers were 7450±1890 and 5066±1334 respectively. During the extreme dry condition the numbers were lower than the other environmental conditions.

The results revealed that under all the environmental conditions buffaloes prefer grassland habitats. During dry and extreme dry conditions buffaloes use scrublands as their preferred habitat. But under wet condition buffaloes do not prefer scrubland habitat. The population of buffalos in forestland is very low when compared with the population present in other habitat types.

Habitat use by Sambar:

The population of Sambar is quite low in Udawalawe National Park. Therefore the method used to estimate other herbivores population in the park is not suitable to estimate Sambar population. But the seasonal distribution and habitat use of Sambar was assessed by using pellet count technique. Sambars use grasslands habitat during dry environmental condition and they do not prefer grassland during extreme dry conditions. They utilize scrubland and forestland habitats during all three environmental conditions in the same manner. During extreme dry conditions Sambar use forest habitats as their preferred habitat.

A herbivore species prefers a particular habitat to satisfy their requirements for their survival. The results in this study revealed that the elephants prefer grassland and scrubland as their main habitats in Udawalawe National Park. The grassland is the preferred habitat for spotted deer and buffalos. Sambar prefers the forestland and scrubland habitats. The scrubland is the main habitat type at Udawalawe National Park (41.1%) while the extents of grassland and forestland habitats are (31%) and (16.2%) of total land area respectively.

The herbivore populations and their distribution were directly related to the availability of fodder plants in a particular habitat. The environmental conditions and the availability of ground water are the crucial factors in determining the presence of fodder plants in the protected area. Therefore it was evident that the population sizes and the distribution of large herbivores directly depend on the environmental conditions and the food requirements of the animals.

The sizes of herbivore populations within a protected area were different under the different environmental conditions. When the conditions were not favorable especially during extreme dry conditions elephants tend to move for long distances to fulfill their habitat requirements. Therefore during extreme dry conditions elephant populations in the park was low. However it is a fact that some elephants migrate for long distances to fulfill their requirements during dry weather. During wet environmental conditions elephant populations were high within the protected areas. They used grasslands as their preferred habitat during wet environmental conditions. Elephants spend most of their time within the grasslands while consuming fresh grasses if the grasses were available.

The maximum number of elephants recorded in Udawalawe National Park under wet condition was 361±81 in 2003/2004. When the environmental condition changes from wet to dry and extreme dry condition, elephants gradually move from grassland to scrubland and forestland habitats. The minimum numbers of elephants recorded at Udawalawe National Park during extreme dry condition was 104±48. A similar distribution pattern has been observed in several National Parks in India Sukumar (1990). Apart from that a studies conducted by Sukumar (1989) , Clements and Maloiy (1982) show that the elephants roam mainly in search of food and water as they need a quite high amount of food and water to maintain their body condition and to fulfill

their energy requirements. Some animals roam about 15 – 20 Km. per day also to fulfill their sexual and social requirements (Sukumar 1990).

Availability of dung and pellets of herbivores is a reliable factor of the habitat use by a particular animal. Therefore the presence of elephant dung in different habitats indicates that the presence of elephants in the habitat. Observations indicate that the elephants used grassland as their preferred habitat during wet environmental conditions at Udawalawe National Park. However the elephants used scrublands next to the grassland habitats and they did not prefer forestland habitat under the wet environmental conditions. During dry conditions the elephant distribution and habitat use were almost the same as during wet conditions. But under extreme dry conditions elephants used scrubland as their preferred habitat.

The maximum spotted deer populations recorded were 563±161 at Udawalawe National Park in the year 1999/2000 under wet environmental conditions. The minimum number recorded during extreme dry conditions was 311±194. Even under extreme dry conditions the Udawalawe National Park could accommodate this number. Population of spotted deer in different seasons suggest that the park has the capacity to accommodate spotted deer during different environmental conditions and spotted deer population was quite stable while the numbers were fluctuating within the limited intervals during different environmental conditions.

Spotted deer was highly concentrated to the grasslands at Udawalawe National Park under wet and dry environmental conditions. During extreme dry condition the spotted deer prefers scrubland habitat than the grasslands and forestlands. These findings are in line with the findings of Augustine et.al (1998) on the study of ungulate grazing.

The results of the population sizes of the buffalo indicate that the ecological densities of buffalo were very high at Udawalawe National Park. The highest populations of buffalo were recorded in the park during wet environmental conditions. The population was 7450±1890. Lowest population of buffalo recorded in the park was 5306±2006. The results of habitat use by buffalos have shown that they preferred grasslands during all the three environmental conditions. They move to scrublands occasionally and none could be observed in forestland habitat.

A higher proportion of buffalo population observed in the park could be considered as domestic or feral. They move in and out of the protected areas regularly. The occurrence of sambar was very low in the park. Under the dry environmental condition sambar used grassland habitat at Udawalawe National Pak with high preference.

CONCLUSIONS AND RECOMMENDATIONS

The distribution of herbivores in different habitats in Udawalawe National Park is varied under different environmental conditions. The elephants utilized grasslands during wet environmental conditions. They tend to dispersed into forest areas during dry conditions. Elephants and sambars showed high flexibility in food habits thus they can survive in different habitats. Spotted deer and buffalo were mainly grazers and habitat selections were highly restricted. The generalist herbivores like elephants tend to leave the park in search of food and this would lead to create conflicts with adjoining communities. The herbivore distribution is strongly related to the availability of food plants in different habitats. The environmental conditions directly affected the abundance of fodder. Environmental conditions decide the distribution of herbivores and their habitat use. The manipulation of habitats to increase fodder availability in the Udawalawe National Park throughout the year is needed for the maintenance of healthy herbivore populations. However alteration of a habitat for a particular animal to survive would affect the survival of other animals. Therefore habitat management interventions should be applied with appropriate strategies for the fulfillment of the requirements of the all wildlife communities under consideration.

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