Chapter 7: Summary
SUMMARY

The present work is a detailed study of habitat ecology, population status and distribution pattern of *Kachuga sylhetensis* (Endangered species, IUCN) in Darrang, Udalguri and Sonitpur district of Assam, India. *Kachuga sylhetensis* (Assam roofed turtle) is a small turtle differing from other *Kachuga* by typically having 13 (thirteen) pairs of marginal scutes attaining a carapace length of 20cm and is endemic to the North-eastern India and Eastern Bangladesh.

The unique physiographical features of Assam including mountains and hills with effect of the aerial distribution of rainfall, happens to be a land of innumerable rivers and tributaries. Assam’s physiography, climatic conditions and wide variety of freshwater resources ranging from hill stream to beels support a species rich turtle fauna.

Turtle & Tortoise species have played major role in ecological communities for over 200 million years. Researchers all over the world noted significant declining of Kachuga species, since 20th century. The study of ecology of a species helps in understanding variations that occur with a species in different ecological conditions. Study of population status, distribution pattern in an area can be used to formulate conservation strategies and taxonomic relationship among the species.

In the recent past some notable contributions have been made towards the understanding of Taxonomy, Ecology and Biosystematics of the turtle species in India. Though this is done yet there is a dearth of research work on fresh water turtles like *K. sylhetensis* of Assam.

Earlier, *K. sylhetensis* was in Kukurmara and Chandubi beels of Kamrup district; Kalathua village of Sibsagar district; Rupali Bhumuk of Manas National park; Barpeta district, Kundil river of Sodia; Banko beel of Dibru-Saikhowa Wild Life Sanctuary; Lohit river near Saikhowaghat, Tinsukia district; Ghilamara of Lakhimpur district and Nameri National Park, Sonitpur district of Assam. Cachar district of
Assam, Garo, Khashi and Naga hills in India are some of the known localities of occurrence of *K. sylhetensis*.

*K. sylhetensis* is fully aquatic found in the habitat of reed beds of grasses on mud, with aquatic vegetation including Nymphaea, Lemna, Pistia, Salvania and Utricularia. In captivity *K. sylhetensis* is omnivorous, nocturnal and accepts food like Pistia, roots of Eichhornia, stem of Utricularia, leaves of Salvania, Ipomoea, earthworms, mollusca, aquatic insects, freshwater fishes (minnows) and prawns.

The district of Darrang, Udalguri and Sonitpur are a part of the Brahmaputra valley. Survey methods included number of methods including active searching in probable habitats of different tributaries, in the river Brahmaputra, beels, National Parks and Game Forests. The study sites were Jia Bharali river of Nameri National park (26°55′20. 22″N to 92°50′27. 12″E), Biswanath ghat (26°46′30. 74″N to 93°32′04. 86″E), Gomirighat (26°44′47. 93″N to 93°38′45. 45″E), Kuruwa ghat (26°13′32. 79″N to 91°46′39. 74″E) and Kulshi river (26°45′30. 74″N to 92°02′51. 38″E) are confirmed as new locality of occurrence of *K. sylhetensis*.

Water samples were collected from the study sites, and the parameters like pH, transparency, FCO$_2$, DO, rainfall, water and air temperature, Chloride, Nitrate, Phosphate, Ar and Hardness were assessed.

Food items of plant source as well as planktons were collected and identified. A total of 136 numbers (male 81 and female 55) of *K. sylhetensis* belonging to the family Emydidae have been collected from study sites and released after investigation. 8 (eight) dead specimen of *K. sylhetensis* were collected from Biswanath ghat and Gomirighat.

The highest air temperature was recorded in Kuruwa ghat and the lowest was recorded in Jia Bharali river during the year 2001 & 2003 respectively. The highest water temperature was recorded in Kulshi river 28.1°C in the post-monsoon in 2004
and the lowest was recorded 15.8°C in the winter (2004) of Kuruwa ghat. The mean water pH was recorded at 6.7 in the pre-monsoon period of 2001; 6.8 in monsoon and post-monsoon while the pH 7.0 was calculated in the winter season.

The maximum rainfall was recorded 320.32 mm in the month of June in Gomirighat followed by 319.94 mm (Biswanath ghat), while the minimum rainfall was recorded in the month of December i.e. 2.22 mm and 2.51 mm in Gomirighat and Jia Bharali river respectively. The maximum humidity was recorded at 88.50% in the month of July in Jia Bharali river, while the minimum humidity was recorded in the month of May at 59.50% of Jia Bharali river.

Transparency in the river water of Jia Bharali ranged was 45 – 64cm. In Biswanath ghat it was recorded 49.5 – 63.5cm, Gomirighat 50.5 – 56.5cm and in Kuruwa it was 50.0 – 65.5cm. In Kulshi river it was 53.5 – 72.5cm.

In different seasons Chloride ranges from 14.5 – 17.8mg/L in the water of Jia Bharali river, 8.8 – 17.6mg/L, in the water at Gomirighat, 9.8mg/L – 18.7mg/L. in the water at Biswanath ghat, 8.3 – 18.5 mg/L in the water at Kuruwa, 10.6 mg/L– 17.8 mg/L. in the water of Kulshi river at Hatigarh.

The lowest amount of Chloride was 8.3mg/L and observed in winter (Nov - January) in the year 2002 and the highest was 18.7mg/L in pre-monsoon (Feb to April) of 2002.

The highest amount of Nitrate was 0.31mg/L in winter season of 2002 in Biswanath ghat and in monsoon 2001 and 2002, the lowest was in pre-monsoon and post-monsoon of the 2001 in Jia Bharali river. The highest amount of phosphate was 0.28 mg/L at Biswanath ghat in Monsoon Season in the year 2003 and the lowest was 0.1 mg/L in Jia Bharali river pre monsoon, monsoon and post-monsoon season of 2002, 2003, 2001, 2003 respectively.
The highest amount of \( \text{At} \) (CaCO\(_3\)) was 40.5 mg/L at Biswanath ghat in the year 2003 and it was observed in winter. The lowest amount was 23.5 mg/L at Biswanath ghat in 2001 and in monsoon season.

The highest amount of Hardness was 40.5 mg/L at Gomirighat in winter in 2002 and the lowest was 20.3 mg/L at Biswanath ghat in monsoon in year 2004.

The highest amount of DO was recorded 14.8 mg/L in winter of the year 2001 in Jia Bharali river and lowest recorded was 7.4 mg/L at Kuruwa ghat in the year 2003 in post monsoon.

Highest amount of FCO\(_2\) was recorded 11.4 mg/L in the year 2002 in Biswanath ghat and lowest amount recorded was 4.8 mg/L at Jia Bharali River in the year 2001.

Element analysis of Fe, Ca, Mn, Se and Zn were analyzed with AAS (SAIF, Shillong) in the water of different water bodies, soil and tissue of alimentary canal. In different water bodies and soil, Se was found highest in the water of different water bodies and Mn was detected in lowest amount, while Se was found higher and Zn was detected lower in the soil of study sites. The tissue elements in liver, stomach and intestine were detected, where intestine contains higher amount of Fe, Ca and Zn. Liver contains higher amount of Se while Mn was detected more in the stomach.

The goblet cells observed in the stomach, duodenum and intestine are distributed in the columnar epithelial cells, which are characterized by the invagination of apical boarder forming a deep cavity that confines the nucleus to the basal region. The goblet cells are very prominent with presence of villi. The liver cells are polyhedral in shape with spherical and deep staining nuclei. The pancreas exhibits exocrine and endocrine cells. The stomach and the intestine have greater concentration of mucous and goblet cells certainly are in agreement with the present observation.

Study has shown that the major food item preferred was phytoplankton, species of zooplankton, grasses and minnows, were found in some specimen. The present study
on *K. sylhetensis* gives a qualitative account of the food on which *K. sylhetensis* depends. Gut content analysis gives a clear idea of the food items present in their habitat and their preferences. The species prefer *Spirogyra, Anabaena, Pistia (Borpuni), Utricularia, Lemma (Sarupuni), Ipomoea (Kalmau), Cyclops sp, Daphnia sp, Nauplius sp, Euglena sp, Cypris sp, Minnows, Arthropods, Cynodon sp* as their food item.

Nests of *K. sylhetensis* were observed only in March/April at Biswanath ghat and Kuruwa ghat with 6-8 numbers of eggs per nest. Planktons were collected from the water bodies, where the *K. sylhetensis* were seen basking on logs, debris, gravels and nearby sand bank.

Detailed taxonomic description of the species is given for proper identification. Each specimen was measured with the help of venire caliper. The species authority or the name (s) of scientist (s) or person (s) who first described *Kachuga sylhetensis* is listed by IUCN as Jerdon, 1870.