POPULATION, BREEDING AND CONSERVATION OF BENGAL MONITOR, *VARANUS BENGALENSIS* IN BANGLADESH

A DISSERTATION

SUBMITTED TO THE UNIVERSITY OF DHAKA FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (Ph D) IN ZOOLOGY (WILDLIFE BIOLOGY)

BY

SANTOSH KUMAR DEY
REGISTRATION NUMBER: 02
SESSION: 2011-2012

DEPARTMENT OF ZOOLOGY
UNIVERSITY OF DHAKA
DHAKA – 1000, BANGLADESH

SEPTEMBER, 2016

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Approval Sheet

I, hereby declare that the dissertation entitled "**Population, Breeding and Conservation of Bengal Monitor, *Varanus bengalensis* in Bangladesh**" submitted for the degree of Doctor of Philosophy (Ph D) in Zoology (Wildlife Biology), University of Dhaka is based on self-investigation and carried out under my supervision. I also declare that this or any part of this work has not been submitted for any other degree anywhere.

2.6.15

Professor Dr. Noor Jahan Sarker,
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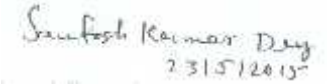
Declaration

I, hereby declare that dissertation entitled "**Population, Breeding and Conservation of Bengal Monitor, *Varanus bengalensis* in Bangladesh"** submitted to the University of Dhaka for the degree of Doctor of Philosophy (Ph D) in Zoology (Wildlife Biology), is based on original research work under the supervision of Dr. Noor Jahan Sarker, Professor, Department of Zoology, University of Dhaka, Dhaka – 1000 Bangladesh. I also declare that this or any part of this work has not been submitted for any other degree anywhere.



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ABSTRACT

The study was conducted on, "Population, Breeding and Conservation of Bengal monitor, *Varanus bengalensis* in Bangladesh" from May 2011 to November 2014 at (1) Hazratpur and Rasulpur village, Hazratpur Union Parishad, Mithapukur, Rangpur (HU, MR); (2) Jahangirnagar University Campus and its adjacent area, Pathalia Union Parishad, Savar, Dhaka (JUC); (3) Jamuna Resort, Durgapur Union Parishad, Kalihati, Tangail (JR, T); (4) Dhaka Zoo and National Botanical Garden Mirpur Model Thana, Mirpur Dhaka (DZ & NBG); (5) Kaltapara and Bostall Village, Jampur Union Parishad, Sonargaon, Narayangonj (SN); (6) Ghorashal Power Plant, Ghorashal Municipality, Palash, Narshingdi (GPP, N) and (7) Animal Garden, Dhaka University (AG, DU).

The estimated highest population density (34.5/ km^2) was found in Durgapur Union, Khalihati, Tangail and the lowest (3.41 km^2) was found in Mirpur Model Thana, Mirpur, Dhaka. Among eleven categories of habitats, the highest percentage of population was noted in garbage (20.1%) followed by drain (15.5%), banks of ponds and lakes (10.8%), cultivated field (9.3%), bamboo shoots and bushes (9.1%), marshland (8.6%), open space (7.5%), underground space (7.2%), sloping ground (5.5%), on the trees (5.1%) and old graveyards (1.3%).

The breeding season started in July to September and ended in March-April. The nest building period was from September to October. The Bengal monitors preferred to build their active nests in termite mounds. Diameter, circumference, depth and height from the ground of the active nests were 33.6±2.9 cm, 105.6±9.2 cm, 23.2±1.1 cm and 28.1±2.7 cm respectively. The mean clutch size was 24.6±7.11 (n = 182). The length, width, girth, weight and volume of the eggs were 5.93±0.19 cm, 3.95±0.22 cm, 12.6±0.52 cm, 41.5±1.7 g and 51.4±1.8 cm^3 respectively Morning and afternoon temperature of the active nests were 18.5±4.9^{0}C and 25.9±5.3^{0}C respectively. The morning and afternoon humidity was 90.8±4.0 % and 54.1±7.7 % respectively. The incubation period was 194.8±1.79 days. The length and weight of hatchlings were 23.8±0.69 cm and 17.9±1.03 g. at the time of hatching respectively. In the of sixth, twelfth, eighteenth, twenty fourth and twenty seventh month, the length and weight were 64.4±3.9 cm, 320±61.9 g ; 93.8±5.9 cm, 927.5±154.2 g ;105.9±6.6 cm, 1651.9±282.8g ; 112.9±9.2 cm, 2302.5±427.3 g and 115.3±9.8 cm, 2632.7±503.9 g respectively. The hatchlings consumed 4.9%, 7.87%, 6.6%, 5.3%, 4.3% and 4.9% of food at the age of one, six , twelve, eighteen, twenty four and twenty seven month respectively in relation to the body weight . The hatchlings shaded their skins at a time rather than part by part. The survival rate of hatchlings was 68.16% in relation to the number of eggs laid.

Within concentrated areas, the population density was higher (44.0 individuals/km^2) in protected zones, than in the non-protected zones (13.2 individuals/km^2). They acted as natural scavengers in the environment to remove the dead and decaying materials. Percentages of scavenging individuals in drains and garbage dumps were 36.7 and 63.3 respectively. Scavenging was mostly observed between 9:00 am to 11:00 am. The number of snake biting decreased when the density of Bengal lizards increased. Bengal monitors control rat population and balancing beetle and earthworm population. The reasons for the declining of the population of Bengal monitors were due to the destruction of habitats (59%), followed by destruction of nests, eggs and hatchlings (16%), killing of adults (11%), predation (8.%), road kill (4%) and effects of pesticides (2%). Through creation of awareness during the study period, it was noted that the general people changed their impression to monitors. At the start of the research, 58.4% people showed negative impression to monitors, on the other hand, at the end of the research, 94.1% people became sympathetic to monitors.

ABBREVIATIONS

ANOVA	**Analysis of Variance**
DZ	**Dhaka Zoo**
AG, DU	**Animal Garden, Dhaka University**
DZ & NBG	**Dhaka Z00 and National Botanical Garden**
HU, MR	**Hazratpur and Rasulpur village, Hazratpur Union, Mithapukur, Rangpur**
Fig.	**Figure**
GPP, N	**Ghorashal Power Plant, Narsingdi**
JUC	**Jahangirnagar University Campus and its adjacent area**
JR, T	**Jamuna Resort, Tangail**
NBG	**National Botanical Garden**
SN	**Kaltapara and Bostall village, Sonargaon, Narayangonj**
L	**Length**
H	**Height**
W	**Width**

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CHAPTER 1: INTRODUCTION

1.1 General Introduction

The Bengal monitor, *Varanus bengalensis* (Daudin, 1802), is locally known as "Guishap" and belongs to the Family Varanidae under the Order Squmata. The generic name *Varanus* is derived from the Arabic word waral لرو, (alternative spelling "waran" = "lizard"). The name comes from a common semitic root ouran, waran or waral meaning "lizard". It has been suggested that the occasional habit of varanids to stand on their two hind legs and to appear to "monitor" their surroundings led to this name as it was Latinized into *Varanus*. Its common name is derived from the Latin word monere meaning "to warn". These large Lizards have received the name of Monitors because they are supposed to give warning by a loud hiss of the approach of the Crocodile. Arabs call this animal waran; hence the generic name of *Varanus* (Bateman, 2011).

Monitor lizards are native to Africa, Asia and Oceania, but are now found also in the Americas as an invasive species and a total of 78 species are currently recognized (https://en.wikipedia.org/wiki/Monitor_lizard).

The colour of Bengal monitor is black, dark gray or brown. Hatchling are said to be dull orange or light brown and boldly banded with black and yellow over the body and tail (Bennett, 1995). The tail of Bengal monitor is round or slightly compressed, with a low double- toothed crest above posteriorly; nostril an oblique slit, near to the orbit than to the end of the snout (Smith, 1935).

Nostrils of *V. bengalensis* are slits – like about half way between the eye and the tip of the snout and the length is approximately 1.5 m (Rathnayake, 2001). Hatchling are said to be dull orange or light brown and boldly banded with black and yellow over the body and tail (Bennett, 1995). Monitor lizards (*Varanus* spp.) range from 0.28 m to more than 3.0 m in total length and occupy deserts, savannas and tropical habitats in the Old World (Mertens, 1942). Varinid lizards are a diverse group of reptiles not only in regards to variation in size within their family, but also in their use of different habitats within their natural range and identified as arboreal, semi-aquatic, terrestrial and rock dwelling (Greer, 1989; Collar *et al.,* 2010 & 2011).

The Komodo dragon *(Varanus komodoensis)*, the largest living robust monitor lizard, persists on the 5 islands in Eastern Indonesia (Auffenberg, 1981a; Ciofi & de Boer, 2004).

An adult Bengal monitor, *Varanus bengalensis* was measured up to 1.08 m in length and up to 9.5 kg of body mass. It had supraocular scale arranged in irregular rows of equal sized scales or single scale sized units are common. The dorsal pattern contains round spots of cream or yellowish on a gray to tan background (Jaman *et al.*, 2007).

The monitor lizards (*Varanus* spp.) are distributed over most of Africa and Australia, through India, Ceylon, and Malaysia and into the islands of the equatorial Western Pacific (Dryden, 1965).

The Bengal lizard *V. bengalensis* is the most widely distributed and largest monitor lizard in Pakistan (Auffenberg, 1989).

V. bengalensis is the commonest and most extensively distributed throughout India, Ceylon, Assam and the greater parts of Burma (Smith, 1935).

The Bengal monitor (*V. bengalensis*) is widespread in India (Das, 1988) and lives in all biotopes, ranging from evergreen forests to the desert fringes (Daniel, 2002).

The monitor lizard diversity of Sri Lanka is limited to two species, namely *Varanus salvator* and *V. bengalensis* (Das & De Silva, 2005).

It is found in all parts of Pakistan bellow about 1218 m where is permanent (Auffenberg, 1989). It is also found in Nepal (Khatiwada & Ghimire, 2009), in Sri Lanka (Deraniyagala, 1953) and in Thailand (Stanner, 2011).

Distribution in Bangladesh

Three species of monitor lizards are known to occur in Bangladesh viz Bengal lizard (*V. bengalensis*), yellow lizard (*V. flavescens*) and the ring lizard (*V. salvator*) (Whitaker & Hikida, 1981; Khan, 1987 and Akond *et al*., 1982). Of the three species, Bengal lizard is most widely distributed through the country, including many islands, in both forested and non-forested open wooded areas (Ahsan & Saeed, 2004). The yellow lizard is also distributed through the country whereas the ring lizard is common in the southern and coastal districts (Akond *et al*., 1982). The Black lizard (*V. bengalensis*) is distributed all over the country and fairly common in Dhaka, Mymensingh and Tangail (Akond *et al*., 1982).

The common monitor lizard (*V. bengalensis*) was reported by local people of St. Martin Island, Cox's Bazer, Bangladesh (Sarker *et al*., 2000).

Bengal monitors *V. bengalensis* are found using rodent holes along canals, roads and banks of ponds, embankments and houses, other premises and trees. More often they use paddy fields under bushes, edge of jungles and bamboo thickets as feeding and basking places (Jaman *et al*., 2007).

The Bengal monitors prefer the more humid areas of arid region and the drier areas of humid regions (Auffenburg, 1994).

The Bengal monitors (*V. bengalensis*) prefer to live the tree holes of mango (*Mangifera indica*) Sajna (*Moringa olefera*), Chatian (*Alstonia scholaris*), Banyan tree (*Ficus* spp), etc. and bushes around the houses. They also found in the old grave (Akond *et al*., 1982). Most *V. bengalensis* were recorded from residential gardens and others from forested areas and they are semi arboreal (Karunarathna *et al*., 2012). *V. bengalensis*is a generalist species inhabiting forests, agricultural lands and grasslands (Shah & Tiwari, 2004).

The Bengal monitor always tried to hide itself under bushes near swampy areas on the edge of standing running water bodies. The nest consisted of holes found in half dry places under the roots of the trees or bushes or sometimes in the holes of trees or cracks in the mud. It poked into the burrows and puddles to find out earthworms, crabs snakes rats, water bugs, snails etc. after sunset they were never seen outside of the burrows (Hossain & Sarker, 1996).

Monitor lizards are concentrated in forests, wetlands villages and homesteads, agricultural lands and the roadsides as their habitats (Rathnayake, 2001) and is widely distributed in tropical dry mixed evergreen forests. Most humid areas of the arid regions can be considered as preferred areas of Bengal lizards (Rathnayake, 2001).

While individual of *V. bengalensis* are capable of digging their own burrows and frequently do so, most are the enlargement of pre-existing rodent burrows or natural cavities. Mean length and depth of burrows are 1.02 m and 0.61 m (Auffenberg, 1983).

Bengal monitors remained submerged for a considerable period of time (Hossain & Sarker, 1996).

Food

Lumps of termite mounds containing termites (adults, mostly eggs and larvae) were placed in the periphery as food for hatchlings of Bengal monitor (Ahsan & Saeed, 2004). The food item of monitor lizards include insects, mollusks, crustaceans, fishes, frogs, toads, snakes, earthworms, eggs of birds, chicken, rodents, etc. (Akond *et al*., 1982).

Cleaned pieces of stomach (omasum part only) of bovines, collected from different slaughter houses of Dhaka city, were supplied to the lizards as food. Beside the supplied food, lizards were also seen to eat arthropods especially beetles and grubs from cow dung, and small fishes (mainly *Tilapia*, which were released in the lake for propagation) (Ahsan & Saeed, 2004). Captive males of *V. bengalensis* eat more food and generally more active than females of the same general size and age (Auffenberg & Ipe, 1983).

Population and Age-sex

In Shukchar Union Parishad, fifty two individuals of monitor lizards per sq km were counted and the least number, 18 individuals at Zahajmara Union Parishad at Hatiya, Bangladesh (Hossain & Sarker, 1996). Monitor lizard abundance of the two areas, with an average approximate abundance of 4 specimens/km2 in uninhabited areas (where human food leftovers were not available) as compared to 1400 specimens/km^2 in areas inhabited by people in Sri Lanka (Uyeda, 2009). It was not possible to get a reliable estimate of the monitor population in Bentenan Lagoon in Indonesia, but it was probably fewer than 25 adults, perhaps as few as 15 (De-Lisle, 2007). Monitor lizards are notoriously difficult to sex from external characters (Mertens, 1946). Sex determination in varanids can be problematic (Horn & Visser, 1997). Cloacal area of sub-adult male *V. bengalensis* showing thickened ridges

posterior-lateral to the vent (Auffenberg, 1981). Males of monitor lizards attain larger size, grow faster and are generally dominant to females (Auffenberg, 1979).

A total of 2112 Bengal lizards (685 [32.4%] males and 1427 [67.6%] females) were released inside farm area (Ahsan & Saeed, 2004). The *V. bengalensis* population from Puttalam to Eluwankulama in Sri Lanka appears to be very large, with 47 sightings (males, 23; females, 15; juveniles 9) recorded from the Eluwankulama area (5:3 male-female sex ratio), and another 29 (males, 14; females, 9; juveniles 6) from the Kalpitiya area (3:2 male-female sex ratio). In total, 85% of *V. bengalensis* sightings were recorded from residential gardens, and the rest from forested areas (Karunarathna *et al*., 2012). Sex ratio of *V. bengalensis* was 1:1(Auffenberg & Ipe, 1983).

Breeding Biology

V. bengalensis gets sexual maturity at the end of second year or beginning of the third year (Auffenberg, 1988).

The peak of breeding period of *V. bengalensis* is January to April but eggs also occur during June to December in ground log or termite mounds in Ceylon (Sri Lanka) (Deraniyagala, 1953).

Egg laying period of *V. monitor* is July to August (Jacob & Romaswami, 1976).

Among reptiles where males are typically larger than females, male-male combat and forced insemination of females occur (Fitch, 1981and Wikramanayake & Dryden, 1988).

Combat behaviour in the Bengal monitor, *Varanus bengalensis*, is provided in the reports of ritualized fighting seen between wild males in India (Ali, 1944) and Sri Lanka (Deraniyagala, 1957). It is also seen in *V. varius* (Carter, 1990).

Male ritual combat of Bengal monitors is restricted to a much shorter period preceding and during extensive courtship activity of the same individuals. 44.5% combat occurred between adult males, 32.8% between adult males and females, 6.3% between adults and adolescents, 4.7% between adult males and females, and 11.7% between adolescents (usually males). Combat tactics class include bipedal stance, brachial embrace, wrestle, snout thrust, lunge, head puss and body arch (Auffenberg, 1981).

Males *V. bengalensis* tend to feed more often and longer, consuming more flesh, leading to higher growth rates than females (Auffenberg, 1979). are generally more active than the females at all times of the year.

An increase in reproductive activities, such as male-female interactions and ritual combat, was observed after a period of rainfall while investigating *V. Olivaceus* in the Philippines and *V. bengalensis* spp. in South-East Asia (Auffenberg, 1988, 1994).

Breeding season of Malayan water monitor *V. salvator* is October (Khan & M, 1969), *V. gouldii* between November and February (King & Greene, 1979).

Many instances of ritualized combat of *V. bengalensis* between mature males were observed (Karunarathna *et al*., 2008). These rituals lasted for 20 min, but according to Daniel (2002).

A female *V. bengalensis* excavated a hole as breeding nest which was 2.5 feet long in December. Nest was goblet-shaped and oblique at the time of depositing eggs she kept her hind legs and tail within the pit, while the head and forelimbs were at the surface (Deraniyagala, 1958) and the depth *of V. acanthurus* is 30.5 cm (Burokas, 2008).

As with all poikilothermic animals, seasonal changes and temperatures are important influences on reproduction in varanids (Horn & Visser, 1989).

Monitors often become sexually active after a sudden change in conditions, such as a cool period (Visser, 1981), a sudden increase of food or transport from one place to another, even if only a change of case (Horn & Visser, 1989).

Size may be a factor in forced inseminations for monitor lizards (Mccoid, 1991).

The process of nest making of *V. bengalensis* and laying would have been completed during daylight and not continued into the night (Deraniyagala, 1958). Termitaria provide a favourable microclimate for incubation of the eggs of *V. niloticus* in Africa (Cowles, 1930).

The eggs Bengal monitor were laid between August and October with a mean clutch-size of 21.1 (range 10-32, n=25) (Ahsan & Saeed, 2004).

Most of the females of *V. monitor* deposit eggs in late June and July (Jacob & Ramaswami, 1976).

Egg deposition of *V. bengalensis* took place during the rainy season (Horn & Visser, 1997).
The interval between copulation and egg-laying of varanid lizards is usually from four to six weeks (Horn & Visser, 1989). Oviposition of *V. jobiensis* occurs in September (Stefani, 2008).

Eggs of *V. bengalensis* were collected from the holes in the soil (dug obliquely) and holes of termite mounds (Ahsan & Saeed, 2004).

The eggs of monitor lizards are deposited in holes in the ground or in ant-hills (Smith, 1935).

The breeding ground of the monitor lizards was in dry places near bamboo groves, banks of ponds or raised places in the jungle. It is completely different from their patrol areas (Hossain & Sarker, 1996).

In the absence of termitaria, *V. bengalensis* lays its eggs in a burrow in the soil excavated by the female (Auffenberg, 1983).

Clutch size, egg laying period, hatching time and incubation period of Bengal monitor were 8-32, November & December, June-July and 6-8 months respectively. The clutch-size varies according to the age of the female. The older one lay more eggs than the younger (Akond *et al.*, 1982).

Incubation period of black monitor is 6-8 months (Akond *et al.*, 1982) and 7-8 months (Whitaker & Hikida, 1981). Incubation period of *V. salvator* is 240 days (Dwyer & Perez, 2007) and at a temperature of 25-26^{0}C (Dwyer & Perez, 2007a). Incubation period of *V. flavescens* is 149-155 days (Visser, 1985), 117 days for *V. timorensis* (Geczy, 2009) and incubation temperature of *V. varius* is 19-31^{0}C (Boylan, 1995).

The clutch of Bengal lizard was 8-32 (Whitaker and Hikida, 1981; Akond *et al*., 1982) and 20-30 in Bangladesh (Khan, 1987) and in India 8-30 (Daniel, 1983). The clutch of *V. komodoensis* is 32 (Visser *et al.,* 2009).

Clutch size varies according to the size and age of the females, larger and older females lay more eggs than younger and smaller ones. The average clutch size was 21.1±7.4 (range 10-32, n = 25) (Ahsan & Saeed, 2004).

Clutch size of Bengal monitor *V. bengalensis* was 24 (Deraniyagala, 1958) and 4-10 eggs (Karunarathna, *et al*., 2008).

The mean size of eggs of Bengal monitor was 5.71±0.41 cm in length, 2.92±0.06 cm in width and 26.93±5.45 g in weight (Ahsan & Saeed, 2004).

In India, the average egg size of gray lizard was 4.9 x 3.8 cm (range 4.7 x 3.6 to5.5 x 4.4 cm, n=50 and weighed 11.4g (range 8.3-14.3 g, n=25) (Daniel, 2002).

The length of eggs of *V. monitor* average 38 mm and the width 24 mm (Jacob & Ramaswami, 1976). Eggs of *V. bengalensis,* measuring from (48.2×37.8) mm to (55.8×44.5) mm were recorded (Karunarathna *et al*., 2008).

Eggs of Bengal monitor were white, oval with soft and contained a large yolk supply (Ahsan & Saeed, 2004).

The eggs monitor lizards are elongated with both ends tapering bluntly and the shell is white, soft and leathery (Biswas & Kar, 1981).

The eggs of Bengal monitor are oval and soft-shelled (Smith, 1935).

The eggs of *V. monitor* have soft shell, are dirty white in colour and oval in shape (Jacob & Ramaswami, 1976).

The eggs of all varanid species have a soft, relatively smooth, leathery shell, without surface ornamental or crystalline material (Auffenberg *et al*., 1989).

The mean incubation period of *V. bengalensis* was 197.7 days (range 189-216 days, n=678) with a hatching success of 3.3% which was very low due to many reasons (Ahsan & Saeed, 2004). The average incubation period of eggs of Bengal monitor was 192.72±4.59 days (range 189-216 days,

n=678 eggs) (Ahsan & Saeed, 2004). Incubation period of Bengal monitor varies due to some ecological factors like temperature, moisture, rainfall etc. (Ahsan & Saeed, 2004).

Nest temperature of Varanid lizards varies between 25.8 ^{0}C to 27.6 ^{0}C in natural condition and the incubation period may be longer than in laboratory condition (Biswas & Kar, 1981). Incubation temperature of *V. salvator* ranged between 28 and 30.5^{0}C (Camina *et al.,* 2013).

Poor hatching success of *V. bengalensis* occurred due to (1) soil became compact due to rain and killed embryos; (2) mishandling of eggs by the staff during egg transplantation, (3) unregulated temperature and moisture in the incubation cases (Ahsan & Saeed, 2004).

Hatching of black monitor takes place in the month of June and July (Akond *et al.*, 1982).

Hatching of black monitor takes place only in the month of July (Whitaker & Hikida, 1981).

Most of the lizards of Bengal monitor hatched late at night or early in the morning; some also hatched during the day (Ahsan & Saeed, 2004).

The average total length and weight of the hatchlings of *V. bengalensis* were 19.72 cm and 13.61g respectively. The hatching successes were 11.9% and 3.3% in the case number I and II respectively (Ahsan & Saeed, 2004).

Hatchlings of monitor lizards are more adaptable than wild caught adults in captivity (Horn & Visser, 1989).

After hatching out, a baby lizard did not eat for the next 2-3 days due to the continued absorbance of its yolk reserve. Neonate lizards ate termite eggs and larvae from the supplied lumps of termite mounds inside the nursery and crushed boiled poultry eggs from the feeding trays (Ahsan & Saeed, 2004). They showed less interest to eat minced beef and mince bovine stomach. Babies also drank water and preferred to roost in the cold, damp areas inside the grasses or water hyacinths, which were kept in a few places inside the nursery (Ahsan & Saeed, 2004). Neonates of *V. juxindicus* began eating after 3-4 days (Wesiak & Koch, 2009) and a week for *V. glauerti* (Zeeuw, 2010). The mean length and weight of 4 hatchlings of V. varius at birth were 19.75 cm and 52.7 g (Horn, 1980).
Juveniles *V. bengalensis* are probably completely insectivorous and most common preys are Orthopterans and Coleopterans, weight of individual prey to predator weight is 0.0269:1 (Auffenberg & Ipe, 1983).

The most common prey of juvenile of Bengal monitors are Orthopterans and Coleopterans (Auffenberg, 1984).
Invertebrate prey of monitor lizards comprising larvae and pupae of beetle, butterfly and moth species (Jessop *et al.,* 2010) and sometimes bigger monitor lizards eat other smaller species of them (Macdonald, 2007).

Neonatal varanids have similar dietary preferences for insects and other invertebrates, then transition to different food items when a certain size or level of maturity is reached (Yuyek, 2012). The neonate of *V. olivaceus* did not show any interest in solid food until day 17 (Yuyek, 2012).

The hatchlings of monitor lizards were very active immediately after hatching. If disturbed they hissed with swollen neck and raised head and during this moment, the tongue would be seen darting out very frequently (Biswas & Kar, 1981).

Juveniles of *V. bengalensis* are extremely wary, rarely di their own burrows, and spend much time in the trees (Auffenberg, 1989).

The dorsal yellow spots are very distinct in hatchlings of *V. bengalensis*, becoming indistinct in adults (Karunarathna *et al*., 2008).

The young specimens of *Varanus* species are much more brightly coloured than the adult one (de Jong, 1944).

During August, most *V. bengalensis* are shedding skin (Karunarathna *et al*., 2008).

Conservation

In Nepal, habitat preference is an important factor for the conservation of any species. *V. bengalensis* preferred the bounded area over the unbounded area, suggesting a positive impact on the abundance of monitor lizards from fence construction. More than 90% of *V. bengalensis* observed in this study (Impacts of Community Forest on the Bengal Monitors, *Varanus bengalensis* (Daudin, 1802): An Impirical Study from Nepal) responded to disturbance, indicating their wariness of people (Ghimire & Phuyal, 2013).

Monitor lizard abundance of the two areas of Tinjil island, West Java, Indonesia, with an average approximate abundance of 4 specimens/km^2 in uninhabited areas (where human food leftovers were not available) as compared to 1400 specimens/km2 in areas inhabited by people (Uyeda, 2009).

The Bengal monitors (*V. bengalensis*) prefer to live the tree holes of mango (*Mangifera indica*) Sajna (*Moringa olefera*), Chatian (*Alstonia scholaris*), Banyan tree (*Ficus* spp), etc. and bushes around the houses (Akond *et al*., 1982).

Monitor lizards preferred high ground and live in holes on mango, sajna, chaitan, banyan trees, mander trees (*Erythrina indica*), rain trees **(***Samanea saman***),** jam trees **(***Syzygium cumini***)** and also in old graves (Akond *et al*., 1982 and Hossain *&* Sarker, 1996).

Eucalyptus trees can decrease the abundance of insects (Majer & Recher, 1999).

Bengal monitors are adept runner and mainly feed on the ground and are also climbed well as like squirrels and even take large animals to the trees for feeding (Taylor, 1963). Bengal monitors are

adept runner and mainly feed on the ground and are climbed well as like squirrels and even take large animals to the trees for feeding (Taylor, 1963).

Numbers of varanid lizards in Sri Lanka began to increase after the establishment of well-shaded tree-covered areas and artificial bodies of water. These species help to balance the native fauna and the entire eco-system (Karunarathna, *et al.,* 2008).

Eucalyptus is an alien species in Nepal, and both Eucalyptus and Teak have smooth trunks. As no *V. bengalensis* were seen using either of these tree species, it is possible that the monitors avoid these trees due to their difficulty to climb (Ghimire & Phuyal, 2013).

Monitor lizards are useful animals for humans (pest control and scavengers) and categorized as scavengers which mainly feed on animal carcasses (Daniel, 2002; de Silva, 1998).

In national parks and recreational areas including picnic and camp grounds, there is indirect interaction between people and monitors. Monitor lizards exhibit both predatory and scavenging behabiour (Wilson, 2005).

V. benalensis nebulosus prefers to inhabit tree hollows or cavities rather than burrows. Hence, hollows occurring in live trees are an essential factor that supports the occurrence of *V. bengalensis nebulosus* in the area and should be considered as an important factor for the management and conservation of this species or its congeners. Therefore, this tree acts as a good shelter for *V. bengalensis nebulosus* in northeastern Thailand (Duengkae & Chuaynkern, 2009).

Varanids feed on crabs, coconut weevils and their larvae, centipedes, snakes and young squirrels and rats. He also reported that *V. bengalensis* eats snail, such as *Achatina fulina*, frogs, skinks, other reptile eggs birds eggs etc. (Derniyagala, 1953) and Bateman (2011) reported that eat eggs of crocodiles, rats, mice, lizards snakes, fish, frogs, birds, worms and insects.

Varanus bengalensis feeds on wild common rat snake (*Ptys mucosus*), common rat (*Rattus rattus*), mole rat (*Bandicoota bengalensis*) and Malabar bandicoot (*B. indica*) (Karunarathna *et al.,* 2008).
Bengal lizards were seen to eat arthropods especially beetles and grubs from cow dung (Ahsan & Saeed, 2004).

The land monitor is useful as a bio-control agent of the pest beetles on coconut trees, which considerable damage to coconut plantation. They also feed on all sorts of carrion; therefore they can be considered a good sanitation agent. In Sri Lanka the Vaddas and Gypsies traditionally hunt the land monitors both for occupation and for sale. A whole animal fetches for Rs: 300-600 (Rathnayake, 2001).

Bengal monitors are generalists, eating many invertebrates, particularly beetles and Orthopterans (Losos & Greene, 1988).

Half a million tons of food grain was destroyed in Bangladesh by the rat in the FAO report (Whitaker & Hikida, 1981).

The beetles suck the juice of bananas and create a kind of mark like that of measles (Islam *et al*., 2012).

Fully grown beetles make holes and go inside the raw top part of coconut plants to take the juice from raw parts of these plants. When beetles cut the raw parts of the plants, they decompose which hinder the growth of the plants (Ahmed, 2006).

A good number of insect and rodent pests are eaten by the monitor lizards (*V. bengalensis*) from the agricultural fields and it seems to act as a biological pest controlling agent. The help increase the crop productivity in the country. They also feed on carcasses, rotten materials and maintain the ecological balance control ecological pollution (Hossain *et al*., 1995).

Earthworm and beetle larvae were regularly eaten usually when digging next to rocks, logs, or in other damp places (Auffenberg, 1989).

An adult Indian bandicoot rat (*Bandicota bengalensis*) was caught by the Bengal monitor (*V. bengalensis*) (Rao & Rao*,* 1984).

When a Bengal monitor is offered a live mouse, it is usually seized between the front and hind legs, violently shaken if large enough to struggle effectively, eaten first (Loop, 1974).

The preferred foods of *V. bengalensis* are rodents such as the common rat (*Rattus ratus*), mole rat (*Bandicoota bengalensis*) and Malabar bandicoot (*B. indica*). Their natural predators are the Brahminy Kite (*Haliastur indus*), Shikra (*Accipiter badius*) and Serpent Eagle (*Spilornis cheela*), however most are unable to capture juvenile varanids because they are shy ground-dwelling animals (Karunarathna *et al.,* 2008).

Bengal monitors are carnivore animals, as they consumed animal food, especially predates on arthropods (39.89%), annelids (28.84%) and mammals like rats and mice (13.75%) from the agricultural fields farmlands, gardens, home yards etc. (Jaman *et al*., 2007).

Monitor lizards are non-poisonous and feed on insects, snakes and their eggs. They also mentioned that spit of monitor lizard is poisonous and meet of monitor lizard is eaten by some tribes of Bangladesh. 12% of wheat is destroyed by the rats in the field and rats are controlled by the monitor lizards by eating them. The skins of monitor lizards are used to make many sophisticated daily used products (Akond *et.al.,* 1982).

Several Guamanians realized that monitors feed on principally on animals generally considered harmful or undesirable (snails, hermit crab, rats and shrew) animals and were tolerated (Dryden, 1965). *V. bengalensis* is valuable as pest control agent Sri Lanka (de Silva, 2006), (Cota *et al.,* 2008) and (Uchida, 1966).

It has been shown that monitors will scavenge food if available in the form of human leftover (Auliya, 2003).

Monoculture can also affect the availability of tree cavities, which serve as important refuge sites for *V. bengalensis* (Pattanavibool & Edge, 1996).

Bengal monitor is economically important for its valuable skin and its role in the eco-system, especially in controlling some pests. In Bangladesh some tribes like Shawtal, Kulee, Kukis, etc. also its meat (Ashan & Saeed, 2004).

The hunting of land monitor is not only profitable part time rural occupation, but also a "thrilling" sport in some villagers of Sri Lanka (Somanader, 1963).

Land monitors are killed for flesh while the water monitors are killed mainly for their skin. The skin trade of both monitor lizards is banned in Sri Lanka, it still occurs in India, Pakistan, Bangladesh, Indonesia, Malaysia, Philippines and Thailand. Not only in Sri Lanka but also in India and some other countries, large numbers of these monitors are collected for the pet trade (Bennett, 1995). Pollution of aquatic habitats declines the population of monitor lizards (Gaulke & de Silva, 1997).

The skin of monitor lizards is a valuable exportable item. An average of Tk. 3329437 was earned per year (1972-73 to 1988-89) by exporting the hides of monitor lizards. Moreover many sophisticated and lucrative goods are made of their skins (Hossain *et al*., 1995).

The skins are used for leather and a few "Nat" tribal eat flesh and drink the blood (often for medicinal purposes such as relief of rheumatism). The skin is also widely used in making drum heads for percussion instruments called "Dholak" and "Dug-Dugi" (Gupta, 1996).
The main part of the skin of monitor lizards in Pakistan is eventually used for wallets, belts, brief-cases and particularly ladies shoes and handbags. In 1986, hunter of monitor lizards in Pakistan receives Rs: 3-5 a skin; after tanning, prices vary from Rs: 10-15, depending on size and quality (Auffenberg, 1989).

An estimated 94528 skin of *V. salvator* were exported from Bangladesh during the year July 1978 to June 1979 (Gilmour, 1984).

An annual average of nearly 40000 skins was exported in Malaysia from 1963 to1967 (Khan, 1969).

The main exporting countries during 1977-1982 were Italy (27.3% of gross trade of 581244 skins), Spain (18.0%), UK (15.6%) and Switzerland (14.6%). The main importing countries were the USA (36.8%), F.R. Germany (15.8%) and Italy (14.7%) (Inskipp, 1984).

Bugis tradition holds the view that some monitor lizards have an animal's body but a human spirit. They also hunt and eat monitor lizards. Moreover, monitor lizards of the southwestern peninsula of Sulawesi are chased for the international pet and reptile leather trades (Koch & Acciaioli, 2007).

As a result of both hunting and urbanization, population of (*V. bengalensis*) have been significantly reduced (Inskipp, 1984).

St. Martins Inland in Bangladesh is poor its lizards population due to the degradation of their habitats (Sarker *et al*., 2000).

Forest destruction and fragmentation has led to their disappearance from much of monitor lizards previous range in the last 50 years (Bennett, 2007 and Das, 1988).

Habitat loss and harvesting due to global demand are both factors which affect monitor lizard population trends (Uyeda, 2009).

Construction of roads and the use of vehicles directly affect the habitat of animals (Trombulak & Frissell, 1992).

Roads fragment habitats and numerous animals are killed by vehicles while migrating and crossing over roads (Coelho *et al*., 2008).

In Sri Lanka, large numbers of *V. bengalensis* are killed for their flesh while that of *V. salvator* is considered to be highly poisonous (de Silva, 1996).

Varanus salvator and *Varanus bengalensis* both species are threatened due to various human activities (Amarasinghe *et al*., 2009).

Habitats loss, killing the lizards for skins and out of fear are the main threats for them (IUCN, Bangladesh, 2000).

Humans are the primary predator of adult and juvenile *V. bengalensis*, but according to villagers other predators include changeable hawk-eagles (*Spizaetus cirrhatus*), pythons (*Python molurus*), peacocks (*Pavo cristatus*), Sri Lankan grey hornbills (*Ocyceros gingalensis*) and white-bellied sea-eagles (*Haliaeetus leucogaster*). Egg predators include wild boars (*Sus scrofa*), rat snakes (*Ptyas mucosa*), domestic cats (*Felis cattus*), and dogs (*Canis familiaris*) (Karunthna *et al*., 2012).

The large abdominal fat found in the monitor is used as a salve for epidermal bacterial infections (Auffenberg, 1989).

According to respondents of Camiguin Island, Northern Philippines, monitor lizard meat is a delicacy, preferably served with alcoholic drinks, as in other parts of the country. Aside from being a delicacy monitor lizards are also hunted in Camiguin for their bile, which supposedly has the ability to cure stomachaches, body pains and convulsions in children. Lizard skin was reportedly sold a decade ago to merchants from Luzon (Reyes, *et al.,* 2008).

Some scheme has been proposed in both India and Pakistan to convert some of the desert lands to agricultural lands. This will undoubtedly result in some habitat destruction of importance to the desert monitor (Auffenberg *et al*., 1990).

Major threats to monitor lizards include: (1) habitat destruction; (2) the international trade in reptile skins and in monitors as pets; and (3) human consumption (Koch *et al.,* 2013).
Habitat destruction, reclamation of wetlands of agriculture and human settlements, road kills and killing by domestic animals (especially dogs) are some of other threats to the monitor lizards (Rathnayake, 2001).

The food source of monitor lizards is destroyed by using chemical fertilizers and pesticides (Jaman *et al.*, 2007).
Building more speed bumps on the route to slow down vehicular traffic in Khao Yai National Park should be considered for the conservation of monitors (Duengkae & Chuaynkern, 2009).
Education and awareness programs should focus on villages, school students and the general public, and universities should use these areas for research and experimental programs Karunarathna *et al*. 2012).

Chewing the tail of a land monitor strengthens one gums and the flesh of a land monitor is a remedy for convalescents (Deraniyagala, 1927).

After eating the row tongue of a land monitor which is inserted in a ripe banana, a child will be given a super memory (de Silva, 1996).

The land monitor never drinks water from the water outlet from the paddy field bunds and if a person normally eats the flesh of a land monitor, he will never suffer from wheeze (Rathnayake, 2001).

The oil of *V. bengalensis*, extracting from the fat is used in the treatment for failing vision (Murthy, 1988), Arthritis, Rheumatism, Piles and Muscular pains (Bennett, 1995) and in cooking (Auffenberg, 1986).
The largest *V. bengalensis* cannibalized was a female with a total length of 46 cm, by a male 121 cm total length (Auffenberg, 1989).
Cannibalism has been reported in varanid species (Flower, 1933; Auffenberg, 1970).

Some Sindis used the blood as a folk medicine and eating monitor flesh is apparently an ancient practice in the Indus River Valley (Murray, 1884).
Monitor lizards are the most loathed animals in Thailand. In that respect, Ban Truem Village in northeastern Thailand is a unique exception because its Gui inhabitants respect and revere monitor lizards and regard them as manifestations of their ancestors. This reverence has both religious and traditional facets. They do not eat, harm or harass monitor lizards, in spite of the fact that the monitors regularly prey on chicken eggs and chicks of the villagers (Stanner, 2011).

1.2 Objective

The main objectives of the present work were to:

a) determine the population status, density, dynamics, age ratio and sex ratio ;
b) study the breeding biology;
c) study the growth and development of the hatchlings;
d) find out the causes of population declination;
e) retrieve the population.

CHAPTER 2: STUDY AREA

Introduction

The study was conducted in seven sites viz (1) Hazratpur and Rasulpur village (Surveyed Area) under Hazratpur Union Parishad (Administrative Area), Mithapukur, Rangpur District, (2) Jahangirnagar University Campus and adjacent area (Surveyed Area) under Pathalia Union Parishad (Administrative Area), Savar, Dhaka (3) Jamuna Resort (Surveyed Area) under Durgapur Union Parishad (Administrative Area), Kalihati, Tangail, (4) a) Dhaka Zoo and b) National Botanical Garden (Surveyed Area) under Mirpur Model Thana (Administrative Area), Mirpur, Dhaka, (5) Kaltapara and Bostoul villages (Surveyed Area) under Jampur Union Parishad (Administrative Area), Sonargaon, Narayangonj District, (6) Ghorashal Power Plant (Surveyed Area) under Ghorashal Municipality (Administrative Area), Palash, Narsingdi District and (7) Animal Garden, Curzon Hall, Dhaka University, Dhaka, during May, 2011 to November, 2014.

A brief description of each study area is given below.

(1) Hazratpur and Rasulpur Village, Hazratpur Union, Mithapukur, Rangpur

Hazratpur Union is under Mithapukur Thana (police station), Rangpur district. Total area consists of 12.84 sq. kilometer. It is located $25^0$54'N and $89^0$28'E.

Temperature is very high in summer which begins to rise in March. September, 2012was the hottest month during period, recording a maximum temperature of 39.6^0C. The coldest month was January 2014 with minimum temperature of 11^0C. Mean of the minimum temperature of the study period (37 months) was 19.8±4.35 (ranged 26.9^0C to 11.0^0C). Mean of the maximum temperature of the study period (37 months) was 34.6±3.96 (ranged 39.6^0C to 24.2^0C) (Map 3).

The highest and lowest rainfall were recorded in the month of July, 2013 and December and December, 2012 and they were 351 mm and 5 mm respectively. Mean rainfall was 159.5±113.7 mm (ranged 351 to 5 mm).

Maximum and minimum humidity were recorded in the months of May, 2011, June, 2012 and February, 2013 and they were 99% and 19% respectively. Mean maximum and minimum humidity were throughout the study area 94.1±5.0 and 40.6±13.5 respectively (Appendix.52 and Figs. 2.1, 2.2, 2.3).

(2) Jahangirnagar University Campus and its adjacent area, Pathalia Union Parishad, Savar, Dhaka

Jahangirnagar University Campus is located only 2 km away in the north from Savar Upazila in the district of Dhaka. Geographically the campus is at $30^0$16'N latitude and $90^0$52'E longitude, 32 km north from the Dhaka city. The university consists of 280 hectares of area. The university bounded on

the south by Bangladesh Public Administration Train Centre (BPATC) and Radio Bangladesh Broadcasting Centre, on the north-east by Savar Cantonment and on the north by "Jatiya Smitri Soudha" (National Monument). On the east, the campus is bordered by Dhaka-Aricha Highway and Savar Dairy Farm and west is bounded by open land with sporadic settlements and villages. The university project was launched in June 1968 and construction work was started from 27 December of the same year. The university was established on 20 August, 1970 as a unitary, teaching and resident university by Jahangirnagar University after the liberation war in early 1972. The average height is 39 ft from the mean sea-level, adjacent to Life Science Institute in Jahangirnagar University, Savar, Dhaka. The campus is an undeclared sanctuary of birds. The campus abounds a good number of semi-natural and artificial water bodies which provide important wetland ecosystem enriching the habitat with myriads of flora and fauna. Many people visit the campus in order to enjoy the beauty of diverse migratory and resident avifauna (Map 4, Plate 1).

Physical Feature, Vegetation and Habitat type

Colour of the soil is yellowish and reddish brown, which indicates the soil is very rich in iron, aluminum and calcium but lack of silicon and nitrogen. Water-holding capacity of this soil is very low.

Different types of habitats are found in the university campus. It consists of woodlands, bushes, grasslands wetlands human settlements, i.e. houses, academic and administration buildings. They supportdifferent types of wildlife (amphibians, reptiles, birds and mammals), fishes, annelids, mollusks and innumerable number of arthropods (e.g. Different types of insects).

Woodland consists of Mahogany (*Swietemia mahagani*), Jack fruit (*Artocarpus heterophyllus*), Tal palm (*Borassus flabellifer*), Banyan tree (*Ficus* spp.), Coconut palm (*Cocos nucifera*), Mango (*Mangifera indica*), Krishna Chura (*Delonix regia*), Date plant (*Phoenix sylvestris*), Eucalyptus (*Eucalyptus* spp.), etc.

A Botanical Garden is situated at the south of the campus, consists of an area 3.23 hectares. Different types of medicinal plants, vegetables fruiting and flowering plants are planted here.

During rainy season, bushes can be seen all over the campus. They are mainly concentrated in the north, south and eastern parts of the campus. The mentionable species are *Lechnocarpus frutescens*, *Sida acuta*, *Urenea lobata*, *Mimsos pudica*, *Puicum repens*, etc. the bushes are used as the shelter for different types of mammals, reptiles, amphibians, insects etc.

Wetlands of Jahangirnagar University Campus can be divided into two portions, i) Permanent water bodies which hold water throughout year and ii) Marshland areas. The area of the water bodies is 23.9 hectares (59.05 acres). These freshwater wetlands have own aquatic plants as well as animals. In rainy season, water lilies are found.

Marshy lands consist of Northern, Southern and Central parts of the campus. These lands are low-lying areas. During rainy season, water remains there for the time being and the height of the water range between 5" to 20", but in winter, these areas remain dry and used as cultivated land.

Grasslands and cultivated lands are found in the south-western portion of the campus. Grasslands are used as pasturelands.

Wildlife Rescue Centre (WRC) is located the southern part of the campus. WRC covers an area of about 10 acres.

Climate (Temperature, Humidity and Rainfall)

The climate of Jahangirnagar Campus is similar to Dhaka. The climate of the campus can be characterized by

i) Winter (November-February): Mild and mainly dry.
ii) Summer (March-June): North-Western storms, rainfall and maximum temperature.
iii) Rainy season or Monsoon (July-October): Warm, rainy and maximum humidity.

Temperature is very high in summer which begins to rise in March. May, 2012 and 2013 was the hottest month during period, recording a maximum temperature of 38.5^0C. The coldest month was February 2012 with minimum temperature of 28.3^0C. Mean of the minimum temperature of the study period (37 months) was 23.8±6.03 (ranged 32.4^0C to 12.1^0C).Mean of the maximum temperature of the study period (37 months) was 34.0±3.24 (ranged 34.5^0C to 28.7^0C).

The highest and the lowest rainfall were recorded in the month of July, 2013and November and December, 2012 and they were 462 mm and 5 mm respectively. Mean rainfall was 197.1±151.7mm (ranged 462to 0mm).

Maximum and minimum humidity were recorded in the months of July, 2012and March, 2012 and they were100% and 19% respectively. Mean maximum and minimum humidity were throughout the study area 95.9±2.98 and 37.1±9.25 respectively (Figs. 2.1, 2.2, 2.3 Appendix. 51).

(3) Jamuna Resort, Durgapur Union Parishad, Kalihati, Tangail

Jamuna Resort is situated beside the bank of River Jamuna, under Durgapur Union Parihsad, Kalihati Thana, Tangail district. Total area consists of 28.9 hectares with adjacent area. This resort is the result of public-private partnership and used as recreation centre, secured by metallic fencing of height 2m. It is located $24^0$23' N and $89^0$46' E (Map 5).

Climate (Temperature, Humidity and Rainfall)

It is similar to Jahangirnagar University Campus.

(4) Dhaka Zoo and Nation Botanical Garden, Mirpur Model Thana, Mirpur, Dhaka

(a) Dhaka Zoo

Dhaka Zoois situated at Mirpur Section 2, about 16 km away on the northern side of Dhaka City. The Zoo is locatedat $23^0$40' N and $90^0$40' E. The total area of the zoo is about 82 hectors (203 acres). Two large lakes names "North Lake" and "South Lake" are situated on the southern and northern side of the zoo. The river "Turag" flows by the western side of the zoo. The "Botanical Garden" is situated on the north eastern side and the Dhaka flood protection embankment is on the western side of the zoo (Map 6, Plates 3 and 4).

Various species of plants are there in this study area. Different kinds of trees like Mango tree (*Mangifera indica*) Jack Fruit tree (*Artocarpus heterophyllus*) etc., shrubs i.e. Dholkolmi (*Ipmoea fistula*), Akand (*Calotropis prostratum*), etc., are found in this area. Different kinds of climber i. e. Telakucha (*Cocinia cordifolia*),Boulata (*Combretum latifolium*) etc. and creeper like Kalmi (*Ipomoea aquatica*), Tarulata (*Cuscutare flexa*) etc. are also available. Different species of animals such as fox mongooses, rats, snakes, birds, frogs, etc. are found there.

Climate (Temperature, Humidity and Rainfall)

It is similar to Jahangirnagar University Campus.

(b) National Botanical Garden

National Botanical Garden is situated at Mirpur, Dhaka. The garden was established in 1961, a total area of 84.21 hectares, beside the Dhaka Zoo, ten km North-West of Dhaka City. It is located at $23^0$48' N and $90^0$20' E (Map 8, Plate 2).

Nine hundred and fifty (950) species of plants under 114 families are conserved in the Botanical Garden (Hossain, 2012). Among them, 28210 trees under 255 species, 8400 herbs under 310 species and 10400 shrubs under 385species are available here. Left side of the entry way of the garden, there is a large Rose Garden. At the opposite of the Rose Garden there is a lake which is used for boating for the visitors. These habitats support different types of wildlife (mammals, birds, reptilians, amphibians, mollusks and a good number of arthropods).Lotus and Lilies are available in the rainy season in "Padma Pukur" (Lotus Pond), Botanical garden. There is a nursery at south-western side of the garden. The garden is divided into many part, one of them is "International Garden" in which many exotic species of plants, like Silver Oak, Royal Palm, Africa Palm etc. are planted. At the east portion of the garden there is a 'Cactus House" is established (Hossain, 2012). The garden is used not only for recreation but also for educational purposes.

There is a residential area in the garden for the staff. Two storied director's office at the middle of the garden. During rainy season, bushes cover the low lands which provide the ideal habitats for some wildlife and floating aquatic vegetation, especially water hyacinth (*Eichhornia crassipes*) covers the

some parts of Lotus Pond and lake low lands. Among avian fauna, pied Myna, Common Myna, Asian cuckoo, Black Drongo, Pond Heron, Night Heron, Crow, Parrot are common in this garden.

Climate (Temperature, Humidity and Rainfall)

It is similar to Jahangirnagar University Campus.

(5) Kaltapara and Bostall villages, Jampur Union Parishad, Sonargaon, Narayangonj

Kaltapara and Bostall, these two villages are under Jampur Union Parishad, Sonargaon Thana (police station), Narayangonj district. Total area of Jampur Union consists of 8.43 Km^2.Koltaparais surrounded by Morisherteck village at north, Haturapara village at west, Bostall village at east and at south Alampur village. Another village, Bostall is surrounded by Musherchar village at east, Asian Highway at north, wetland at south and at west Kaltapara village. Total population of these two villages is about ten thousand. The dominant plants are coconut plant, mango tree, jack fruit tree, bamboo, palm tree, banyan tree etc. It is located $23^0$43' N and $90^0$35'E (Map 2).

Climate (temperature, Humidity and Rainfall)

It is similar to Jahangirnagar University Campus.

(6) Ghorashal Power Plant, Ghorashal Municipality, Palash, Narsingdi

Ghorashal Power Plant is situated beside the bank of River Shitalakshya, under Ghorashal Municipality, Polash Thana (Police Station), Narsingdi district. Boundaries of the Power Plant are at east, Plash Thana, at west, the River Shitalakshya, at north, Plash Urea Fertilizer Factory and at south, Plash Nutun Bazar. Total number of buildings of residential area is hundred. There is a pond, a canal, a mosque, a high school in the area of Ghorashal Power Plant. About twelve hundred employees are working there. This Power Plant is sixty five kilometer away from Dhaka. Total area of the Power Plant consists of 133.54 hectares of land. The dominant plants are coconut plant, mango tree, jack fruit tree, bamboo, palm tree, banyan tree etc. It is located $23^0$97'N and $90^0$63'E (Map 1, Plate 5).

Climate (temperature, Humidity and Rainfall)

It is similar to Jahangirnagar University Campus.

(7) Animal Garden, Curzon Hall, Dhaka University Campus

Dhaka is located $23^0$45' N and $90^0$25' E. The mean height of the city above the sea level is approximately 25 feet. Dhaka University is situated at the centre of Dhaka. Dhaka University was founded on the 1st July in the year of 1921, at Ramna Civil Station area of Dhaka, covering almost 242.81 hectares, comprised 100 buildings. With passage of time, the area of the Dhaka University has decreased due to various reasons. Dhaka University is bounded from all sides by broad roads. On the

east, lies the College Road and Kazi Nazrul Islam Avenue, in the south, the Babupura Road, Shaheed Sharani while on the west, the Asian Highways. In the north is the Shahbug Avenue (Map 7, Plates 6-15).

The Curzon Hall is situated at the centre of Dhaka University. The whole area is very neat and clean with network of drainage and sewerage system. The ground level is also higher than other parts of the capital city and the area was never found to be submerged by flood water. The Curzon Hall Campus includes about 3.64 hectares of land. The area is fascinating for its ancient buildings. Most of the departments of Science Faculty are situated within the Curzon Hall Campus. Besides these, there are two residential halls and a cafeteria, a mosque, a pond, two staff and teachers' quarters are here.

There is an Animal Garden, just east of the Geology Department o f Dhaka University. Research work on Bengal monitors under captive condition was being carried out in the Animal Garden. The whole area is bounded by 2.0 m of concrete wall. The area of the rectangle shaped garden is 62.7 m × 17.2 m. There are about ten (10) enclosures and shades, one human settlement and four (4) small tanks in the garden. Two of these enclosures were used as Hatchery House to rear the Bengal monitors under captive condition in order to carry out the research work. These two separate Hatcheries have concrete flooring and roof with full metallic safety wire-netting all over. A substrate consists of sand and dry soil was placed on the concrete floor of two Hatcheries and the areas were 3.8 m × 3.3 m and 4.4 m × 2.7 m respectively. Two small water basins, measuring 100 cm × 100 cm and 30 cm × 49.5 cm were provided in the hatcheries. Their faecal droppings were cleared regularly, so that no diseases spread there. For their feeding and drinking water, safe and clear earthen jars were provided. Three plastic hollow pipes (98 cm, 92 cm and 86 cm in length) with same diameter (11.5 cm) and five hollow bamboo shoots (52cm, 63cm, 48cm, 56cm and 58cm in length) with 9.5 cm in diameter were provided for hiding as well as resting and roosting of the hatchlings. For climbing, hatchlings were provided tree branches in the hatcheries.

After seven month, hatchlings were released into the patrol ground, a total area of 26.3 m × 5.3 m, bounded by 2.0m of smooth concrete wall, prevent for climbing. There was a cemented water pool, for swimming and diving,a total area of (2.5m×3.5m) and the depth was .6 m in the patrol ground of Animal Garden. Two feeding spots,(1.05m×.95 m; 1.14m×.79 m) and four underground tunnels (3.7m×.33m×.3m); (2.6m×.21m×.17m); (2.6m×.3m×.15m) and (2.8m×.32m×.13m) were establishes in the patrol ground of Animal Garden.For climbing, they were given live tall trees. On the floor of patrol ground, different types live vegetations were provided for hiding and send beds were for basking. During rainy season, densities of these vegetations were increased (Plates 33, 39, 40 and 41).

Climate (Temperature, Humidity and Rainfall)

It was similar to Jahangirnagar University Campus.

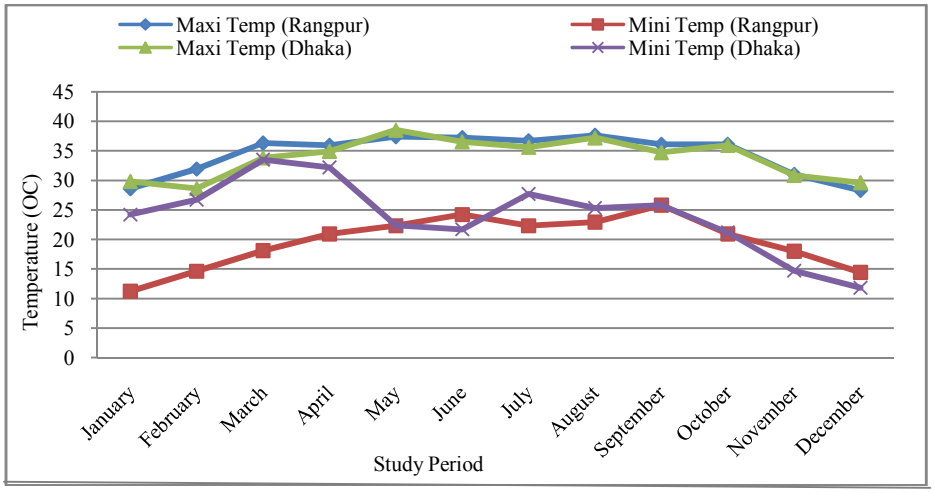

Fig. 2.1. Average temperature in the study areas during study period (2011-2014)

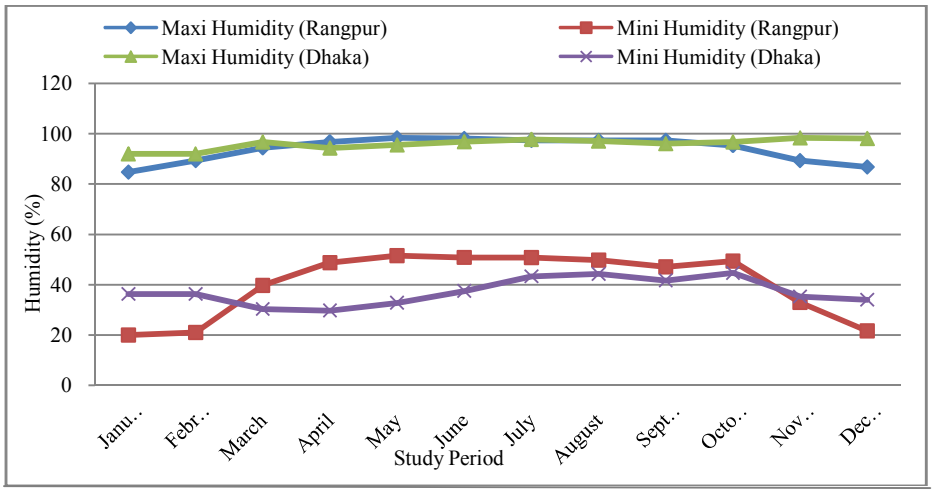

Fig. 2.2. Average humidity in the study areas during study period (2011-2014)

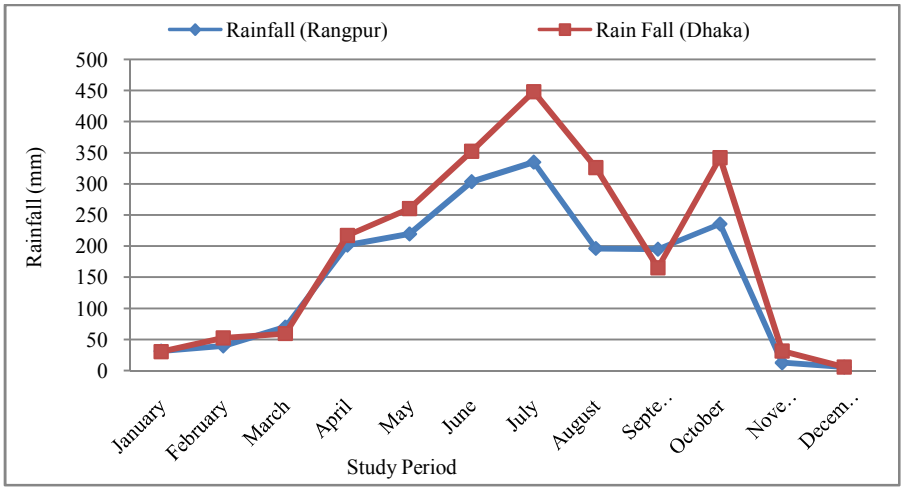

Fig. 2.3. Average rainfall in the study areas during study period (2011-2014)

CHAPTER 3: METHODS AND MATERIALS

The study was done from May, 2011 to November, 2014. (1) The study areas were 3 km^2 of Hazratpur and Rasulpur village under Hazratpur Union Parishad, Mithapukur, Rangpur (HU, MR); (2) 3 km^2 of Jahangirnagar University Campus and adjacent areas, Savar, Dhaka (JUC); (3) 1 km^2 of Jamuna Resort, Durgapur Union, Kalihati, Tangail (JR, T); (4) 1.5 km^2 of Dhaka Zoo and National Botanical Garden and adjacent area, Mirpur, Dhaka (DZ & NBG); (5) 2 km^2 of Kaltapara and Bostall villages, Jampur Union Parishad, Sonargaon, Narayangonj (SN); (6) 1.5 km^2 of Ghorashal Power Plant, Ghorashal Municipality, Plash, Narsingdi (GPP, N) and (7) Animal Garden, Dhaka University (AG, DU).

The observations were made at least once a week in the non-breeding season and thrice a week in the breeding season. The Bengal monitors were watched from 7:00 AM to 5:00 PM from March to October and from 8:00 AM to 4:00 PM in November to February. The variation of time in different months was based on the length in different seasons. Data on population along with habitats, population size, population density, and different types of habitats assessment were collected. Data on the following such as breeding biology (breeding season, combat behaviour, copulation and mating, nest site selection, egg-laying period, clutch size, measurement of eggs, incubation period, hatching period, measurement of hatchlings, rearing of hatchlings etc.) were collected and calculated. Data on conservation including comparison of population between protected and non-protected zones in different study areas, usages of different arboreal habitats, usages of holes of different trees, scavenging behaviour, contribution on fisheries, control of insects and effects on hatching by temperature and rainfall were collected through walking on foot. Besides, local people were interviewed to know about the existence and to assess the status of Bengal monitors. Later photographs were also taken during study period when necessary. After being caught, they were marked with permanent marker by the method of numbering. The total number of individuals counted in each selected area were recorded and calculated according to the occurrence of the monitor lizards per sq. km.

Observation Technique

Observations of Bengal monitors were conducted using the Visual Encounter Survey (VES) Method (Altmann, 1974; Cambel & Christman, 1982; Corn & Bury, 1990; Crump & Scott, 1994) through vigorous searching in different habitats including forests, bushes, grasslands cultivated lands, banks of ponds/ lakes/ rivers, drains, garbage bins, sloping lands, underground space, graveyard and trunks of trees, on the basis of concentrated area. Whenever a Bengal monitor was sighted, the time of observation, number of individuals, size class (juveniles< 1 m total body length; adult > 1 m total body length) were noted. During the application of this method (VES), study areas were divided into different plots. The sizes of the plots depended on the sizes of the study areas. 100 meter×100 meter

plots were made for small study areas i.e. Jamuna Resort, Tangail; Ghorashal Power Plant, Narsingdi; Dhaka Zoo and National Botanical Garden, Mirpur Model Thana, Dhaka where as 1000 meter×100 meter plots were made for large study areas i. e. Jahangirnagar University Campus and its adjacent area, Savar, Dhaka; Hazratpur Union Parishad, Rangpur; Kaltapara and Bostall village, Jampur Union Parishad, Sonargaon, Narayangonj. Sometimes observations were done by binoculars and sometimes with bare eyes from a considerable distance so that monitors would not be disturbed. For clear observation, the site of the observation was changed. The highest numbers of individuals in a month throughout the study period was recognized as the population size of that area.

Population

To analyze out the population size and density, a particular portion of an administrative area (such as Union Parishad, Municipality and Police Station) was selected which could be measured and has been termed as "Surveyed Area' (such as villages, wards or specified area). The population size and density of an administrative area was analyzed on the basis of a "Surveyed Area" inside that administrative area and termed as estimated population.

Among the locations of any administrative area, where it was inadequate for the living conditions of Bengal monitors (such as buildings, factories, roads and high ways and other lands of human usefulness) or where they were not found – those areas were randomly left out by the Quadrat Method (Bradfield & Potter, 2009).

Population size of an administrative area = Surveyed area population size/km^2 ×populated area of that administrative area

Population Density

In order to find out the population density of an administrative area - the highest population size of surveyed area under that administrative area was taken into account. Then after omitting the deducted area by Quadrat Method (Bradfield & Potter, 2009) from the total area of the administrative area –the populated area was calculated. On the basis of population size/km^2 of surveyed area, the population size of populated area of an administrative area was determined. After this, the population density of an administrative was calculated by dividing the total administrative area with the total population size of the populated area of that administrative area. Study on population was done from May, 2011 to June, 2014. The following formula was used to calculate the density.

Population Density of surveyed area (D) = (N/a)/t When D = Population Density N = Number a = areas of occupancy t = time unit	**Population Density of Administrative Area** = Population size of administrative area/ total area of that administrative area

Habitat study

For habitat analysis, the population of "Surveyed Area" was taken into consideration. This was because there was a variation between the habitats of a certain administrative area and the habitats inside its "Surveyed Area".

The population of "Surveyed Areas" was taken into consideration, in the "Conservation" chapter which deals with Protected and Non-protected Zone. The reason for this, is the particular administrative area that was not entirely a protected zone, but only a certain part. For all cases, the highest population was considered to analyze for administrative as well as the "Surveyed Area".

Population in different study areas, considering the habitats

In order to analyze the overall population size in different study areas, considering the habitats, the highest number of population size of different habitats in different study periods has been considered to make an average (in terms of percentage). The year-wise analysis has been shown here also.

Population in different habitats, considering the study areas

In order to analyse this, the percentage of the highest population size was taken into consideration, among different habitats during the study period of a certain study area. However, this did not explain the exact population of a particular study area. What has been established or attempted to be explained is- the highest number population and its percentage that could be found in different habitats of a particular study area. The year-wise analysis has been shown in the results.

In different habitats, populations were noted by observing the frequency of occurrences. Sometimes habitats were studied accompanied by local people. This also facilitated in gathering information on monitors' life style in different habitats throughout the year. Habitats were categorized on the basis of structure of the lands and these were:

Underground space - Subterranean place/space which was comparatively dark and damp during monsoon and dried up at winter.

Banks of Pond/Lake/River - The highlands that surround the water bodies at the edges, banks act as barrier that prevented the entry or exit of water from outside and inside, usually during monsoon.

Cultivated Land - These were lands that were capable of being ploughed and used to grow crops, usually for commercial purposes.

Marshlands - Type of wetlands that were dominated by herbaceous rather than woody plants species. In our country, most marshy lands dry up during winter and used for cultivation. During the rainy season, they hold water averaging depth of 8 to 60 cm.

Sloping Ground - Place between high and low lands, are sometimes covered with bushes, grasses and small plants.

Bush Land - The lands that supported remnant vegetation, usually shrubs and herbs. Growth of this vegetation was high during monsoon and low during the dry season.

Drain - The channel through which waste water, usually from the sewerage rain flowed.

Garbage Bin - Place where rubbish or waste, especially domestic refuses are discarded. Domestic refuse included cooked and un-cooked parts of fishes, meat and bones.

Graveyard - Place where human bodies was buried after death usually situated beside Churches or Mosques.

Bamboo clumps - Dominated by bamboo plants.

Open Place - Place where there was no existence of tall, medium trees, shrubs or herbs but only grass covered the area. Sunlight also falls on the place.

Study on population was done from May 2011 to June 2014.

Breeding Biology

Breeding Season

Breeding season was determined by observing the breeding activities which occurred in the particular time of the year. These activities were observed in nature as well captivity. In nature, 24 nests were identified. Moreover, interviews of local residents were conducted to determine local knowledge on breeding biology of the Bengal lizards. Information was also collected through questionnaires from the catchers in the catchments areas.

Combat behaviour

Combat behaviour (fight for female between two males or among males) was observed after hiding in the bushes or beside the tree trunks from 12 to 19 meters of distance through field binoculars, so that Bengal lizards would not fell disturb. Timing was also recorded by a stop watch.

Nest site selection and building of nests

Before mating, both partners show some unique behavior including female is followed by male, male bites and scratches on the back of female and he tries to ride on her back. Female accepts it. After copulation and mating, only females took part to build the nests and nests sites were also selected by females. The selection of places for nesting was observed and recorded as nest site selection. Method of nest construction was observed and timing for construction of nests was also recorded by stop watch.

Measurement of nests

During the breeding season, the study areas were thoroughly searched to find out nests. After finding the nests, some of them were open to measure the length, breadth, depth and height from the ground

by using a standard measuring tape. Distance between nests and the nearest water bodies was also measured. Egg-laying time was also recorded.

Clutch size and measurement of eggs

After opening the nests, at first the clutch sizes were counted, then eggs were marked with permanent ink as 1, 2, 3, 4 and so on. An electric balance (Model MP – 6000, TOKYO, Electronic Corp. Japan 0.01g) was used. Slide caliper was used to measure length and girth. A measuring cylinder was used to measure the volume of eggs. After pouring water into the cylinder, the eggs were released into the measuring cylinder. Before and after releasing of the eggs, they were cleaned carefully with tissue paper. To calculate weight changes by the month during incubation period, eggs were weighed (Plate 17). Calculation of incubation period, growth (length and weight) of hatchlings and their post hatching behaviour, food and feeding behaviour of hatchlings, moulting, colour changes etc., from every breeding season were observed and measured during the study period. Among different clutch sizes of eggs in the natural nests, one was taken into the Animal garden in the Curzon Hall of Dhaka University where an artificial breeding ground was established by using a big earthen jar. This was filled with soil that was brought from the natural nests of JUC. Rest of the eggs, after marking, were kept in their natural nests as they were arranged before and nests were covered with soil and waited for the calculation of incubation period (Plate 74).

Incubation period

To determine the incubation period, nests were closely observed at three days' interval in nature as well as in captivity of Animal Garden in Dhaka University Campus. Eggs were kept in different depths inside the soil of the earthen jar. From the first of placing of the eggs in the earthen jar, temperature and humidity were recorded by using soil thermometer and spot tester regularly and data were noted. Parents' behaviour to the nests in nature was also recorded. The incubation period was calculated from the first egg laid till the first egg hatched. Eggs were weighed to measure gain of weight during incubation period after every 30 days.

Hatching and hatchlings

The hatchlings were weighed and measured immediately after hatching. The external feature was also noted. Hatching time (day or night) was recorded by seeing the watch. Hatching success was calculated by enumerating the hatchlings in relation to the eggs laid per clutch by the Bengal monitors.

Rearing of hatchlings in hatchery

After hatching, hatchlings were transferred to the hatchery house which was established in Animal Garden, Dhaka University Campus. Hatchery house was well protected by concrete wall and netting. The height of the wall was 3.1 meter with concrete roof, as a result, no invasion took place, especially by crows and mongooses. As it was netted, enough light and air could pass. The length and width of

hatchery house were 3.8 m and 3.3 m respectively. The hatchlings were offered a shallow layer (3.5 cm deep) of substrate consisting of a sand soil mixture atop a concrete floor. Hatchlings were provided five plastic hollow pipes measuring lengths of 98, 92, 85, 82 and 79 cm respectively to hide themselves. Diameter of all pipes were equal and it was 11.5cm and the thickness was 0.2 cm. Hatchery house was also equipped with hallow three bamboo (lengths were 73' 91, and 86 cm respectively) and massive branches of plants (*Ficus* spp.) for climbing and hiding and a water basin (69×61×11 cm). The hatchery room's daytime ambient temperature was 23- 29^0C and basking temperature ranged 32-39^0C. Nighttime ambient temperature varied 18- 23^0C depending on the season.

Hatchery sanitation

Fecal matter of the hatchlings was removed at a two days' interval from the hatchery house to prevent the spreading of germs among the hatchlings.

Growth of hatchlings (Length)

The length of first group of hatchlings (the clutch size obtained in 2012) was observed and measured in the last 27 months. The length of the second and third group of hatchlings (clutch sizes being recorded in 2013 and 2014 respectively) were observed and measured in the last 15 and three months respectively during the study period.

All the hatchlings were allotted individual identification marks. Hatchlings were caught directly with hands after wearing gloves for first six months of their hatching and measure the body length with a measuring tape. At the age of seven months, it was difficult to handle them, as they grew up, for measuring length, they were provoked into the hollow transparent pipe. It must be mentioned that during measuring of length, measurements were taken from the tip of the snout to the last point of the tail.

Length gain = Average present length- Average previous length

$$\text{Percentage of length gained} = \frac{\text{Average final length- Average initial length}}{\text{Average initial length}} \times 100$$

(Model: Clarke, 1984; page no. 51)

Growth of hatchlings (weight)

Hatchlings were weighed with a spring balances up to the age of six months. At the age of seven, for measuring of weight, span balance was used (Plate 16).

Weight gain = Average final Weight- Average initial Weight

$$\text{Percentage of weight gained} = \frac{\text{Average final weight- Average initial weight}}{\text{Average initial weight}} \times 100$$

Food and food consumption by hatchlings

Hatchlings were supplied weighed food two days interval up to three months and then they were given food three days interval. Food was supplied between 10:00 AM to 12:00 PM. And remaining food was removed weight next day to measure the food consumption. Quadrat Method (Bradfield & Potter, 2009, Plate 18) was used at the time of collection of beetle' larvae from the cow dung for the hatchlings of Bengal lizards. Estimation of food consumption by Bengal monitors was calculated by the following formula

Food consumption = weighed supplied food – weighed rejected food

$$\text{Average food consumption} = \frac{\text{weighed supplied food – weighed rejected food}}{\text{Number of hatchlings of Bengal lizards.}}$$

$$\text{Percentage of average food consumption in relation to body weight} = \frac{\text{Average weight of consumed food}}{\text{Average body weight}} \text{ x100}$$

Rearing of hatchlings and young in artificial ground

At the age of ten months they were released in the enclosed artificial patrol ground in Animal Garden, Dhaka University where the enclosure was secured by 2 meter high smoothed concrete wall and one meter deep footing to prevent lizards escape by tunneling. The length and breadth of the patrol area were 26.5 meter and 5.5 meter respectively. In the patrol ground, there was a pool (3.5×2.5×0.6 meter) for swimming and diving, two feeding spots (1.05×0.95×0.3 meter) and (1.14×0.79×0.32 meter) four underground tunnels (3.65×0.33×0.26 meter, 2.6×0.3×0.15 meter, 2.65×0.2×0.19 meter and (2.4×0.28×0.21 meter). To control the mosquito population in the pool of enclosed artificial patrol ground for Bengal lizards, Tilapia fishes (*Oreochromis niloticus*) were released into the water. These fishes ate the mosquito' larvae. The demand of beetle' larvae increase at the age of juveniles and young than adult of Bengal lizards. In this regard, eating of beetles larvae by Bengal lizards was observed and calculated from the first seven months from their hatching. To provide them the facilities for climbing and hiding, live of bushes and trees were planted in the enclosed artificial patrol ground. To transfer them from the hatchery house to the patrol ground safely, a wooden box (1.5×.3×0.25meter) was made with two doors. Nylon nets surrounded the upper portion of the enclosed artificial patrol ground to prevent any invasion, especially by mongooses and crows. The whole enclosure was controlled by a small door (0.85×0.55 meter) (Plates 20 and 25 and 26).

Hatching success

Hatching success was calculated by the following formula:

Hatching success = (number of eggs hatched ÷ total number of eggs laid) × 100

Rate of survival of hatchlings

The rate of survival was calculated in relation to eggs laid by the females and the number of individuals which survived at the adult stage. Sometimes eggs, hatchlings and young were lost due to attack of diseases, predation by mongooses, crows, and others. The rate of survival was calculated by using the following formula:

Rate of survival = (number of adult survive ÷ number of eggs laid by female) × 100

Collection and preparation of breeding nests' soil sample

The soil samples were collected from the breeding nests of Bengal monitors at a depth of 0 to 50 cm and carried to the Laboratory of Soil, Water and Environment Department of Dhaka University for analysis. Polythene bags were used to carry the samples from the field to the laboratory (Plate 21).

Conservation

Two water pools were used to observe the influences on the growth (length and weight) of Tilapia fishes, of which one was inside the boundary wall of patrol ground of Bengal lizards and another was outside of the boundary wall. Fishes were provided rice, home-made bread and sometimes floating fish-meal in thrice in a week at the same amount in both pools. To calculate the weight of larvae of beetles and earthworms, the Quadrat Method was used from one square meter of cow dung deposition. The number of snake biting cases was recorded from the local people on a monthly basis. Each snake was identified by showing the photograph to them and in some cases they showed live snake from habitats.

To get the best suggestions or opinions for the conservation of Bengal monitor, surveys were carried out through questionnaires **(**Appendices 58, 59 and 60**)** among the different communities. Surveys were divided into two categories:

A. **Local people opinion** To know local knowledge and attitudes about Bengal lizards from local residents (those who were living beside the habitats of Bengal monitor i.e. farmers, students, shopkeepers, fishermen, boatmen and teachers). Three hundred and thirty eight respondents were randomly selected from the different study areas and interviewed them using structured questionnaires.

B. **Experts' Opinion** Experts involved in university teaching who dealt with this sort of research. Fifty one experts filled in the questionnaires regarding conservation of Bengal lizard.

The common people and experts were welcome to provide more than one answer, opinion or advice for each question in the questionnaire, in their own way. In other cases, the common people and experts had to choose only one option out of two in the questionnaire and the answers were shown in percentage.

In the conservation chapter entitled "Causes of decline of population of Bengal monitors" the number of incident was taken in terms of percentage into consideration rather than the actual number of individuals. The topic 'Predation' in the chapter 4.2 entitled "Breeding" is different from the topic 'Predation' in the chapter 4.3, entitled "Conservation", because 'Predation' in the chapter 4.2 was considered only in the breeding period, rather than the whole study period

A third questionnaire was prepared with easy questions for the farmers and who worked in the fields. This was distributed among them at the beginning and the end of the work to find out their opinion on Bengal lizards. Between these two periods, leaflets, posters were distributed and verbally farmers were asked to know the importance of Bengal monitors in nature.

Materials used

Weight Measurement Instrument: Electric balance Model MP – 6000, TOKYO, Electronic Corp. Japan 0.01g; ordinary and spring balance from 100g to 20 kg, were used to measure the weight of Bengal lizards, their food items, eggs and hatchlings (Plate 22).

Capturing Tools: Transferring wooden box (1.4 m× .3×.25 m) (Plate 24), Bamboo traps (Dugair, Bana, etc.), gunny bags, Bashal nets were used to transfer, capture and collect live Bengal lizards in nature as well as in captivity. To capture rats and insects two capturing tools were used (Plate 27).

Measuring Tools: Slide calipers, Steel Scales, Measuring Board, Dividers, one pair of forceps and one pair of scissors were used to measure the Bengal lizards in different stages (Plate 22).

Photography: Two cameras (Model No. MF-2 Super, Sony DSC-7) were used to take photograph about Bengal lizards.

Temperature and Humidity Recording Tools: Digital Thermometer (Model SPAR-Taiwan, H00004) and Humidity meter (Model P-330, Product Code AH55.1, Germany) were used to record of temperature and humidity.

Breeding Ground Materials and Rearing Tools: In artificial breeding ground, two earthen pots were used to keep the soil from natural breeding nests that covered the eggs. Three tree branches, one water basin, plastic hollow pipes, hollow bamboos were provided for the hatchlings. Soil and sand mixture was used to make the substrate on the concrete floor. Artificial cemented tunnels were made as hiding places for the hatchlings (Plate 23).

Measuring Tapes: Two measuring tapes (graduated up to 1 cm to 150 cm) were used to measure the lengths of Bengal lizards, their holes, breeding nests, distance of water bodies from their nests etc.

Binoculars: one pair of binoculars (Bushnell 20 × 280 mm with multicoated lens) was used whenever necessary to observe various activities of the Bengal lizards in nature as well as in captivity.

Torch and Electric Bulbs: Torch and Electric Bulbs were used to observe the activities of Bengal monitors at night.

Calculator: For calculation.

Other materials: Note Book, Pencil, Pen, Blank Paper, Nylon Rope, umbrella etc. were used to record different data.

Data Analysis

Data were partially analyzed manually. The pertinent data were transformed and subsequently analyzed by relevant statistical methods (Ahmed *et al*., 2005): Population size, density and sex ratio were calculated and tested by (Chi-square) χ^2 at 5% level. Analysis of Variance (ANOVA) among population group of different sizes and density was made to find out the relationship and difference in means of different parameter. Data on eggs of Bengal monitors, their breeding nests, termite nests, weight and length were calculated and tested by coefficient of correlation was calculated. Standard Deviation and Mean were made from different data using Microsoft Excel Program for statistical analysis. Graphical representation of population sizes, densities, seasonal fluctuations, growths (length weight) of hatchlings of different stages, different data on conservation were made using Micro Graph.

Coefficient of correlations were calculated to know the relationship of length-weight of eggs of lizards and among breeding sites and so on.

CHAPTER 4: RESULTS

4.1 Population

Total population

The total estimated population of six administrative areas was 4006 individuals during this survey (Appendix 7). The estimated highest density (34.5 individuals/km^2) was found in Durgapur Union Parishad (surveyed area was Jamuna Resort, Kalihati, Tangail) and the lowest (3.41 individuals/km^2) at Mirpur Model Thana (surveyed area was Dhaka Zoo & National Botanical Garden, Mirpur, Dhaka) (Fig. 4.1.1). The highest density of adults (16.3 individuals/km^2), juveniles (12.4 individuals/km^2) and young (5.9 individuals/km^2) were found in Durgapur Union Parishad and the lowest density of adults (1.9 individuals/km^2), juveniles (1.01 individuals/km^2) and young (0.53 individuals/km^2) were found in Mirpur Model Thana, Mirpur, Dhaka (Fig. 4.1.2; Appendix 7; Plates 56 and 27). The overall density of six study areas varied significantly (χ^2=43.3, df=5, $p < 0.01$). There was insignificant difference in mean distribution of different age groups of *V. bengalensis* (F= 2.62, df= 2/15, $p > 0.05$).

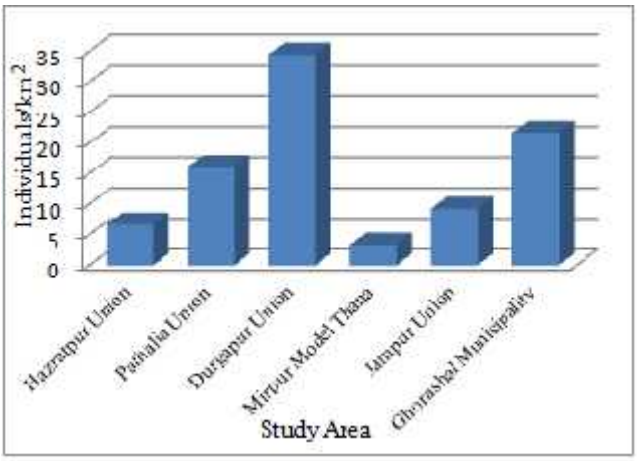

Fig. 4.1.1. Total estimated population density (individuals/km^2) in six administrative areas

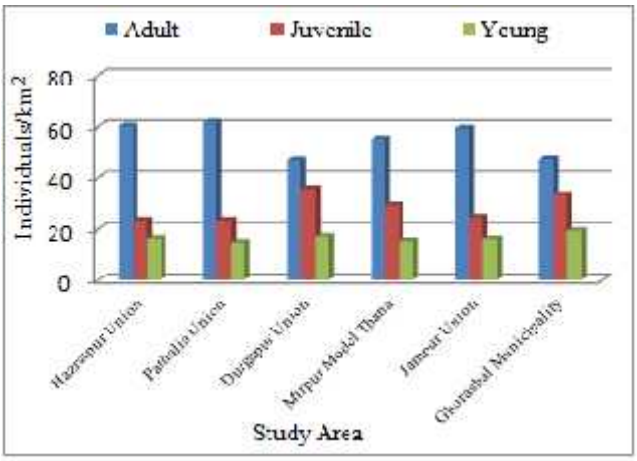

Fig. 4.1.2. Total estimated population density (individuals/km^2) of different age groups in different administrative areas

The highest proportion (in terms of %) of adults (60.0), juveniles (35.8) and young (22.5) were found in Hazratpur Union, Jamuna Resort and Ghorashal Power Plant respectively and the lowest proportion (in terms of %) of adults (47.2), young (24.0) and juveniles (15.6) was found in Jamuna Resort, Jahangirnagar University Campus and its adjacent area and Dhaka Zoo & National Botanical Garden, Mirpur, Dhaka respectively (Fig. 4.1.3; Table 4.1.1).

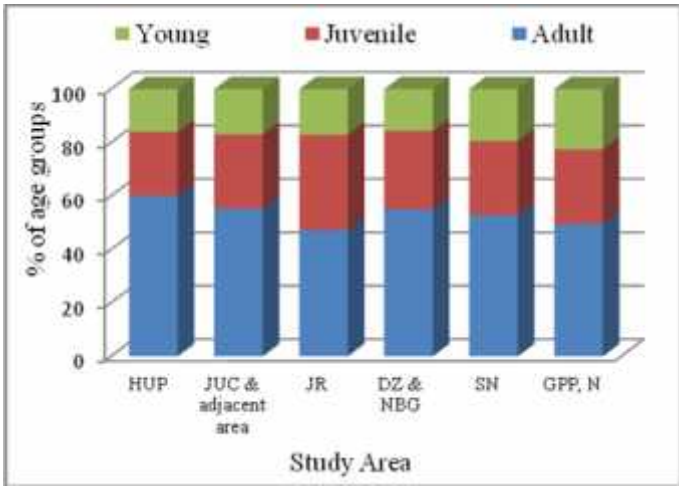

Fig. 4.1.3. Distribution of age groups in six areas

Annual variation

In 2011, the total estimated population of six administrative areas on the basis of surveyed area was 3900 individuals (Appendix 8). The estimated highest density (33.2 individuals/km^2) was found in Durgapur Union (surveyed area was Jamuna Resort, Kalihati, Tangail) and the lowest (3.4 individuals/km^2) at Mirpur Model Thana (surveyed area was Dhaka Zoo & National Botanical Garden, Mirpur, Dhaka) (Fig. 4.1.4). The highest density of adults (15.0 individuals/km^2), juveniles (11.7 individuals/km^2) and young (6.5 individuals/km^2) were found in Durgapur Union Parishad and the lowest one of adults (1.9 individuals/km^2), juveniles (1.0 individuals/km^2) and young (0.5 individuals/km^2) were found in Mirpur Model Thana, Mirpur, Dhaka (Fig. 4.1.5; Appendix 8; Plates 28 and 19). The overall density of six study areas varied significantly (χ^2=42.3, df = 5 and $p < 0.01$). There was insignificant difference in mean distribution of different age groups of *V. bengalensis* (F= 2.31, df= 2/15, $p > 0.05$).

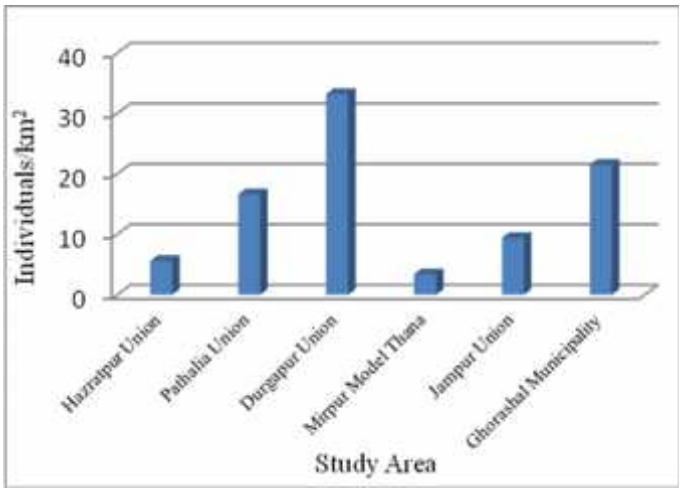

Fig. 4.1.4. Estimated population density (individuals/km^2) in six administrative areas in 2011

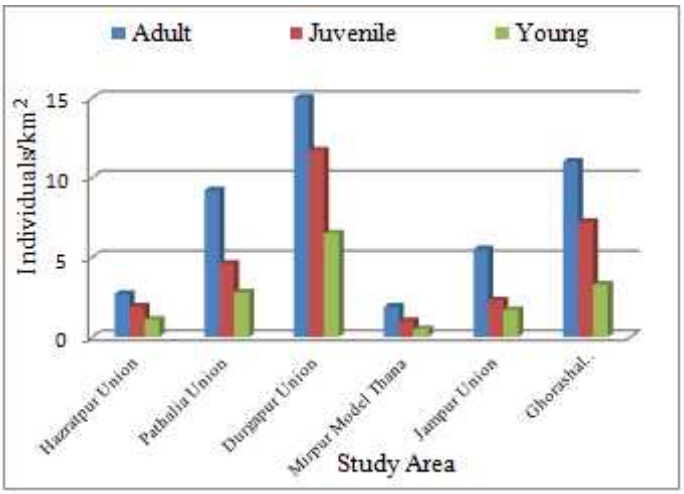

Fig. 4.1.5. Estimated population density (individuals/km^2) of different age group in different administrative areas in 2011

The highest proportion (in terms of %) of adults (58.8), was found in Kaltapara and Bostall village, Jampur Union, Sonargaon, Narayangonj. Juveniles (35.5) and young (19.6) were found in Jamuna

Resort, Tangail. The lowest proportion (in terms of %) of adults (45.5), Juveniles (23.6) and young (9.5) were found in Jamuna Resort, Tangail, Kaltapara and Bostall village, Jampur Union Parishad, Sonargaon, Narayangonj and Hazratpur Union Parishad respectively (Fig. 4.1.6; Table 4.1.2).

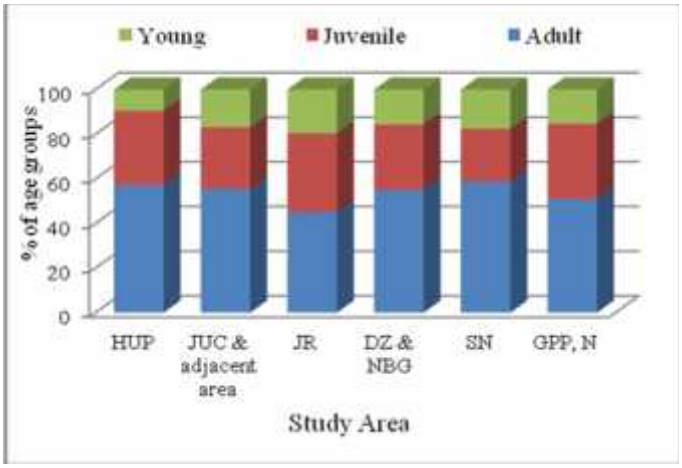

Fig. 4.1.6. Distribution of age groups in six study areas in 2011

In the year of 2012, the total estimated population of six administrative areas on the basis of surveyed area was 3830 individuals (Appendix 9). The estimated highest density (32.6 individuals/km^2) was found in Durgapur Union Parishad (surveyed area was Jamuna Resort, Kalihati, Tangail) and the lowest (3.2 individuals/km^2) at Mirpur Model Thana (surveyed area was Dhaka Zoo and National Botanical Garden, Mirpur, Dhaka) (Fig. 4.1.7). The highest density of adults (17.6 individuals/km^2), juveniles (8.5 individuals/km^2) and young (6.5 individuals/km^2) were found in Durgapur Union Parishad and the lowest density of adults (1.7 individuals/km^2), juveniles (1.0 individuals/km^2) and young (0.5 individuals/km^2) were found in Mirpur Model Thana, Mirpur, Dhaka (Fig. 4.1.8; Appendix 9; Plates 30 and 31). The overall density of six study areas varied significantly (χ^2=39.6, df=5 and $p < 0.01$). There was insignificant difference in mean distribution of different age groups of *V. bengalensis* (F= 2.99, df= 2/15, $p > 0.05$).

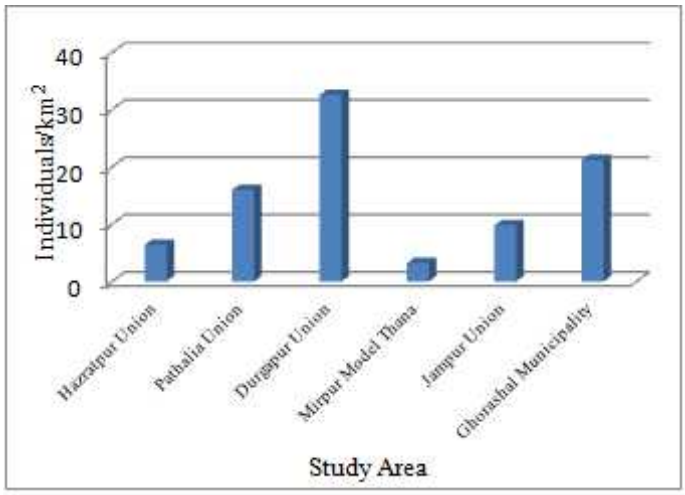

Fig. 4.1.7. Estimated population density (individuals/km^2) in six administrative areas in 2012

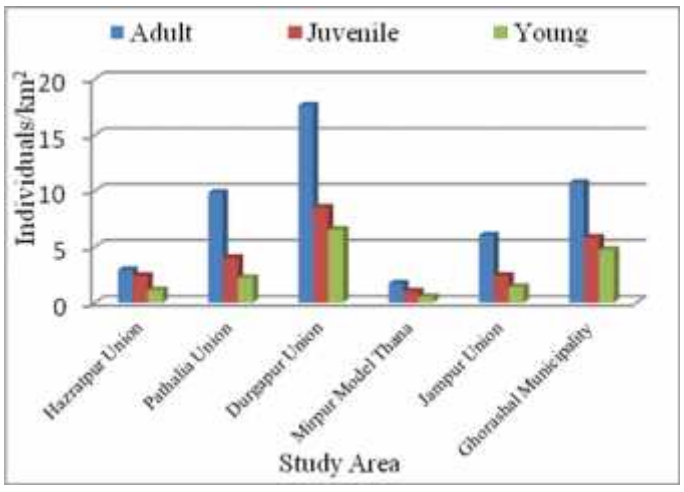

Fig. 4.1.8. Estimated population density (individuals/km^2) of different age group in six administrative areas in 2012

The highest proportion (in terms of %) of adults (61.3), juveniles (37.5) and young (22.0) were found in Jahangirnagar University Campus and its adjacent area, Savar, Hazratpur Union Parishad Union, Mithapukur, Rangpur and Ghorashal Power Plant, Plash, Narsingdi respectively. The lowest proportion (in terms of %) of adults (45.8) was found in Hazratpur Union Parishad. The lowest proportion (in terms of %) of juveniles (25.0) and young (13.7) were found in Jahangirnagar University Campus and its adjacent area, Savar, Dhaka (Fig. 4.1.9; Table 4.1.3).

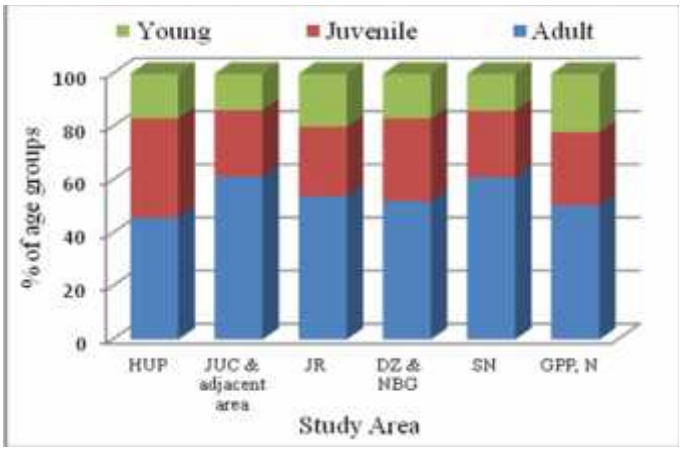

Fig. 4.1.9. Distribution of age groups in six areas in 2012

In the year of 2013, the total estimated population of six administrative areas on the basis of surveyed area was 3976 individuals (Appendix 10). The estimated highest density (34.5 individuals/km^2) was found in Durgapur Union Parishad (surveyed area was Jamuna Resort, Kalihati, Tangail) and the lowest (3.3 individuals/km^2) at Mirpur Model Thana (surveyed area was Dhaka Zoo & National Botanical Garden, Mirpur, Dhaka) (Fig. 4.1.10). The highest density of adults (15.6 individuals/km^2), juveniles (11.1 individuals/km^2) and young (7.8 individuals/km^2) were found in Durgapur Union Parishad and the lowest density of adults (1.7 individuals/km^2), juveniles (1.0 individuals/km^2) and young (0.6 individuals/km^2) were found in Mirpur Model Thana, Mirpur, Dhaka (Fig. 4.1.11; Appendix 10; Plates 32 and 34). The overall density of six study areas varied significantly (χ^2=43.7, df=5 and p< 0.01). There was insignificant difference in mean distribution of different age groups of *V. bengalensis* (F= 1.92, df= 2/15, p > 0.05).

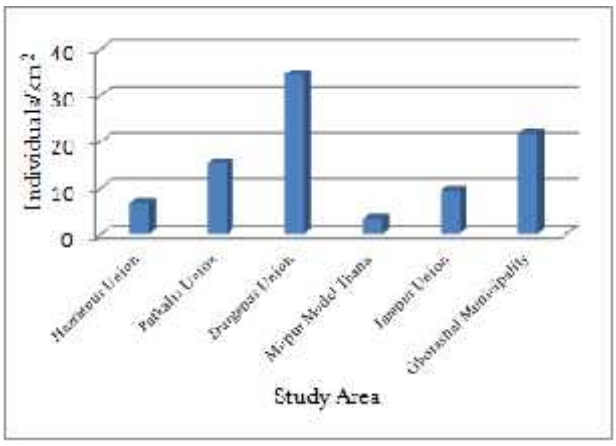

Fig. 4.1.10. Estimated population density (individuals/km^2) in six administrative areas in 2013

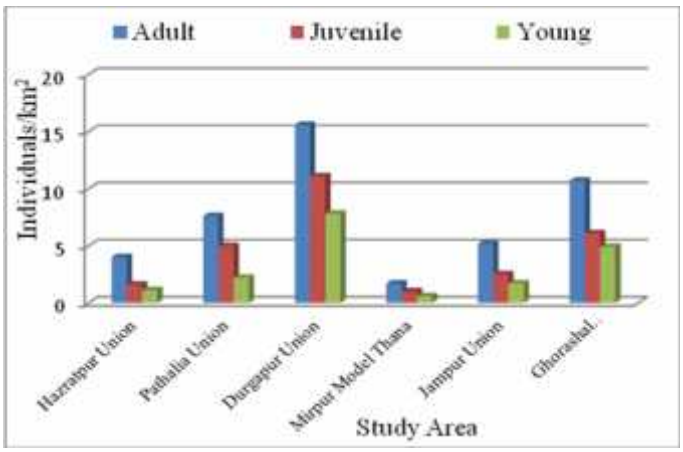

Fig. 4.1.11. Estimated population density (individuals/km^2) of different age group in six administrative areas in 2013

The highest proportion (in terms of %) of adults (60.0) was found in Hazratpur Union Parishad. The highest proportion (in terms of %) of juveniles (32.1) and young (22.6) were found in Jamuna Resort, Tangail. The lowest proportion (in terms of %) of adults (45.3) was found in Jamuna Resort, Tangail. The lowest proportion (in terms of %) of juveniles (24.0) and young (16.0) were found in Hazratpur Union Parishad, Mithapukur, Rangpur (Fig. 4.1.12; Table 4.1.4).

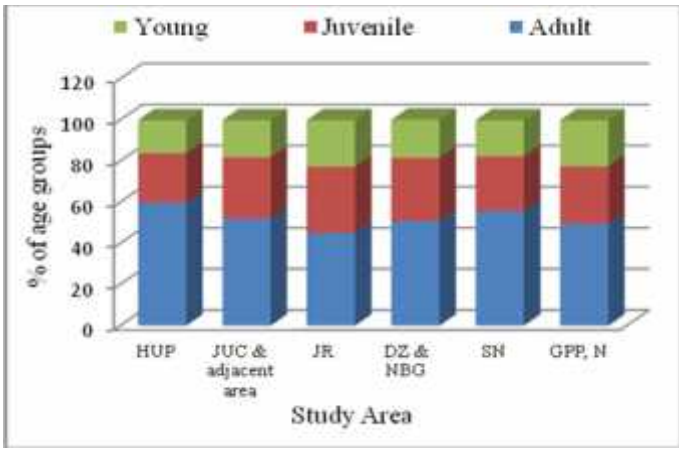

Fig. 4.1.12. Distribution of age groups in six study areas in 2013

In the year of 2014, the total estimated population of six areas on the basis of surveyed area was 3908 individuals (Appendix 11). The estimated highest density (34.5 individuals/km^2) was found in Durgapur Union Parishad (surveyed area was Jamuna Resort, Kalihati, Tangail) and the lowest (3.1 individuals/km^2) at Mirpur Model Thana (surveyed area was Dhaka Zoo & National Botanical Garden, Mirpur, Dhaka) (Fig. 4.1.13). The highest density of adults (16.3 individuals/km^2), juveniles (12.3 individuals/km^2) and young (5.9 individuals/km^2) were found in Durgapur Union Parishad and the lowest density of adults (1.6 individuals/km^2), juveniles (0.9 individuals/km^2) and young (0.6 individuals/km^2) were found in Mirpur Model Thana, Mirpur, Dhaka (Fig. 4.1.14; Appendix 11; Plates 35-37). The overall density of six study areas varied significantly (χ^2=44.2, df=5 and $p < 0.01$). There was insignificant difference in mean distribution of different age groups of *V. bengalensis* (F= 2.23, df= 2/15, $p > 0.05$).

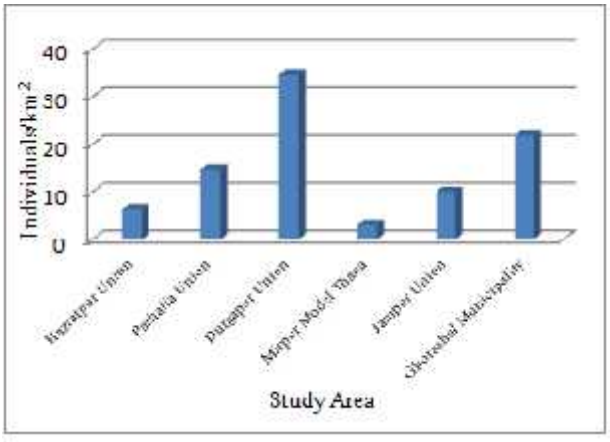

Fig. 4.1.13. Estimated population density (individuals/km^2) in six administrative areas in 2014

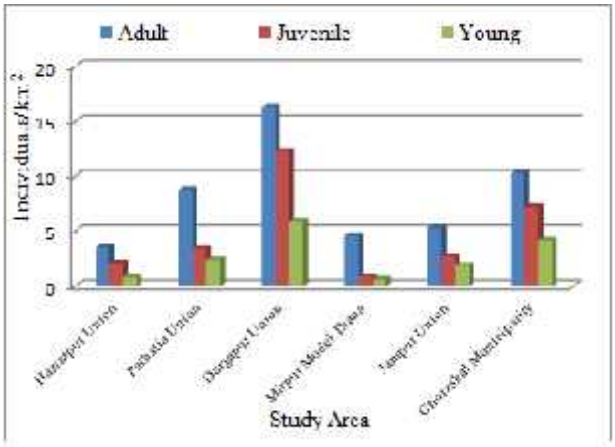

Fig. 4.1.14. Estimated population density (individuals/km^2) of different age group in six administrative areas in 2014

The highest proportion (in terms of %) of adults (56.8), Juveniles (35.9) and young (19.5) were found in Jahangirnagar University Campus and its adjacent area, Savar, Dhaka, Jamuna Resort, Tangail and Kaltapara and Bostall village, Jampur Union Parishad, Sonargaon, Narayangonj respectively.. The lowest proportion (in terms of %) of adults (47.1), juveniles (27.0) and young (12.5) were found in Jamuna Resort, Jahangirnagar University Campus and its adjacent area, Savar, Dhaka and Hazratpur Union Parishad, Mithapukur, Rangpur respectively. (Fig. 4.1.15; Table 4.1.5).

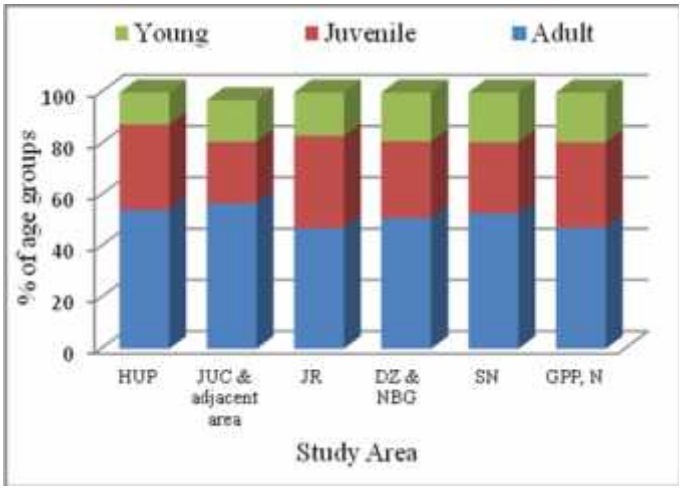

Fig.4.1.15. Distribution of age groups in six study (surveyed areas) areas in 2014

HABITAT ECOLOGY

Population, considering the habitats, in all study area throughout the study period

In underground space (Plates 37 and 42), the maximum proportion (in terms of %) of individuals (48.5%, n = 16) was found in Ghorashal Power Plant, Palash, Narsingdi (GPP, N) and the minimum proportion of individuals (6.1%, n = 2) was found in Hazratpur and Rasulpur village, Hazratpur Union Parishad, Mithapukur, Rangpur (HU, MR).

On the banks of the pond or lakes (plates 38 and 44), the figure for the most (in terms of %) (32.7%, n = 16) was found in Jahangirnagar University Campus and its adjacent area, Pahtalia Union Parishad, Savar, Dhaka (JUC) and the least (8.2%, n = 4) was found in HU, MR.

In marsh lands (Plates 51 and 38), the highest proportion of individuals (35.9%, n = 14) was found in (JUC) and the lowest proportion of individuals (7.7 %, n = 3) was found in HU, MR.

In cultivated field (plate 30), the highest proportion of individuals (30.9%, n = 13) was found in (GPP, N) and the lowest proportion of individuals (4.8 %, n = 2) was found in HU, MR.

Inside the bamboo clumps or under bushes (Plate 50), a high of (in terms of %) (31.4%, n = 13) was found in GPP, N and a low of (9.8%, n = 4) was found in Jamuna resort, Durgapur Union Parishad Kalihati, Tangail (JR, T).

In sloping ground, the highest proportion (in terms of %) of individuals (28.0%, n = 7) was found in JUC and the lowest proportion (in terms of %) of individuals (8.0 %, n = 2) was found in HU, MR.

On the open space (Plates 47 and 49), the maximum (in terms of %) (44.1%, n = 15) was found in GPP, N and the minimum (in terms of %) (5.9%, n = 2) was found in HU, MR

In the drain (Plates 42 and 43), individuals in the utmost (28.6%, n = 20) was found in GPP, N and the least proportion of individuals (4.3%, n = 3) was found in HU, MR.

In the garbage, the highest proportion of individuals (32.9%, n = 30) was found in GPP, Ni and the lowest proportion of individuals (6.6%, n = 6) was found in HU, MR.

On the tree, the figure for the most (in terms of %) of individuals (26.1%, n = 6) was found in JUC and the least proportion of individuals (13%, n = 3) was found in HU, MR.

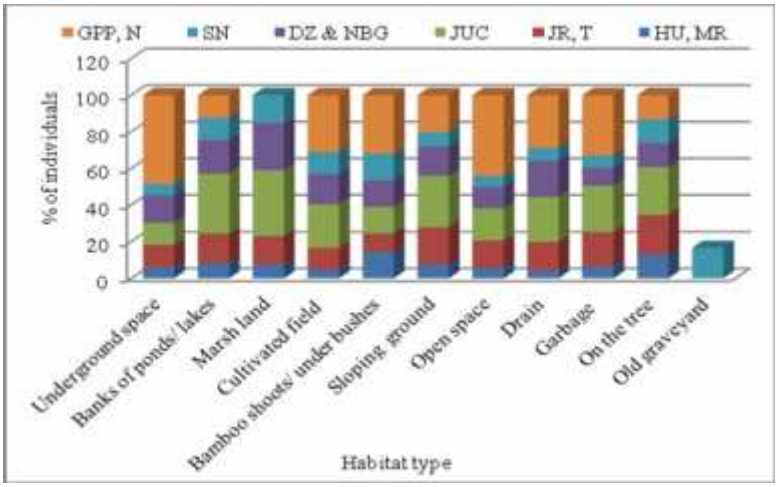

Fig. 4.1.16. Overall percentage of population in different habitats in six areas throughout the study period (2011-2014)

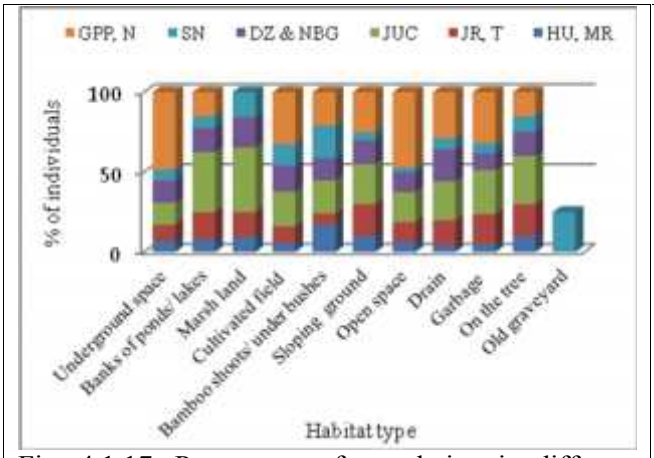

Fig. 4.1.17. Percentage of population in different habitats in six study areas in 2011

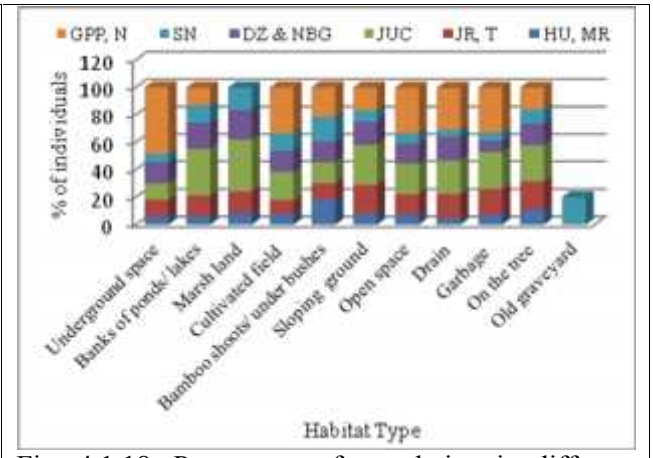

Fig. 4.1.18. Percentage of population in different habitats in six study areas in 2012

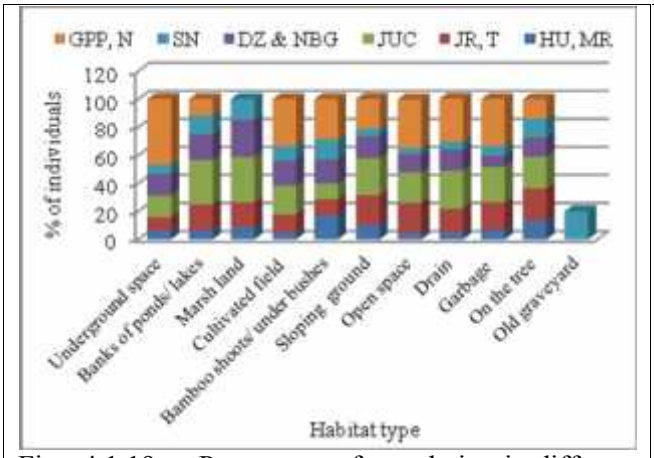

Fig. 4.1.19. Percentage of population in different habitats in six study areas in 2013

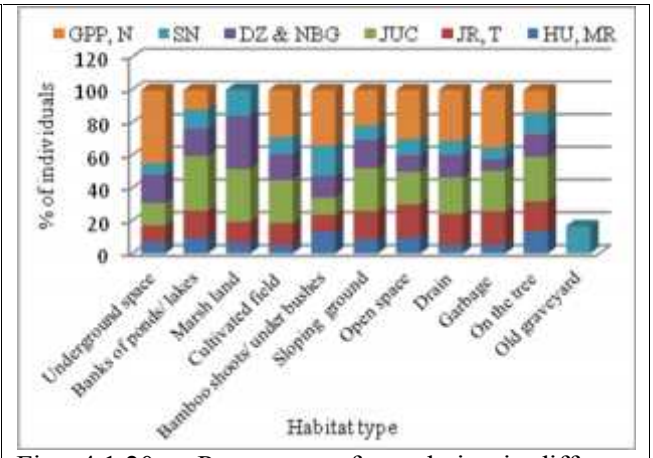

Fig. 4.1.20. Percentage of population in different habitats in six study areas in 2014

The old graveyard (Plate 106) this habitat was found in only in Kaltapara and Bostall village, Jampur Union, Sonargaon, Narayangonj (SN) and the proportion (in terms of %) of individuals was 16.7% (n = 6). The overall population size considering the habitats in six study areas varied significantly (χ^2=129.4, df=10, $p < 0.01$) (Fig. 4.1.16; Appendices 18, 12-17).

Annual variation

In the year of 2011

In underground space, the figure for the most (48.3%, n = 16) was found in Ghorashal Power Plant, Plash, Narsingdi (GPP, N) and the least (6.9%, n = 2) was found in Hazratpur and Rasulpur village, Hazratpur Union Parishad, Mithapukur, Rangpur (HU, MR).

On the banks of the ponds or lakes (Plates 60 and 62), the maximum (37.5%, n = 15) was found in (JUC) and the minimum (8.2%, n = 4) was found in HU, MR and Kaltapara and Bostall village, Jampur Union Parishad, Sonargaon, Narayangonj (SN).

In marsh lands (plates 53 and 56), the highest proportion of individuals (40.6%, n = 13) was found in (JUC) and the lowest proportion (in terms of %) of individuals (9.4 %, n = 3) was found in HU, MR.

In cultivated field (Plate 59), the figure for the most (in terms of %) (32.4%, n = 12) was found in (GPP, N) and the least (in terms of %) (5.4%, n = 2) was found in HU, MR.

Inside the bamboo clumps or under bushes (Plate 55), the highest proportion of individuals (20.7%, n = 6) was found in JUC, SN and GPP, N. The lowest proportion of individuals (6.9%, n = 2) was found in Jamuna Resort, Kalihati, Tangail (JR, T).

In sloping ground, the maximum (25.0%, n = 5) was found in JUC and GPP, N. The minimum (5.0 %, n = 1) was found in SN (Plate 48).

In the open space (Plate 57), the highest proportion of individuals (46.9%, n = 15) was found in GPP, N and the lowest proportion of individuals (3.1%, n = 1) was found in SN.

In the drain individuals in the utmost (28.6%, n = 20) was found in GPP, N and the least proportion of individuals (4.3%, n = 3) was found in HU, MR.

In the garbage, the figure for the most (32.1%, n = 27) was found in GPP, N and the least (4.8%, n = 4) was found in HU, MR.

On the tree, the highest proportion of individuals (30.0%, n = 6) was found in JUC and the lowest proportion of individuals (10.0%, n = 2) was found in HU, MR and SN.

The old graveyard this habitat was found in only in Kaltapara and Bostall village, Jampur Union, Sonargaon, Narayangonj (SN) and the proportion (in terms of %) of individuals was 25.0% (n = 4). The population size considering the habitats in six study areas varied significantly (χ^2=142.5, df=10, $p < 0.01$) (Fig. 4.1.17; Appendices 19, 12-17).

In 2012

In underground space, the figure for the most (48.5%, n = 16) was found in GPP, N and the least (6.1%, n = 2) was found in HU, MR.

On the banks of the pond or lakes (Plate 62), the maximum (34.0%, n = 16) was found in JUC and the minimum (6.4%, n = 3) was found in HU, MR.

In marsh lands, individuals in the utmost (37.8%, n = 14) was found in JUC and the least proportion of individuals (8.1 %, n = 3) was found in HU, MR.

In cultivated field, the figure of the most (33.3%, n = 13) was found in GPP, N and the least (7.7%, n = 3) was found in HU, MR.

Inside the bamboo clumps or under bushes (Plate 55), the highest proportion of individuals (18.2%, n = 6) was found in SN and the lowest proportion of individuals (12.1%, n = 4) was found in Jamuna resort, Kalihati, Tangail (JR, T).

In sloping ground, the maximum (29.2%, n = 7) was found in JUC and the minimum (8.3%, n = 2) was found in HU, MR and SN.

In the open space, the highest proportion of individuals (33.3%, n = 9) was found in GPP, N and the lowest proportion of individuals (7.4%, n = 2) was found in HU, MR and SN.

In the drain, the figure for the most (30.6%, n = 19) was found in GPP, N and the least (4.8%, n = 3) was found in HU, MR and SN.

In the garbage (Plate 61), individuals in the utmost (32.9%, n = 28) was found in GPP, N and the least proportion of individuals (5.9%, n = 5) was found in SN.

On the tree (Plate 64), the highest proportion of individuals (26.3%, n = 5) was found in JUC and the lowest proportion of individuals (10.5%, n = 2) was found in HU, MR and SN.

The old graveyard this habitat was found in only in Kaltapara and Bostall village, Jampur Union Parishad, Sonargaon, Narayangonj (SN) and the proportion (in terms of %) of individuals was 20.0% (n = 5). The population size considering the habitats in six study areas varied significantly (χ^2=125.3, df=10, p < 0.01) (Fig. 4.1.18; Appendices 20, 12-17).

In 2013

In underground space, the highest (46.9%, n = 15) was found in GPP, N and the lowest (6.3%, n = 2) was found in HU, MR and SN.

On the banks of the pond or lakes, the maximum of (31.8%, n = 14) was found in JUC and the minimum (6.8%, n = 3) was found in HU, MR.

In marsh lands, the highest proportion of individuals (32.4%, n = 11) was found in JUC and the lowest proportion of individuals (8.8 %, n = 3) was found in HU, MR.

In cultivated field, the figure for the most (33.3%, n = 13) was found in GPP, N and the least (5.1%, n = 2) was found in HU, MR.

Inside the bamboo clumps or under bushes, the highest proportion of individuals (28.6%, n = 10) was found in GPP, N and the lowest proportion of individuals (14.3%, n = 5) was found in SN.
In sloping ground, a maximum of (26.3%, n = 5) was found in JUC and the minimum (5.3%, n = 1) was found in SN.

In the open space, the highest proportion of individuals (34.8%, n = 8) was found in GPP, N and the lowest proportion of individuals (4.3%, n = 1) was found in HU, MR and SN.

In the drain, individuals in the utmost (30.5%, n = 18) was found in GPP, N and the least proportion of individuals (5.1%, n = 3) was found in HU, MR and SN.

In the garbage, the figure for the most (33.3%, n = 29) was found in GPP, N and the least (6.9%, n = 5) was found in HU, MR and SN.

On the tree, the highest proportion of individuals (22.7%, n = 5) was found in JR and JUC. The lowest proportion of individuals (13.6%, n = 2) was found in HU, MR, Dhaka Zoo and National Botanical Garden, Mirpur Model Thana, Mirpur, Dhaka (DZ & NBG), SN and GPP, N.

The old graveyard this habitat was found in only in Kaltapara and Bostall village, Jampur Union, Sonargaon, Narayangonj (SN) and the proportion (in terms of %) of individuals was 20.0% (n = 5). The population size considering the habitats in six study areas varied significantly (χ^2=133.4, df=10, p < 0.01) (Fig. 4.1.19; Appendices 21, 12-17).

In 2014

In underground space, individuals in the utmost (44.8%, n = 13) was found in GPP, N and the least (6.9%, n = 2) was found in HU, MR.

On the banks of the pond or lakes, the highest (33.3%, n = 14) was found in JUC and the lowest (9.5%, n = 4) was found in HU, MR.

In marsh lands, a maximum of (32.3%, n = 11) was found in JUC and DZ & NBG. The minimum (6.5 %, n = 2) was found in HU, MR.

In cultivated field, the figure for the most (28.9%, n = 11) was found in GPP, N and the least (5.3%, n = 2) was found in HU, MR.

Inside the bamboo clumps or under bushes, the high (in terms of %) of individuals (34.2%, n = 13) was found in GPP, N and the low (in terms of %) of individuals (10.5%, n = 5) was found in JR and JUC.

In sloping ground, the highest (21.7%, n = 5) was found in GPP, N (4.2.46) and the lowest (8.7%, n = 1) was found in HU, MR and SN.

In the open space, a maximum of (30.0%, n = 6) was found in GPP, N and the minimum (10.0%, n = 2) was found in HU, MR, DZ & NBG and SN.

In the drain, the highest proportion of individuals (31.0%, n = 18) was found in GPP, N and the lowest proportion of individuals (5.2%, n = 3) was found in HU, MR.

In the garbage, the figure for the most (35.3%, n = 30) was found in GPP, N and the least (5.9%, n = 5) was found in HU, MR.

On the tree, the highest proportion of individuals (27.3%, n = 5) was found in JUC and the lowest proportion of individuals (13.6%, n = 3) was found in HU, MR, DZ & NBG, SN and GPP, N.

The old graveyard this habitat was found in only in Kaltapara and Bostall village, Jampur Union, Sonargaon, Narayangonj (SN) and the proportion (in terms of %) of individuals was 16.7% (n = 6). The population size considering the habitats in six study areas varied significantly (χ^2=126.9, df=10, $p < 0.01$) (Fig. 4.1.20; Appendices 22, 12-17).

Population, considering the study areas, covered the all habitats throughout the study period

In Hazratpur and Rasulpur village, Hazratpur Union Parishad, Mithapukur, Rangpur (HU, MR), the highest proportion (in terms of %) of individuals (18.2%, n = 6) was found in bamboo clumps and garbage and the lowest proportion of individuals (6.1%, n = 2) was found in underground space and in cultivated field.

In Jamuna Resort, Durgapur Union Parishad, Kalihati, Tangail (JR, T), the highest proportion of individuals (24.3%, n = 17) was found in garbage and the lowest proportion of individuals (5.7%, n = 4) was found in underground space and cultivated field.

In Jahangirnagar University Campus and its adjacent area, Pathalia Union Parishad, Savar, Dhaka (JUC)), the highest proportion of individuals (21.1%, n = 23) was found in garbage and the lowest proportion of individuals (3.7%, n = 4) was found in underground space and cultivated field.
In Dhaka Zoo and National Botanical Garden, Mirpur Thana, Mirpur, Dhaka (DZ & NBG)), the highest proportion of individuals (19.7%, n = 14) was found in drain and the lowest proportion of individuals (4.2%, n = 3) was found on the trees.

In Kaltapara and Bostall village, Jampur Union Parishad, Sonargaon, Narayangonj (SN)), the highest proportion of individuals (12.2%, n = 6) was found in banks of ponds, marsh lands, bamboo clumps, garbage and old graveyard. The lowest proportion of individuals (4.1%, n = 4) was found in underground space, sloping ground and open spaces.

In Ghorashal Power Plant, Ghorashal Municipality, Plash, Narsingdi (GPP, N), the highest proportion of individuals (24.8%, n = 30) was found in garbage and the lowest proportion of individuals (2.5%, n = 3) was found on the trees. The overall population size considering the study areas that covered all habitats varied significantly (χ^2=76.1, df=5, $p < 0.01$) (Fig. 4.1.16; Appendices 23, 12-17).

Annual variation

In 2011

In Hazratpur and Rasulpur village, Hazratpur Union Parishad, Mithapukur, Rangpur (HU, MR), the highest proportion of individuals (14.3%, n = 4) was found in garbage and the lowest proportion of individuals (7.1%, n = 2) was found in underground space cultivated field, sloping ground, open space and on the tree.

In Jamuna Resort, Durgapur Union Parishad, Kalihati, Tangail (JR, T), the highest proportion (in terms of %) of individuals (26.7%, n = 16) was found in garbage and the lowest proportion (in terms of %) of individuals (3.3%, n = 2) was found in bamboo clumps.

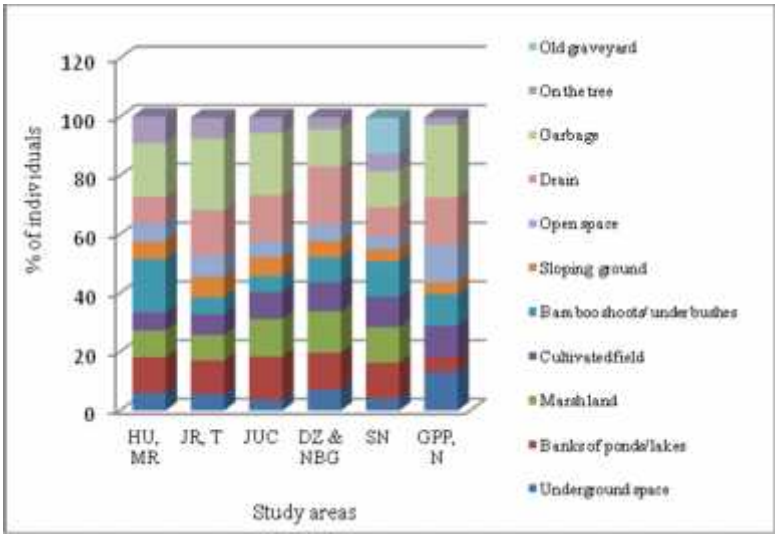

Fig. 4.1.21. Overall percentage of population in six study areas in different habitats throughout the study period (2011-2014)

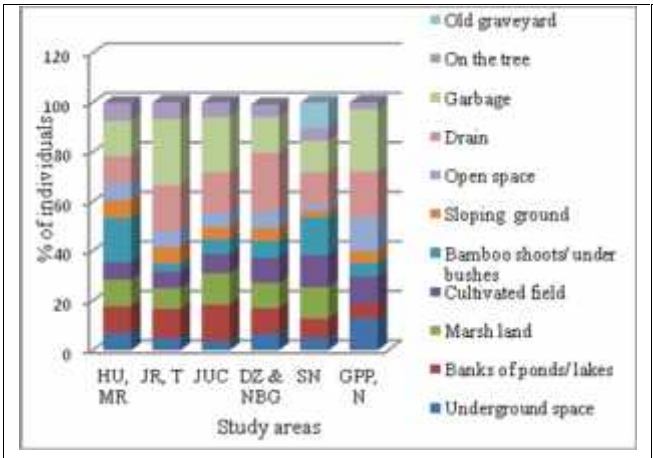

Fig. 4.1.22. Percentage of population in six study areas considering the habitats in 2011

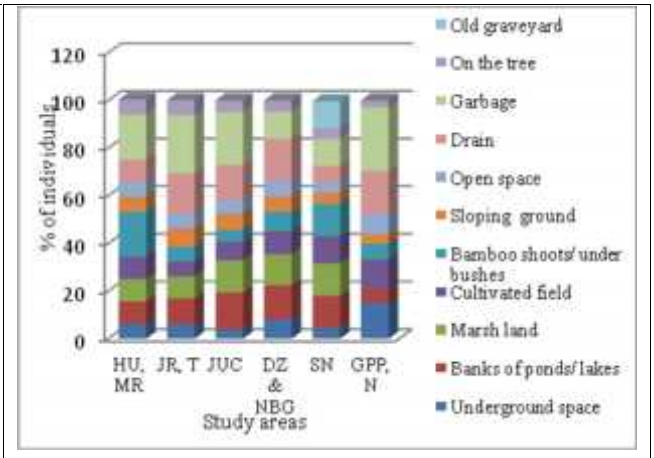

Fig. 4.1.23. Percentage of population in six study areas considering the habitats in 2012

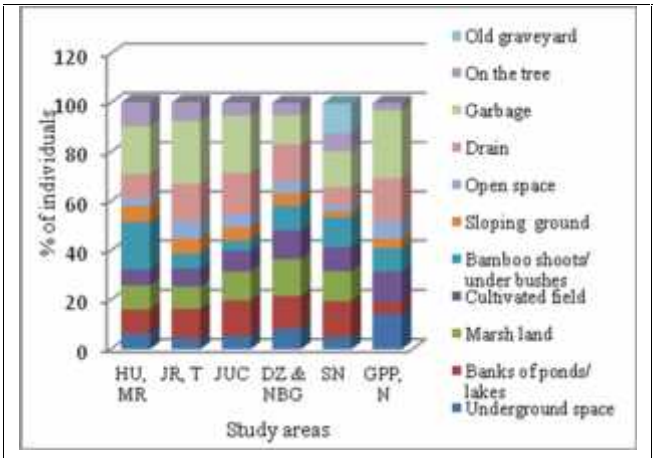

Fig. 4.1.24. Percentage of population in six study areas considering the habitats in 2013

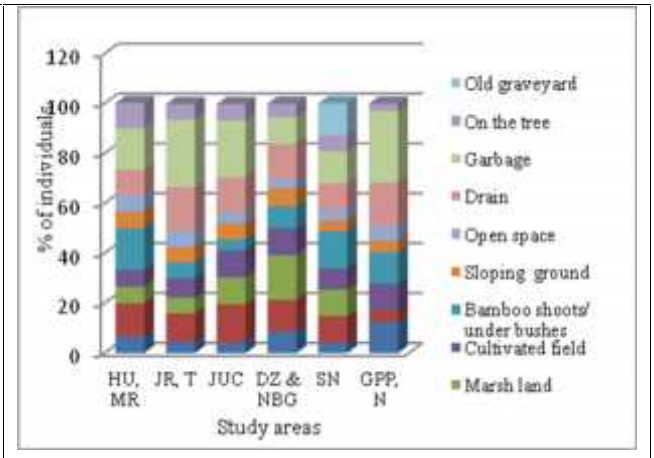

Fig. 4.1.25. Percentage of population in six study areas considering the habitats in 2014

In Jahangirnagar University Campus and its adjacent area, Pathalia Union Parishad, Savar, Dhaka (JUC)), the highest proportion of individuals (22.3%, n = 23) was found in garbage and the lowest proportion of individuals (3.9%, n = 4) was found in underground space.

In Dhaka Zoo and National Botanical Garden, Mirpur Thana, Mirpur, Dhaka (DZ & NBG)), the highest proportion of individuals (23.7%, n = 14) was found in drain and the lowest proportion of individuals (5.1%, n = 3) was found on the trees.

In Kaltapara and Bostall village, Jampur Union Parishad, Sonargaon, Narayangonj (SN)), the highest proportion of individuals (12.8%, n = 5) was found in marsh land, drain and garbage. The lowest proportion of individuals (2.6%, n = 1) was found on sloping ground and open spaces.

In Ghorashal Power Plant, Ghorashal Municipality, Plash, Narsingdi (GPP, N), the highest proportion of individuals (25.0%, n = 27) was found in garbage and the lowest proportion of individuals (2.8%, n

= 3) was found on the trees. The population size considering the study areas that covered all habitats varied significantly (χ^2=81.5, df=5, $p < 0.01$) (Fig. 4.1.22; Appendices. 24, 12-17).

In 2012

In Hazratpur and Rasulpur village, Hazratpur Union Parishad, Mithapukur, Rangpur (HU, MR), the figure for the most (18.8%, n = 4) was found in garbage and the least (6.3%, n = 2) was found in underground space, sloping ground, open space and on the tree.

In Jamuna Resort, Durgapur Union Parishad, Kalihati, Tangail (JR, T), the maximum (24.6%, n = 16) was found in garbage and the minimum (6.2%, n = 2) was found in underground space, cultivated land, bamboo shoot, open space and on the tree.

In Jahangirnagar University Campus and its adjacent area, Pathalia Union Parishad, Savar, Dhaka (JUC)), individuals in the utmost (22.3%, n = 23) was found in garbage and the least proportion of individuals (3.9%, n = 4) was found in underground space.

In Dhaka Zoo and National Botanical Garden, Mirpur Thana, Mirpur, Dhaka (DZ & NBG)), a high of (17.7%, n = 14) was found in drain and a low of (4.8%, n = 3) was found on the trees.

In Kaltapara and Bostall village, Jampur Union Parishad, Sonargaon, Narayangonj (SN)), the highest proportion of individuals (13.6%, n = 6) was found in banks of the ponds and marsh land. The lowest proportion of individuals (4.5%, n = 2) was found in the underground space, sloping ground open spaces and on the tree.

In Ghorashal Power Plant, Ghorashal Municipality, Plash, Narsingdi (GPP, N), the maximum (26.7%, n = 28) was found in garbage and the minimum (2.9%, n = 3) was found on the trees. The population size considering the study areas that covered all habitats varied significantly (χ^2=65.8, df=5, $p < 0.01$) (Fig. 4.2.23; Appendices 25, 12-17).

In 2013

In Hazratpur and Rasulpur village, Hazratpur Union Parishad, Mithapukur, Rangpur (HU, MR), the highest proportion of individuals (19.4%, n = 6) was found in garbage and the lowest proportion of individuals (3.2%, n = 1) was found on open space.

In Jamuna Resort, Durgapur Union Parishad, Kalihati, Tangail (JR, T), the figure for the most (25.4%, n = 17) was found in garbage and the least (4.5%, n = 3) was found in underground space.

In Jahangirnagar University Campus and its adjacent area, Pathalia Union Parishad, Savar, Dhaka (JUC)), a high of (23.2%, n = 22) was found in garbage and a low of (4.2%, n = 4) was found in bamboo shoot.

In Dhaka Zoo and National Botanical Garden, Mirpur Thana, Mirpur, Dhaka (DZ & NBG)), a maximum of (15.0%, n = 9) was found in marsh land and drain. A minimum of (5.0%, n = 3) was found in sloping ground, open space and on the trees.

In Kaltapara and Bostall village, Jampur Union Parishad, Sonargaon, Narayangonj (SN)), the highest proportion of individuals (14.6%, n = 6) was found on the banks of the ponds and garbage. The lowest proportion of individuals (2.4%, n = 1) was found on sloping ground and open spaces.

In Ghorashal Power Plant, Ghorashal Municipality, Plash, Narsingdi (GPP, N), the figure for the most (27.6%, n = 29) was found in garbage and the least (2.9%, n = 3) was found on the trees. The population size considering the study areas that covered all habitats varied significantly (χ^2=63.9, df=5, $p < 0.01$) (Fig. 4.1.24; Appendices 26, 12-27).

In 2014

In Hazratpur and Rasulpur village, Hazratpur Union Parishad, Mithapukur, Rangpur (HU, MR), a maximum of (16.7%, n = 5) was found in bamboo clumps and garbage. A minimum of (6.7%, n = 2) was found in underground space, marsh land, cultivated field, sloping ground, open space.

In Jamuna Resort, Durgapur Union Parishad, Kalihati, Tangail (JR, T), the highest proportion of individuals (27.0%, n = 17) was found in garbage and the lowest proportion of individuals (4.8%, n = 3) was found in the underground space.

In Jahangirnagar University Campus and its adjacent area, Pathalia Union Parishad, Savar, Dhaka (JUC)), a maximum of (22.8%, n = 23) was found in garbage and a minimum of (4.3%, n = 4) was found in underground space and open space.

In Dhaka Zoo and National Botanical Garden, Mirpur Thana, Mirpur, Dhaka (DZ & NBG)), the figure for the most (17.9%, n = 10) was found in marsh land and the least (3.6%, n = 3) was found on the open space.

In Kaltapara and Bostall village, Jampur Union Parishad, Sonargaon, Narayangonj (SN)), individuals in the utmost (14.9%, n = 7) was found in bamboo clumps and the least proportion of individuals (4.3%, n = 2) was found in the underground space, on the sloping ground and open spaces.

In Ghorashal Power Plant, Ghorashal Municipality, Plash, Narsingdi (GPP, N), the highest proportion of individuals (28.8%, n = 27) was found in garbage and the lowest proportion of individuals (2.9%, n = 3) was found on the trees. The population size considering the study areas that covered all habitats varied significantly (χ^2=59.5, df=5, $p < 0.01$) (Fig. 4.1.25; Appendices 27, 12-17).

Overall mean population size (in terms of %) in different habitats of six study areas

Mean population size in terms of percentage, considering the habitats were 17.29 % in garbage (15.2±9.9), 13.3 % in drain (11.7±6.7), on the banks of the pond/lake 9.33 % (8.2±4.2), 14.79% in cultivated land (13.0±7.0), 7.74 % in bamboo clumps/bushes (6.8±3.2), 8.87 % in marsh lands

(7.8±4.3), 6.48 % in open spaces (5.7±4.8), 6.26 % in underground spaces (5.5±5.3), 4.78 % in sloping ground (4.2±1.9), 4.32 % on the trees (3.8±1.3) and 6.83 % in old graveyard (6.0) (Fig.4.1.26).

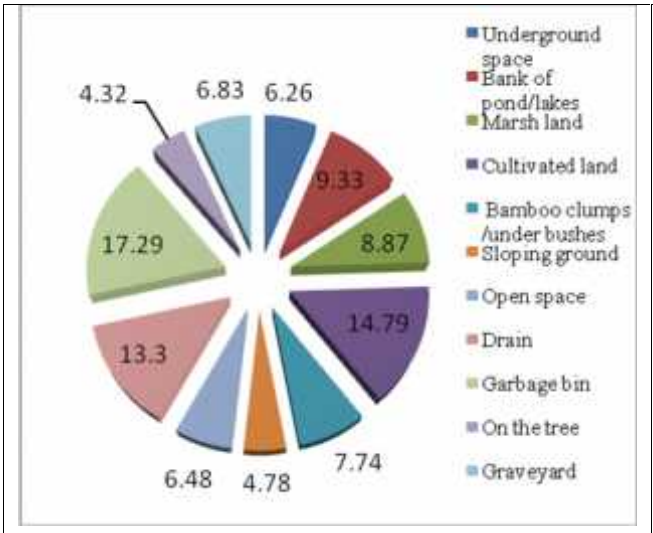

Fig. 4.1.26. Overall mean population size (in terms of %) considering the habitats in different study areas throughout the study period

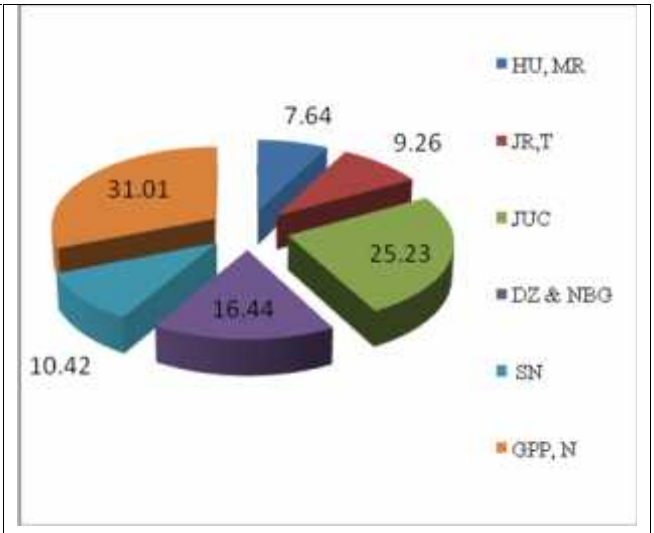

Fig. 4.1.27. Overall mean population size (in terms of %) considering the study areas in different habitats throughout the study period

Overall mean population size (in terms of %) in six study areas of different habitats

Overall mean population size considering the study areas in different habitats were 7.64 % (3.3±1.6) in Hazratpur and Rasulpur village, Hazratpur Union Parishad, Mithapukur, Rangpur, 9.26 % (4.0±4.1) in Jamuna Resort, Durgapur Union Parishad, Kalihati, Tangail, 25.23 % (10.9±6.3) in Jahangirnagar University Campus and its adjacent area, Pathalia Union Parishad ,Savar, Dhaka, 16.44 % (7.1±3.4) in Dhaka Zoo and National Botanical Garden, Mirpur Model Thana, Mirpur, Dhaka, 10.42 % (4.5±1.8) in Kaltapara and Bostall village, Jampur Union Parishad, Sonargaon, Narayangonj and 31.01 % (13.4±8.4) in Ghorashal Power Plant, Ghorashal Municipality, Palash, Narsingdi (Fig 4.1.27).

Sex ratio

Sex ratios of Bengal lizards in six study areas were different during the study period. The overall male-female ratio of Hazratpur Union Parishad, Rangpur; Jamuna Resort, Durgapur Union Parishad, Tangail, Jahangirnagar University Campus, Pathalia Union Parishad, Savar, Dhaka, Dhaka Zoo and National Botanical Garden, Mirpur, Dhaka, Sonargaon, Narayangonj; Ghorashal Power Plant, Ghorashal Municipality, Palash, Narsingdi and Animal Garden, Dhaka University were 1:1.8, 1:1.3, 1:1.4, 1:1.3, 1:1, 1:1.5 and 1:1.9 respectively in May 2011 (Fig. 4.1.28; Table 4.1.6).

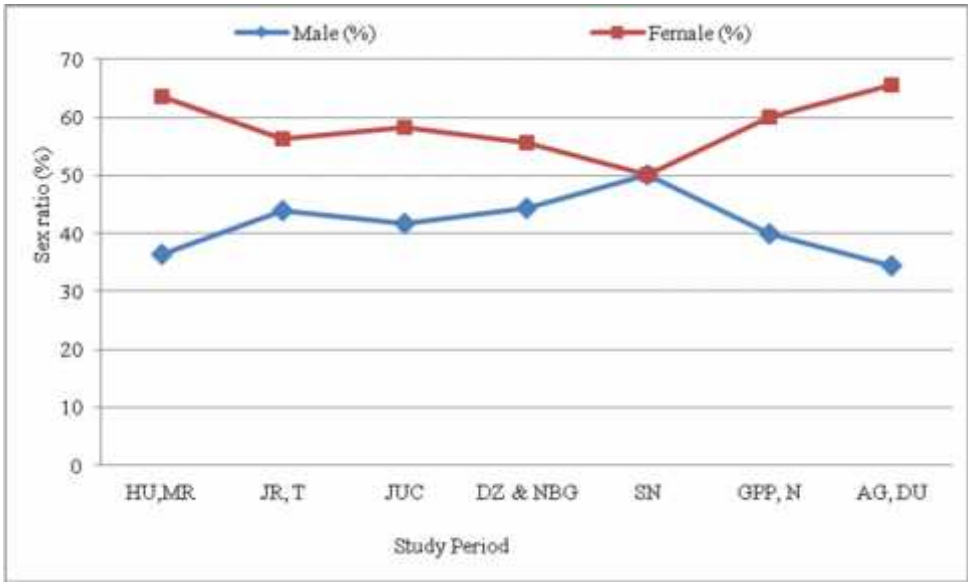

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Fig. 4.1.28. Percentage (%) of males and females population of Bengal monitors in seven study areas in May 2011-June 2014.

Table 4.1.1. Distribution of age groups in six study areas during study period (2011-2014)

Study (surveyed Area) Area	Adults		Juveniles		Young	
	No.	(%)	No.	(%)	No.	(%)
Hazratpur Union Rangpur	15	60	6	24	4	16
Jahangirnagar University Campus and its adjacent areas, Savar,	46	55.4	23	27.7	14	16.9
Jamuna Resort, Kalihati, Tangail	25	47.2	19	35.8	9	17.0
Dhaka Zoo & National Botanical Garden, Mirpur, Dhaka	28	55.0	15	29.4	8	15.6
Kaltapara & Bostall village Sonargaon, Narayangonj	19	52.8	10	27.8	7	19.4
Ghorashal Power Plant, Palash, Narsingdi	46	49.5	26	28	21	22.5

Table 4.1.2. Distribution of age groups in six study area in 2011

Study (surveyed Area) Area	Adults		Juveniles		Young	
	No.	(%)	No.	(%)	No.	(%)
Hazratpur Union Rangpur	12	57.2	7	33.3	2	9.5
Jahangirnagar University Campus and its adjacent areas, Savar, Dhaka	46	55.4	23	27.7	14	16.9
Jamuna Resort, Kalihati, Tangail	23	45.1	18	35.3	10	19.6
Dhaka Zoo & National Botanical Garden, Mirpur, Dhaka	28	55.0	15	29.4	8	15.6
Kaltapara & Bostall village Sonargaon, Narayangonj	20	58.8	8	23.6	6	17.6
Ghorashal Power Plant, Palash, Narsingdi	47	51.0	31	33.7	14	15.3

Table 4.1.3. Distribution of age groups in six study area in 2012

Study (surveyed Area) Area	Adults		Juveniles		Young	
	No.	(%)	No.	(%)	No.	(%)
Hazratpur Union Rangpur	11	45.8	9	37.5	4	16.7
Jahangirnagar University Campus and its adjacent areas, Savar, Dhaka	49	61.3	20	25.0	11	13.7
Jamuna Resort, Kalihati, Tangail	27	54.0	13	26.0	10	20.0
Dhaka Zoo & National Botanical Garden, Mirpur, Dhaka	25	52.1	15	31.2	8	16.7
Kaltapara & Bostall village Sonargaon, Narayangonj	22	61.1	9	25.0	5	13.9
Ghorashal Power Plant, Palash, Narsingdi	46	50.5	25	27.5	20	22.0

Table 4.1.4. Distribution of age groups in six study area in 2013

Study (surveyed Area) Area	Adults		Juveniles		Young	
	No.	(%)	No.	(%)	No.	(%)
Hazratpur Union Rangpur	15	60	6	24	4	16
Jahangirnagar University Campus and its adjacent areas, Savar, Dhaka	40	52.0	23	29.9	14	18.1
Jamuna Resort, Kalihati, Tangail	24	45.3	17	32.1	12	22.6
Dhaka Zoo & National Botanical Garden, Mirpur, Dhaka	25	51.0	15	30.6	9	18.4
Kaltapara & Bostall village Sonargaon, Narayangonj	19	55.9	9	26.5	6	17.6
Ghorashal Power Plant, Palash, Narsingdi	46	49.5	26	28.0	21	22.5

Table 4.1.5. Distribution of age groups in six study area in 2014

Study (surveyed Area) Area	Adults		Juveniles		Young	
	No.	(%)	No.	(%)	No.	(%)
Hazratpur Union Rangpur	13	54.2	8	33.3	3	12.5
Jahangirnagar University Campus and its adjacent areas, Savar, Dhaka	42	56.8	20	27.0	12	16.2
Jamuna Resort, Kalihati, Tangail	25	47.1	19	35.9	9	17.0
Dhaka Zoo & National Botanical Garden, Mirpur, Dhaka	24	51.1	14	29.8	9	19.1
Kaltapara & Bostall village Sonargaon, Narayangonj	19	52.8	10	27.7	7	19.5
Ghorashal Power Plant, Palash, Narsingdi	44	47.3	31	33.3	18	19.4

Table 4.1.6. Male-female Ratio of Bengal lizards in seven study areas during study period (2011-2014)

Sl. No.	Study Area	Total Individuals	Male				Female				Ratio	
			Overall No.	(%)	Adult	(%)	Overall No.	(%)	Adult No.	(%)	Overall	Adult
01	HU, MR	11	4	36.4	3	27.3	7	63.6	6	54.5	1:1.8	1:2
02	JR, T	16	7	43.8	5	31.3	9	56.3	7	43.8	1:1.3	1:1.4
03	JUC	12	5	41.7	4	33.3	7	58.3	5	41.7	1:1.4	1:1.7
04	DZ & NBG	9	4	44.4	3	33.3	5	55.6	4	44.4	1:1.3	1:1.3
05	SN	12	6	50.0	4	33.3	6	50.0	4	33.3	1:1	1:1.0
06	GPP, N	10	4	40.0	3	30.0	6	60.0	5	50.0	1:1.5	1:1.7
07	AG, DU	32	11	34.4	8	25.0	21	65.6	15	46.9	1:1.9	1:1.9
Total		102	41		30		61		46			
Mean		14.6±7.9	5.8±2.5	40.1	4.3±		8.7±5.6	59.8	6.6±3.		1:1.5	1:1.5

CHAPTER 4: RESULTS

4.2 Breeding

Breeding season

The breeding season of Bengal lizards starts during July to September and ends between March and April. In this period, males become sexually active and follow the females; male-male combat occurs, males show excitement, agitation, militancy and so on. Copulation was recorded under bushes and vegetation as well as near the rotten logs. During breeding season male showed some pre-copulating behaviours such as bipedal standing, male-male fighting, male-female biting for sexual urge and at last male mounts on the female. All these activities seen in nature were categorized into six types (Fig. 4.2.1). Some dead animals were dissected during breeding period and accumulated fats were seen in the abdomen of the males and developed ovaries in females.

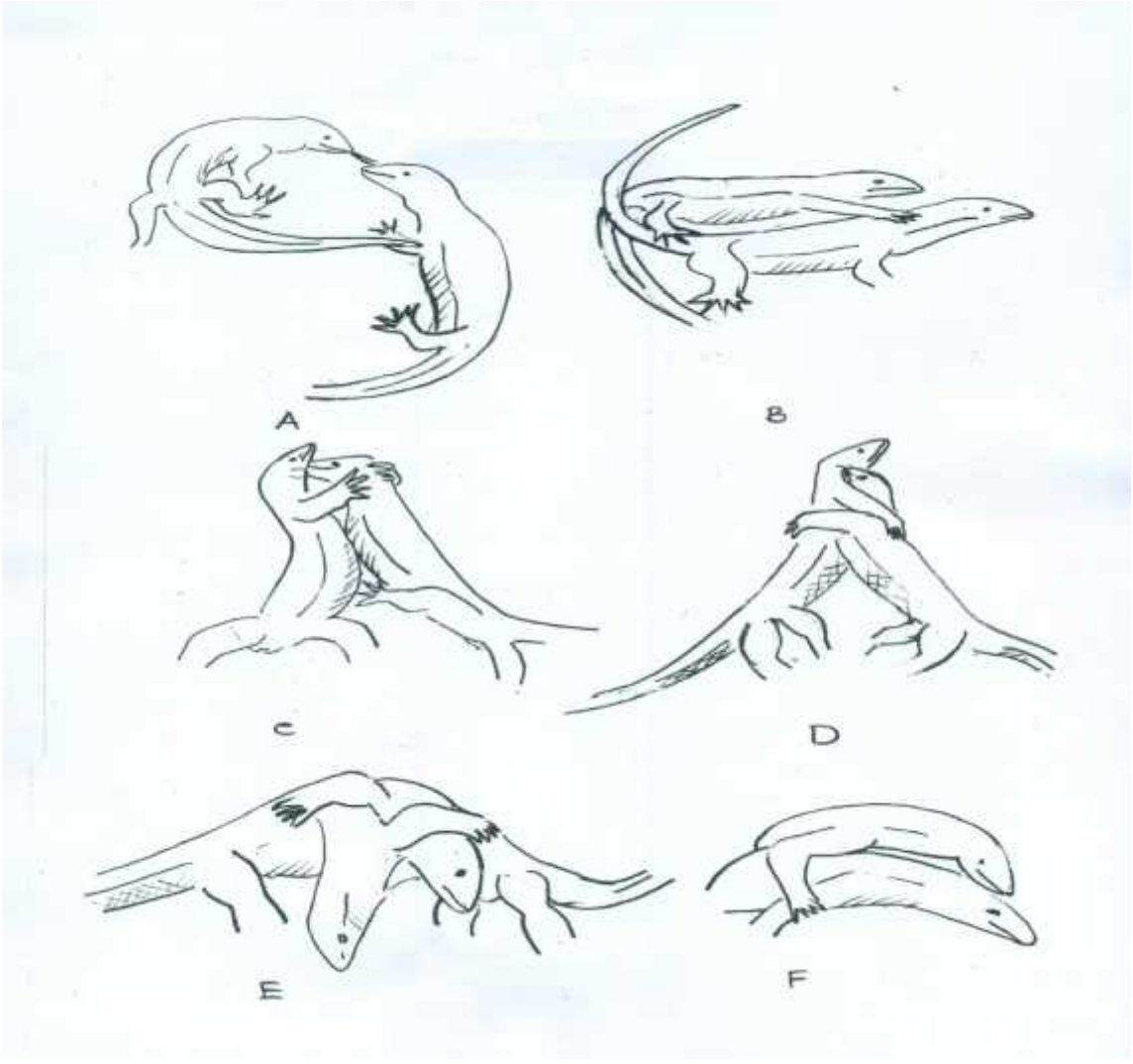

Fig. 4.2.1. Sketch of different stages of male-male combat wrestling

Male-male combat wrestling for female

Male-male combat wrestling was recorded between July and August in different study areas. The males flick their tongues and touch the head each other. During this time, they also curve their bodies and repeat the similar flicking and touching behavior (Fig.4.2.1A).

For dominating the rival, male places front limbs on the neck or head region of the opponent. At this time, the dominant male scratches the rival with claws (Fig. 4.2.1.B). From this stage, bipedal wrestling starts. Both rivals stand with two hind limbs and tails on land. Tail keeps the balance to stand with two legs. One pushes the throat of the rival by snout (Fig.4.2.1 C). In this stage, they embraced each other by holding their neck or abdomen region by front limbs and push each other in such a way so that one would fall down on the land (Fig. D).

At this stage, bipedal stand breaks down, but wrestling goes on horizontally instead of vertically on the land (Fig.4.2.1 E). After falling down on land, the dominant male mounts the rival male and sometimes it was observed that mounted male bites the neck or head region (Fig. 4.2.1F). The defeated male runs away. The Bengal lizards spent 3-6 minutes in combat wrestling (Table 4.2.1). After winning the combat wrestling, the dominant male presumably copulates with the female.

Nest site

Two study areas were selected for the study of nesting sites: (1) Jahangirnagar University Campus and (2) Jamuna Resort, Tangail. Most of the termite mounds were found behind the gymnasium and its adjacent areas in Jahangirnagar University Campus, Savar, Dhaka and in garbage area at Jamuna Resort, Tangail. These two areas are very calm, quiet, undisturbed and uninhabited by people. The Bengal lizards prefer to nest in termite mounds. During three years (2012 to 2014), 58 termite mounds were observed, of which 24 (41.7%) were used for nesting. The maximum termite mounds were used in 2014 (Appendix 29). Termites make mounds in comparatively high lands of an area and these lands become wet in the monsoon and dry up in winter (i. e., in dry season). Females select the nesting sites. The nested termite mounds were 3.6 – 6 m far from the nearest water bodies. The vegetation covers around the nesting termite mounds were mostly *Centella asiatica* (Thankuni), *Cynodon dactylon* (Durba), *Datura metel* (Dhutura), *Brassica napus* (Shorisha). The average height from the ground, base circumferences and base radius of 24 termite mounds were 83.96±24.42 (range 32 to 132 cm), 733.33±108.87 (range 590 to 925 cm) and 116.44±17.34 cm (range 60.0 to 148 cm) respectively. The average distance between nests and the nearest water bodies was 18.0±7.59 m (range 9.0 to 35.6 m) (Appendix 28, Plates 65-71).

The relationship among different parameters of nested termite mounds, were calculated. There were significant correlation differences between height from the ground and base circumference, between height from the ground and base radius, and between base circumference and base radius of the termite mounds in 2012, 2013 and 2014 (Table 4.2.2). There were no significant differences among different heights ($F=0.50$, $df=2/21$, $p > 0.05$), circumferences ($F=0.03$, $df=2/21$, $p > 0.05$), base radius ($F=0.04$, $df=2/21$, $p > 0.05$), and distance from the nearest water body ($F=1.15$, $df=2/21$, $p > 0.05$) of termite mounds in 2012, 2013 and 2014.

Soil texture of the termite nested mounds

The soil texture of nests (n = 6) of Bengal lizards at JUC was composed of sand (11.28%), silt (42.14%) and clay (46.58%) (Appendix 30).

Nest digging behavior of females Bengal lizards

They use front legs in digging nests and observe surroundings time to time. They mostly dig nests during afternoon and complete nest building within 3-4 days.

Nest shape and size

Nests are pitcher shaped i.e., the opening was always less in diameter than the interior part. The overall diameters, circumference, depth and height from the ground of 24 active nests were 33.6±2.9 cm (range 29.6-38.3 cm), 105.6 ±9.2 cm (range 92.9-118.7 cm), 23.2±1.1cm (range 21.4-24.4 cm) and 28.1±2.7 cm (23.6-32.6 cm) (Figs. 4.2.2, 4.2.3; Appendix 31, Plate 72).

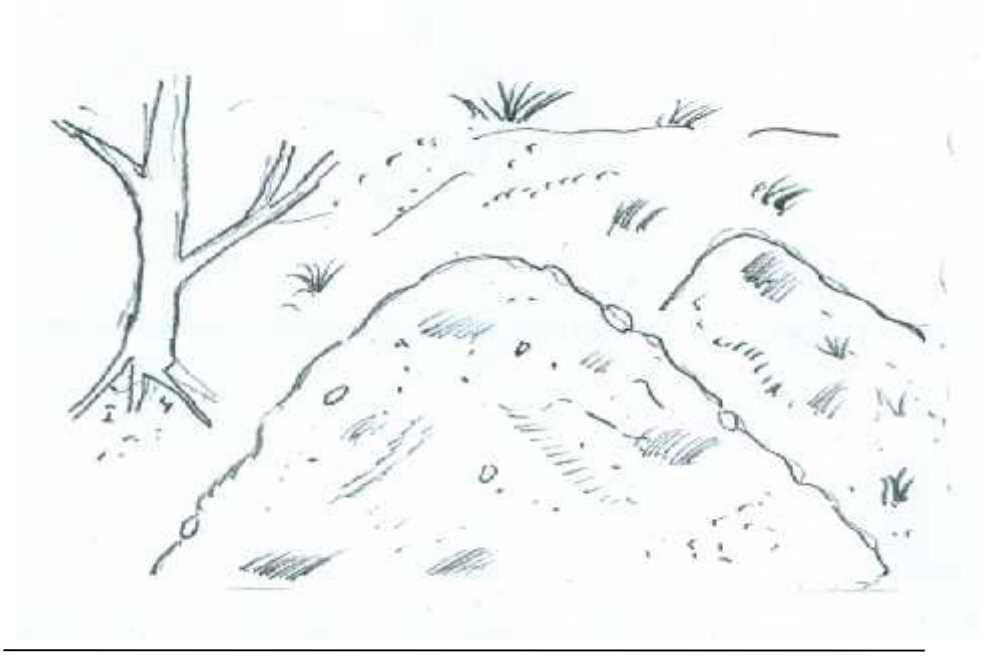

Fig.4.2.2.Sketch of a termite mound.

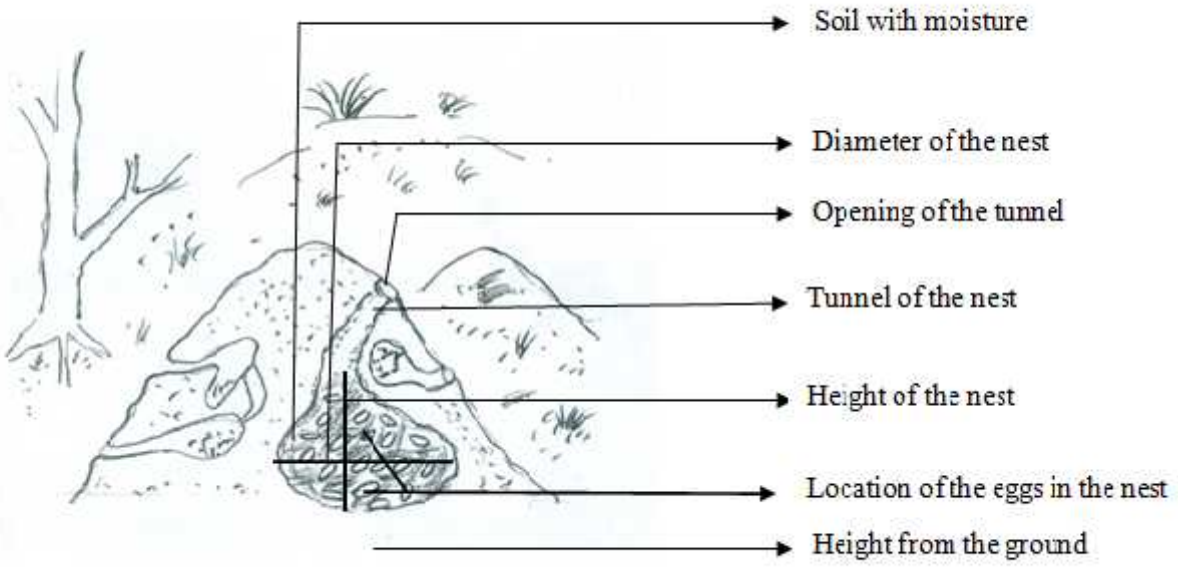

Fig. 4.2.3. Sketch of a same dug up termite mound, showing the location of eggs.

The relationship among different parameters of active nests in termite mounds were calculated. There were significant correlation differences between active nest diameter and nest circumference, between active nest diameter and nest depth, and between nest circumference and nest depth in 2012, 2013 and 2014 (Table 4.2.3). There were no significant differences among different diameters ($F=0.19$, $df=2/21$, $p > 0.05$), circumferences ($F=0.19$, $df=2/21$, $p > 0.05$), depths ($F=0.34$, $df=2/21$, $p > 0.05$), and height ($F=1.02$, $df=2/21$, $p > 0.05$) from the ground to the active nests in termite mounds in 2012, 2013 and 2014.

Nesting Time

Bengal lizards nesting started between end of September and first week of October.

Eggs and Clutch Size

Eggs were arranged side by side, upside down, horizontally and vertically. Spaces between eggs were filled with moist soil. The mean clutch size of nests was 24.57±7.11 (range 39-18, n=7) (Table 4.2.19).

Shape and Color of the eggs and egg-shell

Eggs are elongated in shape. The anterior end of the eggs is slightly pointed and the posterior end is slightly tapered. The eggs are generally whitish and occasionally slightly brownish in color. The color of eggs becomes slightly yellowish before hatching possibly due to the influence of soil color. The egg-shell is delicate and leathery. Before hatching, the shell becomes more soft and deformed. Sometimes it seems to be brownish in color presumably because of a brownish layer of the soil of termite mounds (Plates 73-79).

Measurements of eggs

Measurements of eggs were taken from 7 clutches in three different years (Fig. 4.2.4).

Length: The average length of all eggs is 5.93±0.19 cm. (range 5.6 – 6.3 cm, n=172)

There is no significance difference of overall egg lengths in three different years ($F = 2.56$, $df =2/4$, $p > 0.05$).

Width: The average width of eggs was 3.95±0.22 cm (range 3.5 – 4.4 cm, n=172).

There is no significance difference of egg overall widths in three different years ($F = 1.26$, $df =2/4$, $p > 0.05$).

Girth: The average girth of eggs was 12.62±0.52cm. (range 13.3 – 11.4 cm, n=172).

There is no significance difference of overall egg girths in three different years ($F = 2.24$, $df = 2/4$, $p > 0.05$).

Weight: The average weight of eggs was 41.45±1.74 g. (range 46.8 -3 7.7 g, n=172).

There is no significance difference of overall egg weight in three different years ($F =0.67$, $df = 2/4$, $p > 0.05$).

Volume: The average volume of eggs was 51.35±1.77 cm^3. (range 53.8 – 48.2 cm^3, n=172).

There is no significance difference of overall egg volume in three different years (F = 2.37, df = 2/4, p > 0.05) (Fig. 4.2.4; Table 4.2.4 ; Appendix 32).

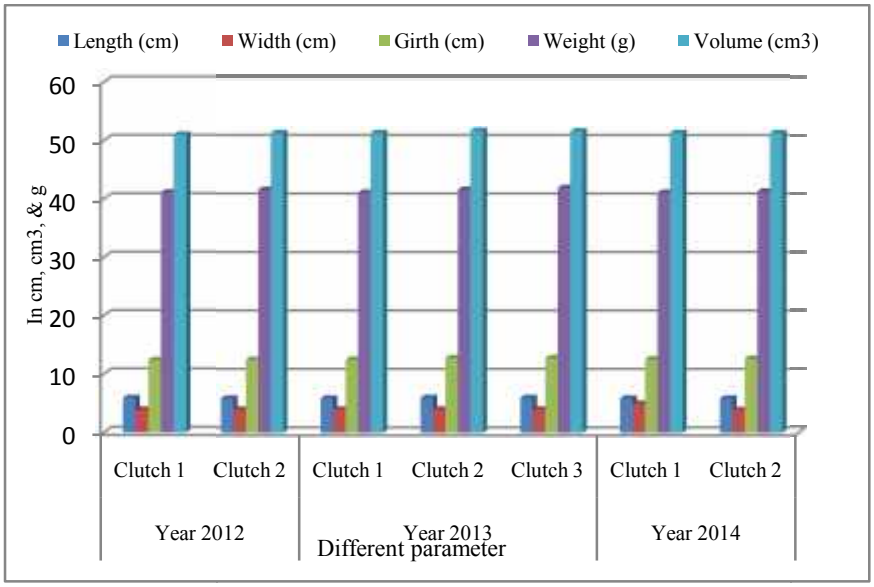

Fig. 4.2.4. Different parameters of eggs (7 clutches) in 2012-2014

Relationship among different parameters of eggs

There were significantly correlated relationship between length and width of eggs, length and girth, length and weight in 2012, 2013 and 2013.

Incubation period

The incubation period ranged from 191 to 198 days with an average of 194.8±1.79 days (n=72 eggs) in 2 nests (Appendix 33).

Temperature of nest

The morning (09:00-12:00) temperature of the breeding nest varied from 11 to 28^{0}C and the mean was 18.48±4.91^{0}C. The afternoon (13:00 – 17:00) temperature of the breeding nest of Bengal monitors varied from 18 to 35^{0}C with an average of 25.92±5.3^{0}C (Appendix 34).

Humidity of nest

The morning (09:00-12:00) humidity of the breeding nest of Bengal lizards varied from 83% to 98% and the mean was 90.84 ±4.03. The afternoon (09:00-12:00) humidity of the breeding nest varied from 34% to 75% and the mean was 54.11±7.67 (Appendix 34).

Hatching time

Fifty one (i. e., 72.86%) out of 70 eggs hatched out during day time and 19 (i. e., 27.14%) at night in March and April.

Overall weight variation of eggs during incubation period

The overall weight of fresh eggs was 41.4±1.9 g (range 46.8 - 37.7 g). After 30 days of incubation, eggs were weighed and the mean was 41.7g±1.9 g (range 46.9 - 37.8g), so the average weight was increased by 0.5%. After 60 days of incubation, mean weight was 41.7±1.9 g (range 47.1 - 38.0 g), so

the average weight was increased by 0.4%. After 90 days of incubation, mean weight was 41.7±2.4 g (range 47.4- 38.3g). It means that after 90 days of incubation, the weight was increased by 0.4%. After 120 days of incubation, the mean weight was 42.0±1.9 g (range 47.6 - 38.4 g). Here the average weight was increased by 0.4%. After 150 days of incubation, the mean weight was 42.3±2.1 g (range 47.8 - 38.6 g), so weight was increased by 0.4%. After 180 days of incubation, the mean weight was 42.5±2.1 g (range 47.9 - 38.7g). It means that weight was increased by 0.4%. At the time of hatching, mean weight was 42.5±1.9 g (range 47.9 - 38.8g) and weight was increased by 0.2% (Table 4.2.10; Appendix 40). There is no significance difference of overall weight variations at the time of incubation periods in three different years ($F = 3.00$, $df = 2/18$, $p > 0.05$).

Hatching success

The overall three years' hatching success of eggs was 89.4% with the highest (92.3%) in 2012 (Table 4.2.20). The majority of eggs (63.9%) hatched out in March and the rest (36.1%) in April (Table 4.2.20).

Length of hatchlings

The hatchlings of Bengal lizards were measured just after hatching then weekly up to the 10th week. The overall three years length of hatchlings just after hatching was 23.80±0.69 cm (range 25.3 - 22.7 cm, n = 72) and at the end of the 10th week it was 38.24±1.07 cm (range 41.3 - 36.4 cm, n = 63) and at the end of 27th month 115.34±9.80 cm (range 13.9 - 107.2 cm, n = 24) (Figs. 4.2.5, 4.2.6; Tables 4.2.6, 4.2.7; Appendices 35, 36 and Plates 80-82). There is no significance difference of overall lengths of hatchlings from three different clutches in 10 different weeks ($F = 0.32$, $df = 2/27$,) and in 27 different months ($F=3.09$, $df=2/42$, $p > 0.05$).

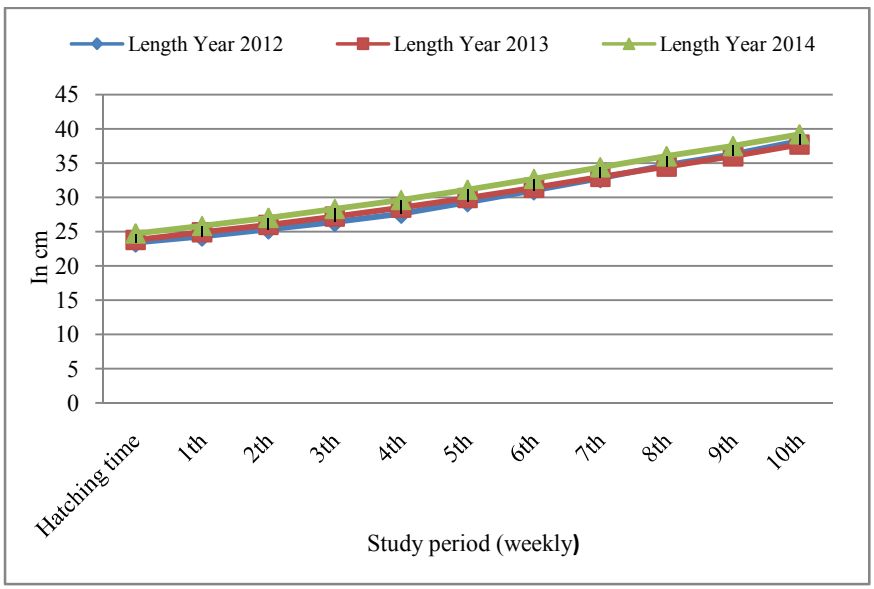

Fig. 4.2.5. Weekly average length of hatchlings of Bengal lizard in three different clutches during 2012-2014

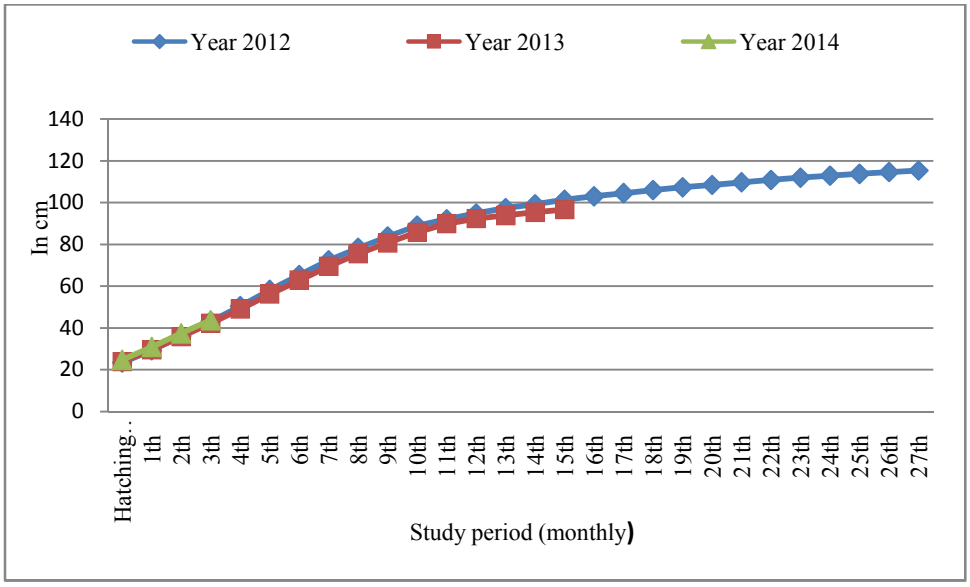

Fig. 4.2.6 Monthly average length of Bengal lizard from hatchlings to adults in three different clutches during 2012-2014

Weight of hatchling

The hatchlings of Bengal lizards were measured just after hatching then weekly up to the 10th week. The overall weight of hatchlings just after hatch was 17.91±1.03 g, (range 19.5 to 15.8 g, n = 72) and at the end of the 10th week it was 85.69±9.44 g (range 103.5 to 66.1 g, n = 63) and at the end of 27th month 2632.71±503.93 g (range 3498.0 to 1530.0 g, n = 24) (Figs. 4.2.7 and 4.2.8; Tables 4.2.8 and 4.2.9; Appendices 37and 38; Plates 85-88 and 90).

There is no significance difference of overall weights of hatchlings from three different clutches in 10 different weeks (F = 0.11, df = 2/27, p > 0.05) and in 27 different months (F=6.81, df=2/42, p > 0.05).

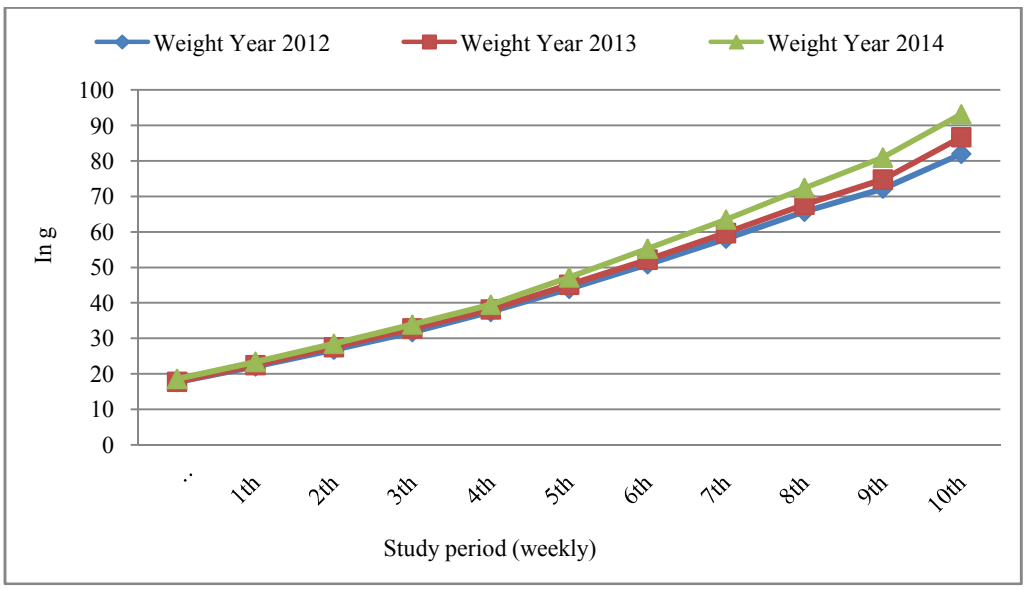

Fig. 4.2.7. Weekly average weight of hatchlings of Bengal lizard in three different clutches during 2012-2014

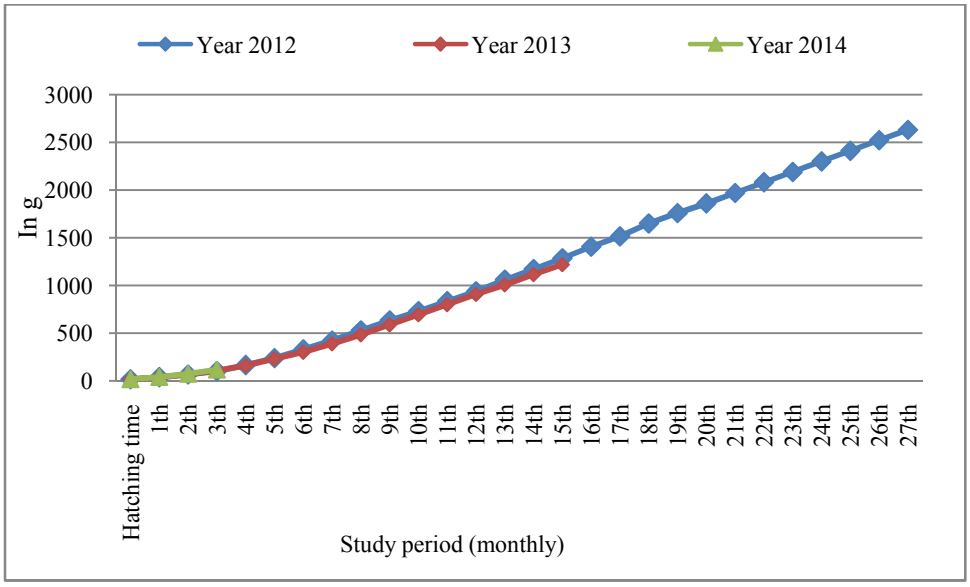

Fig. 4.2.8. Monthly average weight of hatchlings of Bengal lizard in three different clutches, 2012-2014

Growth

At the time of hatching

The mean length of head, abdomen and tail regions at the time of hatching were respectively 3.81±0.12 cm (range 4.1 - 3.6 cm), 5.96±0.17cm (range 6.4 - 5.7cm and 14.04±0.40 cm (range 15.0 - 13.4cm (n = 72, Appendix 39).

At the age of one month

The average length of head, abdomen and tail regions at the age of one month old hatchings were respectively 4.74±0.14 cm (range 5.0 - 4.5 cm, 7.41±0.23cm (range 7.0 – 7.6 cm and 17.48±0.54cm (range 18.5 - 16.5 cm (n = 69, Appendix 39).

At the age of one year

The mean length of head, abdomen and tail regions at the age of one year babies were respectively 14.92±1.10 cm (range 16.3 - 12.9 cm), 23.31±1.73 cm (range 25.5 - 217.5 cm) and 55.0±4.10cm (range 59.6 - 41.2 cm (n = 44, Appendix 39).

At the age of two years

The average length head, abdomen and tail regions at the age of two year young were respectively 18.24±1.44cm (range 20.3 - 17.3 cm), 28.51±2.27cm (range 31.8 - 24.4 cm and 67.23±5.35cm (range 74.9 - 61.8 cm (n = 21, Table 4.2.11; Appendix 39).

There was no significance difference of overall lengths of head ($F = 0.39$), abdomen ($F = 0.62$) and tail regions in three different batches, which were hatched from three different egg-clutches ($F = 0.62$, $df = 2/6$, $p > 0.05$).

Habit and consumption of food of hatchlings in relation to body weight

Food habit

The first three to four days, the hatchlings did not eat any supplied food. From the fifth day, they started consuming animal foods but rejected plant food items. Animal food items were small prawns and cockroaches. The hatchlings of five days old ate chopped boiled chicken (*Gallus gallus domesticus*). At the age of twenty five days, they started to eat different types of insect (e.g., Butterfly *Danaus plexippus*, Dragonfly *Libellula puichella*, Grasshopper *Conocephallus fasciatus*, Damselfly *Ischnura cervula*, caterpillars, etc.), they were also provided live Earthworms (*Pheretima posthuma*), Laboratory Rat, House Rat (*Rattus rattus*), etc., which they ate but they preferred to eat live food than dead ones (Table 4.2.5; Plates 83, 84 and 91).

Food consumption

The consumption of food by the hatchlings of Bengal lizards were calculated just after hatching on a weekly and monthly basis. The overall consumption of food/day/individual of 1st and10th weeks were 0.062 g (n = 71) and 5.5 g (n = 65) day/individual respectively (Fig. 4.2.9, Appendix 41).

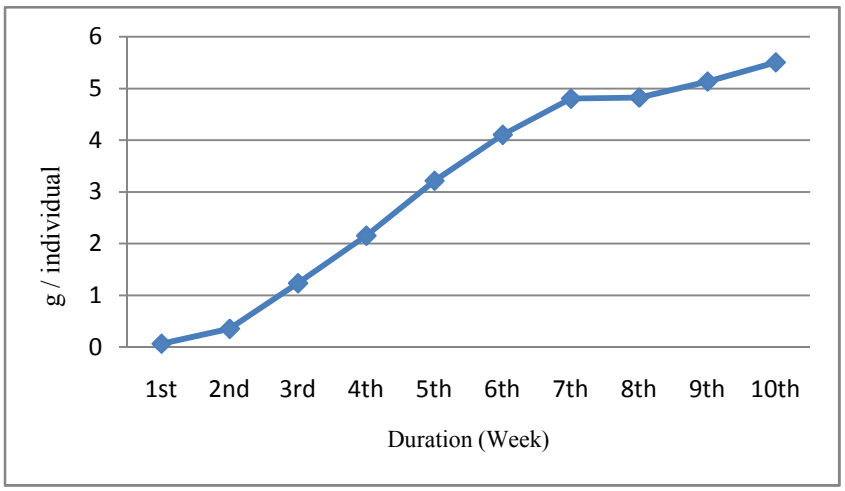

Fig. 4.2.9. Consumption of food/day/hatchling on a weekly basis of the Bengal lizard

The overall food consumption/day/individual of 1st month, 12th month, 24th month and 27th months were respectively 1.95 g (n = 69), 61.35 g (n= = 43), 99.2 g (n = 24) and 129.0 g (n = 24) day/individual (Fig. 4.2.10, Appendix 43).

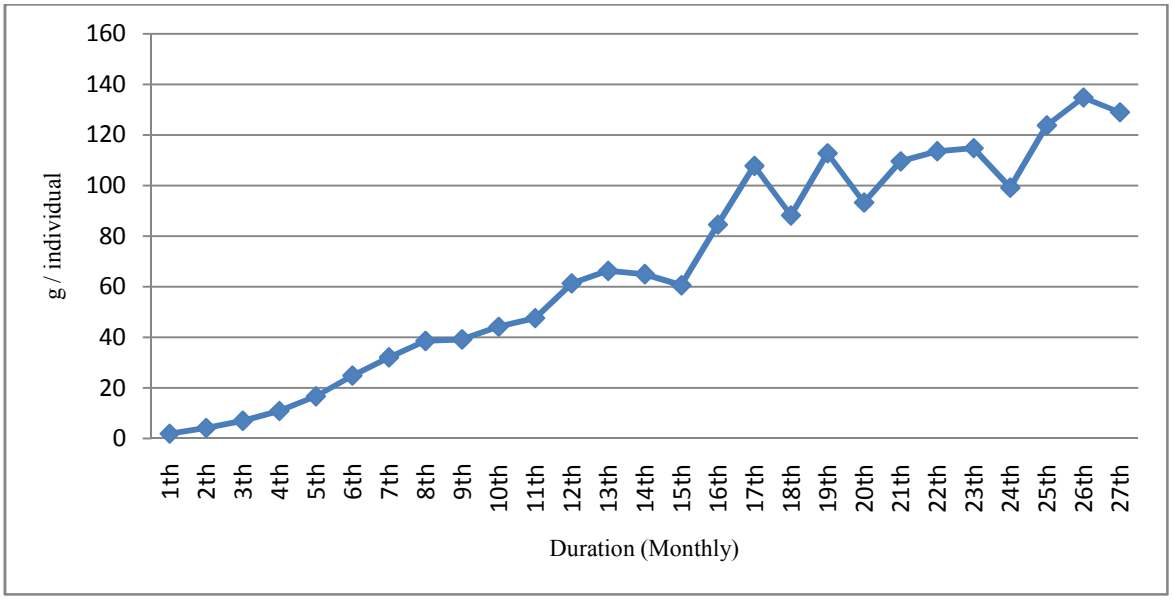

Fig. 4.2.10. Consumption of food/day/hatchling on a weekly basis of the Bengal lizard

There was no significance difference of overall amount of food consumption by the hatchlings in 10 different weeks ($F = 0.05$, $df = 2/27$, $p > 0.05$) but there was a significance difference in 27 different months ($F=9.81$, $df=2/42$, $p < 0.05$).

Food consumption in relation to body weight

The consumption of food by the hatchlings of Bengal lizards were calculated after hatching up to 27 months. The overall percentage of food consumed by the lizards of 1st and 10th weeks old were respectively 0.27 % (n = 71) and 6.25 % (n = 65) per day in terms of their body weights (Appendix 42).

On the other hand, overall the lizards of 1-month, 1-year, 2-year and 27th months old consumed foods per day were respectively 4.9 % (n = 69), 6.6 % (n = 43), 4.3 % (n = 24) and 4.9 % (n = 24) in terms of the percentages of their body weights. It is mentionable that at the age of 1 year old Bengal lizards eat more food in terms of percentage of their body weight, not in terms of amount to comparison of 2 years and 27 months old Bengal lizard and it might have happened due to their growth (Appendix 44).

There was no significance difference of overall percentage of food consumption by the hatchlings in 10 different weeks ($F = 0.01$, $df = 2/27$, $p > 0.05$) and in 27 different months ($F=0.62$, $df=2/42$, $p > 0.05$).

Feeding behavior

The hatchlings consumed food throughout the day, mostly between 09:00 am and 12:00 pm. They showed more interest to eat live food than dead one. At night, they remained inactive inside their burrows. When they were offered live animal (e.g., live earthworms, prawns, rats, different insects and fishes) were offered, hatchlings (young) caught the head region first and jerked vigorously till death and then engulfed the food. When monitors were provided dead animals as food, they did not jerk the food but engulfed directly. Before eating food, they used to flick their tongues in order to

confirm whether the food was edible or not. After eating food, they drank water and used to relax on the ground by stretching their limbs and/or entered into their burrows (Plates 91, 97, 98 and 99).

Age of producing hissing sound of the hatchling

Hissing sounds of monitor lizard are very important throughout their life. These calls act as communication to others and hissing sound was not heard at the beginning of their life (i.e., just after hatching). During this study 8 (11.1%) of 72 hatchlings died before emitting hissing sound. All survived hatchings produced hissing sound between 6th and 12th weeks. At the age of 6 weeks 3.1% hatchlings produced hissing sound, 12.5% at 7 weeks, 15.6% at 8th week, 26.5% at 9 weeks, 25.0% at 10 weeks, 10.9% at 11 weeks and 6.3% at 12 weeks of age (Table 4.2.14).

Color of hatchling

Color changing is a continuous process from the time of hatching up to become adult when they become gray dorsally and pale-white ventrally. The color of dorsal and ventral sides was completely different from the time of hatching to becoming adult.

Color of dorsal side: All hatchlings had Yellow Stripes on Black Surface (YSBS) at the time of hatching throughout the study period. YSBS turned into Thin Yellow-stripes on Black surface (TYBS) between 6th and 10th week and lasted up to 11th weeks. TYBS turned into Yellow Dots on Black Surface (YDBS) between 12th and 19th week. Finally, they gained permanent gray color (G) from YDBS between 19th and 20th weeks (Table 4.2.12; Plate 89).

Color of ventral side: Hatchlings were deep yellow at the time of hatching without any stripes or dots. It changes gradually and become deep yellow (DY) and then turned into light yellow (LY) between 5th and 10th weeks. They gained light white (LW) from LY between 10th and 15th weeks. LW then turned into permanent cream (C) color between 14th and 19th weeks (Table 4.2.13; Plates 92 and 93).

Moulting of hatchling

Moulting (ecdysis) of the hatchling of Bengal monitor is a continuous process that occurs throughout the life. Moulting of Bengal lizards is completely different from the moulting of other animals like snakes or insects (they shed their upper skin or cuticle at a time). In case of Bengal monitor, they do not shed their upper skin or cuticle at a time after forming new one beneath it. Part by part skin or cuticle is shed and it takes long time. The first moulting of hatching was observed at the age of 6-9th weeks. At the age 6th week 14.1% hatchings moulted, by 7th week 29.7% hatchlings moulted, by 8th week 40.6% and 25.6% by 9th week. The second moulting was noticed at the age of 14-17th weeks. During this time 16.1% hatchlings moulted at the age of 14th week, 22.6% ay 15th week, 51.6% at 16th week and 9.7% at 17th week (Table 4.2.15; Plates 94 and 95).

Predation

House crow, large mongoose and Brahminy Kite were seen to predate hatchings of **the** Bengal monitor. Seven predations were observed, of which crows predated four times (57.14%), large mongoose twice (28.57%) and Brahminy Kite once (14.26%).

Breeding success in relation to eggs laid

During this study, 72 of 80 eggs hatched out from three clutches in three different years, so the hatching success was 90 % (Table 4.2.16). The higher hatching success of eggs in this study period was most probably due to: (1) soil of the artificial nests became loose due to the protection of rain water by roof (2) during incubation period eggs were handled with care (3) regulated temperature and moisture in the artificial nests (4) provided protection of eggs from the predators.

There was a significance difference of overall breeding success in relation to egg laid up to 27 months (Here comparison is shown how many lizards survive at the age of 1 month, 1 year, 2 years and 27 months from total eggs) ($F = 10.83$, $df = 2/10$ $p < 0.05$).

Survival rate

The overall survival rate of hatchlings in three years was 68.16% in relation to the number of eggs laid (Table 4.2.17) and 74.3% in relation to the number of hatchlings (Table 4.2.18).

Table 4.2.1. Duration of Male-Male Combat behaviour of Bengal monitors during breeding season at different study areas

Observation No.	Year	Place of occurrence	Time	Duration (Minutes)	Mean
1	August, 2012	JUC*	05:14-05:19 pm	05	4.33±01
2	July, 2012	AGDU**	04:33-04:36 pm	03	
3	August, 2012	AGDU	11:07-11:11 am	04	
4	August, 2013	JUC	04:27-04:31 pm	04	
5	August, 2013	AGDU	03:46-03:50 pm	04	
6	July, 2013	JR***	04:03-04:08 pm	05	
7	August, 2014	AGDU	10:56-10:61 am	05	
8	August, 2014	AGDU	05:02-05:05 pm	03	
9	July, 2014	JR	04:14-04:20 pm	06	

*JUC- Jahangirnagar University Campus, ** AGDU- Animal Garden of Dhaka University and ***JR Jamuna Resort.

Table 4.2.2. Measurement of termite mound in the study area

Year	No. of termite nest	Height from the ground (cm)	Base circumference (cm)	Base radius (cm)	Distance from the water body (m)
2012	7	87.1	740.7	117.9	18.2
2013	8	89.1	727.5	115.3	15.0
2014	9	76.9	732.8	116.3	20.6

Table 4.2.3. Measurement of active nest of Bengal monitor in termite mound

Year	Nest No.	Diameter (cm)	Circumference (cm)	Depth (cm)	Height from the ground the ground (cm)
2012	7	33.1	103.8	23.0	28.9
2013	8	34.0	106.7	23.1	28.6
2014	9	33.8	106.2	23.5	27.1

Table 4.2.4. Measurement of eggs of Bengal monitor

Year	Clutch No.	Egg No.	Length (cm)	Width (cm)	Girth (cm)	Weight (g)	Volume (cm^3)
2012	1	39	5.9	3.9	12.4	41.4	51.0
	2	25	5.9	4.0	12.5	41.6	51.3
Average			**5.9**	**3.95**	**12.45**	**41.5**	**51.15**
2013	1	19	5.9	4.0	12.5	41.1	51.3
	2	23	6.0	4.0	12.8	41.6	51.7
	3	27	6.0	4.0	12.8	41.9	51.6
Average			**5.97**	**4.0**	**12.7**	**41.53**	**51.53**
2014	1	18	5.9	4	12.6	41.1	51.3
	2	21	5.9	3.9	12.7	41.3	51.3
Average			**5.9**	**3.95**	**12.65**	**41.2**	**51.3**

Table 4.2.5. List of consumed foods by Bengal monitor

Live foods

Sl. No.	Local Names/ English name	Scientific Name
1	House Rat	*Rattus rattus*
2	House Mouse	*Mus musculus*
3	Wall Lizard (Common House Gecko)	*Hemidactylus frenatus*
4	Crab	*Seylla serrate*
5	Snakehead Murrel	i) *Channa punctatus,* ii) *Channa striatus*
6	Live Prawn	i) *Macrobrachium dayanus* ii) *Penaeus indicus*
7	Cockroach	*Periplaneta americana*
8	Dragon Fly	*Macromiam agnifina*
9	Damsel Fly	*Iscnura cervula*
10	Butter Fly	i) *Papilio demolius* ii) *Pieris rapie,* iii) *Danaus plexippus*
11	Grasshopper	*Conocephalus fasciatus*
12	Different types of Caterpillars	
13	Earthworms	*Pheretima posthuma*
14	Different types of Moths	
15	Tilapia fish	*Oriochromis niloticus*

Dead foods

Sl. No.	Local Names/ English names	Scientific Names
1	Pieced Boiled Chicken	*Gallus gallus domesticus*
2	Soft Parts of Snail	*Pila globosa*
3	Soft Parts of Freshwater Mussel	*Lamellidenus marginalis*
4	Tank Goby	*Glossobius giuris*
5	Cat Fishes	i) *Mistus gulio,* ii) *M. vittatus*
6	Pool Barb	*Puntius sophore*

Table 4.2.6. Weekly length of hatchlings of Bengal monitor during 2012 to 2014

Year	Hatchlings No. (At the time of hatching)	After hatching (cm)	1st Week (cm)	2nd Week (cm)	3rd Week (cm)	4th Week (cm)	5th Week (cm)	6th Week (cm)	7th Week (cm)	8th Week (cm)	9th Week (cm)	10th Week (cm)
2012	36	23.4	24.3	25.3	26.4	27.6	29.3	31.0	32.8	34.7	36.3	38.2
2013	20	23.8	24.9	26.0	27.2	28.5	29.9	31.4	33.0	34.5	36.0	37.7
2014	16	24.7	25.8	27.0	28.3	29.6	31.1	32.7	34.4	36.0	37.5	39.2

Table 4.2.12. Dorsal side color changing age of the hatchlings of Bengal monitor 2012-2014

Year	Color	At the time of hatching	Week												
			6th	7th	8th	9th	10th	13th	14th	15th	16th	17th	18th	19th	20th
2012	YSBS	36													
	TYBS		1	11	12	9									
	YDBS							9	7	10	4	2			
	G											8	7	9	7
2013	YSBS	20													
	TYBS		1	3	9	5	1								
	YDBS							4	8	6	0	4	6	8	
	G											4	6	8	
2014	YSBS	16													
	TYBS		1	3	5	3	1								
	YDBS							2	5	3	3				
	G											2	5	4	2

YSBS=Yellow Stripes on Black Surface, TYBS= Thin Yellow-Stripes on Black Surface, YDBS=Yellow Dots on Black Surface and G=Gray

Table 4.2.13. Ventral side color changing age of the hatchlings of Bengal monitor 2012-2014

Year	Color	At the time of hatching		Week													
				5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th
2012	Y	36																
	LY			3	15	6	2	5	2									
	LW								8	12	5	4	2	1				
	C													5	13	6	5	3
2013	Y	20																
	LY				4	6	6	2										
	LW									6	8	4	1					
	C													4	7	5	1	
2014	Y	16																
	LY				4	1	5	4										
	LW								1	3	3	5	1					
	C												1	1	4	5	2	

Y=Yellow, LY=Light Yellow, LW=Light White and C= Cream

Table 4.2.14. Hissing sound-producing age of the hatchlings of Bengal monitors in 2012-2014

Year	Week						
	6th	7th	8th	9th	10th	11th	12th
2012		3	3	6	12	5	4
2013		3	2	7	3	3	
2014	2	2	4	4	1		

Table 4.2. 15. Moulting age (weeks) of the hatchlings Bengal monitor during 2012-2014

Year	Moulting No.	Week							
		6th	7th	8th	9th	14th	15th	16th	17th
2012	1	3	8	18	4				
	2					6	3	22	
2013	1	4	6	4	4				
	2					3	6	5	4
2014	1	2	5	4	2				
	2					1	5	5	2

Table 4.2.16. Breeding success of Bengal lizard in relation to the number of eggs laid

	Year			Total
	2012	2013	2014	
Egg No.	39	23	18	80
No. of hatchlings after hatchlings	36	20	16	72 out of 80
No. of hatchlings after 1 month	34	20	15	69 out of 80
No. of hatchlings after12 months	27	17		44 out of 62
No. of hatchlings after 24 months	24			24 out of 39
No. of hatchlings after 27 months	24			24 out of 39

Table 4.2.17. Mortality and survivability in relation to number of eggs laid

Clutch No.	**Clutch Size**	**Year**	**No. of hatchlings**	**Mortality/Lost (up to the end of study)**				**Survivability (up to the end of study)**			
				No.	Mean	%	Avg. %	No.	Mean	%	Avg. %
1	39	2012	36	15	9.0±5.57	38.5	31.84	24	18.0±5.2	61.5	68.16
2	23	2013	20	8		34.8		15		65.2	
3	18	2014	16	4		22.22		14		77.78	

Table 4.2.18. Mortality and survivability in relation to number of hatchlings

Clutch No.	**Clutch Size**	**Year**	**No. of hatchlings**	**Mortality/Lost (up to the end of study)**				**Survivability (up to the end of study)**			
				No.	Mean	%	Avg. %	No.	Mean	%	Avg. %
1	39	2012	36	12	6.67±4.73	33.3	25.7	24	17.33±5.86	66.7	74.3
2	23	2013	20	5		25.0		15		75.0	
3	18	2014	16	3		18.8		13		81.3	

Table 4.2.19. Clutch sizes of the eggs of Bengal monitor during study period

Year	**Clutch Size**	**Mean**	**Range**
2012	39	24.57±7.11 n = 182	39-18
	25		
2013	19		
	23		
	27		
2014	18		
	21		

Table 4.2.20. Hatching of Bengal monitor in the months of March and April

Study period	Clutch size	No. of hatchlings	(%) of hatching success	(%) of hatching failure	Hatching month			
					March		April	
					No.	(%)	No.	(%)
2012	39	36	92.3	7.7	21	58.3	15	41.7
2013	23	20	87.0	13.0	14	70.0	6	30.0
2014	18	16	88.9	11.1	11	68.6	5	31.2
Mean			89.4	10.6	15.3	65.7	8.7	34.3

CHAPTER 4: RESULTS

4.3 Conservation

The study was in six geographical regions to assess the importance of conservation of Bengal monitors. Among them, Hazratpur Union Parishad under Mithapukur of Rangpur and Sonargaon of Narayangonj were not protected by boundary walls, they are open areas and no security person was involved i. e., non-protected zone. On the other hand, Jahangirnagar University Campus, Savar, Dhaka, Zoo and National Botanical Garden, Mirpur, Dhaka, Ghorashal Power Plant, Palash, Narsingdi and Jamuna Resort, Tangail were in protected zones i.e., the areas are restricted for entrance and the areas are protected by boundary walls, security persons are engaged even in some cases military persons are involved and habitat destruction as well as killing of any wildlife are not permitted, but these areas are not protected by the law. The population density of Bengal monitors was higher in the protected zones than that of the non-protected zones.

Population density between protected and non-protected zones

The overall population density of all protected areas was 44.0±16.3 (Table 4.3.2) individuals/km^2 while in the non-protected areas it was 13.2±6.9 individuals/km^2 (Table 4.3.1; Fig. 4.3.1). Among four different protected zones, the population densities of all classes of Bengal lizards in JUC, DZ & NBG, GPP and JR, T were 27.0, 34.0, 62.0 and 53 individuals/km^2 respectively. In two non-protected zones the population densities of all classes of Bengal lizards in HU and SN were 8.3 and 18.0 individuals/km^2 respectively.

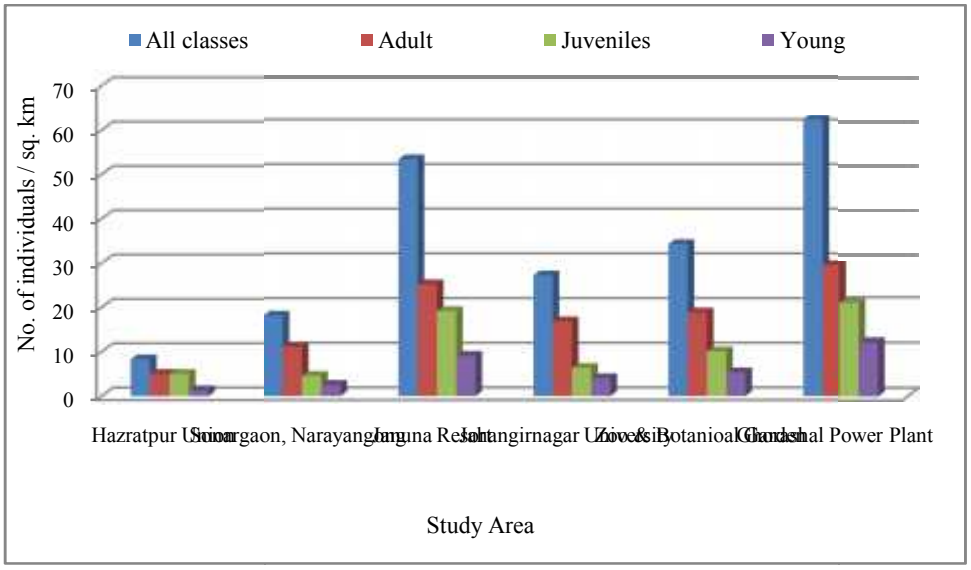

Fig. 4.3.1. Population of Bengal lizards in the non-protected (HU) and protected zones (JR, JUC, DZ &NBG and GPP, N) of the study areas

Scavenging behaviour

Bengal lizards have some positive roles in the environment. They help not to spread the germs from rotten and decaying animals' bodies and household wastages by feeding them as well as they assist to

keep the environment clean. Scavenging behavior of Bengal monitors were observed in two habitats. These were drains and garbage bins. The number of individuals seen and the scavenging timing were not always same in different months. During scavenging, they ate fins and offal parts of fishes, rotten eggs and broken egg-shells, chicken feathers and alimentary canals, bones and other fragments of dead body of decayed birds (crows) and mammals (mongooses, rats, etc.) (Table 4.3.5).

On an average, 4.1±3.04 (36.4%) of 7.1±5.02 lizards were found scavenging in the drain and 7.2±5.1 (63.4%) of 11.6±7.8 individuals were seen in the garbage bins. The highest number of individuals took part in scavenging between 09:00-11:00 hours and the lowest number at 15:00- 17:00 hours of the day time (Figs. 4.3.2, 4.3.3; Tables 4.3.3, 4.3.4; Appendices 45-47; plates 96, 97).

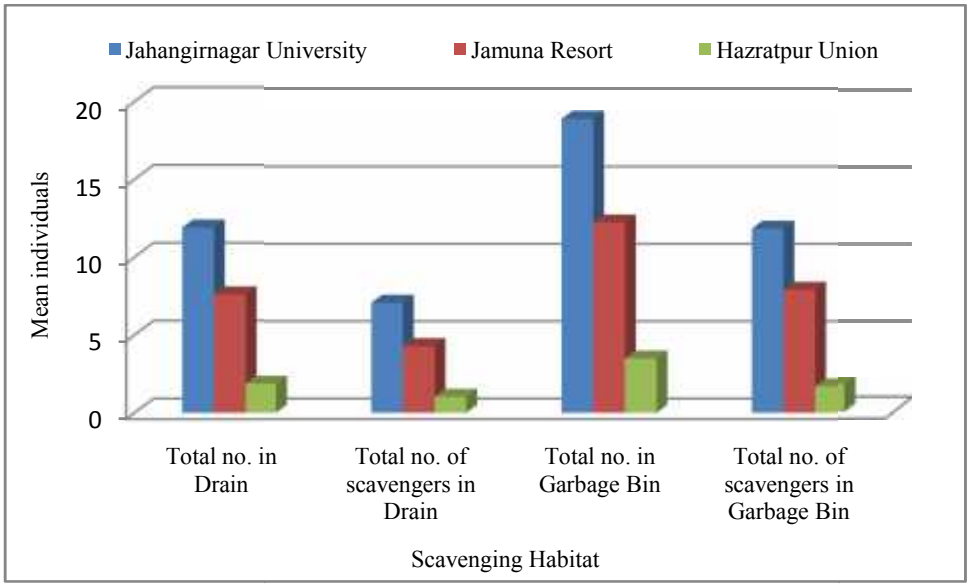

Fig. 4.3.2. The average number of scavenging Bengal lizards in the drain and garbage bins in three study areas during the study period.

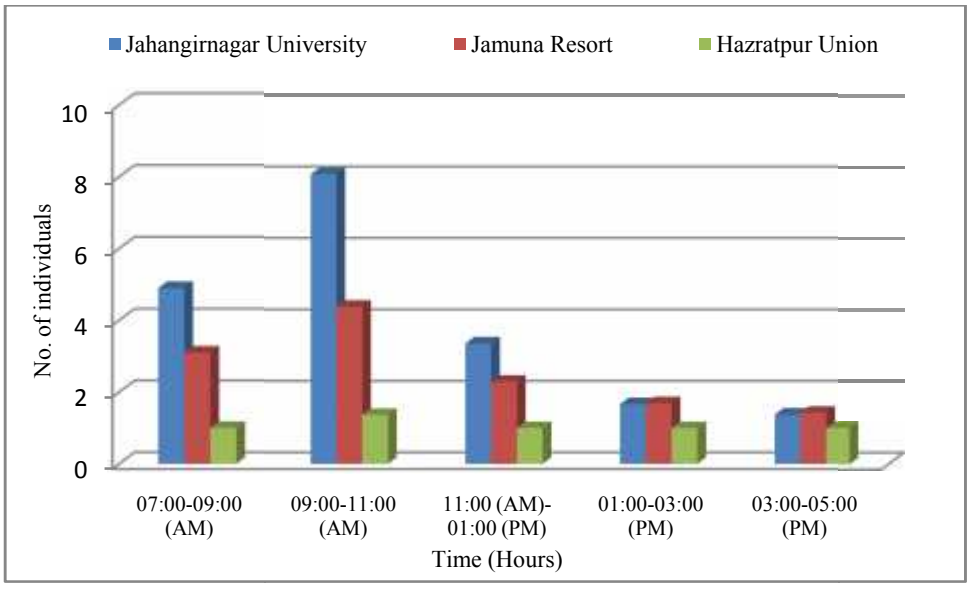

Fig. 4.3.3. The average number of scavenging of Bengal monitors in three study areas during the study period.

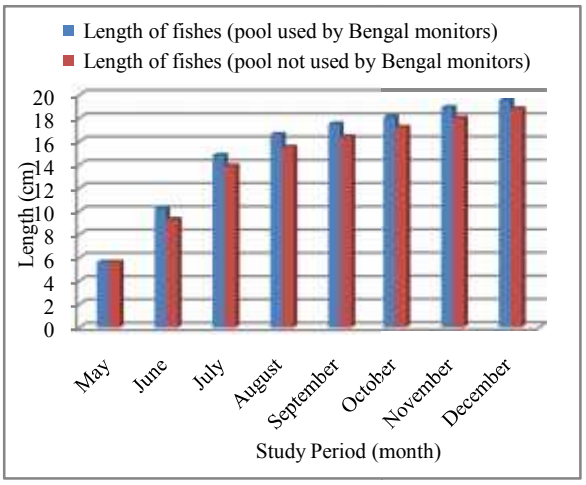

Fig. 4.3.4a. Length of one used and one unused pools by the Bengal lizards in different months

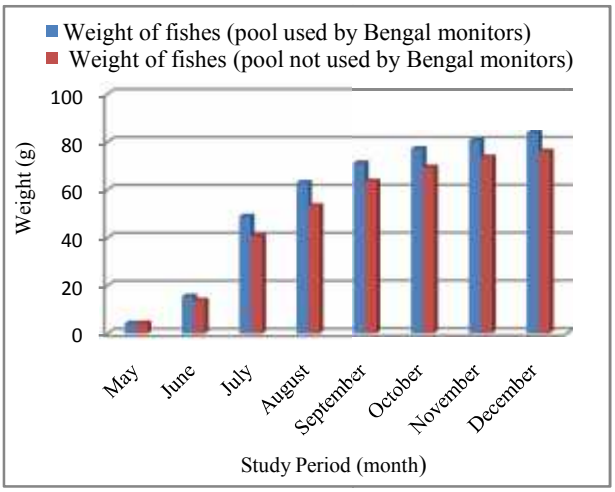

Fig. 4.3.4b. Weight of one used and one unused pools by the Bengal lizards in different months

Role of Bengal lizards

In fish development: The movements of Bengal lizards in the water bodies indirectly enhance fish growth. When the lizards dive and/or swim in the water pool that influence the rapid movement of fishes due to fear rushing. This sort of rapid movement of fishes makes physical exercise that enhances growth of fish when food supply in the water pool is sufficient. The lizards used Pool-1 that contained clean and transparent water (Plate 102) than that of the similar Pool-2 (Plate 103). Bengal lizards were not seen to eat live fish during diving or swimming in this study period, but they ate dead and rotten fishes that signify their cleaning role of aquatic environment. This became evident by the following experiment.

Fifteen tilapia fishes (*Oreochromis niloticus*) were released in each of two similar water pools in the Animal Garden of Dhaka University (AG, DU). Pool-1 is inside the lizard experimental area and the Pool-2 is out the boundary wall of the experimental area (AG, DU). The average length of fishes was 5.6 cm for both pools (Fig. 4.3.4a) and weight were respectively 4.2 g and 4.3 g (Fig. 4.3.4b) at the time of release. Artificial foods (boiled rice, homemade bread and fish feed) were supplied every day. After seven months of rearing the fishes were harvested. The average lengths of fishes of Pool-1 and Pool-2 were respectively 19.5 cm and 18.8 cm (Fig. 4.3.4a) and the mean weight were respectively 83.8 g and 76.1g (Fig. 4.3.4b). This result indicates that the fishes of Pool-1 were to some extent longer and heavier that that fishes of Pool-2 (Appendix 48, Plates 109, 110 and 111).

In controlling rat population: Bengal lizards act as a bio-control agent against rats. Twelve months old Bengal lizards were offered rats as food in AG, DU and the lizards spent 2.2 to 9.1 minutes to consume the rats (Appendix 49, Plate 99).

Rats make holes in the pond banks and bring soil out of the holes that also fill in water edge of the pond banks and loosen soils too. Consequently, pond banks become weak and rain water filled holes and sometimes damage banks subsequently hamper fish farming in the pond. As a rat hunter, Bengal lizards can control rat population and save damaging pond banks. In Tangail, the owner of fish farming ponds killed Bengal lizards without knowing the role Bengal lizard and consequently the number of rat-holes increased in April 2013. When stopped killing of Bengal lizards surprisingly the number of rat-holes decreased. For instance, there were 12 and 9 rat-holes in the banks of two ponds in May 2011 and after killing Bengal lizards the number of rat-holes increased respectively to 49 and 45 in May 2013. After stop-killing of Bengal lizards the number of rat-holes gradually decreased to 5 and 7 respectively in two those ponds at the end of the study, June 2014 (Fig. 4.3.5; Appendix 53).

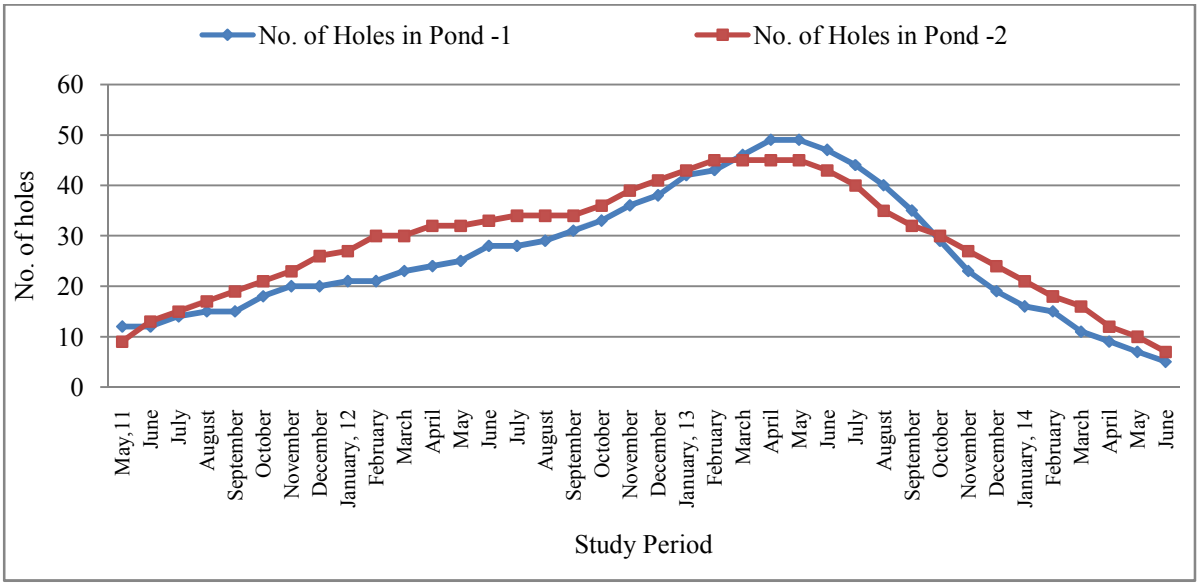

Fig. 4.3.5. Number of rat-holes on banks of two fish ponds in Tangail during May 2011 to June 2014

In balancing beetle and earthworm populations: The Bengal monitors contribute significant role in controlling beetle populations. In Jahangirnagar University campus (JUC), some employees rear cows for milk and meat. In order to pasture, they release their cows in the grasslands of the campus. They use cow dung for preparing bed of flowering plants. In order to use, the deposited cow dung beside the bed of flowering plants or in some particular places for few months. In this deposition, beetles lay their eggs and grubs are hatched out in the cow dung. In addition, some earthworms are also live and reproduce there naturally. After hatching, the baby Bengal lizards consume grubs, beetles and earthworms as food and hence balance insect and earthworm populations.

September is the peak month of production of invertebrate foods (3.1 g per day per m^2) of the Bengal lizards in the cow dung deposition and April and October were least production months (2.4 g per day per m^2) (Appendix 50). The amount of food is produced from 1 m^2 of cow dung deposit per day is more than that of the food required for one month old baby of Bengal lizard per day. But for 6-month

old baby lizard, it needs 13.4 m^2 area of cow dung per day to produce the require amount of food supply (plates 100 and 101).

In balancing snake populations

Three study areas were selected (HU,MR - Hazratpur Union, Mithapukur, Rangpur; JUC - Jahangirnagar University Campus and its adjacent area, and Kaltapara village of Jumpur Union Parishad, Sonargaon, Narayangonj) to find the relation between the number of snake bites and the density of Bengal lizards. It is evident that the number of snake biting decreased when the density of Bengal lizards increased. The highest number of snake biting (10) was recorded at Kaltapara village, Sonargaon in 2014 and the lowest number of snaking biting (3) was recorded at Hazratpur Union in 2014, and at the same time the highest number of snakes (7) was eaten by lizards at Kaltapara in 2011 and the lowest number (2) was in Hazratpur Union in 2012 (Fig. 4.3.6). The snake bites were caused by three snakes (Striped Keelback *Amphiesma stolata*, Cheeckered Keelback *Xenochrophis piscator* and Olive Keelback *Atretium schistosum*). Including these three species of snakes Bengal lizards also ate Rat Snake (*Ptyas mucosus*). All these snakes are non-venomous, so death toll of human happened. It reveals that the density of Bengal lizards is inversely proportional to the number of snake bites.

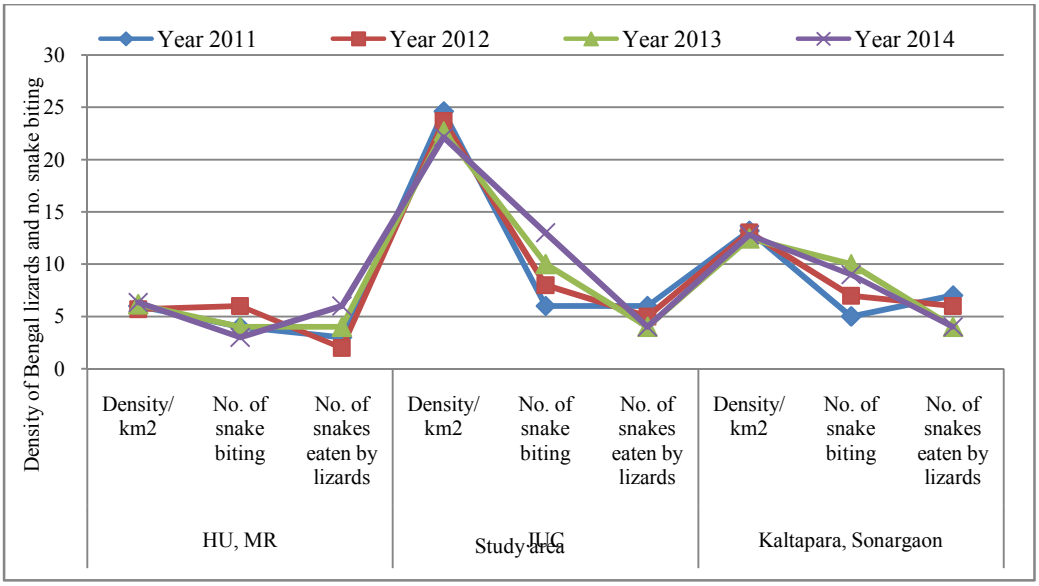

Fig.4.3.6. Year-wise relation between the density of Bengal lizards and the number of snake bites

Questionnaire based survey on Bengal lizard

A questionnaire survey was conducted to get suggestions/opinions from different people of the society or community for the conservation of Bengal monitor. Surveys were divided into two categories:

A. Local people opinion: those who are living near/in and around the habitats of Bengal monitors that includes farmers, students, shopkeepers, fishermen, boatmen and teachers (Appendix 54).
B. Experts' opinion: experts involved in university teaching engaged these sorts of research and the persons, who have completed their research on these types of work (Appendix 55).

Overall outcome of the survey

A. Local people's opinion (Appendix 54)

Familiar, size and color

All respondents (100%) opined that they are familiar to Monitor lizards and have seen them, and 96% have said that Bengal lizards are not seen as they use to see frequently in the past. Most of the people (76%) replied that the lizard's color is brown and they are available in monsoon. Most of the respondents (63%) did not reply regarding the length of Bengal lizards and only 37% of the respondents told that the length of lizards is approximately 0.46 m.

Habitat

Regarding the habitats of Bengal lizards, the highest proportion of respondents (36%) said that they are available in bushes and the lowest proportion (5%) said these lizards are seen in the gardens (Fig. 4.3.7).

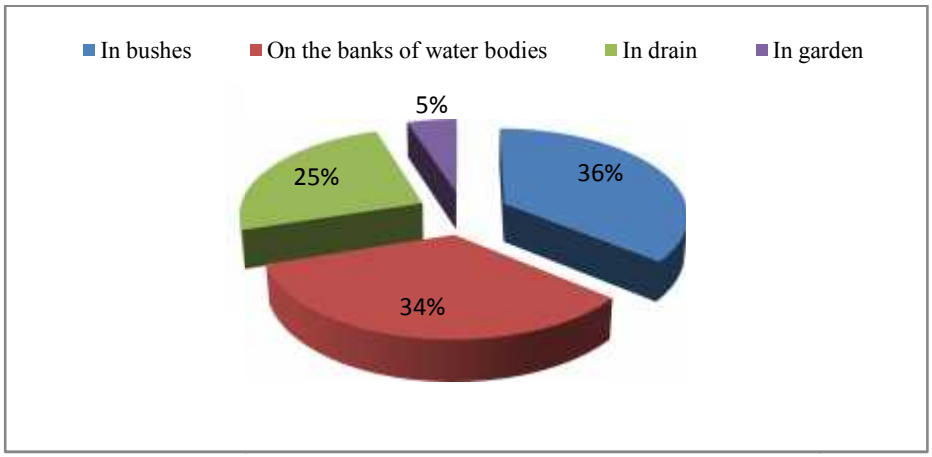

Fig. 4.3.7. Opinion of the respondents regarding habitats of the Bengal lizards

Seeing frequency

Majority of the respondents (56%) have seen Bengal lizards once in their life and 44% said that lizards are seen more than once in their life (Fig. 4.3.8). Live Bengal lizards are seen by 86% of the respondents and the rest (14%) have seen dead lizards after killed by the local people. Most of the respondents (66%) said that Bengal lizards are useful and the rest (34%) said harmful.

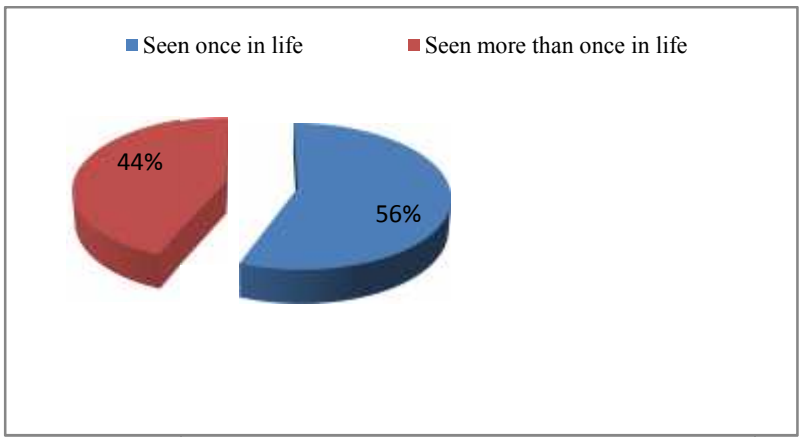

Fig. 4.3.8. Opinion of the respondents regarding availability of the Bengal lizards

Age classes seen

Most of the respondents (64%) have seen adults and only 5% have seen only juveniles (Fig. 4.3.9).

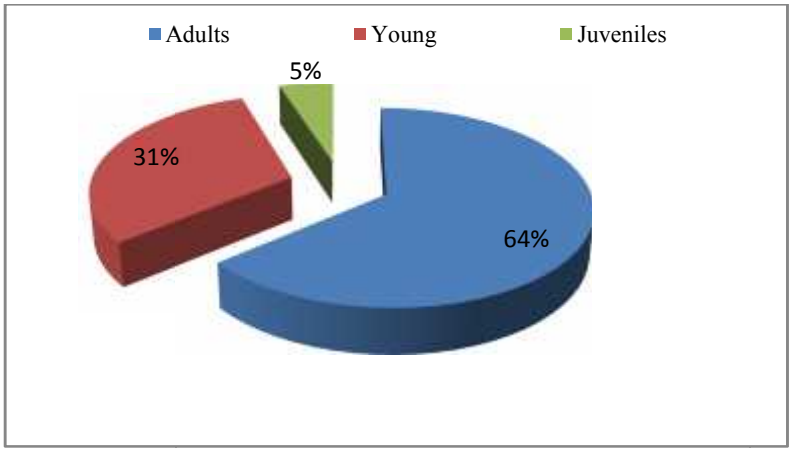

Fig. 4.3.9. Opinion of the respondents regarding age classes of the Bengal lizards

Availability from water bodies

"Bengal lizards are seen within a short distance from water bodies" – remarked 83% of the respondents and

17% are seen from the long distance of water bodies.

Availability from human settlements

76% of the people said Bengal lizards are available around human settlements and 24% of them observed that these lizards are found from quite a distance of the same.

Live or dead lizards

Live Bengal lizards are seen by 86% of the respondents and the rest of those (14%) have seen dead lizards after being killed by the local people.

Usefulness and harmfulness

Most of the respondents (66%) said that Bengal lizards are useful and the rest (34%) said that they are harmful.

Importance

The respondents who think that Bengal lizards are useful, among them, 27% think that Bengal lizards maintain an ecological balance in the environment and only 7% said that they are helpful in tourism (Fig. 4.3. 10). About lizards natural foods respondent mentioned that Bengal lizards eat mice, rats and harmful insects, rotten animal bodies and kill snakes.

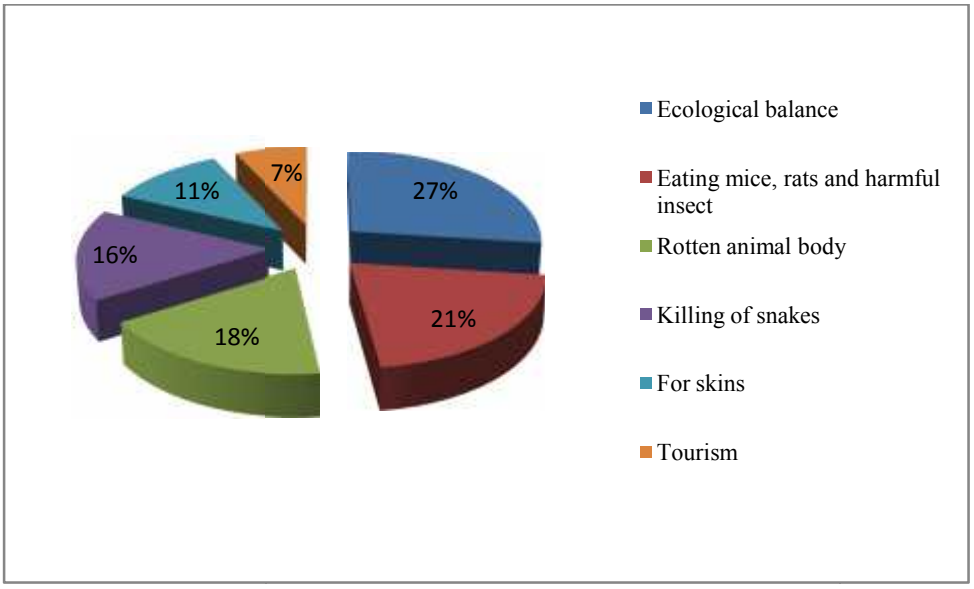

Fig. 4.3.10. Opinion of the respondents regarding importance of the Bengal lizards

Cause declining population

Majority of the respondents (54%) replied that Bengal lizards face shortage of food, so they catch and eat domestic ducks hens, pigeons and stork eggs and their hatchlings. Human population explosion is the main reason in decrease of population of Bengal lizards said by 30%of the respondents followed by others (Fig.4.3.11; Plates 107 and 108).

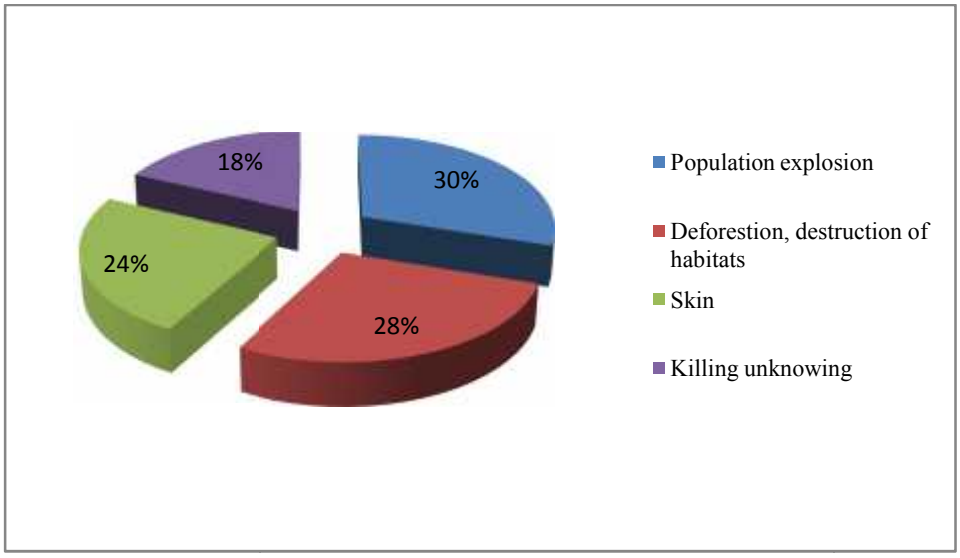

Fig. 4.3.11. Cause of declining the population of Bengal lizards

Conservation thought

Twenty four percent of the respondents opined that public awareness is essential to increase the positive role of Bengal lizards in nature for their protection followed by the others and the least number of respondents (4%) said captive breeding is needed (Fig.4.3.12).

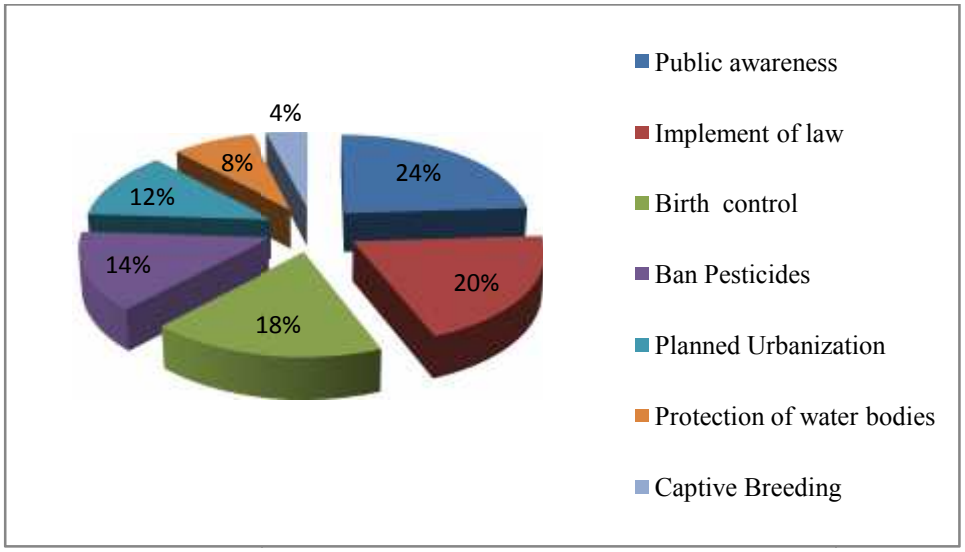

Fig. 4.3.12. Opinion of common people for the conservation of Bengal lizards in the study areas

Most of the respondents (96%) opined that they have never seen Bengal lizard eggs and only 4% people noticed that they have seen eggs (Appendix 54).

B. Experts' opinion (Appendix 55)

Legislation protection

Most of the experts (85%) opined that the Govt. of Bangladesh has taken initiative to protect wildlife including the Bengal monitors and they (100%) have also noticed that this is not enough to protect them and further steps should be taken. Twenty five percent experts opined that Wildlife (Conservation and Security) Act, 2012 is not properly being implemented to protect wildlife including Bengal lizards and 11% said it is due to the negligence of responsible persons (Fig. 4.2.13).

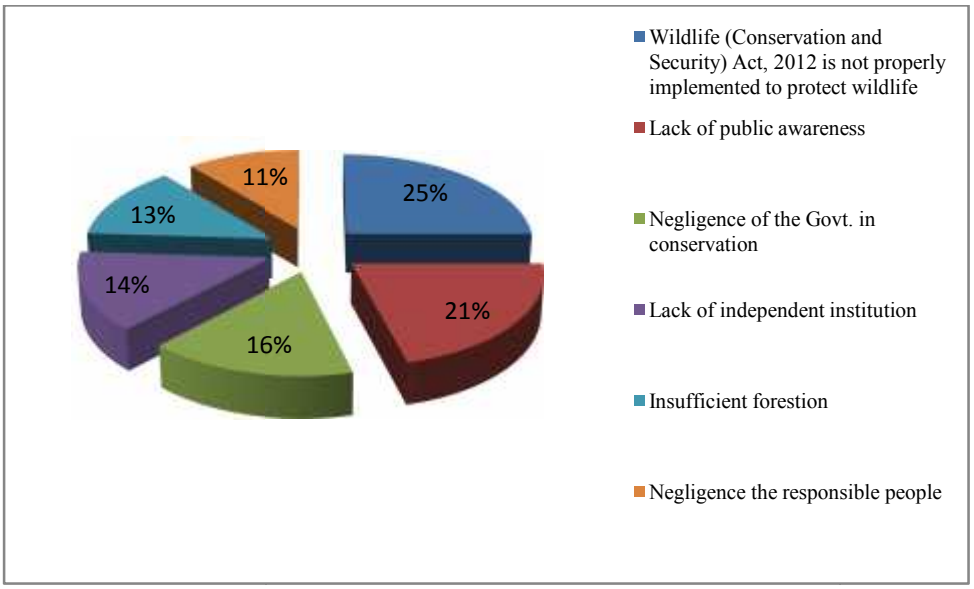

Fig. 4.3.13. Opinion of experts regarding protecting Bengal lizards in Bangladesh

Recommendations for conservation

Protecting natural habitats of Bengal lizards, their egg and hatchlings can save the species said 25% experts and 7% mentioned to take steps through science-oriented survey (Fig .4.3.14; Plates 104 and 105).

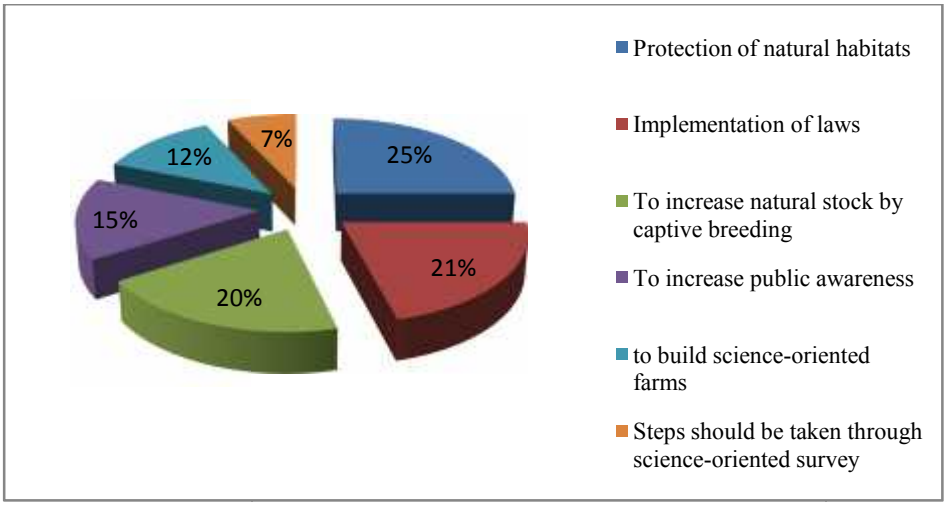

Fig. 4.3.14. Opinion of experts for protecting Bengal lizards

All experts noticed that non-government steps are often visible in this matter and also think this is not enough. There is a lack of coordination between government agencies and between non-government agencies. Most of the experts (32%) think that lack of understanding between government agencies and lack of directions are the reasons for not visible any attempt on conservation from the non-government levels. All experts (100%) noticed that public awareness raised by mass media about wildlife should be increased. The highest proportion of experts (36%) opined about making conservation campaigns of wildlife including the Bengal lizards by electronic and print media should be mandatory to create public awareness and only 6% of them said that seminars, meetings, committees of both national and international levels through mass media can build up public awareness (Fig.4.3.15; Plate 118).

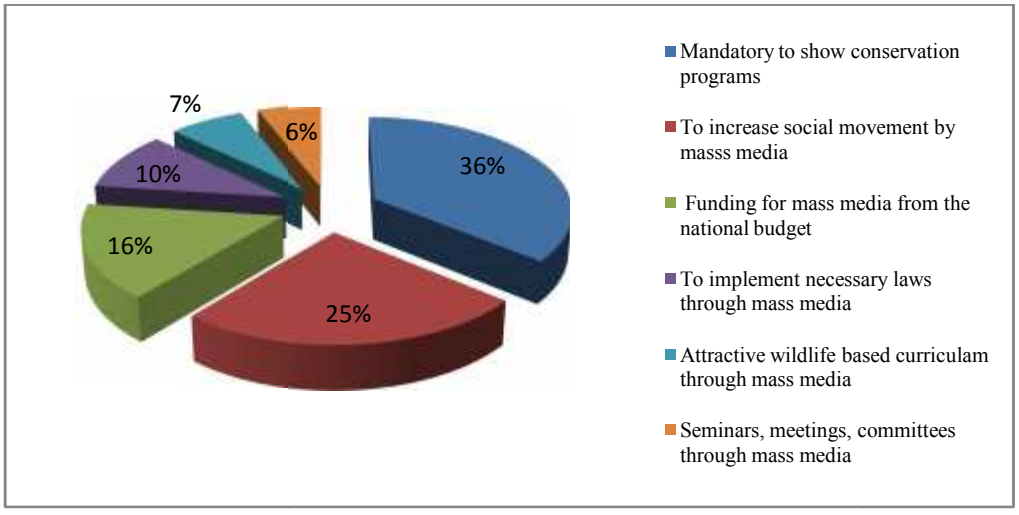

Fig. 4.3.15. Opinion of experts of mass media awareness in conserving Bengal lizards

Role of media

Thirty three percent of the experts prefer documentary films in six different forms of media campaigns for wildlife conservation and 4% prefer leaflets (Appendix 61) for such program to raise awareness among the common people (Fig. 4.2.16; Plates 112-117,119, 122, 127 and 128).

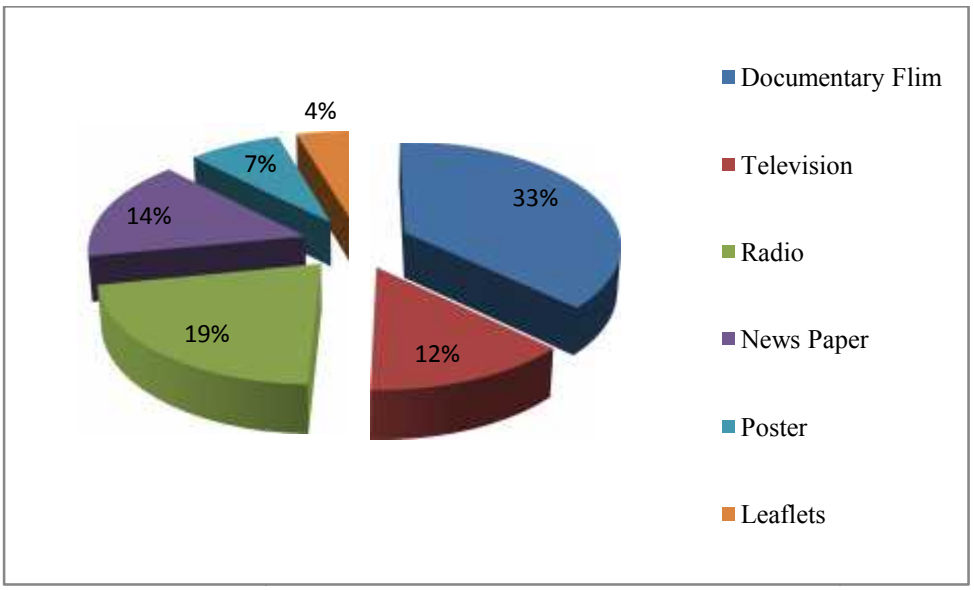

Fig. 4.3.16. Opinion of experts of using different media to build conservation awareness among mass people

Seventy percent of the experts noticed that the lessons about conservation of nature should be included in our national curriculum is not enough. All experts think that Bengal lizards are useful and among them 46% noticed that they control different sorts of pest.

Maintain natural balance

Fifty six percent of the experts say that by controlling harmful insects Bengal lizards create a balance in the environment and 12% of them noticed that they contribute in fisheries sector (Fig. 4.3.17).

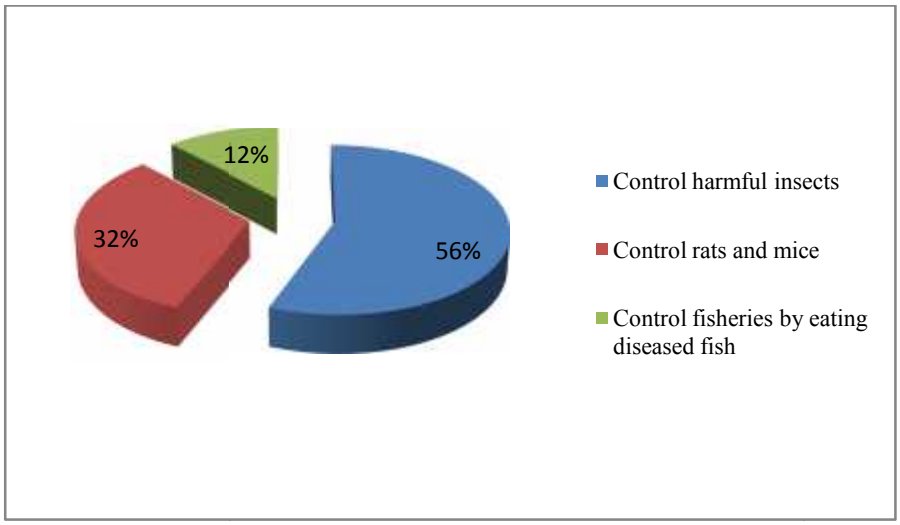

Fig. 4.3.17. Opinion of experts how do the Bengal lizards make balance on environment

Increasing population

Twenty four percent of the experts advised setting up scientific farms by selecting suitable locations and only 11% of them suggested to raising awareness among teachers and students to enhance the conservation programs (Fig. 4.3.18; Appendix 55).

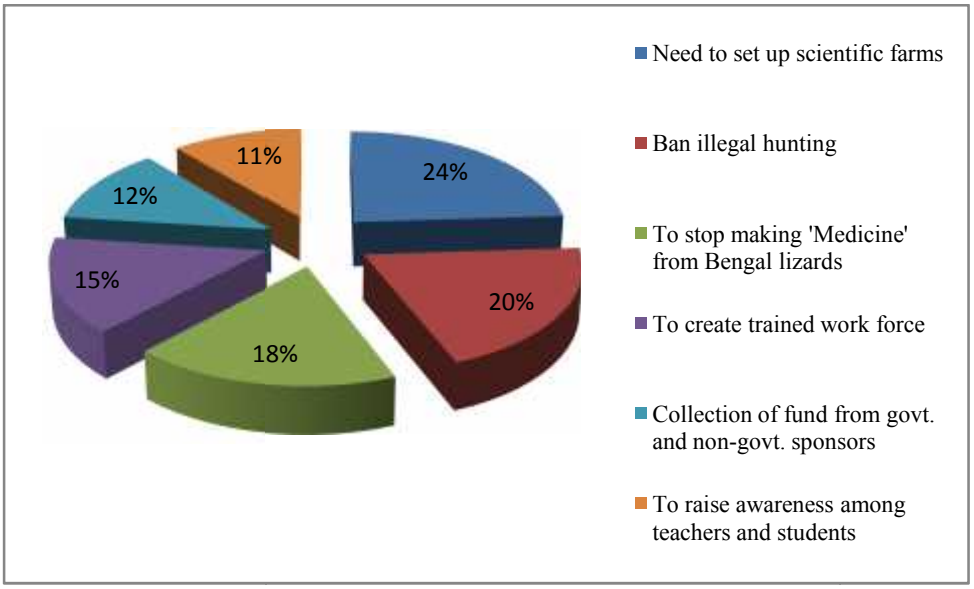

Fig. 4.3.18. Suggestions of experts to enhance conservation programs

Recommendations for conservation

Impression before and after campaigning among farmers and people

Most of the farmers and people (58.4 %) who work in the fields had a negative impression about Bengal monitors at the beginning of this study period. After distributing leaflets, posters and verbal advises to the farmers and people about the positive role of Bengal lizards in nature, their impression changed to positive and most of them (88.2 %) developed caring attitude of lizards but 5.9% remained with negative impression (Appendix 57; Plates 120 and 121).

Cause of declining population

During this study period the causes of declining population of Bengal monitors in the study areas were noted and roughly estimated by eye observations. The main reason is the destruction of habitats, which comprised 59.5% and others are killing of them, destruction of their nests, eggs and hatchlings, etc. (Fig. 4.3.19).

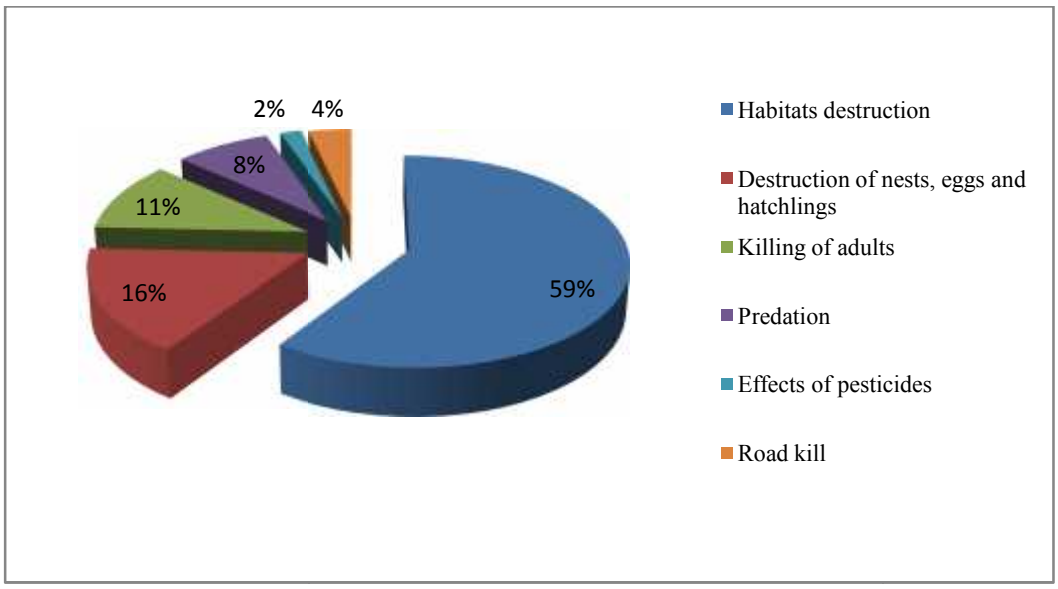

Fig. 4.3.19. Causes of decline of population of Bengal lizards

Destruction of habitat

Within habitat destruction, there are several causes, of which agriculture expansion is the main factor. Ever growing human population needs extra space for housing and agriculture within the limited landmass of a small country like Bangladesh causing the destruction natural habitats of the Bengal lizards (Appendix 56). Habitat destruction includes (a) agricultural expansion (Plate 107) followed by (b) construction of new buildings and houses,(c) deforestation, (d) reducing of wetlands and commercial usage of water bodies (Fig. 4.3.20; Appendix 56).

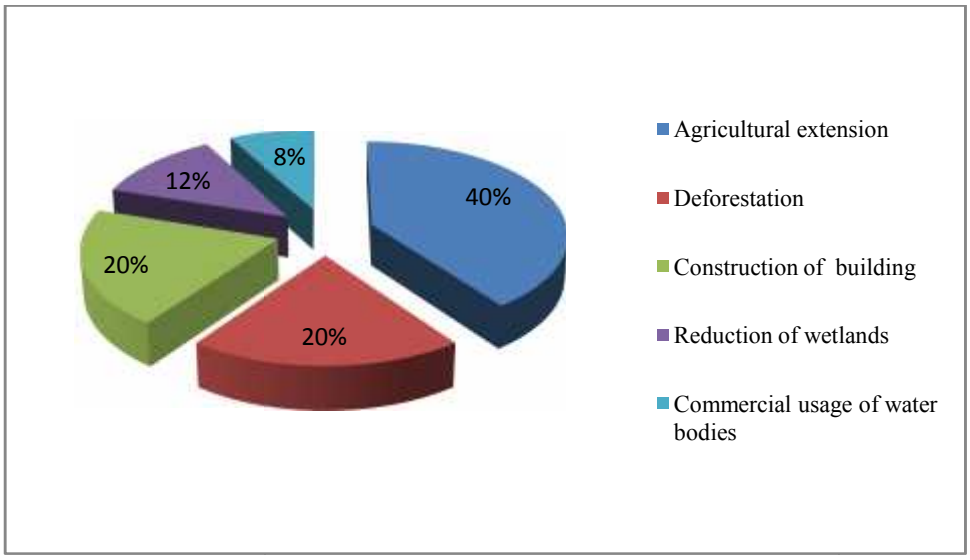

Fig. 4.3.20. Causes of destruction of habitats of Bengal lizards

Destruction of nests, eggs and hatchlings: Due to lack of public awareness and proper knowledge without any reason people destroy nests, eggs and hatchlings (Plate 124).

Killing of adults: Villagers as well as common people kill adult lizards due to negative attitudes to Bengal monitors (Appendix 56; Plates 123, 125 and 126).

Predation: Sometimes Bengal monitors especially hatchlings and young were predated mainly by mongooses, and other predators were crows and Brahminy kite (Appendix 56).

Effects of pesticides: Two Bengal lizards were found dead due to eating poisoned rats by pesticides (Appendix 56).

Road kill: High speed vehicles kill Bengal lizards in the newly constructed roads through natural habitat of Bengal lizards (Appendix 56).

Beside these causes, two incidents were recorded on cannibalism in AG,DU in the study period.

Local belief about Bengal monitor

During the study period, local people were interviewed verbally to know their attitudes about Bengal monitors. Mixed opinions were expressed. Local people (except tribe people) belief that saliva of Bengal monitor is highly poisonous and if a monitor whips and injures someone with its tail, the injurious part may rot, some of them told that they do not kill the Bengal monitor because it eats poisonous snakes as well as rotten animal foods from their surroundings. They also added that fecal matters of Bengal monitor are poisonous and if it accidentally touches to the any part of the body that area may rot. Tribe people ("Shautal") of Mithapukur, Rangpur told to the researcher that meat of Bengal lizard is edible, very tasty and nutritious and their children eat it if they get, but they do not disclose it to the non-tribe people.

Table 4.3.1. Population density (individual/km^2) of Bengal lizard in the non- protected zones during 2011-2014

Sl No.	Study Area	All ages	Adults	Juvenile	Young
1	Hazratpur Union	8.3	5.0	2.0	1.3
2	Sonargaon, Narayangonj	18.0	11.0	4.5	2.5
Mean ± SD		13.2±6.9	8.0±4.2	3.3±1.8	1.9±0.8

Table 4.3.2. Population density (individual/km^2) of Bengal lizard in the protected zones during 2011-2014

Sl No.	Study Area	All ages	Adults	Juveniles	Young
1	Jamuna Resort	53.0	25.0	19.0	9.0
2	Jahangirnagar University Campus	27.0	16.7	6.3	4.0
3	Dhaka Zoo and National Botanical Garden	34.0	18.7	10.0	5.3
4	Ghorashal Power Plant, Plash, Narsingdi	62.0	29.3	20.7	12.0
Mean ± SD		44.0±16.3	22.4±5.8	14.0±7.0	7.6±3.6

Table 4.3.3. Monthly average total number and scavenging number of lizards in Drain and Garbage Bins in three study areas

Study Area	Drain		Garbage Bin		Total average of scavenging no.(in drain + garbage)	Percentage (%)	
	Total Number	Scavenging Number	Total number	Scavenging Number		In drain	In garbage
Jahangirnagar University Campus	11.9	7.11	19.0	11.9	19.01	37.4	62.6
Jamuna Resort	7.55	4.26	12.3	7.94	12.2	34.9	65.1
Hazratpur Union	1.87	1.03	3.5	1.7	2.73	37.7	62.3
Mean ± SD	7.1±5.02	4.1±3.04	11.6±7.8	7.2±5.1	11.3±8.2	36.7	63.3

Table 4.3.4. Average number of scavenging Bengal lizards in three study areas during different day hours

Timing	Study Area		
	JUC	JR	HU, MR
07:00-9:00 (AM)	4.9	3.1	1
09:00-11:00 (AM)	8.11	4.4	1.37
11:00(AM)-01:00(PM)	3.37	2.3	1
01:00-03:00(PM0	1.63	1.7	1
03:00-05:00(PM)	1.38	1.43	1

Table 4.3.5. Dead, decaying, cooked and uncooked food items consumed by Bengal lizards

SL. No.	Food sources	Food items
1.	Fishes	Fins of fishes and other cooked and uncooked unnecessary parts
2.	Eggs	Rotten eggs and eggs-hells
3.	Chicken	Chicken feathers, cooked and uncooked chicken meat, bones and other
4.	Dead and decaying	Dead and decaying mongooses, crows and rats.
5.	Beef and mutton	Unnecessary parts, bones.

CHAPTER 5: DISCUSSION

Distribution

During the present study period, in all study areas, Bengal monitors (*Varanus bengalensis*) were more or less available. In some cases, other two species of monitor lizards (*V. salvator* and *V. flavescens*) were noted in HU, MR; JUC and JR, T with *V. bengalensis*.

Akond *et al*. (1982) stated that *V. bengalensis* is distributed all over the country and is fairly common in Dhaka, Mymensingh, Tangail. They also reported that *V. flavescens* also occurred all over the country and *V. salvator* was found in sothern and coastal districts of Bangladesh.
Sarker *et al*. (2000) stated that the common monitor lizard (*V. bengalensis*) was reported by local people of St. Martin Island, Cox's Bazer, Bangladesh.

Ahsan & Saeed (2004) stated that the Bengal or Gray Monitor Lizard (*V. bengalensis*) is one of the three varanid species found in Bangladesh. It is most widely distributed through the country, including many islands, in both forested and non-forested open wooded areas.

Smith (1935) stated that *V. bengalensis* is the commonest and most extensively distributed throughout India, Cylon, Assam and the greater part of Burma.

Mertens (1942) stated that the monitor lizards (Family Varanidae) are distributed over most of Africa and Australia, through India, Ceylon, and Malaysia and into the islands of the equatorial Western Pacific.
Rathnayake (2001) mentioned that of the four Varanid lizards found in the Indian sub-continent, only *V. salvator* (Water monitor) and *V. bengalensis* (Land monitor) are found in Sri Lanka.

Daniel (2002) reported that the Bengal monitor (*V. bengalensis*) is widespread in India (Das, 1988) and lives in all biotopes, ranging from evergreen forests to the desert fringes.

Population size and density

In the present study, the total estimated population of six administrative areas on the basis of surveyed area was 4006 individuals. The highest density (34.5 individuals/km^2) was found in Durgapur Union (surveyed area was Jamuna Resort, Kalihati, Tangail) and the lowest (3.41 individuals/km^2) at Mirpur Model Thana (surveyed area was Dhaka Zoo & National Botanical Garden, Mirpur, Dhaka). The highest density of adults (16.3 individuals/km^2), juveniles (12.4 individuals/km^2) and young (5.9 individuals/km^2) were found in Durgapur Union and the lowest density of adults (1.9 individuals/km^2), juveniles (1.01 individuals/km^2) and young (0.53 individuals/km^2) were found in Mirpur Model Thana, Mirpur, Dhaka.

The highest percentage of adults (61.7) juveniles (35.8) and young (19.2) were found in Pathalia Union, Durgapur Union and Ghorashal Municipality respectively and the lowest percentage of adults

(47.1) and young (14.8) were found in Durgapur Union and Pathalia Union. The lowest percentage of juveniles (23.5) was found in Hazratpur Union and Pathalia Union.

Hossain & Sarker (1996) reported that fifty two individuals of monitor lizards per sq km were counted in Shukchar Union Parishad and the least number, 18 individuals at Zahajmara Union Parishad at Hatiya, Bangladesh.

De-Lisle (2007) stated that it was not possible to get a reliable estimate of the monitor population (*V. bengalensis* and *V. salvator*) in Bentenan Lagoon (Thailand), but it was probably fewer than 25 adults, perhaps as few as 15, without mentioning the area.
Uyeda (2009) stated that monitor lizard abundance of the two areas of Tinjil Island, Indonesia, with an average approximate abundance of 4 specimens/km2 in uninhabited areas (where human food leftovers were not available) as compared to 1400 individuals/km^2 in areas inhabited by people.

Karunarathna *et al*. (2012) mentioned that the population of *V. bengalensis* from Puttalam to Eluwankulama (in Sri Lanka) appears to be very large, with 47 sightings (males, 23; females, 15; juveniles 9) recorded from the Eluwankulama area (5:3 male-female sex ratio), and another 29 (males, 14; females, 9; juveniles 6) from the Kalpitiya area (3:2 male-female sex ratio), but author did not mention the area of the study area.

Koch *et al*., (2013) stated that the texa *bengalensis* belongs to the *Varanus bengalensis* species group and the distribution of this lizard from Southeastern Iran, Afghanistan, Pakistan, India, Nepal, Bangladesh and Myanmar.

Overall mean population size (in terms of %) considering the habitats in different study areas

Mean population size in terms of percentage, considering the habitats were 20.1 % in garbage (15.2±9.9), 15.5% in drain (11.9±6.7), on the banks of the ponds/lakes 10.8% (8.2±4.2), 9.3% in cultivated land (13.0±7.0), 9.1% in bamboo shoots/bushes (6.8±3.2), 8.6% in marsh lands (7.8±4.3), 7.5% in open spaces (5.7±4.8), 7.2% in underground spaces (5.5±5.3), 5.5% in sloping ground (5.7±4.8), 5.1% on the trees (3.8±1.3) and 1.3% in old graveyard.

Akond *et al*. (1982) reported that Monitor lizards live mostly in the earth holes and tree holes. These are found in the agricultural field and around the houses near bushy area, ponds ditches, swamp areas and khals (cannels) during their movement or daily activities. Black monitor generally prefer higher ground and lives around homes and between agricultural fields. They also mentioned that monitors (*V. bengalensis*) prefer to live the tree holes of mango (*Mangifera indica*), Sajna (*Moringa olefera*), Chatian (*Alstonia scholaris*), Banyan tree (*Ficus* spp.), etc. and bushes around the houses as well as in the old grave.

Hossain & Sarker (1996) mentioned that the grey land monitor always tried to hide itself under bushes near swampy areas on the edge of standing running water bodies.

Jaman *et al*. (2007) mentioned that Bengal monitors were found using rodent holes along canals, roads and banks of ponds, embankments and houses, other premises and trees. More often they used paddy fields under bushes, edge of jungles and bamboo thickets as feeding and basking places.

Greer, (1989); Collar *et al*., (2010) and Collar *et al*., (2011) noted that habitats were classified as arboreal, arboreal/semi-aquatic, terrestrial, and rock dwelling and present study supported it.

Auffenburg (1994) reported that the Bengal monitors prefer the more humid areas of arid region and the drier areas of humid regions.

Gaulke & de Silva (1997); Karunarathna *et al*. (2008) reported that monitor lizards can be found in both aquatic and terrestrial habitats such as swamps, ditches, home gardens, streams, reservoirs, ponds, arboreal areas and mangroves.

Rathnayake (2001) reported that Monitor lizards are concentrated in forests, wetlands villages and homesteads, agricultural lands and the roadsides as their habitats.
Shah & Tiwari (2004) stated that *V. bengalensis* is a generalist species inhabiting forests, agricultural lands and grasslands.

Shah & Tiwari (2004) reported that the Bengal monitor lizard (*Varanus bengalensis*) is a wide-ranging species, inhabiting forests, agricultural lands and grasslands.

Karunarathna *et al*. (2012) reported that most *V. bengalensis* were recorded from residential gardens and others from forested areas as well as in semi arboreal habitats.

The present study supported all these habitats where the Bengal monitors were noted, none of author did not mention above mentioned habitats together, but separately.

Sex ratio of Bengal monitors

Ahsan & Saeed (2004) stated that a total of 2112 Bengal lizards (685 [32.4%] males and 1427 [67.6%] females) were released inside the farm area. It supported the sex ratio of Hazratpur Union and Animal Garden, Dhaka University. On the other hand, the sex ratio of the rest areas supported by Auffenberg & Ipe, (1983) and Ahsan & Saeed, (2004).

Table 5.1. Male-female ratio of different monitor lizards

Species	**Sex ratio**	**Sources**
V. bengalensis	1:5	Present study
V. bengalensis	1:2.1	Ahsan & Saeed, 2004
V. bengalensis	1:1	Auffenberg & Ipe, 1983
V. indicus	1:3	Wikramanayake & Dryden, 1988
V. flavescens	1:1	Auffenberg, 1989.
V. cumingi	1:3	Yuyek, 2012.

Breeding

Sexual maturity

Fitch (1981) reported that among reptiles where males are typically larger than females, male-male combat and forced insemination to females occur.

The present), but they did not report the timing of male-male combat wrestling.

Table 5.2. Age of the sexually maturity of different monitor lizards

Species	Age of sexual maturity	Other	Sources
V. bengalensis	Males of *V. bengalensis* were larger than females and both sexes became sexually mature at the age of two or beginning of the third years in AGDU.	-	Present study
V. salvator	-	They reproduce throughout year, both in terraria and in wild.	Khan, 1969.
V. bengalensis	- They become sexually mature at the end of 2nd or beginning of the 3rd year.	-	Auffenburg, 1988.
V. flavescens	During 3rd year	-	Auffenburg, *et al*., 1989
V. komodoensis	At the age of five year	-	Visser *et al*., 2009

Sex identifying

Monitor lizards are notoriously difficult to sex from external characters (Mertens, 1946).

Male monitors attain larger size, grow faster and are generally dominant to females (Auffenberg, 1979).

Cloacal area of sub-adult male *V. bengalensis* showing thickened ridges posterior-lateral to the vent (Auffenberg, 1981).

Sex determination in varanids can be problematic (Horn & Visser, 1997).

Sexes of *V. jobiensis* were determined based on differences in appearance of the tail base area. The male possesses a prominent hemipenal bulge, whereas the female does not. The male also possesses a high keel towards the middle of the tail, whereas the female does not (Stefani, 2008).

During the present study, it was noted that the males of *V. bengalensis* grew faster than females dominated the females that supported Auffenberg (1981). In the caught specimen, it was found that the cloacal region showing thickness of muscles than females. It was also found by Auffenberg (1979) and it was also noted that during discharging of fecal matter, males' hemi pennis came out which was not seen in females, none of author did not reported this matter.

Breeding season

During the present it was found that the breeding season started from Mid-August to the end of September that supported Ahsan & Saeed, (2004) and Jacob & Ramashawami (1976) but did not match with Jaman *et al*., (2007) and Deraniyagala, (1953).this season ended in March-April.

Table 5.3. Breeding season of different monitor lizards

Species	Breeding season	Geographical	Source
V. bengalensis	July to September and ends between March and April (from male-male combat wrestling to hatch out).	Bangladesh	Present study
V. bengalensis	August to October	Bangladesh	Ahsan & Saeed, 2004.
V. bengalensis	March to June, pick period was May	Bangladesh	Jaman *et al*., 2007
V. bengalensis	January to April	Ceylon (Sri Lanka)	Deraniyagala, 1953.
V. bengalensis	June-July	India	Jacob & Ramashawami, 1976.

Breeding behavior

Males become more active and aggressive to the other males for females. Male-male combat wrestling was seen supports observations of Ali, (1944), Deraniyagala, (1957, 1958), Auffenberg (1981), Horn (1980), Horn & Visser (1997) and Karunarathnan *et al*. (2008).

Combat behaviour in the Bengal monitor, *V. bengalensis*, is provided in the reports of ritualized fighting seen between wild males in India (Ali, 1944) and in Sri Lanka (Deraniyagala, 1957), supported by Auffenberg (1981), Deraniyagala (1958), Horn (1980), Horn & Visser (1997) and Karunarathnan *et al*. (2008).

Nesting time

The nesting time of Bengal monitors started between end of the September and first week of October. It was also observed that this activity as done at day time, mostly morning and afternoon. This present observation is close to Auffenberg, (1983).

Nesting places

In the present study, the Bengal monitors preferred the termite mound a faster way to build their breeding nests in it and where the termite mounds were not available, the females preferred under the roots of trees. Average height from the ground, base circumferences and base radii of 24 termite mounds were 84.0±26.4cm, 733.3±108.9 cm and 116.4±17.3cm and 41.7% of termite mounds were used as nests during breeding season. This present study supported by Cowls, (1930), Smith, (1935), Biswas & Kar (1981), Auffenberg, (1983), Hossain & Sarker (1996) and Ahsan & Saeed,(2004), none of them reported the measurement of termite mounds.

Table 5.4. Nesting places of different monitor lizards

Species	Place	Sources
Varanus bengalensis	Holes of termite mounds, where mounds are not available, Bengal lizards prefer under roots of trees.	Present study
V. bengalensis	Holes of termite mounds	Ahsan & Saeed, 2004
V. bengalensis	Bamboo groves, banks of ponds and raised places in jangles.	Hossain & Sarker (1996)
Varanus. spp.	Termite mounds	Cowles, 1930.
V. bengalensis	Ant-hills	Smith, 1935
Varanus spp.	Termite mounds	Biswas & Kar (1981)
V. bengalensis	Burrows in the soil, in the absence of termite nests, termite nests, flask-shaped holes on the ground, earthen cliffs.	Auffenberg, 1983.

Nest measurement and shape

Table 5.5. Nest measurement of different monitor lizards

Species	Nest measurement	Sources
Varanus bengalensis	The average diameters, circumference, depth and height from the ground of all breeding nests (24) were 33.6±2.9, 105.6 ±9.2cm, 23.2±1.1cm and 28.1±2.7 cm.	Present study
V. bengalensis	2.5 feet long, goblet-shape and oblique.	Deraniyagala, 1958.
V. varius	Approximately 25 cm diameter×15 cm high.	Boylan, 1995.
V. acanthurus	Depth was 30.5 cm.	Burokas, 2008.

Deraniyagala, (1958) did not mention the above parameters on nests.

Nest temperature

Table 5.6. Nest temperature of monitor lizards

Species	Temperature	Sources
Varanus bengalensis	The morning temperature of the breeding nest of Bengal lizards varied from 11^0C to 28^0C and the mean was 18.48^0C±4.91. The afternoon temperature of the breeding nest of Bengal monitors varied from 18^0C to 35^0C and the mean was 25.92^0C±5.3.	Present study
V. g. rosenbergi	Approximately 27^0C	King & Greene, 1979.
V. salvator	25.8-27.6^0C in natural condition	Biswas & Kar, 1981.
V. flavescens	30^0C	Visser, 1985

None of the mentioned author worked on the incubation temperature of *V. bengalensis*, but incubation temperature of other species was closer to the present studied species.

Nest Humidity

The morning humidity of the breeding nest of Bengal monitors varied from 98% to 83% and the mean was 90.84 ±4.91. The noon temperature of the breeding nest of Bengal monitors varied from 34% to 75% and the mean was 54.11±7.67.

Egg-laying period

Table 5.7. Egg laying period of monitor lizards

Species	Egg-laying period	Sources
Varanus bengalensis	September to November in Bangladesh	Present study
V. bengalensis	Between August and October in Bangladesh	Ahsan & Saeed, 2004.
V. monitor	Late June to July	Jacob & Ramaswami, 1976.
V. bengalensis	Rainy season	Horns & Visser, 1997.
V. bengalensis, V. p. beccarii, V. timorensis, V. dumerilli, V. indicus,	Between August and March	Auffenberg, 1994; Horns & Visser, 1997.

Present study is supported by Ahsan & Saeed (2004); Horns & Visser, (1997); Horns & Visser (1997); and Auffenberg (1994) and did not similar to Jacob & Ramaswami (1976).

Clutch size

Ahsan & Saeed (2004) stated that the clutch size varies according to the size and age of the females, larger and older females lay more eggs than younger and smaller ones. The average clutch size *V. bengalensis* was 21.1±7.4 (range 10-32, n=25).

Auffenberg (1988) and Sumiller (1998) reported that reptilian clutch size is often associated with the size and age of a female.

Table 5.8. Clutch size of different monitor lizards

Species	Clutch size	Sources
V. bengalensis	The mean clutch size of 7 nests was 24.57±7.11 and the range was 39-18 in Bangladesh.	Present study
V. bengalensis	8-32	Whitaker & Hakida, 1981; Akond *et al*., 1982.
V. bengalensis	20-30 in Bangladesh	Khan, 1987.
V. bengalensis	The clutch size varies according to the size and age of the females, larger and older females lay more eggs than younger and smaller ones. The average clutch size *V. bengalensis* was 21.1±7.4 (range 10-32, n=25).	Ahsan & Saeed, 2004
V.bengalensis	24	Deraniyagala, 1958.
V. monitor	15-20 egg deposition is completed approx. 8-10 hours.	Jacob & Ramaswami, 1976.
V. griseus	2-15	Auffenberg, 1990.
V.bengalensis	8-30 in India	Daniel, 2002.
V. bengalensis	4-10	Karunarathna, 2008.

During the present study the mean clutch size of 7 nests was 24.57±7.11 and the range was 39-18 in Bangladesh, was supported by Ahsan & Saeed (2004); Khan, (1987); Daniel, (2002) and Deraniyagala, (1958), but it did not support Karunarathna, (2008).

Table 5.9. Egg shape colour and shell

Shape	Colour	Shell	Remarks	Sources
Elongated, anterior end slightly pointed and the other end slightly tapered	Whitish and occasionally slightly brownish	Soft	Leathery, at the time of hatching it becomes deformed	Present study
Oval	White	Soft	Leathery	Ahsan & Saeed, 2004.
Oval	-	Soft	Leathery	Smith, 1935.
Oval	Dirty white	Soft	Leathery	Jacob & Ramaswami, 1976.
Elongated, both ends tapering bluntly	White	Soft	Leathery	Biswas & Kar, 1981.
-	-	Soft, smooth without surface ornamental	Leathery	Auffenberg *et al*., 1989.

Ahsan & Saeed (2004); Jacob & Ramaswami (1976); Biswas & Kar (1981) and Auffenberg *et al*. (1989) supported the present study.

Egg Measurement

Table 5.10. Measurement of different parameters of eggs of different monitor lizards

Species	Length	Width	Weight	Girth	Sources
V. bengalensis	5.39 cm	3.95 cm	41.45 g	12.62 cm	Present Study
V. bengalensis	5.71 cm	2.92 cm.	26.93 g	-	Ashan & Saeed, 2004.
V. bengalensis	4.9cm (4.7-5.5cm)	3.8cm (3.6-4.4 cm)	11.4 g (8.3-14.3 g)	-	Daniel, 2002.
V. bengalensis	48.2-55.8 mm	37.8-44.5 mm	-	-	Karunarathna, *et al.*, 2008.

Incubation period

During the present study period, it was found that the first hatchling hatched out after 191 days and the last one hatched out 198 days (clutch size was 39) in 2012. In 2013, the first hatchling hatched out after 192 days and the last one hatched out 196 days (clutch size was 23). In 2014, the first hatchling hatched out after 192 days and the last one hatched out 197 days (clutch size was 18). Average minimum and maximum duration for incubation were 191.7±0.58 days and197±1.0 days respectively, supported by Ahsan & Saeed, (2004); Akond *et al*., (1982) and Deraniygala, (1958), but Whitaker & Hikida, (1982) did not supported the present study.

Table 5.11. Incubation periods of different monitor lizards

Species	Duration	Source
Varanus bengalensis	191-198days	Present study
V. bengalensis	6-8 months (183-244 days)	Akond *et al*., 1982.
V. bengalensis	6-7 months (189-216 days)	Ahsan & Saeed, 2004.
V. bengalensis	6-7 months (185-214 days)	Deraniygala, 1958
V. bengalensis	7-8 months (213-244 days)	Whitaker & Hikida, 1982.

Hatching time

Table 5.12. Hatching time of different monitor lizards

Species	Time	Sources
V. bengalensis	March to April, 72.86% hatched out at day and 27.14% at night.	Present study
V. bengalensis	June-July	Akond *et al*., 1982.
V. bengalensis	Mid March to early June	Ahsan & Saeed, 2004.
V. bengalensis	July	Whitaker & Hikida, 1981.

Present study supported Ahsan & Saeed, (2004), but it did not support Whitaker & Hikida, (1981) and Akond *et al*., (1982).

Table 5.13. Hatching factors

Species	Factors	Sources
V. bengalensis	1) Handling of eggs 2) Predators	Present study
V. bengalensis	to (1) soil became compact due to rain and killed embryos; (2) mishandling of eggs by the staff during egg transplantation; (3) unregulated temperature and moisture in the incubation cases	Ahsan & Saeed, 2004.
Varanus spp.	To infertile eggs, aggression, incubation difficulties, reproduction related pathologies.	Camina *et al*., 2013.

Present study partially supports to Ahsan & Saeed, (2004).

Measurement of hatchlings

Table 5.14. Different measurement of body length and weight at hatchling stage in different monitor lizards comparing to Bengal lizard

Species	Snout-Vent Length (SVL) (cm)	Tail Length (TL) (cm)	Total Length (ToL)	Weight (g)	Sources
V. bengalensis	(Head + Abdomen) = SVL 3.81+5.96 =9.77	14.04	23.8 cm	17.91	Present study
V. bengalensis	-	-	19.72 cm	13.61	Ahsan & Saeed, 2004.
V. varius	-		35.4 cm	52.7	Horn, 1980.
V. varius	10.6	I6.5	27.1 cm	12.8	Boylan, 1995.
V. salvator	12.0-13.5		29.0-30.5 cm	-	Dwyer & Perez, 2007.
V. salvator	12.9	17.5	30.4 cm	38.1	Dwyer & Perez, 2007a.

The average length and weight of all hatchlings were 23.96 cm and 18.03 g respectively at the time of hatching, close to Ahsan & Saeed (2004).

Colour of Hatchlings

De Jong (1944) reported that it is well known fact that the young specimens of *Varanus* species are brighter than the adult ones.

Table 5.15. Color of monitor lizards (dorsal and ventral side)

Species	Colour of hatchlings	Sources
V. bengalensis	Hatchlings were yellow stripes on black surface on dorsal surface on ventral side were yellow.	Present study
V. salvator	Yellow spots on very black background.	Biswas & Kar, 1981.
V. flavescens	They usually have transverse bands of separated yellowish ocelli and small black dots on a brownish background.	Auffunberg *et al*., 1989.
V. salvator	They have transverse bands of separated yellow ocelli on background.	Auffenberg, 1989.
V. bengalensis	Dorsal sides have yellow spots that are very distinct, becoming indistinct in adults	Karunarathna *et al*., 2008.

Colour of Hatchlings on Dorsal side

During the present study it was found that hatchlings and young were much more colourful than adults, which were similar to De Jong (1944). The all hatchlings were Yellow Stripes on Black Surface (YSBS) at the time of hatching, which was supported by Karunarathna *et al*., (2008) and Auffunberg *et al*., (1989).

None of authors did not mention the colour changing stages in different time.

Timing for sound (hissing)-producing power by the hatchlings of Bengal monitor

The hissing calls of monitor lizards are very important throughout their lives. These calls act as defense as well as dominance to other. But they do not gain this power at the beginning of their lives. They have to wait for some weeks to gain this power. They obtained this power between 7thweek to 12th week.

No one reported about the timing of hissing sound by the hatchlings.

Post hatching behaviour

Ahsan & Saeed (2004) stated that after hatching out, a baby lizard of *V. bengalensis* did not eat for the next 2-3 days due to the continued absorbance of its yolk reserve.

Biswas & Kar (1981) reported that the hatchlings of monitor lizards were very active immediately after hatching.

Auffenberg (1989) stated that juveniles of *V. bengalensis* are extremely wary and spend much time in the trees.

Wesiak & Koch (2009) stated that neonates of *V. juxindicus* began eating after 3-4 days

Zeeuw (2010) stated that the hatchlings of *V. glauerti* began feeding after a week.

After hatching, the hatchlings ran away, which is similar to Biswas & Kar (1981) and took shelter in burrows and did not come out from their burrows up to four to six days which were supported by Ahsan & Saeed (2004), Wesiak & Koch (2009) and Zeeuw (2010).

Table 5.16. Food of hatchlings and Feeding Behaviour

Species	Food	Feeding behaviour	Source
V. bengalensis	Provided small prawn and cockroaches, the pieced boiled chicken. At the age of twenty five, they started to take different types of insects e. g. Butterfly, Dragonfly, Grasshopper, Damselfly, caterpillars etc. they were also given live Earthworms, House Rats etc.	After fifth day, they started to eat and prefer to take live food than dead food. Before eating food, they used to flick their tongues in order to confirm whether the food was edible or not. When they were offer live animals catch head region first and jerked then vigorously till death and then animals were engulfed.	Present study
V. bengalensis	Termite eggs and larvae,	Preferred to take live food	Ahsan & Saeed,

	crushed boiled poultry eggs	than dead food	2004.
V. bengalensis	completely insectivorous and most common preys are Orthopterans and Coleopteran	-	Auffenberg & Ipe, 1989.
Varanus spp	Insects, such as wax moths *Galleria mellonela*, crickets *Acheta domestica*, *Gryllus migratoria*, cockroaches *Blaptica dubia* and locusts *Locusta migratoria*.	-	Horn & Visser, 1989.
Varanus spp	Insects and other invertebrates	-	Yuyek, 2012.

Table 5.17. Ecdysis of monitor lizards

Species	Ecdysis	Source
V. bengalensis	First moulting starts from 6th week and it lasts 13th week. Second moulting starts from 14th week and it lasts 20th week.	Present study
V. flavescens	Occur during and after the period of greatest food abundance.	Auffenberg *et al*., 1989.
V. bengalensis	Ecdysis starts on August	Karunarathna, 2008.
V. juxtindicus	Starts after two months of hatching.	Wesiak & Koch, 2009.

Karunarathna (2008) and Auffenberg *et al*. (1989) agreed regarding ecdysis but timing varied with the present study.

Breeding success and mortality

The hatching success was 90.0% in relation to egg laid and mortality in three years was 25.7% with highest in 2012 (33.3%).

Conservation

Table 5.18. Comparison of population density between non-protected and protected zones

Species	Population		Source
	Protected zones	Unprotected zones	
V. bengalensis	More	Less	**Present study**
V. bengalensis	More	Less	Ghimire & Phuyal, 2013.

Auliya, (2003) it was predicted that the concentration of monitors would be higher in areas of human settlements, due to the presence of food or possible association between humans and food in the form of leftovers or garbage.

Uyeda (2009) stated that it has been shown that monitors will scavenge food if available in the form of human leftovers.

Ghimire & Phuyal (2013) stated that habitat preference is an important factor for the conservation of any species. *V. bengalensis* preferred the bounded area over the unbounded area, suggesting a positive impact on the abundance of monitor lizards that supports present study.

Scavenging behaviour by Bengal monitors

Scavenging behavior of Bengal monitors were noted in two habitats. These were drains and garbage bins. Number of the individuals and the timing of scavenging were not same and depended on months. During scavenging, they take fins and unnecessary parts of fishes, rotten eggs and their shells, chicken feathers, stomach, bones and other unnecessary parts, dead and decaying crows, mongooses and rats etc.

On monthly average, out of (7.1±5.01) individuals, scavenging individuals were (4.1±3.04) and their percentage was 36.7% in drain and in the garbage bin, mean of scavenging individuals were (11.6±7.8) out of (7.2±5.1) individuals and their percentage was 63.3 % in three study areas. Most cases scavenging occurred between 09:00 – 11:00. The present study was supported by Hossain *et al*.(1995), Jaman *et al.* (2007), King & Greene (1979), de Silva (1998), Rathnayake (2001) and Daniel (2002), but no one mention type of scavenging except Wilson (2005), and the time of scavenging.

Hossain *et al*. (1995) reported Bengal monitors feed on carcasses, rotten materials and maintain the ecological balance and control environmental pollution.

Jaman *et al.* (2007) reported that the contribution of Bengal monitor to the ecological balance by destroying harmful animals as well as saving our farmlands is considerably high.

Rathnayake (2001), King & Greene (1979) reported the land monitors feed on all sorts of carrion, therefore can be considered a good sanitation agent.

Daniel (2002) and de Silva (1998) reported that monitor lizards are useful animals for humans (pest control and scavengers) and categorized as scavengers which mainly feed on animal carcasses.

Wilson (2005) noted that in national park and recreational areas including picnic and camp grounds, there is indirect interaction between people and monitors. Monitor lizards exhibit both predatory and scavenging behavior.

Das & de Silva (2005), Deraniyagala (1953) and Rathnayake (2001) reported that *Varanus s. salvator* is useful as pest control agents, despite being categorized as scavengers that mainly feed on animal carcasses.

Help in Fish development

Table 5.19. In fish development

Species	The way of helping	Source
V. bengalensis	Movement of fished take place very firstly and it influences the growth of fishes. They are unable to catch live fishes take only dead fishes.	Present study
Varanus spp	Dead fishes are taken by *Varanus* spp near shore of Coastal stream, North Sulawesi, Indonesia.	de Lisle, 2007.

de Lisle (2007) supported the present study.

Table 5.20a. In controlling rat population

Species	Ways of monitor lizards control rat population	Sources
V. bengalensis	Rats make holes in the banks of pond and they bring the soil. Loose soil fills the bottom of the pond and the depth decreases. It prevents fish culture. By eating or removing rats from the banks of fish ponds, the Bengal lizards help in fish culture.	Present study
V. bengalensis	Takes rats as food.	Loop, 1974
V. bengalensis	Twelve percent of wheat is destroyed in Bangladesh by the rats in fields. Rats are taken as food by Bengal lizards. In this way lizards save crops every year.	Akond *et al.,* 1982
V. bengalensis	Takes rats (*Bandicoota bengalensis*) as food	Rao & Rao, 1984
V. bengalensis	A good number of rodent pests are eaten by Bengal lizards in agricultural fields.	Hossain *et al*., 1995
V. bengalensis	In Sri-Lanka, the preferred foods of Bengal lizards are rodents such as *Rattus rattus* and *Bandicoota bengalensis* and *Bendicoota indica.*	Karunarathna *et al.,* 2008
Varanus spp.	Takes rats as food.	Dryden, 1965
V. indicus	*V. indicus* controls rat population in Western Caroline Island, Ifaluk, Micronesia that causes serious economic loss by making holes in growing coconuts.	Uchida, 1966

Table 5.20b. In balancing snake populations

Species	Ways of monitor lizards control snake population	Sources
V. bengalensis	They ate Striped Keelback *Amphiesma stolata*, Cheeckered Keelback *Xenochrophis piscator* and Olive Keelback *Atretium schistosum* and Rat Snake (*Ptyas mucosus*.	Present study
V. bengalensis	Snakes and their eggs were eaten by *V. bengalensis*	Akond *et al.,* 1983
V. bengalensis	They feed on wild common rat snake (*Ptys mucosus*), common rat (*Rattus rattus*), mole rat (*Bandicoota bengalensis*) and Malabar bandicoot (*B. indica*).	Karunarathna *et al.,* 2008
Varanus spp.	They ate snakes and reptiles' eggs	Derniyagala, 1953
Varanus spp.	They ate snakes	Bateman, 2011

Present study is supported by Akond *et al.* (1983), Karunarathna *et al.* (2008), Derniyagala, (1953) and Bateman (2011).

Table 5.21. In balancing beetle and earthworm populations

Species	Ways monitor lizards control beetle and earthworm population	Sources
V. bengalensis	Bengal lizards eat beetles, larvae and earthworms as food and control their population. Availability of these invertebrate foods varies season to season. Monsoon is the peck and winter is the off-peck season for production of these foods. During hatching period of the lizards, demand of these foods increased.	Present study
V. bengalensis	Bengal lizards act as bio-control agents of pest beetles on coconut trees, which cause considerable damage to coconut plantation.	Rathnayake, 2001
V. bengalensis	Bengal lizards are seen to eat arthropods especially beetles and grubs from cow-dung.	Ahsan & Saeed, 2004
V. bengalensis	Bengal lizards eat many invertebrates, particularly beetles and Orthopterans.	Losos & Greene, 1988
V. bengalensis	Earthworms and beetle larvae are regularly eaten from cattle dung by Bengal lizards.	Auffenberg, 1994
V. bengalensis	One of the foods of Bengal lizards is earthworms.	Akond *et al*., 1982
V. spp.	One of the preys of monitor lizards comprises larvae and pupae of beetles.	Jessop, *et al.,* 2010

Besides these, Ahmed (2006) noted that beetles suck juice from the raw part of coconut trees and Islam *et al.,* (2012) stated that beetles suck the juice from banana, but none of them mentioned the availability of these food items in particular season.

Questionnaire based survey on Bengal lizard

Important opinions, suggestions and advice on conservation are discussed by local people and experts in this part of the chapter. These have been highlighted into three different main headlines for a better understanding. They are

A. Why we should conserve Bengal lizards;
B. The reasons which work behind the decrease of Bengal lizards' population, and
C. How we can conserve Bengal lizards

Why we should conserve Bengal lizards The main points from local people and experts are (a) they maintain about the ecological balance in the environment and keep the nature healthy as scavengers; (b) they help farmers by eating rats, mice and other harmful insects; (c) they help to keep a healthy environment by eating dead and rotten animal bodies; (d) the regions where they lived – had no snakes; (e) different types of products were made from their skins and (f) they play a significant role in the food chain.

Auffenberg (1989) stated that the Bengal monitor is an insectivore and feeds most extensively upon beetles of two families associated with extensive damage of grain crops, Scarabaeidae and Tenebrionidae. Ahsan and Saeed (2004) noted that the role of Bengal lizards in ecosystem is to control some pests.

Their opinions are also supported by Loop (1974), Akond *et al*., (1982), Hossain *et al.* (1995) and Cota *et al*. (2008).

The reasons which work behind the decrease of Bengal lizards' population The main points from local people and experts are (a) habitat destruction; (b) killing them unknowingly by local people; (c) usages of pesticides; (d) illegal hunting for flesh and skin; (e) destroying nests; (f) insufficient forestation and (g) negligence among responsible people.

Deraniyagala (1931) stated that *V. bengalensis*is eagerly hunted for its skin, flesh and eggs. Akond *et al.* (1982) stated that skin of monitor lizards are used to make many sophisticated and daily usable products. Gaulke and de Silva (1997) suspected that the free use of agrochemical is likely to be one of the reasons for the decline of monitor lizards. Rathnayake (2001) stated that the eggs of land monitors are considered a delicacy and killed for their testy flesh. Their opinions are supported by Auffenberg (1989), Auffenberg *et al.,* (1990), Trombulak & Frissel (1992), Gupta (1996), Bennett (2007), Cota *et al*., (2008) Jaman *et al*., (2007) and Uyeda (2009).

How we can conserve Bengal lizards The main points from local people and experts are (a) to increase public awareness about the usefulness of Bengal monitors; (b) to implement laws and order to stop killing, selling and smuggling of Bengal monitors; (c) human population control; (d) to decrease the use of pesticides gradually; (e) planned urbanization; (f) to protect habitats and stop filling up water bodies and (g) to release them in their habitats by increasing their number through captive breeding.

Karunarathna *et al*. (2012) mentioned that education and awareness programs should focus on villages, school students and the general public, and universities should use these areas for research and experimental programs. Their advices are supported by Wilson (2005) and Duengkae & Chuaynkern (2009).

Causes of decline in population

Population of Bengal monitors is declining due many reasons. One of the main reasons is destruction of habitats includes (a) agricultural extension, (b) deforestation (c) construction of buildings, (d) reduction of wetlands and (e) commercial usage of water bodies**,** supported by Akond *et al.* (1982), Auffenburg *et al.* (1990), de Silva (1996), IUCN Bangladesh (2000), Rathanayake (2001), Bennett (2007), Jaman *et al.* (2007) and Koch *et al.* (2013) stated that breeding of *V. bengalensis* is disturbed by losing its habitat like bushy area near the water bodies and basking place as well as sheltering from predators. Uyeda (2009) stated that habitat loss due to global demand affects monitor lizard population trends.

Ahsan & Saeed (2004) noted that in Bangladesh, some tribes like Shawtal, Kulee, Kukis, etc. are killing monitors lizards meat as their food. Deraniyagala (1931), Somanader, (1963), Gupta (1996), Rathnayake (2001), and Uyeda (2009) noted that eggs of monitor lizards are considered a delicacy

and killed for their testy flesh that supports the present study of killing of adults, eggs and their hatchlings.

Sometimes Bengal monitors especially hatchlings and young were predated mainly by mongooses. Other predators were crow and Brahminy kite. Karunarathna *et al*. (2008) noted that predators of *V. bengalensis* and *V. salvator* are the Brahminy kite (*Haliastur indus*), Shikra (*Accipiter badius*) and Serpent Eagle (*Spilornis cheela*) in Sri- Lanka. Deraniyagala (1953) stated that it is believed to prey upon hatchlings and juveniles of monitor lizards by the wild boar.

By taking dead animal, especially rats, after applying poison from pesticides, two Bengal monitors were noted to die and supported by Gaulke and de Silva (1997) and stated that the free use of agrochemical is likely to be one of the reasons for the decline of monitor lizards., Jaman *et al*. (2007) also mentioned that the particular food sources o f monitor lizards must not be destroyed by using chemical fertilizers and pesticides. Auffenburg (1989), Karunarathna *et al*. (2008) and Khatiwada & Ghimire (2009) supported it.

Population of Bengal monitors are decreasing due to road kill, supported by Karunarathna *et al.* (2012) and mentioned that many road killed *V. bengalensis* were seen inside Udawalawa, Yala, Wilpattu, Kumana and Maduru-oya National Parks in Sri-Lanka between 2010-2011 by DWC vehicles and hired jeeps.

To cannibalize, they were destroyed by themselves and two incidents were noted in AGDU, supported by Auffenburg (1989) and mentioned that the largest *V. bengalensis* cannibalized was a female with a total length of 46 cm, by a male 121 cm total length. Ahsan & Saeed (2004) adviced that it is necessary to separate "nursery" case for neonates and juveniles to prevent cannibalism most probably. Flower (1933), MacDonald (2007) and Geczy (2009) also supported about cannibalism of monitor lizards.

Local beliefs about Bengal monitors

The local impressions on Bengal monitors were mixed. The local people (except tribal people) thought that the saliva of Bengal monitors are highly poisonous and if monitors whip and injure someone with their tail, the injurious part would rot; some of them said that they did not kill the Bengal monitors as they get rid of poisonous snakes and rotten animal food from their surroundings. They also added that fecal matters of Bengal monitors are poisonous and if it accidentally touches any part of the body, it would rot. The tribal people ("Shautal") of Mithapukur, Rangpur told the researcher that their meat is edible, very tasty and nutritious and their children take it if they get it, but they do not disclose it to the non-tribal people.

Deraniyagala (1927) mentioned that chewing the tail of a land monitor strengthens one's gums and the flesh of a land monitor is a remedy for convalescents. De Silva (1996) stated that after eating the tongue of a land monitor, which is inserted in a ripe banana, a child will be given a super memory. Auffenberg (1989) reported that some Thani Jogi tribals in Pakistan prepare a powder of the

hemipenis of *V. bengalensis* to mark the foreskin of male babies believing this to bring wealth and fortune to the child in later life. He also added that some Hindus also use the monitor's oil on the temple Linga as a symbolic gesture of desired fertility. He further he mentioned that many villagers of Pakistan believe monitor lizards to be venomous and partly because in general, Muslims refrain from close contact with lizards and snakes. Rathnayake (2001) reported that the land monitor never drinks water from the water outlets from paddy field bunds and if a person normally eats the flesh of a land monitor, he will never suffer from wheezing. Stanner (2011) reported that monitor lizards are the most loathed animals in Thailand. In that respect, the Ban Truem Village in northeastern Thailand is a unique exception because its Gui inhabitants respect and revere monitor lizards and regard them as manifestations of their ancestors. This reverence has both religious and traditional facets. They do not eat, harm or harass monitor lizards, in spite of the fact that the monitors regularly prey on chicken eggs and chicks of the villagers. Karunarathna *et al*. (2012) reported that Varanid lizards are also an important feature in local art, and both species have a place in folklore and are closely associated with the day to day life of humans. Koch *et al*. (2013) stated that Bugis tradition holds the view that some monitor lizards have an animal's body but a human spirit. It is also believed that a woman on Komodo Island, Indonesia gave birth to twins of whom one was a monitor lizard. Since that time, Komodo people and dragons are siblings.

CHAPTER 6: SUMMARY

The study was conducted in (1) Hazratpur Union Parishad, Mitapukur, Rangpur District (HU, MR), (2) Jahangirnagar University Campus (JUC), Savar, Dhaka; (3) Januna Resort, Kalihati (JR, T), Tangail; (4) (a) Dhaka Zoo and (b) National Botanical Garden, Mirpur, Dhaka (DZ & NBG); (5) Kaltapara and Bostall villages, Sonargaon, Narayangonj District (SN); (6) Ghorashal Power Plant, Palash, Narsingdi District (GPP, N); and (7) Animal Garden, Curzon Hall, Dhaka University (AG, DU), Dhaka, during May, 2011 to June, 2014.

On the basis of surveyed area, the total estimated population of six administrative areas was 4006 individuals. The highest density (34.5 individuals/km^2) was found in Durgapur Union Parishad and the lowest (3.41 individuals/km^2) at Mirpur Model Thana.
The highest and the lowest proportion (in terms of %) of adults were (60.0) and (47.2) ; juveniles were (35.8) and (24.0) and young were (22.5) and (15.6).

Overall mean population size (in terms of %) considering the habitats in different studies areas: Mean population size in terms of percentage, considering the habitats were 20.1 % in garbage (15.2±9.9), 15.5% in drain (11.9±6.7), on the banks of the ponds/lakes 10.8% (8.2±4.2), 9.3% in cultivated land (13.0±7.0), 9.1% in bamboo clumps (6.8±3.2), 8.6% in marsh lands (7.8±4.3), 7.5% in open spaces (5.7±4.8), 7.2% in underground spaces (5.5±5.3), 5.5% in sloping ground (5.7±4.8), 5.1% on the trees (3.8±1.3) and 1.3% in old graveyards.

Sex ratio of Bengal monitors: The sex ratios of Bengal monitors in different study areas varied during each study period. The sex ratio of Hazratpur Union, Rangpur, Jamuna Resort, Tangail, Jahangirnagar University Campus, Savar, Dhaka, Dhaka Zoo and National Botanical Garden, Mirpur, Dhaka, Sonargaon, Narayangonj, Ghorashal Power Plant, Plash, Narsingdi and in Animal garden, Dhaka University were 1:1.8, 1:1.3, 1:1.4, 1:1.3, 1:1, 1:1.5 and 1:1.9 respectively.

Breeding

The males of *V. bengalensis* were larger than females and both sexes became sexually mature at the age of two or beginning of the third year. Male-male combat wrestling was recorded between July and August in different study areas and the average timing for this mean timing was 4.33±01 minutes (range 03-06 minutes).

The males of *V. bengalensis* grew faster than females dominated the females.

The breeding season starts during July to September and ends between March and April.
The Bengal monitors preferred the termite mounds to build their nests. The average height from the ground, base circumferences and base radius of termite mounds were 83.96±24.42 cm, 733.33±108.87 cm and 116.44±17.34cm. The average distance between nearest water body and termite mound was 18.00±7.59 m.

The nests were pitcher shaped i.e. the opening was always smaller in diameter than the interior part. The average diameters, circumference, depth and height from the ground of all breeding nests were 33.6±2.9 cm, 105.6 ±9.2cm, 23.2±1.1 cm and 28.1±2.7 cm.

Nesting time: Nesting started between the end of September and the first week of October.

Clutch Size: The mean clutch size of nests was 24.57±7.11 (range 39-18, n=7).

Measurement of eggs: The average length, width, girth weight and volume of all eggs were 5.93 cm, 3.97 cm, 12.6 cm, 41.4 g and 51.35 cm^3 respectively.

Incubation Period: Incubation periods varied from 191 to 198 days.

Nest temperature: The morning temperature of the breeding nest varied from 11^0C to 28^0C and the mean was 18.48^0C±4.91. The afternoon temperature of the breeding nest of Bengal monitors varied from 18^0C to 35^0C and the mean was 25.92^0C±5.3.

Nest humidity: The morning humidity of the active nests varied from 83% to 98% and the mean was 90.84 ±4.03. The afternoon humidity varied from 34% to 75% with a mean of 54.11±7.67.

Fifty one hatched out at day (72.86%) and nineteen hatched out at night (27.14%). Hatchlings hatched out in March and April.

Egg laying period: All nests were found between September and November, which indicates the egg laying periods in Bangladesh.

Hatching month: Hatchlings hatched out during March and April. A total of 72 hatching periods of Bengal lizards were recorded. Among them, fifty one hatched out at day (72.86%) and nineteen hatched out at night (27.14%).

At the time of hatching, the mean length was 23.80±0.69cm and varied from 22.7cm to 25.3cm (n=72) and mean weight of hatchlings was 17.91±1.03g and varied from 15.8 to 19.5g (n=72).

Colour of hatchlings: During the present study it was found that all hatchlings had Yellow Stripes on a Black Surface (YSBS) at the time of hatching. The Yellow (Y) was on the ventral side at the time of hatching. Concentration of Yellow is deeper on the abdomen than tail region.

Food of hatchlings: Pieces of boiled chicken were offered as food to the five day-old-hatchlings (*Gallus domesticus*). At the age of twenty five, they were live animals (insects e. g. Butterfly (*Danaus plexippus*), Dragonfly (*Libellula puichella*), Grasshopper (*Conocephallus fasciatus)*, Damselfly (*Ischnura cervula*), caterpillars etc., live Earthworms (*Pheretima posthuma*), Albino Rat, House Rats (*Rattus rattus*) etc.).

Moulting: The first moulting of the hatchlings of Bengal monitors was found at the age of 6^{th} week and it lasted up to 13^{th} week. The second moulting started at the age of 14^{th} week and lasted at the age of 20^{th} week.

Hatching success in relation to eggs-laid: A total of 72 hatchlings were hatched out from 80 eggs and hatching success was 90%.

Conservation

Population density between protected and non-protected zones: The overall population density of Bengal monitors is higher in protected zones than non-protected zones. Six areas were selected as study areas, among them two (Hazratpur, Mitapukur, Rangpur and Sonargaon, Narayangong) were in non-protected zones and four (Jahangirnagar University Campus, Savar, Dhaka, Zoo and Botanical Garden, Mirpur, Dhaka, Ghorashal Power Plant, Palash, Narsingdi and Jamuna Resort, Tangail) were in protected zones.

Scavenging behaviour: On an average, 4.1±3.04 of 7.1±5.02 lizards were found scavenging in the drain and 7.2±5.1 of 11.6±7.8 individuals were seen in the garbage bins. The percentage of individuals in drain and garbage were 36.7% and 63.3% respectively.

In fish development: The movement of Bengal monitors in water pools influences in fish growth. When the lizards dive or swim in the water pools, movement of fishes take place firstly, as a result, their growth and increase in weight occurred rapidly. The average length of Tilapia (*Oreochromis niloticus*) fishes was 5.6 cm for both pools (Fig. 4.3.4a) and weight were respectively 4.2 g and 4.3 g at the time of release. The average lengths of fishes of Pool-1 and Pool-2 were respectively 19.5 cm and 18.8 cm and the mean weight were respectively 83.8 g and 76.1g at the time of harvest.

In controlling rat population: Twelve month old Bengal lizards were offered rats as food in AG, DU and the lizards spent 2.2 to 9.1 minutes consuming the rats. It indicated that they act as a bio-control agent against rats.

In balancing beetle and earthworm populations: After hatching, baby Bengal monitors take beetles, their larvae and earthworms to use as food to control their population. September is the peak month and October is an off-peak month of production of beetles' larvae and earthworms together in the cow dung deposition.

In balancing snake populations: The number of snake biting decreased when the density of Bengal lizards increased. It reveals that the density of Bengal lizards is inversely proportional to the number of snake bites.

Overall outcome of the questionnaire based survey

Important opinions, suggestions and advice on conservation are given by local people and experts. The main points about the importance on conservation from local people and experts are (a) Bengal lizards maintain the ecological balance in the environment and keep nature healthy as scavengers and (b) they help farmers by eating rats, mice and harmful insects. The main reason for the decline in the population according to local people and experts are (a) habitat destruction; (b) killing them unknowingly by local people; (c) usages of pesticides and (d) illegal hunting of their flesh and skin. The main reasons to take steps against the declining population of the lizards from local people and

experts are (a) to increase public awareness about the usefulness of Bengal monitors; (b) to implement law and order to stop the killing, selling and smuggling of Bengal monitors; (c) human population control and (d) to decrease the use of pesticides gradually.

Causes of decline in population

Population of Bengal monitors is declining due to many reasons.

The reasons are (1) habitat destruction including (a) agricultural extension, (b) deforestation, (c) construction of new buildings/houses, (d) reducing of wetlands and (e) commercial usages of water bodies ; (2) destruction of nests, eggs and hatchlings ; (3) killing of adults ; (4) predation ; (5) effects of pesticides on them and (6) road kill.

Local Beliefs on Bengal monitors: The local non-tribal people thought that the saliva of Bengal monitors are highly poisonous and if monitors whip and injure someone with their tail, the injurious part would rot. Some of them said that they did not kill the Bengal monitors as they take poisonous snakes and rotten animal as food from their surroundings. They also added that fecal matters of Bengal monitors are poisonous and if it accidentally touches any part of the human body, the place would rot. The tribal people ("Shautal") of Mithapukur, Rangpur told the researcher that their meat is edible, very tasty and nutritious and their children take it, but they do not disclose it to the non-tribal people.

CHAPTER 7: CONCLUSION

The Bengal monitor (*Varanus bengalensis* Daudin, 1802) is invaluable assets to our nature. The presence of monitor lizard is an indicator of a healthy environment. The areas inhabited by monitor lizards, not only help the farmers, but they also prevent the spread of diseases and germs. The present study shows that the population of Bengal lizards is gradually decreasing in some parts of Bangladesh. So, by understanding the habitats, food, feeding habit, breeding biology, daily activities, their threats and contribution to nature, one can take steps to conserve specific species of wildlife. The present study further shows that there are many factors which are responsible in the decline of population of Bengal lizards. Some of the main reasons are: (1) destruction of habitats, (2) destroying of adults, hatchlings, eggs and nests, (3) effects of agrochemicals and (4) being run over by vehicles.

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CHAPTER 9: APPENDECES

Appendix 1. Population size and density of Bengal monitor in 3km^2 areas of Hazratpur and Rasulpur village, Hazratpur Union Parishad, Mithapukur, Rangpur during 2011-2014

Study Period	Total Individuals in 3 km^2	Density/ km^2	Adult		Juvenile		Young	
			No.	Density/ km^2	No.	Density/ km^2	No.	Density/ km^2
May-2011	19	6.3	9	3.0	7	2.3	3	1.0
June	18	6.0	9	3.0	6	2.0	3	1.0
July	21	7.0	10	3.3	7	2.3	4	1.3
August	21	7.0	12	4.0	7	2.3	2	0.7
September	20	6.7	9	3.0	6	2.0	5	1.7
October	19	6.3	10	3.3	6	2.0	3	1.0
November	14	4.7	8	2.7	4	1.3	2	0.7
December	12	4.0	6	2.0	3	1.0	3	1.0
January-2012	13	4.3	7	2.3	2	0.7	4	1.3
February	10	3.3	5	1.7	2	0.7	3	1.0
March	18	6.0	8	2.7	6	2.0	4	1.3
April	21	7.0	10	3.3	7	2.3	4	1.3
May	22	7.3	10	3.3	8	2.7	4	1.3
June	24	8.0	11	3.7	9	3.0	4	1.3
July	22	7.3	12	4.0	7	2.3	3	1.0
August	21	7.0	13	4.3	5	1.7	3	1.0
September	18	6.0	9	3.0	6	2.0	3	1.0
October	16	5.3	9	3.0	5	1.7	2	0.7
November	11	3.7	5	1.7	2	0.7	4	1.3
December	9	3.0	5	1.7	2	0.7	2	0.7
January-2013	10	3.3	4	1.3	2	0.7	4	1.3
February	12	4.0	5	1.7	3	1.0	4	1.3
March	23	7.7	13	4.3	5	1.7	5	1.7
April	20	6.7	13	4.3	4	1.3	3	1.0
May	22	7.3	14	4.7	5	1.7	3	1.0
June	25	8.3	15	5.0	6	2.0	4	1.3
July	24	8.0	13	4.3	7	2.3	4	1.3
August	18	6.0	9	3.0	6	2.0	3	1.0
September	19	6.3	11	3.3	6	2.0	2	0.7
October	23	7.7	13	4.3	5	1.7	5	1.7
November	14	4.7	6	2.0	3	1.0	5	1.7
December	12	4.0	5	1.7	4	1.3	3	1.0
January-2014	10	3.3	5	1.7	1	0.3	4	1.3
February	12	4.0	6	2.0	2	0.7	4	1.3
March	23	7.7	12	4.0	7	2.3	4	1.3
April	22	7.3	10	3.3	8	2.7	4	1.3
May	24	8.0	13	4.3	8	2.7	3	1.0
June	23	7.7	11	3.7	9	3.0	3	1.0

Appendix 2. Population size and density of Bengal monitor in 3km^2 areas of Jahangirnager University Campus and adjacent area, Pathalia Union Parishad, saver, Dhaka during 2011-2014

Study Period	Total Individuals in 3 km^2	Density	Adult		Juvenile		Young	
			No.	Density/ km^2	No.	Density/ km^2	No.	Density/ km^2
May-2011	81	27	50	16.7	19	6.3	12	4.0
June	80	26.7	44	14.7	24	8.0	12	4.0
July	79	26.3	46	12.0	23	7.7	10	3.3
August	82	27.3	45	15.0	24	8.0	13	4.3
September	83	27.7	46	15.3	23	7.7	14	4.7
October	78	26.0	36	12.0	27	9.0	15	5.0
November	60	20.0	42	14.0	8	2.7	10	3.3
December	56	18.7	39	13.0	6	2.0	11	3.7
January-2012	62	20.7	40	13.3	9	3.0	13	4.3
February	58	19.3	32	10.7	13	4.3	13	4.3
March	78	26.0	45	15.0	21	7.0	12	4.0
April	74	24.7	38	12.7	24	8.0	12	4.0
May	76	25.3	39	13.0	26	8.7	11	3.7
June	79	26.3	44	14.7	25	8.3	10	3.3
July	78	26.0	47	15.7	22	7.3	9	3.0
August	80	26.7	49	16.3	20	6.7	11	3.7

September	79	26.3	44	14.7	20	6.7	15	5.0
October	77	25.7	46	15.3	19	6.3	12	4.0
November	58	19.3	37	12.3	12	4.0	9	3.0
December	54	18.0	37	12.3	7	2.3	10	3.3
January-2013	55	18.3	34	11.3	11	3.7	10	3.3
February	57	19.0	37	12.3	9	3.0	11	3.7
March	76	25.3	46	15.3	17	5.7	13	4.3
April	72	24.0	37	12.3	19	6.3	16	4.0
May	72	24.0	43	14.3	18	6.0	11	3.7
June	77	25.7	38	12.7	25	8.3	14	4.7
July	74	24.7	38	12.7	25	8.3	11	3.7
August	76	25.3	43	14.3	20	6.7	13	4.3
September	77	25.7	40	13.3	23	7.7	14	4.7
October	75	25.0	43	14.3	20	6.7	12	4.0
November	55	18.3	34	11.3	10	3.3	11	3.7
December	52	17.3	35	11.7	8	2.7	9	3.0
January-2014	53	17.7	37	12.3	6	2.0	10	3.3
February	57	19.0	36	12.0	9	3.0	12	4.0
March	73	24.3	44	14.7	17	5.7	12	4.0
April	70	23.3	40	13.3	20	6.7	10	3.3
May	70	23.3	40	13.3	21	7.0	9	3.0
June	74	24.7	42	14.0	20	6.7	12	4.0

Appendix 3. Population size and density of Bengal monitor in 1km^2 areas of Jamuna Resort and adjacent area, Durgapur Union Parishad, Kalihati, Tangail during 2011-2014

Study Period	Total Individuals in 1 km^2	Density	Adult		Juvenile		Young	
			No.	Density/ km^2	No.	Density/ km^2	No.	Density/ km^2
May-2011	41	41	18	18	15	15	8	8
June	44	44	21	21	17	17	6	6
July	47	47	19	19	19	19	9	9
August	51	51	23	23	18	18	10	10
September	48	48	19	19	17	17	12	12
October	47	47	26	26	13	13	8	8
November	33	33	15	15	7	7	11	11
December	30	30	17	17	5	5	8	8
January-2012	30	29	14	14	8	8	8	8
February	26	26	15	15	5	5	6	6
March	42	42	19	19	15	15	8	8
April	47	47	25	25	13	13	9	9
May	45	45	22	22	15	15	8	8
June	50	50	27	27	13	13	10	10
July	48	48	22	22	15	15	11	11
August	49	49	22	22	15	15	12	12
September	50	50	23	23	16	16	11	11
October	45	45	23	23	13	13	9	9
November	36	36	20	20	6	6	10	10
December	28	28	16	16	5	5	7	7
January-2013	26	26	15	15	5	5	6	6
February	25	25	14	14	5	5	6	6
March	44	44	20	20	15	15	9	9
April	49	49	23	23	18	18	8	8
May	51	51	24	24	17	17	10	10
June	48	48	27	27	13	13	8	8
July	49	49	23	23	16	16	10	10
August	52	54	26	26	15	15	11	11
September	53	53	24	24	17	17	12	12
October	48	48	29	29	12	12	7	7
November	36	36	20	20	7	7	9	9
December	29	29	16	16	5	5	8	8
January-2014	26	26	15	15	4	4	7	7
February	29	29	19	19	4	4	6	6
March	46	46	24	24	15	15	7	7
April	50	50	24	24	17	17	9	9
May	53	53	25	25	19	19	9	9
June	52	52	23	23	18	18	11	11

Appendix 4. Population size and density of Bengal monitor in 1.5 km^2 areas of Dhaka Zoo and National Botanical Garden and adjacent area, Mirpur Model Thana, Mirpur, Dhaka during 2011-2014

Study Period	Total Individuals in 1.5 km^2	Density	Adult		Juvenile		Young	
			No.	Density/ km^2	No.	Density/ km^2	No.	Density/ km^2
May-2011	51	34.0	28	18.7	15	10.0	8	5.3
June	48	32.0	25	16.7	16	10.7	7	4.7
July	51	34.0	27	18	14	9.3	10	6.7
August	47	31.3	24	16.0	12	8.0	11	7.3
September	44	29.3	23	15.3	13	8.7	8	5.3
October	45	30.0	23	15.3	14	9.3	8	5.3
November	23	15.3	12	8.0	6	4.0	5	3.3
December	20	13.3	11	7.3	4	2.7	5	3.3
January-2012	24	16.0	13	8.7	5	3.3	6	4.0
February	25	16.7	17	11.3	3	2.0	5	3.3
March	42	28.0	21	14.0	12	8.0	9	6.0
April	48	32.0	26	17.3	15	10.0	7	4.7
May	47	31.3	24	16.0	13	8.7	10	6.7
June	46	30.7	22	14.7	15	10.0	9	6.0
July	48	32.0	25	16.7	15	10.0	8	5.3
August	45	30.0	22	14.7	13	8.7	10	6.7
September	44	29.3	19	12.7	12	8.0	13	8.7
October	42	28.0	21	14.0	10	6.7	11	7.3
November	23	15.3	14	9.3	4	2.7	5	3.3
December	20	13.3	11	7.3	4	2.7	5	3.3
January-2013	22	14.7	15	10.0	3	2.0	4	2.7
February	26	17.3	17	11.3	5	3.3	4	2.7
March	43	28.7	21	14.0	11	7.3	11	7.3
April	47	31.3	23	15.3	14	9.3	10	6.7
May	49	32.7	25	16.7	15	10.0	9	6.0
June	45	30.0	23	15.3	12	8.0	10	6.7
July	43	28.7	21	14.0	13	8.7	9	6.0
August	45	30.0	20	13.3	12	8.0	13	8.7
September	40	26.7	18	12.0	10	6.7	12	8.0
October	42	28.0	22	14.7	11	7.3	9	6.0
November	20	13.3	10	6.7	4	2.7	6	4.0
December	19	12.7	12	8.0	3	2.0	4	2.7
January-2014	22	14.7	14	9.3	5	3.3	3	2.0
February	24	16.0	15	10.0	6	4.0	3	2.0
March	43	28.7	21	14.0	11	7.3	11	7.3
April	46	30.7	24	16.0	12	8.0	10	6.7
May	47	31.3	24	16.0	14	9.3	9	6.0
June	43	28.7	23	15.3	10	6.7	10	6.7

Appendix 5. Population size and density of Bengal monitor in 2km^2 areas of Kaltapara and Bostall village, Jampur Union Parishad, Sonargaon, Narayangonj area, during 2011-2014

Study Period	Total Individuals in 2 km^2	Density/ km^2	Adult		Juvenile		Young	
			No.	Density/ km^2	No.	Density/ km^2	No.	Density/ km^2
May-2011	34	17.0	20	10.0	8	4.0	6	3.0
June	30	15.0	17	8.5	7	3.5	6	3.0
July	27	13.5	17	8.5	6	3.0	4	2.0
August	31	15.5	21	10.5	6	3.0	4	2.0
September	32	16.0	20	10.0	7	3.5	5	2.5
October	25	12.5	17	8.5	5	2.5	3	1.5
November	17	8.5	10	5.0	2	1.0	5	2.5
December	15	7.5	10	5.0	2	1.0	3	1.5
January-2012	19	9.5	14	7.0	3	1.5	2	1.0
February	20	10.0	15	7.5	2	1.0	3	1.5
March	36	18.0	22	11.0	9	4.5	5	2.5
April	33	16.5	18	9.0	9	4.5	6	3.0
May	32	16.0	20	10.0	8	4.0	4	2.0
June	28	14.0	19	9.5	6	3.0	3	1.5
July	26	13.0	15	7.5	7	3.5	4	2.0
August	29	14.5	18	9.0	6	3.0	5	2.5
September	30	15.5	19	9.5	8	4.0	3	1.5

October	27	13.5	19	9.5	6	3.0	2	1.0
November	17	8.5	11	5.5	4	2.0	2	1.0
December	16	8.5	11	5.5	2	1.0	3	1.5
January-2013	19	9.5	13	6.5	3	1.5	3	1.5
February	17	8.5	11	5.5	2	1.0	4	2.0
March	34	17.0	19	9.5	9	4.5	6	3.0
April	32	16.0	20	10.0	8	4.0	4	2.0
May	29	14.5	18	9.0	7	3.5	4	2.0
June	27	13.5	18	9.0	6	3.0	3	1.5
July	29	14.5	20	10.0	5	2.5	4	2.0
August	27	13.5	19	9.5	6	3.0	2	1.0
September	27	13.5	20	10.0	4	2.0	3	1.5
October	28	14.0	18	9.0	5	2.5	5	2.5
November	16	8.0	12	6.0	2	1.0	2	1.0
December	14	7.0	10	5.0	2	1.0	2	1.0
January-2014	16	8.0	12	6.0	1	0.5	3	1.5
February	17	8.5	14	7.0	1	0.5	2	1.0
March	36	18.0	19	9.5	10	5.0	7	3.5
April	32	16.0	19	9.5	8	4.0	5	2.5
May	27	13.5	15	7.5	6	3.0	6	3.0
June	26	13.0	14	7.0	7	3.5	5	2.5

Appendix 6. Population Size and Density of Bengal monitor in 1.5km^2 areas of Ghorashal Power Plant and adjacent area, Ghorashal Municipality, Palash, Narsingdi, during 2011-2014

Study Period	Total Individuals in 1.5 km^2	Density/ km^2	Adult		Juvenile		Young	
			No.	Density/ km^2	No.	Density/km^2	No.	Density/km^2
May-2011	92	61.3	47	31.3	31	20.7	14	9.3
June	89	59.3	45	30.0	27	18.0	17	11.3
July	84	56.0	43	28.7	29	19.3	12	8.0
August	90	60.0	44	29.3	25	16.7	21	14.0
September	82	54.7	37	24.7	28	18.7	17	11.3
October	89	59.3	45	30.0	21	14.0	23	15.3
November	43	28.7	23	15.3	12	8.0	8	5.3
December	48	32.0	24	16.0	15	10.0	9	6.0
January-2012	38	25.3	19	12.7	12	8.0	7	4.7
February	51	34.0	23	15.3	18	12.0	10	6.7
March	79	52.7	34	22.7	29	19.3	16	10.7
April	88	58.7	39	26.0	31	20.7	18	12.0
May	91	60.7	46	30.7	25	16.7	20	13.3
June	87	58.0	37	24.7	29	19.3	21	14.0
July	86	57.3	54	36.0	21	14.0	11	7.3
August	89	59.3	42	28.0	27	18.0	20	13.3
September	80	53.3	39	26.0	24	16.0	17	11.3
October	86	57.3	45	30.0	26	17.3	15	10.0
November	45	30.0	22	14.7	16	10.7	7	4.7
December	39	26.0	21	14.0	10	6.7	8	5.3
January-2013	41	27.3	22	14.7	11	7.3	8	5.3
February	49	32.7	30	20.0	9	6.0	10	6.7
March	83	55.3	48	32.0	23	15.3	12	8.0
April	90	60.0	40	26.7	31	20.7	19	12.0
May	93	62.0	46	30.7	26	17.3	21	14.0
June	92	61.3	49	32.7	24	16.0	19	12.7
July	84	56.0	42	28.0	23	15.3	19	12.7
August	89	59.3	45	30.0	27	18.0	17	11.3
September	83	55.3	43	28.7	22	14.7	18	12.0
October	91	60.7	39	26.0	28	18.7	24	16.0
November	44	29.3	27	18.0	9	6.0	8	5.3
December	45	30.0	23	15.3	10	6.7	12	8.0
January-2014	37	24.7	17	11.3	10	6.7	10	6.7
February	56	37.3	35	23.3	13	8.7	8	5.3
March	86	57.3	47	31.3	26	17.3	13	8.7
April	93	62.0	44	29.3	31	20.7	18	12.0
May	90	60.0	54	36.0	24	16.0	12	8.0
June	92	61.3	46	30.7	27	18.0	19	12.7

Appendix 12. Different habitats used by Bengal monitors in the nature of Hazratpur and Rasulpur village, Hazratpur Union Parishad, Mithapukur, Rangpur during 2011-2014

Study period	Underground space	Banks of ponds	Marsh land	Cultivated field	Bamboo shoots/ under bushes	Sloping ground	Open space	drain	Garbage bin	On the tree
May-2011	1	2	2	2	4	0	0	2	4	2
June	1	2	3	2	3	0	1	2	3	1
July	1	2	2	1	5	1	1	2	4	2
August	1	1	2	1	4	1	2	3	4	2
September	2	1	1	2	4	1	1	3	4	1
October	0	2	3	2	5	0	1	2	4	0
November	0	3	0	2	2	1	2	1	2	1
December	0	3	0	2	1	2	0	1	2	1
January-2012	0	3	0	1	3	2	1	2	1	0
February	0	2	1	2	1	1	1	0	2	0
March	1	1	2	1	3	1	2	2	3	2
April	1	2	3	1	5	0	0	3	5	1
May	2	1	3	2	4	0	1	2	5	2
June	1	1	2	2	5	1	1	3	6	2
July	1	2	3	3	6	0	1	1	3	2
August	2	2	2	1	3	1	2	2	4	2
September	1	2	2	2	3	1	1	2	3	1
October	0	1	2	1	4	0	1	3	3	1
November	0	3	1	1	2	1	0	1	2	0
December	0	2	0	1	2	2	1	0	1	0
January-2013	0	2	0	1	1	2	1	1	2	0
February	0	3	1	0	2	1	1	1	2	1
March	1	2	1	3	5	1	1	3	4	2
April	2	1	2	1	5	0	1	2	4	2
May	1	1	3	2	5	0	1	2	5	2
June	1	2	3	2	4	2	1	3	5	2
July	2	2	2	1	6	1	0	3	5	2
August	1	1	1	2	3	0	1	2	6	1
September	0	2	2	2	4	1	1	2	4	1
October	1	2	3	2	5	0	1	3	3	3
November	0	3	1	1	3	2	0	1	2	1
December	0	3	1	2	1	2	1	0	2	0
January-2014	0	4	0	0	0	2	0	1	2	1
February	0	3	1	2	2	1	1	0	2	0
March	1	2	2	2	5	0	0	3	5	3
April	1	1	1	2	5	2	1	2	5	2
May	2	2	2	2	4	1	2	3	4	2
June	1	2	2	1	5	1	1	2	5	3

Appendix 13. Different habitats used by Bengal monitors in the nature of Jahangirnagar University Campus and adjacent area, Pathalia Union Parishad, Saver, Dhaka during 2011-2014

Study period	Underground space	Banks of ponds/lakes	Marsh land	Cultivated field	Under bushes	Sloping ground	Open space	drain	Garbage bin	On the tree
May-2011	2	7	10	7	4	5	5	15	21	5
June	3	5	12	6	3	3	6	14	23	5
July	3	8	10	6	5	2	3	14	22	6
August	4	9	13	5	6	4	4	12	21	4
September	2	10	9	8	5	2	6	17	20	4
October	2	7	10	4	6	3	4	15	24	3
November	0	15	4	4	2	3	5	10	16	1
December	2	12	3	3	2	4	6	7	15	2
January-2012	0	16	4	3	2	6	6	9	14	2
February	1	15	3	4	1	3	5	10	16	0
March	2	7	12	6	4	4	4	14	21	4
April	3	6	11	8	2	2	3	13	22	4

May	2	7	10	7	5	3	5	15	19	3
June	4	6	14	7	2	3	3	13	23	4
July	1	8	12	9	5	4	2	13	22	2
August	3	7	13	6	4	3	4	14	21	5
September	4	9	12	5	3	2	3	14	23	4
October	2	7	14	7	5	3	3	13	20	3
November	1	13	6	4	2	4	5	6	15	2
December	0	12	4	4	1	7	4	6	13	3
January-2013	2	14	4	3	3	5	4	5	13	2
February	2	12	3	4	2	3	4	10	15	2
March	3	7	10	6	3	4	3	15	22	3
April	2	8	9	7	2	2	3	13	21	5
May	4	7	11	5	3	3	2	14	19	4
June	3	9	9	5	2	5	3	16	21	4
July	5	6	10	7	4	3	2	14	20	3
August	3	6	10	8	3	4	3	13	21	5
September	2	8	11	6	2	4	5	16	20	3
October	3	7	9	7	4	3	3	14	21	4
November	2	13	5	3	2	3	2	9	14	2
December	0	11	4	5	1	4	5	9	11	2
January-2014	1	14	3	4	0	6	4	6	14	1
February	2	12	5	5	1	4	4	7	15	2
March	2	8	9	10	3	2	2	12	21	4
April	1	7	10	6	2	3	2	13	21	5
May	4	8	7	6	4	3	2	12	19	5
June	2	7	10	7	2	2	4	12	22	6

Appendix 14. **Different habitats used by Bengal monitors in the nature of Jamuna Resort and its adjacent area, Durgapur Union Parishad, Kalihati, Tangail during 2011-2014**

Study period	Underground space	Banks of pond	Marsh land	Cultivated field	Planned Garden/ under bushes	Sloping ground	Open space	drain	Garbage bin	On the tree
May-2011	2	3	4	2	2	2	3	7	14	2
June	3	2	5	3	2	3	2	8	14	2
July	2	4	5	3	2	2	3	7	16	3
August	1	4	4	5	1	4	2	10	16	4
September	2	2	3	3	3	3	3	11	15	3
October	3	3	5	4	2	2	3	9	14	2
November	1	7	2	2	1	4	4	4	7	1
December	0	7	1	2	0	3	3	5	8	1
January-2012	1	6	1	1	1	4	2	4	8	1
February	0	4	0	2	0	3	2	6	7	2
March	2	2	4	3	2	2	2	8	13	4
April	1	2	4	4	2	1	4	9	16	4
May	2	3	3	4	1	2	3	10	14	3
June	4	2	3	3	3	4	4	9	16	2
July	1	4	2	3	4	3	2	10	15	4
August	2	3	4	4	2	5	3	11	13	2
September	3	5	4	3	4	3	2	10	13	3
October	1	3	6	2	2	2	3	8	15	3
November	2	6	3	3	1	4	2	5	8	2
December	0	7	2	1	0	2	3	4	7	2
January-2013	1	5	1	2	0	2	2	4	8	1
February	1	4	1	1	2	2	1	5	7	1
March	2	3	4	4	3	3	2	8	12	3
April	3	4	6	3	2	4	3	7	15	2
May	2	4	4	4	3	3	5	8	14	4
June	1	3	4	5	4	2	3	9	15	2
July	3	5	5	5	3	3	3	8	12	2
August	1	5	6	4	2	2	4	8	15	5

September	2	4	3	3	3	4	4	10	17	3
October	1	3	4	3	4	3	5	8	14	3
November	1	8	2	2	1	3	2	5	10	2
December	0	5	0	2	0	4	3	6	8	1
January-2014	0	7	1	2	0	3	2	4	7	0
February	2	7	0	0	1	2	1	5	8	3
March	3	5	4	3	2	3	2	9	11	4
April	2	4	3	3	3	4	3	10	15	3
May	1	3	4	5	4	3	2	10	17	4
June	3	2	4	3	3	3	4	11	15	4

Appendix 15. Different habitats used by Bengal monitors in the nature of Dhaka Zoo and National Botanical Garden and adjacent area, Mirpur Model Thana, Mirpur, Dhaka during 2011-2014

Study period	Underground space	Banks of ponds / lakes	Marsh land	Planned Garden	Bamboo shoots/ under bushes	Sloping ground	Open space	drain	Garbage bin	On the tree
May-2011	3	5	6	6	4	3	3	11	7	3
June	3	3	5	5	4	2	2	13	8	3
July	4	5	5	5	3	3	4	12	8	2
August	2	2	5	6	3	2	4	14	7	2
September	3	4	3	4	3	3	3	11	9	1
October	4	5	4	3	4	3	4	10	6	2
November	1	6	2	2	2	1	2	2	4	1
December	0	7	1	4	1	0	1	3	3	0
January-2012	1	9	2	3	0	1	1	3	4	0
February	1	6	1	3	0	2	2	4	5	1
March	3	4	7	4	2	3	1	9	6	3
April	4	3	6	6	4	4	3	10	6	2
May	5	5	5	4	2	3	4	10	7	2
June	3	5	7	4	4	2	3	10	5	3
July	5	4	6	5	4	3	4	9	6	2
August	4	4	8	6	5	2	1	7	5	3
September	4	2	7	6	4	3	1	9	6	2
October	3	3	5	5	3	3	2	11	6	1
November	1	5	3	3	2	1	1	3	3	1
December	0	6	2	3	1	1	1	2	4	0
January-2013	1	7	1	3	1	2	1	2	3	1
February	2	8	2	2	1	2	2	2	4	1
March	3	3	7	5	4	3	2	9	5	2
April	4	4	8	5	5	2	3	8	5	3
May	3	5	9	4	6	2	2	8	7	3
June	2	5	7	6	5	3	1	9	6	1
July	4	3	7	6	5	2	3	7	4	2
August	5	2	8	7	4	2	2	8	5	2
September	3	4	6	5	4	2	1	9	5	1
October	4	3	7	6	3	3	2	7	5	2
Novem1ber	1	5	2	3	2	0	1	3	3	0
Decem3ber	0	6	0	2	0	2	1	3	4	1
January-2014	1	7	0	3	0	2	2	3	4	0
February	0	7	1	2	1	4	1	2	5	1
March	3	4	10	5	1	2	2	8	6	2
April	4	5	7	6	5	2	1	8	6	2
May	5	5	8	6	3	3	2	7	5	3
June	4	5	7	6	4	2	2	7	4	2

Appendix 16. Different habitats used by Bengal monitors in the nature of Kaltapara and Bostall village, Jampur Union Parishad, Sonargaon, Narayangonj during 2011-2014

Study period	Undergro und space	Banks of ponds	Marsh land	Cultivat ed field	Bamboo shoots/ under bushes	Sloping ground	Open space	dr ain	Garba ge bin	On the tree	Old Grave yard
May-2011	1	3	5	4	5	1	1	3	5	2	4
June	2	3	4	5	4	1	1	2	4	1	3
July	0	2	4	3	5	1	0	3	3	2	4
August	0	3	5	4	6	0	0	3	5	1	4
September	0	2	4	5	6	0	1	5	5	2	2
October	1	2	5	4	4	0	1	3	4	1	3
November	0	3	2	2	2	1	0	2	2	1	2
December	0	4	1	2	1	0	1	1	3	0	2
January-2012	0	5	1	2	1	2	1	1	3	0	3
February	1	6	0	0	2	1	2	2	1	0	3
March	2	3	6	4	4	2	1	4	4	2	4
April	1	2	6	4	4	1	1	3	5	2	4
May	0	3	5	3	6	0	0	4	5	1	5
June	0	3	4	5	3	1	0	2	3	1	6
July	0	2	3	4	4	0	1	2	4	2	3
August	0	4	4	3	2	1	1	3	5	1	3
September	1	3	4	4	3	1	1	3	4	1	5
October	0	4	3	5	3	1	0	2	3	2	4
November	0	5	1	3	2	0	0	1	3	0	2
December	0	5	1	2	1	2	0	1	1	0	3
January-2013	0	6	1	2	2	1	1	1	3	0	2
Februar1y	1	4	0	3	1	1	0	0	3	1	3
March	1	3	4	4	5	1	2	3	5	2	4
April	2	3	5	3	4	0	0	3	4	3	5
May	1	4	3	4	3	1	0	2	5	2	4
June	0	3	3	3	4	1	1	2	6	1	3
July	1	2	5	4	4	1	1	2	4	1	4
August	0	3	4	4	4	1	0	2	4	2	3
September	0	3	3	3	5	0	1	2	5	1	4
October	0	2	5	4	4	0	0	3	4	2	4
November	0	4	2	2	2	1	1	1	3	0	2
December	1	4	1	1	1	1	0	1	2	0	2
January-2014	1	5	0	2	0	2	1	0	3	0	2
February	0	4	0	2	1	1	1	1	4	0	3
March	2	2	5	4	1	2	1	5	6	2	6
April	0	3	3	3	7	0	1	3	5	3	4
May	1	2	3	4	4	1	1	3	4	1	4
June	0	3	4	3	3	1	2	2	4	1	3

Appendix 17. Different habitats used by Bengal monitors in the nature of Ghorashal Power Plant and its adjacent area, Ghorashal Municipality, Palash, Narsingdi during 2011-2014

Study period	Underground space/ Concrete slab	Banks of pond/ worm water canal	Cultivated field	Under bushes	Sloping ground	Open space	Drain	Garbage bin	On the tree
May-2011	7	6	12	8	5	7	20	24	3
June	10	5	10	6	3	10	18	25	2
July	12	4	8	7	2	12	16	21	2
August	14	3	6	6	4	15	17	22	3
September	8	4	7	3	3	8	20	27	2
October	10	5	11	5	4	13	18	23	0
November	5	2	5	2	2	4	8	15	0
December	6	3	4	2	3	5	10	13	2
January-2012	5	3	5	0	2	4	7	12	0
February	7	4	5	1	4	6	9	14	1
March	11	3	10	4	2	9	14	23	3
April	14	4	11	7	3	5	17	25	2
May	16	4	13	5	2	8	15	26	2
June	13	6	12	7	3	7	15	23	1
July	11	3	11	7	2	6	19	25	2
August	15	4	11	5	3	5	17	29	0
September	10	5	9	6	4	7	13	24	2
October	12	3	12	7	2	6	15	28	1
November	5	4	9	3	2	4	6	12	0
December	4	5	5	2	2	3	7	10	1
January-2013	4	5	6	2	1	4	8	11	0
February	3	3	9	3	2	5	10	13	1
March	10	4	11	7	4	8	15	22	2
April	11	4	13	8	3	6	17	26	2
May	13	3	10	9	4	7	15	29	3
June	15	5	12	10	3	5	16	25	1
July	10	4	9	9	5	6	14	27	0
August	13	2	11	7	4	7	18	26	1
September	11	3	10	9	3	6	14	25	2
October	12	4	12	8	2	5	17	28	3
November	5	3	5	2	2	2	9	15	1
December	6	3	6	3	2	3	9	13	0
January-2014	5	4	5	2	1	4	6	10	0
February	7	5	7	3	2	5	10	16	1
March	11	3	11	9	3	6	15	25	3
April	13	4	9	11	3	4	18	29	2
May	12	3	10	13	3	3	17	27	2
June	10	4	11	9	5	4	17	30	2

Appendix 28. Termite nest measurement 2012-2014

Year	Nest No	Height from the ground (cm)	Base Circumference (cm)	Base Radius (cm)	Distance from the water bodies (m)	Study Areas
2012	1	65	590	93.9	19.3	JUC
	2	104	925	147.3	35.6	JUC
	3	74	610	97.1	15.2	JUC
	4	83	720	114.6	13.4	JUC
	5	123	780	124.2	14.5	JUC
	6	109	890	141.7	18.3	JR
	7	52	670	106.7	10.8	JR
2013	1	96	810	128	19	JUC
	2	83	570	90	11	JUC
	3	121	890	141	16	JR
	4	63	725	115	23	JUC
	5	77	615	97	9	JUC
	6	52	670	106	14	JUC
	7	132	880	140	10	JR
	8	89	660	105	18	JUC
2014	1	62	630	101	30	JUC
	2	81	710	113	24	JUC
	3	32	670	106	13	JUC
	4	72	715	113	17	JUC
	5	57	810	128	12	JR
	6	67	680	108	10	JUC
	7	112	930	148	18	JR
	8	86	680	108	25	JUC
	9	123	770	122	36	JUC
	Mean	83.96	733.33	116.44	18.00	
	SD	24.42	108.87	17.34	7.59	

Appendix 29. Percentage of used and unused termite mounds as nests by Bengal monitors during study period (2011-2014)

Study Period	Total no. of termite mounds	No. of termite mounds used as nests	Percentage (%)	No. of termite mounds unused as nests	Percentage (%)
2012	16	7	43.8	9	56.2
2013	19	8	42.1	11	57.9
2014	23	9	39.1	14	60.9
Sum	58	24		34	
Mean	19.3±3.5	08±01	41.7±2.4	11.3±2.52	58.3±2.4

Appendix 30. Textual class of soil of breeding nest of Bengal monitor in JUC

Nest No	Study Area	Place where found	Sand (%)	Silt (%)	Clay (%)	Textual Class
1	JUC	Termite Nest	10.53	43.69	45.78	Clay
2	JUC	Termite Nest	8.73	44.37	46.9	Clay
3	JUC	Termite Nest	11.83	42.08	46.09	Clay
4	JUC	Termite Nest	12.69	39.01	48.3	Clay
5	JUC	Termite Nest	13.21	38.59	48.2	Clay
6	JUC	Termite Nest	10.67	45.12	44.21	Clay

Appendix 31. Active nests of Bengal monitor measurement 2012-2014

Year	**Nest No.**	**Diameter (cm)**	**Circumference (cm)**	**Depth (cm)**	**Height from the ground (cm)**	**Study Areas**
2012	1	29.6	92.9	21.9	24.6	JUC
	2	30.8	96.7	23.8	25.5	JUC
	3	31.6	99.2	22.6	27.8	JUC
	4	33.5	105.2	21.7	29.6	JUC
	5	35.8	112.4	24.3	32.8	JUC
	6	32.9	103.3	22.6	31.6	JR
	7	37.2	116.8	24.4	30.2	JR
2013	8	30.9	97.2	22.3	25.6	JUC
	9	30.7	96.4	24.2	27.3	JUC
	10	35.6	111.8	23.9	28.5	JR
	11	37.3	117.1	21.4	26.2	JUC

	12	32.8	102.9	23.6	29.5	JUC
	13	36.4	114.3	24.3	28.6	JUC
	14	38.3	120.3	21.8	30.5	JR
	15	29.7	93.3	23.6	32.6	JUC
2014	16	32.7	102.7	23.6	24.1	JUC
	17	34.8	109.3	23.9	32.1	JUC
	18	31.2	97.9	22.8	27.5	JUC
	19	36.5	114.6	24.6	23.6	JUC
	20	37.3	117.1	24.9	25.3	JR
	21	30.7	96.4	21.6	26.5	JUC
	22	33.6	105.5	22.5	29.5	JR
	23	37.8	118.7	24.1	27.3	JUC
	24	29.7	93.3	23.2	28.3	JUC
	Mean	33.6	105.6	23.2	28.1	
	SD	2.9	9.2	1.1	2.7	

Appendix 32. Egg measurement of Bengal monitors 2012-2014

Year	Clutch Size	Egg No.	Length (cm)	Width (cm)	Girth (cm)	Weight (g)	Volume (cm^3)
2012	1	1	6.03	4.03	13	43.1	51.2
		2	6.02	4.06	13.2	43.5	51.8
		3	6.08	3.5	11.4	42.9	52.3
		4	6.03	3.7	12.5	43.3	50.8
		5	6.01	3.9	12.1	40.3	52.7
		6	5.9	3.8	12.7	41.2	51.3
		7	6.1	4	13.1	45.3	54.5
		8	6.2	3.99	13.3	46.8	54.8
		9	5.95	3.92	12.8	41.3	50.3
		10	6	3.9	12.3	42.5	53.3
		11	6	4.2	13.2	41.9	53.8
		12	6.02	4.3	13.1	44.3	53.9
		13	6.08	4	12.9	39.9	54.2
		14	6.1	3.6	11.8	43.2	54
		15	5.95	3.8	11.6	40.3	55.1
		16	5.97	3.9	11.8	38.9	49.3
		17	5.98	3.9	12.7	39.5	49.6
		18	5.98	4	12.6	40.3	49.8
		19	6	3.7	11.8	41.5	52.3
		20	6.3	4	12.7	42	52.4
		21	5.9	4	12.6	38.7	50.3
		22	6	3.9	12.7	43.7	52.2
		23	5.8	3.6	11.9	40.5	48.9
		24	5.7	3.5	11.5	38.7	48.5
		25	5.7	3.8	12.5	38.9	48.8
		26	5.6	3.5	11.5	37.7	49.7
		27	5.7	3.6	11.4	37.9	48.6
		28	5.8	3.7	12.1	38.5	49.6
		29	5.8	3.7	12.3	39.2	49.9
		30	5.7	3.8	12.3	39.9	48.6
		31	5.6	3.8	11.9	38.9	48.9
		32	6.1	4	13.2	42.3	50.8
		33	6.2	4.01	13.1	43.6	53.2
		34	5.9	3.9	12.5	40.1	50.3
		35	5.8	3.6	12.2	42.5	48.6
		36	5.8	3.9	12.8	43.6	48.8
		37	5.9	3.9	12.7	42.8	49.6
		38	5.6	4.1	12.6	41.7	48.2
		39	5.7	4	12.8	42.9	49.3
	2	1	5.9	3.99	11.8	41.2	50.3
		2	6.2	4.01	13.2	44.3	53.2
		3	6	4.2	13.1	43.8	53
		4	5.8	3.85	12	39.5	49.3
		5	5.8	3.9	12.5	40.5	50.2
		6	6.1	4.2	13	40.8	54.2
		7	6.15	4.1	13.2	42.3	53

		8	6.2	4.3	13.3	43.6	54.6
		9	5.8	3.9	11.8	40.5	49.5
		10	5.7	3.8	11.9	41.6	48.9
		11	5.7	3.9	11.7	39.9	48.6
		12	5.9	4	12.3	41.3	51
		13	6	4.1	12.7	42.8	52.7
		14	6.1	4.15	12.9	43.4	53.3
		15	6.2	4.2	13.2	43.8	54.2
		16	6.15	4.1	13	42.7	52.1
		17	5.8	4	12.7	38.8	48.6
		18	5.6	3.8	12.5	39.6	49.7
		19	5.7	3.7	12	40.3	49.8
		20	5.9	3.9	11.8	41.3	50.3
		21	6	4	12.6	43.8	51.3
		22	6.1	4.1	12.9	43.7	53.2
		23	6	4	13	42.5	52.1
		24	5.8	3.9	11.9	38.7	49.9
		25	5.9	3.8	12.3	39.4	50.3
2013	1	1	6.1	4.3	13.1	43.6	53.9
		2	5.9	4	12.9	40.3	50.5
		3	5.9	4.1	12.8	41.3	51.3
		4	5.8	3.9	12.6	40.6	49.9
		5	6.3	4.4	13.2	44.3	53.6
		6	6.1	4.2	13	42.7	52.7
		7	6.1	4.3	12.9	41.9	51.9
		8	6	4.2	12.9	42.3	52.2
		9	5.8	3.6	11.9	39.3	49.9
		10	5.7	3.5	11.6	38.6	49.7
		11	5.7	3.8	11.8	37.9	48.9
		12	5.9	4.1	12.6	39.5	50.3
		13	6	3.9	12.9	41.3	52.1
		14	6.1	4.2	13.1	42.5	52.9
		15	5.8	4	11.8	40.3	50.6
		16	5.8	3.8	12.6	41.3	51.3
		17	6	4.1	12.9	42.9	52.3
		18	5.7	3.7	11.9	39.9	51.3
		19	5.8	3.9	11.9	40	48.9
	2	1	5.8	3.9	12.7	40.9	50.3
		2	5.7	4	12.3	39.5	49.3
		3	5.9	4	12.9	41.8	51.6
		4	6.2	4.3	13.3	43.5	53.3
		5	6.2	4.2	13	43	53.8
		6	6.1	4.1	13.2	42.7	52.6
		7	6	3.9	13.2	42.6	51.8
		8	6	4.1	13	42	51.9
		9	5.9	3.9	12.8	41.5	51.1
		10	5.8	3.7	12.3	41	50.6
		11	5.7	3.8	11.9	38.9	49.6
		12	5.7	3.8	12	38.5	49.1
		13	6.2	4.2	13.2	43.2	53.2
		14	6.3	4.3	13.2	42.9	53.8
		15	6	4.1	13	41.6	52.8
		16	6.1	4.2	13.1	42.8	53.3
		17	5.9	4	12.9	41.6	52.1
		18	5.8	4	12.6	41	50.8
		19	5.7	3.5	11.8	38.9	48.9
		20	5.8	3.6	12.7	40.9	49.6
		21	6.2	4.3	13.2	42.9	52.9
		22	6	4	13	41.9	52.8
		23	6.1	3.9	13.1	42.8	53.2
	3	1	6.2	4.3	13.2	43	53.5
		2	6.2	4.3	13.1	42.9	53.8
		3	6	4.2	13	42.7	52.6
		4	6.1	4.1	13.2	43.1	52.9
		5	5.8	4	12.8	42.7	50.3
		6	5.7	3.8	12.5	40.6	49.8

		7	5.7	3.9	12.6	39.9	49.2
		8	5.9	3.9	12.9	41.3	51.6
		9	6	4	13.1	42.6	52.9
		10	6.1	4.2	13	42.9	53.1
		11	6.2	4.2	13.3	43.2	53.6
		12	5.7	3.7	12.5	39.7	50.1
		13	5.9	3.8	12.8	40.6	51.3
		14	5.6	3.5	11.7	38.8	48.6
		15	5.7	3.6	11.9	40.6	48.9
		16	6	3.9	12.8	42.5	52.1
		17	6.3	4.2	13.1	43.2	53.6
		18	6.3	4.3	13.2	42.9	53.8
		19	6.2	4.3	13	43	52.8
		20	6	4	13	42.8	51.9
		21	6.1	4	13.1	42.7	52.7
		22	5.7	3.7	12.8	40.6	49.5
		23	5.7	3.8	11.9	39.8	49.3
		24	5.9	4	12.3	41.6	51.8
		25	5.8	3.9	12.6	41.9	50.3
		26	6	4.1	13	42.8	52.3
		27	6	4.2	12.9	42.6	51.9
	1	1	6.2	4.3	13.2	43.4	53.6
		2	6	4	13	42.6	52.9
		3	6	4.1	12.9	40.9	53
		4	5.9	3.9	12.8	39.8	51.3
		5	5.6	3.7	11.9	38.9	48.6
		6	5.6	3.5	12.2	38.2	49
		7	5.7	3.8	11.8	39.8	49.7
		8	6.3	4.3	13.1	43.2	53.1
		9	6.2	4.3	13	42.9	52.8
		10	6	4.2	13	41.3	51.8
		11	6	4	12.9	42	52
		12	6.1	4.1	13.1	42.8	53
		13	6	4.1	13.1	41.6	52.6
		14	5.6	3.8	11.7	38.6	48.9
		15	5.7	3.7	11.9	39.6	49.1
		16	5.9	3.9	12.8	41.7	52.1
		17	6	4	12.9	42.5	52.6
		18	5.6	3.6	11.8	39.2	48.8
2014	2	1	5.8	3.9	12.9	40.3	50.3
		2	5.7	3.8	12.6	39.6	49.8
		3	5.7	3.7	12.1	39.2	48.3
		4	5.6	3.5	11.8	38.8	48.9
		5	5.9	3.9	12.6	40.8	51.2
		6	5.9	3.8	12.8	41.3	51.8
		7	6	4.1	12.9	42.8	52.2
		8	6.1	4.1	13.1	43	53.1
		9	5.6	3.7	12.1	38.8	50.3
		10	5.9	3.9	12.8	41.3	51.8
		11	6.3	4.3	13.2	43.6	53.6
		12	6.2	4.3	13.1	43	52.8
		13	6	4.1	13	42.9	51.2
		14	6	4	12.9	43	50.9
		15	6.3	4.3	13.3	43.3	53.3
		16	5.6	3.5	11.9	39.3	49.3
		17	5.8	3.9	12.6	40.7	50.8
		18	5.9	4	12.8	41.5	51.9
		19	5.6	3.6	11.9	39.1	50
		20	6	4.1	13	42.6	52.4
		21	6.3	4.2	13.2	43.3	53.3
		Mean	5.93	3.95	12.62	41.45	51.35
		SD	0.19	0.22	0.52	1.74	1.77

Appendix 33. Mean incubation period of eggs (2012-2014)

Year & clutch size	Egg no.	Incubation Period (days)	Year & clutch size	Egg no.	Incubation Period (days)	Year & clutch size	Egg no.	Incubation Period (days)
2012 & 39								
	1	192		31	198		19	195
	2	197		32	194		20	194
	3	195		33	197		21	193
	4	196		34	194		22	Did not hatch
	5	194		35	Did not hatch		23	194
	6	192		36	193			
	7	198		37	194			
	8	197		38	Did not hatch			
	9	198		39	198	2014 & 18	1	195
	10	196					2	197
	11	195					3	196
	12	193	2103 & 23				4	195
	13	193		1	196		5	197
	14	195		2	195		6	194
	15	192		3	195		7	195
	16	192		4	195		8	195
	17	198		5	192		9	196
	18	194		6	192		10	Did not hatch
	19	195		7	Did not hatch		11	193
	20	194		8	194		12	197
	21	196		9	193		13	195
	22	198		10	195		14	194
	23	192		11	193		15	197
	24	193		12	194		16	Did not hatch
	25	198		13	Did not hatch		17	195
	26	195		14	193		18	191
	27	Did not hatch		15	194	Mean		194.8±1.79
	28	194		16	195	Mean		26.3±11.4
	29	195		17	196			
	30	197		18	195			

Appendix 34. M**orning and noon temperature and humidity of breeding nest of Bengal lizards during study period (2011-2014)**

Sl. No.	Date	Morning Temp. ^{O}c	Noon Temp. ^{O}c	Morning Humidity (%)	Noon Humidity (%)	Sl. No	Date	1Morning Temp. ^{O}c	Noon Temp. ^{O}c	Morning Humidity (%)	Noon Humidity (%)
1	23.09.13	25	34	96	63	45	04.02.14	17	23	89	45
2	26.09.13	28	33	98	62	46	07.02.14	15	22	86	49
3	29.09.13	26	31	92	55	47	10.02.14	16	21	84	43
4	03.10.13	25	29	96	65	48	13.02.14	14	20	88	51
5	06.10.13	24	27	94	53	49	15.02.14	16	24	87	56
6	09.10.13	23	29	92	64	50	18.02.14	18	27	83	47
7	12.10.13	25	32	94	72	51	21.02.14	19	28	94	51
8	15.10.13	28	30	90	75	52	24.02.14	20	24	93	48
9	18.10.13	29	32	93	64	53	27.02.14	22	28	97	61
10	21.10.13	27	33	98	62	54	03.03.14	24	30	95	55
11	24.10.13	25	32	94	51	55	06.03.14	23	33	91	59
12	27.10.13	22	33	92	57	56	09.03.14	21	31	92	57
13	30.10.13	21	28	95	68	57	12.03.14	22	30	94	49
14	02.11.13	18	6	89	53	58	15.03.14	19	29	96	43
15	05.11.13	17	27	94	52	59	18.03.14	23	33	94	39

16	08.11.13	19	28	92	56	60	21.03.14	24	35	92	34
17	11.11.13	16	27	91	53	61	24.03.14	22	32	93	48
18	14.11.13	15	26	90	49	62	27.03.14	23	30	94	59
19	17.11.13	17	24	89	43	63	30.03.14	24	32	91	61
20	20.11.13	14	23	88	54		Mean	18.48±4.03	25.92±5.3	90.84±4.03	54.1±7.69
21	23.11.13	16	24	84	57						
22	26.11.13	15	26	83	54						
23	29.11.13	13	24	92	52						
24	02.12.13	14	26	94	61						
25	05.12.13	15	25	92	64						
26	08.12.13	13	22	91	53						
27	11.12.13	12	23	89	54						
28	14.12.13	11	20	87	57						
29	17.12.13	13	19	88	56						
30	20.12.13	14	19	84	47						
31	23.12.13	13	18	85	43						
32	26.12.13	12	18	81	56						
33	29.12.13	13	20	89	61						
34	03.01.14	15	21	86	43						
35	06.01.14	14	23	87	51						
36	09.01.14	14	22	82	49						
37	12.01.14	13	20	90	52						
38	15.01.14	12	18	92	53						
39	18.01.14	16	22	91	51						
40	21.01.14	15	25	93	49						
41	24.01.14	13	27	94	48						
42	27.01.14	16	25	92	53						
43	30.01.14	17	26	94	57						
44	01.02.14	19	24	93	62						

Appendix 35. Length of Hatchlings (weekly), 2012-2014

Year	Clutch	Egg No.	Just after hatching (cm)	1st week (cm)	2nd week(cm)	3rd Week (cm)	4th week (cm)	5th Week (cm)	6th Week (cm)	7th Week (cm)	8th Week (cm)	9th Week (cm)	10th Week (cm)
2012	1	1	23.1	24.5	25.9	27.3	28.8	30.3	31.9	33.9	36.1	37.7	39.3
		2	22.9	24.3	25.8	27.0	28.3	29.9	31.6	33.1	35.2	36.7	38.7
		3	22.8	24.1	25.2	26.4	27.5	29.0	30.7	32.5	34.1	35.7	37.6
		4	23.5	24.5	25.6	26.5	27.6	28.9	30.3	31.8	33.3	35.0	36.9
		5	23.1	24.7	26.3	27.8	29.4	30.9	32.5	34.2	36.0	37.6	39.3
		6	23.4	24.6	26.0	27.2	28.5	30.3	32.2	34.2	36.3	38.0	39.6
		7	23.6	24.9	26.3	27.8	29.2	30.8	32.5	34.3	36.2	37.7	39.7
		8	23.0	24.2	25.5	26.9	28.2	30.0	31.9	34.0	36.3	38.2	39.9
		9	22.9	23.8	24.9	26.0	27.0	28.4	29.9	31.5	33.1	34.8	36.7
		10	23.5	24.5	25.7	Die							
		11	23.8	24.7	25.8	26.9	27.9	29.3	30.8	32.4	34.0	35.6	37.6
		12	23.3	24.2	25.4	26.7	28.1	29.7	31.5	33.3	35.2	36.9	38.8
		13	22.8	23.7	24.9	26.0	27.1	28.7	30.4	32.3	34.3	35.9	37.7
		14	23.6	24.5	25.7	26.8	27.9	29.7	31.6	33.6	35.7	37.1	39.0
		15	23.5	24.3	25.5	26.6	27.8	29.5	31.3	33.3	35.6	37.3	38.9
		16	24.0	24.9	Die								
		17	23.7	24.7	25.8	26.9	28.2	29.9	31.7	33.6	35.4	37.0	38.8
		18	23.9	25.1	26.3	27.7	29.0	30.6	32.3	34.1	35.9	37.6	39.5
		19	23.6	24.3	25.2	26.9	27.2	28.5	29.9	31.5	33.1	34.8	36.7
		20	23.5	24.3	25.2	26.2	27.3	28.7	30.2	31.8	33.4	35.0	36.9
		21	23.7	24.4	25.2	26.2	27.3	29.1	31.0	33.1	35.2	36.9	38.8
		22	23.2	24.2	25.3	26.6	27.8	29.5	31.3	33.2	34.9	36.5	38.5
		23	23.0	24.1	25.2	26.5	27.9	29.4	31.0	32.7	34.3	36.1	37.9
		24	23.2	24.1	25.1	26.2	27.4	29.2	31.1	33.1	35.3	37.0	38.8
		25	22.7	23.6	24.6	25.7	26.9	28.8	30.8	32.9	35.0	36.5	38.3
		26	23.4	24.1	24.9	25.8	26.9	28.6	30.4	32.9	34.2	35.8	37.7
		27	Did not										
		28	23.4	24.0	24.6	25.3	26.2	28.0	29.9	31.9	34.1	35.6	37.5
		29	22.8	23.4	24.1	24.9	26.0	27.6	29.3	31.1	32.9	34.7	36.5
		30	23.0	23.7	24.5	25.4	26.4	28.0	29.7	31.5	33.1	34.9	36.8

		31	23.8	24.4	25.1	25.9	27.3	29.1	31.0	32.9	35.1	36.9	38.7
		32	24.1	24.5	25.0	25.6	26.5	28.2	30.0	Die			
		33	23.2	23.9	24.7	25.7	27.1	28.4	29.8	31.3	32.8	34.5	36.5
		34	24.0	24.8	25.7	26.8	28.3	29.9	31.6	33.4	35.3	37.0	38.8
		35	Did not										
		36	22.7	23.4	24.2	25.2	26.5	28.1	29.8	31.6	33.1	34.9	36.7
		37	23.4	24.2	25.1	26.3	27.9	29.5	31.2	33.1	34.7	36.3	38.1
		38	Did not										
		39	24.0	24.8	25.7	26.8	28.6	30.2	31.9	33.7	35.3	37.1	38.9
2013	1	1	23.3	24.2	25.2	26.4	27.6	29.3	31.1	33.1	35	36.7	38.3
		2	23.5	24.6	25.8	27.2	28.4	30	31.7	33.5	35.2	36.9	38.6
		3	24.2	25.1	26.1	27.1	28.2	29.9	31.7	33.6	35.5	36.9	38.2
		4	24.6	26.6	26.8	28	29.3	30.9	32.6	34.4	36.1	37.6	39.4
		5	23	24.1	25.3	26.3	27.4	28.9	30.5	32.2	33.8	35.4	37.1
		6	23.8	24.9	26.1	27.3	28.5	30.1	31.8	33.6	Die		
		7	Did not hatch										
		8	24.5	25.6	26.8	28.1	29.3	30.7	32.2	33.7	35.1	36.6	38.4
		9	24.8	25.9	27.1	28.3	29.5	30.8	32.2	33.6	34.9	36.3	38
		10	24.1	25.1	26.2	27.4	28.7	30.1	31.6	33.2	34.5	36.1	37.8
		11	24	25	26.1	27.3	28.5	29.9	31.4	32.9	34.3	35.6	37.2
		12	23.3	24.4	25.5	26.4	27.6	28.7	29.9	31.3	32.7	34.7	36.9
		13	Did not hatch										
		14	23.5	24.4	25.5	26.6	27.9	29	30.1	31.5	33	34.6	36.4
		15	23.5	24.4	25.5	26.9	28.5	30	31.6	33.3	34.9	36.4	38.2
		16	23	23.9	25	26.3	27.6	29	30.5	32.1	33.5	3.1	36.8
		17	23.7	24.7	25.8	27.3	28.5	29.8	31.2	32.8	34.2	35.7	37.4
		18	24.2	25.2	26.3	27.6	28.9	30.4	32	33.7	35.1	36.6	38.3
		19	24.1	25	26.1	27.3	28.8	30	31.3	32.7	34.1	35.6	37.3
		20	23.9	24.9	26	27.3	28.8	30	31.3	32.7	34	35.5	37.2
		21	24	24.9	26.1	27.4	28.9	30.3	31.8	33.4	34.9	36.3	37.9
		22	Did not hatch										
		23	23.6	24.5	25.6	26.9	28.3	29.6	31	32.5	33.9	35.5	37.2
2014	1	1	24.9	26.1	27.4	28.8	30.1	31.8	33.6	35.5	37.1	39.1	41.3
		2	24.1	25.3	26.6	28	29.2	30.9	32.7	Die			
		3	24.3	25.5	26.8	28.2	29.5	31.1	32.8	34.6	36.2	37.7	39.3
		4	24.5	25.7	27	Die							
		5	25.2	26.3	27.5	28.8	30.1	31.7	33.4	35.2	36.9	38.4	40
		6	25.3	26.3	27.4	28.7	30	31.7	33.5	35.4	37.3	38.6	40.2
		7	24.6	25.6	26.7	27.9	29.2	30.9	32.7	34.5	36.2	37.6	39.3
		8	24.8	25.9	27.1	28.4	29.9	31.5	33.2	35	36.9	38.1	39.6
		9	24.6	25.6	26.7	27.9	29.1	30.5	32	33.6	35.1	36.5	38.2
		10	Did not hatch										
		11	25.3	26.4	27.6	28.9	30.1	31.5	33	34.6	36.2	37.6	39.3
		12	24.8	25.8	26.9	28.1	29.3	30.7	32.2	33.7	35.2	36.7	38.5
		13	24.3	25.3	26.4	27.6	29.1	30.5	32	33.6	35.1	36.6	38.3
		14	25.4	26.5	27.7	29	30.2	31.7	33.3	35	Die		
		15	25	26.1	27.3	28.6	29.9	31.4	33	34.7	36.1	37.5	39.2
		16	Did not hatch										
		17	24.2	25.2	26.3	27.5	28.9	30.3	31.8	33.4	34.9	36.4	38
		18	24.3	25.4	26.5	27.8	29	30.4	31.9	33.4	34.8	36.2	37.9
		Mean	23.80	24.79	25.87	27.04	28.30	29.84	31.47	33.22	34.88	35.98	38.24
		SD	0.69	0.77	0.85	0.97	1.04	1.03	1.04	1.06	1.14	4.28	1.07

Appendix 36. Length of Hatchlings (monthly)

Appendix 37. Weight of Hatchlings (weekly)

Year	Egg No.	Just after hatching	1st week	2nd week(g)	3rd Week	4th Week	5th Week (g)	6th Week (g)	7th Week	8th Week	9th Week (g)	10th Week
2012	1	17.6	21.3	26	30.9	35.8	41.4	47.3	53.8	60.4	69.1	78.1
	2	16.7	20.1	23.8	28.4	33.6	39.2	45.1	51.4	57.6	63.4	70.3
	3	15.8	19.2	23.1	27.4	32.9	38.5	44.3	50.2	55.9	59.3	66.1
	4	18.1	22.7	27.6	32.9	38.6	46.5	54.9	63.5	72.6	82.3	93.5
	5	17.8	22.4	27.3	32.7	37.9	44.8	52.1	59.5	67.1	71.6	78.5
	6	18.2	23.4	29	34.9	41.1	48.2	55.7	63.5	71.3	74.9	82.1
	7	18.5	23.6	29.1	35.1	41.4	48.3	55.6	63.2	70.5	79.6	91.3
	8	17.3	21.2	25.5	30.3	34.9	39.8	45.1	51.2	57.1	61.8	69.7
	9	16.5	19.9	23.6	27.3	31.9	38.7	46.3	54.6	63.6	78.3	81.4
	10	18.7	22.5	26.5	Die							
	11	18.9	24.1	29.8	35.5	41.8	49.1	57.1	65.3	73.8	91.4	95.3
	12	17.3	21.8	26.6	31.3	37.1	43.1	49.2	55.7	62.4	69.3	81.3
	13	16.3	20.9	25.8	31	36.8	40.9	45.5	50.4	54.9	58.2	67.4
	14	18.8	23.9	29.5	35.6	41.5	47.8	55.1	63.3	72.8	79.2	91.3
	15	18.3	23.7	29.1	35.4	41.2	48.7	56.8	65.3	73.6	82.4	98.5
	16	19.1	24	Die								
	17	18.8	24.3	30.1	36.2	41.8	49.7	58.1	67.1	76.3	83.2	94.7
	18	18.1	22.6	27.4	33.1	38.8	45.9	53.5	61.6	69.4	72.1	79.5
	19	17.7	21.8	26.4	31.7	36.9	44.7	53.2	62.3	71.3	78.3	89.9
	20	17.8	22.4	27.3	32.9	37.7	44.2	51.1	58.6	65.9	67.2	74.3
	21	17.3	21.7	26.3	31.4	36.8	42.4	48.3	54.7	61.3	65.9	75.1
	22	17.1	20.6	24.7	28.9	33.7	39.3	45.2	51.5	57.6	60.6	66.8
	23	17.4	21.5	25.9	31	35.1	41.2	47.7	54.6	61.1	67.4	Die
	24	17.6	21.6	25.8	31.1	35.3	42.2	49.7	57.8	65.8	71.9	85.5
	25	15.7	19.5	23.4	27.7	32.1	38.5	45.4	52.7	60.2	65.1	74.3
	26	17.3	21.4	26.1	31.1	36.1	41.4	47.3	54.1	61.9	64.1	70.2
	27	Did not hatch										
	28	17.9	22.4	27.3	22.8	38.1	45.1	52.4	60.3	68.3	77.5	89.3
	29	16.7	21.1	25.7	30.8	34.9	41.8	49.3	57.2	65.6	73.4	84.5
	30	16.9	21.2	25.8	30.9	36.1	42.9	50.1	57.7	64.8	73.4	87.6
	31	18.3	22.9	27.8	33.1	39.1	46.1	53.5	61.4	70.3	78.7	89.7
	32	19.1	24.2	29.6	35.8	41.9	48.3	54.9	Die			
	33	17.9	22.4	27.3	32.6	38.1	44.9	52.2	59.8	67.2	73.2	85.2
	34	19	24.1	29.5	35.3	41.1	48.7	57.2	65.9	75.3	83.5	96.3
	35	Did not hatch										
	36	15.9	21.2	27.1	33.3	39.9	44.8	50.1	55.6	61.1	65.6	76.4
	37	16.8	20.4	24.3	28.8	33.8	40.6	47.8	55.4	63.2	69.8	80.7
	38	Did not hatch										
	39	18.9	23.8	29.1	35.1	40.7	46.3	52.2	59.1	66.3	70.3	80.5
2013	1	16.9	21.2	25.8	30.7	36.2	43.8	51.7	60.1	68.3	77.7	88.3
	2	17.5	22.3	27.4	32.8	37.9	45.7	54.2	63.1	72.1	81.6	93.4
	3	19.2	24.1	29.4	35.3	41.8	51.4	61.6	72.2	81	90.4	103.5
	4	19.3	24.3	30.2	36.1	42.2	50.6	59.2	68.3	76.9	86.2	99.7
	5	16.3	20.7	25.3	30.2	35.2	40.7	46.4	52.3	59	67.4	77.8
	6	17.8	22.3	26.9	31.8	36.8	42.4	48.2	54.3	Die		
	7	Did not hatch										
	8	19.3	24.6	30.2	35.9	41.6	49.2	57.1	65.4	74.1	84.1	96.2

	9	19.5	24.7	30.3	36.1	42.2	47.7	53.4	59.3	68.2	77.3	90.4
	10	18.7	23.6	28.8	34.2	39.8	47.2	54.8	62.6	70.3	77.6	89.5
	11	18.6	23.7	29.2	34.9	41.3	48.4	55.9	63.8	71.2	80.1	93.2
	12	16.3	21.1	26.2	31.5	36.7	43	49.7	56.6	63.8	69.8	81.3
	13	Did not hatch										
	14	16.5	20.8	25.4	30.3	35.8	41.7	47.9	54.4	61.1	66.1	77.2
	15	16.3	20.6	25.1	29.9	34.7	40.5	46.5	52.8	59.2	62.6	70.5
	16	15.8	20.1	24.6	29.2	33.9	38.8	43.9	49.2	55.3	59.9	71.2
	17	17.5	21.8	26.4	31.2	36.1	43.4	51	58.9	67.4	72.3	Die
	18	18.9	23.9	29.3	34.9	40.2	48	56.1	64.4	72.3	79.5	91.3
	19	18.7	23.5	28.6	33.9	39.1	46.9	55.1	63.3	71.3	77.1	89.5
	20	17.6	21.7	26.2	30.9	35.1	41.9	49.1	56.3	63.9	71.3	84.6
	21	18.7	23.6	28.8	34.6	39.9	46.6	53.5	60.7	67.7	74.4	86.4
	22	Did not hatch										
	23	16.7	21.3	26.2	31.6	36.8	43.1	49.4	56.1	62.8	66.2	77.2
2014	1	19.1	24.1	29.2	35.1	41	49.5	58.3	67.3	76.3	85.3	97.3
	2	18.7	23.6	28.9	34.5	39.9	47.7	55.8	Die			
	3	18.8	23.6	28.7	34.1	39.2	47.1	55.5	64.1	73.1	80.3	93.6
	4	18.6	23.3	28.2	Die							
	5	19.3	24.1	29.2	34.6	40.3	48.1	56.2	64.4	72.3	83.1	96.2
	6	19.1	23.9	29.1	34.4	39.9	48	56.7	65.7	75.1	83.6	96.1
	7	18.9	23.8	29	34.3	40.1	48.1	56.3	65.1	73.9	80.8	93.2
	8	18.6	23.5	28.8	34.4	40.3	47.9	55.8	64.2	72.1	81.1	94.3
	9	18.4	23.1	28.2	33.6	38.9	46.1	53.6	61.5	70.3	79.4	93.1
	10	Did not hatch										
	11	19.3	24.2	29.7	35.4	41.1	48.6	56.4	64.4	73.1	82.7	96.5
	12	18.4	22.9	27.7	32.6	38.1	46.1	54.4	63.2	72.3	81.9	91.4
	13	17.9	22.5	27.4	32.6	37.9	45.5	53.4	61.5	69.5	77.9	87.2
	14	18.8	23.7	28.8	34.2	40.1	47.7	54.3	63.9	Die		
	15	17.9	22.6	27.5	32.8	38.6	45.7	53.2	61.1	69	77.1	89.3
	16	Did not hatch										
	17	18.3	23.2	28.4	33.8	39.9	48.5	57.4	66.5	75.3	83.9	96.5
	18	16.9	21.7	26.8	32.1	37.1	44.1	51.5	59.3	68.3	75.4	87.2
	Mean	17.91	22.49	27.40	32.56	38.12	44.98	52.21	59.77	67.58	74.71	85.69
	SD	1.03	1.40	1.85	2.61	2.75	3.41	4.24	5.22	6.13	7.97	9.44

Appendix 38. Weight of Hatchlings (monthly)
Appendix 39. Growth of different parts of the body of Bengal monitor, Year 2012-2014

Year	Egg no	Just after hatching (n=36)				After one month of hatching (n=34)				After one year of hatching (n=27)				After two years of hatching (n=20)			
		Length of head region (cm)	Length of abdomen (cm)	Length of tail (cm)	Total length (cm)	Length of head region (cm)	Length of abdomen (cm)	Length of tail (cm)	Total length (cm)	Length of head region (cm)	Length of abdomen (cm)	Length of tail (cm)	Total length (cm)	Length of head region (cm)	Length of abdomen (cm)	Length of tail (cm)	Total length (cm)
2012	1	3.7	5.8	13.6	23.1	4.8	7.5	17.8	30.1	16.0	25.1	59.1	100.2	20.3	31.8	74.9	127.0
	2	3.7	5.7	13.5	22.9	4.7	7.3	17.2	29.2	15.6	24.3	57.4	97.3	20.1	31.4	74.0	125.5
	3	3.6	5.7	13.5	22.8	4.6	7.2	16.9	28.6	15.2	23.8	56.1	95.1	19.7	30.8	72.7	123.3
	4	3.8	5.9	13.9	23.5	4.5	7.1	16.8	28.4	15.5	24.3	57.3	97.1	18.1	28.3	66.7	113.1
	5	3.7	5.8	13.6	23.1	4.8	7.6	17.8	30.2	15.8	24.7	58.4	98.9	19.8	30.9	73.0	123.7
	6	3.7	5.9	13.8	23.4	4.8	7.4	17.5	29.7	Die							
	7	3.8	5.9	13.9	23.6	4.8	7.6	17.9	30.3	16.3	25.5	60.1	101.9	20.3	31.8	74.9	127.0
	8	3.7	5.8	13.6	23.0	4.7	7.3	17.2	29.1	14.4	22.5	53.2	90.1	Die			
	9	3.7	5.7	13.5	22.9	4.5	7.1	16.6	28.2	13.0	20.3	47.9	81.2	15.6	24.4	57.5	97.4
	10	3.8	5.9	13.9	23.5	Die											
	11	3.8	6.0	14.0	23.8	4.7	7.4	17.3	29.4	13.2	20.6	48.6	82.4	15.7	24.5	57.8	97.9
	12	3.7	5.8	13.7	23.3	4.7	7.4	17.4	29.5	Die							
	13	3.6	5.7	13.5	22.8	4.5	7.1	16.8	28.4	15.2	23.7	56.0	94.9	Die			
	14	3.8	5.9	13.9	23.6	4.8	7.4	17.5	29.7	15.8	24.7	58.3	98.8	19.5	30.5	72.0	122.1
	15	3.8	5.9	13.9	23.5	4.8	7.4	17.5	29.7	11.2	17.5	41.2	69.8	18.8	29.3	69.2	117.3
	16	3.8	6.0	14.2	24.0	Die											
	17	3.8	5.9	14.0	23.7	4.8	7.5	17.6	29.9	15.6	24.4	57.6	97.7	Lost			
	18	3.8	6.0	14.1	23.9	4.8	7.6	17.9	30.3	16.3	25.5	60.2	102.1	18.9	29.6	69.7	118.2
	19	3.8	5.9	13.9	23.6	4.6	7.2	16.9	28.7	13.6	21.2	50.0	84.8	Die			
	20	3.8	5.9	13.9	23.5	4.6	7.2	17.0	28.8	Die							
	21	3.8	5.9	14.0	23.7	4.6	7.2	17.1	28.9	15.4	24.0	56.6	96.0	Die			
	22	3.7	5.8	13.7	23.2	4.7	7.3	17.3	29.3	15.5	24.2	57.1	96.7	Lost			
	23	3.7	5.8	13.6	23.0	4.7	7.3	17.2	29.1	Die							
	24	3.7	5.8	13.7	23.2	4.7	7.4	17.4	29.5	15.4	24.1	56.9	96.4	17.8	27.8	65.7	111.3
	25	3.6	5.7	13.4	22.7	4.5	7.1	16.6	28.2	Die							
	26	3.7	5.9	13.8	23.4	4.6	7.2	16.9	28.7	14.9	23.2	54.8	92.9	17.0	26.6	62.7	106.3
	27	Did not hatch															
	28	3.7	5.9	13.8	23.4	4.6	7.2	17.0	28.8	14.4	22.6	53.2	90.2	16.8	26.2	61.8	104.8
	29	3.6	5.7	13.5	22.8	4.5	7.0	16.5	28.0	Die							
	30	3.7	5.8	13.6	23.0	4.6	7.1	16.8	28.5	14.4	22.5	53.0	89.8	16.8	26.3	62.1	105.2
	31	3.8	6.0	14.0	23.8	4.7	7.4	17.5	29.6	15.6	24.4	57.6	97.7	18.0	28.1	66.3	112.3
	32	3.9	6.0	14.2	24.1	4.8	7.5	17.6	29.8	Die							
	33	3.7	5.8	13.7	23.2	4.6	7.1	16.8	28.5	14.9	23.3	55.0	93.3	17.6	27.5	64.8	109.8
	34	3.8	6.0	14.2	24.0	4.8	7.5	17.8	30.1	16.0	25.1	59.2	100.3	18.1	28.3	66.7	113.1
	35	Did not hatch															
	36	3.6	5.7	13.4	22.7	4.5	7.0	16.6	28.1	14.6	22.8	53.7	91.1	Lost			
	37	3.7	5.9	13.8	23.4	4.7	7.3	17.2	29.1	15.1	23.6	55.6	94.2	17.3	27.0	63.7	107.9

	38	Did not hatch														
	39	3.8	6.0	14.2	24.0	4.8	7.6	17.9	30.3	16.2	25.3	59.6	101.0	18.5	29.0	68.4	115.9
2013	1	3.7	5.8	13.7	23.3	4.6	7.2	17.1	28.9	15.9	24.8	58.5	99.2				
	2	3.8	5.9	13.9	23.5	4.7	7.3	17.3	29.3	16.0	25.0	58.9	99.8				
	3	3.9	6.1	14.3	24.2	4.8	7.5	17.6	29.8	15.9	24.9	58.7	99.5				
	4	3.9	6.2	14.5	24.6	4.8	7.6	17.8	30.2	15.8	24.7	58.4	98.9				
	5	3.7	5.8	13.6	23.0	4.5	7.1	16.8	28.4	13.9	21.7	51.2	86.8				
	6	3.8	6.0	14.0	23.8	4.7	7.4	17.3	29.4	Die							
	7	Did not hatch															
	8	3.9	6.1	14.5	24.5	4.8	7.5	17.8	30.1	15.2	23.7	55.9	94.7				
	9	4.0	6.2	14.6	24.8	4.9	7.6	17.9	30.4	15.2	23.7	56.0	94.9				
	10	3.9	6.0	14.2	24.1	4.7	7.4	17.5	29.6	Die							
	11	3.8	6.0	14.2	24.0	4.7	7.4	17.3	29.4	14.4	22.5	53.0	89.8				
	12	3.7	5.8	13.7	23.3	4.6	7.2	16.9	28.6	12.7	19.8	46.7	79.1				
	13	Did not hatch															
	14	3.8	5.9	13.9	23.5	4.6	7.2	17.0	28.8	12.9	20.2	47.7	80.9				
	15	3.8	5.9	13.9	23.5	4.7	7.3	17.3	29.3	15.3	23.9	56.4	95.6				
	16	3.7	5.8	13.6	23.0	4.6	7.1	16.8	28.5	14.0	21.9	51.6	87.4				
	17	3.8	5.9	14.0	23.7	4.7	7.4	17.3	29.4	Die							
	18	3.9	6.1	14.3	24.2	4.8	7.5	17.6	29.9	15.4	24.1	56.8	96.2				
	19	3.9	6.0	14.2	24.1	4.7	7.4	17.5	29.6	14.6	22.8	53.7	91.1				
	20	3.8	6.0	14.1	23.9	4.8	7.4	17.5	29.7	Die							
	21	3.8	6.0	14.2	24.0	4.8	7.4	17.5	29.7	14.9	23.2	54.8	92.9				
	22	Did not hatch															
	23	3.8	5.9	13.9	23.6	4.7	7.3	17.2	29.2	14.3	22.4	52.8	89.5				
2014	1	4.0	6.2	14.7	24.9	5.0	7.8	18.4	31.2								
	2	3.9	6.0	14.2	24.1	4.9	7.7	18.1	30.6								
	3	3.9	6.1	14.3	24.3	4.9	7.7	18.2	30.9								
	4	3.9	6.1	14.5	24.5	Die											
	5	4.0	6.3	14.9	25.2	5.0	7.9	18.5	31.4								
	6	4.0	6.3	14.9	25.3	5.0	7.8	18.4	31.2								
	7	3.9	6.2	14.5	24.6	4.9	7.7	18.2	30.8								
	8	4.0	6.2	14.6	24.8	5.0	7.8	18.5	31.3								
	9	3.9	6.2	14.5	24.6	4.9	7.6	18.0	30.5								
	10	Did not hatch															
	11	4.0	6.3	14.9	25.3	5.0	7.9	18.5	31.4								
	12	4.0	6.2	14.6	24.8	4.9	7.7	18.1	30.7								
	13	3.9	6.1	14.3	24.3	4.9	7.6	17.9	30.4								
	14	4.1	6.4	15.0	25.4	5.0	7.9	18.6	31.5								
	15	4.0	6.3	14.8	25.0	5.0	7.8	18.5	31.3								
	16	Did not hatch															
	17	3.9	6.1	14.3	24.2	4.8	7.5	17.8	30.1								
	18	3.9	6.1	14.3	24.3	4.8	7.5	17.8	30.1								
Mean		3.81	5.96	14.04	23.80	4.74	7.41	17.48	29.63	14.92	23.31	55.00	93.21	18.24	28.51	67.23	113.96
SD		0.12	0.17	0.40	0.69	0.14	0.23	0.54	0.91	1.10	1.73	4.10	6.95	1.44	2.27	5.35	9.09

Appendix 40. Changes of weight of eggs of Bengal monitor during incubation (in g) Year: 2012 -2014

Year	Sl No.	Weight after collection (g)	Weight after 30 days (g)	Weight gain after 30 days (g)	Average % of weight gain	Weight after 60 days (g)	Weight gain after 60 days (g)	Average % of weight gain	Weight after 90 days (g)	Weight gain after 90 days (g)	Average % of weight gain	Weight after120 days (g)	Weight gain after120 days (g)	Average % of weight gain	Weight after 150 days (g)	Weight gain after150 days (g)	Average % of weight gain	Weight after180 days (g)	Weight gain after 180 days (g)	Average % of weight gain	Weight at the time hatching (g)	Weight gain at the time of hatching (g)	Average % of weight gain
2012	1	43.1	43.3	0.2	0.5	43.4	0.1	0.2	43.6	0.2	0.5	43.7	0.1	0.2	43.9	0.2	0.5	44.0	0.1	0.2	44.0	0.0	0.0
	2	43.5	43.6	0.1	0.2	43.7	0.1	0.2	43.9	0.2	0.5	44.0	0.1	0.2	44.1	0.1	0.2	44.2	0.1	0.2	44.2	0.0	0.0
	3	42.9	43.0	0.1	0.2	43.2	0.2	0.5	43.5	0.3	0.7	43.7	0.2	0.5	43.7	0.0	0.0	43.9	0.2	0.5	44.0	0.1	0.2
	4	43.3	43.5	0.2	0.5	43.7	0.2	0.5	43.8	0.1	0.2	44.1	0.3	0.7	44.1	0.0	0.0	44.3	0.2	0.5	44.4	0.1	0.2
	5	40.3	40.6	0.3	0.7	40.9	0.3	0.7	41.0	0.1	0.2	41.3	0.3	0.7	41.4	0.1	0.2	41.6	0.2	0.5	41.7	0.1	0.2
	6	41.2	41.5	0.3	0.7	41.6	0.1	0.2	41.8	0.2	0.5	41.9	0.1	0.2	42.0	0.1	0.2	42.3	0.3	0.7	42.4	0.1	0.2
	7	45.3	45.5	0.2	0.4	45.7	0.2	0.4	45.9	0.2	0.4	46.0	0.1	0.2	46.2	0.2	0.4	46.5	0.3	0.6	46.6	0.1	0.2
	8	46.8	46.9	0.1	0.2	47.1	0.2	0.4	47.4	0.3	0.6	47.6	0.2	0.4	47.8	0.2	0.4	47.9	0.1	0.2	47.9	0.0	0.0
	9	41.3	41.5	0.2	0.5	41.7	0.2	0.5	41.8	0.1	0.2	41.9	0.1	0.2	42.1	0.2	0.5	42.2	0.1	0.2	42.2	0.0	0.0
	10	42.5	42.6	0.1	0.2	42.7	0.1	0.2	42.8	0.1	0.2	43.0	0.2	0.5	43.1	0.1	0.2	43.1	0.0	0.0	43.2	0.1	0.2
	11	41.9	42.0	0.1	0.2	42.1	0.1	0.2	42.4	0.3	0.7	42.7	0.3	0.7	42.8	0.1	0.2	42.8	0.0	0.0	42.9	0.1	0.2
	12	44.3	44.5	0.2	0.5	44.8	0.3	0.7	44.9	0.1	0.2	45.0	0.1	0.2	45.3	0.3	0.7	45.5	0.2	0.4	45.6	0.1	0.2
	13	39.9	40.2	0.3	0.8	40.3	0.1	0.2	40.5	0.2	0.5	40.7	0.2	0.5	41.0	0.3	0.7	41.2	0.2	0.5	41.3	0.1	0.2
	14	43.2	43.4	0.2	0.5	43.6	0.2	0.5	43.8	0.2	0.5	44.0	0.2	0.5	44.1	0.1	0.2	44.3	0.2	0.5	44.4	0.1	0.2
	15	40.3	40.5	0.2	0.5	40.5	0.0	0.0	40.8	0.3	0.7	40.8	0.0	0.0	40.9	0.1	0.2	41.2	0.3	0.7	41.3	0.1	0.2
	16	38.9	39.1	0.2	0.5	39.2	0.1	0.3	39.3	0.1	0.3	39.4	0.1	0.3	39.5	0.1	0.3	39.6	0.1	0.3	39.6	0.0	0.0
	17	39.5	39.8	0.3	0.8	39.9	0.1	0.3	40.0	0.1	0.3	40.1	0.1	0.3	40.1	0.0	0.0	40.2	0.1	0.2	40.2	0.0	0.0
	18	40.3	40.4	0.1	0.2	40.6	0.2	0.5	40.7	0.1	0.2	40.9	0.2	0.5	41.0	0.1	0.2	41.2	0.2	0.5	41.3	0.1	0.2
	19	41.5	41.6	0.1	0.2	41.9	0.3	0.7	42.1	0.2	0.5	42.4	0.3	0.7	42.6	0.2	0.5	42.7	0.1	0.2	42.8	0.1	0.2
	20	42.0	42.2	0.2	0.5	42.3	0.1	0.2	42.6	0.3	0.7	42.7	0.1	0.2	42.9	0.2	0.5	43.0	0.1	0.2	43.1	0.1	0.2
	21	38.7	39.0	0.3	0.8	39.1	0.1	0.3	39.2	0.1	0.3	39.3	0.1	0.3	39.4	0.1	0.3	39.6	0.2	0.5	39.8	0.2	0.5
	22	43.7	43.9	0.2	0.5	44.1	0.2	0.5	44.2	0.1	0.2	44.4	0.2	0.5	44.5	0.1	0.2	44.8	0.3	0.7	44.9	0.1	0.2
	23	40.5	40.6	0.1	0.2	40.9	0.3	0.7	41.0	0.1	0.2	41.2	0.2	0.5	41.5	0.3	0.7	41.6	0.1	0.2	41.7	0.1	0.2
	24	38.7	38.9	0.2	0.5	39.0	0.1	0.3	39.2	0.2	0.5	39.4	0.2	0.5	39.7	0.3	0.8	39.8	0.1	0.3	39.9	0.1	0.3
	25	38.9	39.2	0.3	0.8	39.3	0.1	0.3	39.5	0.2	0.5	39.6	0.1	0.3	39.7	0.1	0.3	39.9	0.2	0.5	40.1	0.2	0.5
	26	37.7	37.8	0.1	0.3	38.0	0.2	0.5	38.3	0.3	0.8	38.4	0.1	0.3	38.5	0.1	0.3	38.7	0.2	0.5	38.8	0.1	0.3
	27	37.9	38.0	0.1	0.3	38.2	0.2	0.5	38.3	0.1	0.3	38.4	0.1	0.3	38.6	0.2	0.5	38.9	0.3	0.8	39.0	0.1	0.3
	28	38.5	38.5	0.0	0.0	38.8	0.3	0.8	38.9	0.1	0.3	39.1	0.2	0.5	39.3	0.2	0.5	39.4	0.1	0.3	39.5	0.1	0.3
	29	39.2	39.3	0.1	0.3	39.4	0.1	0.3	39.6	0.2	0.5	39.8	0.2	0.5	40.0	0.2	0.5	40.3	0.3	0.8	40.4	0.1	0.2
	30	39.9	40.1	0.2	0.5	40.2	0.1	0.2	40.5	0.3	0.7	40.8	0.3	0.7	41.0	0.2	0.5	41.4	0.4	1.0	41.6	0.2	0.5
	31	38.9	39.2	0.3	0.8	39.3	0.1	0.3	39.6	0.3	0.8	39.8	0.2	0.5	39.9	0.1	0.3	40.0	0.1	0.3	40.1	0.1	0.3
	32	42.3	42.4	0.1	0.2	42.7	0.3	0.7	43.0	0.3	0.7	43.2	0.2	0.5	43.3	0.1	0.2	43.5	0.2	0.5	43.6	0.1	0.2
	33	43.6	43.8	0.2	0.5	43.9	0.1	0.2	44.3	0.4	0.9	44.5	0.2	0.5	44.6	0.1	0.2	44.8	0.2	0.4	44.8	0.0	0.0
	34	40.1	40.4	0.3	0.7	40.5	0.1	0.2	40.6	0.1	0.2	41.0	0.4	1.0	41.1	0.1	0.2	41.4	0.3	0.7	41.4	0.0	0.0
	35	42.5	42.7	0.2	0.5	42.8	0.1	0.2	42.9	0.1	0.2	43.0	0.1	0.2	43.2	0.2	0.5	43.5	0.3	0.7	43.6	0.1	0.2
	36	43.6	44.0	0.4	0.9	44.3	0.3	0.7	44.5	0.2	0.5	44.6	0.1	0.2	44.7	0.1	0.2	44.8	0.1	0.2	44.9	0.1	0.2
	37	42.8	42.9	0.1	0.2	43.3	0.4	0.9	43.3	0.0	0.0	43.4	0.1	0.2	43.5	0.1	0.2	43.6	0.1	0.2	43.7	0.1	0.2
	38	41.7	42.0	0.3	0.7	42.1	0.1	0.2	42.2	0.1	0.2	42.2	0.0	0.0	42.2	0.0	0.0	42.4	0.2	0.5	42.6	0.2	0.5
	39	42.9	43.1	0.2	0.5	43.3	0.2	0.5	43.5	0.2	0.5	43.6	0.1	0.2	43.8	0.2	0.5	43.9	0.1	0.2	44.1	0.2	0.5
2013	1	40.9	41.1	0.2	0.5	41.2	0.3	0.7	41.3	0.1	0.2	41.5	0.2	0.5	41.6	0.1	0.2	41.9	0.3	0.7	42.0	0.1	0.2
	2	39.5	39.8	0.3	0.8	39.6	0.1	0.3	39.8	0.2	0.5	40.0	0.2	0.5	40.2	0.2	0.5	40.3	0.1	0.2	40.4	0.1	0.2
	3	41.8	42.0	0.2	0.5	42.0	0.2	0.5	42.3	0.3	0.7	42.6	0.3	0.7	42.9	0.3	0.7	43.1	0.2	0.5	43.1	0.0	0.0
	4	43.5	43.6	0.1	0.2	43.7	0.2	0.5	43.9	0.2	0.5	44.3	0.4	0.9	44.5	0.2	0.5	44.8	0.3	0.7	44.9	0.1	0.2
	5	43.0	43.3	0.3	0.7	43.2	0.2	0.5	43.3	0.1	0.2	43.6	0.3	0.7	43.7	0.1	0.2	43.9	0.2	0.5	44.0	0.1	0.2
	6	42.7	42.8	0.1	0.2	42.9	0.2	0.5	43.0	0.1	0.2	43.2	0.2	0.5	43.5	0.3	0.7	43.7	0.2	0.5	43.7	0.0	0.0
	7	42.6	42.8	0.2	0.5	42.7	0.1	0.2	43.0	0.3	0.7	43.2	0.2	0.5	43.4	0.2	0.5	43.7	0.3	0.7	43.8	0.1	0.2
	8	42.0	42.3	0.3	0.7	42.2	0.2	0.5	42.3	0.1	0.2	42.7	0.4	0.9	42.9	0.2	0.5	43.0	0.1	0.2	43.0	0.0	0.0
	9	41.5	41.9	0.4	1.0	41.7	0.2	0.5	41.9	0.2	0.5	42.3	0.4	1.0	42.4	0.1	0.2	42.5	0.1	0.2	42.5	0.0	0.0
	10	41.0	41.3	0.3	0.7	41.1	0.1	0.2	41.4	0.3	0.7	41.7	0.3	0.7	42.0	0.3	0.7	42.0	0.0	0.0	42.1	0.1	0.2
	11	38.9	39.1	0.2	0.5	39.2	0.3	0.8	39.3	0.1	0.3	39.6	0.3	0.8	40.0	0.4	1.0	40.1	0.1	0.3	40.2	0.1	0.2

	12	38.5	38.6	0.1	0.3	38.8	0.3	0.8	38.9	0.1	0.3	39.1	0.2	0.5	39.4	0.3	0.8	39.6	0.2	0.5	39.8	0.2	0.5
	13	43.2	43.4	0.2	0.5	43.4	0.2	0.5	43.4	0.0	0.0	43.5	0.1	0.2	43.9	0.4	0.9	44.1	0.2	0.5	44.2	0.1	0.2
	14	42.9	43.2	0.3	0.7	43.0	0.1	0.2	43.2	0.2	0.5	43.2	0.0	0.0	43.5	0.3	0.7	43.8	0.3	0.7	43.9	0.1	0.2
	15	41.6	41.8	0.2	0.5	41.9	0.3	0.7	41.9	0.0	0.0	42.2	0.3	0.7	42.3	0.1	0.2	42.4	0.1	0.2	42.6	0.2	0.5
	16	42.8	43.0	0.2	0.5	42.9	0.1	0.2	43.0	0.1	0.2	43.2	0.2	0.5	43.3	0.1	0.2	43.3	0.0	0.0	43.4	0.1	0.2
	17	41.6	41.7	0.1	0.2	41.8	0.2	0.5	42.0	0.2	0.5	42.1	0.1	0.2	42.3	0.2	0.5	42.4	0.1	0.2	42.6	0.2	0.5
	18	41.0	41.3	0.3	0.7	41.0	0.0	0.0	41.1	0.1	0.2	41.2	0.1	0.2	41.4	0.2	0.5	41.6	0.2	0.5	41.6	0.0	0.0
	19	38.9	39.3	0.4	1.0	39.0	0.1	0.3	39.2	0.2	0.5	39.4	0.2	0.5	39.5	0.1	0.3	39.8	0.3	0.8	39.9	0.1	0.3
	20	40.9	41.2	0.3	0.7	41.0	0.1	0.2	41.4	0.4	1.0	41.7	0.3	0.7	41.9	0.2	0.5	42.1	0.2	0.5	42.2	0.1	0.2
	21	42.9	43.0	0.1	0.2	43.1	0.2	0.5	43.4	0.3	0.7	43.4	0.0	0.0	43.5	0.1	0.2	43.8	0.3	0.7	44.0	0.2	0.5
	22	41.9	42.0	0.1	0.2	42.2	0.3	0.7	42.3	0.1	0.2	42.4	0.1	0.2	42.4	0.0	0.0	42.5	0.1	0.2	42.6	0.1	0.2
	23	42.8	43.1	0.3	0.7	42.9	0.1	0.2	43.1	0.2	0.5	43.2	0.1	0.2	43.3	0.1	0.2	43.4	0.1	0.2	43.5	0.1	0.2
2014	1	43.4	43.7	0.3	0.7	43.9	0.2	0.5	44.0	0.1	0.2	44.0	0.0	0.0	44.1	0.1	0.2	44.3	0.2	0.5	44.4	0.1	0.2
	2	42.6	42.8	0.2	0.5	43.0	0.2	0.5	43.1	0.1	0.2	43.1	0.0	0.0	43.3	0.2	0.5	43.5	0.2	0.5	43.5	0.0	0.0
	3	40.9	41.1	0.2	0.5	41.2	0.1	0.2	41.4	0.2	0.5	41.5	0.1	0.2	41.7	0.2	0.5	42.0	0.3	0.7	42.0	0.0	0.0
	4	39.8	40.2	0.4	1.0	40.3	0.1	0.2	40.3	0.0	0.0	40.4	0.1	0.2	40.5	0.1	0.2	40.6	0.1	0.2	40.7	0.1	0.2
	5	38.9	39.0	0.1	0.3	39.3	0.3	0.8	39.4	0.1	0.3	39.6	0.2	0.5	39.8	0.2	0.5	39.8	0.0	0.0	40.0	0.2	0.5
	6	38.2	38.3	0.1	0.3	38.5	0.2	0.5	28.7	0.2	0.5	39.0	0.3	0.8	39.0	0.0	0.0	392	0.0	0.0	39.1	0.1	0.3
	7	39.8	40.0	0.2	0.5	40.3	0.3	0.8	40.4	0.1	0.2	40.6	0.2	0.5	50.7	0.1	0.2	50.9	0.2	0.5	41.0	0.1	0.2
	8	43.2	43.5	0.3	0.7	43.7	0.2	0.5	43.9	0.2	0.5	44.0	0.1	0.2	44.2	0.2	0.5	44.3	0.1	0.2	44.3	0.0	0.0
	9	42.9	43.1	0.2	0.5	43.2	0.1	0.2	43.4	0.2	0.5	43.4	0.0	0.0	43.5	0.1	0.2	43.6	0.1	0.2	43.7	0.1	0.2
	10	41.3	41.5	0.2	0.5	42.7	0.2	0.5	41.8	0.1	0.2	41.9	0.1	0.2	41.9	0.0	0.0	42.1	0.2	0.5	42.3	0.2	0.5
	11	42.0	42.3	0.3	0.7	42.6	0.3	0.7	42.7	0.1	0.2	42.8	0.1	0.2	43.1	0.3	0.7	43.4	0.3	0.7	43.6	0.2	0.5
	12	42.8	43.2	0.4	0.9	43.4	0.2	0.5	43.6	0.2	0.5	43.8	0.2	0.5	43.9	0.1	0.2	44.1	0.2	0.5	44.4	0.3	0.7
	13	41.6	41.9	0.3	0.7	42.1	0.2	0.5	42.1	0.0	0.0	42.1	0.0	0.0	42.3	0.2	0.5	42.4	0.1	0.2	42.5	0.1	0.2
	14	38.6	38.8	0.2	0.5	39.1	0.3	0.8	39.2	0.1	0.3	39.3	0.1	0.3	39.3	0.0	0.0	39.5	0.2	0.5	39.5	0.0	0.0
	15	39.6	39.7	0.1	0.3	40.0	0.3	0.8	40.0	0.0	0.0	40.2	0.2	0.5	40.3	0.1	0.2	40.3	0.0	0.0	40.3	0.0	0.0
	16	41.7	42.0	0.3	0.7	42.2	0.2	0.5	42.3	0.1	0.2	42.4	0.1	0.2	42.6	0.2	0.5	42.7	0.1	0.2	42.8	0.1	0.2
	17	42.5	42.8	0.3	0.7	43.1	0.3	0.7	43.3	0.2	0.5	43.5	0.2	0.5	43.7	0.2	0.5	43.8	0.1	0.2	43.9	0.1	0.2
	18	39.2	39.4	0.2	0.5	39.7	0.3	0.8	39.8	0.1	0.3	39.9	0.1	0.3	40.2	0.3	0.8	40.4	0.2	0.5	40.5	0.1	0.2
Mean		41.4	41.6	0.2	0.5	41.7	0.2	0.4	41.7	0.2	0.4	42.0	0.2	0.4	42.3	0.2	0.4	42.5	0.2	0.4	42.5	0.1	0.2
SD		1.9	1.9	0.1	0.2	1.9	0.1	0.2	2.4	0.1	0.2	1.9	0.1	0.2	2.1	0.1	0.2	2.1	0.1	0.2	1.9	0.1	0.2

Appendix 41. Weekly food consumption by the hatchlings

Week	Year									Mean Taken food (g) /week/ individual	Mean Taken food (g) /day/ individual
	2012			2013			2014				
	No. of Hatchling	Taken food (g)/week	Taken food (g) /week/ individual	No. of Hatchling	Taken food (g)/week	Taken food (g) /week/ individual	No. of Hatchling	Taken food (g)/week	Taken food (g) /week/ individual		
1st	35	13.7	0.39	20	8.54	0.43	16	7.62	0.48	0.42±0.05	0.062
2nd	34	84.3	2.48	20	54.6	2.73	16	34.7	2.2	2.47±0.27	0.35
3rd	33	286.4	8.68	20	175.0	8.75	15	124.9	8.3	8.58±0.24	1.23
4th	33	505.9	15.3	20	326.2	16.3	15	203.7	13.6	15.07±1.37	2.15
5th	33	783.1	23.7	20	473.2	23.7	15	303.5	20.2	22.53±2.02	3.21
6th	33	924.0	28.0	20	571.2	28.9	15	436.8	29.1	28.67±0.59	4.1
7th	32	1034.9	32.3	20	660.8	33.0	14	489.0	35.0	33.43±1.40	4.8
8th	32	965.4	30.2	19	569.2	30.0	14	574.3	41.0	33.73±6.29	4.82
9th	32	1090.1	34.1	19	637.1	33.5	14	562.5	40.2	35.93±3.17	5.13
10th	32	1160.3	36.3	19	706.2	37.2	14	575.3	41.1	38.2±2.55	5.5

Appendix 42. Weekly food consumption by the hatchlings Bengal lizards in relation to body weight

Week	2012				2013				2014				Mean body weight (g)	Mean % of Food consumption in relation to body weight
	No. of hatchlings	Mean Food Consumption /day/ individual	Mean body weight (g)	% of Food consumption in relation to body weight	No. of hatchlings	Mean Food Consumption /day/ individual	Mean body weight (g)	% of Food consumption in relation to body weight	No. of hatchlings	Mean Food Consumption /day/ individual	Mean body weight (g)	% of Food consumption in relation to body weight		
1st	35	0.056	22.1	0.25	20	0.061	22.5	0.27	16	0.068	23.4	0.29	22.67± 0.67	0.27
2nd	34	0.354	26.8	1.32	20	0.39	27.5	1.41	16	0.31	28.5	1.1	27.60± 0.85	1.28
3rd	33	1.24	31.8	3.91	20	1.25	32.8	3.82	15	1.19	33.9	3.5	32.83± 1.05	3.74
4th	33	2.19	37.5	5.83	20	2.33	38.2	6.10	15	1.94	39.5	4.92	38.40± 1.01	5.62
5th	33	3.39	43.9	7.73	20	3.38	45.1	7.50	15	2.89	47.3	6.11	45.43± 1.72	7.11
6th	33	4.00	50.9	7.83	20	4.08	52.2	7.82	15	4.16	55.3	7.52	52.80± 2.26	7.72
7th	32	4.62	58.1	7.95	20	4.72	59.7	7.91	14	4.99	63.7	7.83	60.50± 2.88	7.90
8th	32	4.31	65.7	6.56	19	4.28	67.7	6.32	14	5.86	72.4	8.10	68.60± 3.44	6.99
9th	32	4.87	72.2	6.75	19	4.79	74.8	6.41	14	5.74	80.9	7.1	75.97± 4.47	6.75
10th	32	5.18	82.0	6.32	19	5.31	86.7	6.12	14	5.87	93.2	6.3	87.30± 5.62	6.25

Appendix 43. . Monthly food consumption by the hatchlings

Month	Year									Mean Taken food (g) /month/ individual	Mean Taken food (g) /day/ individual
	2012			2103			2014				
	No. of Hatchling	Taken food (g)/month	Taken food (g) /month/ individual	No. of Hatchling	Taken food (g)/month	Taken food (g) /month/ individual	No. of Hatchling	Taken food (g)/month	Taken food (g) /month/ individual		
1st	34	1856.4	54.6	20	1200	60.0	15	909	60.6	58.4	1.95
2nd	33	3960	120.0	19	2348	123.6	13	1778.4	136.8	126.8	4.23
3rd	32	6048	189.0	18	3742	208.2	13	3061.5	235.5	210.9	7.03
4th	31	10602	342.0	18	5616	312.0				327.0	10.9
5th	31	15372	495.9	18	9126	507.0				501.5	16.7
6th	30	22050	735.0	18	13608	756.0				745.5	24.9
7th	30	32670	1089.0	17	14229	837.0				963.0	32.1
8th	28	40152	1434.0	16	14064	879.0				1156.5	38.6
9th	28	38892	1389.0	16	15408	963.0				1176.0	39.2

10th	27	42201	1563.0	16	17376	1086.0				1324.5	44.2
11th	27	42687	1581.0	16	20400	1275.0				1428.0	47.6
12th	27	63261	2343.0	16	21408	1338.0				1840.5	61.35
13th	26	63024	2424.0	15	23265	1551.0				1987.5	66.3
14th	26	55926	2151.0	15	26235	1749.0				1950.0	65.0
15th	26	51558	1983.0	15	24795	1653.0				1818.0	60.6
16th	25	63450	2538.0							2538.0	84.6
17th	25	80850	3234.0							3234.0	107.8
18th	24	63504	2646.0							2646.0	88.2
19th	24	81216	3384.0							3384.0	112.8
20th	24	67176	2799.0							2799.0	93.3
21th	24	78912	3288.0							3288.0	109.6
22th	24	81792	3408.0							3408.0	113.6
23th	24	82656	3444.0							3444.0	114.8
24th	24	71424	2976.0							2976.0	99.2
25th	24	89136	3714.0							3714.0	123.8
26th	24	97056	4044.0							4044.0	134.8
27th	24	92880	3870.0							3870.0	129.0

Appendix 44. Monthly food consumption by the hatchlings Bengal monitor in relation to body weight

Month	2012				2013				2014				Mean body weight (g)	Mean % of Food consumption in relation to body weight
	No. of hatchlings	Mean Food consumption /day/ individual	Mean body weight (g)	consumption in relation to body weight	No. of hatchlings	Mean Food Consumption /day/ individual	Mean body weight (g)	% of Food consumption in relation to body weight	No. of hatchlings	Mean Food Consumption /day/ individual	Mean body weight (g)	% of Food consumption in relation to body weight		
1st	34	1.82	38.8	4.7	20	2.0	39.3	5.1	15	2.02	41.3	4.9	39.8	4.9
2nd	33	4.0	67.7	5.9	19	4.12	69.8	5.9	13	4.56	75.0	6.1	70.8	6.0
3rd	32	6.3	103.0	6.12	18	6.93	109.7	6.32	13	7.85	118.6	6.62	110.4	6.4
4th	31	11.4	166.2	6.83	18	10.4	160.8	6.46					163.5	6.6
5th	31	16.53	239.2	6.91	18	16.9	233.3	7.23					236.3	7.1
6th	30	24.5	330.5	7.41	18	25.2	302.5	8.33					316.5	7.9
7th	30	36.3	424.3	8.56	17	27.9	391.9	7.12					408.1	7.8
8th	28	47.8	529.5	9.02	16	29.3	485.9	6.02					507.7	7.5
9th	28	46.3	633.4	7.31	16	32.1	588.4	5.46					610.9	6.4
10th	27	52.1	731.1	7.12	16	36.2	694.3	5.22					712.7	6.2
11th	27	52.7	834.8	6.31	16	42.5	801.2	5.31					818.0	5.8
12th	27	78.1	938.4	8.32	16	44.6	909.1	4.91					923.8	6.6

13th	26	80.8	1062	7.61	15	51.7	1007.6	5.13					1034.8	6.4
14th	26	71.7	1171.9	6.12	15	58.3	1114.8	5.23					1143.4	5.7
15th	26	66.1	1288.9	5.14	15	55.1	1219.7	4.52					1254.3	4.8
16th	25	84.6	1406.9	6.01									1406.9	6.0
17th	25	107.8	1516.3	7.11									1516.3	7.1
18th	24	88.2	1651.9	5.34									1651.9	5.3
19th	24	112.8	1759.8	6.41									1759.8	6.4
20th	24	93.3	1862.4	5.01									1862.4	5.0
21th	24	109.6	1972.3	5.56									1972.3	5.6
22th	24	113.6	2084.3	5.45									2084.3	5.5
23th	24	114.8	2191.9	5.51									2191.9	5.5
24th	24	99.2	1302.5	4.31									1302.5	4.3
25th	24	123.8	2413.6	5.13									2413.6	5.1
26th	24	134.8	2524.7	5.30									2524.7	5.3
27th	24	129.0	2632.7	4.9									2632.7	4.9

Appendix 45. Scavenging behavior of Bengal monitors in Jahangirnagar University Campus, Pathalia Union Parishad, Savar, Dhaka

Study Period	No. of individual						Timing for scavenging (AM)				
	Drains			Garbage Bins			7:00-9:00	9:00-11:00	11:00-1:00	1:00-3:00	3:00-5:00
	Total no.	Scavenging no	Percentage of scavenging no	Total no.	Scavenging No.	Percentage of scavenging no					
May 2011	15	9	60	21	14	66.7	6	11	3	2	1
June	14	7	50	23	15	65.2	4	13	4	1	-
July	14	8	57.1	22	14	63.6	5	10	4	2	1
August	12	6	50	21	14	66.7	4	8	5	1	2
September	17	9	53	20	11	55	6	9	3	2	-
October	15	11	73.3	24	15	62.5	9	11	5	1	-
November	10	6	60	16	9	56.3	4	8	2	-	1
December	7	4	57.1	15	8	53.3	3	6	2	1	-
January	9	6	66.7	14	11	78.6	5	7	2	2	1
February	10	5	50	16	12	75	4	6	3	3	1
March	14	9	64.3	21	13	61.9	5	11	4	1	2
April	13	8	61.5	22	11	50	4	8	3	2	2
May	15	9	60	19	12	63.2	6	7	6	1	1
June	13	8	61.5	23	14	60.9	4	9	5	3	1
July	13	6	46.2	22	11	50	5	6	3	2	1
August	14	11	78.6	21	13	61.9	7	11	4	1	1
September	14	8	57.1	23	14	60.9	5	8	5	2	2
October	13	7	53.8	20	14	70	6	8	4	1	2
November	6	4	66.7	15	8	53.3	3	5	2	1	1
December	6	3	50	13	9	69.2	2	5	2	2	1
January	5	3	60	13	8	61.5	3	4	3	-	1
February	10	7	70	15	10	66.7	5	8	2	2	-
March	15	9	60	22	17	77.3	7	11	5	2	1
April	13	7	53.8	21	14	66.7	6	9	3	1	2
May	14	8	57.1	19	13	68.4	5	7	4	3	2
June	16	11	68.8	21	15	71.4	6	12	4	2	2
July	14	9	64.3	20	12	60	7	9	3	1	1
August	13	8	61.5	21	13	61.9	6	9	3	2	1
September	16	12	75	20	14	70	7	12	4	2	1

October	14	6	42.9	21	13	61.9	5	8	3	1	2
November	9	5	55.6	14	9	64.3	4	5	3	2	-
December	9	5	55.6	11	8	72.7	3	4	3	1	2
January	6	4	66.7	14	9	64.2	3	5	2	2	1
February	7	3	42.9	15	7	46.7	3	4	1	1	1
March	12	8	66.7	21	13	61.9	5	8	3	1	1
April	13	7	53.8	21	11	52.3	6	9	4	-	2
May	12	8	66.7	19	12	63.2	4	7	5	2	2
June	12	6	50	22	14	63.6	6	10	2	1	1

Appendix 46. Scavenging behavior of Bengal monitors in Jamuna Resort, Durgapur Union Parishad, Kalihati, Tangail

Study Period	No. of individual						Timing for scavenging (AM)				
	Drains			Garbage Bins			7:00-9:00	9:00-11:00	11:00-1:00	1:00-3:00	3:00-5:00
	Total no.	Scavenging no	Percentage of scavenging no	Total no.	Scavenging No.	Percentage of scavenging no					
May 2011	7	3	42.9	14	8	57.1	3	5	2	1	-
June	8	4	50	14	9	64.3	3	6	2	1	1
July	7	3	42.9	16	9	56.3	2	4	2	2	2
August	10	6	60	16	11	68.8	4	7	3	2	1
September	11	5	45.5	15	10	66.7	3	6	2	3	1
October	9	4	44.4	14	8	57.1	3	4	3	1	1
November	4	3	75	7	5	71.4	2	3	2	-	1
December	5	3	60	8	6	75	2	3	1	2	1
January	4	2	50	8	5	62.5	2	3	1	-	1
February	6	3	50	7	5	71.4	2	4	2	-	-
March	8	5	62.5	13	9	69.2	3	5	2	2	2
April	9	4	44.4	16	12	75	3	6	3	2	2
May	10	6	60	14	9	64.3	3	5	4	2	1
June	9	4	44.4	16	10	62.5	2	5	3	2	2
July	10	7	70	15	11	73.3	4	7	4	2	1
August	11	6	54.5	13	8	61.5	5	4	3	1	1
September	10	5	50	13	7	53.8	4	3	2	2	1
October	8	5	62.5	15	11	73.3	5	6	3	1	1
November	5	3	60	8	5	62.5	3	4	1	-	-
December	4	3	75	7	4	57.1	2	2	2	1	-
January	4	2	50	8	6	75	3	3	1	1	-
February	5	4	80	7	5	71.4	4	2	2	-	-
March	8	5	62.5	12	7	58.3	3	5	2	1	1
April	7	4	57.1	15	10	66.7	4	4	3	1	2
May	8	6	75	14	10	71.4	4	5	3	2	2
June	7	4	57.1	15	8	53.3	3	3	2	2	2
July	7	5	71.4	12	7	58.3	4	3	1	2	2
August	8	6	75	15	9	60	3	6	3	2	1
September	10	6	60	17	12	70.6	4	5	4	3	2
October	8	4	50	14	10	71.4	3	4	2	3	2
November	5	3	60	10	6	60	2	3	3	1	-
December	6	3	50	8	5	62.5	1	4	2	2	-
January	4	1	25	7	3	42.9	-	2	1	1	-
February	5	2	40	8	4	50	1	3	1	1	-
March	9	6	66.7	11	6	54.5	2	4	2	2	2
April	10	5	50	15	10	66.7	3	5	3	3	1
May	10	6	60	17	13	76.4	5	7	3	2	2
June	11	6	54.5	15	9	60	4	6	3	1	1

Appendix 47. Scavenging behavior of Bengal monitors in Hazratpur and Rasulpur village, Hazratpur Union Parishad, Mithapukur, Rangpur

Study Period	No. of individual						Timing for scavenging (AM)				
	Drains			Garbage Bins			7:00-9:00	9:00-11:00	11:00-1:00	1:00-3:00	3:00-5:00
	Total no.	Scavenging no	Percentage of scavenging no	Total no.	Scavenging No.	Percentage of scavenging no					
May 2011	2	1	50	4	3	75	1	2	1	-	-
June	2	1	50	3	2	66.7	-	1	1	1	-
July	2	0	0	4	2	50	1	1	1	-	-
August	3	1	33.3	4	3	75	1	2	1	-	-

September	3	2	66.7	4	3	75	1	2	1	1	-
October	2	1	50	4	2	50	-	1	1	1	-
November	1	0	0	2	1	50	-	-	1	-	-
December	1	0	0	2	1	50	-	1	-	-	-
January2012	2	1	50	1	0	0	-	-	1	-	-
February	0	0	0	2	1	50	-	1	-	-	-
March	2	0	0	3	2	66.7	-	1	1	-	-
April	3	2	66.7	5	3	60	1	2	1	1	-
May	2	1	50	5	2	40	-	1	1	-	1
June	3	2	66.7	6	3	50	1	2	1	-	1
July	1	0	0	3	2	66.7	-	1	-	1	-
August	2	2	100	4	1	25	1	1	-	1	-
September	2	1	50	3	1	33.3	-	1	1	1	-
October	3	2	66.7	3	2	66.7	1	2	-	-	1
November	1	1	100	2	1	50	-	1	-	1	-
December	0	0	0	1	0	0	-	-	-	-	-
January	1	1	100	2	1	50	1	1	-	-	-
February	1	0	0	2	1	50	-	-	1	-	-
March	3	2	66.7	4	3	75	1	2	1	-	1
April	2	2	100	4	1	25	1	1	-	1	-
May	2	1	50	5	2	40	-	1	1	1	-
June	3	2	66.7	5	3	60	1	2	1	-	1
July	3	1	33.3	5	2	40	-	1	1	1	1
August	2	2	100	6	4	66.7	1	2	1	1	-
September	2	1	50	4	1	25	-	1	1	-	-
October	3	2	66.7	3	1	33.3	1	-	1	1	-
November	1	0	0	2	1	50	-	1	-	-	-
December	0	0	0	2	0	0	-	-	-	-	-
January,	1	1	100	2	1	50	1	1	-	-	-
February	0	0	0	2	1	50	-	-	1	-	-
March	3	2	66.7	5	2	40	1	2	-	1	-
April	2	2	100	5	2	40	1	1	1	1	-
May	3	1	33.3	4	1	25	1	-	1	-	-
June	2	1	50	5	3	60	-	2	1	-	1

Appendix 48. Comparison of length and weight of Tilapia (*Oreochromis niloticus*) between two pools in the Animal Garden, Dhaka University (AG, DU), one of which was used by the Bengal monitors and another one was not used.

Study Period	Average length(cm) (pool used by Bengal monitors)	Average weight (g) (pool used by Bengal monitors)	Average length(cm) (pool not used by Bengal monitors)	Average weight (g) (pool not used by Bengal monitors)
May, 2011	5.6	4.2	5.6	4.3
June	9.9	15.3	8.8	13.2
July	13.7	34.7	12.9	29.5
August	15.8	55.6	14.7	43.7
September	16.5	64.8	15.3	55.9
October	17.1	72.3	16.1	64.6
November	17.8	76.4	16.8	68.3
December	18.3	79.6	17.4	70.6
May, 2012	5.7	4.6	5.7	4.9
June	10.3	16.7	9.4	14.2
July	15.1	53.3	14.3	43.2
August	17.6	68.2	16.4	59.3
September	18.3	77.2	17.6	66.4
October	18.9	80.3	18.2	71.6
November	19.6	83.1	18.9	77.3
December	20.3	85.5	19.6	79.2
May, 2013	5.5	3.9	5.5	3.8
June	10.3	14.5	9.7	13.9
July	15.7	58.6	14.6	49.7
August	16.4	65.3	15.5	56.8
September	17.6	71.6	16.4	68.2
October	18.4	78.9	17.3	72.1
November	19.9	82.3	18.1	75.3
December	20.3	86.4	19.3	78.6

Appendix 49. Timing of consumption of rats by Bengal monitors

Study Period	Age of Bengal monitors (Month)	Bengal monitor-I						Bengal monitor II						No. of total rates
		No of rats	Time taken(min)					No of rats	Time taken(min)					
			1st	2nd	3rd	4th	5th	6th		1st	2nd	3rd	4th	5th	
March,	12	3	7.1	8.2	7.3				4	7.5	7.1	6.5	7.5		7
April	13	4	8.3	7.5	6.5	6.3			4	6.8	8.1	7.1	5.4		8
May	14	4	8.5	6.4	6.5	7.5			4	7.3	5.5	8.2	9.1		8
June	15	4	5.5	5.5	6.3	6.1			3	6.8	6.1	7.1			7
July	16	6	4.3	6.4	7.5	7.5	7.2	8.2	4	8.4	6.3	6.2	4.5		10
August	17	3	3.4	7.3	8.5				4	5.3	4.1	6.5	7.2		7
September	18	3	5.5	4.1	4.5				5	5.4	6.3	5.5	4.5	6.1	8
October	19	6	5.1	5.3	4.3	4.5	4.2	6.5	5	5.3	5.5	5.4	6.5	5.4	11
November	20	3	2.5	4.2	5.2				2	5.5	6.2				5
December	21	2	2.2	5.3	5.4				2	4.5	4.2				4
January,	22	2	3.3	5.2	6.3				2	3.5	4.3				4
February	23	3	3.4	4.3	5.2				2	3.3	4.1				5
March	24	4	3.5	5.4	6.1	3.1			3	4.2	3.5	3.5			7
April	25	5	2.2	4.3	4.2	2.5	4.5		5	4.1	3.3	3.1	2.5	5.5	10
May	26	4	2.3	5.1	4.1				5	2.5	2.5	3.0	3.2	3.5	9
June	27	4	3.0	3.2	5.3				4	3.1	2.4	2.5	3.1		8
Mean		3.8±1.2							3.6±1.2						7.4±2.1

Appendix 50. Amount of food from beetles' larvae with some earthworms per meter square from cow dung deposition at JUC during hatching period of Bengal lizards.

Study Period	Average amount of food /week (g) from 1 m^2 of cow dung	Average amount of food /day (g) from 1 m^2 of cow dung	Average food required /hatchling/ day (g)	No. of 1 meter square area needed/hatchling/day for obtaining required food (g)
April	16.9	2.4	1.95	0.81
May	19.4	2.8	4.23	1.5
June	21.2	3.0	7.03	2.34
July	20.9	3.0	10.9	3.63
August	19.7	2.8	16.7	6.0
September	21.5	3.1	24.9	8.0
October	17.0	2.4	32.1	13.4

Appendix 51. Meteorological data (Temperature, Humidity and Rainfall) of Dhaka Division.

Study Period	Temperature (^{0}C)		Humidity (%)		Rainfall (mm)
	Maximum	Minimum	Maximum	Minimum	
May 2011	38.4	20.6	95	28	239
June	36.1	21.3	97	33	309
July	35.5	25.2	96	36	441
August	37.1	25.4	97	42	246
September	34.7	24.5	95	40	112
October	35.1	18.4	97	37	364
November	30.6	14.6	99	44	27
December	29.5	11.3	98	45	7
January 2012	29.8	24.3	98	40	35
February	28.3	26.4	95	42	57
March	33.6	33.9	96	43	54
April	34.7	32.1	88	37	226
May	38.5	22.3	95	48	264
June	36.5	22.4	96	50	387
July	35.6	29.5	100	46	441

August	37.2	25.3	97	37	451
September	34.8	26.3	97	28	231
October	36.1	21.2	95	51	301
November	30.8	14.2	99	31	36
December	29.7	12.1	98	33	5
January 2013	29.8	24.3	89	27	26
February	28.7	27.2	87	28	51
March	33.8	33.2	98	19	63
April	34.9	32.4	97	24	216
May	38.4	22.4	95	28	288
June	36.7	21.5	96	34	362
July	35.8	28.4	97	48	462
August	37.4	25.1	97	54	281
September	34.7	26.5	96	57	153
October	36.4	24.1	98	46	361
November	30.9	15.2	97	31	32
December	29.6	12.1	98	24	6
January 2014	29.8	24.1	89	42	31
February	28.9	26.4	94	39	51
March	33.9	33.4	96	29	62
April	35.1	32.1	98	28	210
May	38.5	24.1	97	27	251
June	36.5	21.4	98	33	352

Appendix 52. Meteorological data (Temperature, Humidity and Rainfall) of Rangpur Division.

Study Period	**Temperature (^{0}C)**		**Humidity (%)**		**Rainfall (mm)**
	Maximum	Minimum	Maximum	Minimum	
May 2011	38.3	22.3	99	56	210
June	37.2	24.4	98	54	298
July	36.4	23.6	97	52	315
August	38.2	24.2	96	55	214
September	33.6	25.8	97	41	159
October	34.6	21.4	98	50	210
November	32.7	18.6	90	43	12
December	30.1	14.5	89	22	5
January 2012	25.2	11.8	87	19	30
February	28.5	15.3	85	25	42
March	35.3	19.2	92	49	58
April	35.2	22.8	96	48	192
May	37.5	23.1	98	47	207
June	38.4	24.7	99	48	303
July	36.5	22.5	97	51	339
August	36.2	23.1	98	53	194
September	39.6	26.9	95	48	210
October	36.4	21.1	97	47	245
November	36.2	18.5	89	25	15
December	25.5	13.4	87	20	7
January 2013	28.4	10.7	82	21	36
February	33.8	14.6	87	19	41
March	36.7	18.1	98	52	74
April	37.3	20.5	96	53	201
May	38.3	21.4	97	51	210
June	36.1	23.2	97	48	310
July	37.1	20.5	98	49	351
August	38.4	21.4	97	41	181
September	35.2	24.6	99	45	216
October	37.3	20.1	99	51	252
November	24.2	17.0	90	31	11
December	29.4	15.4	86	23	5
January 2014	32.1	11.0	87	20	28
February	33.5	13.8	89	19	36
March	37.0	16.9	93	18	78
April	35.3	19.5	98	45	212
May	35.5	22.3	99	52	251
June	37.1	24.4	98	53	303

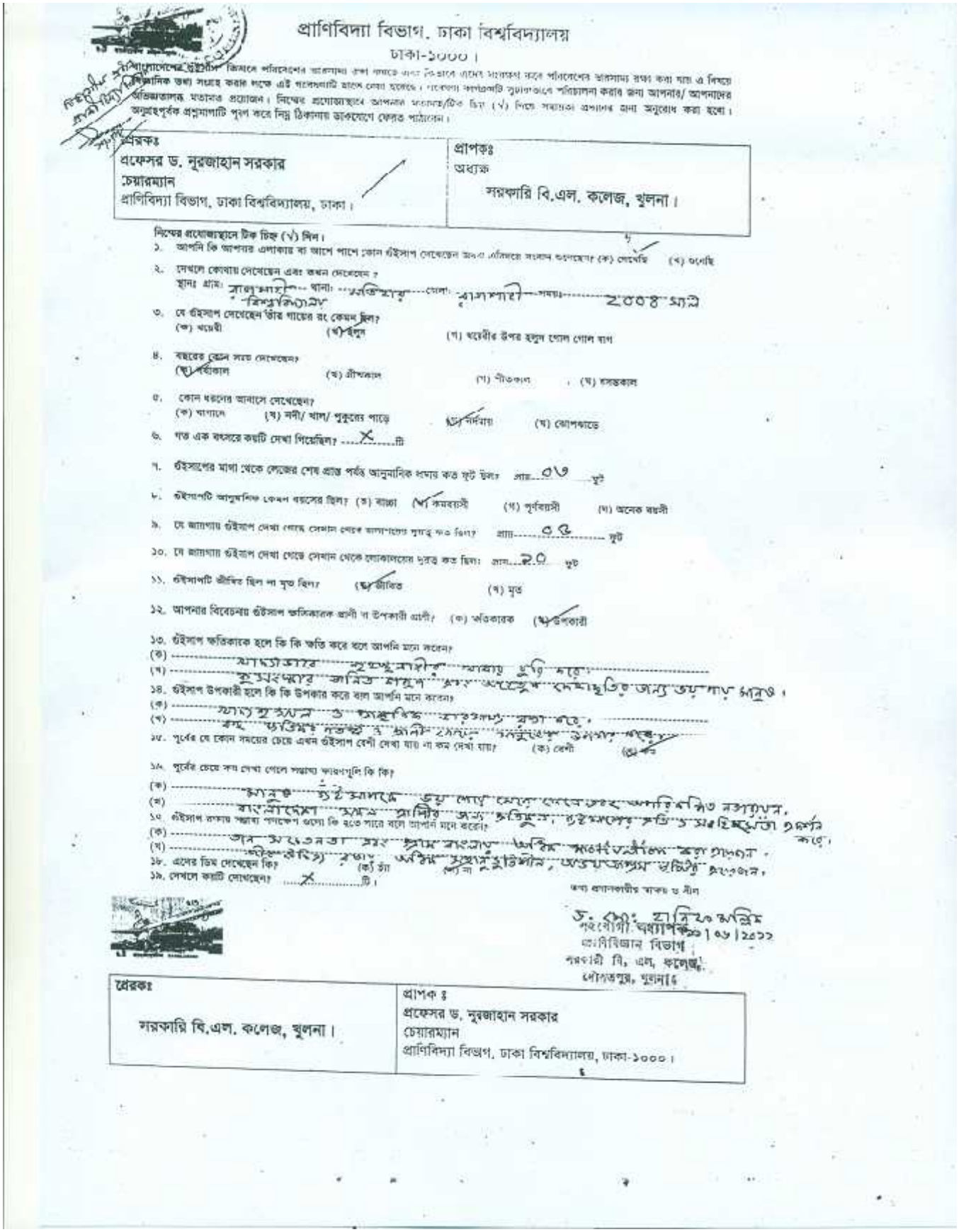
Appendix 53. Number of holes made by rats on the banks of two ponds during study period

Month	No. of Holes of pond-1	No. of Holes of pond-2	Month	No. of Holes of pond-1	No. of Holes of pond-2
May,11	12	9	December	38	41
June	12	13	January, 13	42	43
July	14	15	February	43	45
August	15	17	March	46	45
September	15	19	April	49	45
October	18	21	May	49	45
November	20	23	June	47	43
December	20	26	July	44	40
January, 12	21	27	August	40	35
February	21	30	September	35	32
March	23	30	October	29	30
April	24	32	November	23	27
May	25	32	December	19	24
June	28	33	January, 14	16	21
July	28	34	February	15	18
August	29	34	March	11	16
September	31	34	April	9	12
October	33	36	May	7	10
November	36	39	June	5	7

Appendix 57. Result of third questionnaire

Study Area	Total respondents		Positive impression to Bengal monitors				Negative impression to Bengal monitors				No comment			
	At the beginning of the work	At the end of the work	At the beginning of the work		At the end of the work		At the beginning of the work		At the end of the work		At the beginning of the work		At the end of the work	
			No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
HU, MR	21	23	5	23.8	20	87.0	16	76.2	2	8.7	--	--	1	4.3
JR, T	19	21	7	36.8	19	90.4	10	52.6	1	4.8	2	10.6	1	4.8
JUC	17	19	9	52.9	16	84.2	7	41.2	--	--	1	5.9	3	15.8
DZ & NBG	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SN	23	21	6	26.1	19	90.5	15	65.2	2	9.5	2	8.7	--	--
GPP, N	21	17	8	38.2	15	88.2	11	52.3	1	5.9	2	9.5	1	5.9
Total	101	101	35	34.7	89	88.2	59	58.4	06	5.9	07	6.9	06	5.9

Appendix 58. Questionnaire 1. Common peoples' opinion on conservation of Bengal monitor was collected through this questionnaire



প্রাণিবিদ্যা বিভাগ, ঢাকা বিশ্ববিদ্যালয়

ঢাকা-১০০০।

বাংলাদেশের বন্যপ্রাণীর জিনগত পরিবেশের অবস্থানের তথ্য সংগ্রহ করে কিভাবে এদের সংরক্ষণ করে পরিবেশের ভারসাম্য রক্ষা করা যায় এ বিষয়ে বৈজ্ঞানিক তথ্য সংগ্রহ করার লক্ষে এই প্রশ্নমালাটি তৈরি করা হয়েছে। গবেষণা কার্যক্রমটি সুচারুভাবে পরিচালনা করার জন্য আপনার/ আপনাদের অভিজ্ঞতালব্ধ মতামত প্রয়োজন। নিম্নের প্রশ্নোত্তরগুলোর আপনার মতামত/টিক চিহ্ন (√) দিয়ে সহায়তা প্রদানের জন্য অনুরোধ করা হলো। অনুগ্রহপূর্বক প্রশ্নমালাটি পূরণ করে নিম্ন ঠিকানায় ডাকযোগে ফেরত পাঠাবেন।

প্রেরকঃ	প্রাপকঃ
প্রফেসর ড. নূরজাহান সরকার চেয়ারম্যান প্রাণিবিদ্যা বিভাগ, ঢাকা বিশ্ববিদ্যালয়, ঢাকা।	অধ্যক্ষ সরকারি বি.এল. কলেজ, খুলনা।

নিম্নের প্রযোজ্যস্থানে টিক চিহ্ন (√) দিন।

১. আপনি কি আপনার এলাকায় বা আশে পাশে কোন গুইসাপ দেখেছেন অথবা এদিকের সংবাদ শুনেছেন? (ক) দেখেছি (খ) শুনেছি

২. দেখলে কোথায় দেখেছেন এবং কখন দেখেছেন?
স্থান: গ্রাম: [illegible] থানা: [illegible] জেলা: বাগেরহাট সময়: ২০০৪ সাল

৩. যে গুইসাপ দেখেছেন তাঁর গায়ের রং কেমন ছিল?
(ক) ধূসর (খ) হলুদ (গ) ধূসরের উপর হলুদ গোল গোল দাগ

৪. বছরের কোন সময় দেখেছেন?
(ক) বর্ষাকাল (খ) গ্রীষ্মকাল (গ) শীতকাল (ঘ) বসন্তকাল

৫. কোন ধরণের আবাসে দেখেছেন?
(ক) আগাছে (খ) নদী/ খাল/ পুকুরের পাড়ে (গ) নির্বাচিত (ঘ) ঝোপঝাড়ে

৬. গত এক বছরে কয়টি দেখা গিয়েছিল? ....X.....টি

৭. গুইসাপের মাথা থেকে লেজের শেষ প্রান্ত পর্যন্ত আনুমানিক লম্বায় কত ফুট ছিল? প্রায় ০৩ ফুট

৮. গুইসাপটি আনুমানিক কেমন বয়সের ছিল? (ক) বাচ্চা (খ) কমবয়সী (গ) পূর্ণবয়সী (ঘ) অনেক বয়সী

৯. যে জায়গায় গুইসাপ দেখা গেছে সেখান থেকে আপনাদের দূরত্ব কত ছিল? প্রায় ০৫ ফুট

১০. যে জায়গায় গুইসাপ দেখা গেছে সেখান থেকে হেঁটেকালয়ের দূরত্ব কত ছিল: প্রায় ২০ ফুট

১১. গুইসাপটি জীবিত ছিল না মৃত ছিল? (ক) জীবিত (খ) মৃত

১২. আপনার বিবেচনায় গুইসাপ ক্ষতিকারক প্রাণী না উপকারী প্রাণী? (ক) ক্ষতিকারক (খ) উপকারী

১৩. গুইসাপ ক্ষতিকারক হলে কি কি ক্ষতি করে বলে আপনি মনে করেন?
(ক) ----------
(খ) ----------

১৪. গুইসাপ উপকারী হলে কি কি উপকার করে বলে আপনি মনে করেন?
(ক) ----------
(খ) ----------

১৫. পূর্বের যে কোন সময়ের চেয়ে এখন গুইসাপ বেশী দেখা যায় না কম দেখা যায়? (ক) বেশী (খ) কম

১৬. পূর্বের চেয়ে কম দেখা গেলে সম্ভাব্য কারণগুলি কি কি?
(ক) ----------
(খ) ----------

১৭. গুইসাপ রক্ষায় সম্ভাব্য পদক্ষেপ গুলো কি হতে পারে বলে আপনি মনে করেন?
(ক) ----------
(খ) ----------

১৮. এদের ডিম দেখেছেন কি? (ক) হ্যাঁ (খ) না

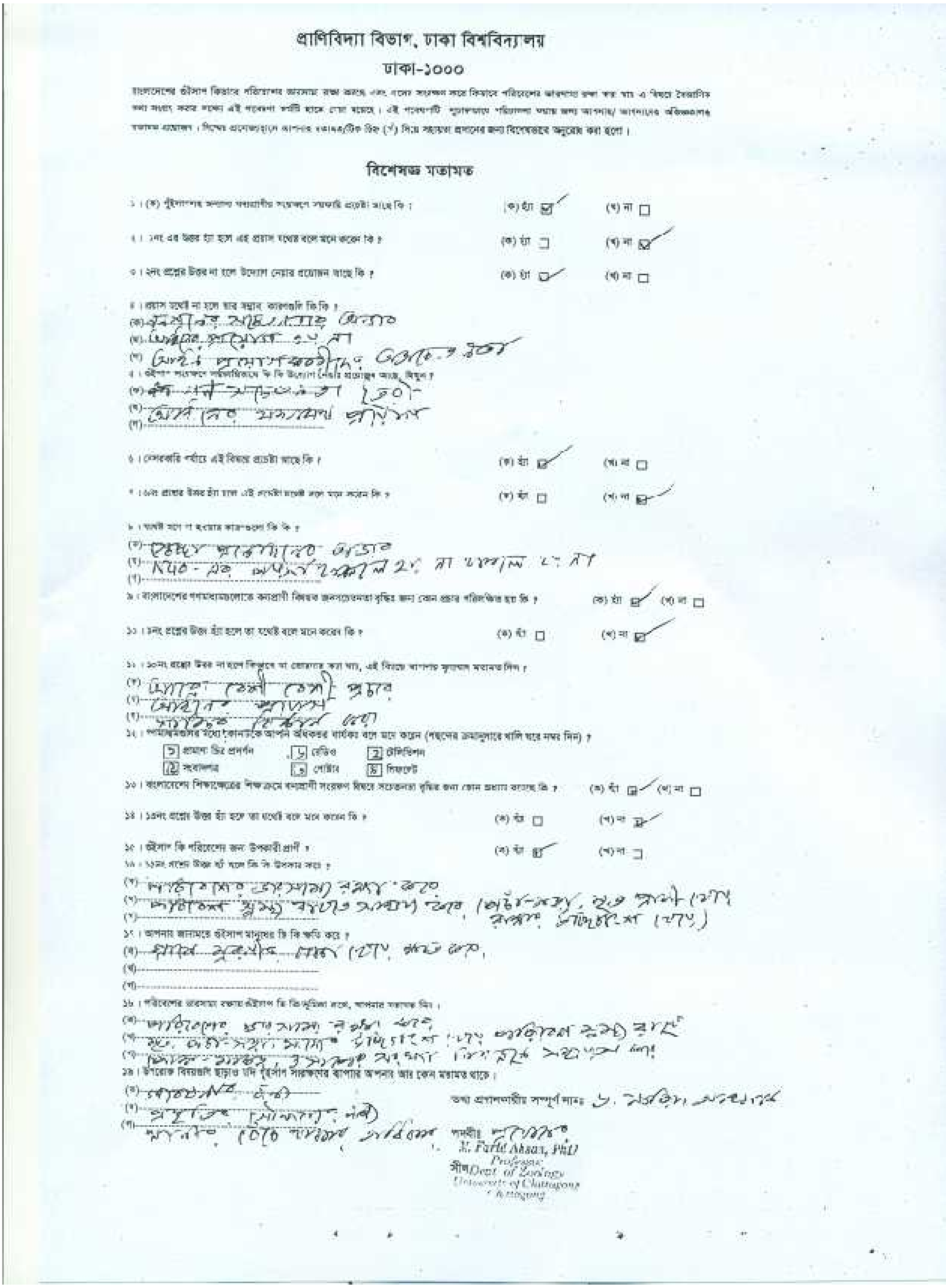
১৯. দেখলে কয়টি দেখেছেন? ....X.....টি।

কথা প্রদানকারীর স্বাক্ষর ও সীল

ড. মো: হানিফ মল্লিক
সহযোগী অধ্যাপক | ০৬ | ২০১১
প্রাণিবিজ্ঞান বিভাগ
সরকারী বি, এল, কলেজ,
দৌলতপুর, খুলনা।

প্রেরকঃ	প্রাপক ঃ
সরকারি বি.এল. কলেজ, খুলনা।	প্রফেসর ড. নূরজাহান সরকার চেয়ারম্যান প্রাণিবিদ্যা বিভাগ, ঢাকা বিশ্ববিদ্যালয়, ঢাকা-১০০০।

Appendix 59. Questionnaire 2. Experts' opinion on conservation of Bengal monitors was collected through this questionnaire



Appendix 60. Questionnaire-3. Farmer's opinion on conservation of Bengal monitors was collected through this questionnaire. (a, c, e and g) at beginning of the work and (b, d, f and h) at the end of the work


গুইসাপ সম্পর্কিত প্রশ্নমালা

বক্সের ভিতরে টিক (√) অথবা ক্রস (x) চিহ্ন দিয়ে গবেষনা কাজে সহায়তা করার জন্য অনুরোধ করা হলো।

১। গুইসাপ কি ফসলের ক্ষতি করে ?
☑ হ্যাঁ ☐ না ☐ মন্তব্য নেই

২। গুইসাপ কি পঁচা প্রাণীদেহ খেয়ে পরিবেশ সুস্থ রাখে ?
☐ হ্যাঁ ☐ না ☑ মন্তব্য নেই

৩। গুইসাপ কি ইঁদুর খায় ?
☐ হ্যাঁ ☐ না ☑ মন্তব্য নেই

৪। গুইসাপ কি উপকারী ?
☐ হ্যাঁ ☐ না ☑ মন্তব্য নেই

৫। গুইসাপ কে কি রক্ষা করা উচিত ?
☐ হ্যাঁ ☐ না ☑ মন্তব্য নেই

নাম: [illegible]
পেশা: কৃষক
ঠিকানা: [illegible]

(a)


গুইসাপ সম্পর্কিত প্রশ্নমালা

বক্সের ভিতরে টিক (√) অথবা ক্রস (x) চিহ্ন দিয়ে গবেষনা কাজে সহায়তা করার জন্য অনুরোধ করা হলো।

১। গুইসাপ কি ফসলের ক্ষতি করে ?
☐ হ্যাঁ ☐ না ☑ মন্তব্য নেই

২। গুইসাপ কি পঁচা প্রাণীদেহ খেয়ে পরিবেশ সুস্থ রাখে ?
☑ হ্যাঁ ☐ না ☐ মন্তব্য নেই

৩। গুইসাপ কি ইঁদুর খায় ?
☐ হ্যাঁ ☑ না ☐ মন্তব্য নেই

৪। গুইসাপ কি উপকারী ?
☑ হ্যাঁ ☐ না ☐ মন্তব্য নেই

৫। গুইসাপ কে কি রক্ষা করা উচিত ?
☐ হ্যাঁ ☑ না ☐ মন্তব্য নেই

নাম: [illegible]
পেশা: কৃষক
ঠিকানা: [illegible]

(b)


গুইসাপ সম্পর্কিত প্রশ্নমালা

বক্সের ভিতরে টিক (√) অথবা ক্রস (x) চিহ্ন দিয়ে গবেষনা কাজে সহায়তা করার জন্য অনুরোধ করা হলো।

১। গুইসাপ কি ফসলের ক্ষতি করে ?
☑ হ্যাঁ ☐ না ☐ মন্তব্য নেই

২। গুইসাপ কি পঁচা প্রাণীদেহ খেয়ে পরিবেশ সুস্থ রাখে ?
☐ হ্যাঁ ☐ না ☑ মন্তব্য নেই

৩। গুইসাপ কি ইঁদুর খায় ?
☐ হ্যাঁ ☐ না ☑ মন্তব্য নেই

৪। গুইসাপ কি উপকারী ?
☐ হ্যাঁ ☐ না ☑ মন্তব্য নেই

৫। গুইসাপ কে কি রক্ষা করা উচিত ?
☐ হ্যাঁ ☐ না ☑ মন্তব্য নেই

নাম: [illegible]
পেশা: কৃষক
ঠিকানা: [illegible]

(c)


গুইসাপ সম্পর্কিত প্রশ্নমালা

বক্সের ভিতরে টিক (√) অথবা ক্রস (x) চিহ্ন দিয়ে গবেষনা কাজে সহায়তা করার জন্য অনুরোধ করা হলো।

১। গুইসাপ কি ফসলের ক্ষতি করে ?
☐ হ্যাঁ ☐ না ☑ মন্তব্য নেই

২। গুইসাপ কি পঁচা প্রাণীদেহ খেয়ে পরিবেশ সুস্থ রাখে ?
☑ হ্যাঁ ☐ না ☐ মন্তব্য নেই

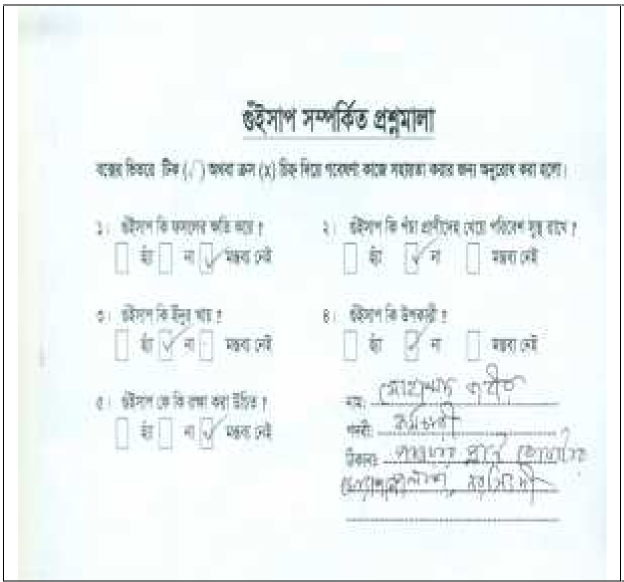
৩। গুইসাপ কি ইঁদুর খায় ?
☐ হ্যাঁ ☑ না ☐ মন্তব্য নেই

৪। গুইসাপ কি উপকারী ?
☑ হ্যাঁ ☐ না ☐ মন্তব্য নেই

৫। গুইসাপ কে কি রক্ষা করা উচিত ?
☐ হ্যাঁ ☑ না ☐ মন্তব্য নেই

নাম: [illegible]
পেশা: কৃষক
ঠিকানা: [illegible]

(d)


গুঁইসাপ সম্পর্কিত প্রশ্নমালা

বক্সের ভিতরে টিক (√) অথবা ক্রস (x) চিহ্ন দিয়ে গবেষণা কাজে সহায়তা করার জন্য অনুরোধ করা হলো।

১। গুঁইসাপ কি ফসলের ক্ষতি করে? হাঁ / না / মন্তব্য নেই

২। গুঁইসাপ কি পঁচা প্রাণীদের খেয়ে পরিবেশ সুস্থ রাখে? হাঁ / না / মন্তব্য নেই

৩। গুঁইসাপ কি ইঁদুর খায়? হাঁ / না / মন্তব্য নেই

৪। গুঁইসাপ কি উপকারী? হাঁ / না / মন্তব্য নেই

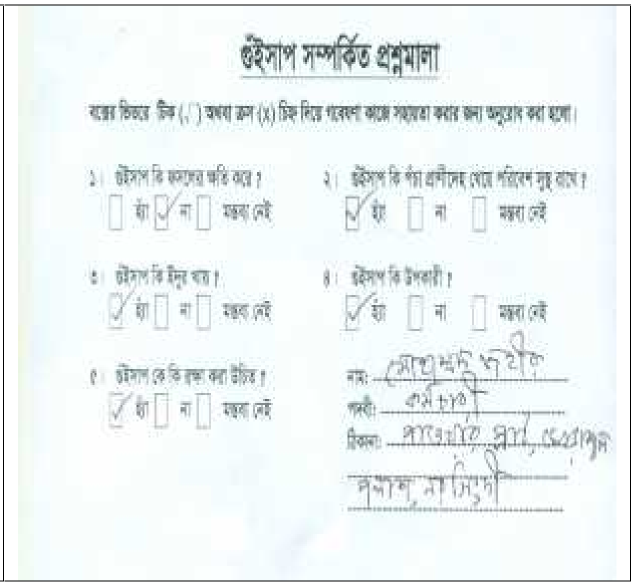
৫। গুঁইসাপ কে কি রক্ষা করা উচিত? হাঁ / না / মন্তব্য নেই

নাম:

পদবী:

ঠিকানা:

(e)


গুঁইসাপ সম্পর্কিত প্রশ্নমালা

বক্সের ভিতরে টিক (√) অথবা ক্রস (x) চিহ্ন দিয়ে গবেষণা কাজে সহায়তা করার জন্য অনুরোধ করা হলো।

১। গুঁইসাপ কি ফসলের ক্ষতি করে? হাঁ / না / মন্তব্য নেই

২। গুঁইসাপ কি পঁচা প্রাণীদের খেয়ে পরিবেশ সুস্থ রাখে? হাঁ / না / মন্তব্য নেই

৩। গুঁইসাপ কি ইঁদুর খায়? হাঁ / না / মন্তব্য নেই

৪। গুঁইসাপ কি উপকারী? হাঁ / না / মন্তব্য নেই

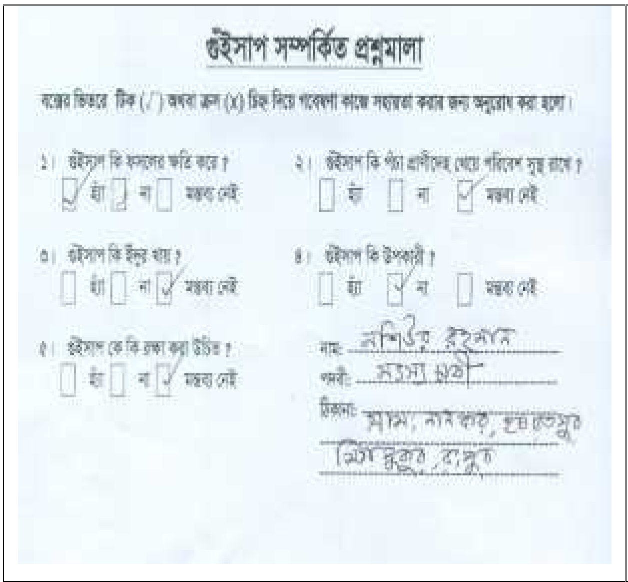
৫। গুঁইসাপ কে কি রক্ষা করা উচিত? হাঁ / না / মন্তব্য নেই

নাম:

পদবী:

ঠিকানা:

(f)


গুঁইসাপ সম্পর্কিত প্রশ্নমালা

বক্সের ভিতরে টিক (√) অথবা ক্রস (x) চিহ্ন দিয়ে গবেষণা কাজে সহায়তা করার জন্য অনুরোধ করা হলো।

১। গুঁইসাপ কি ফসলের ক্ষতি করে? হাঁ / না / মন্তব্য নেই

২। গুঁইসাপ কি পঁচা প্রাণীদের খেয়ে পরিবেশ সুস্থ রাখে? হাঁ / না / মন্তব্য নেই

৩। গুঁইসাপ কি ইঁদুর খায়? হাঁ / না / মন্তব্য নেই

৪। গুঁইসাপ কি উপকারী? হাঁ / না / মন্তব্য নেই

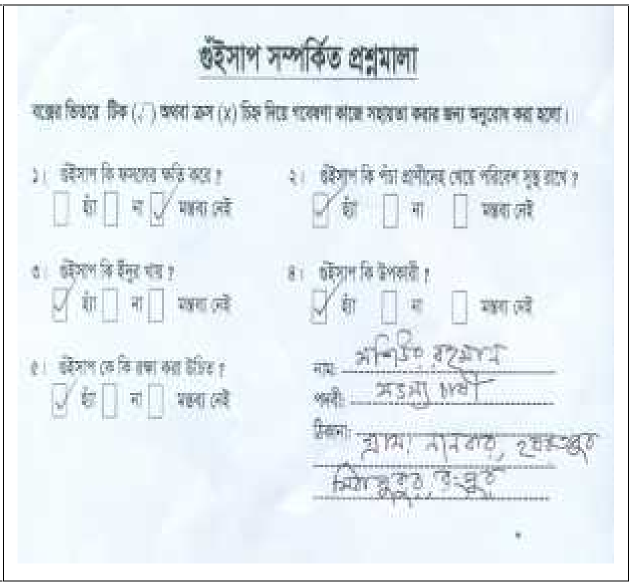
৫। গুঁইসাপ কে কি রক্ষা করা উচিত? হাঁ / না / মন্তব্য নেই

নাম:

পদবী:

ঠিকানা:

(g)


গুঁইসাপ সম্পর্কিত প্রশ্নমালা

বক্সের ভিতরে টিক (√) অথবা ক্রস (x) চিহ্ন দিয়ে গবেষণা কাজে সহায়তা করার জন্য অনুরোধ করা হলো।

১। গুঁইসাপ কি ফসলের ক্ষতি করে? হাঁ / না / মন্তব্য নেই

২। গুঁইসাপ কি পঁচা প্রাণীদের খেয়ে পরিবেশ সুস্থ রাখে? হাঁ / না / মন্তব্য নেই

৩। গুঁইসাপ কি ইঁদুর খায়? হাঁ / না / মন্তব্য নেই

৪। গুঁইসাপ কি উপকারী? হাঁ / না / মন্তব্য নেই

৫। গুঁইসাপ কে কি রক্ষা করা উচিত? হাঁ / না / মন্তব্য নেই

নাম:

পদবী:

ঠিকানা:

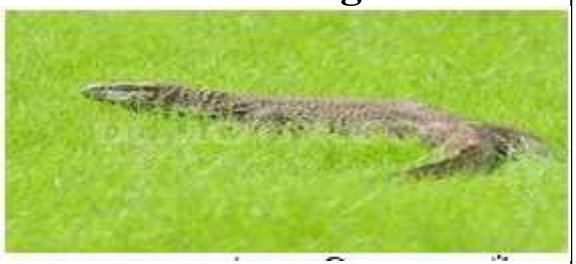
(h)

Appendix 61. An awareness building leaflet on Bengal lizard, distributed among the common people, especially farmers

গুঁইসাপের উপকারিতা

আমরা অনেকেই জানিনা যে, গুঁইসাপ একটি পরিবেশ বান্ধব, নির্বিষ উপকারি প্রাণী। গুঁইসাপ ইঁদুর ও ক্ষতিকর কীট-পতঙ্গ খেয়ে ফসল রক্ষা করে আর্থিক ভাবে কৃষকের উপকার করে, নিজে ফসলের কোন ক্ষতি করে না। মরা-পচাঁ জীব-জন্তুর দেহ খেয়ে পরিবেশকে দুর্গন্ধ ও রোগ-জীবানু মুক্ত রাখতে সহায়তা করে। এরা সাপ ও এর ডিম খেয়ে সাপের সংখ্যা নিয়ন্ত্রণ করে। ফলে সাপের কামড়ের সম্ভবনা কমে আসে। তাই আসুন, আমাদের স্বার্থেই গুঁইসাপ রক্ষা করি এবং ভবিষ্যৎ প্রজন্মকে তাদের গুরুত্ব সম্পর্কে অনুধাবন করাই।

Usefulness of Bengal lizard



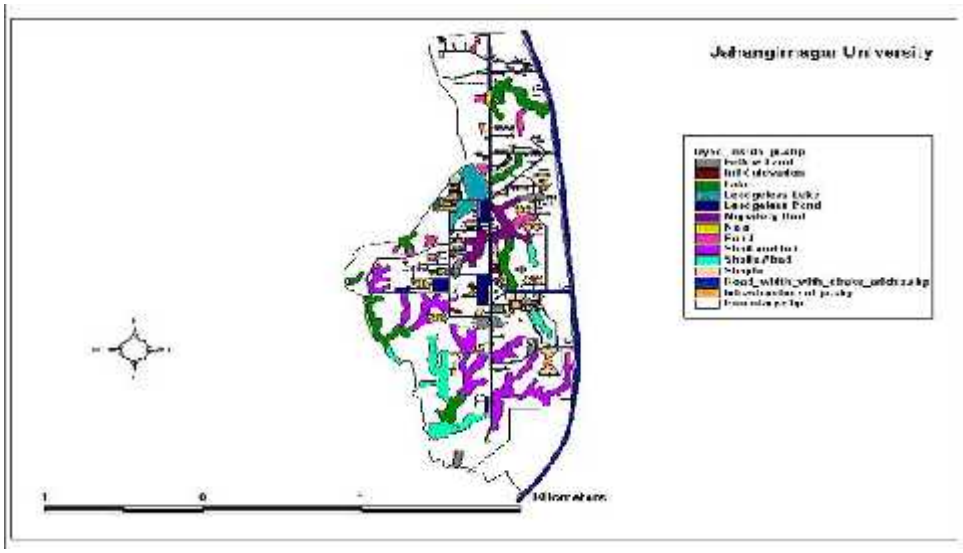
Many of us do not know that the Bengal lizard is an eco-friendly and a non poisonous animal. Bengal lizards help farmers financially by eating rats and harmful insects, and they do not harm their crops either. They also help to keep the environment free from foul odour and germs by consuming rotten animals. By eating snakes and their eggs, Bengal lizards also control the snake population. As a result, the probability of snake-biting decreases. So, let us save the Bengal lizards for our own interests and make the next generation realise about the importance of these animals.

MAPS

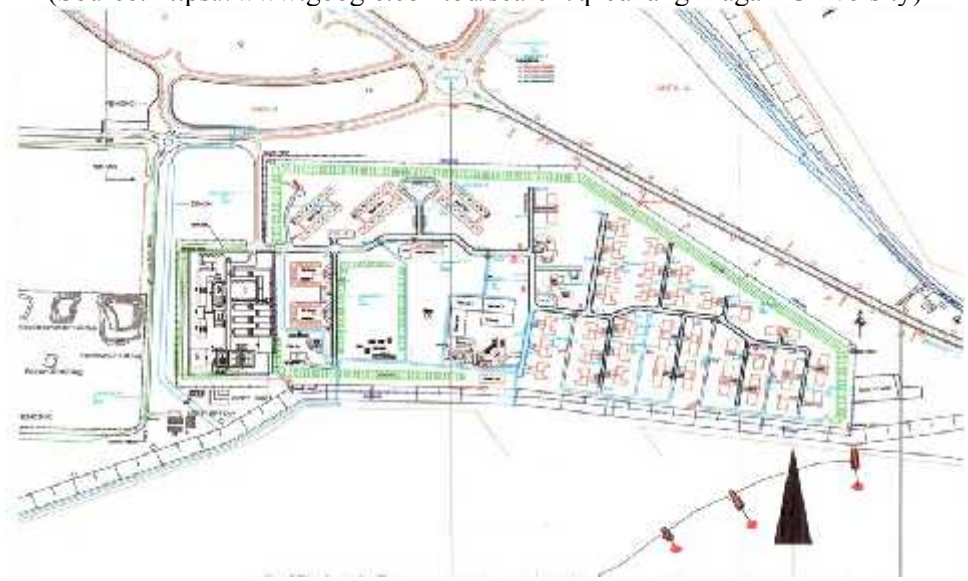
Map 1. Satellite Image of Ghorashal Power Plant, Plash, Narsingdi

Map 2. Satellite Image of Kaltapara and Bostall, Sonargaon, Narayangonj

Map 3. Map of Hazratpur, Mithapukur, Rangpur (Source: Hazratpur Union Parishad, Rangpur)

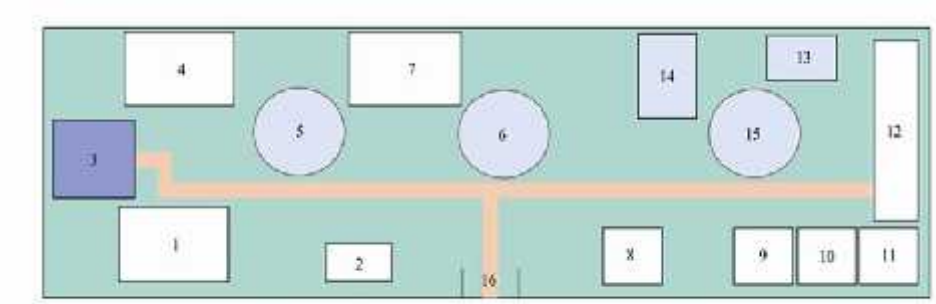


Map 4. Jahangirnagar University Campus, Savar, Dhaka
(Source: https://www.google.com.bd/search?q=Jahangirnagar+University)



Map 5. Map of Jamuna Resort, Kalihati, Tangail (Source: Durgapur Union Parishad, Tangail)

Map 6. Map of Dhaka Zoo, Mirpur, Dhaka



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উপকারী বন্ধু গুঁইসাপ

করলে গুঁইসাপের যতন,
মাঠে মিলবে ধান-পাটের বাম্পার ফলন।

বলে পোকামাকড়ের দল,
কাটছিল তো সুখেই দিনকাল।
কোত্থেকে যে এল 'যম' গুঁইসাপের দল,
মরণ যে হল, আজকাল।

ইঁদুর বলে ছিলাম তো বেশ সুখে,
ধান, পাট আর গমের ক্ষেতে।
যে দিন এল শত্রু গুঁইসাপের দল,
হলাম অসুখী, হারালাম মনোবল।

রোগজীবাণু আর বালাই,
বলে আছি তো বেশ 'ভালাই'।
দেখে তারা গুঁইসাপ,
বলে পালাই পালাই।

SANTOSH KUMAR DEY
Ph.D Student
Dept. of Zoology, University of Dhaka

Plate 127. A poster on conservation of Bengal monitors to make awareness among the common people.

Plate 128. A poster on conservation of Bengal monitors to make awareness among the common people.

Appendix 7. Population size and density of the main administrative area in relation to the surveyed area during study period (2011-2014)

Highest population found in	Name and area of the surveyed place	Observed maximum population All ages = (adults + juveniles +young)	Name of the main administrative area	Total administrative area (km^2)	Area of reduction (%)	Populated area (km^2)	Estimated population of administrative areas on the basis of surveyed area							
							Total		Adults		Juveniles		Young	
							Size = surveyed area population size/km^2× populated area	Density/ km^2 = size/total administrative area	Size	Density/ km^2	Size	Density/ km^2	Size	Density/ km^2
June, 2013	Hazratpur and Rasulpur Village (3 km^2)	25= (15+6+4)	Hazratpur Union Parishad, Rangpur	12.84	20	10.3	86	6.69	52	4.04	20	1.6	14	1.1
May, 2011	Jahangirnagar University and its adjacent areas (3 km^2)	81= (50+19+12)	Pathalia Union Parishad, Savar, Dhaka	28.74	40	17.2	464	16.1	287	10.0	109	3.8	68	2.4
May, 2014	Jamuna Resort (1 km^2)	53= (25+19+9)	Durgapur Union Parishad, Kalihati, Tangail	75.1	35	48.9	2591	34.5	1223	16.3	929	12.4	440	5.9
May, 2011	Dhaka Zoo and National Botanical Garden and adjacent area (1.5 km^2)	51= (28+15+8)	Mirpur Model Thana, Dhaka	58.66	90	5.87	200	3.41	110	1.9	59	1.01	31	0.53
May, 2011	Kaltapara and Bostall Village (2 km^2)	34= (20+8+6)	Jampur Union Parishad, Sonargaon, Narayangonj	8.43	45	4.63	78	9.3	46	5.5	19	2.3	13	1.5
April, 2014	Ghorashal Power Plant and adjacent area (1.5 km^2)	93 = (44+31+18)	Ghorashal Municipality, Palash, Narsingdi	27.0	65	9.45	587	21.7	277	10.3	196	7.3	114	4.2

* The highest number of population was not seen in 2012 in six study areas.

Appendix 8. Population size and density of the main administrative area in relation to the surveyed area during 2011

Highest population found in	Name and area of the surveyed place	Observed maximum population All ages = (adults + juveniles +young)	Name of the main administrative area	Total administrative area (km^2)	Area of reduction (%)	Populated area (km^2)	Estimated population of administrative areas on the basis of surveyed area							
							Total		Adults		Juveniles		Young	
							Size = observed population size/km^2× populated area	Density / km^2 = size/total main area	Size	Density/ km^2	Size	Density / km^2	Size	Density / km^2
July	Hazratpur and Rasulpur Village (3 km^2)	21=(10+7+4)	Hazratpur Union Parishad, Rangpur	12.84	20	10.3	72	5.6	34	2.7	24	1.9	14	1.1
September	Jahangirnagar University and its adjacent areas (3 km^2)	83=(46+23+14)	Pathalia Union Parishad, Savar, Dhaka	28.74	40	17.2	476	16.6	264	9.2	132	4.6	80	2.8
August	Jamuna Resort (1 km^2)	51=(23+18+10)	Durgapur Union Parishad, Kalihati, Tangail	75.1	35	48.9	2493	33.2	1125	15.0	880	11.7	488	6.5
May	Dhaka Zoo and National Botanical Garden and adjacent area (1.5 km^2)	51=(28+15+8)	Mirpur Model Thana, Dhaka	58.66	90	5.87	200	3.4	110	1.9	59	1.0	31	0.5
May	Kaltapara and Bostall Village (2 km^2)	34=(20+8+6)	Jampur Union Parishad, Sonargaon, Narayangonj	8.43	45	4.63	79	9.4	46	5.5	19	2.3	14	1.7
May	Ghorashal Power Plant and adjacent area (1.5 km^2)	92=(47+31+14)	Ghorashal Municipality, Palash, Narsingdi	27.0	65	9.45	580	21.5	296	11.0	195	7.2	89	3.3

Appendix 9. Population size and density of the main administrative area in relation to the surveyed area during 2012

Highest population found in	Name and area of the surveyed place	Observed maximum population All ages = (adults + juveniles +young)	Name of the main administrative area	Total administrative area (km^2)	Area of reduction (%)	Populated area (km^2)	Estimated population of administrative areas on the basis of surveyed area							
							Total		Adults		Juveniles		Young	
							Size = observed population size/km^2× populated area	Density/ km^2 = size/total main area	Size	Density/ km^2	Size	Density/ km^2	Size	Density/ km^2
June	Hazratpur and Rasulpur village (3 km^2)	24=(11+9+4)	Hazratpur Union Parishad, Rangpur	12.84	20	10.3	82	6.4	37	2.9	31	2.4	14	1.1
August	Jahangirnagar University and its adjacent areas (3 km^2)	80=(49+20+11)	Pathalia Union Parishad, Savar, Dhaka	28.74	40	17.2	459	16.0	281	9.8	115	4.0	63	2.2
June	Jamuna Resort (1 km^2)	50=(27+13+10)	Durgapur Union Parishad, Kalihati, Tangail	75.1	35	48.9	2445	32.6	1320	17.6	636	8.5	489	6.5
July	Dhaka Zoo and National Botanical Garden and adjacent area (1.5 km^2)	48=(25+15+8)	Mirpur Model Thana, Dhaka	58.66	90	5.87	188	3.2	98	1.7	59	1.0	313	0.5
March	Kaltapara and Bostall Village (2 km^2)	36=(22+9+5)	Jampur Union Parishad, Sonargaon, Narayangonj	8.43	45	4.63	83	9.8	51	6.0	20	2.4	12	1.4
May	Ghorashal Power Plant and adjacent area, Palash, Narsingdi (1.5 km^2)	91=(46+25+20)	Ghorashal Municipality, Palash, Narsingdi	27.0	65	9.45	573	21.2	290	10.7	157	5.8	126	4.7

Appendix 10. Population size and density of the main administrative area in relation to the surveyed area during 2013

Highest population found in	Name and area of the surveyed place	Observed maximum population All ages = (adults + juveniles +young)	Name of the main administrative area	Total administrative area (km^2)	Area of reduction (%)	Populated area (km^2)	Estimated population of administrative areas on the basis of surveyed area							
							Total		Adults		Juveniles		Young	
							Size = observed population size/km^2× populated area	Density/ km^2 = size/total main area	Size	Density/ km^2	Size	Density/ km^2	Size	Density/ km^2
June	Hazratpur and Rasulpur village (3 km^2)	25=(15+6+4)	Hazratpur Union Parishad, Rangpur	12.84	20	10.3	86	6.7	51	4.0	21	1.6	14	1.1
June	Jahangirnagar University and its adjacent areas (3 km^2)	77=(38+25+11)	Pathalia Union Parishad, Savar, Dhaka	28.74	40	17.2	441	15.3	218	7.6	143	5.0	63	2.2
September	Jamuna Resort (1 km^2)	53=(24+17+12	Durgapur Union Parishad, Kalihati, Tangail	75.1	35	48.9	2592	34.5	1174	15.6	831	11.1	587	7.8
May	Dhaka Zoo and National Botanical Garden and adjacent area (1.5 km^2)	49=(25+15+9)	Mirpur Model Thana, Dhaka	58.66	90	5.87	192	3.3	98	1.7	59	1.0	35	0.6
March	Kaltapara and Bostall Village (2 km^2)	34=(19+9+6)	Jampur Union Parishad, Sonargaon, Narayangonj	8.43	45	4.63	79	9.4	44	5.2	21	2.5	14	1.7
May	Ghorashal Power Plant and adjacent area (1.5 km^2)	93=(46+26+21)	Ghorashal Municipality, Palash, Narsingdi	27.0	65	9.45	586	21.7	290	10.7	164	6.1	132	4.9

Appendix 11. Population size and density of the main administrative area in relation to the surveyed area during 2014

Highest population found in	Name and area of the surveyed place	Observed maximum population All ages = (adults + juveniles +young)	Name of the main administrative area	Total administrative area (km^2)	Area of reduction (%)	Populated area (km^2)	Estimated population of administrative areas on the basis of surveyed area							
							Total		Adults		Juveniles		Young	
							Size = observed population size/km^2× populated area	Density/ km^2 = size/total main area	Size	Density/ km^2	Size	Density/ km^2	Size	Density/ km^2
May	Hazratpur and Rasulpur village (3 km^2)	24=(13+8+3)	Hazratpur Union Parishad, Rangpur	12.84	20	10.3	82	6.4	45	3.5	27	2.1	10	0.8
March	Jahangirnagar University and its adjacent areas (3 km^2)	73=(44+17+12)	Pathalia Union Parishad, Savar, Dhaka	28.74	40	17.2	419	14.6	252	8.8	97	3.4	70	2.4
May	Jamuna Resort, Kalihati, Tangail (1 km^2)	53=(25+19+9)	Durgapur Union Parishad, Kalihati, Tangail	75.1	35	48.9	2592	34.5	1223	16.3	929	12.3	440	5.9
May	Dhaka Zoo and National Botanical Garden and adjacent area (1.5 km^2)	47=(24+14+9)	Mirpur Model Thana, Dhaka	58.66	90	5.87	184	3.1	94	1.6	55	0.9	35	0.6
March	Kaltapara and Bostall Village (2 km^2)	36=(19+10+7)	Jampur Union Parishad, Sonargaon, Narayangonj	8.43	45	4.63	45	10.0	45	5.3	23	2.7	16	1.9
April	Ghorashal Power Plant and adjacent area (1.5 km^2)	93=(44+31+18)	Ghorashal Municipality, Palash, Narsingdi	27.0	65	9.45	586	21.7	277	10.3	195	7.2	113	4.2

Appendix 18. Overall population size and their percentages, considering the habitats in different study areas throughout the study period (2011-2014).

Study Area		**Underground space**	**Banks of ponds**	**Marsh land**	**Cultivated field**	**Bamboo shoots/ under bushes**	**Sloping ground**	**Open space**	**Drain**	**Garbage bin**	**On the tree**	**Old graveyard**
HU,MR	Population	2	4	3	2	6	2	2	3	6	3	-
	(%)	6.1	8.2	7.7	4.8	14.6	8.0	5.9	4.3	6.6	13.0	
JR, T	Population	4	8	6	5	4	5	5	11	17	5	-
	(%)	12.1	16.3	15.4	11.9	9.8	20.0	14.7	15.7	18.7	21.6	
JUC	Population	4	16	14	10	6	7	6	17	23	6	-
	(%)	12.1	32.7	35.9	23.8	14.6	28.0	17.6	24.3	25.3	26.1	
DZ & NBG	Population	5	9	10	7	6	4	4	14	9	3	-
	(%)	15.1	18.4	15.6	16.7	14.6	16.0	11.8	20.0	9.9	13.1	
SN	Population	2	6	6	5	6	2	2	5	6	3	6
	(%)	6.1	12.2	15.4	11.9	14.6	8.0	5.9	7.1	6.6	13.1	16.7
GPP, N	Population	16	6	-	13	13	5	15	20	30	3	-
	(%)	48.5	12.2		30.9	31.7	20.0	44.1	28.6	32.9	13.1	

Appendix 19. Population size and their percentages, considering the habitats in different study areas in 2011.

Study Area		**Underground space**	**Banks of ponds**	**Marsh land**	**Cultivated field**	**Bamboo shoots/ under bushes**	**Sloping ground**	**Open space**	**Drain**	**Garbage bin**	**On the tree**	**Old graveyard**
HU,MR	Population	2	3	3	2	5	2	2	3	4	2	
	(%)	6.9	7.5	9.4	5.4	17.2	10.0	6.3	4.3	4.8	10.0	
JR, T	Population	3	7	5	4	2	4	4	11	16	4	
	(%)	10.3	17.5	15.6	10.8	6.9	20.0	12.5	15.7	19.0	20.0	
JUC	Population	4	15	13	8	6	5	6	17	23	6	
	(%)	13.8	37.5	40.6	21.6	20.7	25.0	18.7	24.3	27.4	30.0	
DZ & NBG	Population	4	6	6	6	4	3	4	14	9	3	
	(%)	13.8	15.0	18.8	16.3	13.8	15.0	12.5	20.0	10.7	15.0	
SN	Population	2	3	5	5	6	1	1	5	5	2	4
	(%)	6.9	7.5	15.6	13.5	20.7	5.0	3.1	7.1	6.0	10.0	25.0
GPP, N	Population	14	6		12	6	5	15	20	27	3	
	(%)	48.3	15.0		32.4	20.7	25.0	46.9	28.6	32.1	15.0	

Appendix 20. Population size and their percentages, considering the habitats in different study areas in 2012.

Study Area		Underground space	Banks of ponds	Marsh land	Cultivated field	Bamboo shoots/ under bushes	Sloping ground	Open space	Drain	Garbage bin	On the tree	Old graveyard
HU,MR	Population	2	3	3	3	6	2	2	3	6	2	
	(%)	6.1	6.4	8.1	7.7	18.2	8.3	7.4	4.8	7.1	10.5	
JR, T	Population	4	7	6	4	4	5	4	11	16	4	
	(%)	12.1	14.9	16.2	10.3	12.1	20.8	14.8	17.7	18.8	21.1	
JUC	Population	4	16	14	8	5	7	6	15	23	5	
	(%)	12.1	34.0	37.8	20.5	15.2	19.2	22.2	24.2	27.1	26.3	
DZ & NBG	Population	5	9	8	6	5	4	4	11	7	3	
	(%)	15.2	19.1	21.6	15.4	15.2	16.7	14.8	17.7	8.2	15.8	
SN	Population	2	6	6	5	6	2	2	3	5	2	5
	(%)	6.1	12.8	16.2	12.8	18.2	8.3	7.4	4.8	5.9	10.5	20
GPP, N	Population	16	6		13	7	4	9	19	28	3	
	(%)	48.5	12.8		33.3	21.2	16.7	33.3	30.6	32.9	15.8	

Appendix 21. Population size and their percentages, considering the habitats in different study areas in 2013.

Study Area		Underground space	Banks of ponds	Marsh land	Cultivated field	Bamboo shoots/ under bushes	Sloping ground	Open space	Drain	Garbage bin	On the tree	Old graveyard
HU,MR	Population	2	3	3	2	6	2	1	3	6	3	
	(%)	6.3	6.8	8.8	5.1	17.1	10.5	4.3	5.1	6.9	13.6	
JR, T	Population	3	8	6	5	4	4	5	10	17	5	
	(%)	9.4	18.2	17.6	12.8	11.4	21.1	21.7	16.9	19.5	22.7	
JUC	Population	5	14	11	8	4	5	5	16	22	5	
	(%)	15.6	31.8	32.4	20.5	11.4	26.3	21.7	27.1	25.3	22.7	
DZ & NBG	Population	5	8	9	7	6	3	3	9	7	3	
	(%)	15.6	18.2	16.5	17.9	17.1	15.8	13.0	15.3	8.0	13.6	
SN	Population	2	6	5	4	5	1	1	3	6	3	5
	(%)	6.3	13.6	14.7	10.3	14.3	5.3	4.3	5.1	6.9	13.6	20.0
GPP, N	Population	15	5		13	10	4	8	18	29	3	
	(%)	46.9	11.4		33.3	28.6	21.1	34.8	30.5	33.3	13.6	

Appendix 22. Population size and their percentages, considering the habitats in different study areas in 2014.

Study Area		**Underground space**	**Banks of ponds**	**Marsh land**	**Cultivated field**	**Bamboo shoots/ under bushes**	**Sloping ground**	**Open space**	**Drain**	**Garbage bin**	**On the tree**	**Old graveyard**
HU,MR	Population	2	4	2	2	5	2	2	3	5	3	
	(%)	6.9	9.5	6.5	5.3	13.2	8.7	10.0	5.2	5.9	13.6	
JR, T	Population	3	7	4	5	4	4	4	11	17	4	
	(%)	10.3	16.7	12.9	13.2	10.5	17.4	20.0	19.0	20.0	18.2	
JUC	Population	4	14	10	10	4	6	4	13	21	6	
	(%)	13.8	33.3	32.3	26.3	10.5	26.1	20.0	22.4	24.7	27.3	
DZ & NBG	Population	5	7	10	6	5	4	2	8	6	3	
	(%)	17.2	16.7	32.3	15.8	13.2	17.4	10.0	13.8	7.1	13.6	
SN	Population	2	5	5	4	7	2	2	5	6	3	6
	(%)	6.9	11.9	16.1	10.5	18.7	8.7	10.0	8.6	7.1	13.6	16.7
GPP, N	Population	13	5		11	13	5	6	18	30	3	
	(%)	44.8	11.9		28.9	34.2	21.7	30.0	31.0	35.3	13.6	

Appendix 23. Overall population size and their percentages, considering the study areas in different habitats throughout study period (2011-2014).

Study Area		**Underground space**	**Banks of ponds**	**Marsh land**	**Cultivated field**	**Bamboo shoots/ under bushes**	**Sloping ground**	**Open space**	**Drain**	**Garbage bin**	**On the tree**	**Old graveyard**
HU,MR	Population	2	4	3	2	6	2	2	3	6	3	-
	(%)	6.1	12.1	9.1	6.1	18.2	6.1	6.1	9.1	18.2	9.1	
JR, T	Population	4	8	6	5	4	5	5	11	17	5	-
	(%)	5.7	11.4	8.6	7.1	5.7	7.1	7.1	15.7	24.3	7.1	
JUC	Population	4	16	14	10	6	7	6	17	23	6	-
	(%)	3.7	14.7	12.8	9.2	5.5	6.4	5.5	15.6	21.1	5.5	
DZ & NBG	Population	5	9	10	7	6	4	4	14	9	3	-
	(%)	7.0	12.7	14.1	9.9	8.5	5.6	5.6	19.7	12.7	4.2	
SN	Population	2	6	6	5	6	2	2	5	6	3	6
	(%)	4.1	12.2	12.2	10.2	12.2	4.1	4.1	10.2	12.2	6.1	12.2
GPP, N	Population	16	6	-	13	13	5	15	20	30	3	-
	(%)	13.2	5.0		10.7	10.7	4.1	12.4	16.5	24.8	2.5	

Appendix 24. Population size and their percentages, considering the study areas in different habitats in 2011.

Study Area		Underground space	Banks of ponds	Marsh land	Cultivated field	Bamboo shoots/ under bushes	Sloping ground	Open space	Drain	Garbage bin	On the tree	Old graveyard
HU,MR	Population	2	3	3	2	5	2	2	3	4	2	
	(%)	7.1	10.7	10.7	7.1	17.9	7.1	7.1	10.7	14.3	7.1	
JR, T	Population	3	7	5	4	2	4	4	11	16	4	
	(%)	5.0	11.7	8.3	6.7	3.3	6.7	6.7	18.3	26.7	6.7	
JUC	Population	4	15	13	8	6	5	6	17	23	6	
	(%)	3.9	14.6	12.6	7.8	5.8	4.9	5.8	16.5	22.3	5.8	
DZ & NBG	Population	4	6	6	6	4	3	4	14	9	3	
	(%)	6.8	10.2	10.2	10.2	6.8	5.1	6.8	23.7	15.3	5.1	
SN	Population	2	3	5	5	6	1	1	5	5	2	4
	(%)	5.1	7.7	12.8	12.8	15.4	2.6	2.6	12.8	12.8	5.1	10.3
GPP, N	Population	14	6		12	6	5	15	20	27	3	
	(%)	13.0	5.6		11.1	5.6	4.6	13.9	18.5	25.0	2.8	

Appendix 25. Population size and their percentages, considering the study areas in different habitats in 2012.

Study Area		Underground space	Banks of ponds	Marsh land	Cultivated field	Bamboo shoots/ under bushes	Sloping ground	Open space	Drain	Garbage bin	On the tree	Old graveyard
HU,MR	Population	2	3	3	3	6	2	2	3	6	2	
	(%)	6.3	9.4	9.4	9.4	18.8	6.3	6.3	9.4	18.8	6.3	
JR, T	Population	4	7	6	4	4	5	4	11	16	4	
	(%)	6.2	10.8	9.2	6.2	6.2	7.7	6.2	16.9	24.6	6.2	
JUC	Population	4	16	14	8	5	7	6	15	23	5	
	(%)	3.9	15.5	13.6	7.8	4.9	6.8	5.8	14.6	22.3	4.9	
DZ & NBG	Population	5	9	8	6	5	4	4	11	7	3	
	(%)	8.1	14.5	12.9	9.7	8.1	6.5	6.5	17.7	11.3	4.8	
SN	Population	2	6	6	5	6	2	2	3	5	2	5
	(%)	4.5	13.6	13.6	11.4	13.6	4.6	4.6	6.8	11.4	4.5	11.4
GPP, N	Population	16	6		13	7	4	9	19	28	3	
	(%)	15.2	5.7		12.4	6.7	3.8	8.6	18.1	26.7	2.9	

Appendix 26 Population size and their percentages, considering the study areas in different habitats in 2013.

Study Area		Underground space	Banks of ponds	Marsh land	Cultivated field	Bamboo shoots/ under bushes	Sloping ground	Open space	Drain	Garbage bin	On the tree	Old graveyard
HU,MR	Population	2	3	3	2	6	2	1	3	6	3	
	(%)	6.5	9.7	9.7	6.5	19.4	6.5	3.2	9.7	19.4	9.7	
JR, T	Population	3	8	6	5	4	4	5	10	17	5	
	(%)	4.5	11.9	9.0	7.5	6.0	6.0	7.5	14.9	25.4	7.5	
JUC	Population	5	14	11	8	4	5	5	16	22	5	
	(%)	5.3	14.7	11.6	8.4	4.2	5.3	5.3	16.8	23.2	5.3	
DZ & NBG	Population	5	8	9	7	6	3	3	9	7	3	
	(%)	8.3	13.3	15.0	11.7	10.0	5.0	5.0	15.0	11.7	5.0	
SN	Population	2	6	5	4	5	1	1	3	6	3	5
	(%)	4.9	14.6	12.2	9.8	12.2	2.4	2.4	7.3	14.6	7.3	12.2
GPP, N	Population	15	5		13	10	4	8	18	29	3	
	(%)	14.3	4.8		12.4	9.5	3.8	7.6	17.1	27.6	2.9	

Appendix 27. Population size and their percentages, considering the study areas in different habitats in 2014.

Study Area		Underground space	Banks of ponds	Marsh land	Cultivated field	Bamboo shoots/ under bushes	Sloping ground	Open space	Drain	Garbage bin	On the tree	Old graveyard
HU,MR	Population	2	4	2	2	5	2	2	3	5	3	
	(%)	6.7	13.3	6.7	6.7	16.7	6.7	6.7	10.0	16.7	10.0	
JR, T	Population	3	7	4	5	4	4	4	11	17	4	
	(%)	4.8	11.1	6.3	7.9	6.3	6.3	6.3	17.5	27.0	6.3	
JUC	Population	4	14	10	10	4	6	4	13	21	6	
	(%)	4.3	15.2	10.9	10.9	4.3	6.5	4.3	14.1	22.8	6.5	
DZ & NBG	Population	5	7	10	6	5	4	2	8	6	3	
	(%)	8.9	12.5	17.9	10.7	8.9	7.1	3.6	14.3	10.7	5.4	
SN	Population	2	5	5	4	7	2	2	5	6	3	6
	(%)	4.3	10.6	10.6	8.5	14.9	4.3	4.3	10.6	12.8	6.4	12.8
GPP, N	Population	13	5		11	13	5	6	18	30	3	
	(%)	12.5	4.8		10.6	12.5	4.8	5.8	17.3	28.8	2.9	

Appendix 54. Some main results of survey report for the conservation of Bengal monitors from the common people during the study period

QN	Respondents		Questions																			
1	Type	Total no. of Respondents	Are monitors useful?				TNO	Monitors are available in which season?						TNO	What way monitors are harmful							
	College teachers, students, villagers and other people	338	Yes		No		846	Monsoon		Summer		Winter		289	Take domestic ducks, hens etc.		Fearful		Others			
			NR	%	NR	%		NO	%	NO	%	NO	%		NO	%	NO	%	NO	%		
			115	34	223	66		355	42	305	36	186	22		156	54	93	32	40	14		

Questions																					
TNO	What way monitors are useful												TNO	Causes of decline of population							
672	Ecological balance		Pest control		As scavengers		Snake eaters		For skin		others		815	Human population explosion		Deforestation		Illegal hunting		Killing	
	NO	%	NO	%	NO	%	NO	%	NO	%	NO	%		NO	%	NO	%	NO	%	NO	%
	181	27	141	21	121	18	108	16	74	11	47	7		244	30	228	28	196	24	147	18

Appendix 55.Some main results of survey report for the conservation of Bengal monitors from the experts during the study period

QN	Total no of experts	Questions																	
2	51	Govt. initiative is enough for conservation				TNO	What are the probable reasons not to take proper initiative for conservation by government												
		Yes		No		179	Scarcity of application of Wildlife Act, 1974		Scarcity of public awareness		Negligence of govt. on conservation		No independent instauration		Insufficient forestation		Negligence among the responsible persons		
		NE	%	NR	%		NO	%	NO	%	NO	%	NO	%	NO	%	NO	%	
		51	100	0	0.0		45	25	38	21	28	16	25	14	23	13	20	11	

TNO	Questions											
186	Steps should be taken											
	Protection of natural habitats		Application of law		Captive breeding		Public awareness		Science oriented farm		Science oriented survey	
	NO	%	NO	%	NO	%	NO	%	NO	%	NO	%
	47	25	39	21	37	20	28	15	22	12	13	7

QN = Questionnaire No, NO = Number of Opinions, TNO = Total Number of Opinions, NE = Number of Experts, NR = Number of Respondents

Appendix 56. Main causes of decline of population of Bengal monitors during study period

Study areas	Destruction of habitats										Destruction of nests, eggs and hatchlings				Killing of adults		Predation				Effects of pesticides		Road kill	
	Agricultural extension		Deforestation		Construction of new buildings/ house		Reducing of wetlands		Commercial usages of water bodies		Considered as recreational work		Considered as enemy		IN	%	IN	%			IN	%	IN	%
	IN	%	IN	%	IN	%	IN	%	EN	%	IN	%	IN	%										
HU, MR	10	9.02	5	4.5	5	4.5	3	2.7	2	1.8	5	4.5	3	2.7	5	4.5	2	1.8			1	0.9	1	0.9
JR, T	-	-	2	1.8	1	0.9	1	0.9	-	-	-	-	-	-	1	0.9	-	-			-	-	2	1.8
JUC	-	-	-	-	3	2.7	1	0.9	4	3.6	1	0.9	-	-	2	1.8	1	0.9			-	-	1	-0.9
DZ & NBG	-	-	-	-	1	0.9	1	0.9	-	-	1	0.9	-	-	-	-	3	2.7			-	-	-	-
SN	8	7.23			5	4.5	4	3.6	3	2.7	4	3.6	4	3.6	4	3.6					1	0.9	-	-
GPP, N	2	1.8	3	2.7	1	0.9	1	0.9	-	-	-	-	-	-	-	-	3	2.7			-		-	-
AG, DU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	-
Sum of IN	66										18				12		9				2		4	
Sum of %	59.5										16.2				10.8		8.1				1.8		3.6	

IN = Incident Number

Table 4.2.7. Monthly length of hatchlings (in cm) during 2012 to 2014

Year	No. of Hatchlings	Just after hatching	1st Month	2nd Month	3rd Month	4th Month	5th Month	6th Month	7th Month	8th Month	9th Month	10th Month	11th Month	12th Month	13th Month	14th month	15th Month	16th Month	17th Month	18th Month	19th Month	20th Month	21th Month	22th Month	23th Month	24th Month	25th Month	26th Month	27th Month
2012	36	23.4	29.2	36.1	43.1	50.4	58.2	65.3	72.4	78.3	83.7	88.9	92.0	94.8	97.4	99.2	101.4	103.0	104.5	106.0	107.3	108.4	109.7	110.8	111.9	112.9	113.7	114.6	115.3
2013	20	23.8	29.4	35.7	42.2	49.0	56.1	62.8	69.5	75.5	80.6	85.7	89.9	92.3	93.8	95.3	96.6												
2014	16	24.7	30.9	37.4	43.7																								

Table 4.2.8. Weekly weight of hatchlings (in gram) during 2012 to 2014

Year	No. of Hatchlings	After hatching	1st Week	2nd Week	3rd Week	4th Week	5th Week	6th Week	7th Week	8th Week	9th Week	10th Week
2012	36	17.7	22.1	26.8	31.8	37.5	44.0	50.9	58.1	65.7	72.2	82.0
2013	20	17.8	22.5	27.5	32.8	38.2	45.1	52.2	59.7	67.7	74.8	86.7
2014	16	18.6	23.4	28.5	33.9	39.5	47.2	55.3	63.5	72.4	81.0	93.2

Table 4.2.9. Monthly weight of hatchlings (in gram) during 2012 to 2014

Year	No. of Hatchlings	Just after hatching	1st Month	2nd Month	3rd Month	4th Month	5th Month	6th Month	7th Month	8th Month	9th Month	10th Month	11th Month	12th Month	13th Month	14th month	15th Month	16th Month	17th Month	18th Month	19th Month	20th Month	21th Month	22th Month	23th Month	24th Month	25th Month	26th Month	27th Month
2012	36	17.7	38.8	67.7	103.0	166.2	239.2	330.5	424.3	529.5	633.4	731.1	834.8	938.4	1062.0	1171.9	1286.0	1407.0	1516	1652	1760	1862	1972	2084	2192	2303	2414	2525	2633
2013	20	17.8	39.3	69.8	109.7	160.8	233.3	302.6	391.9	485.9	588.4	694.3	801.2	909.1	1007.6	1114.8	1220												
2014	16	18.6	41.3	75.0	118.6																								

4.2.10. Table Weight of eggs (in gram) of Bengal monitor during incubation period in 2012-2014

Year	Egg No.	After laying	Weight after 30 days	Weight gain after 30 days	% of weight gained	Weight after 60 days	Weight gain after 60 days	% of weight gain	Weight after 90 days	Weight gain after 90 days	% of weight gain	Weight after 120 days	Weight gain after 120 days	% of weight gain	Weight after 150 days	Weight gain after 150 days	% of weight gain	Weight after 180 days	Weight gain after 180 days	% of weight gain	Weight at the time of hatching	Weight gain at the time of hatching	%of weight gain at the time of hatching
2012	39	41.1	41.6	.19	.46	41.7	.2	.4	41.9	.2	.4	42.1	.2	.4	42.2	.1	.3	42.4	.2	.4	42.5	.1	.2
2013	23	41.6	41.8	.22	.55	41.8	.18	.43	41.9	.17	.41	42.1	.21	.51	42.3	.2	.47	42.5	.17	.41	42.6	.09	.23
2014	18	41.1	41.3	.24	.58	41.5	.22	.54	41.6	.12	.28	41.8	.12	.29	41.9	.14	.34	42.0	.14	.34	42.1	.1	.24

Table 4.2.11. Growth of different parts of body of the hatchlings of Bengal monitor in 2012

Year	Sl. No.	Just after hatching (n=36)				After one month (n=34)				After one year (n=27)				After two year (n=20)			
	No. of Eggs	Length of head region (cm)	Length of abdomen (cm)	Length of tail (cm)	Total Length (cm)	Length of head region (cm)	Length of abdomen (cm)	Length of tail (cm)	Total Length (cm)	Length of head region (cm	Length of abdomen (cm)	Length of tail (cm	Total Length (cm)	Length of head region (cm	Length of abdomen (cm)	Length of tail (cm)	Total Length (cm)
2012	39	3.7	5.8	13.8	23.4	4.7	7.3	17.2	29.2	15.0	23.4	55.3	93.8	18.2	28.5	67.2	114.0
2013	23	3.8	6.0	14.1	23.8	4.7	7.4	17.4	29.4	12.4	19.4	45.8	92.3				
2014	18	4.0	6.2	14.6	24.7	4.9	7.7	18.2	30.9								

month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)	month (cm)
83.6	89.6	94.6	97.5	100.2	102.7	104.8	106.7	108.2	111.3	113.2	115.2	116	118.2	121.3	125.2	127.3	130.1	132.2	133.9
80.7	86.3	91.1	94.2	97.3	100.5	103.3	105.4	107.6	110.1	113.1	115.9	117.3	121.3	123.1	124.9	125.5	126.5	128.3	129.5
78.4	84.5	89.3	92.4	95.1	97.4	99.5	101.4	102.7	105.3	108	111.3	113.1	116.7	118.2	120.1	123.3	124.9	125.6	126.7
80.2	85.8	90.9	94.2	97.1	99.7	101.8	104.1	105.9	107.5	109.3	110.5	111.4	112.2	112.5	112.8	113.1	113.3	113.5	113.6
81.7	87.5	92.7	95.8	98.9	101.5	103.6	105.6	107.2	109.4	111.3	113.4	115.5	118.3	120.2	122.5	123.7	124.3	125.3	126.1
Die																			
83.6	89.9	95.2	98.7	101.9	104.5	10.6.6	108.7	110.5	112.1	114.6	116.8	118.9	120.8	123.6	125.1	127.3	128.3	129.8	130.9
74.6	79.7	84.3	87.4	90.1	Die		Die												
67.8	72.1	76.2	78.8	81.2	83.3	85.8	87.3	89.1	90.7	92.1	93.3	94.2	94.9	95.5	96.1	97.4	98.6	99.4	100.1
							Die												
68.9	73.4	77.7	80.1	82.4	84.4	86.2	87.7	89	90.1	91.3	92.4	93.7	94.1	95.4	96.7	97.9	98.1	99.2	101.1
Die																			
78.6	83.9	89.2	92.3	94.9	97	98.6	100.2	Die											
81.8	87.4	92.3	95.9	98.8	101.3	103.4	105.3	106.9	108.2	110.3	112.4	114.2	116.8	118.3	120.1	122.1	123.2	124.5	125.4
80.4	85.7	90.8	94	96.4	99.1	101.2	103.2	104.8	106.1	108.2	110.3	112.3	114.3	115.3	116.3	117.3	118.1	118.9	119.3
Die																			
81.4	86.7	91.7	94.8	97.7	100.2	102.3	104.2	105.9	107.1	109.2	110.9	111.5	112.3	113.5	114.3	115.1	115.9	116.5	117.1
85.2	91.1	95.7	99.2	102.1	104.7	106.8	108.8	110.3	111.6	112.7	113.3	114.3	115.5	116.7	117	118.2	119.3	119.9	120.8
70.4	75.5	80.1	82.7	84.8	86.7	88.7	90.3	91.5	92.6	93.5	93.8	94.1	94.3	94.5	95.5	96.4	97.1	97.8	98.4
Die																			
79.3	85	90.2	93.4	96	98.3	100.4	102.1	103.3	104.5	Die									
80.6	85.8	90.4	93.5	96.7	99	100.6	102.2	103.6	104.9	106.1	108	109.7	110.3	111.2	111.9	112.6	113.1	113.8	114.2
Die																			
80.1	85.3	90.2	93.5	96.4	98.7	100.5	102.1	103.6	104.7	105.9	106.8	107.4	108.7	109.3	110.7	111.3	111.9	112.3	113.5
Die							Die												
77.2	82.8	87.9	90.5	92.9	95.4	97.5	99.6	101.1	102.2	103.3	104.2	104.6	105	105.3	105.9	106.3	107.2	107.9	108.5
Did not hatch																			
74.4	79.5	83.6	87.1	90.2	92.7	94.8	96.8	98.6	100.2	101.5	102.3	103.1	103.8	104.2	104.5	104.8	105.2	105.9	106.3
69.8	74.9	Die					Die												
73.8	79	83.8	86.9	89.8	92.4	94.8	96.6	98.1	99.3	100.2	100.8	101.4	102.3	103.7	104	105.2	106.4	107.5	108.4
81.1	86.6	91.7	94.8	97.7	100.3	102.3	104.1	105.4	106.6	107.8	108.2	109.7	110.1	111.2	111.9	112.3	112.9	113.2	113.9
Die																			
77	82.3	87.6	90.7	93.3	95.8	98.1	99.9	101.5	102.8	103.9	104.7	105.1	106.4	107.6	108.7	109.8	110.4	111.2	111.9
84.1	89.5	94.6	97.7	100.3	102.8	105.1	107.1	108.6	109.9	110.8	111.6	112.1	112.5	112.7	112.9	113.1	113.5	114.3	114.8
Did not hatch																			
74.2	79.8	85.1	88.2	91.1	93.7	96.1	98.2	99.5	100.7	101.2	101.8	102.2	103.5	104.1	104.8	105.4	106.2	106.9	107.2
78.4	83.9	88.5	91.6	94.2	96.6	98.7	100.7	102.1	103.2	104.2	105.1	105.9	106.6	107	107.4	107.9	108.3	108.8	109.2
Did not hatch																			
83.5	89.2	94.7	98.1	101.2	103.6	105.7	107.8	109.4	110.6	111.6	112.4	113	114.4	114.9	115.3	115.9	116.3	116.8	117.3
79.4	85.1	90.5	95.1	99.2	102.3	104.3	105.6												
80.9	86.5	91.9	96.5	99.8	102.7	104.5	105.9												
81.6	87.5	92.3	96.8	99.5	Die														
81.8	87.1	92.2	96.5	98.9	101.5	103.1	104.3												
70.4	75.5	80.6	84.7	86.8	88.1	89.4	90.6												
ot hatch																			
77.6	82.9	88.2	92.4	94.7	96.8	98.7	99.8												
77.9	83.3	88.5	92.8	94.9	97	99	100.3												
Die																			
73.3	78.4	83.5	87.7	89.8	91.1	92.3	93.6												
65.8	70.1	74.2	77.8	79.1	80.2	81.1	81.7												
ot hatch																			
66.1	70.8	75.3	79.1	80.9	82.5	83.7	84.9												
78.6	84.2	89.3	93.5	95.6	97.2	98.8	100.3												
71.8	76.3	81.3	85.2	87.4	88.9	90.1	91.9												
78.6	83.7	88.8	93.4	96.2	98.6	100.5	101.8												
75.4	80.2	84.8	89	91.1	93.2	95.1	96.5												
75.6	80.9	86.2	90.4	92.9	94.9	96.2	97.8												
ot hatch																			
73.3	78.4	83.6	87.2	89.5	91.6	92.9	94.2												
77.25	82.58	87.70	91.21	93.84	96.07	97.76	99.64	102.98	104.47	105.97	107.31	108.36	109.72	110.80	111.86	112.88	113.71	114.56	115.34
5.03	5.40	5.53	5.62	5.93	6.31	6.44	6.71	6.03	6.20	6.64	7.04	7.31	8.00	8.45	8.89	9.19	9.45	9.67	9.80

month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)	month (g.)
528	623	710	804	880	978	1075	1160	1250	1348	1453	1540	1616	1718	1813	1903	1995	2094	2204	2310
535	627	712	801	875	972	1060	1152	1236	1337	1442	1520	1595	1690	1786	1888	1993	2089	2185	2291
518	611	695	785	856	952	1020	1197	1245	1332	1431	1503	1597	1693	1794	1901	2008	2106	2213	2319
602	707	805	910	1026	1122	1228	1325	1421	1523	1629	1718	1814	1929	2050	2169	2280	2403	2526	2658
542	632	730	821	903	998	1085	1176	1262	1371	1481	1565	1636	1739	1845	1943	2046	2152	2256	2363
617	728	849	974	1106	1248	1393	1503	1624	1756	1871	1976	2090	2191	2306	2404	2527	2661	2794	2930
350	422	501	577	653	Lost														
609	712	824	936	1056	1177	1318	1470	1611	1720	1850	1974	2107	2214	2335	2441	2551	2671	2781	2904
624	739	857	981	1110	1244	1382	1523	1665	1813	1965	2120	2279	2441	2605	2770	2939	3115	3296	3482
389	461	537	616	699	789	864	940	Lost											
619	738	864	993	1128	1260	1396	1527	1662	1801	1943	2088	2236	2371	2507	2641	2786	2945	3087	3239
613	721	825	936	1041	1142	1251	1356	1462	1553	1661	1760	1856	1971	2089	2199	2381	2442	2563	2708
639	766	873	998	1126	1271	1397	1546	1681	1842	1996	2163	2301	2483	2639	2801	2962	3151	3327	3498
596	727	854	979	1104	1236	1378	1524	1659	1793	1934	2076	2214	2349	2491	2627	2759	2901	3056	3088
590	707	822	941	1065	1194	1326	1464	1599	1737	1879	2019	2154	2276	2386	2491	2601	2716	2847	2968
355	431	494	553	616	690	762	838	901	953	Lost									
341	415	471	532	587	672	731	802	887	931	982	1031	1087	1148	1213	1272	1336	1402	1468	1530
551	672	797	912	1022	1143	1266	1395	1527	1662	1803	1935	1967	2081	2203	2312	2428	2557	2648	2754
Die																			
356	429	486	543	597	688	749	818	896	951	1013	1062	1106	1162	1238	1291	1361	1432	1492	1570
523	631	743	858	977	1101	1231	1365	1491	1619	1744	1868	1997	2116	2244	2365	2480	2591	2710	2829
610	740	Die																	
592	717	849	985	1126	1271	1406	1538	1664	1795	1915	2030	2142	2257	2369	2478	2588	2686	2788	2857
545	654	767	882	1003	1128	1256	1387	1508	1623	1733	1845	1964	2076	2181	2283	2349	2481	2586	2689
511	616	724	836	951	1068	1188	1313	1434	1549	1658	1763	1865	1967	2063	2161	2246	2324	2398	2473
631	766	898	1019	1148	1273	1393	1508	1624	1735	1847	1966	2091	2220	2347	2472	2596	2717	2840	2965
464	566	664	762	864	965	1068	1157	1242	1325	1418	1521	1612	1698	1781	1861	1939	2018	2094	2168
542	658	778	901	1020	1135	1247	1357	1436	1565	1663	1752	1849	1942	2044	2148	2242	2328	2417	2511
434	520	610	704	799	896	998	1093	1185	1274	1335	1441	1522	1604	1693	1785	1868	1944	2016	2081
503	594	690	792	902	1008	1119	1230												
571	686	803	904	1019	1144	1279	1424												
595	710	829	950	1052	Lost														
598	714	835	961	1063	1165	1268	1371												
393	488	590	685	776	861	956	1059												
t hatched																			
539	644	752	862	982	1108	1234	1378												
551	661	748	857	961	1071	1196	1287												
Lost																			
553	663	778	897	1018	1131	1241	1344												
382	473	581	675	765	852	942	1049												
ot hatch																			
480	586	696	811	940	1055	1161	1251												
395	494	599	705	817	932	1052	1167												
367	459	560	655	740	834	920	1004												
499	601	705	814	927	1038	1138	1236												
481	588	691	792	905	1012	1108	1201												
465	558	654	756	862	972	1087	1188												
ot hatch																			
403	496	597	703	816	931	1021	1107												
513.66	617.07	717.37	822.28	927.51	1042.12	1150.98	1261.71	1406.88	1516.32	1651.92	1759.83	1862.38	1972.33	2084.25	2191.92	2302.54	2413.58	2524.67	2632.71
91.39	105.33	119.34	135.90	154.18	165.34	185.53	203.52	250.88	278.63	282.78	310.21	336.48	360.68	381.81	404.56	427.25	454.36	482.08	503.93