Diversity, Distribution & Observation on threats to the freshwater turtle population in Fatehgarh Fort, Chandrakesar Dam, Imli Ghat, & Khedapati Pond (M.P India)

Aayushi Sharma
Department of Zoology, Govt. Model Autonomous Holkar Science College Indore M.P.

Abstract: ***Fresh water turtle are reptiles belong to the class of Testudines, they spend most of their life in the water, they come on land only when there is any dry land where they can rest in sunlight. The significance of freshwater turtles for our ecosystem is unforgettable. The present study aimed to investigate the diversity distribution and observation on threat to the population of fresh water turtles in Fatehgarh Fort, Imli Ghat(Narmada River), Chandrakesar Dam (River Chandrakesar) and Khedapati Pond, Dewas (M.P), where no research work was done previously on that species. Visual Survey, trapping method were applied to collect data related to diversity distribution. Questionnaire method , experimental method and direct observation applied to calculate threats on the population of turtles. Analysis of data revealed three fresh water species including Indian Flapshell Turtles (Lissemys punctata), Softshell Turtle (Aspideretus Gangeticus) ,Indian Black Turtle (Melanochelys Trijuga). Lissemys Punctata was recorded as the most common (53.96%) species. Maximum population density (62.85 turtle/km^2) recorded in Imli Ghat and minimum population density was recorded at Khedapati Pond (33.33 turtle/km^2). Freshwater Turtles faced various threats including sand mining activities, water pumps, fishing activities, pollution.Measured seasonal temperature and pH variation in four sites and total population that varied according to the season, this calculation have done by Mean and Standard Deviation Method. Awareness about the importance of life of fresh water turtles among local communities observed very limited.***

Key Words: Fresh Water Turtles, Narmada River, Threats.

INTRODUCTION

Turtles are one of the oldest living animals in the world .Fresh water turtles play an important role in the health of aquatic ecosystem and considered as important biodiversity component of the ecosystem .Out of world 300 living tortoises and fresh water turtles species ,India is home to 29 species of fresh water turtles, most of the turtles are omnivores in feeding habits but some species are completely herbivores, they are responsible for cleaning and aquatic environmental by feeding upon the dead organic material and diseased fish. The turtle habitats are being extensively degraded because of hunting and some personal things done by human being, unfortunately the life of fresh water turtles is affected drastically in last few years. Fresh water turtles testudines mainly three species occur in Fatehgarh fort, & Imli ghat (Narmada river) Chandrekesher Dam (chandrekesher river) & Khedapati pond (dist. Dewas mp) family of trionychid consist of two species Indian softshell turtle (Aspideretus gangeticus), Flap shelled turtle (Lissemys punctata)and family geomydidae consist of one species Indian black turtles (Melanochelys trijuga). Temperature water and PH are considered the most important physical variable affecting the survival of turtles .In this place species of turtles are exploited to meet , medicines and other purpose.

Some human activities like sand mining, water pumps and fishing activities are responsible for declining the population of turtle. Water quality changes linked to sand and gravel mining include increases in turbidity, changes to water temperature, changes to the distribution and availability of habitats and increased pollutants and salt water intrusion (koehnken, L, 2018, Singh *et al.* 2014, Sitaram and Rao, 2012). The Present Study conducted to identifying the current threat that cause of declining in population of turtles.

Significance of Fresh Water Turtles

Freshwater turtles are known for their ecosystem services like keeping river, ponds and freshwater sources clean by eating algal blooms and scavenging on dead matter. They act as indicators of a healthy

aquatic ecosystem.

It providing key habitat for other aquatic life, helping to balance aquatic food webs and facilitating nutrient cycling from water to land.

The Pharmaceutical industry also uses turtles plastron for preparing specific medicines & other significance of freshwater turtles is it is also uses for making jewelry and related things, making an strong leather.

LITERATURE REVIEW

Many Researches have done their Study previously on Fresh Water turtles , and highlighted various important points like, The present exploration carried out for the demographic biology ,population dynamics and biodiversity of freshwater turtles of panchnand area off northern India to device management for better establishment and species enrichment of wildlife in the carefully chosen zone (Tripathi & upadhayay 2016), They give insight into how these species as a whole may respond to human recreational activities during crucial life history stages ,such as the nesting season (Polich rebeccal 2016) , The present study reviews the effort made to protect the species and control their illegal trade .the study emphasizes the need for regular monitoring of the status of the species and recommends action for their safeguard (Dr. Syed Ali Ghalib *et al.* 2017).

They Studied the sand quantity analysis indicated that the river sand in the river area is pollution free and can serve as a good habitat for many aquatic animals including reptilian species (Taigore & Rao 2019), Here they evaluated the effect of substrate on nest removal by human in the eastern Brazilian amazon .river segment and substrate type were the most important predictors of nest removal by human (Frenanda Michalski *et al.* 2020) , They States, " different study methodologies coupled with environmental factor can influences reported plastic ingestion frequencies in marine turtles and we expect the same is true of non marine turtles ". (Adam G. claus *et al.* 2021)

OBJECTIVE OF THIS STUDY ARE

The major Objectives of study are :

i) To determine the diversity and distribution of fresh water turtles in Fatehgarh Fort, Imli Ghat, Chandrakesar dam, Khdepati pond.
ii) To identify threats and the factors that are affecting the life of turtles & cause of declining in population.
iii) Monthly variation in their population and changes in their habitat.
iv) Measure required to improve the situation of freshwater turtles.

MATERIAL AND METHOD

Area of Investigation

Freshwater Turtles are found residing in the whole Indian River System, where i studied about my research. I had visited mainly four different sites.

I) Chandrakesar Dam, which is situated near village Hirapur and at distance of about 105 km from Dewas. It is located at Chandrakesar River.

II) Fatehgarh fort, a very beautiful island on Narmada River, this is located near about 30km from Satwas which comes under Distt. Dewas.

III) Imli Ghat, this is also situated at the shore of Narmada River and also near to satwas around 28km, and also it comes under Distt. Dewas.

IV) Khedapati pond which is situated near to my residence. It is also comes under Distt.Dewas. All the four places are located in state Madhya Pradesh of India.

METHODOLOGY

Monthly survey were conducted from December 2020 – December 2021 at different study sites. The study area was divided into four zones Fategarh Fort, Chandrakesar Dam, Imli Ghat, Khedapati Pond.

Sampling Method

Survey were carried out to determine diversity distribution of turtle species and factor affecting using the following different methods.

i) Visual survey method was adopted to study basking turtles in different habitats. This method is helpful for population identification of particular species and type of habitat. Species

were identified following method of Khan (2013).

ii) Questionaries method was adopted to gather information from local communities, fisherman and wildlife workers about population distribution, diversity and factor affecting the life of turtles.

iii) Experiments Method, in this thermometer used for measuring temperature and pH meter for measuring pH level of water according to Season.

iv) Trapping Method was used to determine abundance of particular species. It was done with Drag net & Dip net (Gambel & simmons 2004).

Analysis of Population Distribution

Population distribution was determined using the formula,

$D = n / A$

where , n = mean number of turtles at that location, A = area in square/ km.

The distribution of all three species in 4 different habitats was tested using mean, by using mean we get the average pH and temperature. By Standard deviation, we found the variance in population of turtles according to the months. While observation of threat in all four study zones, we apply standard deviation to found which threat affect the most & reason behind the declining of population.

RESULT AND DISCUSSION

Diversity:- Three Species of freshwater turtles were recorded including Indian Softshell turtles, Flapshell turtles & Indian Black Turtles in the study area. Turtle are important part of water ecosystem, its presence makes the whole water ecosystem healthy.

Distribution :- Direct and Indirect Observation comes to the result that Indian Flapshell turtle was distributed in all localities of the study area with a maximum population (n=46) in Imli Ghat, and minimum Population (n=21) in Khedapati Pond. Indian Softshell Turtle with highest population (n=27) in Imli Ghat. This species was absent in village pond.

Indian Black Turtles was distributed in all localities of the study area with highest population (n=19) in Khedapati pond and minimum population (n=9) in Chandrakesar Dam.

Most Common Species were Indian Flapshell Turtles (54.13%) followed by Indian Softshell (23.960%) and Indian Black Turtle (21.09%) was recorded.

Table: Population Density of three species in different study area

Research Zones	Indian Flapshell Turtle in sq/km	Indian softshell turtle in sq/km	Indian Black Turtle in sq/km	Total
Chandrakesar Dam	21.06	13.07	6.92	43.53
Fatehgarh Fort	29.06	10.07	7.69	53.33
Imli Ghat	35.38	20.76	11.53	62.85
Khedapati Village Pond	17.05	0.00	15.83	33.33

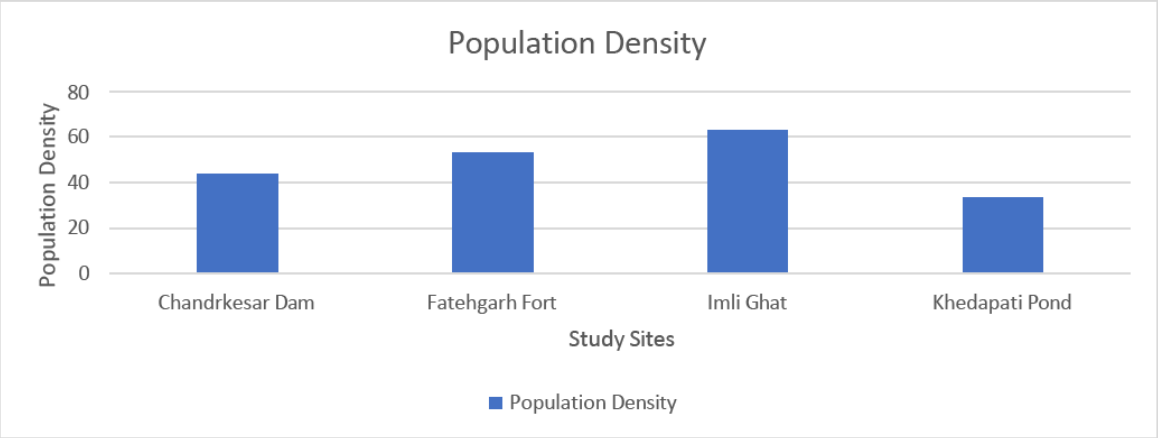

Fig: Comparison of total population at different study zones.

Monthly Distribution of Population

Maximum Number of Population was recorded in the rainy season in the period of July to September, I observe in term of lowest density recorded in the winter season in the period of December to February. Indian Flapshell was most common species observed in all season of study period.

Table: Monthly Population Distribution

Months	Fatehgarh Fort	Chandrakesar Dam	Imli Ghat	Khedapati Pond
Dec (2020)	4	3	4	1
January	1	0	3	2
February	2	1	4	0
March	3	3	5	2
April	3	5	6	4
May	4	4	4	2
June	5	6	8	4
July	8	7	18	7
August	12	9	12	5
September	9	6	12	5
October	6	5	6	4
November	3	2	4	2
Dec(2021)	2	1	2	2
Total	62	52	88	40

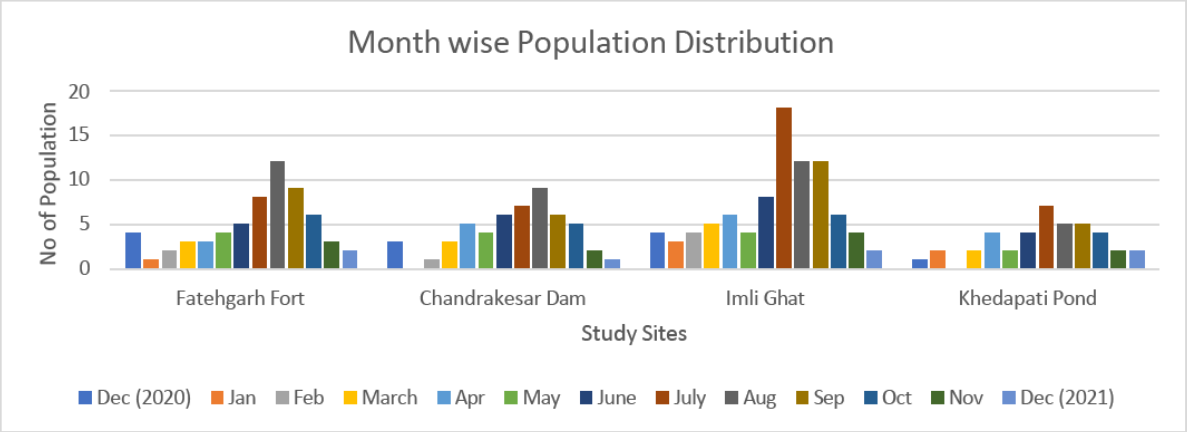

Fig: Bar chart of monthly Population Distribution

Measured Temperature

In all four sites, measuring of water temperature has been done through the instruments of water thermometer in different seasons. Temperature, water and respiratory gases considered the most important physical variable affecting the survival of reptiles (Packard and Packard , 1988). Then I measured average temperature by the help of statistical mean deviation method. In summer season, I recorded highest temperature in Khedapati Pond that is 38.2^{0}C among all four research zones ,

Table: Average Month Wise Temperature of All the places:

Months	Fatehgarh Fort	Chandrakesar Dam	Imli Ghat	Khedapati Pond
Dec (2020)	16	17	12	14
January	21	16	22	18
February	19	21	24	20
March	24	28	25	22

April	29	31	29	28
May	34	36	38	38
June	36	39	36	35
July	23	26	30	25
August	31	29	28	28
September	24	29	32	30
October	23	25	29	27
November	21	24	25	24
Dec (2021)	20	19	15	14

Bar Graph:

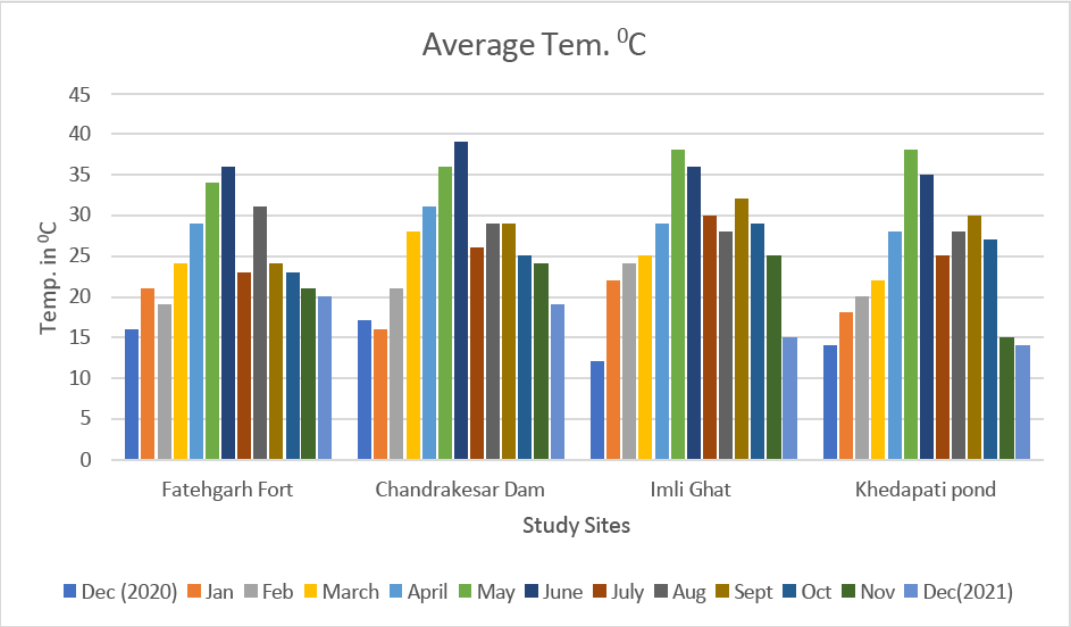

Fig. Bar Chart of Average Temperature in ^{0}C

Measured pH

The Study of measuring pH is done by pH meter in all the four sites in different season. By measuring pH, we get to know about quality of water.

Table: Average Month Wise pH of all the places

Months	Fatehgarh Fort	Chandrakesar Dam	Imli Ghat	Khedapati Pond
December	7.2	7.8	7.1	7.6
January	7.4	8.1	7.0	7.9
February	7.2	7.6	7.2	8.0
March	7.5	7.7	7.4	7.8
April	7.6	8.2	7.5	7.9
May	7.8	8.1	7.7	8.2
June	7.6	7.9	7.6	7.8
July	7.4	7.2	7.5	7.6
August	7.2	6.8	7.3	6.4
September	7.5	6.7	7.2	6.8
October	7.4	7.0	7.2	7.0
November	7.3	7.3	7.4	7.2
Dec (2021)	7.2	7.4	7.3	7.4

Bar Graph:

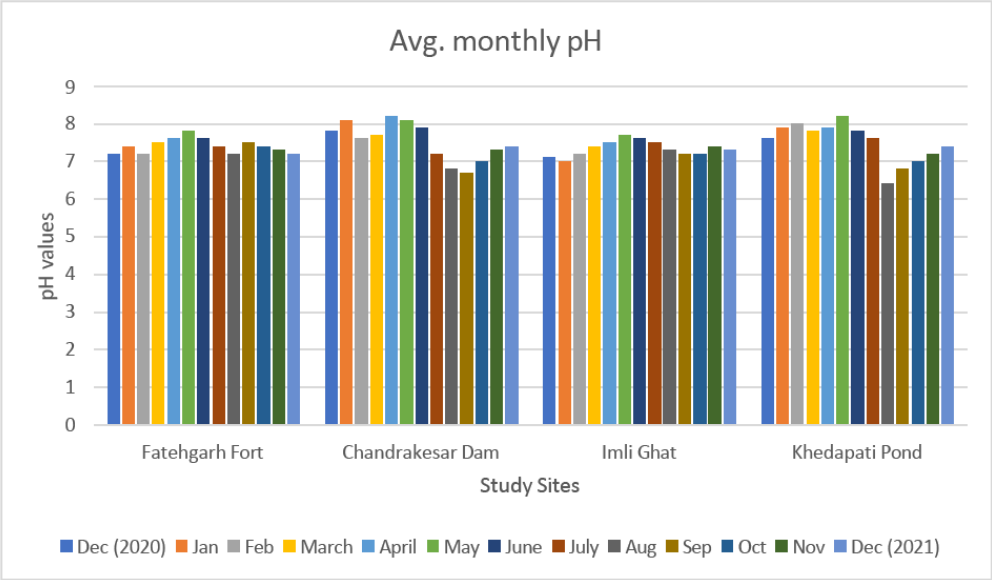

Fig. Average Monthly pH of all four research zones

Observation on threats to the freshwater turtle population:-

Turtle species of the study area faced various threat for their survival. I measured and recorded the pH and temperature monthly and season wise here, but the both pH and temperature were recorded stable there but other human activities effect the population of turtle and major threats for their survival. Data revealed from direct observation and questionnaire that the maximum (52%) threat causing factor is sand mining. During study session, the sand mining by tractors was recorded in Fatehgarh fort and Imli Ghat (River Narmada), maximum number of tractors were recorded in study area Fatehgarh fort (96), many of the interviewer and people of local communities also confirmed that.

Fig: Sand Mining Activity at Fatehgarh Fort

Another observed threat for the turtles are water pumps , that put by nearby farmers into the river for irrigation purpose. During the research at all four sites water pumps were recorded, at Fatehgarh fort it is spotted maximum (42),followed by and Chandrakesar Dam (28), followed by Khedapati Pond (20), at last Imli Ghat (8). Another threat for turtle population is fishing activity done by fisherman in all four research sites. Maximum average fisherman recorded along with fishing nets in Chandrakesar dam (62), followed by Fatehgarh Fort (56), followed by khedapati pond (48), at last at Imli Ghat(6). Sometimes turtles are also stuck into the fishing nets, most of the fisherman doesn't put into the water again and sail it commercially.

Table: Show all the threats with their Average and SD (Standard Deviation)

Research Sites	Water Pump (mean± SD)	Sand Mining (mean ± SD)	Fishing Activity (mean ± SD)	No of Turtles in study zones (SD)
Chandrakesar Dam	28 ± 3.01	0 ± 0	62 ± 5.65	52 ± 9.55
Fatehgarh Fort	42 ± 3.49	67 ± 4.55	56 ± 4.75	62 ± 11.05
Imli Ghat	8 ± 0.88	16 ± 3.06	6 ± 0.06	88 ± 13.25
Khedapati Pond	20 ± 1.58	0 ± 0	48 ± 3.66	40 ± 7.66

Above mentioned threat due to human activities affecting the life of turtle and could be the reason behind declining the population of turtle but some other factors than not such a big in numbers but at minimum rate, is also affecting the life of turtle.

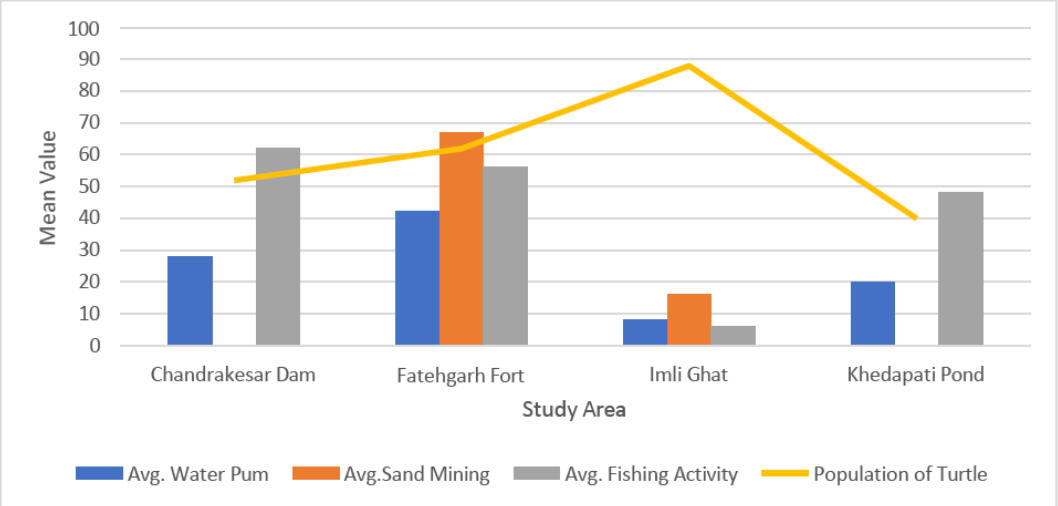

Fig: Showing the comparison between occurring threat vs turtle population in study area.

RECOMMENDATIONS

Human Activities are dangerous for the fresh water turtles, and we need to take major actions for the conservation of fresh water turtles. Limited awareness has been observed among local inhabitants regarding its significance, and ecological importance and legal role of fresh water turtle. We must aware local communities about the importance of turtle's life by doing various seminars and meets up with them. Awareness campaign by media should be conducted, discussion among peoples about turtle's species should be started to protect particular species, Fishing in the larger numbers should be prohibited, illegally peoples doing in study area, most of fisherman doesn't follow the government guidelines about the fishing. Illegal trade is a serious problem, and need to be prohibited. It could be prevented through strict law enforcement.

For the concern of pollution, there should be dustbin kept distance apart specially in mostly affected area. Aware people about turtle's life and stopping them for washing clothes and taking bath inside the water, also stopping them to throwing detergents into the water. In Fatehgarh fort and Imli Ghat, Sand mining is serious concern, people doing it illegally in large numbers, this kind of things should be stopped. Strict law should be made to stopping sand mining and take strict action again those people who doing this, local communities should also step up and stopping people from doing it.

CONCLUSION

The current study reported the three species turtle in all four research sites. The Fatehgarh fort, Imli Ghat are the best place to reside for fresh water turtles. The species reported are Indian Black Turtle (Melanochelys trijuga), Indian flapshell turtle (Lissemys punctata), & Indian softshell turtle (Aspideretes gangeticus). Most of the turtle present are omnivores in feeding habits but some of them are herbivores also. The present study also reveals that Imli Ghat is best for residence of turtle as compared to the other areas, maximum turtle population were observed here. The study also concludes that pH and temperature of all four research sites are considerably good but the illegal trading, fishing activity, water pumps affecting the life of turtle in the study areas.

The study also reveals about various threats for the life of turtles like pollution, sand mining, domestic waste, and pathogens etc, that is also the reason behind the declining of population of turtles. The local communities plays a vital role for the survival of fresh water turtles. At Chandrakesar Dam, fishing activities took place in large numbers, without following the government guidelines about it, so they should be must aware about the scale of fishing.

ACKNOWLEDGEMENT

Primarily, I would like to express my special thanks of gratitude to my guide Prof.Kiran Billore who had given me her continuous support while doing that research. I would also like to thank Dr.Rekha Sharma, her guidance helped me in all the time of research.

Beside my guide, I would like to thank the teaching and non-teaching department of Zoology, Holkar science college Indore, for all their assistance during my research work.

I am grateful to the Forest Department, Jinwani Forest Area , Distt.Dewas Madhya Pradesh , India. I would also like to thanks to the Mr. Mukesh Dubey who is the head of the department for giving me permission to carry out my research work in Chandrakesar dam and khedapti pond.

Last but not the least, I extend my cordial thanks to the Almighty for being providing me strength to complete this research work successfully.

REFERENCE

[1] Ahmed M.F. and Das A., (2009) Tortoises and freshwater Turtles of kaziranga National Park, Assam-Diversity, Distribution, Conservation Status.

[2] Akbar, M., Mushtaq-ul-Hassan, M. and Nisa, Z. (2006) Distribution of freshwater turtles in Punjab, Pakistan. Caspian Journal of Environmental Science, 4(2), 142– 146.

[3] Bhupathy, S. and Vijayan ,V. S. (1989) Predation on the Indian Flapshell turtle, Lissemys punctata. In: Proceedings of Natural Symposium on Animal Behaviour. Keoladeo National Park, Bharatpura, Rajsthan. pp. 27–33.

[4] Das, I. (1995) Turtles and Tortoises of India. WWF-India/Oxford University Press, Bombay, pp 195.

[5] Fatima, F. (2008) Distribution and current population status of freshwater turtles of Sindh. Thesis Submitted in partial fulfillment of Doctor of Philosophy, University of Karachi. pp 183.

[6] Gupta, B. K. and Rathinasabapathy, B. (1995) Freshwater turtles: Illegal trade in Coimbatore, South India. Cobra, 22, 20 –21

[7] Hossain, M. L., Sarker, S. U. and Sarker, N. J. (2008) Ecology of Spotted Flapshell turtle, Lissemys punctata (Lacepede, 1788) in Bangladesh. Ecoprint: An International Journal of Ecology, 15, 59–67.

[8] Rashid, S. M. A. and Swingland, I. R. (1997) On the ecology of some freshwater turtles in Bangladesh. In Proceedings: Conservation, restoration, and management of tortoises and turtles–An international conference, pp. 225–242.

[9] Srivastav, A. and Nigam, P. (2009) Freshwater Turtles of India: Status and Management in Captivity, pp 133–141. In: Vasudevan, K. (Ed). Freshwater Turtles and Tortoises of India. ENVIS Bulletin: Wildlife and Protected Areas, Vol 12(1). Wildlife Institute of India, Dehradun, India.

[10] Talukdar, S. (2004) Turtles Target in India's Northeast as Meat Craze Spirals. One world South Asia 8/6/04, New Delhi, India.

[11] Vasudevan, K. (Ed). (2009). Freshwater Turtles and Tortoises of India. ENVIS Bulletin: Wildlife and Protected Areas, Vol 12(1). Wildlife Institute of India, Dehradun, India. pp 177.