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Study of human impacts and interaction with herpetofauna-A review

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ABSTRACT

They play role to maintain ecosystem by having linage in plants distribution mechanism, play role in maintaining heterogeneity in environment most important role in forming balanced ecosystem structure, these encourage and enhance important symbiotic association with other animals. Reptiles play most important role in maintaining balance in ecosystem by the help of food chain. They prey insects and rodent. From the wildlife species herpetofauna include those most important two categories that contribute to maintain biological diversity in ecosystem by contributing in different habitats and are playing functional role. Anthropogenic factors are also affecting reptile's communities and species. For example, lizard abundance and species richness peaked at intermediate levels of urbanization, while disturbance due to agricultural lands has caused highly prominently visible decrease in diversity of lizard species in the Dominican Republic. Finally, anthropogenic climate change and pollution are also important causes of biodiversity declines. A large variety of herpetofauna is used for example lizards, snakes, turtle and frog. These are also used for medicine preparation. Ethnozoological studies are important because that reveals nearly all impacts related to animals specially medicines. From ancient time biodiversity has been used as largest source for therapy purpose in different cultures.

Key words: Medicine, Food, Ethnozoology, Lizard

INTRODUCTION

From the wildlife species herpetofauna include those most important two categories that contribute to maintain biological diversity in ecosystem by contributing in different habitats and are playing functional role. From all the terrestrial vertebrates of the world amphibians and reptiles make 46% role in maintenance of total species richness. But no proper attention provided to them. Out of 315 articles only 6% articles were found to be related to the herpetofauna this shows that only a minor important is given to these vertebrates in literature although these are playing very important role in maintenance of biodiversity of ecosystem (Christoffel and Lepczykn, 2013). In Brazile 4.1% amphibians and 9.2% reptiles are found in danger. The study was conducted in Northwest Amazonian state of Maranhao and its closer areas to find the diversity and richness of amphibians and reptiles. Nearly 3 amphibians and 100 reptile species with some new species were discovered. By using this information Belem Endemism Center knowledge about amphibians and reptiles has increased which was short because of less sampling. In Brazil 1080 amphibians and 773 reptile species are present (Marco *et al*., 2017).

Herpetofauna role in food web: Herpetofauna are very important in maintenance of balanced food web which helps in balancing a healthy ecosystem on earth because they play role as consumers, predators and prey. Now the decrease in herpetofauna number and diversity is a key role problem about which all the conservation biologists are pondering. The Global Amphibian Assessment and the Global Reptile Assessment have expressed serious warning in regards to recent, alarming statistics (Urbina, 2008), and current trends suggest even more species could become threatened in the near future. Amphibians play important role in food web as a prey as well as a predator (Palumbo, 2010).

They prey many insects and invertebrates and are being used as a food by number of fishes, reptiles, birds and mammals. In this way help to maintain the ecosystem balance. Similarly reptiles are also used as a food of many animals like mammals, birds and reptiles (Palumbo, 2010). Rattle snakes are very important to maintain proper balanced ecosystem because it swallow rodents. Only one timber rattlesnake can play role in removal of 2500 to 4500 ticks. Ticks are those organisms who are involved behind Lyme disease (Laura, 2018). Reptiles and amphibians sustain biodiversity by covering key roles in their ecosystems, utilizing both terrestrial and aquatic environments (Schneider *et al*., 2001; McCallum, 2007).

Herpetofauna roles as indicator of environment: A large number of herpetofauna are helpful to determine the ecosystem stress and habitat condition. So, they work as the indicator. In the cities where the environmental stress is present study of the herpetofauna provide a source of indicator of environmental

conditions in a particular biome (Prasad *et al*., 2018). Amphibians are very sensitive to the changes in environment and changes in habitat nature because they dependence on water and terrestrial environment for their survival. They use aquatic environment for the completion of breeding, to escape from highly cold winter effect etc (Prasad *et al*., 2018).

Amphibians work as indicator of ecological health because they have highly permeable and glandular skin along with complex life history because of which they shows sensitivity to the environmental variations and irregularities. If the amphibians and reptiles reside in the same habitat then they may face same threats and habitat destruction effects. Amphibians and reptiles also depict the changes in environment, species abundance along with some other factors of the site in which they reside (Homyack *et al*., 2014).

As compared to the birds and mammals less research work is done regarding amphibians especially about their status and link with forest and anthropogenic factors effect on them (Homyack *et al*., 2014). Jemez Mountain salamander is endangered in Colorado Plateau region. North leopard frog that was abundantly visible in United States and Canada is not much available in its habitats. Their diversity has declined in last few decades. A few of them are now found in United States (Palumbo, 2018). Information about these animals is necessary because these are important to maintain environmental conservation like amphibians are called biological indicators these species tell about the environmental health of that area in this way help to make appropriate conservation policies. Maranhao state has a large diversity of amphibians and reptiles but till now no proper research work is done and even no proper samples are collected specially in northwest area of state (Marco *et al*., 2017)

Mankind link with herpetofauna: Mankind relationship with animals is as old as start of civilization. Animals are very important for humans in these ways, economically, culture and in religions (Bagde *et al*., 2015). Nearly 456 reptiles and 209 amphibians' species are found in India whose number is now decreased due to illegal trades (Vijayakumar *et al*., 2015).

Anthropogenic factors effect: Anthropogenic factors are also affecting reptile's communities and species. For example, lizard abundance and species richness peaked at intermediate levels of urbanization in Arizona and Tucson (Germaine and Wakeling, 2001), while disturbance due to agricultural lands has caused highly prominently visible decrease in diversity of lizard species in the Dominican Republic (Glor *et al*., 2000). Finally, anthropogenic climate change and pollution are also important causes of biodiversity declines in the Neotropics (Lips *et al*., 2005).

Anthropogenic activities effect need extreme level of attention for conservation of amphibians and reptiles (Gray and Strine, 2017). Anthropogenic

activities are causing high level of habitat destruction of rock dwelling reptiles (Hare, 2000). In last for 50,000 years the population of human on earth was nearly one billion but the population has increased much speedily from 1960 and now it is more than seven billion. This shows that the increase in billion number of population is much more rapid in recent years than past years in history. It is estimated in United Nations project that in 2050 the population of world will be 9.3 billion (Bloom, 2011). In Belem Endemism Center is smallest center from eight other Endemism Centers and most of its forest part nearly 70% is destroyed because of human activities (Marco *et al*., 2017).

In last 10,000 years natural vegetation contains land is converted into agricultural land because of which habitat specific species became extinct and most of centralistic species adopted new habitat for their survival (Bouma *et al*., 1998).The human population is increasing day by day and to fulfill their needs more land is being used for agriculture, intensification and industrialization, this all is causing pollution which is causing threat to animal's diversity (Altaf *et al*., 2013, 2018). At the end of 20^{th}century it is observed that the rate of farming is too intense this is causing changes in land and causing harmful effects on animal dispersal (Newton, 2004; Purtauf *et al*., 2005; Stoate *et al*., 2009). Different human land practices such as bush encroachment because of poor land management or forest clearing in the Amazon can change lizard habitat (Vitt *et al*., 1998; Meik *et al*., 2002). In Ecuador five amazing snakes are found such type of snake is discovered who feed on snails. But attention is required for these snakes because out of these five species three species are included in red list and are near extinction. According to International Union of Conservation only single species is considered safe till now while 4 are closer to get removed from earth because they lack proper habitat availability which can be used as a shelter for hiding. In Ecuador 2% natural plantation provide shelter while remaining all the plantation is destroyed by the human activities like logging and use of land for agricultural purpose and for domestication with cattle farms formation (Snyder, 2018).Most part of the forest is destroyed and now nearly no proper forest is available this all condition do not support to the snakes because they require such habitat where they can hide easily, proper water in the form of moisture and stream with thick plantation is available. In the domesticated fields snakes cannot live (Snyder, 2018). Herpetofauna are facing a large number of threats especially about their habitat loss because most of land is used for agricultural purpose, pasture, human activities that degrade habitat quality and landscape connectivity for which deforestation is taking place (Urbina, 2008).

By increasing habitat fragmentation directly correlates with the increasing magnitude of edge-effects, altering environmental conditions such as temperature and humidity, and rendering many species more vulnerable to population decline

(Lehtinen *et al*., 2003). Habitat destruction of amphibians and reptiles are because of many factors like growth in urbanization, loss of watery habitat or the alteration of water flowing streams route, pollutants and toxic chemicals availability in the watery habitat (Gibbons, 2010). With the development of humans the habitats of the herpetofauna are getting badly affected and are working as a barrier between different habitats. This barrier is causing the lack of communication, distribution among the populations, effecting negatively to the colony formation. In southeast Arizona mountain the bunchgrass lizard was found to be getting depleted with the depletion of bunchgrass because this grass works as the source of covering shield for the bunchgrass lizard against extreme winter effects and provide escape way from predator (Gibbons, 2010).

These factors are causing many harmful effects on all the herpetofauna present on all parts of earth, such as decrease in sites for reproduction purpose or even the ability to reproduce, a decrease in genetic diversity and changes in behavioral patterns and physiological functions (Urbina, 2008). Amphibians and some of the reptiles that live in water are facing loss of the breeding sites availability and populations fragmentation because of the damage to wetlands that is getting non-repairable with the passage of time (Gibbons, 2010). Due to high imbalance between increase in human population and uncontrolled use and wastage of natural resources global; biodiversity is getting badly affected (Ehrlich, 1988; Wilson, 1988).

In developing countries people are depending on natural resources for their survival due to lack of employment. Because of these factors the natural resources are getting much more destroyed as a result which is leading to species diversity decrease and ultimately results in a degraded ecosystem with diminished return of key environmental services (Rapport *et al*., 1998). Different human land practices such as bush encroachment because of poor land management or forest clearing in the Amazon can change lizard habitat (Vitt *et al*., 1998; Meik *et al*., 2002).

Herpetofauna role in ecology: They play role to maintain ecosystem by having linage in plants distribution mechanism (Fialho, 1990; Olesen and Valido, 2010), play role in maintaining heterogeneity in environment (Kaczor and Hartnett, 1990) most important role in forming balanced ecosystem structure (Ashton, 2010), these encourage and enhance important symbiotic association with other animals (Witz *et al*., 1991). Fossorial snake helps to provide air to the plants root so help in soil aeration for trees root in rain forests (Rajendran, 1977) by significantly modifying sand maintaining habitats. Reptiles play most important role in maintaining balance in ecosystem by the help of food chain. They prey insects (Bhanotar and Bhatnagar, 1976) and rodent (Whitaker and Advani, 1983).

It's a major challenge in ecology to understand the limits of balanced ecosystem and flexibility with respect to change in species number and their distribution (Downing and Leibold, 2002).Crocodiles and alligator are considered as engineer of ecosystem because are counted in top predators. Response of living organisms is directly related to the changes in climate so we can easily estimate the status of that specie (Mazzotti *et al*., 2008). Reptiles play very important ecological roles and informing significant animal biomass (Iverson, 1982).

Adaptations of herpetofauna: Herpetofauna are adapted for different requirements in different environments. In Ecuador five amazing snakes were found who feed on snails. According to work on snail now more than 70 species of snail feeding reptiles are founded. In snail eating snakes physical modifications are founded (Arteaga *et al*, 2018).Crocodilians also establish in an area with such conditioned wet area where they can survive although they are near extinction. Florida is place where alligator and crocodile both are present. The population of crocodiles is facing threat because of habitat loss with the damage of breeding sites (Mazzotti *et al*., 2008).

Uses of herpetofauna: Many reptiles such as crocodiles, pythons and monitor lizards are harvested for commercial gain (Webb *et al*., 1987; Shine *et al*., 1996, 1999). In Banten and Indonesia monitor and crocodile are used for commercial benefits. The skin of the some species is used at international export level. Export of these amphibian and reptile skin is much higher from Indonesia at global level in International leather trade (Uyeda *et al*., 2016). A large variety of herpetofauna is used as food for example lizards, snakes, turtle and frog (Valencia *et al*., 2013).

Biodiversity has a great importance in supporting life on earth, which includes thriving human activities such as medical practices and food production (Urbina, 2008).In the Neotropics the government has not paid the required attention toward the conservation of amphibians and reptiles. One of the turtle specie is critically endangered and is closer to the extinction but still being hunted as traditional food. While the hunting of this turtle species is banned from May 2017 (Gray and Strine, 2017). Sea turtle are used to get meat and are captured during nesting. Only leather black turtle is not used for hunting as a source of meat or egg. Kao hippuh, Hikunth, Kao ka, Kao kayil and Kao reyeh are some of the names are used by local people of island for the different turtle types. During nesting season eggs of these turtles are used for the edible purpose. Some elder people use the eggs of leather black turtle for edible purpose because it is believed that it provides a great amount of energy and reduce aging. Leather black turtle is not hunted for the edible purpose and all hawksbill turtle are hunted to get the fat located near their neck region (Chandi, 2006).

Presence of fat shows that turtle has used algae or sea grass as a food because of which the meat become poisonous and is no more usable for the edible

purpose. Uncooked flesh of turtle is used for eating purpose.Hunting is done at the night time by using torches made of dry coconut leaves. Green turtle is most favorably used turtle. Small young ones sea turtles are kept as pet. Most of turtle do not grow to enough larger size that they get favor to be used for edible purpose. Green, olive ridley and hawksbill sea turtle are mostly hunted turtles. On the sea petrol is used to find the turtles on beach (Chandi, 2006).

In Nicobars animals are used for the edible purpose and for the preparation of other food items like apart from the Malayan Box Turtle, frogs, agamids, skins are used as a source of protein. Moreover marine crocodile, salt water turtle, monitor lizard and python are more common in contact (Chandi, 2006). In Banten and Indonesia it was founded that the local taboo society has negatively influenced the collection of two species monitor lizard and crocodile. In village only these two species were used to get benefits from their skin and meat (Uyeda *et al*., 2016).

Monitor lizard contains fat that is considered as taste enhancer and to enhance the flame. These are considered smart animals.Saltwater crocodile is considered very important for its power and flesh use in cooking. It is not easily captured it can be hunted by those hunters who are experienced and highly knowledge about capturing techniques (Chandi, 2006).

So its hunting is highly dangerous and whenever hunting is done by the expert hunters and meat became available it is distributed among all the villagers. These are hunted on the location where these hunt for their food on fish, boar and macaques during summer. During monsoon the crocodiles roam here and there for food especially for the wild pigs during this period hunters try to avoid from bringing their hunter dogs with them. Crocodiles are assumed to have 3 eyes pair (Chandi, 2006).Reptiles are used as most preferred prey by the predatory animals like mammals, birds, fish, large invertebrate, including spiders, and even themselves (Martin and Lopez, 1990); most of reptiles are also used as prey by large number of vertebrate and invertebrate species. A large variety of herpetofauna is used as pet animals for example lizards, snakes, turtle and frog (Valencia *et al*., 2013). Malayan Box turtle are kept as pet because they are considered as harmless and are easy to treat. Sometime kept capture in chains or by using some fence (Chandi, 2006).

Narratives: In South Africa, Xhosa and Zulu kill the reptile speaking people of the Eastern Cape Province for medicinal purposes, as a result of superstition, or if they pose a potential danger (Simelane and Kerley, 1997). In district Kasur, Punjab, Pakistan it is supposed that a cobra can transformed to human after getting 100 years old. If you stand in front side of monitor lizard then it will affect your teeth which will directly reduce your age. If you kill cobra other partner of that cobra will came back for revenge (Ali *et al.*, 2017).

Herpetofauna use in therapy: A large variety of herpetofauna is used for example lizards, snakes, turtle and frog. These are also used for medicine preparation (Valencia *et al*., 2013). Ethnozoological studies are important because that reveals nearly all impacts related to animals specially medicines. From ancient time biodiversity has been used as largest source for therapy purpose in different cultures. People are aware from the use of these animals for different purposes like food, medicine and other uses (Vijayakumar *et al*., 2015).

Zoo-therapy is also one of the keystone fact related to the animals such as wall lizard is used for skin disease treatment (Bagde *et al*., 2015). For the humans as a medicinal importance snakes are very important their venom is extracted for manufacturing of drugs like anti-venom serum that is used for snake bite treatment to save life (Cleary and Kini, 2013; Zouari-Kessentini *et al*., 2013).

Conservation of herpetofauna: PARC is maintaining connection like a bridge between science-management with identification of climate changes effect on amphibians and reptiles and helping to maintain communication for maintenance of adaptation approaches in Australia Workshop of Amphibians Response to Climate Change Workshop' held in Australia in 2009. Herpetofauna Climate Change Adaptation Management Tool is working to find solution for proper habitat conditions for amphibians that have got changed due to climate changes. Relocation, Reintroduction, Translocation and Head starting project in 2011 is working for the conservation of those species that are getting rare with time passage instead of variety conservation (Olson, 2018).

In United States federal biologists and managers are working by finding the science information available till now and to find the gaps and to find way to adjust them in new research work in this PARC is also involved and 2012 is celebrated as a year of lizard (Olson, 2018).

Despite the ecological role that amphibians and reptiles play a vital role to sustain ecosystem and the threats they face; these species have frequently been neglected in conservation programs. For example, amphibians and reptiles represent 16 percent of (13 of 82) threatened and endangered vertebrate species in Canada yet received only 2 percent of the $6.2 million available through the federal recovery program in 1998/99 (Seburn *et al*., 2000).

Reptiles are important from different point of view because of their usefulness and sometimes because of phobia they have been slaughtered. Reptiles are thought harmful, they are killed to get commercial uses and no research or management for their conservation is working. Only work is being done for the Yellow Monitor lizard conservation (Ghimire *et al*., 2014).

Harmful effects of reptiles: As compared to other Endemism Centers Belem Endemism Center has huge variety of amphibians and reptiles In North part of Marahao state high number of amphibians and reptiles are present because of

Cerrado vegetation (Marco *et al*., 2017). In Banten and Indonesia monitor lizard which is included in amphibian while the second is crocodile belongs to reptiles villagers kill these species by considering them harmful for their crops they kill them by considering them as a pest (Uyeda *et al*., 2016). Death because of snake bite is more common in the people who live near rain forest as compared to those who live in developed area. A survey in 1976 it was found that out of 58 gents 15 and 1female out of 62 survived after attack of python. Between 1934 and 1973 nearly 6 people died by the attacks of python it was calculated by help of interview. In the middle Indonesia a python engulfed a woman as a whole (Laura, 2018). Reticulated pythons select the area for hunting where they feel smell of prey presence. Rodents, deer, pigs and monkey are commonly engulfed because for snake it is easy for snake to open its mouth when the prey is small sized. Because of shoulders shape and body size of human snake usually do not engulf them. But if snake is larger in size like above 20 feet and the human who is going to prey is smaller in size then there is possibility that he may engulf human after murder. Reticulated python are larger in size as compared to other pythons like Burmese python are living in Florida from few years (Laura, 2018).

Burmese python of 19 feet are easily seen there while the human of even 15 feet is rare to be seen. Although these pythons are not much large in size but safety measurements should be taken when work in the snake habitat area. Especially children and pet animals that we take with us much are protected during visit with keeping each step forward. This is 2nd attack seen in Indonesia while first attack was seen in 3rd month of 2018 when a young boy was engulfed by python (Laura, 2018).

Python are found to be bird eater so named Yammai. Python eat chicken of the people which live on island. Once the python was killed and it was founded after cutting of python body that it has engulfed a domestic pig. It was told by the local people that the forest python are different physically from coast pythons. Pythons of the forest were found with dark coloration. Python eats birds and fruit eating bats and found usually near banana tree as compared to other ripened or ripening fruit trees (Chandi, 2006).

Rattle snake was killed by a man who was working in his field. The head of snake was removed by the man but when after his work he was going to remove the body and head of dead snake the snake bite the man. It was suggested that this reaction from snake head was because of its low metabolism rate and snake inserted large amount of venom involuntarily. It is suggested by a professor of biology in Pennsylvania that the snake inject less venom in small animal while high venom in large animal (Laura, 2018).

For treatment of effected person 26 doses of anti-venom were provided for recovery. It is suggested that if someone kill a rattle snake then he should stay

away from him. It is said that these snakes do not follow. For the removal of rattle snake we should consult the wildlife department. Do not use the urban rumor method of sucking snake venom and left use of extraction kit because our body is like a sponge higher will be our movement and fear as much fast blood will circulate in body and venom too which is present in blood. In United States out of 10,000 only 5-6 are found to be dead (Laura, 2018).

Climate changes effect on herpetofauna: As climate changes take place but if these changes exceed from a specific limit of environmental tolerance that will cause risk factor for the amphibians and reptiles. Moreover with the study of climate effect on amphibians and reptiles there is needed to manage alternate habitat availability (Olson, 2018).

Evolution and changes in ecosystem has different effects on non-native amphibians and reptiles. Effect on them is different from each other. These ecological changes are usually because of tropical disruption. This disruption may be direct, indirect, top down or bottom up etc. in each community there effect are different. Evolutionary changes may be due to hybridization. But usually high changes in local fauna came by selection method (Kraus, 2015). In mountain zone 62 species were discovered. 32 new specie including frog, lizard, and snakes were found and very minor information is available about hem which are located on all four hill ranges (Ganesh, 2016).

***Herpetofauna and road accidents*:** In southeastern Spain, common chameleons (*Chamaeleo chameleon*) are most common in areas of intermediate disturbance, such as near roads and cultivated areas (Hodar *et al*., 2000). In Delhi region few field studies are conducted. Results obtained from the few surveys in Delhi shows seven species of amphibians and 25 species of reptiles located in city. The forest located in the RB Estate has been cut off due to high traffic city road location near it. Mughal Garden for the researchers is also out of reach because of security issues (Prasad *et al*., 2018).

The death of most of the amphibians and reptiles is because of road accidents it was said after a study survey in India. In observation of 27 days in 95.5 km area was done and 136 amphibians and 133 reptiles were found to be died because of road accident. These belong to 6 amphibians and 11 reptile species. By average nearly 18 animals were killed per day. This shows that such a huge loss on daily bases may cause harmful decline in the local herpetofauna population and will further lead to the unbalance condition in the ecosystem (Dutta *et al.,* 2016).

Use of vehicles in a terrestrial route having the habitat of amphibians and reptiles other than the using road route.It is also reported that a large number of amphibians and reptiles are killed in road accidents. Especially amphibians are founded to be killed in road accidents during their migration from one patch to the

other patch of habitat. In summer 83% amphibians were found to be dead in road accident. In Arizona during the summer amphibians and reptiles death is founded to be high when they migrate for the breeding purpose (Gibbons, 2010).

Alien species effect on herpetofauna: Moreover, the rapid invasion of alien species is a further threat to the local biodiversity, as invaders may carry infectious diseases and pathogens such as the fungus an organism causing frog population crashes (Daszak *et al.,* 2003). During Pleistocene after interruption of human population, introduction of non-native species, with decrease in range site availability in archipelago have caused huge extinction of local population of amphibians and reptiles. But in last few years this decline in much more high (Pinya *et al.,* 2011).

Now 5 amphibians and 21 reptiles are placed in the list formed from archipelagos. From 5 amphibians species one is local species and from 21 reptiles noted 2 are local species. For the conservation purpose removal and addition of species is critically observed and it is founded that 6 new reptiles species are able to establish them and some are still trying according to the natural environment (Pinya *et al.,* 2011).

Physical and chemical barriers effect: Deep study conducted to observe effects of contaminants show that these created lethal effects in amphibian populations. Minimum amount of toxin even below the toxicity level effects badly to the amphibians in such a way that it affect the capacity of amphibians to face the environmental stress. So it is required to study harmful effect caused by chemical and physical stress when the animals face and they are being moved to the destruction of whole population (Gibbons, 2010).

Some of the chemicals used by humans for different purposes like for the weeds killing, herbs removal, as a fertilizer, untreated waste released in the form of sewerage system and as a fuel etc. All of these chemicals cause pollution and work as a pollutant which effect negatively to the amphibians and reptiles (Gibbons, 2010). In RB Estate flowers and vegetables are highly cultivated and for this purpose to get a good yield the pesticides use and the removal of the weeds is too much because of which the availability of the microhabitat for the herpetofauna is badly damaged (Prasad *et al*., 2018).

Habitat in natural aquatic sources and vegetation can affect maintenance of the amphibian diversity in urban area. Unmanaged weedy area in forest was found to be the richest area with amphibians and reptiles diversity. In RB Estate local forest preservation, artificial free of chemical ponds must be maintained for the conservation and to enhance the population of amphibians and reptiles (Prasad*et al*., 2018). Until natural habitats are located near agricultural areas they play role of a buffer for the population of the amphibians and reptiles communities (Gray and Strine, 2017).

Pollutants effect on herpetofauna: Amphibians get affected from these pollutants in different ways like from the water the pollutants moved into their body if they drink the water, pollutants may move to their body (Gibbons, 2010). By the help of direct method through highly permeable and glandular skin or from the aquatic environment in which they live and from soil by the ingestion of organic matter which they use for the feeding purpose. Some of the snakes that live in water or reptiles living in semi watery environment may also face effects of toxins present in water like narrow-headed garter snake. Some of the physical damaged studied in amphibians about the effect of pollutants is like a sour not fully healed while in reptile minimum study is conducted. Effects caused by their pollutants on the reptiles were first found to be observed in turtle and crocodile (Gibbons, 2010). Amphibians are getting much more affected from the harmful effects of UV-B rays as compared to the other animals because they have highly permeable skin and without shell eggs. UV-B rays are moving on the surface of earth because of increasing ozone layer thinning specially in spring season. Now UV-B rays are more harmfully effecting to the reptilian eggs transcription of DNA which is causing threat to the survival of reptiles on earth (Gibbons, 2010).

Moisture effect on herpetofauna: Amphibians and reptiles are highly effected by the presence of moisture, how many and at which time it is available. Due to dryness a large population of amphibians is depleted. Dryness can directly affect amphibians like survival, reproduction, contaminants exposure ratio, disease chances and UV-B radiation effect. Dryness fluctuation affect animals more rapidly before this that animal could adopt according to the changes. Change in climate is one of major reason of amphibian population destruction (Gibbons, 2010).

Dryness effect negatively on reproduction of amphibians because they depend on water for the reproductive purpose because if the water source like pond get dry at the metamorphic stage of amphibian larva then all the efforts made for reproduction during year gets in vain. If the pond size gets reduced due to the dryness then the larva are negatively affected because of high larva density in the pond growth rate gets decrease which affect the survival. In the desert the water availability is extremely low for reptiles and their prey. If no prey is available then the reptiles do not have sufficient food to eat so they have to drink and maintain maximum water in their body like diamond back rattle snake. If no prey and no water available then they will die (Gibbons, 2010).

Temperature variation effect on herpetofauna: Changes in temperature effect growth stage of turtle and sex determination in turtle and crocodile. If change occurs during hibernation period that will affect amphibians and reptiles so temperature causes change in death and birth level of a population. In summer if temperature is too high it will cause dryness and animals will not use their burrow

because of which people will capture the amphibians and reptiles illegally and the total population will be effected (Gibbons, 2010).

Sign of danger: Animals are also threatened because of human behavior toward them e.g. in Australia elapid snake is killed in large number because these snakes are highly poisonous and these are considered dangerous and threat (Whitaker and Shine, 2000). Due to increased urbanization caused by human a dispute condition is created among the humans and poisonous species. In each year dozens of amphibians and reptiles are killed from the location where humans live while some are moved to the desert environment. However this change in habitat is not effective and the animals are facing more danger (Gibbons, 2010).

Threatened and rare species record: The IUCN (2004) red list of threatened species marks one in three of the world's amphibian species as threatened with extinction (Baillie *et al*., 2004). Worldwide, 32.5% and 22% of amphibian and reptile species, respectively, are endangered (Canavero *et al*., 2010), and current trends suggest even more species could become threatened in the near future (Urbina, 2008).

Worldwide, 32.5% and 22% of amphibian and reptile species, respectively, are endangered (Canavero *et al*., 2010). In these days the most threatened vertebrate fauna is reptiles and amphibians. Few of reptiles and amphibians are announced red listed and threatened. Moreover, we do not have much part of the data about the large number of the amphibian and reptile species. So, it is estimated that the number of the amphibians and reptiles found threatened is higher than that which is considered to be calculated till now (Prasad *et al*., 2018).

General factors behind herpetofauna extinction: There are a large number of factors that are considered as the reason behind the diminishing of amphibians and reptiles some of them include habitat loss from forest and wetland, change in temperature, overexploitation, aquatic pollution, variety of increasing diseases (Prasad *et al*., 2018). Brown tree snake are is a non-native species in Guam island and is destroying the birds of the island and on the same hand it is causing danger to Pacific island. Appropriate method is required for their control (Rodda *et al*., 2007).

Sonora located in Mexico has a lager diversity of amphibians and reptiles and no sufficient work is done here till now (Enderson *et al.,* 2009). Mindanao Island has large diversity of amphibians and reptiles. Especially northeast has much more high variety of herpetofauna that is still unstudied (Sanguila *et al*., 2017).

In urban and suburban areas forests, river bank, park, wetlands, highly vegetative area can provide the area to escape for amphibians and reptiles. But such areas are not usually studied. It is necessary to study the amphibians and

reptiles in developed and less developed areas of city so that we can work properly for their management (Prasad*et al*., 2018). As compared to other all vertebrates amphibians and reptiles are least studied (Gray and Strine, 2017).

Extinction rate: On this earth with in last 65 million years large numbers of animals have been extinct (Lawton and May, 1995; Vitousek *et al*., 1997; Balmford *et al*., 2003). As compared to previous fossil record it has been seen that the rate of animals and plants extinction is up to 1000 times more in current extinction rate on earth (Beebee and Griffiths, 2005).

Evolution of herpetofauna: It was founded that the reptiles and mammals both originated from the single one ancestor (Weisberger, 2018). Seven clades of herpetofauna local of Madagascar the hypothesis of steadily decrease in species variation accumulation was found be highly authentic (Scantlebury, 2013).

Discovery of new species: In a survey conducted in India (Delhi) a complete list of amphibians and reptiles was formed by using which the conservation was planned in urban areas. New snake species located in Delhi was discovered which was not already discovered in Delhi. By study conducted in RB. Estate five new species of reptiles were discovered. One of the species the burrowing frog could not be identified up to species level therefore has taxonomic issue (Prasad *et al*., 2018).

Methods used for study of herpetofauna: For the study of herpetofauna systematic search was used. This method is used because it provides data about the distribution, abundance, habitat type, living pattern, and life style. Visual method of search is used in study of those animals that are freely visible openly in their habitats; nocturnal animals at day time and in cold days are studied and surveyed by the help of sampling method. But sampling method depends on the temperature and weather variations (Hare, 2012).

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