

CLIMATE CHANGE AND DEPLETION OF TOAD POPULATION

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Abstract : Climate change is emerging as one of the biggest threats to toads & other amphibians. Although a number of causes are responsible for the depletion of toad's population, but the new study establishes climate change as a major risk for amphibians around the world too. Toad, frog and other amphibians are "overlooked compared to more well-known groups like birds and mammals," said Kelsey Neam. But losing amphibian's would be devastating because they often act as a crucial link in the food web of ecosystem, gobbling up insects and in turn, being eaten by larger predators. According to Neam without amphibians we will see the collapse of the food web.

Amphibians are the animals that partly live on land and partly on fresh water. In real sense they need both land and water to complete their life cycle. The word 'amphibian' is derived from the Greek word "amphibios", where amphi means dual or both and bios means life. They are the first land vertebrates which arose from the Crossopterygian ancestors in the Devonian period and are perpetuating since Carboniferous to the recent period. They have descended from fish-like ancestors, on one hand and are themselves ancestors of reptiles from which birds and mammals are evolved. Toad is one of the most common amphibia found in Assam. They are the indispensable part of the ecosystem as they are closely associated with many food chain and food web. Even they are directly or indirectly related with human life. They may be considered as an important biological factor by which we can control a number of harmful insect pests. In comparison to their harmful activities they show more useful activities towards human life. But it is observed that due to climate change and different anthropogenic activities their population is declining day by day. To maintain the balance of nature we are to adopt fruitful strategies to stop the devastation of Global Biodiversity.

IndexTerms - Poikilothermic, Anthropogenic, Hibernation, Carnivorous, Croaking, Nocturnal.

I.INTRODUCTION

The toad is an inconspicuous animal as it usually lies hidden during the day time. It becomes active just after coming dusk and spends the night hunting for the invertebrates. It moves with a slow walk or short jumps. It is found in damp, dark and warm places all over the country. As they remain active at night, so they may be call nocturnal animal. An adult toad can live both in water and on land but they generally prefer to live on land. During breeding season the male toad produces a croaking sound which attracts the female toad and come for mating. Although they mainly live on land but breed in water and spend the early life in water. Toad is a poikilothermic animal and so its body temperature changes with the change of environmental temperature. They cannot tolerate excessive heat and cold. That is why during winter season they become inactive and undergo hibernation. During hibernation they hide themselves and enjoy an inactive mode of life, even they do not take food and use the stored food to obtain energy. The phenomenon hibernation breaks when the environmental temperature rises and they come to the open environment to spend normal life. Toad is carnivorous and generally prefers to take different types of insects. Normally toad does not travel to find food but rather sits and wait for its prey.

The body of toad is bilaterally symmetrical. The skin of the body is rough and possesses numerous warts all over the dorsal surface of the body. The colour of the dorsal surface is blackish grey and the ventral surface is yellowish grey. They do not possess any exoskeleton structure. The body is divisible into two main parts- head and trunk, but there is no neck. Though the tail is present in the tadpole stage but it is lost in adult. In toad head is semi-circular in shape where the anterior blunt end is called snout. The terminal end of the head bears a transverse cut i.e. mouth. Dorsally behind the top of the snout, there are two external nares that help in respiration. The head bears two large prominent bulging eyes one on either side of the head. Eyes are protected by three eyelids; upper eyelid, lower eyelid and a nictitating membrane. The upper eyelid is comparatively thick, opaque and slightly movable whereas the lower eyelid is thin, semi-transparent and easily movable. On the other hand the nictitating membrane is thin and transparent and covers the eye when they are in water. On either side of the head, behind each eye, there is prominent circular area covered with a tough stretched membrane called tympanum or eardrum. There is a larger elliptical parotid gland present behind each of the tympanum. It is a protective device for the animal as because this gland secretes a whitish sticky poisonous juice for offence and defence. In male, a pair of wrinkled vocal sacs are found on the lower side of the buccal cavity. These vocal sacs are responsible for croaking by the male during breeding season. The trunk lies behind the head that bears two pairs of limbs. The forelimbs are shorter than the hind limbs. Each forelimb consists of an upper arm, forearm, a wrist and a hand. The hand bears four digits. And the male toad, dark coloured pigmented copulatory pad is found along the inner surface of the hand called nuptial pad. It helps in grasping the female firmly in amplexus. The hind limbs are larger and powerful than the forelimbs. Each hind limb consists of thigh, shank and foot. The foot possess five toes which are united by webs. The webbed foot are used in swimming. At the posterior end of the body between the two legs cloacal aperture is located.

II. POSITIVE ECONOMIC IMPORTANCE OF TOAD

- Toad is considered as the natural pest controller. It takes slugs, snails, beetles, flies, cockroach, mosquito etc. as food in gardens, crop fields and even inside the house.
- Tadpoles are one of the important food source for fish and the adult toads may be the food source for some birds and reptiles mainly.
- Toads play role in nutrient cycle.
- They are highly susceptible to pollutants because of their permeable skin and so toads serve as an indicators of environmental health.
- The common toad seems to be a potentially good species for application in human medicine.
- It is an important component of ecosystem for maintaining ecological balance.
- Tadpoles play important role in aquatic food webs as they can reach high densities and biomass, serve as important prey for other consumers and transfer nutrients and energy between aquatic and terrestrial ecosystems. (Capps, Berven & Tiegs, 2015; Whiles et. al. 2006)
- They play an important role in consuming insects and are an important food source for birds, snakes and other animal throughout the food web.
- Pharmacological researchers reveal the anti-tumour effect of toad venom. Toad venom also displays therapeutic effects on purulent disease induced by some antibiotics, but also has the capacity to increase blood capillary permeability during inhibition, reduces medicinal overflow and is beneficial in elementary swelling and so on.
- A research of Jin Quiquan [68] shown that a mixture of toad skin water and fat displayed an intravenous LD₅₀ of 3.81±0.22 mg/kg in mice and an intraperitoneal injection showed an LD₅₀ of 26.27±0.30 mg/kg. it was observed that original toxic drug ingredients are mainly toad toxins and ester soluble constituents.
- In China, toad venom has been made into a variety of drugs, such as injections, oral liquids film agents, pills, the transdermal drug delivery system, among others and is mainly used for clinical treatment of multiple premature beats, increase in eosinophils, leukaemia, skin cancer, neurodermatitis, tuberculous fistula, toothache and local anaesthesia.
- Cao Jie [90] confirmed that the toad venom injection in combination with the chemical therapy treatment of 60 cases of late malignant tumours, can significantly improve the body's immune function, improve the quality of life of patients, significantly increase WBCs and reduce the toxic reaction caused by chemotherapy.
- Many of the older folklore collections report remedies in which the toad figures strongly, being used to cure, among many other ailments, cancer, rheumatism, plagues, nosebleeds, sprains, smallpox, whooping cough etc.
- Toads also played a historical role in human culture and religion. In Assam it is believed that severe drought for long duration can be broken by arranging toad's marriage.

III. OBJECTIVE

- To study the present status of toad's in Barama area of Baksa District BTR Assam.
- To find out the probable causes of depletion of toad population overall.

IV. METHODOLOGY

- Field Survey Method- It is the method by which one can obtain proper information regarding behaviour, usefulness and probable causes of population depletion. But it is more laborious, expensive and requires long time.
- Data Collection Method- Data and information collection is made by spot verification and by secondary information. Sources like books, research papers, journals, information from local people etc.

V. RESULTS AND DISCUSSION

Toad is an useful animal and is considered as a natural pest controller as well as an important component of ecosystem for maintaining ecological balance. But the previous data reports collected from various research papers and author's short term survey reveals the fact that due to climatic change and various anthropogenic activities their population is gradually declining. If this trend continues in such a way then in near future nature will certainly lose its own natural pest controller.

VI. MAJOR THREATS TO THE TOAD POPULATION

- Climate change may raise the vulnerability of amphibians by acting synergistically with other impacts like habitat loss, emerging diseases and chemical contaminants (Stuart et. al. 2004; Collins, 2010). According to the Global Amphibian Assessment (GAA), these threats have already placed 32% of amphibian species under some of IUCN Red List threat categories. The amphibians vulnerability to climate change is also expected to be limited by the amplitude of their thermal tolerance range (Freitas et. al., 2010), results of the process of natural selection and adaptation to the extreme temperature that lineages have experienced through their evolution (Denny et. al., 2009; Bozinovic et. al., 2011; Buckley and Huey 2016). Recent study establishes climate change as a major risk for the soft skinned amphibians around the world. "There is a growing proportion of species being pushed to the brink of extinction by disease and the effects of climate change", said Jennifer Luedtke

- Environmental pollution has become a tremendous threat to the soft skinned amphibians like toad. They are very much sensitive to pollution around them. Over use of chemical fertilizer, weedicides, pesticides etc. in agriculture sector leads water pollution that make the breeding ground of toad unfavourable. That can hurt toads easily because they take water through their skin. These chemicals can easily enter into their body through skin. The eggs and tadpoles are even more sensitive than the adults. They can be exposed to pollution in the water where they live. Zoology experts at MSU have found that toads in Gujrat are fast disappearing due to low rainfall and industrial pollution. For the first time in India MSU experts are doing research on the impact of environmental pollution on amphibians. Different pesticides can reduce their immunity. Besides pesticides, minerals from mining can cause serious problem to them. One source of pollution that gets overlooked is light pollution that can affect the inner working of the toads (September 18, 2017. Adam)
- Loss and fragmentation of habitats may raise the risk of mortality for amphibians like toad with higher dispersal abilities during migration that may lead in isolation and extinction of species with limited dispersal abilities (Cushman, 2006). Samuel Cushman stated that habitat loss and fragmentation are among the largest threats to amphibian population. Habitat loss or habitat modification has an immediate severe impact on endemic species since these species are associated with high sensitivity to environmental changes given both their limited distribution and habitat specialization (Ochoa- Ochoa et. al., 2011; Berry, Ogawa- Onishi, & McVey, 2013; Wilson, Johnson, & Mata- Silva, 2013). Amphibians are globally affected by habitat loss and fragmentation, often resulting from urbanization (Stuart et. al.,2004, Cushman, 2006; Hamer and Mc Donnell, 2008)
- Over exploitation and human collection for medicines, baits, pets and education and research may be considered as one of the prominent cause of their population depletion.
- Traffic mortality may be treated as significant factor for the population depletion of toad. Today toad is unable to hop its way across the highway. Once a regular visitor to our lawns and gardens, especially during monsoon period, the toad- that warty, jumpy, diminutive amphibian is hard to spot these days. They are the natures unsung pest controller have been disappearing from the Indian urban landscape. Now a new Indian study reveals the fact that toads are unable to cross a national highway not just because of the huge size but also due to certain factors like vehicular traffic (31 Mar 2016. Ananda Benerjee).

VII. CONCLUSION

In comparison to the harmful activities toad exhibits more useful activities towards human life and nature. During their life time they act as natural pest controller and through this activity they not only provide us protection from different diseases but at the same time help in raising the crop production also. Toad is an important component of ecosystem for maintaining ecological balance. Simultaneously they serve as indicator of environmental health. But most of the people are still not aware about this fact and so as an important component of the nature toad is not getting much more preference from human community. For the better production of crops, modern farmers prefer overuse of chemical fertilizer and many pesticides, weedicides etc. that leads water pollution which in term makes the breeding ground of toad unfavourable. Data collection and survey report of the author reveals that due to different anthropogenic activities the population of toad is gradually declining. We are to extend our helping hand to prevent it, otherwise amphibian population depletion will lead to the more critical threat to the global biodiversity.

VIII. ACKNOWLEDGEMENT

The author acknowledges all the respected well-wishers who helped me a lot by sharing their knowledge with me to make my project successful.

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