

Frog: Past Present and Future

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Abstract

Frog is one of the key member of ecosystem and it play important role in the food chain in many balanced ecosystem as pray and predator. Frog feeds on various insect crop pests and medical pests both stages of its life cycle providing benefit to agriculture and human health by minimizing the spread of vector borne disease, including Dengue Chikungunya and Malaria etc all over the world. Characteristics of having highly permeable skin make it readily susceptible and vulnerable for different diseases. Beside this habitat destruction, adverse effects of climate change, different diseases and overuse of chemical fertilizers and pesticides in agriculture is again create threats to decline of amphibian population. In order to conserve the frog, awareness of the people is necessary to combat situation of global declines of amphibian population. Also by limiting the use of toxic chemicals, including fertilizers, herbicides and pesticides and by saving the habitat of frog through education, it may helpful to survival of this species and for healthy ecosystem.

Key words: Threats, habitat destruction, climate change

Introduction

Frog is one of the important key member of ecosystem and it play vital role in many balanced ecosystem. Frog is tailless animal of class amphibia belonging to the order anura. As a predators and prey they play an important role in the food chain it means that their decreasing number will definitely impart negative impact on lots of other animals and ecosystem. On the other hand it also play important role in biological control of mosquito during its larval stage. Frog has moist porous skin with the help of which it perform cuticular respiration. The permeability of their skin makes them highly susceptible for the pathogens and chemicals that can be absorbed directly into their body.

History

Frogs have existed for nearly 300 million years. But now they are threatened because of different reasons worldwide. Since last four decades their population decreases and localized mass extinctions occurs at some places all over the world. These declines is one of the signal of the most critical threats to global biodiversity.^{[1][2]} According to the report of Global Amphibian Assessment in 2004, 32% of amphibian species were globally threatened, at least 43% were experiencing some form of population decrease, and many species have become extinct since 1980.^[3] This declines in amphibian population including frog was first widely recognized in the late 1980s, during herpetologist's gathering which report indicated declines in frog population across the world^[4]

Major threats

So many factors are responsible for the present threatened situation of decline numbers of frogs. Growing human population and to fulfill the needs, increasing practices in agriculture, land expansion, rapid industrialization, urbanization, over-exploitation of resources in forest, and emerging diseases resulted not only in disturbs and destruction of habitat but also decline their numbers too.

Habitat destruction

Habitat destruction is one of the most dramatic issues affecting amphibian species including frog worldwide. Amphibians including frog basically need Water i.e. aquatic habitat during larval stage and land i.e. terrestrial habitats for adult stage. As one of the habitat either water or land disturb it can affect their populations. Therefore frog is most vulnerable to habitat destruction than the organisms that only require one habitat to complete their life cycle and to survive.

One of the study shown many examples of habitat changes and its adverse affect on amphibian communities.^[5]

Climate Change

Another remarkable threat to decline of frog population is climate change. It may further go to modify aquatic habitats, preventing amphibians from spawning (BBC News 2008). Some other study reveals that extreme natural events (droughts, floods) as a result of climate change that can cause high mortalities or reproduction failing in several species.^[6] According to some other studies climate can also synergistically interact with other factors that may impact amphibian populations^[7]

Interaction with Manmade chemicals

In agriculture pesticides and weedicides are tremendously use as routine practices. These herbicides and pesticides with rainwater drain to aquatic habitat of frog. According to Some experimental studies exposure to commonly used herbicides such as glyphosate or insecticides such as malathion or carbaryl greatly increase mortality of tadpoles. According to this pollutants impart adversely effects on the central nervous system of frog, causing disruption in the production and secretion of hormones.^[8]

Diseases

A number of diseases have been related to mass die-offs or declines in populations of amphibians including frog species, for example "red-leg" disease, Ranavirus ,Anuraperkinsus, and chytridiomycosis . The reason is not understood clearly that why these diseases have suddenly begun to affect amphibian populations, however some evidence suggests that these diseases may have been spread by humans, or may be more virulent when combined with other environmental factors.^[9] In one of the related study shown considerable evidence that parasitic trematode platyhelminthes have contributed to developmental abnormalities and population declines of amphibians in some regions.^[10] One of the related study showed that high levels of nutrients used in farming and ranching activities resulted in immergence of parasitic infections that have caused frog deformities in ponds and lakes across North America. The study showed increased levels of nitrogen and phosphorus causing hikes in the abundance of trematodes forming cysts in the developing limbs of tadpoles causing missing limbs, extra limbs and other severe malformations.^[11] In Australia and central America in 1998 there was a mass destruction events of frog and other amphibaiaans occurred, after investigation it was came to know that responsible pathogen was a fungus Batrachochytrium dendrobatidis (Chytrid).^[12] Frogs

infected by this disease show symptoms like skin lesions and hyperkeratosis, and finally died because of interference with skin functions including maintenance of fluid balance, electrolyte homeostasis, respiration and role as a barrier to infections.^{[13][14]} As of 2010, the IUCN Red List, which incorporates the Global Amphibian Assessment and subsequent updates and declared 486 amphibian species as the "Critically Endangered species".^[15]

Fate of frog extinction

Frogs play an important role in many ecosystems. They control the insect population by feeding on insects and their larvae. However they itself acts as food source for many larger animals in the ecosystem. If frog is completely vanished from the food chain, then as a result no-one will eat the grasshopper and other crop pests, so the population of grasshoppers and other crop insect pests will increase. Since frog is completely removed, Snakes will not have enough food to eat, as a result population of snakes will decline and so population of rats will increase. Frogs feeds on large quantities of insects and facilitate the biological control of disease carriers vectors, medical pests that can transmit fatal illnesses to humans, thus in absence of frog, mosquito borne diseases will be increase. Loss of amphibians allow insects populations to increase. The death of frogs would create incurable gap in the ecosystem. The animals that depends on frog as their food will remain hungry, and their populations will be reduce as well. This would disturb the food chain of the ecosystem.

Efforts and measures to save frog

Amphibians including Frog are the most threatened group of animals in the world as per the IUCN Red List being adversely affected by habitat loss, change in Climate, disease, and a number of other factors. So for the sake amphibian conservation, it is now necessary to design protected areas for amphibians which will provide suitable conditions for their survival. In order to conserve the frog, awareness of the people is necessary to combat situation of global declines of amphibian population. Its today's need to inspiration and sensitization the peoples in view of conservation of frog. People should learn to take personal action to protect these incredible species. It is also necessary to limiting the use of toxic chemicals like fertilizers, herbicides and pesticides in sensitive amphibian areas.

Conclusion

Amphibians including frog play an important role in nature both as predators and prey and also credited to maintain balanced ecosystem. Frog feeds on various insect crop pests and medical pests providing benefit to agriculture and human health minimizing the spread of vector borne disease, including Dengue Chikungunya and Malaria etc all over the world. On the other hand Habitat destruction, Climate change, Pollution and diseases etc have been shown to contribute to worldwide amphibian and frog declines. The ecosystems of the world need the enhanced stability and resilience conferred by the key role player i.e. frog. So its today's demand to sensitize the people, to conserve the habitat of frog and by limiting the use of toxic chemicals such as fertilizers, herbicides and pesticides in sensitive amphibian areas. This is helpful for not only frog but also whole healthy ecosystem.

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