

ASSESSMENT OF CONSERVATION ON HERPETOFAUNA SPECIES INHABITED IN SOME VILLAGES OF INLE LAKE

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Abstract

A total of 20 herpetiles, four species of amphibians and 16 species of reptiles were recorded from the three study sites of Inlelake, during a period of 10 months (from December 2017 to September 2018). The habitat types of the species have been observed. The Family Gekkonidaewas recorded to be of highest percentage (20.00 %) in the present study. The protective status of the species based on the IUCN Red List (2018) has been determined. *Fejervaryagreenii* and *Indotestudoelongata* are observed as the endangered species. *Amydacartilaginea* is vulnerable species and *Melanochelystrijugais* near threatened species.

Key wards: herpetiles, protective status, endangered, vulnerable, near threatened

Introduction

Herpetofauna includes amphibians and reptiles. They are among the most successful and diverse animals on earth, and many have fascinating lifestyle, intriguing adornments, striking colors and camouflage patterns, and deadly toxins. Some are ferocious predators (O'shea and Halliday, 2002). However, they play important roles in natural ecosystems and provide many benefits to society such as aesthetic, spiritual and recreational values (Mattison, 2014).

Amphibians use aquatic environments for at least part of their life cycle- for breeding, foraging or overwintering. They have relatively small home ranges and travel little compared to other vertebrate groups. Migration of amphibians and reptiles between wintering, breeding and feeding habitats may require crossing roads, with resulting high mortality (Mattison, 2014).

They are under considerable threat in many parts of the world. Amphibians, in particular, are becoming extinct at an alarming rate. Scientists estimate that about three in every 10 species are in danger of extinction in the near future (Jacobs, 2014).

Millions of reptiles are killed every year to supply the skin trade and to be used for souvenirs in the tourism industry. Some crocodilians are now farmed, although snakes and lizards are not. Other species are collected for the pet trade. Land development for industry, agriculture, and the expansion of the cities has changed and fragmented many areas where reptiles and amphibians were formerly common (Mattison, 2014).

CITES (the Convention on International Trade in Endangered Species) regulates trade in some species by either banning trade altogether or by monitoring numbers. The IUCN (International Union for Conservation of Nature) helps to identify species that may be in need of protection, and in response a number of zoos and scientific institutions have set up captive-breeding programs for species that are considered at risk. Most of these conservation efforts, however are directed toward high profile species; some less conspicuous amphibians and reptiles probably go extinct before we even learn of their existence (Mattison, 2014).

The aim of this work was

- to record the herpetile species inhabited in Inle lake
- to identify the herpetile species according to their habitat types and
- to determine the types of protective status of the recorded species based IUCN Red List (2018).

Materials and Methods

Study area and sites

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Inle Lake is located in the NyaungShwe Township, Southern Shan State of east Myanmar and in Thanlwin river basin. Three study sites at different locations: Site I Thar Lay village between North Latitude 20° 28' 27" and 20° 28' 34", East Longitude 096° 53' 46" and 096° 53' 29", Site II Nang Pang village between North Latitude 20° 27' 57" and 20° 27' 10", East Longitude 096° 54' 17" and 096° 54' 23" and Site III Inn Paw Khone village between North Latitude 20° 27' 69" and 20° 32' 59", East Longitude 096° 63' 37" and 096° 63' 37" were chosen.

Study period

This study was conducted from December, 2017 to September, 2018.

Specimen collection and preservation

The study sites were visited once a month. Specimens were collected from the buildings, grass lands, water area and plantation sites. Frogs, toads and house lizards were caught by hand and hand glove. Agamids were collected by sticks with plastic ring and gecko, turtle, tortoise and snakes were caught by the help of fisherman and the hunter. Those animals were carried in plastic basket and brought to the laboratory of Department of Zoology, Taunggyi University. Lizards were put into the plastic cups and then they were narcotized with tobacco smoke before photographing. Collected specimens: alive, narcotized and dead animals were taken photographs by Nikon digital camera (Nikon Coolpix 4600 3X). *Hemidactylus frenatus* and *Eutropis macularia* were recorded and photographed naturally with their distinctive characters. Natural habitats of the collected species were also recorded. The only dead specimens of snakes were preserved in 10% formalin solution.

Identification and classification

Measurement of snout to vent length is for family Bufonidae, Dicroglossidae and Microhylidae. Measurement of straight carapace length for family Geoemydidae, Testudinidae and Trionychidae, total length for family Colubridae, Viperidae, Elapidae and, snout to vent length and tail length for family Agamidae, Gekkonidae and Scincidae of collected specimen were done. Counting of body scale rows, ventral scales and subcaudal scales; scales of head were also recorded for family Colubridae, Viperidae and Elapidae. The identification and classification was done according to Smith (1943), Ernst and Barbour (1989), Cox (1998), O'shea and Halliday (2002), Win Maung and Win KoKo (2002), Das (2010), and Mattison (2014).

Data analysis

Collected data were calculated by the formula of Thrushfield, 1995.

$$\text{Prevalence} = \frac{\text{Numbers of species in each order}}{\text{Total numbers of species observed}} \times 100$$

Determining the types of protective status

The types of protective status of the recorded species were determined based on the IUCN Red List (2018).

Results

Classification of recorded herpetile species is presented in Table 1. Population composition of different herpetile species in the study area and their protective status based on the IUCN RED LIST (2018) are shown in Table 2.



A. *Duttaphrynus melanostictus* B. *Fejervarya greenii* C *Fejervarya limnocharis*



D. *Kaloula pulchra* E. *Melanochelys strijuga* F. *Indotestudo elongata*



G. *Amydactylus* H. *Calotes mystaceus* I. *Calotes versicolor*



J. *Gekko gecko* K. *Hemidactylus frenatus* L. *Hemidactylus garnotii*



M. *Hemidactylus platyurus* N. *Eutropis macularia* O. *Eutropis multifasciata*



P. *Ahaetulla nasuta* Q. *Ptyas mucosus* R. *Xenochrophis piscator*



S. Daboiarusselii T. *Najakaouthia*

Plate 1 Recorded herpetile species from the study sites

Species composition of herpetiles in different families

The Family Gekkonidae was recorded to be of highest percentage (20.00%) in the present study. Family Colubridae was (15.00%), Dicroglossidae, Agamidae and Scincidae were (10.00%). The Family Bufonidae, Microhylidae, Geoemydidae, Testudinidae, Trionychidae, Viperidae and Elapidae were recorded to be of the lowest percentage (5.00%) in species composition.

Population composition of different herpetile species in the study area

Hemidactylus garnotii was recorded to be the highest percentage (30.00%) in the present study while *Indotestudo elongata*, *Eutropis macularia*, *Ptyas mucosus*, *Daboiarusselii* and *Najakaouthia* were recorded to be the lowest percentage (1.00%) (Table 2).

The types of protective status of recorded species

Fejervarya greenii and *Indotestudo elongata* are endangered species, *Amydactylus* is a vulnerable species, *Melanocheilichthys* is a near threatened species and the rest species are least concern and not evaluated species determined based on the IUCN Red List (2018) (Table 2).

Table 1 Classification of recorded herpetile species from the study sites

Order	Family	Species	Vernacular name	Collected sites
Anura	Bufonidae	<i>Duttaphrynus melanostictus</i>	Hparpyoke	I, II, III
		<i>Fejervarya greenii</i>	Hparpaungsinn	I, II, III
	Dicroglossidae	<i>Fejervarya limnocharis</i>	Kyawsan kay	II, III
	Microhylidae	<i>Kaloulapulchra</i>	Hparkhonnyin	I

Table 1 Continued

Order	Family	Species	Vernacular name	Collected sites
Testudines	Geoemydidae	<i>Melanocheilichthys</i>	Leik poke	I, II,
	Testudinidae	<i>Indotestudo elongata</i>	Leik war	III
	Trionychidae	<i>Amydactylus</i>	Asiatic soft shell turtle	I, II, III
		<i>Calotes mystaceus</i>	Poke thin nyo	I, II, III
	Agamidae	<i>Calotes versicolor</i>	Poke thin ni	III
		<i>Gekko gekko</i>	Tauk tai	II, III
		<i>Hemidactylus frenatus</i>	Einmyaung	I

	Gekkonidae	<i>Hemidactylusgarnotii</i>	Einmyaung	I, II, III
Squamata		<i>Hemidactylusplatyurus</i>	Einmyaung	I, II, III
		<i>Eutropismacularia</i>	Kin leikshaw	I
Scincidae		<i>Eutropismultifasciata</i>	Kin leikshaw	I, III
		<i>Ahaetullanasuta</i>	Mweseinngaungchoon	I, II, III
Colubridae		<i>Ptyasmucosus</i>	Lin mwe	I
		<i>Xenochrophispiscator</i>	Yay mwe	I, II, III
Viperidae		<i>Daboiarusselii</i>	Mwepway	I
Elapidae		<i>Najakaouthia</i>	Mwe haut	I

Table 2 Population composition of different herpetile species in the study area and their protective status based on the IUCN RED LIST (2018)

Herpetile species	Numbers	Composition of total (%)	Protective status
<i>Duttaphrynusmelanostictus</i>	12	10	Least Concern
<i>Fejervaryagreenii</i>	7	6	Endangered
<i>Fejervaryalimnocharis</i>	4	3	Not Evaluated
<i>Kaloulapulchra</i>	2	2	Not Evaluated
<i>Melanochelystrijuga</i>	2	2	Near Threatened
<i>Indotestudoelongata</i>	1	1	Endangered
<i>Amydacartilaginea</i>	3	2	Vulnerable
<i>Calotesmystaceus</i>	22	18	Not Evaluated
<i>Calotesversicolor</i>	2	2	Not Evaluated
<i>Gekko gecko</i>	3	2	Not Evaluated
<i>Hemidactylusfrenatus</i>	2	2	Not Evaluated

Table 2 Continued

Herpetile species	Numbers	Composition of total (%)	Protective status
<i>Hemidactylusgarnotii</i>	38	30	Not Evaluated
<i>Hemidactylusplatyurus</i>	10	8	Not Evaluated
<i>Eutropismacularia</i>	1	1	Not Evaluated
<i>Eutropismultifasciata</i>	2	2	Not Evaluated
<i>Ahaetullanasuta</i>	3	2	Not Evaluated
<i>Ptyasmucosus</i>	1	1	Not Evaluated

<i>Xenochrophispiscator</i>	5	4	Not Evaluated
<i>Daboiarusselii</i>	1	1	Not Evaluated
<i>Najakaouthia</i>	1	1	Least Concern
Total	122	100	

Discussion

Jenny Bhamet *al.* (2004) recorded eleven herpetiles, three species of amphibians and eight species of reptiles from various sites of Inlelake and adjacent farm lands in the area of Southern Shan State. Among their recorded species, *Duttaphrynusmelanostictus*, *Fejervaryalimnocharis*, *Calotesmystaceus*, *Calotesversicolor*, *Hemidactylusfrenatus*, *Ahaetullanasuta*, *Ptyasmucosus*, *Xenochrophispiscator* and *Najakaouthia* species are similar to the present results. According to the IUCN Red list (2018) those species were least concern and not evaluated species. This finding showed that those species should not be needed of protection now.

MOECA (2015) stated the Inle Lake Wildlife Sanctuary Report in which 11 frog species, three agamid species, three house lizard species, eight snake species and three turtle species are contained in this report. Among the listed 11 frog species, only *Duttaphrynusmelanostictus* and *Fejervaryalimnocharis* species are similar in the present study but the rest nine species were not recorded. Among the agamids, *Leiolepisbelliana* were not recorded in this study. In the house lizard species, *Hemidactylusfrenatus* is similar to the list but the rest two species were not collected and *Hemidactylusgarnotii* and *Hemidactylusplatyurus* species were collected. In the snake and turtle species, four species of snake and two species of turtle were not collected as the report. This finding showed that some species were disappeared and some might be introduced in the lake.

In this study, *Fejervaryagreenei* species was collected from all the study sites. This species is used by man in two important ways, as food and as laboratory animals, in the teaching of biology, in the medical sciences and for a few other experimental purposes of direct benefit to man. According to the IUCN Red list (2018) that species was listed as endangered species.

Turtle trade in Inlelake is observed in this study. The selling price for 1.65 kg (1 viss) of alive turtles is 20000 kyats and 15000 kyats are for not alive. *Indotestudoelongata* species was not recorded by the previous workers in Inlelake. According to the IUCN Red list (2018) that species was listed as endangered species. *Melanochelystrijuga* species was also collected from the study site I and II. According to the IUCN Red list (2018) that species was listed as near threatened species and *Amydacartilaginea* was also listed as vulnerable species. This finding indicated that the area of the lake is changing according to seasons from the initial existence. The recent loss in open water area of the lake is due to the development of floating garden agriculture. The presence of suitable habitats, good condition of weather and prevention of the introduction and spread of non-native species would be needed to live and survive for the herpetile species as the conservation aspects. The floating island agriculture should be limited as it is one of the problems on sedimentation and silting of Inlelake. Turtle trade also should be prohibited in the lake.

Amphibians and reptiles are under considerable threat, and every year several species become disappearing and extinct. They require clean environments to breed in. Chemical pollution from agricultural spraying and run-off and acid rain are harmful to many species. But other culprits include climatic changes, parasitic infestation, introduction of non-indigenous predators/competitors, infectious diseases and over-harvesting for food have seriously impacted certain species.

Land development for industry, agriculture, and the expansion of cities has changed and fragmented many areas where amphibians and reptiles were formerly common. These animals so once a population is cut off, its long-term future is bleak. For these reasons, habitats and communities must be maintained for herpetile conservation because they were of paramount importance.

Conclusion

The finding from this study essential habitat features including native vegetation, rocks, logs, stumps and bark for foraging and covers should be preserved to exist the herpetile species in Inle lake. Chemical pollution from agricultural spraying should not be done. Over-harvesting for food of those species should not be made. The introduction and spread of non-native species should be prevented. Turtle trade should be prohibited and conservation of Inle lake should be done not to further damage of natural existence.

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