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Diversity, morphology, distribution and population of amphibian fauna in district Jamshoro and Larkana Sindh-Pakistan

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Abstract

Present study was planned to confirm amphibian status in two Districts: Jamshoro (11,517 Km²) and Larkana (7423 Km²) of Sindh-Pakistan. Amphibian diversity was identified through morphology, whereas their distribution and population was confirmed via monthly surveys conducted at fixed locations using Global Positioning System. Study of three years (2011-2013) discovered four amphibian species i.e. *Bufo stomaticus*, *Hoplobatrachus tigerinus*, *Euphlyctis cyanophlyctis* and *Allopa hazarensis*. District Jamshoro circumscribed richer amphibian diversity than District Larkana. *B. stomaticus* was widely distributed in District Jamshoro as well as in Larkana, whereas *A. hazarensis* was limited only inside Taluka Kotri and Thano Bula Khan of District Jamshoro. *B. stomaticus* was sustained highly in both study zones, however lowest population was presented by *A. hazarensis* in District Jamshoro and *E. cyanophlyctis* in District Larkana. Comparative study indicated District Larkana embracing higher amphibian population, though their diversity was richer in District Jamshoro.

Keywords: Amphibians, Diversity, Distribution, Population, Sindh, Pakistan

Introduction

According to assessment of IUCN (International Union for the conservation of Nature) only 1, 856 amphibians out of 6, 500 species have remained with threatened status ^[1]. The amphibian species in different regions of the world exhibit morphological variation and these morphologically variable species sometimes lead to the formation of divergent taxonomic categories. Hence for the identification of diversity, morphology plays crucial role ^[2]. The distribution of amphibian fauna varies greatly on the basis of environmental conditions. Their distribution and abundance may vary differently in different areas even in adjacent localities ^[2]. Basically Amphibians have cosmopolitan distribution apart from Antarctica. Temperate areas of South America, most of Australian continent, West Indies, and most Oceanic islands of the world hold low amphibian distribution ^[3].

IUCN assessment in 2008 recorded Latin American countries such as Colombia, Ecuador and Mexico procuring largest number of threatened species. Also in Haiti and Caribbean about 92.0% and 80.0% amphibian species are at the risk of extinction ^[1]. Total percentage of threatened species (88.0%), lower estimate of threatened species (31.0%), best estimate of threatened species (41.0%), and Upper estimate of threatened species (56.0%) is also recorded by IUCN ^[3].

A vast research records amphibian diversity preferring tropical regions than temperate areas as tropical areas are rich with humidity and food resources ^[4]. Their huge distribution is recorded from tropical forests but also in subtropical and subarctic regions. A variety of different environs such as coniferous, deciduous and rain forests is also preferred by amphibians ^[3]. Diversity of Class Amphibia is studied by many researchers in several areas of world ^[5-12]. Some areas of Pakistan are reported to give shelter to 24 amphibian species ^[6], but most of the country is still unexplored in relation to exact amphibian diversity.

In recent times there is need of regular research to record the thorough status of amphibian fauna because of increasing threats which eventually cause rapid decline in their population. Therefore present study was proposed to record amphibian diversity through their morphology to record variation in comparison to same species reported from other areas ^[6-12]. Amphibian distribution and population was also studied to know their status in each subdivision (Taluka) of Jamshoro and Larkana Districts to distinguish which area supports amphibian diversity to flourish more abundantly.

Material and Methods

The extensive research (2011-2013) was carried out in two Districts of Sindh province which are quite different in their environmental conditions. The information about study zones is described below:

District Jamshoro: This study zone being divided into three Talukas: Kotri, Sehwan and Thano Bula Khan is located at 25.43212°N (Latitude) 68.263171°E (Longitude). Whole area consists of rocks, sediments and dry land including small number of agricultural fields. Altogether 18 permanent agricultural ponds in this District were found sheltering amphibians and hence marked for regular sampling (Table 1). The agricultural fields inhabited by amphibians were mainly of wheat and different kinds of vegetables. Present study

reconnoitered all Talukas separately to understand the variation in distribution and population of diverse amphibian species.

District Larkana: Larkana is located in the North-West of Sindh province at 27°33" North (Latitude) 68°13" East (Longitude). This study zone consists of plain and humid soil with extremely muddy and swamp fields of agricultural importance. 26 agricultural ponds in District Larkana provided permanent habitats to amphibian fauna (Table 1). The study sites were surrounded by different crops such as rice, wheat, sorgum, fruits and vegetables. Its four Talukas: Bakrani, Dokri, Larkana and Rato Dero were surveyed individually to determine the variability in status of amphibian fauna.

Table 1: Various study sites in Jamshoro and Larkana Districts

DISTRICT JAMSHORO	DISTRICT LARKANA
Taluka Kotri	Taluka Bakrani
S1- Unar Pur	S1- Mehrab Pur
S2- Qaim Khan	S2- Bahadur Khan
S3- Baigo Khan	S3- Wakro
S4- Budha pur	S4- Mud Bahu
S5- Toungs	S5- Goth Wazir
S6- Khuman	S6- Purano abad
Taluka Sehwan	S7- Wahir
S7- Shora	Taluka Dokri
S8- Mehrab	S8- Garelo
S9- Sain Dinao Mallah	S9- Faridabad
S10- K.B.Feeder canal	S10- Aarija
S11- Chakar Rajar	S11- Kot Chandka
S12- Ramzan Rajar	S12- Fatah pur
Taluka Thano Bula Khan	S13-Badrah
S13- Taj pur	S14- Sihar
S14- Khaisana	Taluka Larkana
S15- Faiz Muhammad	S15- Zakria Mahesar
S16- Karim Khan	S16- Dhamrah
S17- Muhammad Khan	S17- Faiz Muhammad
S18- Sada pur	S18- Habib Bughio
	S19- Bero Chandio
	S20- Rashid Wagan
	Taluka Rato Dero
	S21- Wasayo Bhutto
	S22- Kodrani
	S23- Zangeja
	S24- Khanwah
	S25- Noudero
	S26- Khairo Dero

The study was carried out in fixed stations within margins of District Jamshoro and Larkana during day time (09 am-04 pm) consecutively from March to October during the years 2011-2013. Pitfall trap and scoop net was used to capture adult specimens from each pond. Amphibian specimens were collected into aquarium till examined and identified at the spot. The amphibian species were identified through taxonomic key and literature [6] laterally by observation and measurement of morphological characteristics including body weight, dorsal and ventral body coloration, pattern of patches on dorsal side of body, mid-dorsal line present/absent, length of body (snout-vent); fore limbs; hind limbs and fingers, head wide/narrow, snout wide/pointed, diameter of eye and tympanum, loreal shape, canthus shape, tibio-tarsal articulation shape, toes blunt/pointed, inter-orbital space narrow/wide. The morphological characteristics were measured using weigh machine, metric ruler and divider.

Afterward each studied specimen was released into same pond where it was captured. All the study locals of each Taluka were surveyed on the same day so that amphibian status could be determined thoroughly at each study site (Table 1).

Results and Discussion

Present study recorded amphibian diversity of only four species *Bufo stomaticus* (family Bufonidae) *Hoplobatrachus tigerinus*, *Euphyctis cyanophlyctis* and *Allopa hazarensis* (Family Ranidae) out of 24 species existing in other areas of Pakistan [10-14]. Altogether 18 and 26 permanent amphibian locations (S) respectively in Jamshoro and Larkana were investigated regularly to confirm morphology, distribution and population of diverse amphibian species during the study of three years (Figure 1-3 and Table 2).

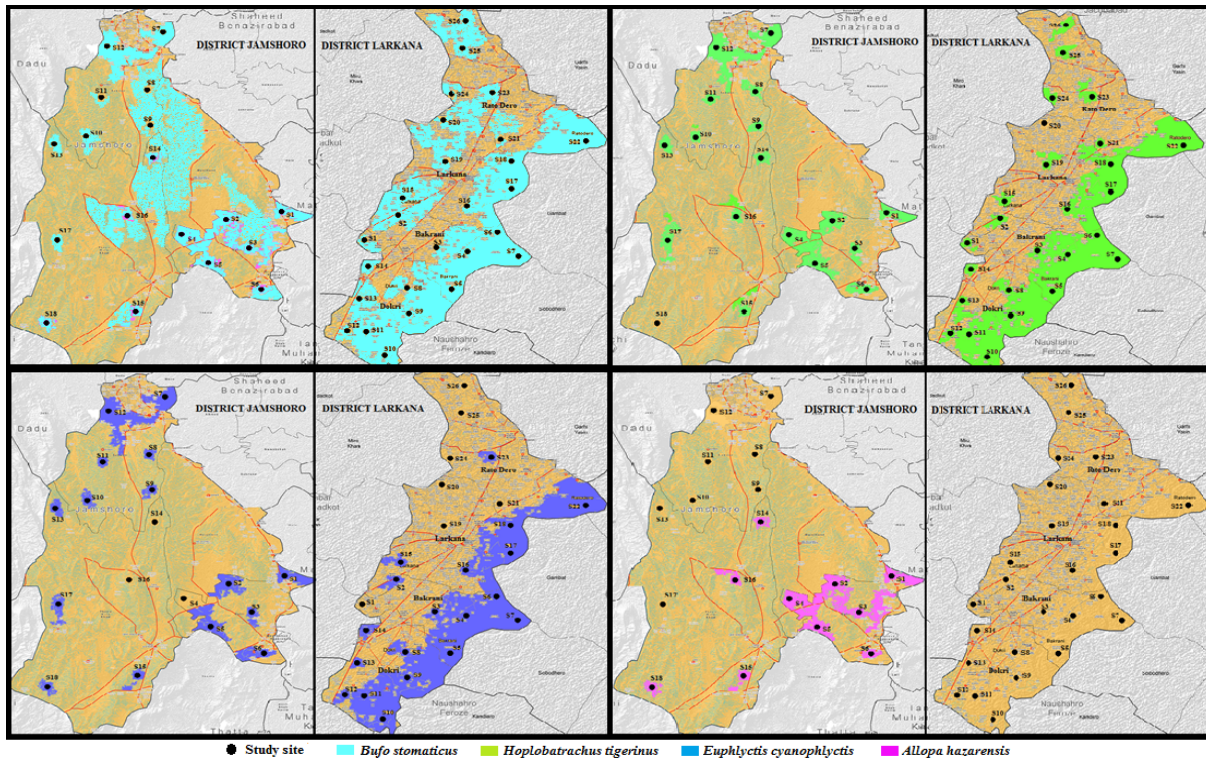
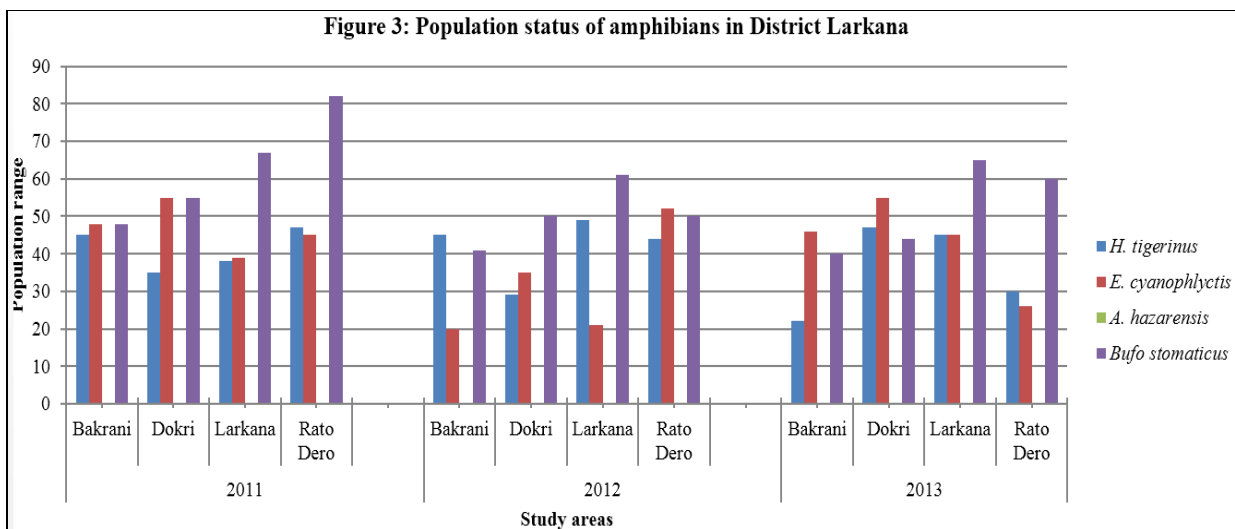
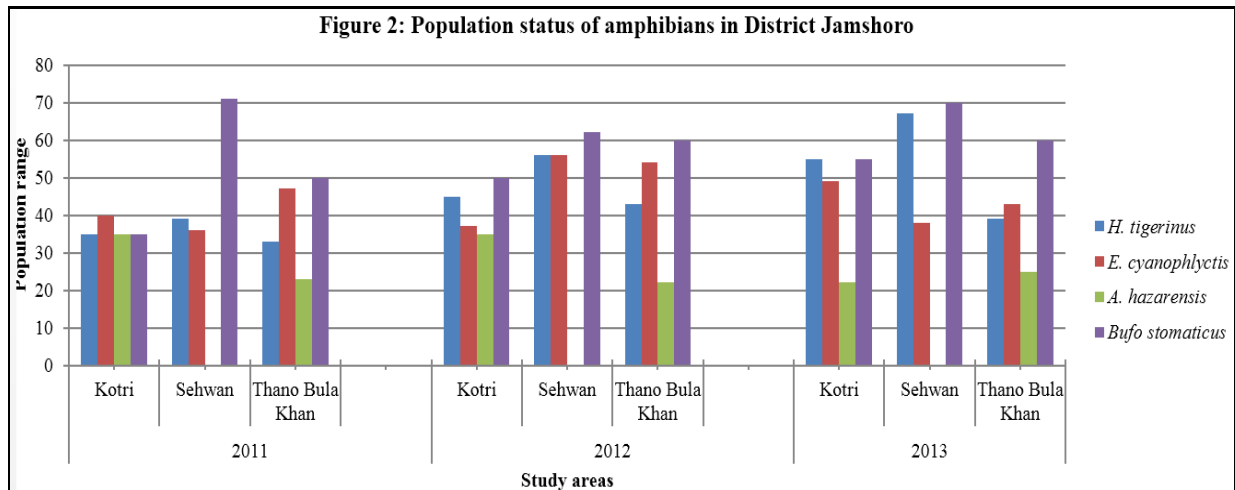


Fig 1: Distribution of amphibian species in Jamshoro and Larkana Disticts



***Bufo stomaticus* (Lutken, 1864)**

Morphological characteristics: All the specimens of *B. stomaticus* were found in light brown coloration with similar dark patches, blotches or mottling all over the dorsal side. Mottling was also found on legs, whereas cranial crests were entirely absent. The space between eyes was measured to be broad. The tympanic membrane was two third of the eye. First and second fingers were equal with a sub-articular tubercle. Spiny ridge was found on the tarsus. Tibial gland as well as parotid gland was longer than broad in all the specimens. Some specimens exhibited dark bands like strips on the forearm. All the examined specimens exhibited common morphological characteristics without any variation.

Distribution: The distribution of *B. stomaticus* is previously reported from Afghanistan, India, Iran, Nepal, Sri Lanka and Pakistan [10]. Present study confirmed its presence at all the study locals in both Districts i.e. Jamshoro and Larkana (Figure 1).

Population: Highest population (39.6%) of *B. stomaticus* was recorded in Taluka Sehwan, whereas its lowest population rate (27.3%) existed in Taluka Kotri. In District Larkana nearly same population status of *B. stomaticus* was recorded in three Talukas except Taluka Dokri where only 22.5% population persevered. The population of *B. stomaticus* was higher (56.4%) in District Larkana.

***Hoplobatrachus tigerinus* (Daudin, 1803)**

Morphological characteristics: It was found in dark green, olive green and brown dorsal coloration with dark spots or patches and longitudinal folds with mid-dorsal line. Ventral side of the body was white with feeble pigmentation only on the throat. Head was moderate, snout was pointed, canthus rostral was obtuse, nostril was located near to the end of the mouth and inter-orbital space was narrower than upper eyelid. Tympanic membrane was distinct, fingers were short, limbs with dark bars or blotches, thighs were posteriorly marbled with black and yellow color. Toes were moderate, obtuse and extensively webbed, sub-articular tubercles were also moderate. Inner metatarsal tubercle was strongly compressed and crescent shaped. All the specimens of *H. tigerinus* did not exhibit variation in physical features except dorsal body coloration i.e. green and brown.

Distribution: Previous studies showed distribution of *H. tigerinus* throughout the wetland areas of India, Bangladesh, Nepal, Myanmar [15], Bhutan, Sri Lanka and Afghanistan [1]. Maldives and Madagascar as well [16]. This specie was distributed in 17 study sites of District Jamshoro except study site 18 (village Sada pur), meanwhile it was dispersed in 25 study locations of District Larkana (Figure 1).

Population: *H. tigerinus* was disseminated in highest population (39.3%) at the Taluka sehwan; however its least population of 27.9% was recorded in Taluka Thanu Bula Khan. In District Larkana maximum population of this specie was carried out by Taluka Larkana, although minimum and approximately same range of *H. tigerinus* was embraced by Taluka Bakrani and Dokri. *H. tigerinus* population (53.6%) was more abundant in District Larkana.

***Euphlyctis cyanophlyctis* (Schneider, 1799)**

Morphological characteristics: Dorsal side of this species had the coloration of olive, yellowish brown or dark brown skin with small tubercles and distinct rows of pores. Ventral

side of the body was white and plan with moderate head. Snout was scarcely pointed, canthus rostral was indistinct, inter-orbital space was much narrower than the upper eyelid. Tympanic membrane of all specimens was distinct, fingers were pointed, thighs and legs exhibited same pattern of patches as dorsal side. Toes were pointed and extensively webbed like *H. tigerinus*. Sub-articular articulation was small, inner metatarsal tubercle was also small and conical, whereas nuptial spines were absent.

Distribution: This specie ranges throughout the South Asia including southern Afghanistan, Sri Lanka, Arabia, Thailand, Iran and India [17]. It has also been recorded from Sri Lanka [18]. In three study sites of District Jamshoro *E. cyanophlyctis* was completely absent; at the same time its distribution was also sporadic in District Larkana (Figure 1).

Population: Study in District Jamshoro revealed uppermost population of *E. cyanophlyctis* in Taluka Thanu Bula Khan, while its nethermost status was recorded at Taluka Kotri. Its population was discontinuous during the year 2011, 2012 and 2013 IN different Talukas. Comparative study showed 54.9% population of *E. cyanophlyctis* existing in District Larkana.

***Allopa hazarensis* (Dubois & Khan, 1979)**

Morphological characteristics: Dorsal body color of all *A. hazarensis* specimens was dark brown or dark grey with black spots or patches equally on legs. Lateral and dorsal folds were entirely absent. Ventral side of the body was devoid of any spackles. Head was longer than wide; however snout was round slightly projecting beyond the mouth. Canthus rostral was also rounded, loreal region was strongly concave and distance between nostrils was greater than width of upper eyelid. Nostril was as close to the tip of snout as to the eye, tympanic membrane was more or less round in sharp, a small vestige of pineal ocellus was present, dorsal tubercles found on the short longitudinal folds. Naris lied above the canthus; very few tubercles were present in the inter-orbital region, fingers were slender, sub-articular tubercle of fingers was longer than wide, while hind limbs were slightly long. Toes were fully webbed and inner metatarsal was longer than wide.

Distribution: This specie was first known to exist in Rush valley of Hazara Division of Pakistan, hence named as Hazara frog [6]. It is also reported from Jammu and Kashmir, India, Nepal and Bhutan [19]. Present study discovered *Allopa hazarensis* only from Taluka Kotri and Thanu Bula Khan of District Jamshoro. All the study sites of Taluka Kotri were encompassing *A. hazarensis* but Taluka Thanu Bula Khan's two locales (S-13 and 17) were devoid of the specie being discussed here (Figure 1).

Population: The population of *A. hazarensis* in whole District Jamshoro was recorded as least abundant as compared to other amphibian species. The status of *A. hazarensis* was higher in Taluka Kotri with 56.7% population, wherein Taluka Thanu Bula Khan comparatively lower population (43.2%) was recorded. *A. Hazarensis* was completely absent in whole District Larkana as well as in Taluka Sehwan of District Jamshoro (Figure 2-3).

The morphological characteristics of studied species did not exhibit any major morpho-taxonomic variation. *B. stomaticus* was recorded being widely distributed, whereas *A. hazarensis* was dispersed narrowly. The most populous amphibian specie was *B. stomaticus* in both District, but it was more abundant in District Larkana with 56.4% population. In District Jamshoro

A. hazarensis was recorded as least abundant with only 19.0% population, while in District Larkana *E. cyanophlyctis* existed in diminutive status.

The population range of whole amphibians was higher (55.0%) during 2011 in District Larkana, while in 2012 and 2013 amphibian population remained higher (54.1% and 51.7%) in District Jamshoro. Combined study of three years disclosed amphibian population higher in District Larkana, but District Jamshoro was richer in amphibian diversity (Figure 1).

The deforestation, environmental pollution and negligence towards conservation are main threats to amphibian sustainability. Therefore wild environment must be protected against encroachment for the sustenance of diversity, distribution and population of amphibian fauna.

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References

1. Ford LS, Cannatella D. The major clades of frogs. *Herpetological Monographs* 1993; 7:94-117.
2. Gordon MS, Schmidt NK, Kelly HM. Osmotic Regulation in the Crab-Eating Frog (*Rana cancrivora*). *Journal of Experimental Biology* 1961; 38:659-678.
3. Stuart SN, Chanson JS, Cox NA, Young BE, Rodrigues AS, Fischman DL *et al.* Status and trends of amphibian declines and extinctions worldwide. *Science* 2004; 306:1783-1786.
4. Arnold, Nicholas, Ovenden, Denys. *Reptiles and Amphibians of Britain and Europe*. Harper Collins Publishers, ISBN 0-00-219964, 2002, 73-74.
5. Khan MS. A normal table of *Rana tigrina* Daudin. Early development (Stages 1-27). *Pakistan Journal of Science* 1969; 21:36-50.
6. Khan MS. A checklist and key to the Amphibia of Pakistan. *Bulletin of Chicago* 2002; 55:158-163.
7. Khan MS. Annotated Checklist of amphibians and reptiles of Pakistan. *Asiatic Herpetology* 2004; (10):191-201.
8. Khan MS. Amphibians and Reptiles of Pakistan. *Pakistan Journal of Zoology* 2006; 2:40-47.
9. Khan MS. Amphibians of Pakistan. *Reptilia* 2008; 56:60-66.
10. Khan MS. Checklist of Amphibians of Pakistan. *Pakistan Journal of Wildlife* 2010; 1:37-42.s
11. Khan MZ, Nazia M. Impact of Habitat Destruction on the Population of Amphibians: Current Status of Frogs and Toads in Karachi and Thatta. LAP Lambert Academic Publishers, ISBN 978-3-8473-3684-6, 2012, 104-115.
12. Shaikh K, Gachal GS, Yusuf SM, Nabi G, Qadri AH, Afghan A. Checklist and Distribution of Amphibian fauna in Sindh, Pakistan. *Sindh University Research Journal* 2014; 46:159-162.
13. Kalsoom S, Gachal GS, Qadri AH, Yusuf SM. A preliminary checklist of amphibian fauna of District Larkana Sindh, Pakistan. *Multi-Disciplinary Edu Global Quest* 2013a; 2:26-32.
14. Kalsoom S, Gachal GS, Qadri AH and Yusuf SM. Checklist of True frogs (Family Ranidae) District Matiari Sindh, Pakistan. *International Journal of Advanced Research* 2013b 1:73-76.
15. Das I and Dutta SK. Checklist of the amphibians of India with English common names. *Hamadryad* 1998 23:63-68.
16. Dubois A, Ohler. A Frogs of the subgenus *Pelophylax* (Amphibia, Anura, genus *Rana*). *Zoology* 1995; 39:139-204.
17. Frost RD, Taran G, Faivovich H, Raoul B, Alexander H, Celio FB *et al.* The Amphibian Tree of Life. *Bulletin of American Museum of Natural History* 2006; 297: 1-291.
18. Boulenger GA. Fauna of British India. Reptilia and Batrachia 1890; 7:94-117.
19. Khan MS. Checklist, distribution and zoogeographical affinities of amphibians and reptiles of Balochistan. *Proceedings of the 7th Pakistan Congress of Zoology* 1987 19:105-112.