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Non-native Chelonians in the National Zoological Collections of Zoological Survey of India

Shantanu Kundu[1], Vikas Kumar[1*], B. H. C. K. Murthy[2] and Kailash Chandra[1]

[1]Zoological Survey of India, M - Bolck, New Alipore, Kolkata – 700053, West Bengal, India; vikaszsi77@gmail.com
[2]Western Ghat Regional Centre (WGRC), Zoological Survey of India, Kozhikode – 673006, Kerala, India

Abstract

The native species is the biological assets of a nation, however the non-native species is the threat for indigenous taxa. Thus, before describing any native or non-native species, it is required to thoroughly check the collateral information. As of now, many non-native species from different faunal group were invaded into the native eco-system and reported from India. In this study, we represent the check-list of non-native turtles and tortoises stored in National Zoological Collections of Zoological Survey of India to assure their taxonomic rank and distribution pattern. The list is enriched with the registration numbers, most recent species name, collection localities, conservation status, and other taxonomic information. This comparative data of 35 non-native turtles not only useful in taxonomic research, but also helpful to recognize the invasive species from India and quarantine regulation.

Keywords: Archival specimens, Conservation, Ecosystem, Exotic species, Taxonomy

Introduction

National Zoological Collections (NZC) of the Zoological Survey of India (ZSI) is the largest repositories of zoological specimens in India, holding a huge number of chelonians. Extensive surveys and explorations of faunal diversity within India and adjacent countries since the early 1800s have let ZSI to recognize as the most significant organization in systematic zoology in India. A total of 1173 turtle specimens were preserved in ZSI, in wet as well as in dry condition (Lehn *et al*., 2007). Many paleontological and zoological materials of turtles were collected from all over British India and often included from Middle East, Africa, North America, Central Asia, the Malayan Peninsula and Archipelago, and Eastern China. The collections and preservation of native as well as non-native turtle species was made by the naturalists during the scientific expeditions. Many non-native taxa were also received from museums such as Berlin, London, Karachi and Port Louis via exchanges or as donations (Murthy and Das, 2009). Such resources may be of dynamic importance being Holotype or other types, extant threatened species or extinct one. Briefly, the ZSI has provided an over-the-top contribution of chelonian research around the globe.

However, the contents of the non-native chelonian collections of the ZSI had remained unknown to the outside world due to non-availability of a catalogue. Although Das *et al*., 1998, documented reptile types in the collection of the ZSI, followed by a checklist on the voucher of collections in the ZSI by Murthy and Das in 2009, which however lack of comprehensive information of non-native chelonian species. In taxonomic research, the use of integrative approaches in the delineation of species and/or subspecies is not uncommon. Thus, over time, species concept, criteria, and the morphological characters used to differentiate species may alter (Sharon *et al*., 2006). The archival data provide researchers with the option to revisit morphological characters or advancing technologies to re-examine the previous descriptions or conclusions (Stuckas *et al*., 2013). The recent study suggested that the existence of three non-native turtle species, *Cyclemys fusca*, *Amyda ornata* and *Chitra chitra* in northeastern region of India evidenced by genetic information (Kundu *et al*., 2016). Further, the illegal trade of 'red-eared slider *turtle'Trachemys scripta elegans*,

* *Author for correspondence*

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native to western nations, is clearly established by the two arrested passengers on 19th July 2013 by Indian Customs Officials at the Netaji Subhas Chandra Bose International Airport in Kolkata. The biggest consignment of 10,043 non-native turtles were identified by the ZSI scientists and suspected of smuggling from China to Kolkata via Singapore. Furthermore, on 21 August 2015, The Times of India reported the same species from a water body within the Kolkata city premise in India. Thus, the information, especially the collection localities of a non-native chelonian further furnished a scope of expanding the range distribution in India as well as other geographical regions beyond the existing thoughts. The data of archival taxa further impelled to review their real existence or accurate distribution in wild as well as reassessment of any species by IUCN/SSC *Tortoise and Freshwater Turtle Specialist Group* (*TFTSG*) or other international organization, involved in the field of nature conservation and sustainable use of natural resources. Besides, the data of a non-native species also help to understand their native ranges to protect native species from havoc in same environment.

This research notes present a list of all non-native chelonian collections in the Zoological Survey of India, Kolkata. The table represents the registration numbers of the non-native chelonians, species name (nomenclature follows Fritz and Havaš, 2007, IUCN Red data List, http://www.iucnredlist.org/ and The Reptile Database, http://reptile-database.reptarium.cz/) and authors, collection localities and IUCN status (IUCN, 2017). The study encompasses 35 non-native chelonian species of seven families from the archival collections of ZSI. The related data were collected from the 'Species Card', 'Species Register' and from the tag of the available specimens and compared with the previous literatures. The figure represents the representative of non-native chelonian species preserved in National Zoological Collections of ZSI. The morphometric measurement of carapace and plastron were taken by Vernier slide calipers and photographs of *Chelydra serpentina* were taken by Nikon D3300 (AF-S Nikkor 8-55 mm lens). Further, the detailed morphology and additional molecular data of the studied specimens would substantiate to know the actual systematics to resolve many taxonomic quests.

Remarks

The collateral data of non-native Chelonians in Zoological Survey of India reflects the holding of archival collection in National Zoological Collections. The collection localities of a few species mentioned in Species Card or Species Register further obligate to revisit the morphological characters of preserved species. The species collected from Calcutta (=Kolkata) markets as well as from Zoological Garden, Calcutta, are might be donated sold by someone in local markets. Thus, the

Figure 1. Representative of exotic Chelonians (the common snapping turtle, *Chelydra serpentina*) preserved in Zoological Survey of India, Kolkata, species tag and morphometric measurements. HL = Head Length, SCL = Straight Carapace Length, SCW = Straight Carapace Width, CCL= Curved Carapace Length, CCW- Curved Carapace Width, SPL = Straight Plastron Length, SPW= Straight Plastron Width, BD = Body Depth.

Table 1. List of exotic chelonians in NZC of Zoological Survey of India, Kolkata. The registration numbers and collection localities were verified from the species card and ZSI registered

Sl. No.	Species Name and Authority	IUCN status 2016-3	Registration Numbers in Reptilia section	Collection localities
Family: Testudinidae				
1	*Aldabrachelys gigantea* (Schweigger, 1812)	Not assessed, Extinct species	14921	Mauritius
2	*Chersina angulata* (Schweigger, 1812)	Not assessed	808 (8a A.S.B)	South Africa
3	*Manouria impressa* (Günther, 1882)	Vulnerable	663 (1140)	Pegu, Burma
4	*Testudo marginata* (Schoepff, 1793)	Least Concern	16724	Zoological Garden, Calcutta
5	*Astrochelys radiata* (Shaw, 1802)	Critically Endangered	804 (2a A.S.B); 15487	South Africa; Madagascar
6	*Testudo hermanni* (Gmelin, 1789)	Near Threatened	507 (42); 508 (44); 509; 510 (51); 515 (41); 516; 517 (49); 518 (46)	Not Known
7	*Testudo graeca* (Linnaeus, 1758)	Vulnerable	300; 301; 519 (47); 11346; 11347; 11348	Karman, South East Arabia; Aunsb-Tin, near Lake Galille
8	*Testudo horsfieldi* (Gray, 1844)	Not assessed	3856; 5591; 5592; 5593; 5594; 5595; 5596; 5597; 5598; 5599; 5600; 15538; 15541; 15542; 15543; 16478; 16479; 16480; 15551; 15552; 793 (7a A.S.B); 11420	Safed-i-Rak, Kabul; Kelat, Baluchistan; Quetta; Khanai, Quetta; Afghanistan
9	*Geochelone platynota* (Blyth, 1863)	Critically Endangered	988 (1137); 2653 (181); 17049; 732; 787 (5a A.S.B.); 788 (5b A.S.B); 789 (5c A.S.B)	Akyal, Burma; North Pegu, Burma, Irrawaddy River near Yenangyat, Pukokuku Dist. Burma; Upper Burma
10	*Indotestudo forstenii* (Schlegel and Müller, 1845)	Endangered	17697; 17017; 18045; 24520	Cochin states forest, Kerala; Punalur, Travancore, Kerala
Family: Geoemydidae				
11	*Mauremys japonica* (Temminck and Schlegel, 1835)	Lower Risk/Near Threatened	1418	Japan
12	*Heosemys spinosa* (Gray, 1830)	Endangered	11693	Serawak
13	*Heosemys annandalii* (Boulenger in Annandale and Robinson, 1903)	Endangered	18914	Western Bangkok, Siam
14	*Batagur trivittata* (Duméril and Bibron, 1835)	Endangered	744; 1443	Burma
15	*Notochelys platynota* (Gray, 1834)	Vulnerable	1021; 1021; 1323 (792); 1326 (934);	Burma

16	*Heosemys depressa* (Anderson, 1875)	Critically Endangered	490 (1008); 1176 (1309); 1319 (2303); 1322 (1656)	Arakan, Burma
17	*Mauremys reevesii* (Gray, 1831)	Endangered	18028; 18029; 18030; 18031; 18032; 18033	Tong-Dong-Ding, Tai- Hu, Kiangsu Province, China; Tai- Hu, Kiangsu Province, China
18	*Mauremys caspica* (Gmelin, 1774)	Not assessed	18892; 18893; 18894; 296; 297; 298; 299; 505; 19238; 18894; 22952; 23714	Nasiriyeh Euphratis River, Mesopotomia; North Persia; Caspian Sea; Shatta- el- Arab, Iraq; Central Iraq
19	*Cyclemys dentata* (Gray, 1831)	Lower Risk/near threatened	760 (1438); 775 (408); 18568; 1332 (901); 18593; 18594; 19235; 20023; 20449; 335; 339; 340; 341; 1328; 1329; 1330; 1333; 18482; 13; 410; 12603; 820; 821; 994 (753); 1356 (544); 1320 (1484); 1325 (1300); 1327 (1926)	Burma; Tura, Garo Hills, Assam; He-Hah, South Shan states; Fort Stedman Inte Lake, South Shan states; Sattau Chaung stream Myitkyina, Dist. Upper Burma; Narainpur Tea Estate, Cachar, Assam; Calcutta, India market; Akyab, Burma; Sibsagar, Assam; Joranti River, West Dooars; Arakan Hills, Burma; Tenasserium, Burma
20	*Heosemys grandis* (Gray, 1860)	Vulnerable	918 (354); 920 (361); 921 (375); 922 (388); 13008 (2006); 1783 (2469); 2052; 923 (406); 1309; 1311 (1626); 1307 (2179); 20474; 916 (347); 1310 (2065); 1315 (2910); 1316 (2495); 1487 (2318); 1490 (2529); 699 (410); 917 (351); 926 (436); 927 (439); 815; 2052; 710 (388); 729	Burma; Enoshima, Japan; Tenasserim, Burma
21	*Siebenrockiella crassicollis* (Gray, 1830)	Vulnerable	648 (301); 834 (16a A.S.B); 835 (16b A.S.B); 1378; 18039; 18040; 15; 3862; 18023; 18024; 567 (933); 639 (322); 764 (1073)	Burma; Lanpung, Patalung, Siam; Penang; Singgora, Siam; Lungpung, Patalung, Siam
22	*Morenia ocellata* (Duméril and Bibron, 1835)	Vulnerable	178; 179; 180; 181; 182; 183; 185; 186; 187; 191; 199; 203 (364); 206 (59); 207 (377); 208 (386); 209 (298); 211; 1601 (321); 946 (223); 1460 (295); 1464 (418); 935; 939 (129); 1019 (408); 1468 (313); 1469 (283); 1470 (204); 1483 (146); 1473; 2042; 859; 861; 860; 862; 863; 864; 940 (136); 941 (155); 942 (201); 947 (232); 948 (233); 950 (281); 951 (284); 952	Akyab; Burma; Pegu

23	*Malayemys subtrijuga* (Schlegel and Müller, 1845)	Vulnerable	18025; 18027; 18041; 824 (13a A.S.B); 825 (13b A.S.B); 826 (13c A.S.B); 18041	Lampam, Patalung, Siam; Singgora, Siam; Java
24	*Mauremys rivulata* (Valenciennes, 1833)	Not assessed	11349; 11350; 11351; 11352; 11353; 17055; 17056	Sea of Galifee; West of Es-semakh, lake, Palestine; Palestine
Family: Trionychidae				
25	*Pelochelys bibroni* (Owen, 1853)	Vulnerable	20478	Calcutta (market)
26	*Pelodiscus sinensis* (Wiegmann, 1835)	Vulnerable	279; 4693; 4694; 4695; 18034; 18035; 18036;	Shanghai, China; Hiknoe Lake, Biwa, Japan; Taittu, Kiangsu Province, China
27	*Dogania subplana* (Geoffroy Saint-Hilaire, 1809)	Lower Risk/least concern	661 (1010); 11589; 13468; 13469	Sinkipls, East coast of Sumatra; Kingsls. Mergui, Archipelago
28	*Nilssonia formosa* (Gray, 1869)	Endangered	1051; 1785; 1786; 688 (943); 634; 1785; 1786; 1787; 1837; 766; 277; 278; 687 (942)	Burma; Moulmein; Irrawaddy River; Mandaley
Family: Emydidae				
29	*Chrysemys picta* (Schneider, 1783)	Least Concern	418	North America
30	*Trachemys scripta* (Schoepff, 1792)	Least Concern	444; 3860	North America
31	*Clemmys guttata* (Schneider, 1792)	Endangered	395; 397	North America
32	*Emys orbicularis* (Linnaeus, 1758)	Lower Risk/near threatened	302; 485; 978	Enzelion on Caspian Sea; Berlin Museum;
Family: Kinosternidae				
33	*Kinosternon subrubrum* (Lacépède, 1788)	Least Concern	391 (1559)	North America
Family: Chelydridae				
34	*Chelydra serpentina* (Linnaeus, 1758)	Least Concern	12014; 426; 12288; 12293	Karachi; North America
Family: Platysternidae				
35	*Platysternon megacephalum* (Gray, 1831)	Endangered	873; 205; 16040; 16720	Martaban, Burma; Tonghu, Burma; Dawna Hills, Lower Burma; Sukli East side of Dawana Hills, Lower Burma

exact collection localities of that species are unknown. Further, in two genera, viz., *Cyclemys* and *Indotestudo*, the distribution information of their congeners is very poor. In recent reviews, the diversity of *Cyclemys* congeners were described in detail: *C. atripons* are distributed in South-eastern Thailand, including the Ko Chang and Ko Kut islands, South-western Cambodia; *C. dentata* are distributed in Southern Malay Peninsula, Sumatra, Java, Borneo and nearby small islands, Palawan Islands and Sulu Archipelago, Philippines, introduced in Leyte and some other islands of the Philippines; *C. pulchristriata* are distributed in Central and Southern Vietnam; Easternmost Cambodia; *C. oldhamii* are distributed in Central and Southern Myanmar (Burma), Central and

Northern Thailand, Laos, Northern Cambodia, Northern and Central Vietnam, perhaps neighboring Southern China; *C. enigmatica* from Malaysia to Sumatra, Java and up to Borneo, Indonesia; *C. fusca* from Myanmar; and *C. gemeli* from Northeast India (Fritz *et al*., 2008; Praschag *et al*., 2009; Kundu *et al*., 2016). Furthermore, the congeners of *Indotestudo* reportedly inhabit distant geographical locations; *I. forstenii* is the oldest named species and is believed to be restricted in Sulawesi, Indonesia; *I. elongata* is distributed through east and northeast India, Myanmar, LAOs, Thailand, Cambodia to Vietnam; and *I. travancorica* is restricted in South India (Kundu *et al*., 2012). Thus, the collection localities of *C. dentata* from Tura, Garo Hills as well as from Sibsagar in Assam states of Northeast India and the collection localities of *I. forstenii* in Cochin states forest, Kerala listed here warrant reexamination of the species identification through in-depth morphological studies.

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