# Chapter 17

## Freshwater Turtles of India: Status and Management in Captivity

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### Introduction

Freshwater wetlands are home to a diverse assemblage of flora and fauna – both microbial and macro. Chelonians are one such group which has made freshwater rivers, lakes, ponds and estuaries their home. Chelonians are by far the most ancient quadraped vertebrates on earth and India is home to a large and diverse assemblage of this order (Das, 1985; 1995; 2002; Das and Andrews, 1997). It ranks among the top five Asian countries in terms of its importance for turtle conservation (Stuart and Thorbjarnarson, 2003). Twenty eight species of tortoises and freshwater turtles have been reported from the Indian subcontinent. Unfortunately, nearly 40% (11 of 28 species) are listed as either Endangered or Critically Endangered on the IUCN Red List. Three of these 28 species of tortoises and turtles, the *Indotestudo travancorica* (Travancore Tortoise), *Nilssonia leithii* (Deccan Softshell turtle) and *Vijayachelys silvatica* (Cochin ForestCane Turtle) are endemic to India. Northeast India has the largest species diversity with 24 species. The Indo-Gangetic plain and the Terai region also has a diverse chelonian fauna with the occurrence of 20 species (Das, 2002; Rao, 1990). Species richness and diversity in India has both national and global significance.

The ever-increasing human pressures on turtle habitats such as sand mining, agriculture, reclamation of wetlands and riparian areas, alteration of rivers for irrigation and generation of hydroelectric power, pollution, siltation, eutrophication, and intensive fishing have not only taken a heavy toll of turtle biomass, but also have disrupted nesting and reproduction. In northeast India, tortoises get burnt alive during controlled burning of grassland in some protected areas. Several freshwater turtles are still directly exploited for both local consumption and export, (Choudhury and Bhupathy, 1993). This has decimated turtle populations and threatened them with extinction. Although several species receive protection in PAs there have been few concerted efforts to conserve Indian chelonians or breed them in captivity.

Scanty information on ecology and biology of Indian turtles is available (Moll, 1984). Extensive field surveys for the identification and studying the ecology of freshwater turtles were conducted by Rao (1990) As part of the Ganga Action Plan, the Government of India supported a rearing and release programme of the Uttar Pradesh Forest Department. Under this programme two turtle rehabilitation centres were established in the state; one at Sarnath, Varanasi and the other at Kukrail, Lucknow. The Ganges River System, between 1985 and 1993, was restocked with over 40,000 captive reared turtles. However this included only *Nilssonia gangetica* to clear corpses and carcasses from the river, and the project came to a premature end due to lack of funds.

There is an increased awareness on the need for conservation action for protection of freshwater chelonians. However, major gaps exist in our knowledge of the ecology and behaviour, distribution and status, taxonomy and identification of sexes of this increasingly threatened group. Ex-situ studies can provide the bridge to these gaps, especially in behaviour, taxonomy and identification of sexes.

The status of various freshwater turtles of India in captivity in Indian zoos was accessed from information of the Central Zoo Authority of India (cza.nic.in) website. The sections discussing management in captivity and status in wild have been drafted after a review of available literature. *Vijayachelys sylvatica, Melanochelys tricarinata and Cuora mouhotii* have not been included here.

## Results and discussion

### Conservation Status freshwater turtles

Freshwater turtles occupy a variety of habitats from rivers, freshwater lakes and ponds to brackish water and estuaries. Each of these habitats is exploited differently by man and accordingly turtles are under varying degree of threats. **Table-1** below summarizes the Wildlife Protection Act Status and the IUCN Red List status and criteria for inclusion. Eighteen of the 21 species of freshwater chelonians currently found in India are under varying degree of threats, they are listed both, in the different schedules of the WPA and IUCN Red List or in either one of them.

**Table-1: Conservation status of Indian freshwater turtles.**

| Sl. No. | Species | Common name | WPA Status | IUCN Red List Status and Criteria |
|---|---|---|---|---|
| 1. | *Batagur baska* | River Terrapin | Schedule 1 Part II | Critically Endangered A1cd |
| 2. | *Batagur kachuga* | Red Crowned Roofed Turtle | Schedule 1 Part II | Critically Endangered A1cd |
| 3. | *Chitra indica* | Chitra Turtle | Not listed | Endangered A1cd+2cd |
| 4. | *Batagur dhongoka* | Three Striped Roofed Turtle | Not listed | Endangered A1cd+2cd |
| 5. | *Pangshura sylhetensis* | Assam Roofed Turtle | Not listed | Endangered B1+2c |
| 6. | *Pelochelys cantorii* | Cantor's giant softshell turtle | Not listed | Endangered A1cd+2cd |
| 7. | *Nilssonia nigricans** | Black Softshell turtle | Not listed | Possibly extinct in the wild, However recent reports indicate the presence in north-east Assam |
| 8. | *Nilssonia gangetica* | Indian/Ganges Soft-shelled Turtle | Schedule 1 Part II | Vulnerable A1d+2d |
| 9. | *Amyda cartilaginea* | Asiatic Softshell Turtle | Not listed | Vulnerable A1cd+2cd |
| 10. | *Nilssonia hurum* | Peacock Soft shelled Turtle | Schedule 1 Part II | Vulnerable A1cd+2d |
| 11. | *Nilssonia leithii* | Deccan Softshell Turtle | Not listed | Vulnerable A1c |
| 12. | *Cuora amboinensis* | Malayan Box Turtle | Not listed | Vulnerable A1d+2d |
| 13. | *Geoclemys hamiltonii* | Spotted Black Terrapin | Schedule 1 Part II | Vulnerable A1d+2d |
| 14. | *Hardella thurjii* | Brahminy Terrapin | Not listed | Vulnerable A1cd+2cd |
| 15. | *Morenia petersi* | Indian Eyed Turtle | Not listed | Vulnerable A1cd+2d |
| 16. | *Cyclemys dentata*, *Cyclemys oldhamii* | Asian leaf turtle | Not listed | Low risk/ near threatened |
| 17. | *Pangshura smithii* | Brown Roofed Turtle | Not listed | Low risk/ near threatened |
| 18. | *Melanochelys trijuga* | Indian Pond Terrapin or Black Turtle | Not listed | Low risk/ near threatened |
| 19. | *Pangshura tecta* | Indian Roofed Turtle | Schedule 1 Part II | Low risk/ least concern |
| 20. | *Pangshura tentoria* | Indian Tent Terrapin | Not listed | Low risk/ least concern |
| 21. | *Lissemys punctata* | Indian Mud or Flap Shell Turtle | Schedule 1 Part II | Low risk/ least concern |

**Status in captivity**

The status of freshwater turtles in captivity in various Indian zoos is provided in **Table-2**. A perusal of the table suggests that most of the turtle species are poorly represented in Indian zoos with skewed/ undetermined sex ratios. Accordingly the breeding of these turtle species, several of which are highly threatened is still poorer. Of a total of 21 freshwater turtle species only 7 are represented in captivity besides this there were 143 specimens in captivity which could not be identified.

**Table-2: Status of freshwater turtles in Indian Zoos.**

| Sl. No. | Common Name | Species | No. of Zoos | Captive Population | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Births | M | F | U | T |
| 1. | Indian/Ganges Soft-shelled Turtle | *Nilssonia gangetica* | 6 | 0 | 4 | 5 | 38 | 47 |
| 2. | Peacock Soft shelled Turtle | *Nilssonia hurum* | 1 | 0 | 0 | 0 | 2 | 2 |
| 3. | Red Crowned Roofed Turtle | *Batagur kachuga* | 1 | 6 | 0 | 0 | 14 | 14 |
| 4. | Indian Roofed Turtle | *Pangshura tecta* | 3 | 0 | 5 | 9 | 2 | 16 |
| 5. | Indian Tent Terrapin | *Pangshura tentoria* | 3 | 0 | 1 | 1 | 4 | 6 |
| 6. | Indian Mud or Flap Shell Turtle | *Lissemys punctata* | 17 | 2 | 51 | 33 | 306 | 390 |
| 7. | Indian Pond Terrapin or Black Turtle | *Melanochelys trijuga* | 8 | 0 | 12 | 19 | 55 | 86 |
| 8. | Red Eared Terrapin** | *Trachemys scripta elegans* | 2 | 0 | 4 | 1 | 798 | 803 |
| 9. | Unidentified Turtles | Unidentified turtle species | 16 | 0 | 18 | 31 | 94 | 143 |

M: Male, F: Female,
U: Unsexed and
T: Total

** The species is not a native of India and individuals in captivity probably owe their presence to confiscated animals as the species is common in the pet trade.

Freshwater turtles in captivity with reference to their IUCN Red List status are presented in Plate 17 A. It may be inferred that species which are in urgent need of ex-situ conservation efforts are poorly represented whereas species which at lower risk are relatively more abundant.

**Status of information available on biology and ecology of freshwater turtles**

The biological and ecological information collected from various sources available for freshwater turtle species occurring in India is summarized in **Table-3**. The table suggests that while some baseline information is available for most of the species critical gaps remain for most of the species. Information on age of maturity and life spans are noticeably missing for all the species. Information on reproduction, breeding seasons and rearing protocols for juveniles is lacking for several species.

**Table-3 Information available on habitat preferences and biology of freshwater turtles**

| S.N | Species | Habitat preference | Food preference | Nesting areas | Breeding Season | Clutch Size | Incubation period |
|---|---|---|---|---|---|---|---|
| 1. | *Batagur baska* | Tidal areas of estuaries of large rivers | Mainly herbivorous; plant material at lower salinities, but also eats mollusks, crustaceans and fish | Communal nesting on sandbars in the tidal zone | Mating; prior to and beginning of monsoon. Nesting late December to early March | 5 – 60 eggs | 68 – 112 days |
| 2. | *Batagur kachuga* | Large deep flowing rivers | Herbivorous | – | Nesting in March – April | 15 – 30 eggs | Exact duration not known, hatchlings appear in May or June |
| 3. | *Chitra indica* | Clear sand bottom stretches of large rivers | Mainly carnivorous; fish, snails, shrimps, mollusks and some amount of plant material | Sand or sandy loam | Nesting from August to mid September | 65 – 187 eggs | – |
| 4. | *Batagur dhongoka* | Large deep rivers | Herbivorous, may occasionally eat snails | Sand banks | Nesting from March to April | 16 – 35 eggs | Exact duration not known, hatchlings appear in May - June |
| 5. | *Pangshura sylhetensis* | Rivers and oxbow lakes with emergent macrophytic vegetation | Omnivorous; plant parts of emergent macrophytic vegetation, aquatic invertebrates and fish | – | – | – | – |
| 6. | *Pelochelys cantorii* | Freshwater streams and deep slow moving rivers, brackish coastal waters, captures have also been reported from sea | Omnivorous; aquatic invertebrates, fish and aquatic plants | – | Nesting February – March | 20 – 28 eggs | – |
| 7. | *Nilssonia nigricans* | Temple pond in Bangladesh | – | Earth banks | Feb – May | 6-38 eggs | 96 – 104days |
| 8. | *Nilssonia gangetica* | Any large, deep and turbid water body | Omnivorous; mollusks, insects, fish, amphibians, waterfowl and carrion | Sand banks | Mating during Monsoon Nesting from May to January, with a peak in December to January | 8 – 47 eggs | 251 – 310 days |
| 9. | *Amyda cartilaginea* | Both upland and lowland streams, ponds and swamps | Carnivorous; fishes, amphibians, crustaceans, aquatic insects and other invertebrates. | Mud banks | No fixed breeding season | 5 – 7 eggs 3 – 4 times a year | 135 – 140 days |
| 10. | *Nilssonia hurum* | Rivers, streams, ponds and lakes with mud or sand bottom | Carnivorous; snails, insects and fish | – | Nesting in winter | – | – |

| S.N | Species | Habitat preference | Food preference | Nesting areas | Breeding Season | Clutch Size | Incubation period |
|---|---|---|---|---|---|---|---|
| 11. | *Nilssonia leithii* | Reservoirs shallow stretches of rivers and streams with mud or sand bottom | Carnivorous; aquatic invertebrates, fish, amphibian tadpoles and some plant material | – | – | – | – |
| 12. | *Cuora amboinensis* | Water bodies with soft bottoms and slow currents | Herbivorous | | Nesting takes place April - June | 1 -5 eggs; 2 - 4 clutches | – |
| 13. | *Geoclemys hamiltonii* | Shallow water bodies with slow current and dense vegetation | Carnivorous; aquatic invertebrates, fishes and amphibian larvae | Mud banks | Monsoon – from may – October | 26 – 36 eggs 2 clutches per season | ~74 days |
| 14. | *Hardella thurjii* | Shallow water bodies with slow current and dense vegetation | Herbivorous; aquatic plants | Sandy soil | Mating April – July, Nesting August – September | 14 – 19 eggs | – |
| 15. | *Morenia petersi* | Slow moving rivers, ponds and swamps | Omnivorous | – | Mating in winter nesting from April - May | 2 eggs | – |
| 16. | *Cyclemys dentata/ Cyclemys oldhamii* | Shallow streams in both mountains and lowlands | Omnivorous | – | – | 2 -4 eggs per clutch and 4 – 5 clutches each year | – |
| 17. | *Pangshura smithii* | Rivers and large canals with muddy water | Omnivorous; plants, crustaceans and occasional scavenging | Sand banks | Nesting August to mid-September | 3 – 11 eggs | – |
| 18. | *Melanochelys trijuga* | Ponds, streams and rivers with clean water | Herbivorous; may occasionally scavenge | Eggs have been recovered from grassland latrines of rhinoceros | Throughout the year | 3 – 6 eggs | 60 – 65 days |
| 19. | *Pangshura tecta* | Soft bottom, sluggish streams, canals and oxbows, also reported from coastal brackish waters | Omnivorous; it also scavenges | – | Mating and nesting during October to march | 3 – 14 eggs, may lay two clutches in each season | 70 – 144 days |
| 20. | *Pangshura tentoria* | Rivers | Mainly herbivorous but occasionally take animal food | | Egg laying October to November | 3 - 10 eggs | - |
| 21. | *Lissemys punctata* | Shallow stagnant waters with soft bottom | Omnivorous; frogs, fishes, aquatic invertebrates and plant material | Loamy soil near swampy areas where sunlight is available | Nesting from September to November (June – October) Western India | 34 – 40 eggs, 2 -3 clutches each year | 241 – 409 days |

It is recommended that adult turtles be captured from the wild and maintained in captivity. The number of captive individuals can be increased by collecting eggs from the wild and rearing them in captivity. While collecting eggs or collecting eggs from the wild care must be taken to ensure that they come from different locations. This would maximize genetic diversity of the founder population.

All individuals should be appropriately marked at the time of their entry into captivity (all eggs should also be marked and as hatchlings emerge these should also be marked). Detailed records for all individuals in captivity on location of capture/egg collection, parentage details, behavioural patterns, reproductive history and records of all health care interventions should be maintained. These records should be used to plan mating between individuals. The ex-situ program should be strongly linked to the in-situ conservation efforts and be targeted to produce surpluses for reintroduction/ restocking wherever appropriate. All reintroductions/restockings should be carried out in consonance with relevant IUCN guidelines and should have a well defined post-release monitoring program.

Selection of species for conservation breeding and display needs to be prioritized based on the conservation status of species. Those having greater threat perception should receive high priority for ex-situ programs. The selected sites for initiation of such programs must be within the natural range of the occurrence of the species. Accordingly **(Table-4)** species have been ranked in order of their threat perception and suitable sites are suggested for establishment of ex-situ facilities.

**Table-4: Distribution of Freshwater turtles in India and suggested centers for ex-situ conservation.**

| Species | Distribution (States) | Existing zoos/ conservation breeding centres to initiate ex-situ conservation |
|---|---|---|
| *Batagur baska* | AP, OA | Establishment of a breeding centre in Sunderbans |
| *Batagur kachuga* | MP, RJ, PU, UP, BH, WB | Kukrail, Lucknow and Deori, Morena |
| *Chitra indica* | TN, AP, OA, MP, MH,RJ, PU, UP, BH, WB, AM | Madras Crocodile Bank Trust, Kukrail, Lucknow and Deori, Morena |
| *Batagur dhongoka* | MP, RJ, UP, BH, WB, AM | Kukrail, Lucknow and Deori, Morena |
| *Pangshura sylhetensis* | WB, MG, AM, AR, NG, MZ | Assam State Zoo, Gauhati |
| *Peleochelys cantorii* | TN, KL, OA, WB, | Madras Crocodile Bank Trust, Nandankannan Biological Park, Bhubaneswar |
| *Nilssonia nigricans* | AM | Assam State Zoo, Gauhati |
| *Nilssonia gangetica* | OA, MP, GJ, RJ, HY, PU, JK, UP, BH, AM, MN | Kukrail, Lucknow and Deori, Morena |
| *Amyda cartilaginea* | MZ | Establishment of a breeding centre in Mizoram |
| *Nilssonia hurum* | OA, MP, MH, RJ, UP, NH, WB, AM, AR, MN | Nandankannan Biological Park, Bhubaneswar, Kukrail, Lucknow and Deori, Morena |
| *Nilssonia leithii* | TN, KL, KA, AP, OA, MP, MH, UP | Madras Crocodile Bank Trust, Kukrail, Lucknow and Deori, Morena |
| *Cuora amboinensis* | AM,AR, NG, MN | Assam State Zoo, Gauhati and Manipur Zoological Garden, Imphal |
| *Geoclemys hamiltonii* | KL, RJ, PU, JK, UP, BH, WB, AM, AR | Madras Crocodile Bank Trust, Kukrail, Lucknow and Deori, Morena |
| *Hardella thurjii* | MP, RJ, PU, UP, BH, WB, MG, AM | Kukrail, Lucknow and Deori, Morena |
| *Morenia petersi* | UP, BH, WB, AR | Kukrail, Lucknow and Deori, Morena |
| *Cyclemys dentata* | WB, MG, AM, AR, MN, MZ | Assam State Zoo, Gauhati and Manipur Zoological Garden, Imphal |
| *Pangshura smithii* | PU, JK, UP, BH, AM | Assam State Zoo, Gauhati, Kukrail, Lucknow and Deori, Morena |
| *Melanochelys trijuga* | TN, KL, KA, AP, MH, GJ, HP, UP, BH, WB,SK, MG, AM | Madras Crocodile Bank Trust and Kukrail, Lucknow |
| *Pangshura tecta* | OA, MP, MH, GJ, RJ, PU, JK, UP, BH, WB, MG, AM, AR, MZ | Kukrail, Lucknow, Nandankannan Biological Park, Bhubaneswar and Deori, Morena |
| *Pangshura tentoria* | OA, MP, MH, GJ, RJ, UP, BH, WB, AM, AR, MN, MZ | Kukrail, Lucknow, Nandankannan Biological Park, Bhubaneswar and Deori, Morena |
| *Lissemys punctata* | TN, KL, KA, GA, AP, OA, MP, MH, GJ, RJ, HY, PU, JK, UP, BH, WB, SK, MG, AM, AR | Madras Crocodile Bank Trust, Kukrail, Lucknow and Deori, Morena |

Species ranked in order of conservation status; Selection of on basis of range of occurrence and the presence of captive breeding facilities/zoos in those areas.

AM=Assam; AP=Andhra Pradesh; AR=Arunachal Pradesh; BH=Bihar and Jharkhand; GA=Goa; GJ=Gujarat; HP=Himachal Pradesh; HY=Haryana; JK=Jammu and Kashmir; KA=Karnataka; KL=Kerala; MG=Meghalaya; MH=Maharashtra; MN=Manipur; MP=Madhya Pradesh and Chhattisgarh; MZ=Mizoram; NG=Nagaland; OA=Orissa; PU=Punjab; RJ=Rajasathan; SK=Sikkim; TN=Tamil Nadu; TR=Tripura; UP=Uttar Pradesh and Uttaranchal; WB=West Bengal; ***Distribution states - source: Choudhury et al., 2000, Bhupathy and Menon, 2003***

**Captive Management**

The few existing programs (*e.g.*, Deori Gharial Center at Morena, Madhya Pradesh Kukrail Gharial Breeding Center at Lucknow, Uttar Pradesh and Madras Crocodile Bank at Mammalapuram, Tamil Nadu), some of which while achieving important breakthroughs such as the record captive breeding of *Batgaur kachuga* at the Madras Crocodile Bank and at Kukrail, were modest in scope. These limited captive breeding efforts restricted to few species were on a scale unlikely to exert a measurable impact on the recovery of wild turtle populations. There needs to be a shift in the focus of these programs on a select number of species in captivity, rearing and reintroducing them into wild to maintaining viable *ex-situ* populations of all species with appropriate housing. The focus should be on managing genetically viable and demographically stable populations that can produce surpluses for reintroduction. All reintroduction efforts should be made in consonance with IUCN guidelines and initiated only when suitable habitats with adequate protection and post release monitoring protocols are in place.

Individuals entering an ex-situ conservation program will have to be managed intensively. Suitable enclosures that fulfill minimal requirements of the species have to be designed and constructed before bringing the species into captivity. A schematic layout of designs for enclosures for display (Plate 17 B) and conservation breeding (Plate 17 C) respectively are given. Designs will change according to the species and location. While designing enclosures care must be taken to ensure that they simulate the naturalistic conditions to a large extent. This will allow the captive individuals to maintain their behavioral repertoire of natural behaviours essential to their survival in the wild. Sanitation, health care also needs consideration while designing the enclosures. Water filtration units with sufficient capacity, should be installed with each enclosure to maintain water-quality and reduce water-borne infections to which all chelonians are susceptible. Turtles in captivity are susceptible to shell rot and enteric disorders in captivity. Good sanitation such as removal of leftover food and continuous circulation of clean water in the ponds will go a long way in maintaining hygiene in the enclosure.

The sides of the enclosures should be vermin proof and the tops should be covered with wire mesh to prevent the entry of predators. The ponds should have a gradual incline on the sides to facilitate turtle entry and exit from the ponds. The centre of each pond should be of adequate depth depending on the species housed. The enclosures should be exposed to direct sunlight for atleast a part of the day to allow basking and also for sex differentiation during hatching of eggs. Each species has a unique nesting requirement. Based on this nest sites with adequate depth and type (Sand/Mud) can be provided in the enclosures. The enclosures should have elevated platforms that are easily accessible for basking and display. Besides this the turtles should have hiding places like crevices for hiding from conspecifics. Similarly the feed being provided and the depth of the water body needs to be monitored on a regular basis.

Turtles are voracious and versatile feeders. In order to have a clear understanding of the quantity required initially ad-libitum feed should be provided and gradually reduced till no feed is leftover. This can then be taken as the optimum quantity of feed. Diets should be as close to food preferences in free ranging counterparts, because these animals are being targeted for reintroduction. Surrogate feed should only be provided when natural feeds are not available. The feeding regime should be developed to provide a complete balanced diet to all individuals in captivity. The feeding protocol should be formulated based on the physiological needs, growth needs and maintenance needs. For all species having carnivorous food preferences live prey should be provided wherever possible. The animals would retain the instinct of predation and the presence of live prey would be a stimulant to express naturalistic behaviours in captivity. It is essential that appropriate supplements are provided along with the feed as in captivity access to natural feeds is restricted and balanced nutrition through diets alone cannot be ensured. It is pertinent to mention here that the feeds being provided should be periodically tested for nutrient quality, microbial load and contaminants if any.

**Conclusions**

Rapidly expanding human population, large scale changes in land use/landcover, burgeoning development projects and improper use of watersheds have all caused a substantial decline of wetland resources of the country. This has resulted in loss of crucial habitats for several faunal types, prominent among which are freshwater turtles. India has a documented species richness of 24 species of freshwater chelonians of which 18 have varying threat perceptions. Large gaps still remain in our knowledge of the biology and ecology of most species. In view of this, it is recommended that species that are under threat in the wild be intensively managed

in a program with dynamic *in-situ – ex-situ* linkage. Conservation breeding centres in existing zoos or new facilities may be established within their natural ranges and the program be targeted for producing surpluses. Besides producing surpluses for reintroduction such a program would provide crucial information on the biology and ecology of the species.

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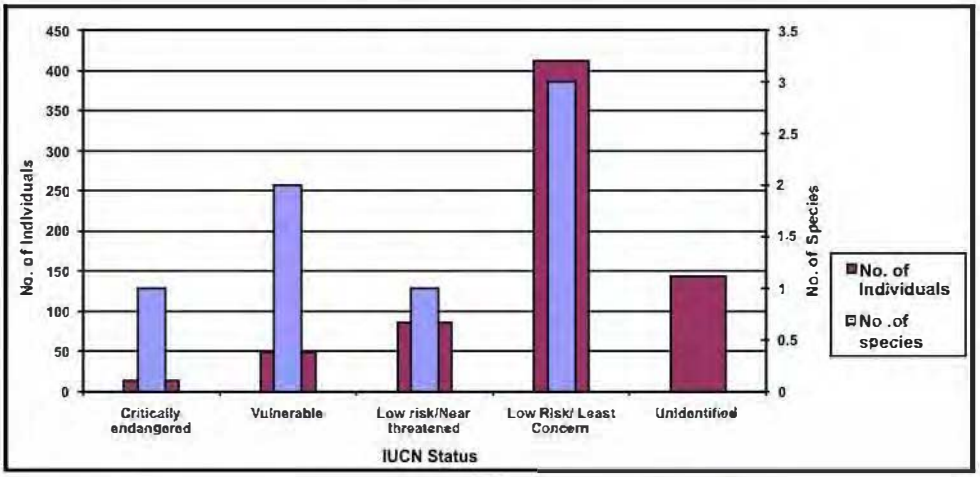
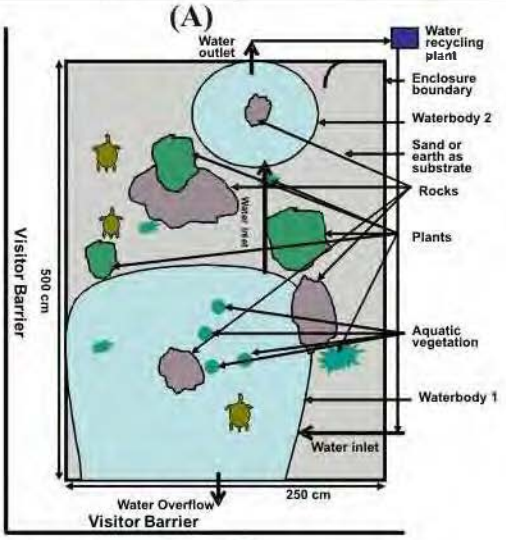
## Plate 17




(A)

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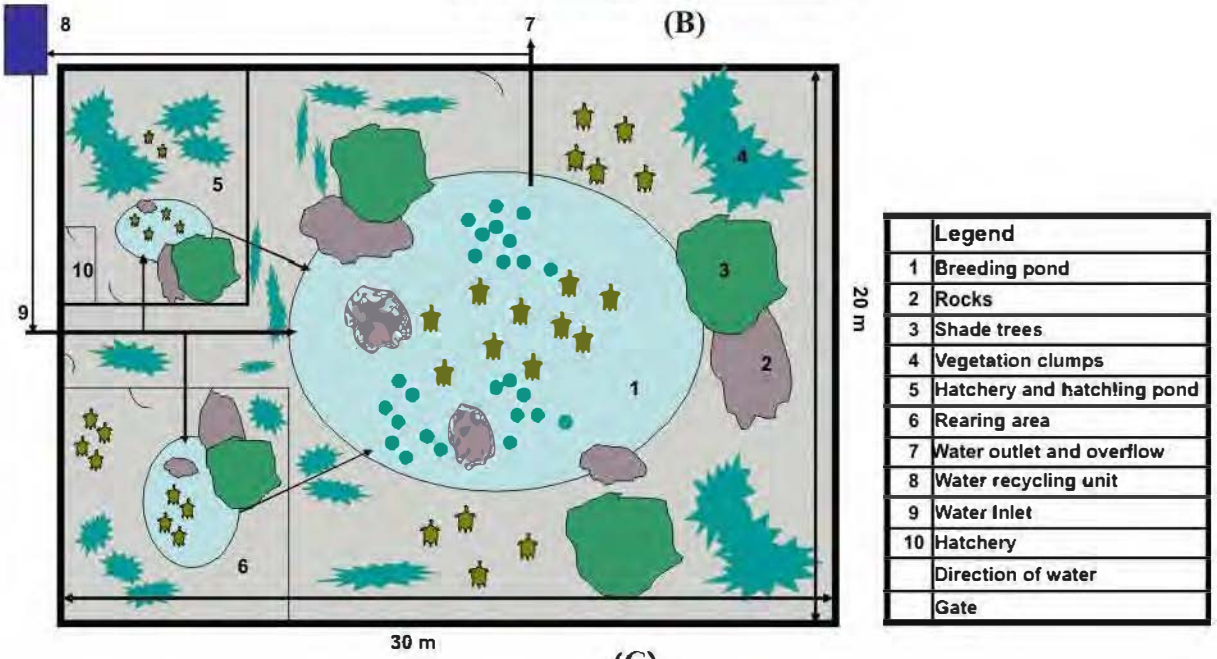


| | Legend |
|---|---|
| 1 | Breeding pond |
| 2 | Rocks |
| 3 | Shade trees |
| 4 | Vegetation clumps |
| 5 | Hatchery and hatchling pond |
| 6 | Rearing area |
| 7 | Water outlet and overflow |
| 8 | Water recycling unit |
| 9 | Water Inlet |
| 10 | Hatchery |
| | Direction of water |
| | Gate |

(C)

(A): Status of Freshwater Turtle in Captivity; (B): An enclosure design for exhibiting six freshwater turtles up to 30 cm in size (not to scale) and (C): An enclosure design for breeding and rearing freshwater turtles for ex-situ management (not to scale)