

Short Review

**BIOLOGY, HABITAT AND CONSERVATION OF INDIAN ROCK PYTHON-A BRIEF REVIEW**

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**ABSTRACT**

The earth ecosystem is facing instability in the present era due to unbridled devastating human activities across the globe. as a result we are losing species globally day by day. Indian Rock Python (*Python molurus molurus*) commonly recognized and pronounced as Indian Python, is considered as one among the list of larger size non-venomous snakes which is widely distributed all through Indian subcontinent particularly in Indus valley as well as Punjab region of Pakistan reaching up to Kashmir. It has been included in near threatened class in the IUCN Red List of species (IUCN, 1996). Jurgen *et al.*, 1988). It dwells in a broad range of living conditions ranging from dry to rocky and from rocky to scrubs as well as moist jungles (Murphy and Henderson, 1997; De Vosjoli, 1991; Jurgen *et al.*, 1988), the main evidence for its common name i.e. Indian Rock Python (Avadhani, 2005). As far as Pakistan is concerned, most of the python rich or inhabited localities are being preferably transformed into agricultural lands which are resultantly restricting it to the Southern Sindh, Indus Valley and its tributaries or the riparian zone (Masroor, 2012). But as a matter of fact, even in these areas it is noted to be diminishing at fast rate (Azam *et al.*, 2007). Only a few pythons have been reported in district Sanghar in Sindh, Deva Vatala National Park, Azad Jammu & Kashmir (Goursi *et al.*, 2012), District Narowal (Shakargarh), and Gujarat are on the verge of extinction as reported by Khan, 2006.

**Key words:** *Python molurus molurus*, IUCN Red List, Deva Vatala National Park, Indus Valley.

**History:** The Indian python has been reported continuously in its range which was mentioned by the previous researchers, but its numbers have declined. The main reason behind this fact is habitat loss, which is a major threat in the declination of python species in the Indian subcontinent. Advances in modern farming technology have allowed humans to convert “waste lands” such as scrubland into farmland. Indian pythons have also been hunted for their skin to make belts, boots, wallets, and other fashion accessories. International treaties now regulate the trade of python skins. Nonetheless, people in some Asian cultures still hunt the snake for food and for use as a medicine.

Like other snakes, the Indian python is regarded simply as dangerous and is often killed on sight. Many people, however, do not realize the ecological role that python plays in the ecosystem to maintain its proper functioning and biological balance. As the Indian python population has decreased in many areas, the rodent population has correspondingly increased (Strain 2011).

**Biology:** On the basis of morphological appearances, Indian pythons may be divided into two popular species or subspecies which are actually differentiated on the basis of their physical characteristics. One is Burmese pythons (*P. molurus bivittatus*), which has the ability to grow up to 7.6 m (25 ft) in length, while it can gain a weigh of 137 kg (300 lbs). The second one is Indian

pythons (*P. molurus molurus*), which remains smaller in size, comparatively, can reach to an extreme length of almost 6.4 m (21 ft), and weight as 91 kg (200 lbs.) to the most. This snake is straw–yellow to brown in color, sometimes with a rich reddish tinge (Whitaker 1993). The dark patterns that form a mosaic on the snake’s skin differ depending on the snake’s geographic location. The skin patterns of both the species can be recognized on the basis of rectangular shaped mosaic form decoration that prevails along the entire body of the snake. *P. molurus bivittatus* is usually higher in dark coloration with fascinating shades comprising of brown and creamy dark blend of rectangular shapes that mask the underlying blackish background skin. In addition, this animal is typically recognized by an arrow shaped design existing on the top of head region, from where the pattern actually starts. *P. molurus molurus* has also the same type of markings but having light brownish or tan colored boxes which seem to be lying over a creamy contextual. *P. molurus molurus* has partially arrow like design if we look at the top side of its head region. Most interestingly, each scale bears a distinct color in case of *P. molurus molurus*.

Being heterothermic, snakes possess many extreme morphological and physiological adaptations (Castoe *et al.*, 2013). The Indian pythons are dimorphic with females of both subspecies being longer and heavier

than males. Males have larger cloacal spurs, or vestigial limbs, than do females. The cloacal spurs are two projections, one on either side of the anal vent, that are thought to be extensions of posterior limbs (Coborn, 1991). Average basal metabolic rate recorded is around 1.266.

**Habitat:** It is found mostly in tropical areas mangroves, scrubs jungles in arid region, major rainforest and grasslands. Indian pythons dwell in wide variety of conditions, which can be a rainforest, some kind of river valley or riparian zone, woody areas which provide a good hiding places, scrublands and / or grassy marshes, as well as rocky or semi-rocky hills. In other words, it prefers the major biomes. They are commonly recorded from the patches which sustain enough sources and shelter (Bhupathy and Vijayan 1989). The rich density of herbs/ shrubs along with trees makes a considerable camouflage for them. The presence of birds, rabbits and other small animals further make the place suitable for python. Noticeably, the snake has never been recorded from a place which is very distant from sustained water bodies, hence it seems to be preferring soggy areas. It is continuously in search of some safe hiding place for which damp and savannas are the best locations. It is also noted to prefer the rocky habitat but it keeps on moving. Besides, it is also found in the riparian zone which is also a testimony towards its preference to dwell near water sources. It is reportedly found in water as it has swimming pattern.

**Food and Feeding:** *Python molurus* is carnivorous and it is evident from the teeth it possesses. It prefers to go for live prey for the most of times in its life span. Its staples are rodents and other mammals. As Python directly preys on rodents that cause damage to grains, so it has vital role in keeping check and balance on rodents population. This activity presents Python an important indicator of ecosystem health. However, a scanty quota of its foods comes from various types of birds, smaller amphibians as well as certain reptiles (Begbie 1907). It has developed a variety of methods to hunt for its live food. During search of foodstuff, *P. molurus* may grab its target tightly, or plan an ambush, and in some cases, it can also scavenge. It is not unusual for a python, which is a good climber, to climb a fruit tree and then wait in ambush for animals attracted to the fallen fruit underneath (Coborn 1991). Pythons have also been observed waiting in hollow trees to capture roosting birds (Murphy and Henderson 1997). This indicates how it prefers to eat but as a matter of fact, they are very poor in their eyesight. Nature has compensated this loss in a very gifted manner on the other hand (Bhupathy *et al.*, 2014). That's why they are endowed with greatly advanced smelling power which can help in detecting the prey along with the blessed heat pits incubating in every single scale of the upper lip, which can feel the heat of the nearby wandering prey.

That's why they are accurate in their preying efforts. Indian python kills its prey either by biting followed by continuous constricting which stops the air supply of its prey which eventually dies off due to suffocation (Daniel 2002). Prey items may also be swallowed as a complete after wards (Boulenger 1890). To accomplish the fate of the prey, *P. molurus molurus* tactfully displaces its lower jaw and springs its skin against the prey which allows to engulf the targeted food entities till many folds greater size of its mouth (De Vosjoli 1991). When noticed for scavenging actions, they do not need the body constrictions of the target (Murphy and Henderson 1997).

**Behavior:** *Python molurus* is familiar as a solitary animal. They aggregate in pairs only at the time of sexual reproduction. Their migration usually takes place when there is scarcity of the food resources in the dwelling areas or if there exists any life threats to their existence (Barker and Barker 2008). The preying activity is already discussed in detail which is also a part of their ecological behavior. They are commonly found and recognized a terrestrial but in some particular cases, they may also climb up the trees for the sake of the prey (Hutchison *et al.* 1966). As they live near water bodies which proves them as excellent swimmers. They have developed the ability to stay under water for more than 30 minutes in one attempt. During winter season which mostly starts with the onset of October and extends up to March, pythons remain under some safe or underground parts indicating a short hibernation which lasts until temperature is increasing again. (Murphy and Henderson, 1997)

**Ecological Associations:** *Python molurus* preys upon many types of rodents and vertebrates. It has an important and crucial role as a limiting factor for the populations of its prey species. Due to its decisive place, it is important in maintaining its ecological habitat. It helps in maintaining the exceeding populations of rodents which inflict heavy grain losses in the crops. In this way, its ecological association is extremely important for humans (Hutchison *et al.*, 1966).

**Reproduction:** Indian python is sexually iteroparous and oviparous. The reproduction is always sexual which is quite an interesting phenomenon of its life cycle. *Python molurus* reaches its sexual height or adulthood when it is of 2-3 years old age if it can attain the proper body weight and shape which is again dependent upon the availability of food and suitable environmental conditions. In India, mating between male and female Indian pythons takes place from December to February. After mating, a female may lay between 6 to 100 eggs at one time. At this time courting behavior may start to appear and its manifestation is more pronounced as the environment becomes feasible (Balakrishnan *et al.*, 2010). During mating behavior, the male counterpart passionately wraps its body around that of the female

partner. It then browses tongue repeatedly on the entire head region as well as the body of the female. Once they have aligned the cloacal openings, male is now exploiting its vestigial legs and continuously massages female partner in order to stimulate. Eventually copulation is done when female raises its tail and allows male snake to put its hemipenis (which are two in number) (Acharjyo and Misra 1976). This activity prevails for five to thirty minutes. After 3 to 4 months' time, the female is ready to lay eggs which may be hundred in number, each having the weight of 207 g (7.3 oz) as recorded. After laying eggs, female snake usually sits in a coiled fashion to safeguard its next generation as well as for the incubation onset. Incubation, in case of pythons usually goes for two to three months duration (Hutchison *et al.*, 1966). It follows the birth of around 100 offspring (higher rate of success) and the gestation period ranges from 2 to 3 months (Lederer 1956). The average number of offspring is usually recorded up to 40 hatchlings per one mating attempt. During the incubation period and process, the female uses and generates specific type of muscular contractions which are actually like shivers which greatly help her to increase its body temperature which is slightly advanced as compared to its environmental air. This is how the incubation temperature is maintained (Mierop and Barnard 1976; Kryskoet *al.*, 2008). This is how they are ready to execute the incubation temperature. It is observed that the mothers are very careful during the incubation period. That is the reason that they are always sticking around the eggs during the incubation time as they know how to better provide the safeguard for the coming generation. But, it is also interesting that once, the hatchlings are produced, they grow quickly and become independent within very short period of time. This is how the parental investment is manifested in the sexual behaviors of the pythons (Mierop and Barnard 1976).

**Conservation and Population Management:** Conservation and management is always based upon the extensively available information about the species under consideration. On the contrary, non-availability and proper records of each snake type renders it hard in managing and executing the conservation strategies implication. Indian python is included in the list for the Schedule I of Indian Wildlife Protection Act (IWPA) 1972 (Jerry 1998). It is also mentioned in the CITES list due to extensive trades for its meat or skin, as well as a pet animal by some people. It is mentioned in the list due to the continuous and stark habitat destruction. In short, ecological knowledge of this snake species is too scanty to discuss its conservation and management strategies in Pakistan (Groomridge and Wright, 1982).

*P. molurus molurus* is enumerated as Lower Risk/ Near Threatened by International Union for the Conservation of Nature and Natural Resources (IUCN,

1994, 1996). It is registered in U.S. ESA (United States Endangered Species Act) as endangered throughout its range (Coborn, 1991; De Vosjoli, 1991; Murphy and Henderson, 1997). Mostly pythons are exterminated for utilizing their skin (for fashion and designing business) and, or for its meat which is eaten in some parts (Hutchison *et al.* 1966) by local communities or even traded (IUCN, 1996;; Minton 1966), so are of high commercial value in international market, one of the main causes of alarmingly decreasing regularly existing populations of Indian python (Mukherjee, 1982; Tikader, 1983; Groomridge and Wright, 1982; Murthy, 1979).

**Threats:** The specie is facing many potential threats like loss of habitat, overgrazing, and human psychology and activities. Over hunting of these animals has greatly reduced their number. The use of pesticides and agrochemicals and unexpected floods are also increasing the intensity of potential treat.

**Recommendations and suggestion to mitigate the existing threats:** To overcome the potential treats to the Pythons the awareness of community and protection of its habitat is necessary. More over rehabilitation of this species and employing rules and regulations against illegal python trades can also play significant role in its conservation. Recent surveys to access its current population, habitat, food and threats are necessary to have updated information about this important species.

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