

Predators and Threats of the Indian Spiny-tailed Lizard *Saara hardwickii* (Gray, 1827) (Reptilia: Squamata: Agamidae)

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Abstract: Observations on the Indian Spiny-tailed Lizard *Saara hardwickii* (Gray, 1827) were undertaken in near Ramdeora (Pokran) Rajasthan, India, which is a satellite area to protect the GIB and other wildlife of the region. The field study was undertaken from March to December, 2014. Data collection was carried out by Direct Observation Technique. Direct observation techniques allow for a more systematic, structured process, using well-designed observation record forms which providing a richer understanding of the subject. The study revealed that the area is one of the preferable habitats for the species. The Human beings are the major threats for spiny tailed lizard. The tribal's hunt for these reptiles to earn their livelihood and to eat their meat. Developmental activities such as canal irrigation, afforestation and urbanization cause of Habitat loss also threat for spiny tailed lizard. Number of mammals, reptiles and birds are predators. Spiny-tailed lizards are a significant prey base for raptors and mammalian predators of the arid desert landscape. Indiscriminate killing of these for trade could seriously impact the complex web of life.

Key words: Spiny tail lizard, predators, behavior, hunting techniques

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I. Introduction

The eastern spiny-tailed lizards of the genus *Saara* are represented by three species worldwide (Wilms et al. 2009a). In India, only one species, *S. hardwickii* (Gray, 1827) is found, which has a patchy distribution in India, Pakistan and Afghanistan (Khan & Mahmood 2004; Knapp 2004; Wilmset al. 2009a). It is the only herbivorous lizard species in India, which is currently distributed largely in small fragmented populations in the dry areas of northwestern India in the Thar Desert of Rajasthan and Gujarat (Das 2002; Daniel 2002; Sharma 2002; Wilms et al. 2009a). Locally known as the 'sanda', it is burrow-dwelling and occurs in clusters. The Indian Spiny-tailed Lizard *Uromastix hardwickii* of the genus *Uromastix* (Merrem, 1820) are restricted to the hot deserts of the Old World from the Thar in the East, across the Arabian peninsula, to the Sahara in the West (Iverson, 1982; Wilms, 2005). Also known as Spiny-tailed Agamas, these diurnal lizards are medium-sized with blunt snouts, dorso-ventrally flattened bodies and thick tails that are covered by whorls of thorny scales (Smith, 1935; Wilms, 2005). This genus consists of 17 species of which some have been described only recently and due to marked polymorphism many subspecies are also recognised (Wilms and Schmitz, 2007), but the taxonomic status of several species and subspecies remains uncertain (Harris et al., 2007).

The oldest species of the genus, *Uromastix hardwickii* (Joger, 1991; Amer and Kumazawa, 2005) or the Indian Spiny-tailed Lizard is endemic to the arid region in the north-western part of the Indian subcontinent (purves, 1915; Smith, 1935; Khan and Mahmood, 2004). Though first described by Gray (1827) as *Uromastix hardwickii*, the current name follows Merrem (1820).

In India, *U. hardwickii* is found in the Thar Desert and the surrounding semi-arid parts of Rajasthan and Gujarat (Smith, 1935; Daniel, 2002). Specific locality records are few in number and include Banni and little Rann of Kutch in Gujarat (Abdulali, 1960; Vyas, 1991), Ramgarh, Kanoi, Gadra Road, Shiv (Bhatnagar et al., 1973 b), Ramdevra (Sankaran and Rahmani, 1998), Barana, Sam, Pithala-Sudasri (Das and Rathore, 2004).

Locally known as the 'sanda', these lizards live in clusters (Smith, 1935; Abdulali, 1960; Minton, 1966), and each lizard excavates a burrow for itself. Each burrow has a single elliptical opening which is level with the ground and leads into a long tunnel that may zigzag for a few feet before ending in a small chamber. The burrows of Sanda have been reported to be found in rectangular or hexagonal clusters with an inter-burrow distance of 25-80 inches (Bhatnagar et al., 1973 b). Apart from serving as a refuge from predators, the burrow also provides Rajasthan.

Ecological information on this species is extremely scarce with shelter during nights and the long period of inactivity in winter or 'hibernation'. At these times, the lizard plugs the mouth of the burrow with soil. Reproduction is believed to occur with the onset of warmer seasons, soon after their emergence from hibernation (Purves,1915; Smith, 1935). After mating, the female is believed to lay eggs in smaller tunnels excavated on either side of the main tunnel of her burrow (Nicolls pers. comm., in Minton, 1966);the eggs are thought to be as large as a dove's egg (purves,1915). The adult lizards are mainly herbivorous, and feed on grass, flowers and fruits of *Capparis decidua* (= *aphylla*), *Prosopis cineraria* (= *spicigera*) and *Salvadora persica* (Purves, 1915), but juveniles have been observed to eat locusts in captivity (Bhatnagar et al., 1973 a).

The Predators and Threats of the Spiny Tailed Lizard include certain species of their own genera, snakes, mammals like human being, dogs, mongoose and hedgehog and some species of birds (Powell, 1913; Purves, 1915; Burt-Charles, 1933; Fitzsimons, 1935; Hibbert-Ware, 1938; Shaw, 1948; Klauber, 1956).

Diet

U. hardwickii were found to feed on herbs such as *ghantiya* (*Dactyloctenium* spp, *Peganum harmala*), *lump* (*Aristida* spp), *Neurada procumbens*, *Punarnava* (*Boerhavia diffusa*), *andkanti* (*Tribulus* spp). When feeding, lizards were observed to bite off the entire leaf and then swallow it, they did not chew foliage. They also consumed flowers of *kair* (*Capparis decidua*) by swallowing them whole. We observed *Boerhavia diffusa* consumed by young one.



Image 1. Feeding on *Boerhavia diffusa*

Study Area

The Ramdeora, Rajasthan (The latitude: 27°01'16"44 and the longitude: 71°09'19"86; area 1958 Ha.; Altitude: 325 Mt.; Fig:1).The study area is a satellite area to protect the GIB and other wildlife of the region near Ramdeora (Pokran). For the protection of the GIB and other wildlife of the region near Ramdeora (Pokran) enclosures created over an area of 1958 Ha., and approximately 358 Ha. open area also covered in the study area. The breeding of GIB has been reported from Ramdeora enclosure. This area also likely to act as best Habitat for Spiny tail lizard as well as Raptors. This area supports a good population of the Indian Spiny-tailed Lizard. The study area comes under the biogeographic zone 3A-Thar Desert (Rodgers et al. 2002). Typical of hot deserts, The Ramdeora has characteristically high temperature and scanty rainfall. Seasonal variations are pronounced and in summer, the temperature can rise up to 50°C and in winter, drop to -2°C. Rainfall occurs between July and August, but the quantum of rain and the number of rainy days decrease considerably from east to west across Rajasthan (Sikka, 1997). Five topographical features are recognised by local people in western Rajasthan: Thalar - gravel plains, Muggra - coarse gravel/rocky plains, Doongar -rocky hillocks, Reth - sandy areas and Tibba - sand dunes.The vegetation of this area has been classified as northern tropical thorn forest (6B) and sub classified as desert thorn forest (6B/C1) (Champion & Seth 1968).

Around 680 species of plants are found here including *Calligonum polygonoides*, *Lasiurus indicus*, *Capparis decidua*, *Prosopis cineraria*, *Salvadora oleoides*, *Calotropis gigantea* and *Tecomella undulata* (Brandis, 1906; Bhandari, 1978). Many species are used in folk medicine (eg: *Calotropis procera*, *Citrullus colocynthis*, *Euphorbia caducifolia*), as fodder (eg: *Aerva tomentosa*, *Lasiurus indicus* and *Cymopsis tetragonoloba*), and

food (eg: *Prosopis cineraria* - pods, *Ziziphus nummularia*= berries, *Acacia senegal*- seeds) (Khan et al., 2003; Islam and Rahmani, 2005).

More than 50 species of reptiles are found here (Sharma, 1996) including those characteristic of the desert such as the Red-spotted Diadem (*Spalerosophis atriceps*), Laungwala Toadheaded Lizard (*Bufo laungwalaensis*) and Indian Sandfish (*Ophiomorus raithmai*) (Whitaker and Captain, 2004; Das and Rathore, 2004). On the whole, rodents are the most well-studied group (eg: Prakash, 1962; Prakash et al., 1971; Prakash, 1981, Wada et al., 1995) and there remains a significant gap in current knowledge of the ecology of many other groups of desert fauna (Ghosh et al., 1996).

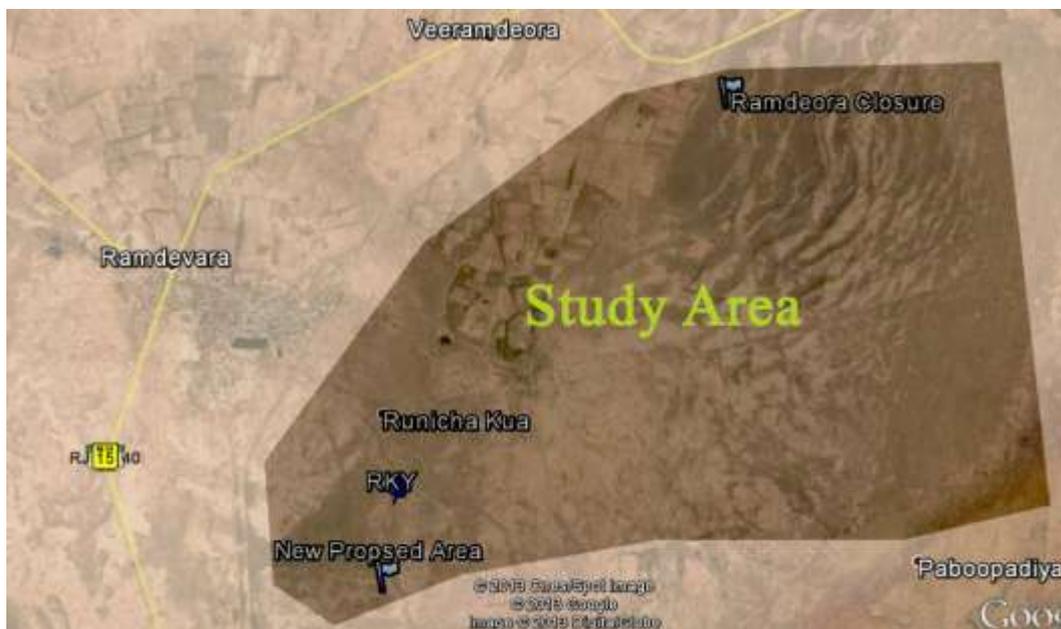


Figure 1. Map of Study Area

II. Methods and Data Analysis

The field study was undertaken from March to December, 2014. The survey was conducted along existing road networks (both tar and mud), to cover as large a proportion of the study area as possible and meet the objectives within the above mention time. Data collection was carried out by Direct Observation Technique. Direct observation techniques allow for a more systematic, structured process, using well-designed observation record forms. The main advantage of direct observation is that an event, institution, facility, or process can be studied in its natural setting, thereby providing a richer understanding of the subject. (USAID 1996). Information was also collected from the nomads, tribals and villagers during the course of the surveys. The mode of predation of various predators was also observed.

III. Results and Discussion

Major threats

Human beings are the major threats for spiny tailed lizard. The tribals believe that the meat and oil of this lizard are sex stimulants and increase the sexual potency in men. The oil is known to be a pain killer. The tribals hunt for these reptiles to earn their livelihood and to eat their meat. They also sell them for their use in laboratories in teaching institutes. Spiny-tailed lizards are a significant prey base for raptors and mammalian predators of the arid desert landscape unique to NW India. Indiscriminate killing of these for trade could seriously impact the complex web of life.

Hunting

Four main techniques that are used to hunt sanda in western Rajasthan; these rely on the fact that all burrows have only one opening and consist of a single long tunnel. The post-monsoon season (around September) is considered the best time to capture these lizards because forage is abundant and they start building up body fat in preparation for hibernation in the following winter months. Except one, all hunting techniques involved destruction of the burrow. But we observed much different technique adopted in study area.

During the survey on dated 26 November, 2013 in morning 8.00 AM we observed a poaching instance near Beermadera village in Pokhran subdivision of Jaisalmer district. The poaching gang catching Spiny-tailed

lizards from their burrows. .We immediately caught the three poachers and recovered 38 half-dead Spiny-tailed lizards were from three poachers the lizards, which had their spines broken and were packed tightly in bags.



Image 2.Spiny-tailed Lizard Poaching

The techniques that are used to hunt the sanda in western Rajasthan. Mainly rely on the fact that all burrows have only one opening and consist of a single long tunnel. The tribals are well-versed with the behavior of this reptile. They know that these lizards come to their burrow openings and stay in it for some time before they come out of their burrows for diurnal activities. Morning 8.00 to 9.30 AM is very appropriate time to poach them, for poaching they using a stone with very sharp edge. They search lizards on the openings of the burrow and through stone with full force just behind one feet to burrow openings. This action damage and blocked burrow as well. This action also broken spine of spiny tail lizard so it can't move. Hence the Lizard cannot retreat and can be dug out easily by the hunter. This technique is very common, effective and much gaining. On 26 November, 2013 morning they got 38 spiny tail lizard in the interval of one and half an hour.



Image3. Hunting by using Stone



Image 4.Crime Scene reconstruction



Image 5. Destroyed burrow after hunting

Habitat Destruction

Habitat loss is also threat to this species. Study area mainly stable and leveled area. It is often encroached to be used for construction of houses, resorts and agriculture, developmental activities such as road-laying also example of habitat destruction. In totality we can say excavation work always cause of habitat destruction

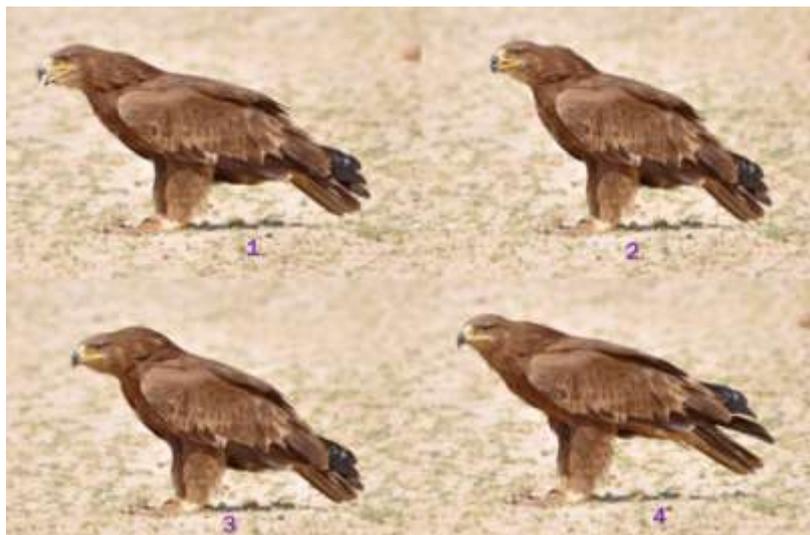
Somehow natural disasters such as floods also contribute to habitat loss and degradation .These factors cause extensive damage to Uromastyx habitats and local populations.

Predators

Predators of *U. hardwickii* as observed during the survey include the Steppe Eagle (*Aquila nipalensis*), Tawny Eagle (*Aquila rapax*), Desert Fox, Earth Boa (*Eryx johnii*) and Desert Monitor. As noted by Abdulali (1960) earlier, the eagles always devoured the entire body, except the tail. But we noticed tail also swallowed by Steppe Eagle.



Image 6-7. Predators of *U. hardwickii* Steppe Eagle



Imag 8. Tail also swallowed by Steppe Eagle in four stages

IV. Results and Discussion

During field survey and observation it is observed that Indian spiny tailed lizard (*S.hardwickii*) have major threats are human activities as like Hunting for trade, Hunting for extraction of Oil, Hunting for use meat .It was noted that mostly burrows were Destroyed by human. During field survey observed a sensational case of cruel hunting of spiny tailed lizards, which are on the verge of extinction. Hunters caught half dead condition and broken their spine by using stone for hunting. The human beings were found to be the main destroyers of the population of this reptile.Eagles, Kite, shikra and crows were the effective predators amongst the birds. In order to protect this endangered species from further exploitation the conservation measures are required like Regular patrolling of *U. hardwickii* areas to control hunting.

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