First sighting of clouded leopard *Neofelis nebulosa* from the Blue Mountain National Park, Mizoram, India

The clouded leopard, *Neofelis nebulosa* is reported to occur in the forests of Nepal, Bhutan, Sikkim, Assam, Myanmar, southern China and Malayan countries[1]. Recently, it has been reported from the northeastern states of Assam, Meghalaya, Arunachal Pradesh, Tripura, Mizoram and in Sikkim and northern parts of West Bengal[2–5]. In Mizoram, the clouded leopard is known as 'kelral' in the local dialect. However, there was no sight record of this animal from here till 1997, when it was sighted twice during the present study on Galliform birds in the Blue Mountain National Park (BMNP). The BMNP is located in southeastern Mizoram at 22°39′ N and 93°02′ E, close to the Myanmar border and the Chin Hills. The total area of the park is 50 km^2. Phawngpui is the main mountain ridge that extends in a north–south orientation. The altitude of different areas in BMNP varies from 1000 to 2157 m. The general vegetation type is Khasi sub-tropical wet hill forest[6], which comprises patches of primary forest inside the park. This is replaced by secondary vegetation of bamboo brakes with occasional *Quercus* spp. at different places. During the present survey, the study area was stratified according to broad vegetation categories and transects were laid in each of these. Trails and transects were monitored regularly for sightings and secondary evidences of different animals in the study area.

On the first occasion (3 March 1997), a clouded leopard was sighted near the Phawngpui peak (2157 m) during dusk (17:15 h). The animal was about to cross a trail and upon finding us, it stopped and backed inside the shrubby growth. It reappeared head first after 15 min, crossed the trail in a single leap and disappeared into the thick forest. On 5 May 1997 at the Farpak Forest Rest House complex (1875 m) which is ca. 12 km away from the Phawngpui Peak, at about 23:45 h, an animal was trying to enter one of the hutments where two chickens were kept. The animal was heard scratching at the wooden door. Using powerful spotlight, we identified the animal as a full-grown clouded leopard. The markings on its coat on both the occasions were quite clear and unmistakable, as the clouded leopard had been seen earlier a number of times in captivity (Figure 1). It resembles the marbled cat, *Felis marmorata*; however, while a marbled cat's total length is about three feet[1], the animal sighted on each occasion at the BMNP was more than five feet in total length. I am not sure whether the same animal was sighted on both the occasions or they were different individuals. During the second incident, the clouded leopard left behind a faint print of its pugmark, 5.5 cm long and 5.9 cm wide, on the cinders dump by the side of the hutment. On two other occasions, pugmarks of similar size were noticed on the soft earth within the park during the transect monitoring.

During their survey at BMNP in 1993, Rai and Johnsingh[4] did not record the occurrence of the clouded leopard. This may be attributed to their relatively shorter survey period of 10 days, whereas the current survey comprised more than eight months in the field, in two spells (February–May and September–December 1997). The locals reported that the clouded leopard is mostly arboreal and feeds on monkeys and birds. The ankle joints of the clouded leopard are notably flexible, which helps them in climbing trees[7]. It also throws some light to the belief that a large part of the clouded leopard's diet in the wild consists of primates[5,8–10].

The clouded leopard has been reported from different habitat types; in primary moist forest and scrub[11], high-altitude temperate forests[12], coastal swamps, logged forests and dry woodland and scrub[9,13]. During the current survey, the clouded leopard was seen in the primary forest consisting of *Quercus* spp. and *Rhododendron* spp. near the Phawngpui peak, as well as in secondary forest comprising bamboo brakes near the Farpak Forest Rest House complex.

The clouded leopard has been categorized as vulnerable by the IUCN[14] and also placed in the Appendix I of CITES, banning all international commercial dealing with this animal or parts of it. It is included in the Schedule I of the Wildlife (Protection) Act of India, 1972. Degradation of habitat due to deforestation and transformation of habitat for agricultural practices is the main threat to these felids[5,8,9,15]. The second most important threat to the clouded leopard comes from illegal hunting for its long canines, decorative pelt and bones used for traditional oriental medicine[7]. In the BMNP, there appears to be no hunting within the protected area; however, the various skull trophies on the walls of the locals' houses suggest that certain amount of hunting might be happening outside the protected area. The skull of the clouded leopard was noticed on two occasions at villages near the BMNP, as has been earlier reported from other areas of Mizoram by Choudhury[16] and Raman *et al.*[17]. Since hunting of wild animals outside the BMNP was evident, it is suggested that inclusion of more adjoining forested stretches into the existing protected area network can be of help, keeping in mind the possibly large home ranges of a carnivorous animal like the clouded leopard. This will

Figure 1. Clouded leopard in captivity. Photographed by the author during January 1997 at the Itanagar Zoo, Arunachal Pradesh.

not only safeguard the animals residing outside the National Park, but also protect those which straggle outside the park boundary.

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Arsenic poisoning in the Gangetic delta: An anthropogenic model

Large-scale arsenic poisoning in parts of West Bengal and in Bangladesh has been reported. Creditable work to mitigate the disaster has been taken up by delineation of the arsenic-prone aquifers and by provision of simple indigenous purification set-up for de-arsenification of drinking water in target areas. The 'end of the pipe' mitigation has brought immediate relief, but for a long-term solution and prevention of reoccurrence elsewhere, the issue must be examined at the 'beginning of the pipeline' of contamination.

The situation is as follows: (a) Arsenic toxicity has surfaced only in recent times and no historical record exists concerning any previous observations. (b) The shallow wells and surface waters are not vulnerable, so are the deep aquifers. The intermediate aquifers of 50 to 80 ft depth are considered to be the principal zone of contamination. (c) Demographic survey indicates widespread contamination around the course of the Ganga and its tributaries. The situation is similar around Padma river in Bangladesh. That is, the river course is one cause of contamination. Down south, in the sea water mixing zone, chlorinity dissolves away and dilutes the element. (d) Investigations show that arsenic is associated with ferruginous coating on quartz or detrital grain surface in the aquifer zone. This means that the coating is a secondary process, precipitated from water trickling down through the aquifer. Arsenic in solution has been brought into the aquifer from outside. (e) Some geologists believe that the volcanics on Bihar Plateau (Dalma Trap, even Dhanjori Volcanics) may contribute the element, since volcanic rocks are rich in arsenic. According to them, arsenic has reached the intermediate aquifer by reworked sand dunes, so common in the Gangetic delta. However, neither has any primary arsenic mineral been reported in the ancient dunes, intermediate aquifers or the *in situ* volcanics, nor have any experiments been conducted to show the possibility of the element leaching out from the volcanics. If the leaching of volcanics and contribution from the ancient dunes are to be believed, such disasters around the vast Deccan Trap rocks, as well as arsenic infestation in ancient times in the present area ought to have been reported. The context of the argument is that arsenic in the aquifers is a recent introduction into the area and is dominantly anthropogenic. The responsibility of the present crisis cannot be brushed aside as mere lithogenic.

It is quite likely that a large amount of arsenic ought to be received by the Ganga basin by way of application of fertilizers, pesticides/herbicides and activities arising out of coal combustion. While rock phosphates carry as high as 10 to 20 ppm of arsenic and manufacture of urea needs arsenic catalyst, some of the pesticides are pure arsenic compounds. Arsenopyrite (FeAsS) is a common accessory mineral in coal and coal is reported to carry between 56 and 156 mg/kg of arsenic. The Czech coal has 1500 mg/kg of arsenic and its burning has caused extensive arsenic dispersion. The leachable arsenic even in pond ash of Indraprastha power plant in Delhi is of the order of 25 mg/kg, when most of the element ought to have been lost to atmosphere during coal combustions and major fraction from ash is lost to supernatant pond water. The two power plants at Indraprastha and Rajghat combined are estimated to contribute annually about 5 to 6 tons of arsenic to the Yamuna from ash-leaching alone. Besides, paints, detergents, metal works, smelting and refining and sewage add to the arsenic content in the Ganga basin. The element being non-degradable, it migrates from a remote corner of the watershed to the discharge