

# A Road-killed Water Monitor *Varanus salvator macromaculatus*: Negative Impact from the Forest Route in Khao Yai National Park, Thailand

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**Abstract – A juvenile water monitor *Varanus salvator macromaculatus* was killed by a car in Khao Yai National Park, Thailand. Recently, this national park has seen a rapid increase in tourism and vehicles recorded monthly. Our result suggests that the National Park should set time restrictions for vehicle traffic, especially during 1800-2000 h since the highest rates of road mortality occur during this time.**

At 1630 h on 15 October 2002, the carcass of a juvenile water monitor *Varanus salvator macromaculatus* (ca. 100 cm in total length; see Fig. 1) was presented to the author (PD) by Amnuoy Intharat, director of Khao Yai Forestry Training Center. The monitor was killed by a car on the forest route in Khao Yai National Park, Nakhon Ratchasima Province, at 14°24'41"N;



Fig. 1. A road-killed juvenile *Varanus salvator* at Khao Yai National Park, Thailand. Photograph by Prateep Duengkae on 15 October 2002.

101°22'20"E, and ca. 800 m in elevation (Fig. 2). Later, a necropsy was performed by an officer of the Khao Yai Forestry Training Center to ascertain its stomach contents. Its stomach did not contain any prey items; however, unknown endoparasites (appearing to be tapeworms) were found in the esophagus, stomach and small intestine. Unfortunately, the *Varanus salvator macromaculatus* specimen and its endoparasites were burned immediately after the necropsy, preventing proper parasite identification.

The first national park in Thailand, Khao Yai National Park, was established in 1961 with an area of 2,168 km<sup>2</sup> covering four provincial areas of Nakhon Nayok, Nakhon Ratchasima, Prachin Buri and Sara Buri. Together with Tap Lan National Park, Pang Sida National Park and Ta Phraya Wildlife Sanctuary, these national parks were promoted as the World Heritage site in 2005 and were named the "Dong Phrayayen – Khao Yai Forest Complex" (DPKY-FC). Biodiversity of flora and fauna in Khao Yai National Park was reported at over 2,000 species of plants (Puff, 2006), 72 species of mammals (including 18 endangered species), 300 species of birds (National Park Wildlife and Plant Conservation

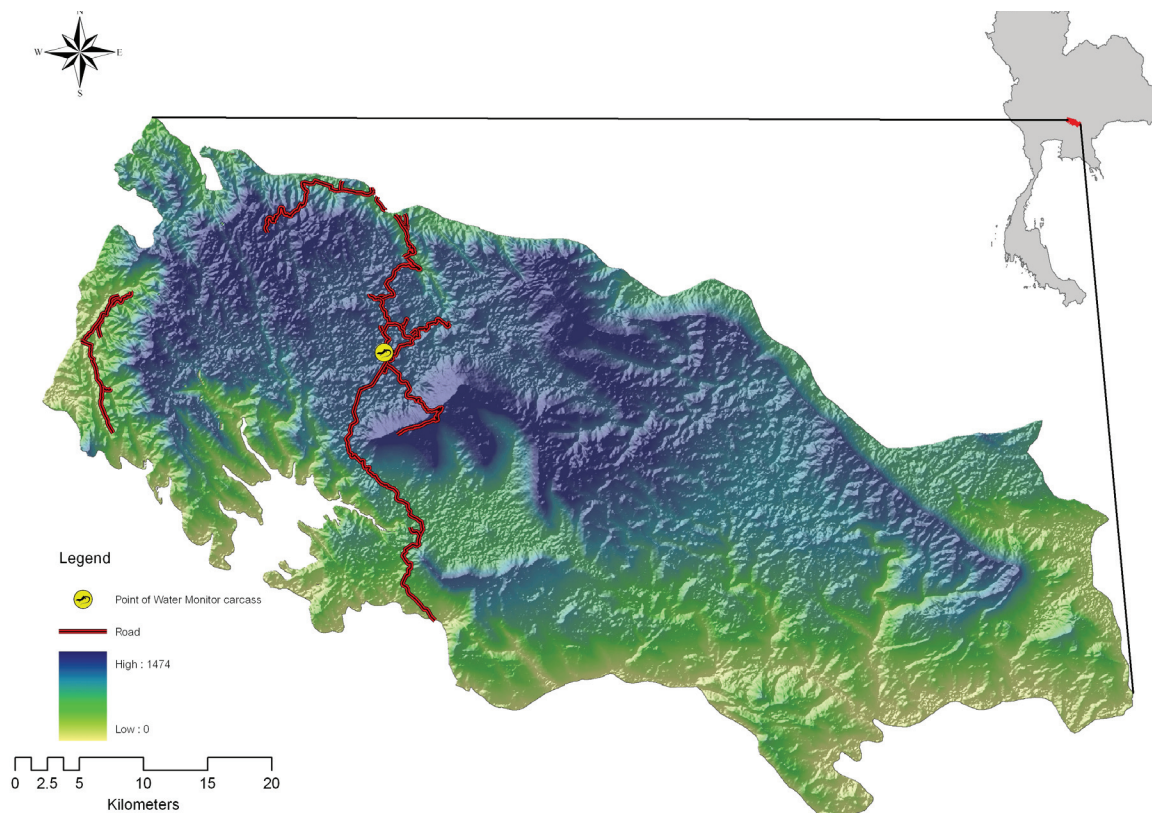


Fig. 2. Map of Khao Yai National Park with forest route.

Department, 2004) and 70 species of amphibians and reptiles (Prapun, 1999).

Approximately 50 km of forest roadways were constructed running north to south in Khao Yai National Park. Traveling by car, Khao Yai is only two hours from Bangkok; therefore, the park is a popular destination for spending long holidays or weekends. In the last decade, ca. 800,000 visitors were annually recorded for this park (National Park Wildlife and Plants Conservation Department, 2005). Recently, there has been a rapid increase in tourism, with over 20,000 vehicles recorded monthly in 2007-2008 (National Park Wildlife and Plant Conservation Department, 2008). The negative impact from the use of vehicles on the forest route directly affects the mortality of wildlife in this park as also reported for other areas (e.g., Kunuri, 2004). Unfortunately, records of this impact in Thailand are rare (Wanghongsa and Boonkird, 2001), especially in Khao Yai National Park as shown in our report. Additionally, in 2002 a snake (Family: Colubridae) and civet (Family: Viverridae) were reported as victims of road mortality in Khao Yai National Park (Amnuoy Intharat, pers. comm.). Their one year old carcasses were exhumed and are presented in Figs. 3 and 4.

Construction of roads and the use of vehicles

directly affect the habitat of animals (Trombulak and Frissel, 1992). Roads fragment habitats and numerous animals are killed by vehicles while migrating and crossing over roads (Coelho et al., 2008). Resolving the negative impacts of road construction and the use of vehicles in Khao Yai National Park should involve greater consideration of the biology and ecology of local wildlife, to determine the best approach to prevent,



Fig. 3. An exhumed one year old carcass of a snake (Family Colubridae) killed on the road at Khao Yai National Park, Thailand. Photograph by Prateep Duengkae on 15 October 2002.



Fig. 4. An exhumed one year old carcass of a civet (Family Viverridae) that was killed on the road at Khao Yai National Park, Thailand. Photograph by Prateep Duengkae on 15 October 2002.

resolve, or reduce such negative impacts. We would like to suggest that the National Park should set time restrictions for vehicle traffic, especially during 1800-2000 h since the highest rates of road mortality occur during this time (Wanghongsa et al., 2007). Moreover, building more speed bumps on the route to slow down vehicular traffic in Khao Yai National Park should be considered.

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## References

- Ferreras P, J. J. Aldama, J. F. Beltran and M. Delibes. 1992. Rates and causes of mortality in a fragmented population of Iberian lynx *Felis pardini* Temminck, 1824. *Biological Conservation* 61: 197–202.
- Coelho, I. P., A. Kindel and A. V. P. Coelho. 2008. Roadkills of vertebrate species on two highways through the Atlantic Forest Biosphere Reserve, southern Brazil. *European Journal of Wildlife Research* 54: 689–699.
- Kunuri, K. 2004. Impacts of Wildlife Feeding in Khao Yai National Park: Case Study of Pig-tailed Macaque (*Macaca nemestrina*). Unpublished M.S Thesis, Kasetsart University, Bangkok. (in Thai)
- National Park, Wildlife and Plants Conservation Department. 2004. Dong Phrayayen – Khao Yai Forest Complex World Heritage Nomination. Bangkok.
- \_\_\_\_\_. 2005. Statistical data National Park Wildlife and Plant Conservation. Bangkok.
- \_\_\_\_\_. 2008. Tourist Statistic. [http://www.dnp.go.th/NPRD/develop/Stat\\_Tourist.php](http://www.dnp.go.th/NPRD/develop/Stat_Tourist.php) (Last accessed 13.11.08)
- Prapun, S. 1999. The survey of Sambar deer (*Cervus unicolor*) in grassland of Khao Yai national park. Royal Forest Department, Bangkok.
- Puff, C. 2006. Plants of Khao Yai National Park. National Park, Wildlife and Plant Conservation Department, Bangkok.
- Trombulak, S. C. and C. A. Frissell. 1992. Review of ecological effects of roads on terrestrial and aquatic communities. *Conservation Biology* 14: 18-30.
- Wanghongsa, S., and K. Boonkird. 2001. Road-killed vertebrates in Khao Ang Rue Nai Wildlife Sanctuary. *Wildlife Yearbook* 3: 100-117. Royal Forest Department, Bangkok.
- Wanghongsa, S., Y. Senadham and K. Boonkird. 2007. From large massacre in the heart of jungle to the time allocation for the welfare of wildlife. *Wildlife Yearbook* 8: 269-280. National Park, Wildlife and Plant Conservation Department, Bangkok.

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