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Status of crocodiles in the U Minh Thuong Nature Reserve, southern Vietnam

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Both species of native crocodile, Siamese Crocodile *Crocodylus siamensis* and Estuarine Crocodile *C. porosus*, are seriously threatened in the wild in Vietnam. The swamp forest of the U Minh region in southern Vietnam was recently suggested to harbor the last remaining wild Estuarine Crocodiles in the country. We investigated the status of crocodiles in the U Minh Thuong Nature Reserve by conducting field surveys and interviewing local people. Field surveys found no signs of living wild crocodiles, and interview results strongly suggested that wild crocodiles have not occurred at U Minh Thuong Nature Reserve for perhaps as long as 30 years.

Key words: *Crocodylus porosus*, *Crocodylus siamensis*, U Minh Thuong, Mekong Delta, Vietnam.

INTRODUCTION

TWO species of crocodiles historically occurred in Vietnam: the Siamese Crocodile *Crocodylus siamensis* inhabited freshwater wetlands from the Mekong Delta north into the Central Highlands, while the Estuarine Crocodile *C. porosus* was restricted to fresh water and saline habitats of the Mekong Delta and offshore islands (Thorbjarnarson 1992; Cuc 1994; Sang and Cuc 1996; Cao and Jenkins 1998). The Siamese Crocodile is considered Critically Endangered ("facing an extremely high risk of extinction in the near future"; Hilton-Taylor 2000) throughout its global distribution (Ross 1998), and viable populations apparently no longer occur in Vietnam as a result of illegal hunting, habitat loss, accidental drowning in fishing nets, and collecting to stock crocodile farms (Platt and Tri 2000). The Estuarine Crocodile is regarded as globally secure, although populations have been seriously depleted or extirpated in many countries (Ross 1998). The current status of the Estuarine Crocodile in Vietnam remains largely unknown (Ross 1998). According to Cuc (1994), populations near Vung Tao, Can Gio, and Kien Giang Bay, and on the offshore islands of Phu Quoc and Con Dao, are no longer extant. Cao and Jenkins (1998) concluded that the only surviving population was confined to swamp forests in the U Minh region and numbered less than 100 individuals. Platt and Tri (2000) strongly recommended immediate surveys of suitable habitat in the Mekong Delta to determine if extant populations of either *C. siamensis* or *C. porosus* remain. Herein we report the results of a recent investigation into the status of crocodiles in the U Minh Thuong Nature Reserve of southern Vietnam.

METHODS

U Minh Thuong Nature Reserve (UMTNR; 105°05'N, 09°36'E) is located in the Mekong Delta of southern Vietnam (Fig. 1), a vast flat area formed by silt deposition from the Mekong River (Kiet 1994). The region experiences a tropical monsoonal climate with a pronounced wet season between May and November; peak rainfall (c. 2 500 mm) occurs in September and October (Kiet 1994; Safford *et al.* 1998).

UMTNR encompasses 22 918 ha in An Minh and Vinh Thuan Districts, Kien Giang Province, and is the largest protected area in the Mekong Delta (Buckton *et al.* 1999). The reserve consists of a core area (8 468 ha) surrounded by a buffer zone (+13 000 ha) (Buckton *et al.* 1999). Significantly, UMTNR contains representatives of all plant communities that were historically present in the Mekong Delta, including the largest area of open swamp remaining in the region (Safford *et al.* 1998). The core area contains mature *Melaleuca* forest, seasonally flooded grassland and sedge communities, and open swamp (Buckton *et al.* 1999). *Melaleuca* forest is dominated by *Melaleuca cajuputi* with an understorey of ferns (Safford *et al.* 1998; Buckton *et al.* 1999). Seasonally flooded grassland and sedge communities are dominated by *Phragmites vallatoroa* and *Eleocharis dulcis*, respectively. Open swamp (Fig. 2) is subject to near-continuous inundation and characterized by *Typha angustifolia* and *Nymphaea nouchali* (Buckton *et al.* 1999). Canals throughout UMTNR support a diverse community of floating, emergent, and aquatic plants (Fig. 3; Buckton *et al.* 1999). The buffer zone is largely unprotected and consists principally of cultivated paddy fields with small patches of *Melaleuca*

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Fig. 1. Map of Indochina showing the Mekong Delta and approximate location of U Minh Thuong Nature Reserve in southern Vietnam.

forest (Buckton *et al.* 1999). Some areas of UMTNR were degraded by anthropogenic fires, drainage, and timber harvesting before the reserve was created in 1993 (Safford *et al.* 1998). Nevertheless, Buckton *et al.* (1999) concluded



Fig. 2. Open swamp in U Minh Thuong Nature Reserve.

that UMTNR is one of the most important sites for biodiversity conservation in the Mekong Delta.

Three of us (BLS, BH, BHM) employed a combination of daylight surveys, nocturnal spotlight surveys, and village interviews to investigate the status of crocodiles in UMTNR from 29 October-20 November 2000. Nocturnal spotlight surveys are used in crocodile censuses worldwide involving many species, and other population estimation techniques, such as mark-recapture, have confirmed the validity of this method (Bayliss 1987; Hutton and Woolhouse 1989). Surveys were conducted from narrow fiberglass boats equipped with long-shaft diesel outboard motors. A 1 000 000 candlepower Nightblaster® halogen spotlight and two 12-volt Maglite® flashlights were used to search for crocodile eyeshines during nocturnal spotlight surveys. Survey routes were selected based on navigability and the absence of human habitation. Potential survey routes were traversed during the day to assess navigability and search for basking crocodiles, tracks and slides. Waterways with banks maintaining high densities of human dwellings were not searched, and all navigable waterways that were devoid of high densities of human dwellings were searched at least once (Fig. 4). The coordinates (latitude and longitude in degrees, minutes, and seconds) were determined for the beginning and endpoint of each survey with a Garmin 40 Global Positioning System (GPS). The distance traveled in each survey was determined by measuring survey routes on a base map constructed by reserve staff using Geographic Information Systems (GIS).

Additionally, reserve staff, local villagers, and fishermen were questioned throughout the survey concerning crocodile sightings, past hunting and collecting practices, and general knowledge of crocodiles.



Fig. 3. Artificial canal choked with floating plants in U Minh Thuong Nature Reserve.

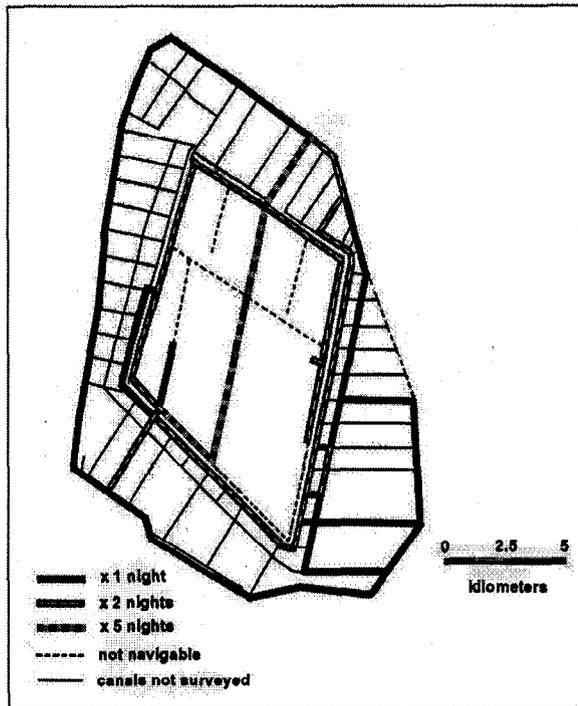


Fig. 4. Map of U Minh Thuong Nature Reserve showing spotlight survey routes.

RESULTS

We conducted nocturnal spotlight surveys along 288.7 km of canals in U Minh Thuong Nature Reserve. A considerably greater distance was covered by boat during the day, but these distances were not quantified. No signs of living wild crocodiles were found. In total, 24 local informants, including reserve staff, fishermen, hunters, and residents, were questioned about the presence of wild crocodiles. Results of the interviews unambiguously supported the conclusion from nocturnal surveys that wild crocodiles do not persist at UMTNR, and may have been extirpated as long as 30 years ago (Table 1).

DISCUSSION

The absence of wild crocodiles at UMTNR was not surprising. Wild crocodile populations have been decimated in Vietnam from illegal hunting, habitat loss, accidental drowning in fishing nets, and collecting to stock crocodile farms (Platt and Tri 2000). UMTNR supports a high density of people, and artificial canals in the buffer zone make most parts of the reserve accessible to hunters. We observed heavy hunting pressure on remaining larger reptile species in the reserve, including all turtle and most snake species. Reintroducing captive crocodiles into the wild at UMTNR would have little chance for success unless current hunting levels are significantly reduced. The report of residents in the buffer zone requesting the reserve staff to kill or capture a recently escaped captive crocodile (Table 1) demonstrates intolerance of crocodiles by local people. This attitude would also have to be amended before reintroduced captive crocodiles could coexist with residents of the reserve.

Although our survey was thorough within UMTNR, it did not cover the entire U Minh swamp region. U Minh Ha Peatland is a 21 760 ha Forestry and Fisheries Concession approximately 25 km south-west of UMTNR (Safford *et al.* 1994). We were unable to visit U Minh Ha Peatland during our survey. However, it is very unlikely that crocodiles persist at U Minh Ha Peatland, since wildlife is afforded even less protection there than at UMTNR. Based on our evidence, the population of Estuarine Crocodiles suggested to remain at U Minh swamp should be considered no longer extant.

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Table 1. Summarized responses of local residents when asked if wild crocodiles occurred in or around U Minh Thuong Nature Reserve, southern Vietnam. No. was the number of participating interviewees.

Interview Location	No.	Most Positive Response
09°38'52"N, 105°08'35"E	4	Never heard of wild crocodiles.
09°32'40"N, 105°05'11"E	3	Crocodiles were present a long time ago, but now there are none.
09°34'17"N, 105°03'32"E	1	Never heard of wild crocodiles.
09°34'58"N, 105°07'37"E	3	One man's grandmother claimed to have once eaten crocodile meat.
09°34'49"N, 105°08'31"E	1	In 1988, one was seen swimming in a river in Vinh Thuan District, and many people came to kill it. Interviewee suggested that it might have escaped from a farm. Otherwise, not even old people talk about wild crocodiles.
09°34'52"N, 105°08'39"E	2	Never heard of wild crocodiles.
09°36'21"N, 105°05'42"E	4	One man had not heard of wild crocodiles in over 30 years.
UMTNR project office (Reserve Director)	1	Heard of wild crocodiles when a boy about 40 years ago.
09°30'48"N, 105°15'32"E	2	One woman said about 30 years ago she heard of wild crocodiles being poached with bombs.
09°36'44"N, 105°03'36"E	3	One crocodile that had escaped from a farm in An Minh had been seen nearby in the buffer zone over the previous few days. Residents complained to the reserve director to catch or kill the nuisance animal.

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