

CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA



Nineteenth meeting of the Conference of the Parties
Panama City, Republic of Panama, 14-25 November 2022

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Transfer of the Thai population of *Crocodylus siamensis* from Appendix I to Appendix II with a zero quota for wild specimens, on the basis of Article II, paragraph 2 (a), of the text of the Convention and in accordance with the Precautionary measures as defined in Annex 4 (A.2.a) of the Resolution Conf. 9.24 (Rev. CoP 17).

B. Proponent

Thailand*

C. Supporting statement

1. Taxonomy

1.1 Class: Reptilia

1.2 Order: Crocodylia

1.3 Family: Crocodylidae

1.4 Genus and species: *Crocodylus siamensis* (Schneider, 1801)

1.5 Scientific synonyms: *Crocodylus galeatus* (Cuvier, 1807)
Crocodylus galeatus (Duméril & Bibron, 1836)
Crocodylus siamensis (King & Burke, 1989)
Crocodylus siamensis (Cox et al., 1998)
Crocodylus siamensis (Nguyen et al., 2009)

1.6 Common names:

English – Siamese Crocodile

French – Crocodile du Siam

Spanish – Cocodrilo del Siam

Thai – Jara Kae Numchued

1.7 Code numbers: L-306.002.001.011

* The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.

2. Overview

The Siamese crocodile has been widely distributed in the low altitude inland floodplain areas and wetlands in central and eastern Thailand. They have been reduced to non-breeding remnants in marginal habitats. The factors contributing to detrimental of the survival of crocodile species include habitat destruction and degradation, illegal hunting, and killing as vermin. Historically, *C. siamensis* occurred widely across mainland Southeast Asia (with an apparently localized distribution in Borneo). They have been considered an endangered species based on the small number of specimens remaining in the wild. In IUCN Red List (1971), *C. siamensis* is categorized as CR: Critically Endangered, Criteria A.1.a. and c. indicates decline in numbers and areas more than 80% decline in three generations (Ross, 1998).

Between 1960s and 1980s, crocodile species in Thailand have been heavily exploited due to commercial skin trade coupled with ineffective wildlife law namely, Wildlife Reservation and Protection Act, B.E. 2503 (1960). Therefore, crocodile populations in the wild have been decreased drastically. However, after Siamese crocodile listed in CITES Appendix I in 1975, Thai government has placed control restrict on illegal hunting of crocodile species in Thailand. Eventually, more effective law has been enacted in 1992 called the Wildlife Reservation and Protection Act, B.E. 2535 (1992) which listed crocodile species in Protected species list and stipulated CITES requirements in the Act. Since then, crocodile species have been prohibited from hunting.

Historically, sightings of *C. siamensis* in the wild were common in Mae Yom, Mae Ping, Chao Phraya, and Pasak Rivers but it did not exist on the upper reaches of the Mekong River (Smith, 1919). Previously, *C. siamensis* wild population is reported to inhabit within five protected areas approximately between 100 - 200 individuals in 5,652 km². During the first preliminary survey, Ratanakorn *et al.* (1994) confirmed the presence of at least a population of wild *C. siamensis* in Pang Sida National Park and another in Khao Ang Rue Nai Wildlife Sanctuary. Many sightings of *C. siamensis* in the wild were later recorded at Pang Sida National Park (Boonyakhajohn, 1999; Temsiripong, 2003). In addition, Platt *et al.* (2002) and Limlikhitaksorn (2010) reported a photograph of a crocodile and a nest in Kaeng Krachan National Park. Recently, Chumnarnkid (2021) reported the presence of Siamese crocodiles and theirs nest in six protected areas namely; Pang Sida National Park, Thung-saraeng Luang National Park, Kaeng Krachan National Park, Khao Ang Rue Nai Wildlife Sanctuary, Yod Dome Wildlife Sanctuary, Bueng Boraphet Non-hunting area and the area outside protected area in Prachinburi Province (Bueng Hui Kayaeng) estimated more than 100 individuals. Nevertheless, it should be noted that Kaeng Krachan National Park has been declared as a UNESCO World Heritage site in 2021.

Although wild *C. siamensis* population is small, the species is well established in captivity, with over 700,000 individuals in farms in Thailand, Cambodia, and Vietnam (Temsiripong *et al.*, 2004; Jelden *et al.*, 2005, 2008). In Thailand, a captive-breeding program has been established since 1937 (Webb and Jenkins, 1991). Currently, Thailand has 29 CITES registered commercial breeding farms. These farms jointly formed an association which has objectives for crocodile trade, conservation and sustainable utilization. After the enactment of Wildlife Reservation and Protection Act, B.E. 2535 (1992), the trade of Siamese crocodile has been strictly controlled and there was no report of illegal trade since then. In 2019, the Act has been amended as Wildlife Reservation and Protection Act, B.E. 2562 (2019) which strengthen more effective implementation and enforcement including imposing higher penalties. In this connection, the policies and practices in Thailand for Siamese crocodile management can be carried out into separate part as Siamese crocodile conservation in protected areas and Siamese crocodile management in commercial farms. The specimens in protected areas will be protected by Wildlife law and National Park law, whereas the specimens in the commercial farms will be managed by both Wildlife law and Fisheries law which complied with CITES requirements and other multilateral agreements.

Moreover, the governments in closed collaboration with private sectors and researchers have initiated the re-introduction program for Siamese crocodile in protected areas since 2005 (Temsiripong, 2001, 2007). Captive-bred Siamese crocodiles have been restocking in many protected areas such as Pang Sida National Park in 2005 and 2006 and many other protected areas afterwards. However, those captive-bred crocodiles for releasing must be pure-bred Siamese crocodile. With this conservation program, it is expected that Siamese crocodile in the wilderness protected areas will be increased gradually. This has led to the formulation of the national plan for crocodile conservation and sustainable utilization in Thailand which

aimed to (i) protect Siamese crocodile in various protected areas as appropriate, (ii) manage Siamese crocodile in the farms in accordance with National laws, CITES obligations and other multilateral agreements, (iii) increase Siamese crocodile population in protected areas through restocking program of pure-bled Siamese crocodile in protected areas, (iv) strictly enforce relevant laws by various government agencies, and (v) strengthen collaboration with ASEAN range states for trade, conservation, sustainable utilization of Siamese crocodile and implement CITES requirements effectively.

These policies and practices are in conformity with the text of the Convention laid down in Article II paragraph 2 (a) and Precautionary measures in Annex 4 (A. 2. a) of the Resolution of Conf. 9.24 (Rev. CoP 17) Criteria for amendment of Appendices I and II.

Even though the species is likely to be in demand for international trade, but its management is such that the Conference of the Parties is satisfied with implementation by range States, appropriate enforcement controls and compliance with the requirements of the Convention and an integral part of the amendment proposal is an export quota (in this case, a zero quota for trade in wild specimens), thus ensure that wild populations of the Siamese crocodile do not become endangered by international trade.

3. Species characteristics

3.1. Distribution

Crocodylus siamensis historically occurred over much of mainland Southeast Asia as well as parts of Indonesia. Extant populations are in Cambodia, Indonesia, Lao PDR, Thailand and Vietnam. In Thailand, *Crocodylus siamensis* appears to have been widely distributed in low altitude freshwater wetlands of central and eastern Thailand (Smith, 1919; Platt *et al.*, 2002). Extant populations are in a number of scattered localities in central and western Thailand (Kreetiyutanont, 1993; Ratanakorn *et al.*, 1994; Platt *et al.*, 2002; Temsiripong, 2003). Confirmed sites include Bueng Boraphet, Pang Sida and Kaengkrachan National Parks and Khao Ang Rue Nai Wildlife Sanctuaries (Platt *et al.*, 2002; Temsiripong, 2003) (see Map 1).

Bueng Boraphet is the largest freshwater swamp and lake in central Thailand. It covers an area of 224 km² east of Nakorn Sawan province, south of the Nan River close to its confluence with the Ping River. In southwestern Thailand, Kaeng Krachan National Park is located in the Tenasserim Mountains along the Thai-Myanmar border in Petchburi and Prachuab Khiri Khan Provinces, encompassing 2,915 km², Kaeng Krachan is Thailand's largest national park. The topography is characterized by steep mountain ridges with swift-flowing rivers in restricted valleys.

Pang Sida National Park is located by The Khorat Hills in Sakaew Province, eastern Thailand. With area 845 km², the park is dominated by deciduous and evergreen rain forest as well as lowland scrub and open grasslands at the foothills. The Houy Nam Yen Creek historically contained many evidences of *C. siamensis*.

Khao Ang Rue Nai Wildlife Sanctuary in Chachoengsao Province comprises of 108 km² and encompasses hills covered in evergreen and dry deciduous forests, with open grasslands in the lowlands. In most of the sanctuary, there are several watersheds that eventually flow into river systems well outside the sanctuary. Most creeks dry and break up to form series of small pools in dry season.

3.2. Habitat

Wetland habitats, which historically contained crocodiles, are both tidal and non-tidal. Large tracts of freshwater wetland occur in central and northeastern Thailand, although these have been altered considerably from their natural state and are now used extensively for agriculture and aquaculture except in protected areas. The northernmost parts of Thailand are mountainous and have apparently never contained crocodilians. The southern peninsula of Thailand opens on the west to the Andaman Sea and the east to the Gulf of Thailand which abuts Thailand southern shoreline (Webb and Jenkins, 1991).

The Siamese crocodile occurs in a wide range of freshwater habitats, including slow-moving rivers and streams, lakes, seasonal oxbow lakes, marshes and swamplands (Smith, 1931; Daltry *et al.* 2003; Bezuijen *et al.*, 2006). The use of burrows excavated into the banks of rivers or lakes has been recorded, with up to five individuals utilizing a single burrow at one time (Simpson *et al.*, 2006b). Generally preferring lowland elevations, the species has been recorded up to 600 m above sea level (Daltry *et al.*, 2003).

3.3. Biological characteristics

Crocodylus siamensis is a medium-sized species, with most individuals attaining a total length of less than 3.5 m (Smith, 1919). Wild nests recorded in Cambodia, Lao PDR, and Thailand were mounds located on floating vegetation mats or on the banks of lakes or rivers (Platt *et al.*, 2006; Simpson *et al.*, 2006a; Starr *et al.*, 2010; Bezuijen *et al.*, 2010). Nesting occurs in the late dry season and wet season. Clutch size observed in wild nests ranged from 11-40 eggs (Starr *et al.*, 2010; Limlikhitaksorn, 2010). Captive *C. siamensis* produce clutches of 6-50 eggs (Youngprapakorn *et al.* 1971; Platt *et al.*, 2011). Hatchlings emerge in the wet season after 70-80 days incubation (Brazaitis and Watanbe, 1983; Platt *et al.*, 2011; Bezuijen *et al.*, 2010). Fidelity to nesting sites has been recorded (Simpson *et al.*, 2006a). Similar to many other crocodylians, *C. siamensis* feeds on a wide variety of prey such as invertebrates, amphibians, reptiles, avians and mammals, including carrion (Daltry *et al.*, 2003; Bezuijen, 2010). They reach maturity at 10-12 years old (Daltry *et al.*, 2003).

3.4. Morphological characteristics

Maximum size reported for the species is between 3,000 and 3,300 mm in total length. Average total length is 2,500-3,000 mm, and 240-290 mm in hatchlings. 1.5 – 2.0 snout ratio with 1 ridge on skull. The neck region has 4 post-occipital scales and 6 nuchal scales. Dorsal osteoderms are 16 – 17 rows. Ventral scales are arranged in 30 to 34 transverse rows and 14 to 16 longitudinal rows. Tail and belly inclusions are visible as well as ISO. The color of adults is olive-brown on the dorsal area, with large black markings on the tail. The ventral area is pale with a creamy-yellowish tone.

Preliminary information is available on phylogeography and population genetics of the species (Gratten, 2003), seasonal sperm cycles (Kitiyant *et al.*, 1994). Hybridisation of captive Siamese crocodiles with *C. rhombifer* and *C. porosus* has been documented (Chavananikul *et al.*, 1994; Thang, 1994) and the chromosome number of *C. siamensis* and hybrids, as well as DNA methods to distinguish them has been identified (Youngprapakorn, 1991; Fitzsimmons *et al.*, 2002).

Srikulnath *et al.* (2012) discovered a new genome (haplotype2, EF581859) and successfully differentiated *C. siamensis* from *C. porosus* and hybrids between both species. The results were consistent with the phylogenetic relationship among the three genomes *C. porosus* (AJ810453), haplotype1 (DQ353946), and haplotype2 (EF581859). These effective markers could be used specifically for rapid and accurate species identification in population, ecology and, conservation studies especially for the re-introduction programs.

3.5. Role of the species in its ecosystem

Crocodylus siamensis facilitates a number of ecological processes, especially in smaller water bodies, where it regulates populations of fish and other invertebrate species. It is preyed upon by birds and medium-sized mammals at juvenile stages. By breaking vegetation and creating passage in shallow water, it is an engineer in freshwater ecosystem.

4. Status and trends

It is likely that some viable wild populations inhabiting in Thailand and other range states. Surveys since the early 1990s have confirmed many fragmented and scattered population largely within protected habitats (Kreetiyutanont, 1993; Ratanakorn and Leelapatra, 1994; Ratanakorn *et al.* 1994; Platt *et al.*, 2002; Temsiripong, 2003; Limlikhitaksorn, 2010). Recently, wild crocodile populations in Thailand have been estimated more than 100 individuals (Chumnarnkid, 2021).

4.1. Habitat trends

Pang Sida National Park has no humans-interaction in the area and having sufficient suitable habitat for a crocodile population. The National Park, situated in eastern Thailand with total area of 844 km² was awarded a World Heritage site by UNESCO in 2005. The habitat survey showed suitable habitat for a viable population of around 100 - 200 crocodiles. The inter-specific competition for micro habitat and food sources with monitor lizards may occur with juvenile crocodiles. During wet season, crocodiles may be flushed out of protected areas. This situation created precautionary management as following.

The villagers have committed to help crocodile conservation. Public hearing and education was carried out in early 2004 to ensure that the escaped crocodiles outside the protected area will not be taken. The villagers, who live next to the park border line, used to see and capture juvenile crocodiles swept away with the water in the valley during the wet season. After being educated, they will not be frightened by the crocodiles if being seen again. Instead, they promised to capture and hand in the escaped crocodiles to the rangers. The villagers have seen the increase in number of eco-tourists since the crocodiles were brought back to the areas.

Thung Saraeng Luang National Park, Pitsanulok Province, is situated in northern Thailand with total area of 1,262 km². *Crocodylus siamensis* have been found in 5 areas of this national park and occasionally they were found outside national park. Further, their nests were found constantly.

Kaeng Krachan National Park in Petchburi and Prachuab Khiri Khan Provinces with total area of 2,915 km², large population of *Crocodylus siamensis* have been found and their nesting also constantly found every year.

Khao Ang Rue Nai Wildlife Sanctuaries in Chachaengsao Province has long been found Siamese crocodile in the wild and recently the reintroduction program has been implemented in 2020.

Bueng Boraphet Non-hunting area in Nakorn Sawan province, central flood plain in Thailand has previously been the large habitat for wild Siamese crocodile. Recently, Siamese crocodiles in Bueng Boraphet have been raised in some restricted area. Their nests have been found occasionally.

Yod Dome Wildlife Sanctuary in Ubon Ratchatani province, northeastern Thailand, some of Siamese crocodiles have been found and there is a plan for reintroduction program in this area.

In general, these six protected areas provide suitable habitats, sufficient food supplies, safety nesting ground and so on for sustainability of viable crocodile population. Further, there are supported by other conservation activities such as smart patrol by wildlife rangers; enhance awareness of villagers, communities and general public by involving them in conservation activities as recapture and return juvenile crocodiles during wet season. Additionally, these areas are well protected by Wildlife law and National Park law with strict law enforcement.

4.2. Population size

Chumnarnkid (2021) reports that there are wild Siamese crocodile populations inhabiting within six protected areas and one population inhabits outside protected area. The most viable wild population is at Bueng Boraphet non-hunting area. In Pang Sida National Park, there are both wild crocodiles and re-introduction crocodiles. Other protected areas include Thung Saraeng Luang National Park, Kaeng Krachan National Park, Khao Ang Rue Nai Wildlife Sanctuary and Yod Dome Wildlife Sanctuary. Recently, another viable wild population has been found outside protected area at natural swamp namely Bueng Huy Kayaeng, Kabinburi district, Prachinburi Province adjacent to Cambodia. All of those wild populations both within protected areas and outside protected can be minimally estimated more than 100 individuals.

4.3. Population structure

Data on the population structure of Thai population seems limited. It is available in one of six populations, Bueng Boraphet Non-hunting Area. 50% of adults, a high proportion of Class I individuals (<1 year) and Class II individuals (2-3 years), representing 50% of population (Wongsongsarn, 2010). These data suggest adequate nesting, hatching, and recruitment rates for the species.

Population structure in Kaeng Krachan National Park was concluded to be 100% adult females (Limlikhitaksorn, 2010). Study revealed infertile eggs were collected to hatch in an artificial incubator in 2009, and 2010 suggesting there is strong bias in sex ratio in this remnant population. Re-introduced population in Pang Sida National Park was 100% sub-adult (6-8 years). 1:1 sex ratio was selected at the time of release in 2004 and 2006.

In 2020, 6 Siamese crocodiles (3 males and 3 females) have been reintroduced at Khao Ang Rue Nai Wildlife Sanctuaries in Chachaengsao Province (Chumnarnkid, 2021).

4.4. Population trends

Currently, there are six wild crocodile populations inhabiting in protected areas and another wild population inhabiting outside protected area as described earlier. The viable population inhabits in Bueng Boraphet Non-hunting Area. Nests have been discovered during annual systematic survey by a researcher team from Department of Fisheries.

In 2014 and 2015, Chumnarnkid (2021) reported that *Crocodylus siamensis* found at Thung Saraeng Luang National Park in natural canals with nests and young crocodiles. It shows the trend of viable population.

The smallest remnant population is in Khao Ang Rue Nai Wildlife Sanctuary. Once the bi-annual survey reveals larger population, and the mark-recapture study is performed, the population trends can be forecast. However, studies show significant increase in number in many habitats that reflected crocodile ability to replenish themselves (Wongsongsarn, 2010; Limlikhitaksorn, 2010).

4.5. Geographic trends

The species remains present throughout its natural range in Southeast Asia. The largest population over the past few years is in Cambodia. Since there has not been a publication on global population, the estimate is available for *C. siamensis* population within each range state that was gathered over years of researches. Based on conservatively estimation, approximately 200 and 400 wild adults may remain in Cambodia (Sam *et al.*, 2015) Lao PDR may support a similar number of adults (Bezuijen *et al.*, 2009). The largest known population at any single site is 55-60 individuals, in Cambodia (Starr *et al.*, 2010).

In Thailand, individuals persist in a number of scattered localities, and nests are sometimes documented (Kanwatanakid-Savini *et al.*, 2012, Limlikhitaksorn, 2010, Temsiripong, 2007, Platt *et al.*, 2002). In Vietnam, a reintroduced population at Cat Tien National Park had an estimated population of 100-150 individuals in 2010-2011 (a maximum of 80 non-hatchlings was observed), based on an initial release of 60 captive individuals (Pahl, 2012).

At Mesangat Lake in East Kalimantan, Indonesia, mark-recapture surveys in 2010-2011 indicated that less than 30 individuals may be present, although nearby are remaining unsurveyed. On the basis of these limited data, the global wild population of *C. siamensis* almost certainly comprises about 1,000 individuals.

5. Threats

As mentioned earlier, wild crocodile populations within protected areas are protected under Wildlife Reservation and Protection Act, B.E. 2535 (1992) which newly amended in 2019 become Wildlife Reservation and Protection Act, B.E. 2562 (2019) and National Park Act, B.E. 2504 (1961) also amended in 2019 become National Park Act, B.E. 2562 (2019). These two sets of law provide various provisions prohibiting activities caused the threats to wild crocodiles in protected areas and also crocodile species outside protected areas. Therefore, crocodiles in Thailand have no threats from illegal hunting or illegal poaching rather the threats arising from environmental impacts such as habitat destruction or habitat degradation, hydropower construction, road construction, local villager encroachment which altered habitats. Nevertheless, by Thai law, any large scale construction project as roads, manmade reservoirs and hydropower constructions can be constructed only after the approval of the Environmental Impact Assessment (EIA). Meanwhile, some crocodiles outside protected areas which are protected and managed by Wildlife law and Fisheries law but their number are quite small due to the facts that most crocodile outside protected areas are legally kept in the farms or in the zoological parks.

6. Utilization and trade

6.1. National utilization

There is no utilization of wild *C. siamensis* in Thailand because they inhabit in the protected areas as National Park, Wildlife Sanctuary areas and Non-hunting areas.

Currently, all commercial utilization of *C. siamensis* in Thailand derives from captive breeding operations. In 2020, there are 731,457 *C. siamensis* from 928 owners (Department of Fisheries, 2021) including 29 Thai registered crocodile farms under Resolution Conference 12.10(Rev. CoP15) of CITES.

6.2. Legal trade

Pursuant to the Thai law, Wildlife Reservation and Protection Act, B.E. 2535 (1992) amended in 2019, *C. siamensis* and its habitat is protected by prohibiting any activities except for scientific purposes. As a result, there is currently no legal trade of wild Siamese crocodile. However, the Act allows only *C. siamensis* from registered captive-bred operations for trading domestically and internationally.

6.3. Parts and derivatives in trade

There is currently no trade of wild *C. siamensis* in Thailand. However, Siamese crocodiles were traded in national and international markets derived from captive breeding. According to the UNEP-WCMC Trade database 2007 - 2011, parts and derivatives of the Siamese crocodiles were skins, meats and leather products. The largest exporter was Thailand (117,875 skins, 894,628 kg of meats and 105,490 leather products), followed by Vietnam (55,715 skins, 15,098 kg of meats and 17,755 leather products).

Meanwhile, John Caldwell (2021) reported that there are 29 crocodile farms registered with the CITES Secretariat for commercial production of this species in Thailand and all reported exports of skins were captive bred. Reported exports peaked at 39,000 skins in 2008 and fluctuated between 25,000 and 36,000 until 2016 when they decreased to lower 15,000 for the first time since 2003. Between 2017 and 2019 they declined further to around 12,000. The main importers over the period 2017 to 2019 were China, Japan, Republic of Korea, and Singapore.

6.4. Illegal trade

After the enactment of Wildlife Reservation and Protection Act, B.E. 2535 (1992), no illegal trade of wild Siamese crocodiles was recorded in Thailand. The current commercial productions from captive breeding are sufficient for the trade demand. Therefore, there is unnecessary to take the species from the wild.

6.5. Actual or potential trade impacts

Thailand has a long history of farming crocodiles, exporting crocodylian products, and importing crocodiles and crocodile skins from other countries (Webb and Jenkins, 1991). Thus, there is no potential trade impact on the wild species.

7. Legal instruments

7.1. National

The measures for Natural Resource Management and Conservation in Thailand include (i) species protection, (ii) habitat protection and rehabilitation, and (iii) activities restriction. Therefore, the legal instruments protecting crocodile species have been designed in line with those measures. Currently, Thailand has three pieces of legislation protecting crocodile species namely; (i) the Wildlife Reservation and Protection Act, B.E. 2562 (2019), (ii) the National Park Act, B.E. 2562 (2019) and (iii) the Royal Ordinance on Fisheries, B.E. 2558 (2015). These three pieces of law have several provisions protecting crocodile species such as listing in the list of protected species, establishing sanctuary area or non-hunting area, ban or restrict activities detrimental to the survival of crocodile species and also the penalty provisions.

The newly amended Wildlife Reservation and Protection Act, B.E. 2562 (2019) listed crocodile species in Protected List which prohibited from hunting, possessing, breeding, trading, exporting or importing except for registered captive-bred operation. Further, this Act empowers the Department of National Park, Wildlife and Plant Conservation to establish the wildlife sanctuary areas and non-hunting areas. In addition, this Act contains provisions to implement CITES requirements. In 2019, the National Park Act, B.E. 2562 also amended and all wildlife inhabiting within National Park including crocodile species are protected by this Act which prohibited from hunting, poaching, taking, or any activity detrimental to the survival of crocodile species. Furthermore, the Royal Ordinance on Fisheries, B.E. 2558 (2015) responsible by the Department of Fisheries also stipulates provisions controlling activities for crocodile farming outside protected areas such as registering captive-bred operation, crocodile farm, crocodile trader and manufacture.

7.2. International

The Siamese crocodile was included in CITES Appendix I in 1975. Since then, the Convention has proven its effectiveness in controlling international trade of the species and preventing illegal activities that may affect wild population. Resolution Conf. 11.12 on the *Universal tagging system for the identification of crocodylian skins* and 12.10 (Rev. CoP15) on *Guidelines for a procedure to register and monitor operations that breed Appendix-I animal species for commercial purposes have established mechanisms to ensure control of international trade in crocodylians*. This is proven by the clear recovery of the species and the few instances of the illegal trade reported by the Parties.

Besides CITES, Thailand is also contracting Parties of Convention on Biological Diversity (CBD), UN Convention on the Law of the Sea (UNCLOS), RAMSAR Convention and UNESCO World Heritage Convention. These international agreements require Thailand in binding with all obligations contributing to crocodile species conservation and sustainable utilization.

8. Species management

8.1. Management measures

Thailand implements crocodile species management plan as In-situ conservation and Ex-situ conservation compliance to the Convention of Biological Diversity (CBD). In this relation, crocodile species inhabiting in protected areas as national park, wildlife sanctuary area and any protected area could be viewed as In-situ conservation whereas crocodile species in captive-bred operations, crocodile farms and zoological parks could be viewed as Ex-situ conservation. This practice ensures that Siamese crocodile will not become endangered because there are large amount of Siamese crocodile breeders in the farms which produce more than 200,000 young crocodiles annually. In addition, government, private sectors and villagers have

closed collaboration in several conservation programs such as re-introduction program in protected areas, raised awareness for villagers and general public for the purposes of sustainable utilization of crocodilians.

Thailand also has closed collaboration with range States namely; Cambodia, Viet Nam, Malaysia and Indonesia as ASEAN member countries. The ASEAN Working Group on CITES and Wildlife Enforcement (AWG-CITES and WEN)) was established in order to seek the cooperation and collaboration from ASEAN member in monitoring illegal wildlife trafficking, combatting illegal wildlife trade, sharing relevant information and conducting law enforcement. Therefore, the implementation of range States have complied with their national laws and requirements of the Convention in addition to appropriate enforcement controls and compliance with the requirements of the Convention laid down in Conf. 9.24 (Rev. CoP17) Annex 4 (A.2.a) Precautionary measures.

8.2. Population monitoring

In Thailand, government and private sectors have jointly planned a country-wide monitoring program for wild populations and habitats of *C. siamensis*. Accordingly the Department of National Park, Wildlife and Plant Conservation regularly carries out biannual monitoring project in Kaeng kranchan National Park (Limlikhitaksorn, 2010).

The monitoring results have been reviewed and assessed in a workshop involving experts and management authorities resulted with the most appropriate methods and define time intervals, localities, and variables taking into account of wild crocodiles and their habitats. Accordingly, the preliminary design supports wild and re-introduced specimens by monitoring effort with biannual sampling throughout the range of the species. In addition, capture-mark-recapture of individuals and standard data/sample collection, as well as nest location will be monitored. The training for wildlife rangers by collaboration between government and private sector was completed in mid-2004, the rangers were trained to understand natural history of crocodiles, and the importance of crocodile in its ecosystem, safe handling of all-sized crocodiles, night-light survey techniques, and field data collection.

The next step is to consider the possibility of involving range states in Southeast Asian region. The aim is to build on the experiences and results of many projects to obtain better information about the status and trends of relevant populations of the species and their habitat. Currently, there are some monitoring projects with community base management practice in neighboring states considering relevant areas in the range of the species.

8.3. Control measures

8.3.1. International

Thailand and all ASEAN countries (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam) are contracting Parties of the CITES. In this relation, ASEAN has established ASEAN Working Group on CITES and Wildlife Enforcement (AWG-CITES and WEN) and the important roles of AWG-CITES and WEN emphasize on engaging ASEAN governments and their agencies, individuals and experts from international organizations, academia, private sector as well as civil society organizations (CSOs) and the publics in combating illegal wildlife trade.

The ASEAN Working Group on CITES and Wildlife Enforcement (AWG-CITES and WEN) is committed to furthering cooperation among all sectors and agencies; increasing law enforcement capacity and support for investigations; encouraging strong laws and appropriate sentencing to deter criminals; and increasing public awareness of wildlife crime and its impacts to reduce consumer demand. AWG-CITES and WEN is helping to build capacity to dismantle the organized criminal networks behind the illegal wildlife trade to turn the tide on trafficking and improve protection for the region's biodiversity.

8.3.2. National

The Department of National Park, Wildlife and Plant Conservation is responsible for implementation and enforcement of the Wildlife Reservation and Protection Act, B.E. 2562 (2019) and the National Park Act, B.E. 2562 (2019). Meanwhile, the Department of Fisheries is responsible for implementation and enforcement of the Royal Ordinance on Fisheries, B.E. 2558 (2015) and the Wildlife Reservation and Protection Act, B.E. 2562 (2019) specifically aquatic animals, crocodiles outside protected areas and crocodile farms. In order to ensure that Thailand Wildlife Enforcement Network works effectively, the National Park, Wildlife and Plant Conservation Department in cooperation with the Department of Agriculture, the Department of Fisheries, the Royal Thai Police, the Customs Department and relevant agencies for enforcement convened the cross border workshop on law enforcement networking and other activities to enhance public awareness for example: distributing the printed materials, brochures, and leaflets on the wildlife trade campaign at airports, tourist spots, local markets, and hotels, as well as at wildlife check points of National Park, Wildlife and Plant Conservation Department and border check points of the Department of Agriculture, Fisheries Department, Royal Thai Police, and Customs Department etc.

8.4. Captive breeding and artificial propagation

There are 928 crocodile farms registered with the management authority of Thailand, Department of Fisheries in 2020. Among them there are 29 farms registered as a captive breeding operation that breed Appendix-I species in captivity for commercial purposes under Conf. 12.10 of CITES. Totally annual productions are approximately 200,000.

8.5. Habitat conservation

Total of 102 protected areas in Thailand including National Parks, Wildlife Sanctuaries, and Non-hunting areas provide sufficient shelter and legal protection to the Siamese crocodile in its potential range. Of these, 6 protected areas have been recorded the presence of wild populations with total area of 5,652 km². There are also 10 RAMSAR sites with 3,706 km² altogether in the potential range of the *C. siamensis*.

8.6. Safeguards

Thai government, private sectors and stakeholders have jointly established viable wild Siamese crocodile populations by re-introducing genetically pure-bred in various protected areas resulted in replenishment trends. This implementation is the safeguards of wild populations compliance to Precautionary measures laid down in Resolution of the Parties, Conf.9.24 (Rev. CoP17), Annex 4 (A.2.a), and Article II of the Convention which the species can be transferred to Appendix II. Even though the species is likely to be in demand for international trade, its management is such that implementation of the Convention is secured and appropriate enforcement controls are in place (see sections 7 and 8 for more information). Moreover, the proposal includes a zero quota to ensure that wild populations of the Siamese crocodile do not become endangered by international trade.

9. Information on similar species

Similar species to *Crocodylus siamensis* in international trade is *Crocodylus porosus*. However, *C. siamensis* can be distinguished by its number of belly traverse scale, wider head, ridges on snout do not stretch from eye to nostril. It rather conjoins and forms a triangle ridge in front of eyes. *C. siamensis* horn back scales tend to be larger and higher than that of *C. porosus*. Detailed information with morphological characteristics, parts and derivatives in trade, and identification keys on CITES-listed crocodile species is available in the *CITES Identification Guide – Crocodylians* (Environment Canada, 1995). According to this guide, it is possible to distinguish between species similar to *C. siamensis* even without special training. Distinctive characteristics can be easily observed in whole skins, which are the main product of the Siamese crocodile in trade.

10. Consultations

Cambodia, Lao PDR, and Vietnam will be consulted, as they are range states of the species, and considering supports transfer of the Thai population of the Siamese crocodile from Appendix I to Appendix II with a zero quota for wild specimens.

11. Additional remarks

At the International IUCN-SSC-Crocodile Specialist Group Regional Species Meeting in 2011, Bangkok, Thailand, the Crocodile Specialist Group (CSG) has addressed many issues and recommendations for ASEAN range states particularly illegal trade issues. It recommended on having dialogue among range states to resolve the issues. Accordingly, the dialogue process among range states can be arranged through a regional working group under appropriate body (e.g. AWG-CITES and WEN and/or Mekong Sub-regional) in order to address regional issues and problems of *C. siamensis*, with emphasized on the action to control illegal trade.

Further development and implementation of re-introduction programs in Thailand will be continued and strengthened according to national plan. The information gained from ongoing monitoring and evaluation of these programs will be applied for future release programs subject to adjustment as appropriate.

Strengthening linkages between commercial captive breeding, trade, and conservation in the Southeast Asian region is a prime objective. Several countries in the region have already developed crocodile farming associations and other commercial enterprises linked to the farming industry. The crocodile industry has an important role to play in the conservation of wild populations, through funding of surveys and/or other conservation initiatives. The ultimate goal aims to re-establish viable wild populations and their sustainable utilization.

There are farms in Thailand maintained large population of captive-bred pure stocks of *C. siamensis*. However, there is also hybridization with *C. porosus*. Therefore, farms are encouraged to segregate genetically pure *C. siamensis* for conservation. Currently, more than 7,000 animals from private farms are designated for re-introduction program in Thailand.

The large captive populations of *C. siamensis* held on farms represent a potential source for re-introduction programs, and farms in Thailand, Cambodia and Vietnam have donated *C. siamensis* for this purpose. Genetically pure *C. siamensis* have been found in captive holdings in Cambodia (Starr *et al.*, 2009), Thailand (Srikulnath *et al.*, 2012) and Vietnam (FitzSimmons *et al.*, 2002).

To effectively control of raising and trading of parts and derivatives from the same species with different CITES appendices among range states, regional regulation of registration for captive-breeding institution with the management authorities and the marking system of live and products will be harmonized among range states.

Thailand also has many programs to educate and raise awareness of villagers, communities and general publics for Siamese crocodile conservation programs such as involving in reintroduction activities at various protected areas, recapture and return escaped crocodiles during wet season, disseminate information and law, etc.

12. References

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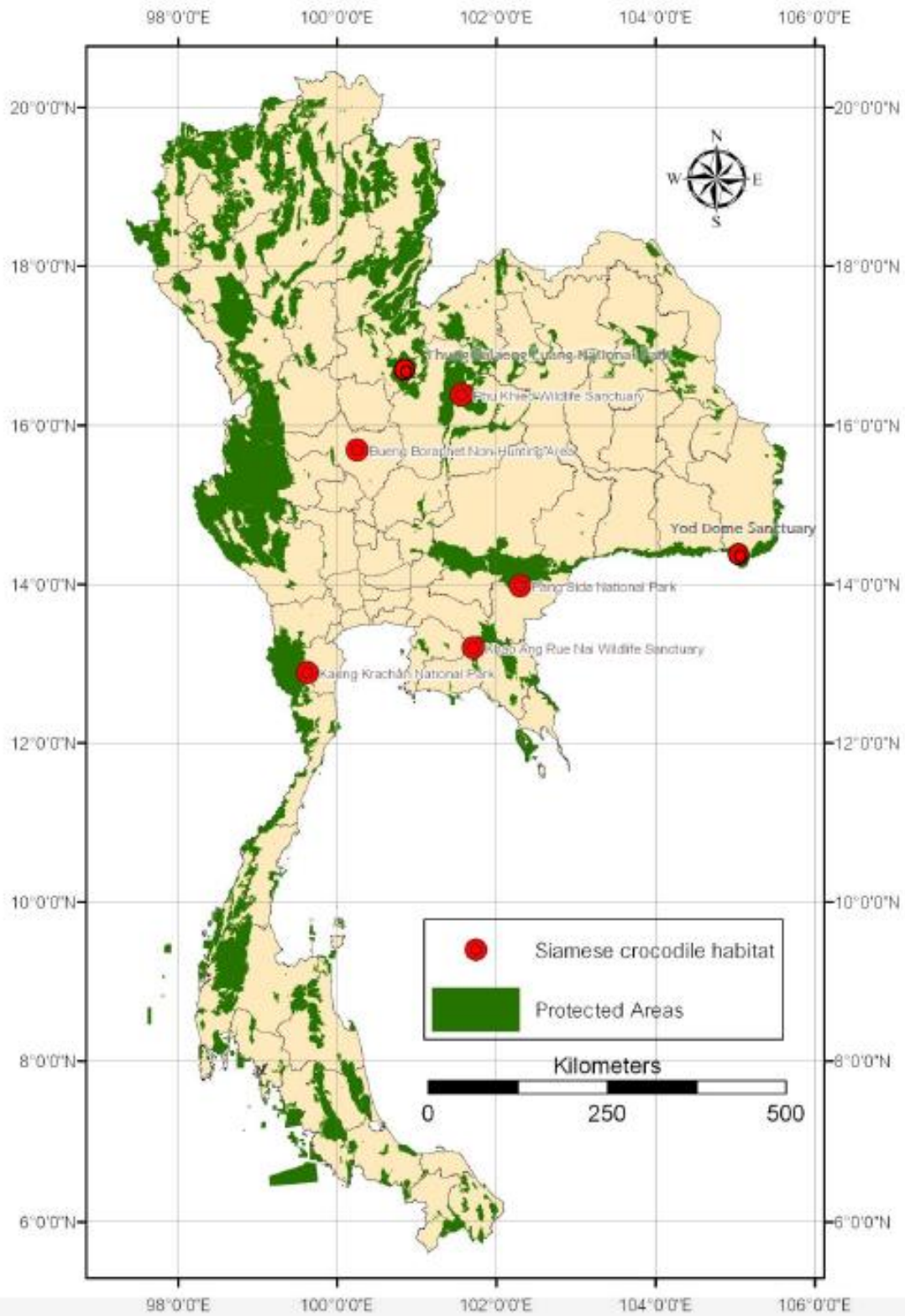
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(Map 1) The Siamese crocodile habitats in Thailand