

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

Seventeenth meeting of the Conference of the Parties
Johannesburg (South Africa), 24 September – 5 October 2016

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Transfer of the Saltwater crocodile (*Crocodylus porosus*) in Malaysia from Appendix I to Appendix II, with wild harvest restricted to the State of Sarawak and a zero quota for wild specimens for the other States of Malaysia (Sabah and Peninsular Malaysia), with no change in the zero quota unless approved by the Parties.

B. Proponent

Malaysia

C. Supporting statement1. Taxonomy

1.1 Class: Reptilia

1.2 Order: Crocodylia

1.3 Family: Crocodylidae

1.4 Genus, species or subspecies, including author and year: *Crocodylus porosus* Schneider, 1801

1.5 Scientific synonyms: *Crocodylus biporcatus*, *Crocodylus oopholis*, *Crocodylus raninus*, *Oopholis pondicherianus*

1.6 Common names: Saltwater crocodile, saltie, Estuarine crocodile, Indo-Pacific crocodile, Buaya katak/tembaga/muara (malay), Baya, Pukpuk, Kone huala (Papua New Guinea), Jara Kaenumkem (Thailand), ius (Palau)

1.7 Code numbers: L-306.002.001.009

2. Overview

2.1 Technical Justification

Article II Fundamental Principles: *C. porosus* in Sarawak no longer meets the criteria for Appendix I (Article II.1). The Appendix-I listing stimulated conservation actions and population recovery, and the species now fits the criteria for Appendix II (Article II.2). Malaysia is committed to CITES and has demonstrated its ability to comply with the provisions of CITES (Article II.4).

Article IV Regulation of Trade in Specimens of Species Included in Appendix II. Crocodiles are protected in Malaysia under the Federal's and States' laws. These laws and regulations are adequate to ensure the

provisions of Article IV can be complied with, including the obligation on the CITES Scientific Authority to demonstrate non-detriment (Article IV.2.a).

2.2 General

Malaysia is represented geographically by 3 regions; Peninsular Malaysia (and the Federal Territory of Labuan), Sabah and Sarawak. Sabah and Sarawak are located on the northern part of Borneo, separated from Peninsular Malaysia by the South China Sea, and sharing the island with the Sultanate of Brunei Darussalam and Indonesian Kalimantan. Management of wildlife, including *C. porosus*, in each of these three regions is under its own statute:

- Wildlife Conservation Act 2010 [Act 716] for the states in Peninsular Malaysia and the Federal Territory of Labuan;
- Wildlife Conservation Enactment 1997 for Sabah; and
- Wild Life Protection Ordinance 1998 for Sarawak.

In addition to these regional laws, the international trade of wild flora and fauna in Malaysia is regulated under the Federal's International Trade in Endangered Species Act 2008 [Act 686]. Movement and trade of wildlife within these three Malaysian regions are considered as import and export and require stringent control and permits system. In addition to wildlife officers, police and customs officers are also empowered to enforce these laws.

The wild *C. porosus* population in Sarawak has increased significantly over the last 30 years due to successful conservation actions. Commensurate with the increasing population of adults, which are seen as voracious predators, there has been a substantial increase in human-crocodile conflict, including fatal and non-fatal attacks. This is eroding public confidence in ongoing conservation of *C. porosus*. The goal of the current proposal is to incorporate into the overall management of this species in Sarawak the ability to conduct a strictly controlled sustainable harvest that can provide economic benefits to local communities being adversely affected by the crocodiles, while retaining viable wild populations. Without economic returns, crocodiles are increasingly seen only as pest that should be eradicated.

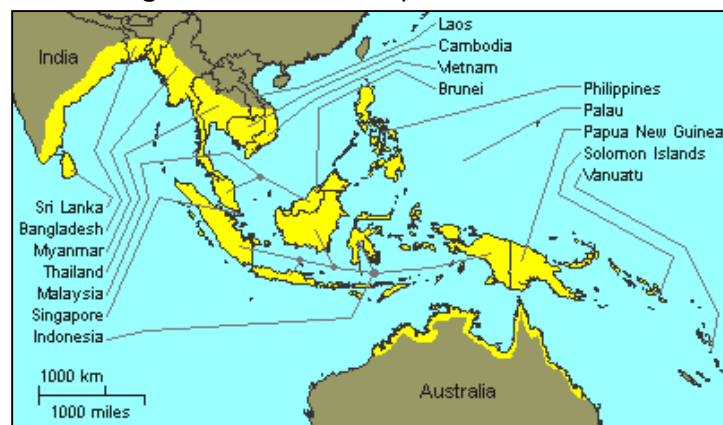
The proposed harvest will be experimental and restricted to a maximum of 500 non-hatchling *C. porosus* per year (around 4% of the estimated population) and <2,500 eggs (or their equivalent in hatchlings) for the first three years, with safeguards aimed at reducing these levels of harvest if the population response does not meet expectations. It is an adaptive management approach.

3. Species characteristics

3.1 Distribution

The distribution of *C. porosus* (see figure 1) encompasses Australia, Bangladesh, Brunei, Cambodia (extinct?), China (possibly historically), India, Indonesia, Malaysia, Myanmar, Palau, Papua New Guinea, Philippines, Seychelles (extinct), Singapore, Sri Lanka, Solomon Islands, Thailand (virtually extinct?), Vanuatu, Vietnam (extinct?) (Webb et. al., 2010).

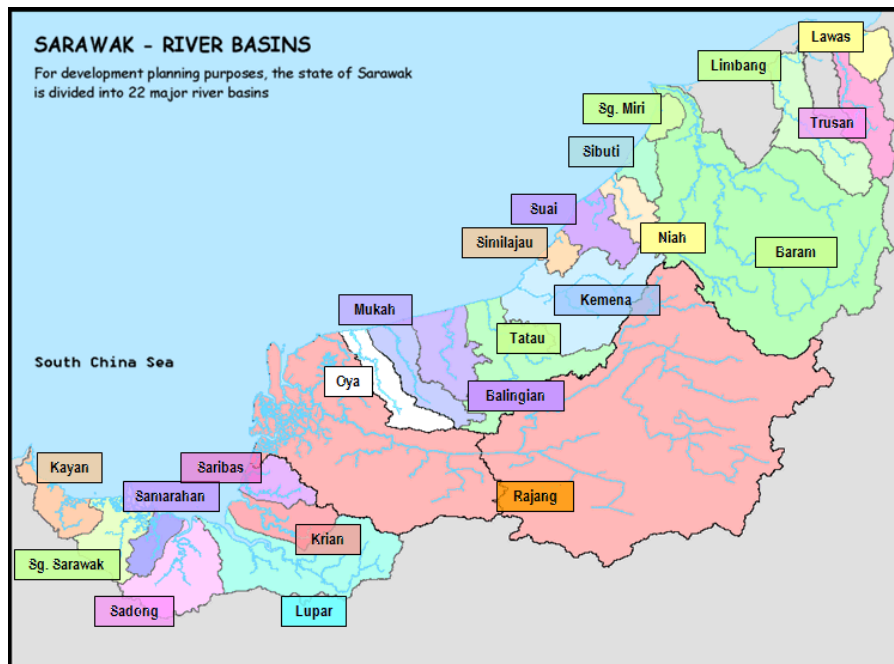
Fig. 1: Distribution of *C. porosus* in the world



(Adam Britton (n.d.))

Estuarine crocodiles are widely distributed in Malaysia. In Sarawak, crocodiles are found in all river basins. Sarawak covers an area of 12 million hectares comprising 22 major river basins (see figure 2).

Figure 2: Map of Sarawak's River Basins



Source: Department of Irrigation and Drainage, Sarawak

3.2 Habitat

Sarawak lies 0.5° - 5° north of the Equator, possesses a hot and humid climate with an average rainfall of more than 3000mm/year and average temperature of 26°C. The topography of the State is generally flat in the peat swamp areas closer to the coast to gently undulating hills and rugged mountains towards the borders in the west and south. The tidal portions of the rivers are lined with mangrove and the rivers meander through great distances through broad flood plains with oxbow lakes.

Sarawak's extensive crocodile habitats are found in the mangrove estuaries, the large river systems, and the inland freshwater swamps. The highest crocodile densities in Borneo are usually found in mid-river areas of medium sized to large rivers (Whitaker, 1984; Stuebing et. al., 1993) but some are also found as far as Kapit town (Rajang RB), which is more than 160 kilometres from its river mouth and is not affected by tidal influence. Crocodiles are known to traverse across and utilize different habitats as a result of social dynamics.

3.3 Biological characteristics

Estuarine crocodiles are water's edge predators that take a wide variety of prey. Juveniles feed on smaller prey such as insects, crustaceans, small reptiles, frogs and small fishes while larger and mature crocodiles eat turtles, snakes, birds, livestock, buffalos, monkeys, wild pigs, mudcrabs and occasionally, people. Breeding territories are usually established along tidal rivers, creeks and freshwater areas. In Australia, female estuarine crocodiles reach sexual maturity at 2.3 m total length at the age of 10-12 years and males at around 3.35 m and 16 years. Females, on average, lay 40 to 60 eggs in mound nests made from vegetation (usually grasses and vines) and mud. The sex of the brood is determined by the temperature of the nest. The highest percentage of males are produced around 32.0oC, with 100% females at <31.0C and >33C (Webb et al., 1987). They are known to live for more than 50 years (Bayliss and Messel, 1990; Burbridge, 1987; Messel et al., 1979-87; Messel and Vorlicek 1985, 1986; Taplin, 1987, 1990; Webb et al., 1984, 1987; Webb and Manolis, 1989, 1992; Stuebing et al., 1993; Whitaker, 1984).

Webb and Manolis (1993) suggested a high mortality rate of crocodiles from egg to maturity, with only 1% surviving to maturity. They predicted the rates of survival for several size classes in the wild, at least 25% for eggs, 54% for hatchlings; 30% for yearlings, 60% for two to three years of age, 56% for three to four years of age and 56% for four to five years of age. They also suggested that 18 crocodiles would survive to five years from 1000 eggs laid.

3.4 Morphological characteristics

Estuarine crocodiles are the largest living reptiles, with the females attaining lengths of 3m and males 3-6m and weigh from 640kg to 1,100kg. They have very large heads with a pair of ridges running from the eyes orbits along the center of the snout. The eyes, ears, and nostrils are located on the same plane on the top of the head, allowing for it to see, hear, and breathe while almost totally submerged. The jaws are heavysset and contain 64-68 teeth. Juveniles are yellow in colour with black stripes and spots. Adults are dark in colour with light grey areas. The belly is yellowish and the underside of the tail is grey near the tip. Dark bands are located on the lower flanks. The hide lacks osteoderms (bony plates) on the ventral (belly scales), and the scales are oval and squarish in shape on the flanks and belly skin (Cogger, 1993; Grigg and Gans, 1993; Cooper-Preston and Jenkins, 1993).

3.5 Role of the species in its ecosystem

Crocodiles are usually considered top-end predators within rivers and lakes, and arguably maintain genetic quality by feeding on weak, injured and dead animals. It has been claimed crocodiles impact positively on fisheries by feeding on predators of commercially valuable fish e.g. catfish, turtles, otters and water birds (Whitaker, 1984; Gorzula, 1987). Crocodiles are a food source for other animals that prey on small crocodiles, and dead crocodiles of all sizes are eaten by many animals.

4. Status and trends

4.1 Habitat trends

There have been minimum changes to the general habitat of major rivers in Sarawak. It is a regulatory requirement to put aside river reserve or river buffers along the waterways, except in towns, cities and human settlements. Land developments and land uses such as agriculture adjacent to major rivers, has little impact and even lead to positive habitat improvement. Secondary type of vegetation called 'padang', a stable community of secondary growth of grasses and herbs, is suitable for crocodile nest construction and supports nesting populations (Sabah Wildlife Department, 2002)

4.2 Population size

The Sarawak Forestry Corporation conducted a comprehensive population survey of *C. porosus* in most rivers in all river basin in Sarawak from 2012 to 2014. The result shows that all 22 river basins were inhabited by crocodiles in varying densities (Table 1). From this survey, the population of wild *C. porosus* in Sarawak was estimated as 13,507 non-hatchlings¹.

Table 1: Summary of Crocodile Survey conducted by Sarawak Forestry Corporation 2012-2014

No	River Basin	Distance Surveyed	H	Y	SA	A	EO	With H	Without H	ρ with H	ρ without H
1	Kayan	137.00	13	13	9	13	22	70	57	0.51	0.42
2	Sarawak	245.55	153	74	50	65	60	402	249	1.64	1.01
3	Samarahan	110.00	82	82	34	37	4	239	157	2.17	1.43
4	Sadong	255.90	253	76	44	32	81	486	233	1.90	0.91
5	Lupar	234.60	138	130	38	43	87	436	298	1.86	1.27
6	Saribas	60.80	29	2	3	6	97	137	108	2.25	1.78
7	Krian	123.30	54	15	1	5	108	183	129	1.48	1.05
8	Rajang	270.86	21	6	4	1	84	116	95	0.43	0.35
9	Oya	74.30	1	1	0	1	3	6	5	0.08	0.07
10	Mukah	43.00	0	1	0	1	0	2	2	0.05	0.05
11	Balingian	45.00	0	0	3	2	2	7	7	0.16	0.16
12	Suai	84.00	25	41	4	6	27	103	78	1.22	0.92
13	Similajau	27.00	64	49	8	0	34	155	91	5.74	3.37
14	Tatau	45.00	5	15	0	5	4	29	24	0.64	0.53

¹ Correction factor used in getting the population estimate was adapted from Bayliss 1987: Hatchling - 1.44; Yearling - 1.34; Subadult - 1.34; Adult - 3.08 and EO - 6.54. The figure is then extrapolated to the length of the rivers.

No	River Basin	Distance Surveyed	H	Y	SA	A	EO	With H	Without H	ρ with H	ρ without H
15	Kemena	45.00	13	16	6	7	3	45	32	1.00	0.71
16	Niah	42.00	33	12	3	3	22	73	40	1.74	0.95
17	Sibuti	35.65	13	14	10	5	9	51	38	1.43	1.07
18	Miri	23.00	1	1	0	0	2	4	3	0.17	0.13
19	Baram	150.00	12	62	14	10	47	145	133	0.96	0.88
20	Limbang	75.00	10	16	2	4	11	43	33	0.57	0.44
21	Lawas	25.00	0	1	1	0	2	4	4	0.16	0.16
22	Trusan	35.00	0	2	0	0	1	3	3	0.08	0.08
		2186.96	920	629	234	246	710	2739	1819	1.25	0.83

Note: ρ is density of observed crocodile per distance surveyed
H = Hatchling (less than 60 cm); Y = Yearling (between 60 to 120 cm); SA = Sub-adult (between 120 – 180cm); A = Adult (more than 180 cm); EO = Eye Only

In a separate and independent study carried out by Sarawak Forest Department (see Table 2) for the same period (2012-2014), covering 45 main rivers and total distance of 2,108.38 km, a total of 2,236 crocodiles were observed, giving a relative density of 1.06 individual per km. The study estimated the population of crocodile in the surveyed rivers at about 12,000 individuals.

These calculations are considered conservative because the population that lives in heavily vegetated swamps which could not be surveyed was not taken into account.

Table 2: Summary of crocodile survey conducted by Forest Department Sarawak 2012-2014

	Rivers	Distance covered (km)	No. of ind. sighted	% Hatchling	Rel density (ind./km)
1.	Kuching Wetland NP	77.72	65	4.62	0.84
2.	Sg. Bako & Sg. Santubong	81.92	174	41.95	2.12
3.	Sg. Sarawak	102.84	25	4.00	0.24
4.	Sg. Kuap	62.73	18	22.22	0.29
5.	Sg. Tuang	19.50	37	40.54	1.90
6.	Btg. Samarahan	94.51	104	35.58	1.10
7.	Btg. Sadong	137.80	360	60.00	2.61
8.	Btg. Krian	87.20	140	27.86	1.61
9.	Sg. Seblak	56.10	103	45.63	1.84
10.	Sg. Kayan	125.66	31	3.23	0.25
11.	Btg. Lingga	20.72	71	56.34	3.43
12.	Sg. Seterap	41.45	49	48.98	1.18
13.	Sg. Sebuyau	31.55	98	24.49	3.11
14.	Btg. Lupar	128.44	182	18.68	1.42
15.	Sg. Sekrang	34.90	10	0	0.29
16.	Sg. Lemanak	7.30	4	0	0.55
17.	Btg. Saribas	137.96	368	45.38	2.67
18.	Sg. Nyelong	17.96	12	33.33	0.67
19.	Sg. Sarikei	15.88	14	57.14	0.88
20.	Btg Rejang (Tg. Manis-S'kei)	46.89	21	47.62	0.45
21.	Sg. Selalang	28.61	7	25.10	0.24
22.	Sg. Belawai	23.42	21	57.14	0.90
23.	Sg. Meradong	58.40	8	0	0.14
24.	Sg. Igan & Pasai	52.47	15	0	0.29
25.	Upper Rejang	19.86	1	0	0.05
26.	Btg Rejang (lower Rejang)	84.16	14	14.29	0.17
27.	Sg. Pasin	32.63	9	0	0.28
28.	Btg. Kemena	41.88	43	13.95	1.03
29.	Sg. Labang	22.53	1	0	0.04
30.	Sg. Pandan	25.04	2	0	0.08
31.	Sg. Tatau/Anap	31.27	29	27.59	0.93
32.	Upper Tatau	35.3	2	0	0.06
33.	Sg. Niah	29.9	9	11.11	0.30
34.	Sg. Suai	32.6	15	0	0.46

	Rivers	Distance covered (km)	No. of ind. sighted	% Hatchling	Rel density (ind./km)
35.	Sg. Sebuti	26.8	11	0	0.41
36.	Upper Baram	41.6	40	12.50	0.96
37.	Lower Baram	34.89	36	13.89	1.03
38.	Sg. Bakong	37.87	46	8.70	1.21
39.	Sg. Limbang	125.12	41	2.44	0.33

4.3 Population structure

As observed in the survey by Sarawak Forestry Corporation, hatchlings account for 33.58% of the population followed by 22.96% yearlings, 8.54% subadult, 8.98% adult and 25.94% eyes only. This population structure for *C. porosus* is consistent with a population that has recovered and is both viable and healthy

4.4 Population trends

A baseline study jointly conducted by WWF and the Sarawak Forest Department 30 years ago (1985) showed uniformly low densities of 0.054 observed crocodiles per kilometer of river surveyed throughout Sarawak (Cox and Gombek, 1985). A very significant increase in population abundance had been confirmed in later (1994-2008) and the most recent surveys (2012-2014). These findings confirm that the conservation program has met with considerable success. Batang Samarahan recorded the highest increase of relative densities (108 times); from 0.02 to 2.17 individuals sighted per km.

Table 3: An increasing trend of relative densities of estuarine crocodile in Sarawak

River	Surveyor	Year	Distant (km)	No. seen (non-hatchling)	Rel. density (ind./km)	Increase
Samunsam	Cox & Gombek	1985	12.00	3	0.25	2 times
	Engkamat	2003	9.00	4	0.44	
	Sarawak Forestry	2014	10.00	5	0.50	
Sarawak Mangrove/ Kuching Wetland	Cox & Gombek	1985	48.00	2	0.04	34.5 times
	Engkamat	1995	78.70	93	1.18	
	Sarawak Forestry	2008	59.00	53	0.90	
	Engkamat	2012	77.72	65	0.84	
	Sarawak Forestry	2014	77.50	107	1.38	
Btg. Lupar	Cox & Gombek	1985	206.00	11	0.05	28.4 times
	Engkamat	1995	180.10	45	0.25	
	Engkamat	2013	128.44	182	1.42	
	Sarawak Forestry	2014	234.00	298	1.27	
Btg. Samarahan	Cox & Gombek	1985	*	1	0.02	108.5 times
	Engkamat	2012	94.51	104	1.10	
	Sarawak Forestry	2014	110.00	239	2.17	
Sungai Suai	Cox & Gombek	1985	40.00	2	0.05	22.4 times
	Engkamat	2014	32.60	15	0.46	
	Sarawak Forestry	2014	84.00	103	1.12	
Btg Rajang	Cox & Gombek	1985	403.00	11	0.02	21.5 times
	Engkamat	2014	380.28	122	0.32	
	Sarawak Forestry	2014	270.86	116	0.43	
Sungai Baram	Cox & Gombek	1985	335.00	24	0.07	14.7 times
	Sarawak Forestry	2014	150.00	145	0.96	
	Engkamat	2014	114.36	122	1.06	
Sg. Limbang	Cox & Gombek	1985	43.00	1	0.02	28.5 times
	Sarawak Forestry	2014	75.00	43	0.57	
	Engkamat	2014	125.12	41	0.33	

*The actual distance was not mentioned in the survey.

4.5 Geographic trends

Population surveys showed that crocodiles have increased in numbers and now occupying stretches of rivers previously considered beyond their normal range. They have extended into small upstream creeks and sections of river well beyond tidal influence. It is now not uncommon to find crocodiles in drains in towns and human settlements.

4.6 Population in Peninsular Malaysia and Sabah

Little is known about the population of *Crocodylus porosus* in Peninsula Malaysia and presumed that the population is rather small anecdotally reflected from the small number of human-crocodile conflicts.

4.6.1 Population of *C. porosus* in Sabah

Recent surveys (Sabah Wildlife Department, 2002) by the Sabah Wildlife Department indicated that based on corrected average densities, crocodile numbers have increased in some rivers by about ten-fold during the last twenty years. Table 4 Crocodiles survey results, 11-27 June, 2002.

Table 4: Crocodile surveys in Sabah 2002

Dates	River	Dist. (km)	No.sightings per size class					Total
			H	1	2	3	EO	
11.6.02	Klias (two surveys)	50	0	27	1	1	8	45
15.06.02	Kinabatangan (Abai)	36.5	0	20	3	0	2	25
16.06.02	Kinabatangan(Bilit)	27.5	0	39	0	1	6	47
17.06.02	Kinabatangan (Batu Putih)	36	0	55	8	1	8	73
19.06.02	Silabukan	12.5	0	2	5	0	2	9
20.06.02	Segama (Lahad Datu)	10.2	0	0	0	0	1	1
22.06.02	Serudong (Tawau)	17	0	14	5	0	3	23
23.06.02	Kalumpang (Semporna, Tawau)	10.5	0	3	7	0	0	10
26-27.06.02	Paitan	22.6	0	18	0	0	1	20
Total		222.8	0	178	29	3	31	241

Hatchling=<0.5m Total Length; Class 1=0.5-1.0m; Class2=>1.0m-2.5m;Class 3=>2.5m; EO=Eyes only

A comparison of survey results between 1984 and 2002 shows an increased proportion of large sized (>3m total length) animals. The corrected density for a large section of the Kinabatangan River between Sukau and Bukit Garam is approximately 3.7 crocodiles per km of riverbank.

Currently, Sabah Wildlife Department is carrying out surveys on crocodile population statewide to determine the current population before pursuing harvesting quota.

5. Threats

In Sarawak, human-crocodile conflict has been on the rise. It has long been taboo to kill, or even 'harass' crocodiles but of late there is an increasing view that crocodiles are pests because they prey on people and livestock. There have often been demands and outcries for the authority to kill or remove the crocodiles in the rivers, especially after fatal attacks on people.

Table 5: Summarized record of crocodile attack incident in Sarawak since 1940

Year	Killed	Survived	Total
1940-1949	3	-	3
1950-1959	6	-	6
1960-1969	5	-	5
1970-1979	4	-	4
1980-1989	7	10	17
1990-1999	11	9	20
2000-2009	19	24	43
2010-14.3.2016	27	25	52
Total	82	68	150

6. Utilization and trade

6.1 National utilization

Currently, no direct commercial utilization of wild crocodiles has been reported because crocodiles are legally protected in Malaysia. All trade in live crocodiles, skins and products come from crocodile farms registered with CITES as commercial captive-breeding facilities for Appendix I species.

6.2 Legal trade

Malaysia only allowed trading of crocodiles from registered crocodile farms in accordance to Article III of the Convention and provision of the national/regional wildlife laws. As Malaysian crocodiles population is currently listed in CITES Appendix I, international trade of crocodiles from the wild is not permitted.

Table 6: Exports from CITES registered crocodile farms from Sarawak

Origin	Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
		Jong's Farm	Crocodile	12*	-	-	-	-	83*	-	10*	203*
Benaya Sdn Bhd		-	-	15**	8**	7**	18**	8**	2*	-	-	-

* Live crocodiles

** Crocodile skin

6.3 Parts and derivatives in trade

While trade from Sarawak is limited to skins and live crocodiles, exports from Peninsular Malaysia, where there are more registered captive breeding farms, also include skins, other byproducts and manufactured products such handbags, shoes, belts, watch straps accessories etc.

Table 7: Summary of exported *C. porosus* sourced from registered captive breeder in Peninsular Malaysia

Year	Skin	Dorsal Ridge	Products (unit)
2014	120	120	0
2013	0	0	3,359
2012	120	120	47,068
2011	0	0	869
2010	115	0	1,612

As for Sabah, the trade ranges from skin, dorsal body parts, meat, oil and products.

Table 8: Summary of exported *C. porosus* sourced from registered captive breeder in Sabah

Year	Skin and Dorsal Ridge	Meat and fats	Oil	Stuffed Crocodile	Parts	Products
2014	2,869 pcs	2,300 kg	505.8L	11 pcs	5 pcs	20 pcs
2013	842 pcs	237 kg	1000 bottles	20 boxes	-	
2012	3,267 pcs	-	8 boxes and 20 bottles	2 boxes	-	
2011	884 pcs	360 kg 17 boxes	-	19 pcs	10 pcs	18 pcs
2010	1,094 pcs	242 kg	1 box	5 pcs	-	5 pcs

6.4 Illegal trade

There is no recent (post-CITES accession) record of illegal trade in crocodile skin or meat leaving Malaysia.

6.5 Actual or potential trade impacts

Trade in crocodiles from Sarawak is restricted largely to live crocodiles and small amount of skins from 2 crocodile farms. In Peninsular Malaysia and Sabah, where crocodiles are also captive bred, other finished products are also produced in addition to skins. In Sabah, crocodile meat is also sold for consumption. Under the proposed program in Sarawak, culled crocodiles can be a source of economic benefit when the skins, meat and other products from the crocodiles are sold.

6.6 Proposed utilization

The maximum sustainable yield for wild *C. porosus* populations is not known precisely. What is known is that a 5% annual harvest rate for alligators did not interfere with continued population growth, and a selective harvest strategy (males) for caiman crocodilus resulted in the harvested wild population increasing rather than decreasing (Webb 2015). A 5% annual harvest rate for the non-hatchling population estimated to exist in the surveyable rivers in Sarawak (population = 13,507 individuals; 5% = 675 individuals) is considered to have a high probability of being sustainable.

Sarawak proposes to harvest no more than 500 non-hatchlings per year for the first three years of the program, and to quantify the response of the population to these limit harvests through survey work. Harvest rates will then be adjusted up or down, based on the results. It is also intended to harvest less than 2,500 eggs, or their equivalent in hatchlings, i.e., 750 hatchlings based on 25% hatchability, or 375 one-year-olds based on an estimated 50% survival to year 1 as recommended by Webb et al. 1984.

7. Legal instruments

7.1 National

Crocodiles are either listed as protected or totally protected in Malaysia according to the region's law i.e., Wildlife Conservation Act 2010 [Act 716] for the states in Peninsular Malaysia and the Federal Territory of Labuan, Wildlife Protection Enactment for Sabah and the Wild Life Protection Ordinance for Sarawak. Hunting, capturing, keeping, farming, import, export and are regulated under these laws. Offences range from RM10,000 (USD37,000) to RM300,000 (USD111,000) and imprisonment of one to ten years.

7.2 International

C. porosus is listed as Appendix I in most range states including Malaysia and as Appendix II for Australia, Papua New Guinea and Indonesia. The implementation of CITES in Malaysia is instrumented under the International Trade in Endangered Species Act 2008 [Act 686] as well as the regional wildlife laws.

8. Species management

8.1 Management measures

Sarawak has put in place a Master Plan for Wildlife in Sarawak which provides recommendations and guidelines for a sound management and protection of wildlife and its habitat. The master plan was approved by the State Legislative Assembly and its recommendations were translated into law and policy. In addition to this, a Crocodile Management Plan has also been drawn specifically to address conservation and utilization of crocodiles in Sarawak.

The State Cabinet of the State Legislative Assembly has also provided directions for crocodiles to be managed holistically and where possible the local communities must be able to derive benefits from the presence of crocodiles in the locality. Measures taken include promoting ecotourism tours, based on crocodile watching at selected rivers with low human density and high density of crocodiles.

The state has also provided the necessary fund to enable continuous monitoring of crocodile, promoting conservation of crocodiles through CEPA programs, signages to warn communities of the dangers in

selected locations, and where necessary, the implementation of non-tolerance zone or crocodile removal zone.

Sarawak has vigorously engaged with the IUCN-SSC Crocodile Specialist Group to seek advice and guidance on crocodile management. The CSG conducted a specialized training workshop in survey and monitoring techniques, data analysis, and management issue for people managing crocodiles in Sarawak.

A number of specialized workshops including two international crocodile conferences were held in Sarawak (2011 and 2014) to solicit ideas, guidance and recommendations for the development of a Crocodile Management Plan for Sarawak.

8.2 Population monitoring

The monitoring data available for *C. porosus* in Sarawak spans over 30 years and provides definitive insights into the recovery trends that have taken place. Monitoring started in 1985, and a renewed monitoring effort in selected rivers occurred between 1994 and 2008. More recently two separate and independent surveys were conducted between 2012 and 2014 by the Sarawak Forestry Corporation and Sarawak Forest Department. University Malaysia Sarawak had also conducted population surveys, as part of post graduate student research programs.

The study conducted by Engkamat Lading of the Sarawak Forest Department (2012-2014) was specifically aimed at getting standardized results that could be used as a baseline for assessing the sustainability of wild harvests over time, and the information that would be needed to comply with the non-detriment provisions of CITES (Article IV.2.a). He found that *C. porosus* were widely distributed along most rivers with remarkably high population densities in some. A number of the rivers had high percentages of hatchlings, indicating successful reproduction. He concluded that some rivers would be suitable for initiating harvest programs and monitoring the results.

Table 9: Rivers where harvesting is considered

Rivers	Relative density (Ind./Km) with CF	% of Hatchling (H)
Sg. Bako	7.34	41.97
Btg. Samarahan	6.01	35.58
Sg. Tuang	9.42	40.54
Btg. Sadong	8.24	60.00
Sg. Sebuyau	12.71	24.49
Sg. Lingga	9.67	56.34
Btg. Saribas	11.86	45.38
Sg. Seblak	11.01	45.63
Lower Baram	11.49	13.89
Sg. Bakong	14.55	8.70

8.3 Control measures

8.3.1 International

The implementation of CITES in Malaysia is instrumented under the International Trade in Endangered Species Act 2008 [Act 686] as well as the regional wildlife law.

For the Sarawak, any international movement will not only require the necessary CITES permit but also export license issue by the Controller of Wild Life.

8.3.2 Domestic

Movement within the states in Malaysia does not require any CITES permits but may require export and/or import license or permit. In Sarawak, such license is issued by the Controller of Wild Life.

8.4 Captive breeding and artificial propagation

Captive breeding of *C. porosus* is governed under the International Trade in Endangered Species Act 2008 [Act 686] as well as the regional wildlife law as stated in 7.1. The penalties for offences committed in respect with captive breeding are very steep with fines up to two million ringgit and imprisonment of seven years.

There are seven crocodiles farms registered with CITES in Malaysia including two in Sarawak. They are:

1. Sandakan Crocodile Farm Sdn. Bhd., Sabah
2. Jong's Crocodile Farm, Sarawak
3. Taman Buaya Langkawi, Kedah
4. Benaya Sdn. Bhd, Sarawak
5. Syarikat Jaya Sewajar Sdn. Bhd., Johor
6. Borneo Crocodile Center Sdn. Bhd., Sabah
7. Suan Hong Crocodile Farm Sdn Bhd., Sabah

These farms are set up primarily to enable the utilization of the crocodile skins for leather. Besides production of skins, the farms also capitalize in getting revenue from visitors.

8.5 Habitat conservation

Table 10 below shows the totally protected areas (TPAs) in Sarawak where crocodile are found in relative abundant. The Kuching Wetland NP is a Ramsar Site in Sarawak. Currently, Pulau Senduku, an island in Batang Lupar is being proposed as a totally protected areas dedicated to the conservation of crocodile.

Table 10: List of TPAs in Sarawak where crocodiles are found

No	Name of TPA	Area (hectares)
1	Samunsam WS	22,798
2	Kuching Wetland NP	6,610
3	Ulu Sebuyau NP	18,287
4	Maludam NP	43,147
5	Rajang Mangrove NP	9,373
6	Similajau NP	8,996 (+13,124 territorial waters)
No	Name of TPA	Area (hectares)
7	Niah NP	3,138
8	Sibuti WS	678
9	Loagan Bunut NP	10,736
10	Bako NP	2,727

8.6 Safeguards

The purpose of transferring *C. porosus* from Appendix I to Appendix II is to enable the sustainable utilization of wild population in Sarawak that will provide the socio-economic benefits to communities thus helping to ensure the sustainability of crocodile in the wild. Such utilization will be managed and safeguarded by the present law and policies concerning protected species and the continuous monitoring of the crocodile's population.

As safeguards, the following will be implemented:-

- a. If the monitoring results indicate the non-hatchling wild population is more or less stable after the first harvest, then the second year's harvest will be unaltered.
- b. If the wild population declines by 20% after the year 1 harvest, the harvest levels for year 2 will be reduced 40%.
- c. If the wild population continues to decline after year 2, the harvest will be reduced to 60%

- d. If the decline is not compensated for by an increase in the population the wild harvest program will be abandoned.

In Sarawak, a specific CEPA program called '3M Buaya' is currently being implemented to promote the importance of conserving crocodiles, living with crocodiles and benefiting from crocodiles.

Utilization of wild *C. porosus* will not affect a similar species found in Sarawak, the Malayan False Gharial, *Tomistoma schlegelli*. *T. schlegelli* is on Appendix I, is no longer involved in international trade, and is not in demand for that trade due to characteristics of its skin and scale pattern.

9. Information on similar species

A similar species crocodile recorded in Sarawak is the Malayan False Gharial, (*Tomistoma schlegelli*). *T. schlegelli* are usually found in upper parts of some rivers with peat swamp habitat. They can be easily distinguished from their external appearance. The snouts of estuarine crocodiles are normally short and blunt, relative to those of the false gharials, which are elongated and narrow.

The distribution of the false gharial is somehow limited and has only been reported along upper reaches of Sg. Ensengei (tributary of Btg. Sadong), Sg. Kroh and Sg. Runjing, Engkelili (tributaries of Btg. Lupar). Old records have shown that this species is found in Sg. Dor (upper Sg. Kelauh), Sg. Maying (upper Tubau) and also Loagan Bunut in Tinjar. Recently, the presence of the false gharial has been detected in Kepadang River (near Ulu Sebuyau National Park, upper Samarahan River and upper Sadong River.

10. Consultations

In 2009, a draft proposal was distributed to the range states and received support from Bangladesh and an acknowledgement by the Philippines. Australia put up a number of recommendations which have been acted on in this proposal among which to work closely with the Crocodile Specialist Group (CSG) of the Species Survival Commission of IUCN.

A preliminary draft of the proposal was reviewed by the IUCN-SSC Crocodile Specialist Group.

This proposal was tabled during the 11th Meeting of the ASEAN Experts Group on CITES on 7-8 May 2015 in Bandar Seri Begawan, Brunei and at the 1st East and South-East Asia Regional Crocodile Specialist Group Meeting on 25-29 May 2015 in Siem Reap, Cambodia. It was also brought to the 28th meeting of the Animals Committee, Tel Aviv, Israel 30 August-03 September 2015. Australia and United States have made comments which have been incorporated in this proposal.

This proposal was distributed to the Range States and we received a written support from Singapore and Philippines.

11. Additional remarks

In a recent Review Mission to Indonesia by the CSG, two of their recommendations as in Brien et. al. 2015 are relevant to Malaysia's proposal:

Recommendation 1d. Ranching and Compliance with CITES

Consideration should be given to whether the current Appendix-II listing under the ranching criteria [in Indonesia] should be amended to an unqualified Appendix-II listing, despite ranching remaining the primary form of use.

It is possible to pursue ranching with or without wild harvest on Appendix II and there may be practical advantages in having *C. porosus* in Malaysia and Indonesia, and regionally in PNG and Australia, managed under Appendix II using zero quotas for areas in which the population has not recovered or may never recover.

Recommendation 3. Management of Human-Crocodile Conflict.

That when basic information on HCC is compiled, that Indonesia host a National workshop on Human-Crocodile Conflict, similar to those that have been held in Malaysia in recent years, in which national approaches to HCC can be refined.

Malaysia has played a prominent role in addressing Human-Crocodile Conflict in the region to ensure the survival of the species while minimizing conflict with people. Indonesia faces the exact same problem within some provinces, and sharing results and experience should be a priority.

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