

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



Fourteenth meeting of the Conference of the Parties
The Hague (Netherlands), 3-15 June 2007

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Transfer of the population of black caiman *Melanosuchus niger* of Brazil from Appendix I to Appendix II of CITES, in accordance with Article II, paragraph 2. a), of the Convention and with Resolution Conf. 9.24 (Rev. CoP13) Annex 4, paragraph A. 2. b).

B. Proponent

The Federative Republic of Brazil.

C. Supporting statement

Downlisting the black caiman from CITES Appendices I to II will not harm or result in risk to wild populations because:

- i) the black caiman is abundant and widely distributed within its range in Brazil;
- ii) regarding international trade, the Brazilian CITES Administrative Authority has effective mechanisms to control all segments of the production chain and, under the controlling measures, it will be advantageous to act legally rather than illegally;
- iii) harvest will occur only in Sustainable Use Conservation Units, which will have their specific management plans that may range from no harvest to a maximum of 10 % of the estimated population size; and
- iv) there is an efficient system to monitor the natural populations and their habitats and to ensure that conservation goals through sustainable use can be achieved. More broadly, in accordance with Resolution Conf. 13.2, each of the 14 Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity (see CBD website), will be closely observed.

1. Taxonomy

- 1.1 Class: Reptilia
- 1.2 Order: Crocodylia
- 1.3 Family: Alligatoridae
- 1.4 Genus, species or subspecies, including author and year: *Melanosuchus niger*, Spix 1825
- 1.5 Scientific synonyms: ---
- 1.6 Common names: English: Black caiman

French: caiman noir
Spanish: lagarto negro, caimán negro, jacare assú, jacare uassu, jacareuna, yacare assu, yanalagart
Portuguese: Jacaré-açu

1.7 Code numbers: A-306.001.003.001

2. Overview

This proposal shows that the black caiman has abundant and widespread populations in Brazil, and the Brazilian CITES Administrative Authority has the management capacity and is prepared to ensure that conservation goals through sustainable use can be achieved.

3. Species characteristics

3.1 Distribution

The black caiman is widely distributed in the Amazon River Basin. Its distribution range includes Bolivia, Brazil, which accounts for approximately 80 % of the species distribution range, Colombia, Ecuador, French Guiana, Guyana, Peru and Suriname (Figure 1, Ross 1998).



Figure 1. South-America map with the distribution range of black caiman *Melanosuchus niger* (yellow area on Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru and Suriname).

The degree of genetic variability and population structure of the black caiman was quantified using a matrilineal marker (mitochondrial gene cytochrome b, Farias *et al.* 2004, Vasconcelos 2005). A total of 132 *Melanosuchus niger* from 11 localities of the Brazilian Amazon, Ecuador, French Guyana and Peru were sampled. The analyses demonstrate that some populations are in a process of a demographic expansion shown by a relatively greater number of singleton haplotypes. Black caimans have high gene diversity but low nucleotide diversity, showing no indication of significant historical events, such as population fragmentation. There is also a significant correlation between genetic divergence and geographic distance.

Table 1 summarizes confirmed sighting of black caimans *Melanosuchus niger* in the Brazilian States in its historic geographic range. Population status was assigned by qualitative assessments according to State Scientific Authorities reports to the Brazilian CITES Scientific

Authority, presented in the workshop held in Goiânia, Brazil, in April 2006. The data show that the species still occurs throughout its historic range and is considered to be locally abundant.

3.2 Habitat

The Amazon River Basin is the world's largest watershed. The river crosses the South American continent for approximately 6,000 km eastwards, from the Peruvian Andes to the Atlantic Ocean. More than two thirds of the basin lies within the Brazilian territory.

The rivers of the Amazon basin are classified in white, black and clear water types (Sioli 1964). The Amazon River is classified as a white water type, which is characterized by high content of suspended solids and dissolved nutrients. The Amazon River and its tributaries form large seasonal floodplains, which are highly productive ecosystems. The high productivity is due to complex ecological interactions between rivers, wetlands and uplands, which are driven by seasonal water pulses, as explained by the Flood Pulse Concept (Junk et al. 1989). As an example, net primary production of aquatic herbaceous plants may reach up to 100 tons dry weight*ha⁻¹*yr⁻¹ (Junk 2005). According to Junk (1983), about 20 % of tropical South America is permanently or periodically flooded and, therefore, could be classified as wetlands or floodplains, subjected to pulse cycles. More recently, Junk (1997) calculated that the area covered by floodplains in the Brazilian Amazon reaches over 300,000 km², with more than a third formed by productive white water rivers (Figure 2).

Table 1. Qualitative assessments of black caimans *Melanosuchus niger* in nine Brazilian States, according to each respective State Scientific Authority's report provided to the Brazilian CITES Scientific Authority.

Brazilian State	River basin	Population status
Amapá	Lake Piratuba, Lake Maruani, Sucuriju, Uaçá, Caciporé, Araguari and Cajari rivers.	Moderately Abundant
Roraima	Rio Branco River	Abundant
Amazonas	Solimões, Japurá, Amazonas, Purus, Juruá, Javari, Negro	Moderately to highly abundant
Pará	Nhamundá, Trombetas	Highly abundant
Tocantins	Araguaia, Tocantins, Crixás, Javaés and Formoso	Moderately to highly Abundant
Goiás	Araguaia	Moderately Abundant
Rondônia	Madeira, Guaporé	Moderately to highly abundant
Acre	Gregório	Abundant
Mato Grosso	Xingu, Araguaia, Mortes, Cristalino, Teles Pires	Abundant

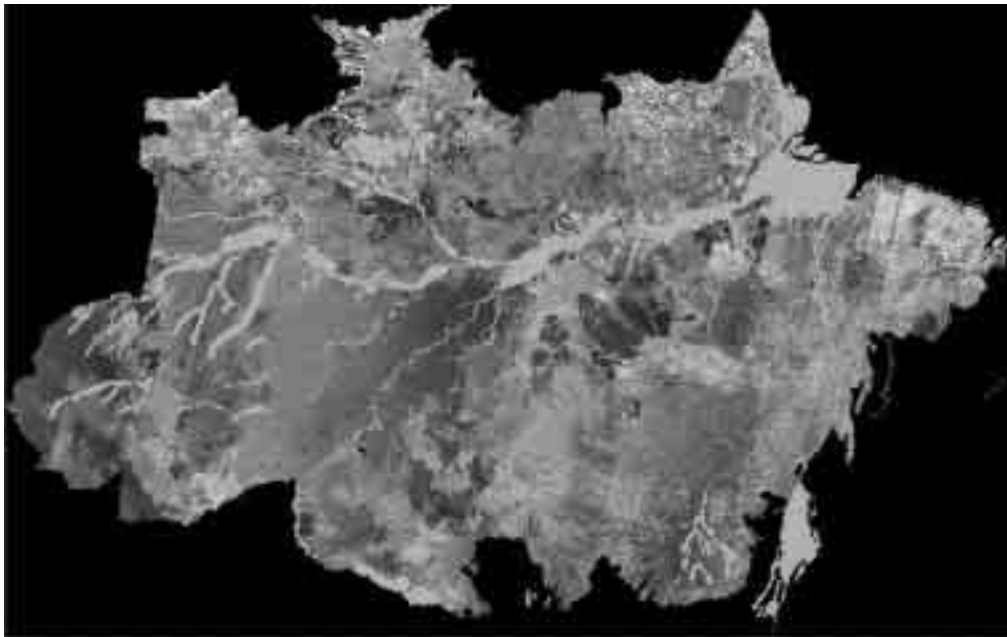


Figure 2. Satellite image of the Brazilian Amazon. Green represents natural forest/vegetation; clear blue and black represent wetlands and Igapó forest and magenta represents deforested areas.

The black caiman is more abundant in white water rivers of the Amazon Basin, but throughout its extensive distribution, the species occupies a wide diversity of wetlands, including large rivers and streams, oxbow lakes, floodplains (regionally known as *várzeas* and *igapós*) and seasonally flooded savannas. Natural black caiman populations can also be found in black and clear water types, and in artificial dams (Rebêlo, pers.comm.).

3.3 Biological characteristics

Diet: small black caimans feed principally on insects, spiders, crabs and snails. Large individuals also feed on fish and other vertebrates (Magnusson *et al.* 1987, Da Silveira & Magnusson 1999).

Growth: patterns of male growth curves in Mamirauá and Anavilhanas are similar to those observed in Peru and Ecuador. However, in Anavilhanas growth-rate values of individuals up to three to four years of age were higher than in Mamirauá. Size at maturity is still unknown, but the size of females found nesting is 100 cm SVL (Snout-to-Vent Length), which may be attained at about 10 years of age.

Reproduction: nests are built in forest or on floating mats. The laying period starts in mid- to late August, extending until November. Incubation takes over 10 weeks, depending on incubation temperature, and hatchlings first appear in October. The females are usually seen in the nest or in the water close to the nest, guarding them against natural predators. Mean clutch size varies from 30 to 32 eggs, but it may reach up to 40-60 eggs, which gives a total egg mass of about 6.0 kg, thus indicating the species high reproductive potential.

Behaviour: black caimans can walk for long distances, mainly in forests, when searching for water. During the dry season they can be found buried in the mud, to a depth of 50 cm. The males protect their territory and can become very aggressive, representing serious problems for local communities, particularly where black caimans are very abundant. More recently, with the increasing population, there have been several cases of black caiman attacks against local people, including fatal ones such as the case of a five-year-old child killed by an adult black caiman when playing in the water in front of his house at Lake Cuniã Reserve, in the Rondonia State.

3.4 Morphological characteristics

Coloration is uniformly black on the upper surface. The lower surface is uniformly light, without dark blotches. The snout is medium length, rather flat and broad. Front corners of eyes are elongated beyond the front margin of the upper eyelids. The skin is less ossified than any other caiman found in the region (Vasquez 1991).

3.5 Role of the species in its ecosystem

The role of black caimans in the ecosystem is unknown, but they are the largest predator of the Amazon Basin. As top predators occurring in high densities, they may play an important role in nutrient cycling and ecosystem flux of energy.

4. Status and trends

4.1 Habitat trends

Most aquatic habitats within the range of black caiman are relatively intact. However, there are plans for the establishment of hydroelectric dams on several of the major tributaries of the Amazon river. There are already major dams on Tocantins and Araguaia rivers. The species is known to colonize hydroelectric dams (Rebelo, pers. comm.), but the effect of dams on overall population levels is unknown. Most of the larger white water rivers are unsuitable for dams so that this does not pose an immediate threat to most of the population.

Deforestation around the major white water rivers (*Várzea* habitat) is a potential threat, but it does not appear to be the highest concern for this aquatic species. However, buffalo grazing in cleared areas could pose a threat for the species prey. Deforestation is minimized in sustainable development reserves, so measures that promote economic sustainability of these reserves will have positive effects on the conservation of habitats of the species. Within the range of the species there are almost 80 million ha. declared as protected areas (ISA 2006).

4.2 Population size

Da Silveira (2002) surveyed 11 representative lakes in Mamirauá Reserve and found an average of 339 black caimans per lake. The studied area has a total number of 616 similar lakes, giving an estimate of $339 \times 616 = 208,958$ non-hatchlings individuals. The area represents 23 % of the reserve, giving an estimate of 908,515 black caimans in Mamirauá SDR. This is certainly an underestimate because the calculation is based only on caimans actually seen by Da Silveira in spotlight surveys and not the total number present. Although black caiman distribution range overlaps with others crocodylian species (e.g. *Caiman crocodylus*), this is not a concern for evaluating survey data because the species can be easily identified in the field (Da Silveira 2001).

The area of Mamirauá reserve is 1,124,000 ha, which gives an average of 0.8 black caiman per ha. As calculated by Junk (1997), there are 300,000 km² of wetlands in the Brazilian Amazon, of which 100,000 km² are productive white water rivers, similar to that found in Mamirauá. This gives an estimation of 8 million black caimans in white waters floodplains of the Brazilian Amazon. Assuming that the densities found in others less productive wetlands are half of that found in Mamirauá, the number of black caimans in such habitats reaches another 8 million individuals. Therefore, the estimated population size of black caimans in the Brazilian Amazon reaches up to 16 million animals (Table 2).

Spotlight surveys in 2004 and 2005 were conducted in 85 sites in five Brazilian Amazonian States (Amazonas, Amapá, Rondônia, Tocantins and Goiás). Surveys covered 767.3 km of shoreline, and 36,962 black caimans were detected (Table 3). Black caiman were found in 94 % of the surveyed sites. Density indices estimates varied from 2.1 to 466.5 ind.*km⁻¹. The consistently high densities recorded indicate that the species is one of the world's most abundant crocodylian species.

Table 2. Estimated population size of black caimans (*Melanosuchus niger*) in the Brazilian Amazon.

Wetland type	Total area (ha)	Black caiman density (ind* ha ⁻¹)	Population size
White water	10,000,000	0.8	8,000,000
Black and clear water	20,000,000	0.4	8,000,000
Total	30,000,000		16,000,000

Table 3. Density estimates of black caiman *Melanosuchus niger* in five Brazilian Amazonian States, obtained in 2004 and 2005 surveys.

State	Watershed	Sites surveyed	Number counted	Sample (km)	Black caimans*km ⁻¹
Amazonas	Purus	22	1,749	279.5	6.3
Amazonas	Solimões	08	16,611	119.0	139.6
Amazonas	Solimões	06	4,950	94.3	52.5
Amazonas	Solimões	01	9,330	20.0	466.5
Mean		37	32,640	512.8	63.7
Amapá	Sucuriju	08	118	57.1	2.1
Amapá	Uaçá	10	947	43.4	21.8
Mean		18	1,065	100.5	10.6
Rondônia	Madeira	03	2,423	37.0	65.5
Mean		03	2,423	37.0	65.5
Tocantins	Tocantins	14	242	76.0	3.2
Mean		14	242	76.0	3.2
Goiás	Araguaia	13	592	41.0	14.4
Mean		13	592	41.0	14.4
General count		85	36,962	767.3	48.2

4.3 Population structure

In 1980, data from confiscated skins indicated a population structure dominated by juveniles, indicative of overexploitation (Rebêlo & Magnusson 1983). As part of the monitoring programme, population size structure and sex ratio were obtained in four Brazilian Amazon States in 2005 (Figure 3). The population is currently composed mostly of large individuals. The average sex ratio was biased towards males (82 %), because most of the animals were captured in open waters. Males are found in open water habitats, whereas females are found in areas covered with aquatic vegetation (Da Silveira 2001). This size structure, with an abundance of large animals is typical of populations with no or a low level of exploitation.

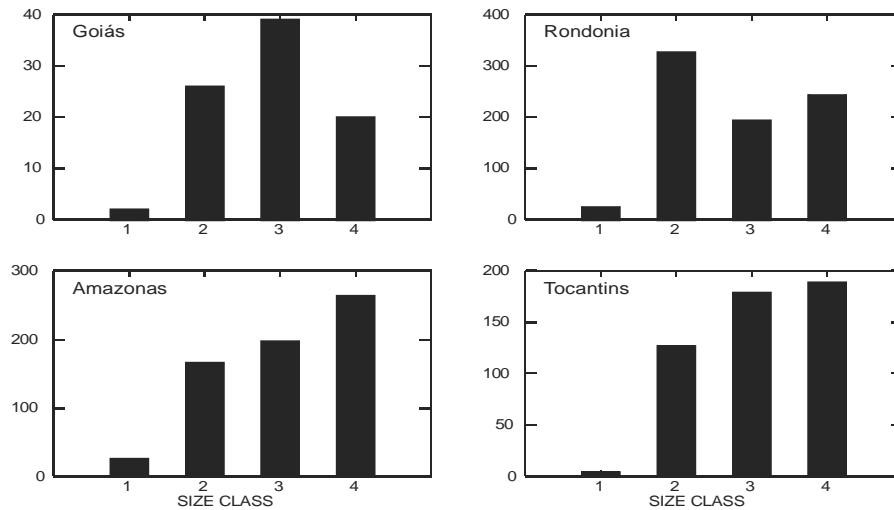


Figure 3. Size class estimates of black caimans *Melanosuchus niger* in four Brazilian Amazon States, obtained in 2004 and 2005 surveys. The size classes given in total length are: 1 (hatchlings): < 80 cm; 2: 80-180 cm; 3: > 180-260 cm and 4: > 260 cm.

4.4 Population trends

Natural black caiman populations were extensively harvested in Brazil from 1950 to 1970 and because of overhunting they were severely depleted. Therefore, in 1982, the species was included in the first official list of Brazilian endangered species. In 2003, the list was revised by Brazilian specialists who, based on recent data on the actual densities confirming that black caiman populations had increased steadily, removed the species from the Brazilian red list.

Recently, the increasing population trend was described by Da Silveira (2001) in Mamirauá Reserve. In five years of study, the number of caimans increased 580 %, changing from 556 individuals observed in 1994 to 3,789 in 1998. The relative proportion of black caimans in relation to spectacle caimans also changed from 38 % in 1994 to 82 % in 1998. Another indication of population growth in Mamirauá was the number of nesting females, which on the lake increased from 1 in 1996 to 22 in 1999. In the River Araguaia, surveys in the last two years also indicate that the population is increasing in the region (Figure 4). Since 1992, Mamirauá conservation model have been very effective for conserving caimans as shown by the trend in population size. In the Araguaia Protected Area, the data also indicate that the model can be replicated, and long-term assessments will show whether or not the harvest has had a detrimental impact on the wild population, and/or whether the increasing trends in this area continue.

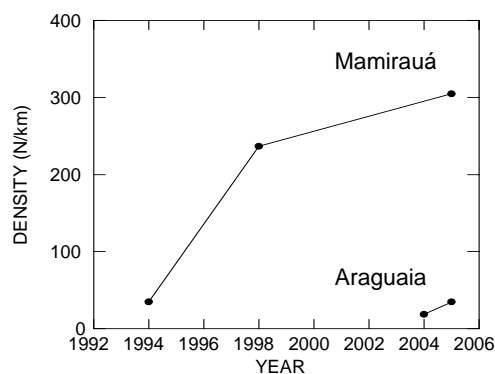


Figure 4. Trends of black caiman *Melanosuchus niger* populations in Mamirauá SRD and Araguaia Protected Area.

4.5 Geographic trends

In Brazil, direct sighting of black caimans confirmed that the species is currently widespread, occurring in all eight States composing the Legal Amazon Forest Area. A brief description of the sites where recent direct observations has been made is given below (see also Figure 5).



Figure 5. Map of the watersheds surveyed for black caiman *Melanosuchus niger* in Brazilian Amazon.

State of Amapá: black caimans occur along the coast of Amapá State, associated mainly with lentic environments such as the lagoon complex of Lake Piratuba Biological Reserve, the Lake Maruani at the Cabo Orange National Park, small lakes located at the Oiapoque Indigenous Land, the Maraca-Jipioca Ecological Station and along the Uaçá, Caciporé, Araguari and Cajari rivers.

State of Roraima: black caiman populations have been registered in the Rio Branco River Valley, which is a tributary of Rio Negro and in Viruá and Serra da Mocidade National Parks. Natural populations are also confirmed for the area of the Anauá National Forest and surroundings.

State of Amazonas: black caimans are widely distributed in the State of Amazonas, occurring mainly in white water rivers, lakes and canõs, where there are abundant food sources such as fish, birds and small vertebrates and invertebrates. Recently, there are reports of high black caiman abundance along the middle course of the Amazon River, especially at the municipalities of Itacoatiara, Parintins, Nhamunda, Urucurituba and surroundings, where the State Government has been asked by local authorities to take measures to reduce population size, which are affecting local human communities. At the municipality of Humaitá, four fatal accidents with humans have been reported in the last two years and local communities are asking for government action. Reports of high black caiman abundance are also given in a number of municipalities located at the High Solimões Region (Javari River Basin), such as Tabatinga, Benjamin Constant, Atalaia do Norte, São Paulo de Olivença, Amatura, Tonantins, Santo Antônio do Iça, Jutai and Fonte Boa. In the Purus Valley, vigorous natural populations are observed in the municipality of Lábria, particularly at the Piagaçu-Purus Sustainable Development Reserve (SDR) and the Abufari Biological Reserve.

State of Pará: high abundance of black caimans in the State of Pará has been reported in Nhamundá River Valley and, particularly, at the municipalities of Faro, Terra Santa, Oriximina, Juruti and Obidos. Vigorous populations are reported in the Trombetas River, at Saracá-Taquera National Forest and Trombetas Biological Reserve.

State of Tocantins: black caimans are widely distributed in the State of Tocantins. Recent studies confirmed the presence of both, *Melanosuchus niger* and *Caiman crocodilus* specimens at the Luiz Eduardo Magalhães Reservoir. Vigorous populations are also found within and around the Araguaia National Park. North of the park at the Cantão State Park, black caimans are found in the Araguaia river and its tributaries. Professional and amateur fishermen have also reported the presence of black caiman populations at Lake Confusão and in various tributaries of the Araguaia and Tocantins rivers such as the Crixás, Javaés and Formoso rivers.

State of Goiás: populations of black caimans are observed in the Araguaia River Basin and its tributaries, which drain northward along the State's western border.

State of Rondônia: the distribution of black caimans in Rondônia State is mainly associated with forest habitats, subjected to white water seasonal floods. High densities are observed in Madeira River basin, particularly in the lower Madeira (at Lake Cuniã Extractive Reserve). The presence of black caiman populations are also confirmed for the Guaporé Valley, along the Brazilian and Bolivian boarder.

State of Acre: natural populations of black caimans are frequently found in the Purus and Juruá River Basins. Recent observations have confirmed vigorous populations in the Gregório river, which is a tributary of the Juruá river. In the Indigenous Lands of Yawanawa (Taraucá municipality), people are permitted to hunt spectacle caimans for food, but black caimans are not included in their diet and, therefore, they are the most commonly observed species found in these areas. There are abundant populations at the Cazumbá Extractive Reserve and the Carapanã and Humaitá Indigenous Lands.

State of Mato Grosso: Mato Grosso is the southern limit of black caiman distribution within Brazil and vigorous populations have been registered in Mortes, Cristalino and Teles Pires River Basins, as well as in Xingu National Park and Suia-miçu Indigenous Land.

5. Threats

The species may be threatened by human activities, such as habitat modification; damming for hydroelectric energy, deforestation and poaching (Da Silveira & Thorbjarnarson 1999). Also, as mentioned before, buffalo grazing in cleared areas could pose a threat for the species prey. Recent reports indicate that, in the absence of other economic alternatives, the species is being used as fish bait by Amazonian fishermen (Da Silveira & Viana 2003). Also, in the last few years the number of attacks on humans has increased and nuisance specimens are causing concern to local communities and authorities. Because of this, in some extreme cases, local communities have destroyed nests in an attempt to slow population increase.

6. Utilization and trade

6.1 National utilization

The species is occasionally used for arts and crafts, usually using parts from animals captured for other reasons. Eggs are consumed locally in some communities. There is a large trade in meat in the Amazon region, especially to sustain markets in Pará State (Da Silveira & Thorbjarnarson 1999).

6.2 Legal trade

There is currently no legal trade in *Melanosuchus niger* products. However, an experimental harvest of the species, with the permission of the National Wildlife Authority (Brazilian Institute of Environment and Renewable Natural Resources - IBAMA), was undertaken in the Mamirauá Sustainable Development Reserve in 2004 and 2006 in order to evaluate the economic potential of sustained management and, particularly, to train local people and to evaluate the logistics of the productive chain, such as harvesting animals alive, transporting to the abattoir, shipping, etc. The experimental harvest yielded 42 individuals, producing 42 skins and 1.26 tons of meat.

The harvest experiments have been a success and the generated products have been used to develop and learn more about the national market, although the real significance of these experiments is to evaluate the logistics involved in the production chain. At the moment, legal harvesting is only permitted in Sustainable Use Reserves within the National Conservation System (see section 7. Legal instruments).

6.3 Parts and derivatives in trade

The reserves management plans are strongly focused on meat and skin trade. The meat market already exists and it is expected that the legal trade will expand the demand. The skin is known to be of good quality and there are others products such as teeth, skulls, oil (medicinal use) which have potential for trading.

6.4 Illegal trade

No illegal trade of skins has been reported in Brazil and in the international market since the 1980s. There is a small local market in teeth and skulls for arts and crafts, and oil for medicinal use. However, the markets are very restricted.

There is a vigorous market in dried and salted meat in the Amazon region. At the end of the 1990s, there was a large off-take of caimans from the Mamirauá SDR with the meat often being sold as counterfeit Arapaima, a much sought after Amazonian fish. An estimated 65 tons of caiman meat was extracted illegally from the Mamirauá reserve in 1995 and sold in Brazil and Colombia (Da Silveira & Thorbjarnarson 1999). The market in this region was drastically reduced in 2000 because of increased enforcement associated with preparation for the legal harvest in the reserve.

The illegal trade in salted meat continues along the lower Amazon river to supply markets in State of Pará. Just in the Piagaçu-Purus reserve, an estimated 50 tons of salted meat (approximately 67.8 tons of fresh meat, or 5,115 individuals) was harvested in 2005. One of the goals of this proposal is to eliminate illegal trade, adding value and additional incentives to the legal production. It is also important to note that the local people involved in legal trade will be the most interested in eliminating illegal trade.

6.5 Actual or potential trade impacts

The low value of salted meat means that many individuals are killed for fish baits (Da Silveira & Viana 2003) and do not enter trade.

The potential effect of legal trade, already seen in Mamirauá Reserve, is to reduce the intensity of hunting and increase revenue to local people by adding value for fresh meat and opening the market for skins, which are presently wasted. The existence of a controlled high-value market will also increase the value of natural systems for local people and promote habitat conservation.

Opening international markets will increase the return per animal harvested, making legal management a more lucrative option than the current highly wasteful illegal practices. There is little potential for an increase of illegal hunting due to the opening of international markets because it is much easier to control international trade than the clandestine local market.

7. Legal instruments

7.1 National

The national laws and regulations related to the commercial use of caimans in Brazil are:

- The Federal Constitution, the Chapter on Environment (Article 225);
- Fauna Federal Law 5.197 of 1967;
- CITES Federal Ordinance 76.623 of 1975;
- Law 6.938 of 1981, promulgates the National Environmental Policy;

- Environment Criminal Federal Law 9.605 of 1998;
- Enforcement CITES Federal Ordinance 3.607 of 2000;
- Federal Law 9.985 of 2000 promulgates the National System for Conservation Units (SNUC), which ordines the creation and management of conservation units, including wildlife management;
- Ordinance 2.519 of 1998, which promulgates the Convention on Biological Diversity (CBD).

7.2 International

Brazil is signatory to CITES and CBD and the national laws for both convention implementations are:

- CITES Federal Ordinance 76.623 of 1975;
- Enforcement CITES Federal Ordinance 3.607 of 2000;
- Ordinance 2.519 of 1998, Convention on Biological Diversity (CBD).

8. Species management

8.1 Management measures

The Programme for Biology, Conservation and Management of Brazilian Crocodylians is coordinated by the Centre for Conservation and Management of Reptiles and Amphibians (RAN/IBAMA).

The only form of management currently proposed is the harvesting of black caiman in Sustainable Use Reserves (*Unidades de Uso Sustentável*), following requirements of national laws and reserve management plans. Black caimans will be caught alive, using harpoons and other methods commonly used by local people, and taken alive to a proper slaughter house to be processed attending all Brazilian sanitary regulations. Harvest will be restricted to male young adults (size class 3, > 90-260 cm total length), because of their lower demographic value when compared to adults (size class 4).

Initially, harvesting will be undertaken in Mamirauá SDR. The estimated population size of non-hatchling individuals exceeds 900,000, for which the 2006 quota has been set at only 695 individuals. With time, given the expected logistic support for processing, we expect the quota to be increased according to experience gained and domestic and international market opportunities.

The total population size in Brazil is estimated to be around 16 million animals. Quotas for individual reserves will not exceed 10 % of the observed non-hatchling population. Because spotlight surveys are an underestimate of the population, quotas will actually be approximately 5 to 7 % of the total population. All quotas will be subject to yearly evaluation of population monitoring indices, as defined in reserves' management plans. This harvesting system is concentrated on juvenile males (Da Silveira 2002), so the impact on population dynamics is minimal as shown by experimental harvesting in the Mamirauá reserve. By taking an adaptive management approach, standard population surveys and other monitoring techniques, such as catch-per-unit effort, will be used to assess management impact on black caiman populations.

8.2 Population monitoring

RAN has a nationwide monitoring programme (Programme for Biology, Conservation and Management of Brazilian Crocodylians) that considers the ecosystem as the management unit and implements monitoring by systematic surveys, applying a set of standard methodologies. Methodology includes: i) habitat description based on satellite image interpretation, ii) water level, temperature and rainfall recording, iii) standard geo-referenced spotlight surveys estimating population size structure and sex ratio, iv) nesting ecology, and v) in sites with sustainable-use potential, mark-recapture techniques. In order to apply such methodology and to ensure a sustained programme, local personnel have been trained and equipped for the job. Standardized surveys are carried out in five Amazonian States to evaluate population trends in

all habitats. Specific more intense surveys, including catch-per-unit effort techniques, are used to monitor sites where harvesting is undertaken. This consists of standardized surveys to monitor population trends in all areas proposed for commercial exploitation. Regular evaluations and systematic reports on the management programme will be provided in order to attend both domestic and international observers and to ensure transparency to the programme.

8.3 Control measures

8.3.1 International

All CITES regulations are already applied in Brazil, including the specific regulations for crocodylian trade and management. The Ministry of Agriculture and the State Sanitary Authority have strict measures to control meat exports, whereas the skins can only be exported at least in wet blue, therefore, control measures will also be implemented at the tanneries. There are other government agencies that play an important role in controlling trade, particularly at the border with neighbour countries. These include the Federal Police, the State Police at each respective Amazon State and the Forestry Police, which are also effective to control domestic trade.

8.3.2 Domestic

The strict observance of national and international laws and regulations are monitored by enforcement state and federal organisms as mentioned above.

All participants of the black caiman management have i) to register in a national database (*Cadastro Técnico Federal*), ii) to obtain an environmental license, and iii) to submit annual reports. All measures are controlled by IBAMA, with the support of range States, which are responsible for issuing annual licenses for harvesting and transport of and trade in products and sub-products. Black caimans have to be caught alive to be taken to a proper slaughter house for processing, thus representing another important control measure. All skins have to be tagged according to CITES Resolution Conf. 11.12. All products coming from registered slaughter houses are legal and have a government green stamp. Legal products attain good prices at the local market, therefore, it is also an incentive to join the legal market based on its economic advantages. The Ministry of Agriculture and the State Sanitary Authority are also responsible for monitoring meat trade and meat sanitary quality.

8.4 Captive breeding

Captive breeding is permitted under Brazilian legislation and is applied for similar species such as *Caiman yacare*. However, there are presently no proposals for this form of management for black caimans.

8.5 Habitat conservation

In 2006, the Amazonian Socio-Environment Institute (ISA) registered in its database 268 conservation units in the area of the Brazilian Legal Amazon Forest, which is 79,712,758 ha, representing 15.92 % of the total area (ISA 2006, Figure 6).

There are basically two distinct types of conservation units which are i) units of sustainable use and ii) preservation units. Black caiman management will be carried out only in units of sustainable use. The potential area for wildlife management is 54,941,262 ha.

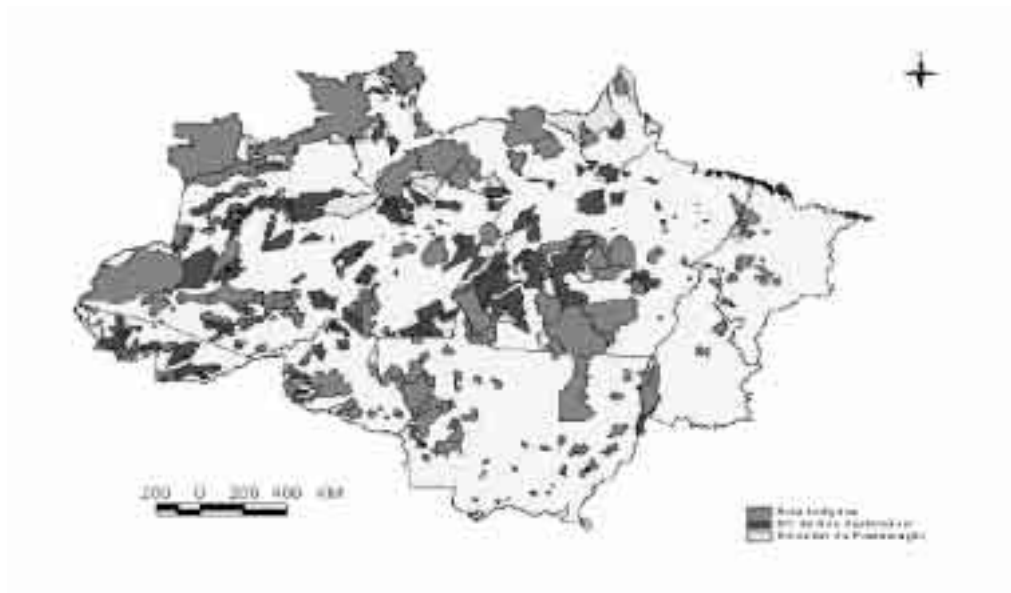


Figure 6. Map of Amazonian protected areas in Brazil.

■ = Indigenous Lands; ■ = Sustainable Use Units; ■ = Preservation Units

8.6 Safeguards

Plans for harvesting are based on adaptive management, with the establishment of quotas based on population monitoring annually. As local people are directly involved and mostly interested in sustainable use, enforcement is much easier, i.e., local people change from “poachers” to managers.

The option for commercial utilization of wildlife makes the creation of new conservation units much more attractive to local people. The example of Mamirauá SDR has already been very effective in eliciting proposals from local communities for the creation of new units. Just in the last three years the State of Amazonas created 17 new reserves, covering more than 8 million ha. (ISA 2006, Figure 6).

Brazilian federal and State governments have funds specifically assigned to the national caiman monitoring programme. The funds have been used to train local expertise and technicians to apply survey techniques, which have been standardized across the whole black caiman range. For instance, it has been a successful initiative, particularly to entice local communities to be trained.

9. Information on similar species

The monitoring programme is organized to obtain also information on the biology, distribution and abundance of spectacle caimans (*Caiman crocodilus*) and *Paleosuchus* spp. The results show that spectacle caimans are highly abundant, but *Paleosuchus* spp. occur in relatively low densities, in the habitats occupied by black and spectacle caimans. *M. niger* and *C. crocodilus* are sympatric species and, given that both have commercial value, the harvest programme is designed to focus on both species.

10. Consultations

This proposal, under the responsibility of RAN/IBAMA, was elaborated with the support of the Brazilian Crocodylian Specialist Group, the CSG/IUCN Latin American Office, students and environmental authorities of the Brazilian Amazon region.

This proposal was submitted to the IUCN Crocodile Specialist Group and to CITES Scientific and Management Authorities of black caiman range States (Bolivia, Colombia, Ecuador, Guyana, Peru and Suriname) for comments and suggestions.

Note: the population of Ecuador is included in Appendix II, and is subject to a zero annual export quota until an annual export quota has been approved by the CITES Secretariat and the IUCN/SSC Crocodile Specialist Group. Other populations within the species range in other countries might also merit downlisting to Appendix II.

11. Additional remarks

Until the 1970s, the 23 species of crocodylians in the world were considered endangered. In the last 35 years, after sustainable-use programmes suggested by CSG/SSC/IUCN, only two still remained in the IUCN red list (*Alligator sinensis* and *Crocodilus siamensis*), both not used for legal international trade from their wild populations. The present proposal is included in this context and expects as outcomes, the social development of Amazonian local communities through the conservation and sustainable use of black caiman populations.

Melanosuchus niger has large and not fragmented wild populations and is widely distributed within its distribution range and, therefore, the species does not meet the criteria to be included in CITES Appendix I. Accordingly, the species should be downlisted to CITES Appendix II.

12. References

- Da Silveira, R. 2001. Monitoramento, crescimento e caça de jacaré-açu (*Melanosuchus niger*) e jacaré-tinga (*Caiman crocodilus crocodilus*). Tese do Doutorado. Orientação: W. E. Magnusson. Convênio INPA/UFAM. Manaus, Amazônia. 145pp.
- Da Silveira, R. 2002. Conservação e manejo do jacaré-açu (*Melanosuchus niger*) na Amazônia brasileira. In: Luciano M. Verdade; Alejandro Larriera. (Org.). Conservação e Manejo de Jacarés e Crocodilos da América Latina - La Conservación y el Manejo de Caimanes y Cocodrilos de America Latina. Piracicaba, São Paulo. V. 2, pp. 61-78.
- Da Silveira, R. & Magnusson, W. E. 1999. Diets of Spectacled and Black Caiman in the Anavilhanas Archipelago, Central Amazonia, Brazil. *Journal of Herpetology*, 33(02): 181-92.
- Da Silveira, R. & Thorbjarnarson, J. B. 1999. Conservation implications of commercial hunting of black and spectacled caiman in the Mamirauá Sustainable Development Reserve, Brazil. *Biological Conservation* 88: 103-9.
- Da Silveira, R. & Viana, J. P. 2003. Amazonian Crocodylians: a keystone species for ecology and management... or simply bait? *CSG Newsletter* 22(01): 17-8.
- Farias, I. P.; Da Silveira, R. ; Thoisy, B. ; Monjelo, L. A.; Thorbjarnarson, J. & Hrbek, T. 2004. Genetic Diversity and Population Structure of Amazonian crocodylians. *Animal Conservation*, 7: 265-72.
- ISA, Instituto Sócio-Ambiental. 2006. Amazônia Brasileira 2006. Edição Especial. Programa Áreas Protegidas da Amazônia - ARPA, /MMA, Brasília.
- Junk, W.J. 1983. As águas da região amazônica. In: Salati, E.; Subart, H.; Junk, W. J. & Oliveira, A. R. (Eds.). Amazônia: desenvolvimento, integração e ecologia: 45-100. CNPq, Editora Brasiliense, Brasília.
- Junk, W. J. 1997. The Central Amazon floodplain: Ecology of a pulsing system. *Ecology Studies* 126. Springer Verlag, Berlin. 526pp.
- Junk, W. J. 2005. Flood pulsing and the linkages between terrestrial, aquatic and wetland systems. *Verh. Internat. Verein. Limnol.* 29: 11-38.
- Junk, W. J.; Bayley, P. B. & Sparks, R. E. 1989. The Flood Plain Pulse Concept in river-floodplain systems. *Can. J. Fish. & Aquat. Sci., Spec. Publ.* 106: 110-27.
- Magnusson, W. E.; Silva, E. V. & Lima, A. P. 1987. Diets of Amazonian Crocodylians. *Journal of Herpetology*, 21(02): 85-95.

- Rebêlo, G. H. & Magnusson, W. E. 1983. An analysis of the effect of hunting on *Caiman crocodilus* and *Melanosuchus niger* based on the sizes of confiscated skins. *Biological Conservation*, 26: 95-104.
- Rebêlo, G. H. & Lugli, L. 2001. Distribution and abundance of four caiman species (Crocodylia: Alligatoridae) in Jaú National Park, Amazonas, Brazil. *Revista de Biologia Tropical*, 49(03): 1019-33.
- Ross, J. P. 1998. *Crocodyles: Status survey and conservation action plan*. Second Ed. IUCN/The World Conservation Union. Gland, Switzerland.
- Sioli, H. 1964. General features of the limnology of Amazon. *Int. Ver. Theor. Agnew. Limnol.*, 15(02): 1053-8.
- Vasconcelos, W. R. 2005. Diversidade genética e estrutura populacional dos crocodylios jacaré-açú (*Melanosuchus niger*) e jacaré-tinga (*Caiman crocodilus*) da Amazônia. Dissertação de Mestrado em Genética, Conservação e Biologia Evolutiva. Orientação: I. P. Farias. Convênio INPA/UFAM. Manaus, Amazônia. 156pp.
- Vasquez, P. G. 1991. *Melanosuchus, M. niger*. Reptilia: Crocodylia: Alligatoridae. *Catalogue of American Amphibians and Reptiles* 530: 1-4.