

A. Proposal

Inclusion of all species of the Genus *Cuora s.l.* in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):

According to Article II 2 a of the Convention fulfilling the criteria B i and B ii laid down in Resolution Conf. 9.24 the species:

<i>Cuora amboinensis</i>	
<i>Cuora amboinensis amboinensis</i>	(Daudin, 1802)
<i>Cuora amboinensis couro</i>	(Schweigger, 1812)
<i>Cuora amboinensis kamaroma</i>	Rummler & Fritz, 1991
<i>Cuora amboinensis lineata</i>	McCord & Philippen, 1998
<i>Cuora flavomarginata</i>	
<i>Cuora flavomarginata flavomarginata</i>	(Gray, 1863)
<i>Cuora flavomarginata evelynae</i>	Ernst & Lovich, 1990
<i>Cuora flavomarginata sinensis</i>	(Hsü, 1930)
<i>Cuora galbinifrons</i>	
<i>Cuora galbinifrons galbinifrons</i>	Bourret, 1939
<i>Cuora galbinifrons bourreti</i>	Obst & Reimann, 1994
<i>Cuora galbinifrons hainanensis</i>	(Li, 1958)
<i>Cuora galbinifrons picturata</i>	Lehr, Fritz & Obst, 1998
<i>Cuora galbinifrons serrata</i>	(Iverson & McCord, 1992)
<i>Cuora trifasciata</i>	(Bell, 1825)

and

according to article II 2a of the Convention fulfilling the criterion A and according to Article II 2b of the Convention fulfilling the criterion B laid down in Resolution Conf. 9.24 the species:

<i>Cuora aurocapitata</i>	Luo & Zong, 1988
<i>Cuora mccordi</i>	Ernst, 1988
<i>Cuora pani</i>	Song, 1984
<i>Cuora yunnanensis</i>	(Boulenger, 1906)
<i>Cuora zhoui</i>	Zhao <i>et al.</i> , 1990

fulfilling the criteria of Article II, Annex 2a of Resolution Conf. 9.24.

B. Proponent

Federal Republic of Germany, United States of America

C. Supporting Statement

1. Introduction

The trade to and in Southeast Asian food markets and Traditional Chinese Medicine has become the main threat to the survival of Southeast Asian turtles. While tortoises and freshwater turtles have been subjected to human predation for centuries (Zhao 1995), recent changes in Asian economics, spawned when Chinese currency became convertible, have opened direct access to foreign markets (Behler 1997). According to Behler, head of IUCN/SSC Tortoise and Freshwater Turtle Specialist Group, Southeast Asia is becoming vacuumed of its turtles for the food markets (cited in Kaesuk Yoon 1999).

China's native turtle species already have been depleted dramatically. Therefore the species present on Chinese markets are increasingly collected in countries further and further away. Besides Bangladesh, Pakistan, India and Nepal even species from New Guinea and the USA are now affected. Only a small portion of the turtles being observed in the markets in 1997 were native for China. This indicates a

dramatic decline of the Chinese populations of all affected species. Lau *et al.* (1995) described the situation in China: "In the late 1970's the hard-shelled chelonian trade was dominated by Chinese species. Now there are more Southeast Asian species for sale than Chinese ones. The import of food chelonians from outside countries has increased more than 10fold since 1977. This reflects an increase in demand in Southern China and the depletion of Chinese chelonians in the wild." According to Dr. John Thorbjarnarson, co-ordinator of international reptile conservation programs at Wildlife Conservation Society (cited in Kaesuk Yoon 1999), the uncontrolled trade into China is the No. 1 threat to Asian turtles. Although not documenting the extent of trade in all details the following data are definite indications for the tremendous threats:

- Bill McCord (1998) reported that on two Chinese food markets alone an estimated 10,000 turtles are offered during a two-day period. He calculates that "if China only had five or six markets, ... , this would add up to at least 50,000 turtles on any given day. If the total replacement time was conservatively figured to be a full week (2-3 days given orally), then five or six markets would process at least 2.6 million turtles a year!" Salzberg (1998) estimates the number of markets to be a lot higher and therefore calculates that more than 12 millions of turtles are sold each year in China alone. This is also estimated by Meier (1998b).
- Lau *et al.* (1995) described a dramatic increase in the number of food chelonians imported to Hong Kong within a few years. According to Barzyk (1999) in 1996 this import reached 3.5 millions of kg. In 1998 these imports are reported to have jumped even to 12 millions of kg (Lee 1999). This development is summarised in FIGURE 1.
- Only about 10 % of the turtles at Vietnamese markets are consumed by the domestic demand. The remaining 90 % are to be exported to China and Hong Kong (Lehr 1997). China's large-scale border trade with Vietnam began only in 1989 but developed rapidly thereafter (Li & Li 1998). During an investigation of Li & Li (1998) about 2.29 to 29.325 tons of wildlife per day were imported to China from Vietnam, while more than 61 % of this volume are turtles.
- According to Martin & Phipps (1996) most turtles exported from Cambodia are destined for Vietnam, at least in the first instance. Turtles have by far the largest turnover by weight among wildlife on sale in Neak Lung: In west Neak Lung approximately 9.5 tons were sold in 1993, while in east Neak Lung about 3.6 tons were sold in 1994.

This huge and increasing trade is – with the exception of a few highly priced species - unselective. The species presently affected represent about 25 % of the worlds turtle species. The turtles which are exported to the Chinese food markets are often declared as "seafood" (McCord 1998). This is one reason why there is a lack of statistics documenting the volume of the trade in separate species. Almost all animals offered at these markets have been caught in the wild (Jenkins 1995; Artner 1998).

Of all turtle species for sale in Vietnam specimens of *Cuora* spp. achieve by far the highest prices. Some years ago live animals were traded for US\$ 6 and US\$ 8, and thus were twice as expensive as other species (Peter 1996). Since then prices in Vietnam but also in China have escalated dramatically (Lehr 1996; Meier *in litt.* 1998a). This and the marked drop in commercial availability at continuous demand might be used as indicators of the decline of wild populations of the Asian box turtles.

Due to the decline of all *Cuora* species within a single decade it has become necessary to afford an international protection for the whole genus. An overview to the situation of the genus *Cuora* is given in TABLE 1. Unless these species are offered international protection against commercial overexploitation it is likely some of the species and subspecies will become extinct within a few years.

- Two *Cuora* species (*Cuora mccordi* and *Cuora zhoui*) are only known from the markets - there is no information about population status, reproduction rate etc. of these species available. According to Barzyk (1999) both species have not been available in the markets for a couple of years although there are huge amounts of money offered by Western herpetologists. It has to be feared that these species might become extinct.
- From all chelonians *Cuora trifasciata* is the most demanded species which results in a 10 fold price in comparison to other species (Jenkins 1995; Van Dijk 1995, cited by the US Fish & Wildlife Service 1999). Meanwhile, the prices for one specimen increased up to US\$ 1,000 (McCord, cited by Behler 1997) or even more (see FIGURE 2).
- Populations are further imperilled through continued exports for the European and North American pet trade. Some species (*Cuora amboinensis*, *Cuora galbinifrons* and *Cuora flavomarginata*) are exported

by hundreds or even thousands to western pet shops (Yuwono 1998; Pro Wildlife *in prep.*). There is also a demand for very rare species (as *Cuora aurocapitata*, *Cuora mccordi*, *Cuora zhoui*, *Cuora pani* and *Cuora trifasciata*) although they are on sale for very high prices (see species-specific statements). The main reasons for the population decline are unsustainable trade to meet the still growing demands of Asian food markets and the low reproductive potential of these long-lived animals. Most species produce only one or two nests per year with clutch sizes of about one to four eggs. This reproduction capacity makes the genus very sensitive to over-exploitation. Five of the nine *Cuora* species are classified in China's Red Data Book as "endangered" or even "critically endangered". One, *Cuora yunnanensis*, is probably extinct in the wild (National Environmental Protection Agency of China). According to Congdon *et al.* (cited in Behler 1997) "*the concept of sustainable harvest of already reduced populations of long-lived organisms appears to be an oxymoron*". The populations of the genus *Cuora* are already reduced and their future use must be carefully monitored.

Besides the increasing demand of the markets habitat loss is the second factor that sharpens the situation of *Cuora* spp.. Habitat quality and quantity in most countries of origin are reduced by large-scale deforestation (Collins 1990; Gray *et al.* 1994; Hardtke 1997; van Dijk 1997; Mackinnon *et al.* 1996; Studley 1999). Other factors might have additional negative impacts, as for example fragmentation of rivers by dams in China (Fu 1997), environmental effects of war (Martin & Phipps 1996), human relocation programs in Indonesia (Collins 1990) or chemical pollution (Maas 1995; Herrmann 1997).

Due to the explosive economic growth and the continuously rising human population in South and East Asian countries (Vorholz 1997) it is most likely that the demand and therefore the trade pressure on *Cuora* species is bound to increase even further. All *Cuora* species but *Cuora amboinensis* are native to China, some are even endemic and are therefore directly affected by the ever growing demand of the country's food markets.

Only international efforts can slow the dramatic decline of Asian box turtles. A strict regulation of the trade in this species for food and pet markets is likely to benefit the populations of this genus. Therefore the chair of the IUCN Freshwater Turtle and Tortoises Specialist Group, John Behler, applauds the efforts to list *Cuora* spp. on Appendix II of CITES (*in litt.* 1999).

Table 1 on the next pages gives an overview on information concerning Asian box turtles. A detailed supporting statement for each species of the genus *Cuora* is given on the subsequent pages. Tables and figures showing relevant data are compiled in the appendix.

TABLE 1: Asian box turtles – An overview

Species	Countries of Origin	Population Status	Population Trends	Use and Trade
<i>Cuora amboinensis</i> Malaysian box turtle	Bangladesh, Cambodia, China?, India, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam	IUCN (1996): " near threatened " Red Data Book of Vietnam (1992): " vulnerable " Lao PDR: one of the most two threatened turtle species in the country (Salter 1993)	Declining populations in Lao PDR (Salter 1993), Vietnam (Lehr 1997) and Thailand (Thirakhupt & van Dijk 1997)	<u>Food markets and TCM:</u> High level of exploitation for food: In 1991 200,000 specimens were exported from Sulawesi alone. <u>Pet trade:</u> Tens of thousands of specimens have been imported in the European and US pet trade through the last decade. Offered for about US\$ 6.50 to 25, <i>Cuora amboinensis lineata</i> for US\$ 145-170.
<i>Cuora aurocapitata</i> Golden-headed box turtle	China	IUCN (1996): " data deficient " Red Data Book of China (1998): " critically endangered " only 70 to 80 animals known in captivity (Meier 1999c)	Populations rapidly decreasing (Behler 1997, Meier 1998a, Devaux 1999). It seemed to be vanished in nature (Behler 1997)	<u>Food markets and TCM:</u> One of the most requested and most expensive species in the Chinese food markets (up to 900 US \$ / animal). <u>Pet trade:</u> Pairs are sold for up to US\$ 3,400 amongst enthusiasts. Although being not widely distributed in western aquaria this species is of high interest for European and North American collectors.
<i>Cuora flavomarginata</i> Chinese box turtle	China, Japan	IUCN (1996): " vulnerable " Red Data Book of China (1998): " endangered " Red Data Book of Japan (1999): " vulnerable "	Populations obviously declining in China (Red Data Book 1998) and Japan (Environment Agency of Japan 1999), indicated by smaller numbers on sale while prices are increasing (Pro Wildlife in prep.)	<u>Food markets and TCM:</u> High level of exploitation in China and Hong Kong, offered in decreasing numbers <u>Pet trade:</u> This species regularly features in the European pet trade and is traded now for US\$ 100 to 160 per animal, decreasing abundance on sale; Also demanded in USA, price: up to US\$ 150 for adults
<i>Cuora galbinifrons</i> Flowerback box turtle	Cambodia, China, Lao PRD, Vietnam	IUCN (1996): " near threatened " Red Data Book of China (1998): " endangered "	Declining populations (Lehr 1996) Red Data Book of China (1998): "now in endan-	<u>Food markets and TCM:</u> High level of exploitation for food markets; offered in decreasing numbers <u>Pet trade:</u>

		Red Data Book of Vietnam (1992): "vulnerable"	gered status due mainly to unrestricted capture"	Highly demanded in western pet trade (thousands were imported into the EU during the past decade), decreasing abundance on sale, price: US\$ 45-125 (increasing) USA: wholesale prices: US\$ 30 to 100, depending on the size
<i>Cuora mccordi</i> Mc Cord's box turtle	China	IUCN (1996): "data deficient" Red Data Book of China (1998): "data deficient" only 110 to 120 individuals known in captivity (Meier 1999c)	declining populations; only known from markets, in some areas commercially extinct (Behler 1997; Barzyk 1999)	<u>Food markets and TCM:</u> Offered in Chinese markets (up to now only about 100 animals have been recorded at all) <u>Pet trade:</u> European collectors will pay almost US\$ 2,000 per animal. This species is highly demanded by enthusiasts. USA: very high demand, rarely available. US\$ 2,500 / pair for imports
Species	Countries of Origin	Population Status	Population Trends	Use and Trade
<i>Cuora pani</i> Pan's box turtle	China	IUCN (1996): "data deficient" Red Data Book of China (1998): "critically endangered" only 150 to 160 individuals known in captivity (Meier 1999c)	no data available	<u>Food markets and TCM:</u> according to Red Data Book of China (1998) only 22 specimens known, was occasionally on sale at Chinese food markets <u>Pet trade:</u> very rare on sale in Europe: Wild caught specimens are offered for US\$ 1,000 to 1,200 in Europe. U.S.A.: US\$ 1,000 to 1,200 / imported pair
<i>Cuora trifasciata</i> Three-striped box turtle	Cambodia, China, Lao PDR?, Vietnam	IUCN (1996): "endangered" Red Data Book of China (1998): "critically endangered" Red Data Book of Vietnam (1992): "vulnerable"	Rapidly declining populations (Behler 1997; Lau 1999); almost no further specimen offered in the markets (Pritchard 1997, Lehr 1997)	<u>Food markets and TCM:</u> Most expensive and requested turtle in the Chinese markets (up to 3,000 US \$/ animal), became very rare on sale. <u>Pet trade:</u> has been offered regularly in the European pet market in the 80ies. Now very difficult to obtain. On sale for US\$ 950 in Europe and US\$ 900 to 1,800 (size-dependent) in the U.S.A., captive bred on sale from one dealer for US\$ 250
<i>Cuora yunnanensis</i> Yunnan box turtle	China	IUCN (1996): "data deficient"	no data available, only known from a few	not observed in trade, maybe already extinct

		Red Data Book of China (1998): " probably extinct in the wild "	specimens in collections of museums,	
<i>Cuora zhoui</i> Zhou's box turtle	China	IUCN (1996): " data deficient " Red Data Book of China (1998): " data deficient " only about 50 individuals known in captivity (<i>Meier 1999c</i>)	Rapidly declining populations (<i>Behler 1997</i>); only known from markets; became commercially extinct (<i>Behler 1997</i> ; <i>Barzyk 1999</i>)	<u>Food markets and TCM:</u> One of the most requested and expensive species in the Chinese markets (up to 800 US \$). <u>Pet trade:</u> Being extremely rare this species is not widely distributed in European aquaria but is very attractive for collectors U.S.A.: extremely rare in U.S. collections, high demand and value species, US\$ 3,000 / pair for imported animals

Cuora amboinensis

1. Taxonomy:

1.1 Class:	Reptilia
1.2 Order:	Testudines (Chelonia)
1.3 Family:	Bataguridae
1.4 Species:	<i>Cuora amboinensis</i>
Subspecies:	<i>Cuora amboinensis amboinensis</i> (Daudin, 1802) <i>Cuora amboinensis couro</i> (Schweigger, 1812) <i>Cuora amboinensis kamaroma</i> Rummler & Fritz 1991 <i>Cuora amboinensis lineata</i> McCord & Philippen, 1998
1.5 Scientific synonyms:	<i>Testudo melanocephala</i> Daudin, 1802 <i>Testudo bicolor</i> Schweigger, 1812 <i>Emys couro</i> Schweigger, 1812

1.6 Common names:

English: Malayan box turtle, Malasian box turtle, Amboina box turtle, Water box turtle, Vietnamese box turtle, Java box turtle, Southeast Asian box turtle, Asian box turtle, Siamese box turtle

Common names for subspecies:

Cuora amboinensis amboinensis: East Indian box turtle

Cuora amboinensis couro: West Indonesian box turtle

Cuora amboinensis kamaroma: Southeast Asian box turtle

Cuora amboinensis lineata:

French: Tortue-boite d'Asie orientale

Common names for subspecies:

Cuora amboinensis amboinensis: Tortue-boite d'Amboine

Cuora amboinensis couro: Tortue-boite de la sonde

Cuora amboinensis kamaroma: Tortue-boite de Thaïlande

Cuora amboinensis lineata: Tortue-boite zayée

Spanish:

German:

Amboina-Scharnierschildkröte

Chinese:

Vietnamese:

Rùa hộp lung den

Thai:

Tao Hab

2. Biological Parameters

According to Rogner (1996) this species' carapace, which varies in colour from brown to almost black, can measure more than 20cm. *Cuora amboinensis* is therefore the largest species in the genus.

The upper part of the head is black or dark-brown in colour and is surrounded with three light bands, the underside including the throat is yellow (Rummler & Fritz 1991). *Cuora amboinensis amboinensis* is characterised by a flat, broad carapace with a distinct margin, and a plastral pattern with larger dark blotches than in the other subspecies. The populations of the Philippine Islands differ from other specimens of this subspecies through extremely narrow light stripes, more extensive dark plastral blotches and different most common plastral formulae (Rummler & Fritz 1991). *Cuora amboinensis kamaroma* has a highly domed, narrower carapace without a well-developed margin. *Cuora amboinensis couro* has an intermediate character concerning the shell and the indistinct margin. According to Rummler & Fritz (1991) this subspecies is thought to be derived from a former intergrade population between the other two subspecies. According to Fritz & Obst (1998) the domed shell of *Cuora amboinensis lineata* resembles *Cuora amboinensis kamaroma* but carapacial pattern differs by one or three light stripes.

The carapace of juvenile animals is characterised by three longitudinal ridges, which fade as the animal matures. In older individuals a faint central ridge can persist (Rummler & Fritz 1991). The outer edge of each plastron plate often carries a faded spot on a yellow background. The caudal and rostral plastron sections are linked by a dermatoid connection. Because of the flexibility of the plastron *Cuora amboinensis* is able to completely close its shell (Rogner 1996).

Box turtles tend to have a low reproduction rate. The Malayan box turtle reaches sexual maturity after 4-5 years and has a life expectancy of between 25-30 years. Two to three eggs are produced several times each year, the nesting seasons are in January-February and April (Jenkins 1995; Whitaker & Andrews 1997). According to Rogner (1996) the clutch size can achieve even five eggs. In the wild the incubation period lasts for between 67 and 77 days, while 76 to 77 days have been reported in captivity (Whitaker

& Andrews 1997). According to Reckel (1999) life expectancy of this species in captivity is reported to be up to 38 years.

2.1 Distribution

Countries of origin: Bangladesh, Cambodia, China (?), India, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam

With its four known subspecies, *Cuora amboinensis* is widely distributed across equatorial rainforests. *Cuora amboinensis amboinensis* can be found on the Indonesian islands of Amboina which is the type locality, Buru, Ceram, Batjan, Halmahera and Sulawesi, as well as practically all islands of the Philippines (Alcala 1986; Gaulke & Fritz 1998; Nietzke 1998).

Cuora amboinensis kamaroma occurs in eastern India (Nicobar Islands, Assam), on the Andamane Islands, in Bangladesh, Malaysia and Borneo (Rummler & Fritz 1991). According to Rummler & Fritz (1991) the type locality is 50 km from Bangkok, Thailand. Gaulke & Fritz (1998) add the Sulu Archipelago of the Philippine Islands, assuming that these animals colonised this island from Borneo.

Cuora amboinensis couro lives on the Indonesian islands of the type locality Java, also on Sumatra and their small offshore islands (Rummler & Fritz 1996). According to Iverson *et al.* (1998) Thailand, Singapore, Southern Myanmar, China and Cambodia, too form part of this subspecies' distribution range. Eastern India, Lao PDR and Vietnam may also be home to some populations (Jenkins 1995). Populations in Vietnam are confirmed by the country's Red Data Book (Ministry of Science, Technology and Environment 1992). However, in China's Red Data Book (National Environmental Protection Agency 1998) no subspecies of *Cuora amboinensis* is listed as native to China.

Cuora amboinensis lineata presumably occurs in the province Kachin in Northeast Myanmar, while as the origin said to be southern Myanmar, in a distance of 170 km from Rangun are reported by McCord & Philippen (cited in Fritz & Obst 1998). However, this species was discovered at the Ruli market in Yunnan, China.

According to Salter (1993) *Cuora amboinensis* occurs all along the Thai/Lao border. Without specifying the subspecies Iverson *et al.* (1998) confirm at least populations of this species in Vietnam and Lao PDR.

2.2 Habitat Availability

Cuora amboinensis prefers warm aquatic environments such as ponds, rivers, swamps and rice-paddies. According to Alcala (1986) this species occurs in streams and swampy or moist areas. It is primarily nocturnal and hides under piles of debris along banks of streams during the day. The animals spend about as much time on land as in the water, although juveniles may be entirely aquatic (Ernst & Barbour 1989). Alcala (1986) reported this species to be found at altitudes up to 500 meters in the Philippines.

This species is considered a generalist, which in contrast to most other turtles is able to better cope with environments altered by man (Moll 1997). The habitat of this species, however, has probably decreased as a result of extensive human relocation programmes in Indonesia. About 61% of the Indonesian human population was moved from Java to Sumatra (Collins 1990), which constitutes one of the main distribution ranges of *Cuora amboinensis* (Gaulke & Fritz 1998).

These developments specifically affect the subspecies *Cuora amboinensis couro*, which might be additionally impacted by large-scale deforestation in Myanmar that is described by van Dijk (1997). There are no details reported on the distribution of this subspecies in China, therefore no information on habitat quality is known.

The effects of Indonesia's human relocation programmes also extend to Sulawesi, which is home primarily to populations of *Cuora amboinensis amboinensis*.

According to Manzke (1993) *Cuora amboinensis kamaroma* has a more terrestrial lifestyle than the other subspecies. The habitat of this subspecies lies on the eastern coast of Borneo, a centre of the heavy forest fires of 1998. Other populations of *Cuora amboinensis kamaroma* are reported from the Indian Andaman Islands. As a consequence of the increasing human populations on these islands the remaining rain forests and the inhabiting wildlife are under huge pressure (Collins 1990).

It has to be assumed that large-scale deforestation in Myanmar as described by van Dijk (1997) has affected the habitat of *Cuora amboinensis lineata*.

2.3 Population Status

The IUCN classified the status of *Cuora amboinensis* as "near-threatened" (1996).

In **Bangladesh** this species is reported as occasionally found at Cox's Bazar (Sarker & Hossain 1997).

In **China**, this species was only recently reported based on captive and market animals (Zhang *et al.* 1998). Apparently no specimen has been found in the wild.

In **Indonesia** this species is still exported in huge numbers mainly for food markets in Hong Kong and China while no data on trade volume and population size are recorded (Saputra *in litt.*1999). Fritz & Gaulke (1997) reported *Cuora amboinensis* to be the most common turtle species observed during a survey on local dealers in Sumatra Utara.

In **Lao PDR** the Malayan box turtle is classified as a "valuable and nearly extinct species". Besides *Sibenrockiella crassicollis* *Cuora amboinensis* is reported to be the most threatened turtle species in this country (Salter 1993).

In **Malaysia** *Cuora amboinensis* is reported to be "widely found and extensively exported" to China (Ministry of Science, Technology and Environment *in litt.*1999). Nevertheless the Government fears negative effects of the intense trade to the populations of the Malayan box turtle.

In **Myanmar** the population size of nearly all turtle species is unknown (van Dijk 1997).

According to Fritz & Obst (1998) a new subspecies, *Cuora amboinensis lineata*, was described by 47 specimens in 1998. However, there is no information about the population size of this subspecies in the wild.

In the **Philippines** Alcalá classified this species as "common" in 1986. However, according to the Ministry of Environment (*in litt.* 1999) meanwhile Alcalá describes this species as "not exactly a common turtle. One has to exert much effort in order to gather a good number of specimens in any locality".

In **Singapore** *Cuora amboinensis* is described as a common resident and abundant in the region (CITES Management Authority of Singapore *in litt.*1999).

In **Thailand** two decades ago the distribution of *Cuora amboinensis* was described to be "numerous" (Nutaphand 1979). However, in 1990 Manzke (1993) did not observe a single specimen in a valley near Chumphon which was reported to be habitat of this subspecies.

In **Vietnam** the species is listed as "vulnerable" (Red Data Book of Vietnam, Ministry of Science, Technology and Environment 1992).

According to the International Species Information System ISIS (September 1999) 16 males, 25 females and 39 specimens of unknown sex are kept in zoos, while 3 hatchlings have been reported within the last six months.

2.4 Population Trends

No precise population figures for Malayan box turtles exist. However, the species' slow reproductive rate increases its susceptibility to overexploitation through uncontrolled trade. Hundreds of thousands of *Cuora amboinensis* have been imported to China and Hong Kong during the last decade (Jenkins 1995; Collins 1998; Lau *et al.* 1995). Additionally, several thousands specimens have been exported for the Western pet trade (Smart & Bride 1993) and are still offered by thousands (Yuwono 1998). Most of them originate from Indonesia. There is no data base that substantiates the sustainability of these high export numbers.

Lao PDR: The populations of *Cuora amboinensis* decreased and are now nearly extinct (Salter 1993).

Philippines: Comparing the status report of Alcalá (1986) with current data of the Ministry of Environment (*in litt.* 1999) the populations in the Philippines seem to be in decline.

Thailand: Almost all populations of native turtle species, including *Cuora amboinensis*, are in decline (Thirakhupt & van Dijk 1997). According to Manzke (1993) no single specimen of this species was observed in a valley near Chumphon in 1990 although it was described as habitat.

Vietnam: The species' availability on markets in Vietnam is also decreasing (Lehr 1996, 1997), which indicates declining populations in the wild.

2.5 Geographic Trends

No data available.

2.6 Role of the species in its ecosystem

In general, turtles play a central role in their ecosystem's food chain either as predators of insects and worms, or as prey species. Eggs as well as a significant proportion of hatchlings are an important source of food for monitor lizards, herons and some small mammalian predators such as viverrids (R. Wirth, *pers. comm.* 1998). Although information on the scale of predation on hatchlings is not available for *Cuora* species, hatchling survival of other turtles is reported to be low, as for example in unprotected nests of Gopher Tortoises in North-Central Florida the survival rate considered to be below 20%, mainly caused by predation (Smith 1997).

In the wild, the Malayan box turtle has an omnivorous, if primarily vegetarian diet (Rogner 1996). According to Nutaphand (1979) it feeds on plants, molluscs and shrimps as well as fungi and worms.

Because of its consumption of worms, from which some might act as intermediate hosts for various human diseases, this species may help to stem the diseases (R. Wirth, *pers. comm.* 1998).

2.7 Threats

National as well as international trade in *Cuora amboinensis* is intense. In 1993, Lehr (1997) reported *Cuora amboinensis*, besides two other turtles species, the most common species to be offered at markets in South Vietnam, but the number of specimens of Malayan box turtles on offer considerably decreased by 1996. Hundreds of thousands of *Cuora amboinensis* have been imported to China and Hong Kong during the last decade (Jenkins 1995; Collins 1998; Lau *et al.* 1995).

According to the Ministry of Environment of the Philippines (*in litt.* 1999) the country's populations are threatened by the demand of local people as food, particularly in the Central Visayas, but maybe also in other parts of the country.

Exports related to the pet trade are of lesser importance, even though *Cuora amboinensis* is commonly on sale in the EU (Pro Wildlife *in prep.*). Several thousands specimens have been exported for the Western pet trade (Smart & Bride 1993; Meier, *pers. comm.* 1999a). This species is still on offer by thousands (Yuwono 1998). Most of them originate from Indonesia.

Habitat loss and habitat degradation impose further environmental pressures on this species (Jenkins 1995). Indonesian populations may have been negatively affected by resettlement programmes for Java's human population (Collins 1990). Populations in Myanmar (van Dijk 1997), Cambodia (Martin & Phipps 1996; Hardtke 1997), the Philippines (Collins 1990) and Thailand (Gray *et al.* 1994) might be under environmental pressure by large-scale deforestation, in Eastern India and Bangladesh by fleeing programs (Smith 1996).

3. Utilisation and Trade

For general information on utilisation of and trade in Asian turtles please refer to the Introduction.

3.1 National Utilisation

Cambodia: Turtle species native to Cambodia, which include *Cuora amboinensis*, are used for the manufacture of ornaments or as TCM ingredients. The animals' heads, as well as their shell are frequently sold as a tonic after childbirth and were offered in 27 % of investigated shops. Prices for shells were recorded as US\$ 6, for decoration products as US\$ 25. Tortoise products have been observed in the O Russei market, in the Poipet market and in souvenir shops of Phnom Penh. Live animals were on sale for US\$ 2.2 per kilogram, the end market was documented to be Phnom Penh, Thailand or Vietnam (Martin & Phipps 1996).

India: In parts of India, namely Arunachal, Pradesh and Assam, the species is a target for subsistence hunting (Choudhury & Bhupathy 1993).

In **Indonesia** the local market for this species is very small, while most animals are directed to the markets in Hong Kong and China (Saputra *in litt.* 1999). However, Fritz & Gaulke (1997) reported *Cuora amboinensis* to be the most common turtle species observed during a survey on local dealers in Sumatra Utara.

Lao PDR: Also in this country the local demand for turtles as food is very small (Salter 1993).

In **Myanmar** *Cuora amboinensis* is used mainly for TCM and is sold in specialist shops primarily to Asian and predominantly Chinese tourists. In 1995, shells of tortoises, which are used to treat some nephrological problems, were sold for US\$ 0.80 a piece (Martin 1997). Because of a marked rise in the number of tourists, demand for these products has increased dramatically during recent years. In Myanmar itself the use of medicines made from turtles is neglectible.

In the **Philippines** this species is reported to be collected by people in the Visayas, where its flesh is considered a delicacy (Alcala 1986). According to the Ministry of Environment of the Philippines maybe also people from other parts of the country use this species as food (*in litt.* 1999).

Singapore: According to the CITES Management Authority of Singapore (*in litt.* 1999) less than 10 % of the animals in trade are for local consumption.

Thailand: In a survey of markets in northern Thailand Puginier (1994) observed Malayan box turtles although in very small numbers (cited in Jenkins 1995).

Vietnam: Relevant trade centres in Vietnam are Hanoi and Ho-Chi-Minh-City (Peter 1996). *Cuora amboinensis* was described to be one of the most abundant species in trade (Lehr 1997). It was recorded commonly on sale in markets in Ho Chi Minh City in the South, but in smaller numbers also sold in northern markets. Market prices were in the range of US\$ 2 per kilogram, variation in price was often apparently as much to do with the location of the market as with the species involved. Young Malayan box turtles are also favoured as release animals (Jenkins 1995).

3.2 Legal International Trade

Because of the frequently uncertain origin of the animals, information provided in section 3.1 also applies to *Cuora amboinensis*. The overwhelming majority of animals in trade is assumed to be destined for Asian food markets.

i) Food markets and Traditional Chinese Medicine

Cambodia: Live turtles, which presumably include *Cuora amboinensis*, were on sale for US\$ 2.2 per kilogram, the end market was documented to be Phnom Penh, Thailand or Vietnam (Martin & Phipps 1996).

China: The species' availability with high numbers at food markets in China's Guangzhou and Shenzhen Provinces was confirmed by Kuchling (1995). About 1,000 specimens were for sale in Xing Ping Market in Guangzhou on just one day in August 1995 (Meier *in litt.* 1998a). Valentin (1999) also reported to have seen about 1,000 specimens at the same market in November 1998 as well as in April 1999. Until 1994 the volume of turtles imported to Hong Kong has increased more than fivefold since 1977 (see FIGURE 1 after Lau *et al.* 1995 and Barzyk 1999). A total of 139,200kg were imported in 1977. By 1993 this figure had risen to 680,582kg, and within the first ten months of 1994 a record level of 1.8 million kilogram had been recorded. As the second most abundant species *Cuora amboinensis* accounts for a large proportion of this trade (Lau *et al.* 1995). According to Barzyk (1999) the imports of food turtles to Hong Kong reached even more than 3 million specimens.

Indonesia: In 1988 Sumatra exported 37,000 individuals (Van den Bunt 1990, quoted in Jenkins 1995). In 1991 200,000 specimens were exported from Sulawesi alone (Collins 1998). Jenkins (1995) reports annual exports of up to 13 tonnes for *Cuora amboinensis* plastrons, the equivalent of 200,000 animals, from Sulawesi into Hong Kong, which confirms Collins' information above. According to Jenkins (1995) and Lehr (1997) trade affects both sexes and all age groups.

According to official figures, 147,344 *Cuora amboinensis* turtles were exported from Indonesia into Hong Kong between November 1993 and October 1994. Thus, this species was imported to Hong Kong most commonly, after *Amyda cartilaginea*. Between 80-90% of these animals were re-exported from Hong Kong into China (Lau *et al.* 1995). Auliya (*in prep.*) reports weekly exports of *Cuora amboinensis* from Sumatra's capital Medan not only to Hong Kong but also to Singapore.

Malaysia regularly exports turtles, including *Cuora amboinensis* to Vietnam, which for the majority of these animals, acts as a through-route into China and Hong Kong (Jenkins 1995). The Government reports extensive exports of *Cuora amboinensis* to China that are not regulated (Ministry of Science, Technology and Environment of Malaysia, *in litt.* 1999).

Philippines: According to the Ministry of Environment (*in litt.* 1999) there was a small scale export to Korea and Hong Kong in 1995 and 1996, only permitting the trade of captive-bred specimens. It may be assumed that these specimens have been destined for food markets or TCM.

Singapore: The CITES Management Authority recorded a substantial trade on this species: "In the last four years, Singapore has imported quantities of this species but less than 10 % are for local consumption. More than 90 % of the specimens are either re-exported or trans-shipped to other Asian countries" (CITES Management Authority of Singapore, *in litt.* 1999).

Vietnam: According to Lehr (1997) 90% of all turtles on Vietnamese markets are destined for export to China. The numbers of *Cuora amboinensis* specimens observed for sale in southern Vietnam during 1993 have since decreased by more than half. At the same time the price per kilogram has doubled from US\$ 10 to US\$ 20 (Lehr 1997).

ii) International pet trade

In comparison to the demand of food markets and TCM a smaller proportion of animals is destined for the pet trade. However, according to Rogner (1996) the Malayan box turtle is the most common *Cuora* species in captivity.

China: Chang (1996) states that there is some demand for aquaria in Taiwan. According to TRAFFIC up to 200 animals were available for immediate sale from pet shops in Taiwan (TRAFFIC, quoted in Chang 1996).

Europe: Following European Union import restrictions on North American box turtles, European reptile enthusiasts have discovered Asian box turtles as an attractive alternative (Pro Wildlife *in prep.*) which is reflected by reports in European magazines (e.g. Anon. 1999). *Cuora amboinensis* plays a significant role in the European specialist pet market (Bringsoe 1991). Tens of thousands of animals have been imported during the past decade, although the majority of animals kept as pets did not survive for long (Meier, *pers. comm.* 1999a). Great Britain alone imported 3,833 individuals between 1986 and 1990 (Smart & Bride 1993). In 1999 *Cuora amboinensis* is on sale for US\$ 25 in the United Kingdom (Maas *in litt.* 1999).

A Dutch trader offered this species for US\$ 35 each on his Internet website (October 1998), while a wholesaler asks as little as US\$ 3 per animal (Monet 1999). He indicated Indonesia and Vietnam as countries of origin although the export of this species from Vietnam is illegal. Traders from Switzerland sell Malaysian specimens of this species for US\$ 45 (Theiler 1998) to US\$ 69 (Auliya *in prep.*). A recent survey of 27 wholesalers and specialist reptile shops carried out by Pro Wildlife in Germany revealed that 44.5% of businesses questioned held stocks of this species available for immediate sale. A further third stated they were able to obtain the species on request (see TABLE 2). The animals were offered for between US\$ 7.5 and US\$ 32 each and originated primarily from Indonesia and Hong Kong. One German importer obtained 150 specimens in 1997 and 320 animals in the subsequent year (Hoch, *pers. comm.* 1999).

Indonesia: Although Saputra (*in litt.* 1999) claims that exports from Indonesia for the pet trade are relatively small one single wholesale animal trader reported *Cuora amboinensis* to be available "by thousands if needed" for the export as pets (Yuwono 1998). Yuwono lists Java, Sumatra and Kalimantan as the animals' places of origin. Fritz & Gaulke (1997) reported this species to be the most abundant one that is available at two traders during a two-months survey in the southeastern part of the province Sumatra Utara.

Philippines: According to the Ministry of Environment (*in litt.* 1999) there was a small scale export to the USA in 1995 and 1996, only permitting the trade of captive-bred specimens. It may be assumed that these individuals are destined for the US pet market.

U.S.A.: Following prices as much as US\$ 38 in 1981 (Hoover 1998) specimens can now be bought from pet shops for approximately US\$ 10 to US\$ 25 (Lucas 1999; Central Florida Reptile Farm 1999). According to the US CITES Management Authority (1999) one American reptile importer indicates that he sells specimens of *Cuora amboinensis amboinensis* from Sumatra, Borneo and Sulawesi for US\$ 6.50 to 9.50 each while adult wild-caught imported specimens are sold for approximately US\$ 15 to 35. Between 1993 and 1995 a total number of 14,476 specimens were imported into the USA with 464 specimens in 1993, 5,066 in 1994 and 8,946 in 1995 (Hoover, 1998). However, according to the US Fish & Wildlife Service (*in litt.* 1999) in 1995, 6,683 live animals were imported into the U.S.A.. The figures for 1996 and 1997 are 5,982 and 6,279 respectively. In 1997, an additional 65 shell-products were imported also (US Fish & Wildlife Service *in litt.* 1999). The U.S.A. exported 749 animals in 1995, 85 in 1996, and 80 in 1997.

3.3 Illegal Trade

A discrimination between legal and illegal trade is sometimes difficult regarding to the complex routes of the transport: Countries as Vietnam and Cambodia are as well countries of origin but also have transit function for the trade in turtles.

Cambodia: Although as stated by Martin & Phipps (1996) the export of native wildlife is prohibited each day 2-4 tonnes of turtles, covering almost all native species, are transported by boat, bus and taxis from Phnom Penh to Vietnam (Klemens 1998). *Cuora amboinensis* as a native species to Cambodia is assumed to be included in this trade.

Lao PDR: Unknown quantities of specimens are caught in southern Lao PDR and transported in the reverse direction to Vietnam (via Savannakhet/Danang Highway) and Cambodia. For Lao PDR, Salter (1993) and Jenkins (1995) described the numbers of specimens of this species exported to Thailand as only 60 to 70 animals annually, but many regions have started their turtle trade as late as 1994 (Jenkins 1995). During the dry season one catcher collects approximately 20 animals. They are then sold mainly across borders.

Myanmar: All native turtle species are protected against commercial trade by domestic law in Myanmar. Despite this protection numerous specimens are exported to China, sometimes via Thailand (Martin 1997). This applies to both live animals and TCM products. It can be assumed that *Cuora amboinensis* as a native species to Myanmar is part of this trade. 47 specimens of the currently described subspecies *Cuora amboinensis lineata* were reported to originate in Myanmar but were found on sale in Yunnan Province, China, by the Hong Kong animal dealer Oscar Shiu who sold them to Western collectors (Fritz & Obst 1998). Three specimens of this subspecies have been offered by a trader from Switzerland for US\$ 145 to US\$ 170 (Theiler 1998).

Philippines: According to the Ministry of Environment (*in litt.* 1999) a number of illegal trade in the local market were recorded.

Vietnam: Compared to 1993, almost no legally protected species could be found in official public markets in Vietnam in 1996, because most of the trade in these animals was now conducted from the traders' private residences. Species not available for sale immediately could be procured at short notice, which indicates that traders are well co-ordinated and organised (Lehr 1997). Every day between 3-30 tonnes

of wild animals, 61.4% of which are turtles, are imported into China through the three border towns of Dong Xing, Longyao and Shuikou alone. This is the equivalent of a daily import volume of 1.84-18.4 tonnes of turtles. A significant proportion of this trade, including *Cuora amboinensis*, is illegal (Li & Li 1998; TRAFFIC 1999). Also specimens in the western pet trade are reported to come from Vietnam (Monet 1999) where this species is excluded from trade.

3.4 Actual or Potential Trade Impacts

Despite its wide distribution range *Cuora amboinensis* is likely to be affected negatively by the present level of utilisation due to the species' continuously high level in national and international trade and due to its demographic parameters. Already in 1995 Jenkins recommended to consider the possibility of including *Cuora amboinensis* in the CITES appendices.

The Government of Malaysia warns: "Since there are no laws or regulations that prohibit exportation of these turtles, an adverse negative effect could happen to the population of these turtles. The Ministry feels that any efforts to control this species from extinction is most welcomed" (Ministry of Science, Technology and Environment of Malaysia, *in litt.* 1999).

All 47 reported specimens of the currently described subspecies *Cuora amboinensis lineata* were found in markets at Yunnan Province in China by Hong Kong animal trader Oscar Shiu (McCord & Philippen, cited in Fritz & Obst 1998). While the first specimens have been found in the beginning of 1997 already in 1998 this subspecies was on sale in European pet trade (e.g. Theiler 1998).

3.5 Captive breeding or artificial propagation for commercial purposes (outside Countries of origin)

Cuora amboinensis is bred in small numbers by private breeders (Grychta 1988; Meier *pers. comm.* 1999a; Internet publications by hobby-breeders). In Switzerland only one and two hatchlings were reported for 1993 and 1994 respectively (SIGS 1999). Breeding statistics for Germany report six hatchlings in 1993 (DGHT (*ed.*) 1995). Almost nothing is known regarding efforts to breed *Cuora amboinensis* in a commercial scale. Saputra mentions a breeding operation in Sumatra but no details on the breeding capacity are known (Saputra *in litt.* 1999). According to the Ministry of Environment of the Philippines (*in litt.* 1999) there are exports of captive-bred specimens by a holder of a wildlife farm.

4. Conservation and Management

4.1 Legal Status

4.1.1 National

In **Bangladesh** capture, trade and killing of all wild fauna is prohibited through Annex III of the Bangladesh Wildlife Preservation Amendment (Rashid & Swingland 1997). The export of turtles was banned in May 1997 (Wright *in litt.* 1999).

In **Cambodia** hunting as well as exporting native wildlife is illegal (Martin & Phipps 1996).

In **India** according to Choudhury & Bhupathy (1993) *Cuora amboinensis* is not covered by the Indian Wildlife Protection Act, 1972.

Indonesia offers no legal protection to this species. However, trade and export have been regulated through quotas determined within the framework of the Act on Conservation of Living Resources (TABLE 3, after Jenkins 1995). According to Saputra (*in litt.* 1999) the Indonesian Government does only issue permits if the buyer's country asks for.

Lao PDR: Being reported as valuable and nearly extinct *Cuora amboinensis* is classified as Category I species (Instructions on the execution of Council of Minister's decree No. 118/PCM dated 5th October 1989 on the Management and Protection of aquatic animals, wildlife and on hunting and fishing). As a consequence this species is strictly protected in Lao PDR, where its capture is prohibited throughout the year (Salter 1993; Jenkins 1995).

Malaysia: Legal protection for this species is lacking (Jenkins 1995).

Myanmar: Although the collection of wild animals for personal use is permitted in Myanmar, wildlife is banned from commercial trade by the Forest Law of 1992 (van Dijk 1997).

Philippines: The export of wild caught animals, including turtles is prohibited (CITES Secretariat - Notification to the Parties, 2.3.98).

Singapore: No information on national wildlife protection laws was available.

Thailand: The Wild Animals Reservation and Protection Act forbids both capture of and trade in this turtle (Thirakhupt & van Dijk 1997).

Vietnam: Due to its listing as "vulnerable" in Vietnam's Red Data Book, this species is excluded from trade (Red Data Book Vietnam, Ministry of Science, Technology and Environment 1992).

4.1.2 International

None.

4.2 Species Management

4.2.1 Population Monitoring

No information available.

4.2.2 Habitat conservation

Since 1962 **Vietnam** has created 87 reserves (Collins 1990). **Thailand** has more than 60 national parks, 28 wildlife reserves and 118 nature reserves. In recent years India has established 17 wildlife parks and 50 new reserves. However, none of these measures are specifically directed to *Cuora amboinensis*. Information on habitat conservation in Malaysia, Lao PDR, Bangladesh, Myanmar, the Philippines or China is not available.

4.2.3 Management measures

No information on the management of *Cuora amboinensis* was available.

4.3 Control measures

4.3.1 International Trade

No data available. However, regarding the huge volume of the transborder wildlife trade, mainly between Vietnam and China, Li & Li (1997b) recommend to initiate a new wildlife trade permit system that should contain the name of a species on the permit which will be traded, and every species should have its own trade permit.

4.3.2 Domestic measures

No information available.

5. Information on Similar Species

Despite its close relationship to *Cyclemys* the genus *Cuora* in general and especially *Cuora amboinensis* resembles *Mauremys* and particularly *Mauremys mutica* more closely in appearance which is mainly caused by a similar pattern at the head of both species (Pritchard 1979; Lehr *pers. comm.* 1999). The yellow bands on the head of *Cuora amboinensis* makes it looking similar to *Annamemys annamensis*, which shows an analogous pattern. Both species have similar size and live in similar humid habitats (Rogner 1996). Nevertheless, the genera can be distinguished from each other by the plastron which is flexible in *Cuora* but not in *Mauremys* or *Annamemys* (Lehr *pers. comm.* 1999).

The Asian box turtles *Cuora* spp. can be distinguished from the North American box turtles *Terrapene* spp. by a less domed carapace and by the end of the marginals which is extent and on the same level like the plastron. *Terrapene* is higher and presents marginals vertical to the plastron (Devaux 1999).

Hatchlings in general are very difficult to distinguish by species. The flexibility of the plastron which is characteristic for some genera like *Cuora* is not developed yet but is formed only after 12 to 14 months (Lehr *pers. comm.* 1999)

6. Other Comments

Lau *et al.* (1995) recommend the inclusion of at least *Cuora amboinensis* and *Cuora trifasciata* in the CITES Appendices. Also Jenkins (1995) recommended at least to discuss this measure.

Although Malaysia is one of the countries where this species is still common the Ministry supports international protection: "Since there are no laws or regulations that prohibit exportation of these turtles, an adverse negative effect could happen to the population of these turtles. The Ministry feels that any efforts to control this species from extinction is most welcomed" (Ministry of Science, Technology and Environment of Malaysia, *in litt.* 1999).

Cambodia, as a range state of at least three *Cuora* species (*C. amboinensis*, *C. galbinifrons* and *C. trifasciata*), will support this proposal (Cambodian Scientific Authority of Fisheries and Aquatic Animals, *in litt.* 1999). Additionally the Government of the Philippines supports the proposal for the inclusion of *Cuora amboinensis* in CITES Appendix II (Ministry of Environment *in litt.* 1999)

7. Additional remarks

Cuora aurocapitata

1. Taxonomy:

1.1 Class:	Reptilia	
1.2 Order:	Testudines (Chelonia)	
1.3 Family:	Bataguridae	
1.4 Species:	<i>Cuora aurocapitata</i>	Luo & Zong 1988
1.5 Scientific synonyms:		
1.6 Common names:		
English:	Golden-headed box turtle, Yellow-headed box turtle	
French:	Tortue-boite à tête jaune	
Spanish:		
Chinese:		
German:	Goldkopf-Scharnierschildkröte, Goldköpfchen	

2. Biological Parameters

This species is dark-brown but hazel to reddish brown along the neural plates, and is distinguished by a well defined central ridge. Because of the flexibility of the plastron *Cuora aurocapitata* is able to completely close its shell. A black stripe extends diagonally across each bridge. The scales on the dorsal part of the front legs are significantly larger than on the rear extremities (Rogner 1996).

According to Fritz & Obst (1998) the upper side of the head, which gave the species its name, is bright yellowish to greenish with the sides sometimes with dark to black stripes. The second to fifth vertebral scutes are reddish brown, otherwise slightly darker. The reddish brown or at least lighter spots are not limited to the second costal scute but may occur on other costals as well. The marginals show lighter centres. The plastron shows radiating black markings particularly along sutures, while the black elements are smaller and less numerous in young specimens. The plastral pattern is very similar to *Cuora pani* but dark plastral figure is broken at least on the anterior plastral lobe in *Cuora aurocapitata*. The carapace of this species can reach up to 15,65 cm in length (Fritz & Obst 1998).

Four eggs are deposited a year, maybe in two occasions, between the end of July and the beginning of August (National Environmental Protection Agency of China 1998). The first successful reproduction in captivity took place in 1992 and resulted in a clutch of three eggs (de Bruin 1994). Subsequent captive breeding successes with up to six eggs have been achieved in Germany. In the terrarium environment only one incidence of secondary egg production has been observed so far (Meier, in litt. 1998a).

2.1 Distribution

Country of origin: China

Cuora aurocapitata is restricted to the Chinese Province of Anhui, approximately 300 km west of Shanghai (Rogner 1996; Iverson *et al.* 1998). The species was first discovered in Nanling County (Zhou & Zhou 1991), although Yixian, Guande and Jingxian have also been mentioned in this context (National Environmental Protection Agency of China 1998).

2.2 Habitat Availability

Cuora aurocapitata lives in clear mountain streams or ponds in hilly areas and is also found among grass and shrubs not far from the water (National Environmental Protection Agency 1998).

This species has been known for only a decade. Accordingly, reliable data about the characteristics of its habitat are scarce. However, it is reasonable to assume that this species might be affected by the fragmentation of China's large rivers caused by dams (Fu 1997) and by the deforestation (Mackinnon *et al.* 1996; Studley 1998). Additionally, it is noteworthy that many waters suffer from severe chemical and particle pollution (Herrmann 1997; Maas 1995).

2.3 Population Status

The IUCN (1996) considers this species "data deficient" while the Chinese Red Data Book classifies it as "critically endangered" (National Environmental Protection Agency of China 1998).

Cuora aurocapitata was discovered in 1988, information on the natural population size are lacking.

According to the International Species Information System there is only one specimen kept in a zoo (ISIS 1999). According to the National Environmental Protection Agency (1998) a few specimens are reported to be maintained by some institutes in China. Meier (1999c) reports 70 to 80 individuals to be kept in captivity, with 25 to 30 in the U.S.A. and 45 to 50 in Europe (TABLE 4).

2.4 Population Trends

The Golden-headed box turtle was discovered only a few years ago and population figures are not available. However, its reduced availability in Chinese food markets and the increasing prices indicate declining populations in the wild (Meier *in litt.* 1998a). This is confirmed by collectors (Devaux 1999).

According to information obtained from European and American collectors the Golden-headed box turtle has vanished in nature and no specimen can be purchased at any price (Behler 1997). One American reptile importer reports that he has been unable to obtain any specimens for the past three to four years, and for the last pair he sold, he received US\$ 3,000 (Weissgold *in litt.* to the German CITES Scientific Authority 1999). In contrary, Lau (*in litt.* 1999) reported that occasionally specimens are offered in pet shops in Hong Kong. According to McCord (1999) at maximum 10 individuals are being found a year.

2.5 Geographic Trends

No data available.

2.6 Role of the species in its ecosystem

For general information on the central role of turtles in their ecosystems please see section 2.6. for *Cuora amboinensis*.

There are only a few data on the diet of *Cuora aurocapitata* in the wild. According to National Environmental Protection Agency of China (1998) it feeds on small fishes, shrimps, snails and tadpoles, in captivity on meat, prawns and bananas (Rogner 1996).

2.7 Threats

Cuora aurocapitata is known only from very few specimens in a small area in Anhui (Lau *in litt.* to the German CITES Scientific Authority 1999). Due to its rarity a narrow distribution range and a low reproductive potential can be assumed rendering the species particularly susceptible to the dangers posed by overexploitation through trade (National Environmental Protection Agency of China 1998).

Moreover, there is a continuous demand of turtle enthusiasts in Europe and the USA for this species although *Cuora aurocapitata* is extremely rare and expensive on sale (Pro Wildlife *in prep.*) and is reported to be virtually unobtainable in the U.S. hobbyist trade (Weissgold, *in litt.* to the German CITES Scientific Authority 1999).

Habitat loss and habitat degradation presumably impose further environmental pressures on this species (Jenkins 1995).

3. Utilisation and Trade

For general information on utilisation of and trade in Asian turtles please refer to the Introduction.

3.1 National Utilisation

According to Zhao (in National Environmental Protection Agency of China 1998) this species was said to have therapeutic significance and to be edible, so its price is very high. Following *Cuora trifasciata* this species is the second most wanted at the food markets and therefore directly affected by the increasing demand (FIGURE 2), despite the fact that this species has been classified as a major protected wildlife in Anhui since 1992 (National Environmental Protection Agency of China 1998). This species was only recorded from markets which indicates the national utilisation of this species (Meier *in litt.* 1998a).

In Hong Kong, the price per animal has escalated dramatically from about US\$ 300 in 1990 to US\$ 900 in 1997 (see FIGURE 2, Meier *in litt.* 1998a). However, according to reports from western collectors there was no specimen available since a few years (Behler 1997). On the other hand Lau (*in litt.* 1999) reported an occasional offer of specimens in Hong Kong pet shops.

3.2 Legal International Trade

Considering the protection offered in Anhui, its sole range, since 1992 there is no legal export of *Cuora aurocapitata* from China to other countries likely to exist.

USA: Captive bred hatchlings are available annually and prices fluctuate significantly from year to year. In 1999 the selling price for captive bred hatchlings was US\$ 500 (Weissgold, *in litt.* to the German CITES Scientific Authority 1999). Individuals are offered in the internet (for example by Central Florida Reptile Farm 1999). A total of 20 to 30 individuals is estimated to be kept in the USA (Weissgold *in litt.* to the German CITES Scientific Authorities 1999).

3.3 Illegal Trade

Trade in this species takes place almost exclusively within China (see section 3.1.), where its status in Anhui as "major protected wildlife" prohibits both capture and trade (National Environmental Protection Agency of China 1998). Any specimens presently being available in Chinese food markets must thus be assumed to be illegal. However, according to McCord (1999) a maximum of 10 animals is found per year.

Europe: Individual specimens are exported from China for the specialist pet trade abroad. Pairs are sold for up to US\$ 3,400 amongst enthusiasts in Europe (Schildkröten-Fachmagazin, 2/98). According to Auliya (*in prep.*) a Swiss importer offers wild-caught male specimens for US\$ 1,500, females for US\$ 1,870. Only a mere 30-35 specimens are currently kept in Europe (Meier, *pers. comm.* 1999a). However, during a recent survey by Pro Wildlife in Germany, 11% of businesses questioned stated that if required they could obtain specimens from China for prices ranging between US\$ 790 and US\$ 1,250 (TABLE 2).

U.S.A.: Wild-caught specimens have been virtually unobtainable in the U.S. for the past few years (Weissgold, *in litt.* to the German CITES Scientific Authority 1999). According to McCord (*in litt.* to Weissgold 4th October 1999) all specimens available are exported from China to Japan, with prices at US\$ 3,000/pair.

3.4 Actual or Potential Trade Impacts

While all but one *Cuora* species are native to China, *Cuora aurocapitata* is endemic to the country and therefore directly affected by the ever growing demand of the country's food markets. Trade specifically to supply Chinese food markets poses a severe threat to this species (National Environmental Protection Agency of China 1998). The international trade as pets is an additional impact to the declining populations of the Golden-headed box turtle.

The price for *Cuora aurocapitata*, which has become increasingly scarce in food markets and therefore presumably also in the wild, has increased considerably during recent years. This in turn has led to intensified efforts to collect specimens from the wild. Yet, according to interested collectors in North America, irrespective of the size of financial offers, the species cannot be purchased from Chinese traders at any price (Behler 1997).

3.5 Captive breeding or artificial propagation for commercial purposes (outside country of origin)

Cuora aurocapitata is kept and bred in small numbers by private breeders (Meier, *pers. comm.* 1999a; Internet publications by hobby-breeders). According to De Bruin (1994) captive breeding was the first time successful in 1992. McCord (*in litt.* to Weissgold 4th October 1999) reports three to four captive bred hatchlings a year in the U.S.A.. However, breeding efforts on a commercial scale are currently not reported for this species.

4. Conservation and Management

4.1 Legal Status

4.1.1 National

In Anhui Province, where the species was classified as "major protected wildlife" in 1992, both capture and trade are strictly prohibited (National Environmental Protection Agency of China 1998).

4.1.2 International

None.

4.2 Species Management

4.2.1 Population Monitoring

In 1991, the action plan of IUCN/SSC/Tortoise and Freshwater Turtle Specialist Group considered *Cuora aurocapitata* as a "species of restricted distribution in need of status investigation". As a consequence surveys and studies have been recommended to confirm taxonomic identity and continued existence of viable populations (IUCN/SSC/TFTSG 1991).

4.2.2 Habitat conservation

According to the World Conservation Monitoring Centre until 1993 nine nature reserves and two scenic areas have been established in the Anhui Province (WCMC 1999), however none of the known localities of *Cuora aurocapitata* are protected (Lau *in litt.* to the German CITES Scientific Authority 1999). Additionally, none of these measures act specifically for the protection of turtles.

Therefore, China's National Environmental Protection Agency (1998) recommends the creation of a special reserve for the protection of *Cuora aurocapitata*.

4.2.3 Management measures

No information available.

4.3 Control measures

4.3.1 International Trade

None.

4.3.2 Domestic measures

No information available.

5. Information on Similar Species

For similarities to other species please see section 5 in the proposal for *Cuora amboinensis*.

6. Other Comments

Cambodia, as a range state of at least three *Cuora* species (*C. amboinensis*, *C. galbinifrons* and *C. trifasciata*), will support this proposal (Cambodian Scientific Authority of Fisheries and Aquatic Animals, *in litt.* 1999).

7. Additional remarks

Cuora flavomarginata

1. Taxonomy:

- 1.1 Class:** Reptilia
1.2 Order: Testudines (Chelonia)
1.3 Family: Bataguridae
1.4 Species: *Cuora flavomarginata* (Gray, 1863)
Subspecies: *Cuora flavomarginata flavomarginata* (Gray, 1863)
*Cuora flavomarginata evelynae** Ernst & Lovich, 1990
*Cuora flavomarginata sinensis*** (Hsü 1930)
* This subspecies was regarded as a separate species by Ernst & Lovich (1990) which was defeated by McCord and Iverson in 1991
** This subspecies is regarded to be identical with the nominate form by Fritz & Obst (1998)
- 1.5 Scientific synonyms:** *Cistoclemmys flavomarginata* (Bour 1980)

1.6 Common names:

English: Black-bellied box turtle, Chinese box turtle, Yellow-margined box turtle, Yellow-rimmed box turtle, Snail-eating box turtle, Asian snail-eating box turtle

Common name of subspecies:

Cuora flavom. flavomarginata: Common yellow-margined box turtle

Cuora flavom. evelynae: Ryu Kyu yellow-margined box turtle

Cuora flavom. sinensis: Chinese yellow-margined box turtle

French:

Tortue-boite à bords jaune

Common name of subspecies:

Cuora flavom. flavomarginata: Tortue-boite à bord jaune de Taiwan

Cuora flavom. evelynae: Tortue-boite à bord jaune des Ryu-Kyu

Cuora flavomarginata sinensis: Tortue-boite à bord jaune de Chine

Spanish:

Chinese:

German:

Gelbrand-Scharnierschildkröte

2. Biological Parameters

According to Rogner (1996) the carapace of *Cuora flavomarginata* grows to between 18 and 20cm. The coloration of the elongated carapace is dark brown to black. In older animals a central ridge of a more yellowish colour may be absent. The plastron is black and flexible. Because of the flexibility of the plastron *Cuora flavomarginata* is able to completely close its shell.

The upper part of the head is medium brown, the remainder yellowish. A bright pale yellow stripe, which is edged darkly, extends from the eye to the neck. Like the shell, the animals' soft parts are of dark coloration.

According to Fritz & Obst (1998) *Cuora flavomarginata evelynae* is distinguishable by a lighter coloration, in particular by the presence of light spots on costals that may fuse to form lateral stripes and smaller brown plastral hour-glass-figure. These stripes are characteristic for *Cuora flavomarginata evelynae* and are absent in other subspecies. The plastron plates of *Cuora flavomarginata sinensis* have a wider rim and are covered in parallel etched in lines. Particularly in the last third of the carapace, the caudal edges of the marginal plates overlap with the front of the plates behind, which gives the carapace a serrated appearance. The tail is shorter than in other subspecies (Rogner 1996).

In captivity clutches of 1-3 eggs (Rogner 1996; Connor & Wheeler 1998) or 2-4 eggs (Meier, *in litt.* 1998a) have been reported. Females may produce two or three clutches a year in one or two-monthly intervals (Becker 1996; Connor & Wheeler 1998). Incubation lasts for 68-90 days. According to Reckel (1999) life expectancy of this species in captivity is reported to be up to 19 years.

2.1 Distribution

Countries of origin: China, including Hong Kong (?) Taiwan, Japan

Cuora flavomarginata occurs in the Chinese provinces of Anhui, Fujian, Henan, Hubei, Hunan, Jiangsu, Shanghai, Taiwan and Zhejiang (National Environmental Protection Agency of China 1998; Iverson et al. 1998) and the Japanese Ryu Kyu Islands (Rogner 1996).

Cuora flavomarginata flavomarginata is distributed in Taiwan and is listed as uncertain to Hong Kong (Bogadek & Lau 1997) although the subspecific status of the species has not been finally agreed upon.

According to Zhao & Adler (1993) *Cuora flavomarginata sinensis* occurs mainly on Junshan Dao on Lake Tungting in Hunan Province. Iverson (1992) reported the distribution of *Cuora flavomarginata evelynae* on the Ryu Kyu Islands, with the type locality being Ishigaki Shima.

2.2 Habitat Availability

Rogner (1996) states that this species inhabits wet places like swamps and shallow edges of ponds, small lakes and flooded rice-paddies. This species is reported to be active during periods of rain and in the water (National Environmental Protection Agency of China 1998). Some specimens have also been sighted on the banks of mountain streams (Jenkins 1995). In Anhui the species inhabits forest borders or grassy mountains with scattered shrubs not far from aquatic areas, and hides in shady and cool places, under fagot or in heap of stones near streams (National Environmental Protection Agency of China 1998). During winter it chooses southern slopes with thick grass and dead leaves for hibernation (National Environmental Protection Agency of China 1998). With the exception of juveniles *Cuora flavomarginata* lives a less aquatic life than other *Cuora* species. For this reason some herpetologists have classified the species as belonging to the genus *Cistoclemmys* (Bour 1980; Hirayama 1984, cited in Rogner 1996). Rice-paddies, ponds and swamps, which are the habitat of this species are affected by the extensive use of fertilisers and chemicals at least in some areas of China (Maas 1995). Additionally, this species is presumably affected by the large-scale deforestation in Yunnan that appears to be by far the worst in China. As a consequence, the region's biodiversity, environment and climate is threatened (Studley 1998). Furthermore, the extensive use of fertilisers and chemicals at least in some areas of China might add further negative impacts (Maas 1995).

2.3 Population Status

IUCN (1996) classifies the species as "vulnerable" realising a population decline projected or suspected in the future based on a decline in area of occupancy, extent of occurrence and/or quality of habitat. However, the National Environmental Protection Agency of China (1998) lists it as "endangered" in the country's Red Data Book. The population of *Cuora flavomarginata evelynae* in Japan is classified as "vulnerable" in the Country's Red Data Book List (Environment Agency of Japan *in litt.* 1999).

As a consequence of its small distribution range Basile and Lorenz (cited in Becker 1996) classify this species as endangered. Current information on population size and reproductive behaviour is not available for wild populations. In 1971 Mao (cited in Connor & Wheeler 1998) reported this species frequently seen in Taiwan.

According to the International Species Information System (ISIS, March 1999) only seven males, 13 females and 13 specimens of unknown sex are kept in zoos, while 2 hatchlings have been reported within the last six months.

2.4 Population Trends

Populations of *Cuora flavomarginata* in China are in decline as stated by the National Environmental Protection Agency of China (1998). The species has also become scarce in Chinese food markets, which has caused significant increases in price. This in turn has raised the incentives for even more intensive collection from the wild (Meier, *in lit* 1998a).

According to reports of European importers the abundance of *Cuora flavomarginata* in the Western pet trade significantly decreased within the last few years while the prices increased to the 10fold. Most importers assume that this is a consequence of declining populations in the wild (Pro Wildlife *in prep.*, see TABLE 2).

Although population figures for *Cuora flavomarginata evelynae* in Japan are not available this subspecies is assumed to be in decline, caused by habitat loss and illegal capture for pet trade (Environment Agency, Government of Japan *in litt.* 1999).

2.5 Geographic Trends

The described Hong Kong specimens are likely to be the result of recent introductions (Bogadek & Lau 1997). This is also discussed for specimens recorded in Guangxi and Guangdong (National Environmental Protection Agency of China 1998).

2.6 Role of the species in its ecosystem

For general information on the central role of turtles in their ecosystems please see section 2.6. for *Cuora amboinensis*.

Stomach contents of *Cuora amboinensis* reported to contain insect remains and plant materials (Chen 1991). Captive specimens survive on a diet of insect larvae, beef, young rats and mice, as well as fruit and vegetables (Becker 1996; Rogner 1996).

2.7 Threats

The strong demand of Chinese food markets represents the greatest threat to *Cuora flavomarginata* (National Environmental Protection Agency of China 1998). This effect is exacerbated by continued takings from the wild to satisfy Western pet markets (Connor & Wheeler 1998). Although on sale for higher prices *Cuora flavomarginata* than a couple of years ago is still attractive for western keepers (Pro Wildlife *in prep.*).

Habitat loss and habitat degradation impose further environmental pressures on this species (Jenkins 1995). Deforestation (Mackinnon *et al.* 1996; Studley 1998) as well as chemicals and fertilisers (Maas 1995) presumably pose additional threats through their effects on the species' habitat.

3. Utilisation and Trade

For general information on utilisation of and trade in Asian turtles please refer to the Introduction.

Cuora flavomarginata is highly demanded for food and in the western pet market.

3.1 National Utilisation

China: At the markets in Guangdong and Guangxi in 1994 this species was described by Wenjun *et al.* (1996) as common. Five specimens were on offer on a single day in August 1995 at Xing Ping market in China's Guangzhou Province (Meier, *in litt.* 1998a). At the same market Valentin (1999) observed about 50 animals of this species in November 1998 and in April 1999. However, Devaux (1999) reported this species to be rare on sale at the Chinese markets.

In Hong Kong, the price of individual animals of *Cuora flavomarginata* has risen continuously from about US\$ 5-8 in 1985, to between US\$ 10-12 in 1990, and US\$ 35-75 in 1997 depending of the animal's size (FIGURE 2). In autumn 1998 animals were for sale in Hong Kong pet shops for US\$ 40 each (German CITES Scientific Authority, *pers. observ.* 1998).

3.2 Legal International Trade

i) Food markets and Traditional Chinese Medicine

Because of the frequently uncertain origin of the animals, information provided in section 3.1 also may apply to *Cuora flavomarginata*. The overwhelming majority of animals in trade is presumably destined for Asian food markets. Lau reported the presence of *Cuora flavomarginata* at markets in South China including Hong Kong and Macao decreasing in the past few years (*in litt.* 1999).

ii) International pet trade

Europe: Relevant European magazines describe *Cuora flavomarginata* as an interesting pet species (e.g., Anon. 1999). This species regularly features in the European pet trade (Bringsoe 1991; Artnr 1998) and is traded for US\$ 210 - 450 per pair amongst enthusiasts (Schildkröten-Fachmagazin, 1/98; Theiler 1998). China is named as the country of origin for these animals. In the United Kingdom this species is on sale for US\$ 100 (Maas, *in litt.* 1999). A Dutch importer offered individuals for US\$ 25 (Monet 1999). According to Meier (*pers. comm.* 1999a) in Germany between 500-1,000 individuals are kept as pets. A recent survey of 27 wholesalers and specialist pet shops in Germany by Pro Wildlife revealed that 48.2 % of businesses questioned kept stocks of this species for immediate sale, while 11,1% stated they would be able to obtain specimens if required (TABLE 2). Prices ranged from US\$ 37 for juveniles to 160 for adults. Only a few years ago specimens were available for US\$ 15 - 20. According to several traders this species has become difficult to obtain, which is reflected in higher prices. One German trader imported 80 individuals in 1997 and 46 specimens in 1998. The import numbers into Germany seem to decrease, some of the animals are imported from Hong Kong (Hoch, *pers. comm.* 1999).

U.S.A.: Connor & Wheeler (1998) say about imports of *Cuora flavomarginata* for the pet trade into the U.S.: "This animal was formerly imported to the US from Taiwan in large numbers for the bulk pet trade. Although direct exports from Taiwan have diminished considerably, quantities continue to enter the international pet trade via Hong Kong". Captive bred hatchlings are offered for US\$ 150 to 250 (Central Florida Reptile Farm 1999; McCord *in litt.* to Weissgold 4th October 1999). Wild-caught specimens are offered for sale by importers for US\$ 35 to 135, depending on the size of the animals (Weissgold, *in litt.* to the German CITES Scientific Authority 1999). McCord (*in litt.* to Weissgold 4th October 1999) estimates more than 1,000 specimens to be kept in captivity in the U.S.A..

According to McCord (*in litt.* to Weissgold 4th October 1999) a total of 50 to 60 individuals of *Cuora galbinifrons serrata* are kept by US enthusiasts. The price of this subspecies is said to be US\$ 400.

3.3 Illegal Trade

No data available.

3.4 Actual or Potential Trade Impacts

As a native species to China *Cuora flavomarginata* is threatened by the ever increasing demand for food markets and medicinal uses (National Environmental Protection Agency of China 1998). Added to this is the pressure posed by the continued collection of wild specimens to satisfy the Western pet trade (Connor & Wheeler 1998).

3.5 Captive breeding or artificial propagation for commercial purposes (outside Countries of origin)

According to Nietzke (1998) captive breeding of *Cuora flavomarginata* was the first time successful in 1986 by Zwartepoorte. In Switzerland between 1993 and 1998 15 hatchlings have been reported (SIGS 1999). Breedings statistics for Germany report six hatchlings in 1993 (DGHT (*ed.*) 1995), three in 1994 (DGHT (*ed.*) 1996) and four in 1995 (DGHT (*ed.*) 1997). Becker (1999) reported two hatchlings in 1996 and one in 1997 in Germany. In the U.S.A. about 12 captive bred hatchlings are recorded per year (McCord *in litt.* to Weissgold 4th October 1999).

Initial attempts to breed this species in captivity for commercial purposes were done in Anhui and Jingsu (National Environmental Protection Agency of China 1998; Lau *in litt.* to the German CITES Scientific Authority 1999).

4. Conservation and Management

4.1 Legal Status

4.1.1 National

China: As a species native to China like all wild animal populations turtles are protected by law (Wildlife Protection Law of 1988). Therefore capture, transport and trade in wild animals requires official permits (Li & Li 1997a). This law also applies to the transport of wild animals between national provinces (Wenjun *et al.* 1996).

Japan: Being protected as National Natural Monument by the Law for the Protection of Cultural Properties the capture of *Cuora flavomarginata evelynae* is prohibited (Environment Agency, Government of Japan *in litt.* 1999).

4.1.2 International

None.

4.2 Species Management

4.2.1 Population Monitoring

China's National Environmental Protection Agency (1998) recommends surveys of *Cuora flavomarginata* and three other species of this genus in order to obtain information on population size and distribution.

4.2.2 Habitat conservation

China: According to the World Conservation Monitoring Centre (WCMC 1999) until 1993 at least 109 nature reserves, five national parks and 10 scenic areas have been established in provinces and autonomous regions, where *Cuora flavomarginata* occurs. However, none of these measures act specifically for the protection of this species.

Japan: The habitat of *Cuora flavomarginata evelynae* is partially regulated as National Sanctuary and/or National Park (Environment Agency, Government of Japan *in litt.* 1999). However, none of these measures act specifically for the protection of this subspecies.

4.2.3 Management measures

No information on the management of *Cuora flavomarginata* is available.

4.3 Control measures

4.3.1 International Trade

None.

4.3.2 Domestic measures

No information available.

5. Information on Similar Species

For similarities to other species please see section 5 in the proposal for *Cuora amboinensis*.

6. Other Comments

Cambodia, as a range state of at least three *Cuora* species (*C. amboinensis*, *C. galbinifrons* and *C. trifasciata*), will support this proposal (Cambodian Scientific Authority of Fisheries and Aquatic Animals, *in litt.* 1999).

7. Additional remarks

Cuora galbinifrons

1. Taxonomy:

- 1.1 Class:** Reptilia
1.2 Order: Testudines (Chelonia)
1.3 Family: Bataguridae
1.4 Species: *Cuora galbinifrons* Bourret, 1939
Subspecies: *Cuora galbinifrons galbinifrons* Bourret, 1939
Cuora galbinifrons bourreti Obst & Reimann, 1994
*Cuora galbinifrons hainanensis** (Li, 1958)
Cuora galbinifrons picturata Lehr, Fritz & Obst, 1998
*Cuora galbinifrons serrata*** (Iverson & McCord, 1992)
* *Cuora galbinifrons hainanensis* is regarded the junior synonym of *Cuora galbinifrons galbinifrons* (Lehr et al. 1998b)
** *Cuora galbinifrons serrata* is regarded a separate species, *Cuora serrata*, by Fritz & Obst (1997).
1.5 Scientific synonyms: *Cistoclemmys galbinifrons*, (Bour 1980)
1.6 Common names:

English: Indochinese box turtles, Flowerback box turtle, Hundred-flower box turtle, White-fronted box turtle, Three-hill box turtle

Common names for subspecies:

Cuora galbinifrons galbinifrons: Vietnam box turtle

Cuora galbinifrons bourreti: Bourret's box turtle

Cuora galbinifrons hainanensis: Hainan box turtle

Cuora galbinifrons serrata: Hainan serrated box turtle

French: Tortue-boite à front jaune

Common names for subspecies:

Cuora galbinifrons galbinifrons: Tortue-boite du Viet-Nam

Cuora galbinifrons bourreti: Tortue-boite de Bourret

Cuora galbinifrons hainanensis: Tortue-boite d` Hainan

Cuora galbinifrons serrata: Tortue-boite dentelée

Cuora galbinifrons picturata: Tortue-boite en luminée

Spanish:

Chinese:

German: Hinterindische Scharnierschildkröte

Vietnamese: Rùa hip

2. Biological Parameters

The plastron of *Cuora galbinifrons galbinifrons* is uniformly black-brown. It is distinguished from *Cuora galbinifrons bourreti* and *Cuora galbinifrons picturata* by the elongated and flatter shape of its shell, a complete or predominantly black rather than spotted plastron, and the absence of a broad dark brown lateral band on the carapace (Lehr et al. 1998a). *Cuora galbinifrons galbinifrons* is characterised by its flat and elongated shell and a mainly or entirely black plastron (Lehr et al. 1998b). The carapace bears a wide, anteriorly forked dark brown median band and lacks a solid dark lateral band. The soft parts are sometimes intensely reddish coloured. *Cuora galbinifrons bourreti* is distinguished by the nominotypical subspecies by its more domed, rounder shell, a plastral pattern consisting of black spots on a yellow primary colour, the presence of a solid, dark brown lateral band on the carapace, running through the mid of costals, and never reddish soft parts. The shape of the wide, dark brown median band on the carapace, reaching the anterior shell margin in its entire width, and an often indistinct or lacking light, thin dorsomedian stripe are characteristic for this subspecies. *Cuora galbinifrons picturata* is closely related to *Cuora galbinifrons bourreti*. It differs from this subspecies by the lower position of the wide, dark lateral band of the carapace, which includes the upper part of the posterior marginals, unpatterned light proximal marginals, and a well defined light, thin stripe along the longitudinal shell axis. *Cuora galbinifrons picturata* is distinguishable by its peculiar grey soft part pattern on a yellowish ground colour and the proximally confluent, V-shaped dark median band on the carapace (Lehr et al. 1998a, b). *Cuora galbinifrons hainanensis* on the other hand has a hazel brown plastron with pale yellow dots and a lighter, yellowish carapace. The upper part of its head is olive coloured and has brown dots (Rogner 1996). However, according to Lehr et al. (1998b) it looks very similar to *Cuora galbinifrons galbinifrons* and might be regarded as the juvenile form of the nominotypical subspecies.

Cuora galbinifrons serrata can easily be identified by its less domed, three-ridged carapace, the caudal part of which is noticeably serrated. The plastron is yellow and has black spots around the rim. (Lehr *et al.* 1998a). Characteristic for this subspecies is the median suture between the back shields which is merged in other subspecies (Fritz & Obst 1997).

In captivity clutches tend to contain two eggs (Rogner 1996).

2.1 Distribution

Countries of origin: Cambodia, China, Lao PDR, Vietnam

Cuora galbinifrons has a distinctly limited distribution range (Das 1997). It lives in colline and submountain forests, where it dwells protected by undergrowth. Like *Cuora flavomarginata*, this species has an atypically terrestrial lifestyle, which has led some to classify it as belonging to *Cistoclemmys* (Lehr 1996). Five subspecies have been described: *Cuora galbinifrons galbinifrons* (occurs in Northern Vietnam with Tam Dao, Bach-Ma and Linh-Cam as type locality; also distributed in China's Guangxi Autonomous Region); *Cuora galbinifrons serrata* (occurs only inland on Hainan and according to Zhao & Adler (1993) typically in Tainhfen, 100 km east of Dongfang); *Cuora galbinifrons hainanensis* (found only on Hainan; according to Zhao & Adler (1993) typically on Mt. Diaolou at an altitude of 200m); *Cuora galbinifrons picturata* (South Vietnam, with Annam as type locality, and Cambodia, Lehr *et al.* 1998a; Lehr *et al.* 1998b) and *Cuora galbinifrons bourreti* (in the central part of Vietnam, with Linh-Cam in the province Ha Tinh as type locality; also occurring in southern Lao PDR; Obst & Reimann 1994; Lehr *et al.* 1998b). According to Nietzke (1998) and Fiebig & Lehr (*in prep.*) the latter subspecies lives also in northeastern Cambodia.

2.2 Habitat Availability

Cuora galbinifrons inhabits preferably moist forests providing undergrowth and fallen leaves (Rogner 1996). It was recorded on Hainan at an altitude of 450m (Artner 1998) and 200m (Zhao & Adler 1993).

Cambodia: The population of *Cuora galbinifrons picturata* in Cambodia may be affected by the environmental effects of war (Martin & Phipps 1996), as well as large-scale forest clearing activities (Hardtke 1997).

China: Little is known about the state of the species' habitat in China, although it is probably affected by the large-scale deforestation in South West China and its ecological consequences described by Studley (1998). According to the China Environment Report (Greenpeace 1998) China ranks first in the world's sulphur dioxide production with Guangxi, where *Cuora galbinifrons* obviously lives and which is one of the areas being most affected by acid rain. Furthermore, the extensive use of fertilisers and chemicals at least in some areas of China might add further negative impacts (Maas 1995).

It must be assumed that populations in **Lao PDR** and **Vietnam** are also affected by habitat loss which is described in Collins (1990) and Lehr (1996).

2.3 Population Status

This species is classified as "near threatened" by IUCN (1996). Information on population size and reproductive behaviour of *Cuora galbinifrons* is not known for wild populations. A recently captured female from Hainan was reported to lay two eggs (Zhang *et al.* 1998). The reproduction rate for *Cuora galbinifrons bourreti* is estimated to be limited to maximal six eggs per year (Fiebig & Lehr *in prep.*)

Cambodia: No data available.

China: As stated by the National Environmental Protection Agency (1998) the Indochinese box turtle is rare and narrowly distributed. It is therefore classified as "endangered" in the Chinese Red Data Book.

Lao PDR: No data available.

Vietnam: This species is classified as "vulnerable" in the country's Red Data Book (Ministry of Science, Technology and Environment 1992). Local people reported *Cuora galbinifrons bourreti* to be very rare and difficult to find. During a survey in central Vietnam in 1996, accompanied by an experienced collector, no single specimen was found. Only a few specimens of *Cuora galbinifrons picturata* have been observed in Vietnamese markets although they are highly demanded (Lehr *et al.* 1998b). This might indicate low populations in the wild not only in Vietnam but also in Lao PDR.

According to the International Species Information System ISIS (March 1999) 17 males, 26 females and 12 specimens of unknown sex are kept in zoos, while no hatchling has been documented within the last six months.

2.4 Population Trends

In 1993, Lehr (1997) observed in central and northern Vietnam more than 50 specimens of the Indochinese box turtle per market, three years later this number decreased to at least less than the half.

This, together with a doubling in price over the same period indicates that wild populations of this species are declining (Lehr 1996; Lehr *et al.* 1998a). The National Environmental Protection Agency of China (1998) described *Cuora galbinifrons* as "now in endangered status due mainly to unrestricted capture."

According to reports of European importers the abundance of *Cuora galbinifrons* in the Western pet trade significantly decreased within the last few years which has led to price increases. Most importers assume that this is a consequence of declining populations in the wild (Pro Wildlife *in prep.*).

2.5 Geographic Trends

No data available.

2.6 Role of the species in its ecosystem

For general information on the central role of turtles in their ecosystems please see section 2.6. for *Cuora amboinensis*.

Nothing is known about the natural diet of the Indochinese box turtle. Captive specimens can be fed with vegetarian food and meat (Rogner 1996).

2.7 Threats

According to the National Environmental Protection Agency of China (1998) food markets pose the most serious threat faced by this species. Exports related to the pet trade are of lesser importance but are continuing. *Cuora galbinifrons* can be found on food markets in China (McCord 1998) as well as in southern, central and northern Vietnam. In all these locations availability of the species at markets has dropped (Lehr 1997).

Additionally, habitat loss in the countries of origin must be assumed to have negative effects on the populations of *Cuora galbinifrons* (Fiebig & Lehr *in prep.*).

3. Utilisation and Trade

For general information on utilisation of and trade in Asian turtles please refer to the Introduction. *Cuora galbinifrons* is highly demanded for food and in the western pet market.

3.1 National Utilisation

Cambodia: The utilisation of turtle species native to Cambodia as *Cuora galbinifrons* is described in section 3.1. of the proposal for *Cuora amboinensis*.

China: Each year between 200,000–300,000kg of turtle shells are transported from China into Taiwan. This is the equivalent of roughly one million animals, some of which are *Cuora* species (Chang 1996). According to the German CITES Scientific Authority (*pers. observ.* in 1998) specimens of *Cuora galbinifrons* were on sale at food markets as well as in pet shops in Hong Kong for about US\$ 17. *Cuora galbinifrons* is mostly traded to supply domestic food markets in China. It was recorded on food markets in China's Guangxi Autonomous Region (McCord, *in litt.* 1998; Meier, *in litt.* 1998a) and Hainan Province (Lau *in litt.* to the German CITES Scientific Authority 1999). The subspecies *Cuora galbinifrons galbinifrons* was for sale in Xing Ping Market in Guangzhou, Guangdong Province in August 1995 (Meier, *in litt.* 1998a). Valentin (1999) reported about 30 specimens of *Cuora galbinifrons* on sale at the Xing Ping market in November 1998 as well as in April 1999.

Lao PDR: The local demand for turtles as food is very small (Salter 1993).

Vietnam: *Cuora galbinifrons* was described to be one of the most abundant species in trade, especially in the northern part of the country (Jenkins 1995; Serov 1997). In 1993 and 1994 *Cuora galbinifrons galbinifrons* was offered in the Don Xuan-Market in Hanoi and in Tam Dao for US\$ 6-9. During a survey in 1993 at Don Xuan market Lehr (1996) observed between 50-100 specimens which means this species besides *Indotestudo elongata* to be the most abundant species.

Cuora galbinifrons bourreti was observed in Hué, Lao Bao and Khe Sanh during surveys in 1993, 1995 and 1996. In Hué the number of specimens observed at three different dealers were between 25-100 each (Lehr *et al.* 1998b). The number of species on offer was significantly lower in 1996 than in 1993 while the price was doubled (Fiebig & Lehr *in prep.*). *Cuora galbinifrons picturata* was regularly found in the Cau Mong food market in Ho-Chi-Minh City during surveys in 1993 to 1996 (Lehr *et al.* 1998b). This species is traded mainly through trade centres in Hanoi and Ho-Chi-Minh-City (formerly Saigon) despite the fact that it is listed in the country's "Red Data Book Vietnam" (Peter 1996).

3.2 Legal International Trade

i) Food markets and Traditional Chinese Medicine

No data available.

ii) International pet trade

A smaller proportion of animals is supposed to be exported to supply the pet trade in the western World.

Europe: *Cuora galbinifrons* features in the European pet trade (Bringsoe 1991). Even though the high mortality of wild caught turtles kept as pets in general (T. Williams 1999) and especially Indochinese box turtles (Lehr et al. 1998a; Nietzke 1998) is reported, relevant European magazines continue to describe *Cuora galbinifrons* as an interesting pet species (e.g., Anon. 1999).

Great Britain imported 84 individuals between 1986 and 1990 (Smart & Bride 1993). In 1999 specimens are on sale for US\$ 50 to 100 in the United Kingdom (Maas, *in litt.* 1999). Pairs of *Cuora galbinifrons bourreti* and *Cuora galbinifrons galbinifrons* are traded amongst European turtle enthusiasts for US\$ 245 (Advertisements in "Schildkröten-Fachmagazin", 2/98 & 4/98; Theiler 1998).

Most of the specimens in German pet shops are exported from Hong Kong. A recent survey of 27 wholesalers and specialist pet shops in Germany revealed that 44.5% of businesses questioned had stocks of this species for immediate sale, while 7.5% stated they would be able to obtain specimens if required (TABLE 2). The animals are sold for between US\$ 42 for juveniles and US\$ 125 for adults (Pro Wildlife *in prep.*).

As estimated by Meier (*pers. comm.* 1999a) thousands of Indochinese box turtles were imported into the European Union during the past decade, often as substitutes for North American box turtles, which had become subject to import restrictions. According to various traders, specimens can no longer be easily acquired, which has led to price increases. Nevertheless, one single German whole sale trader imported 250 specimens in 1997 and 160 in 1998 (P. Hoch, *pers. comm.* 1999).

U.S.A.: The species is also available in the U.S. pet trade. Lehr *et al.* (1998a) state that the species is "abundantly" available in the U.S.A.. According to Hoover (1998) between 1993 and 1995 a total number of 1,179 specimens have been imported to the U.S.A. with 39 specimens in 1993, 481 in 1994 and 659 in 1995. However, McCord (*in litt.* to Weissgold 4th October 1999) estimates only about 300 individuals in captivity, while two-thirds of the imported animals of the last years have died due to poor husbandry.

Wholesale prices in the U.S. range from US\$6.50 to 100 for wild-caught specimens with adult Vietnamese and Hainan specimens exported from Hong Kong bringing the highest prices. One dealer was offering pairs of *Cuora galbinifrons hainanensis* for US\$ 275 in October 1999 (Weissgold, *in litt.* to the German CITES Scientific Authority 1999).

3.3 Illegal Trade

A discrimination between legal and illegal trade is sometimes difficult regarding to the complex routes of the transport: Countries as Vietnam and Cambodia are as well countries of origin but also have transit function for the trade in turtles.

Cambodia: *Cuora galbinifrons* is also exported from Cambodia to South Vietnam and Lao PDR, although the hunting and exporting of wildlife is forbidden by Cambodian law (Martin & Phipps 1996). Nevertheless, most turtles exported from Cambodia are destined for Vietnam, at least in the first instance. The volume of the trade was reported to exceed several tons per month. Turtles have by far the largest turnover by weight among wildlife on sale in Neak Lung: In west Neak Lung approximately 9.5 tons were sold in 1993, while in east Neak Lung about 10 kg were sold a day in 1994. This trade includes unknown amounts of *Cuora galbinifrons* (Lehr *et al.* 1998a).

China: This species is not protected in China (Lau *in litt.* to the German CITES Scientific Authority 1999).

Lao PDR: Although being excluded from trade by law according to Lehr *et al.* (1998a) and Jenkins (1995) specimens of *Cuora galbinifrons bourreti* and *Cuora galbinifrons picturata* are exported from Lao PDR to Vietnam via Lao Bao, and on to Hanoi through Dong Ha, from where they are exported to China and Hong Kong via Lang Son and Mong Cai. However, there are no data concerning the volume of international trade in this species..

Vietnam: Despite national protection this species is amongst the most commonly sold turtle species in Vietnam (Serov 1997), and thus also belongs to those most frequently exported. The price per kilogram in Vietnam doubled between 1993 and 1996 from US\$ 10 to US\$ 20. Yet, during the same period the number of animals on markets observed in Central and northern Vietnam dropped from more than 50 specimens per market to less than half the numbers (Lehr 1997, 1998).

Specimens from Vietnam are also on sale at western pet trade and were offered by a Dutch trader on the Internet for US\$ 80 US in October 1998 (Reptilia Co. 1998).

3.4 Actual or Potential Trade Impacts

Populations of *Cuora galbinifrons* have decreased markedly as a result of commercial trade (National Environmental Protection Agency of China 1998). This is reflected by the species' reduced availability in food markets in Vietnam (Lehr 1997), even though detailed information on exact trade volumes do not exist. European importers, too assume a population decline and report mounting difficulties in obtaining specimens (Pro Wildlife *in prep.*). Nevertheless, this species is commonly sold in the European and US pet market, intensifying the pressure to the populations in the wild.

3.5 Captive breeding or artificial propagation for commercial purposes (outside Countries of origin)

Cuora galbinifrons is bred in small numbers by private breeders (Meier, *pers. comm.* 1999a; Internet publications by hobby-breeders). According to Nietzke (1998) captive breeding was the first time successful in 1993 by de Bruin. McCord (*in litt.* to Weissgold 4th October 1999) reports an incidental captive breeding of only three to five hatchlings per year, with an additional single hatchling of *Cuora galbinifrons serrata*, which is considered by him as a full species. The first captive breeding of the subspecies *Cuora galbinifrons bourreti* was successful in 1998 (Fiebig & Lehr *in prep.*).

Breeding efforts on a commercial scale are not reported for this species.

4. Conservation and Management

4.1 Legal Status

4.1.1 National

In **Cambodia** hunting as well as exporting native wildlife is illegal (Martin & Phipps 1996).

China: This species is not protected in China. The country's Red Data Book recommends *Cuora galbinifrons* to be classified as state major protected wildlife grade II in order to prohibit any capture and trade (National Environmental Protection Agency of China 1998).

Lao PDR: This species is strictly protected in Lao PDR, where its capture is prohibited throughout the year (Jenkins 1995).

Vietnam: Due to its listing as "vulnerable" in Vietnam's Red Data Book, this species is excluded from legal trade (Red Data Book Vietnam, Ministry of Science, Technology and Environment 1992).

4.1.2 International

None.

4.2 Species Management

4.2.1 Population Monitoring

China's National Environmental Protection Agency (1998) recommends surveys of *Cuora galbinifrons* and three other *Cuora* species in order to obtain information on population size and distribution.

In 1991, the action plan of IUCN/SSC/Tortoise and Freshwater Turtle Specialist Group considered *Cuora galbinifrons* ("*Cistoclemmys galbinifrons*") as a "species of restricted distribution in need of status investigation". As a consequence surveys and studies have been recommended to confirm taxonomic identity and continued existence of viable populations. This includes surveys in Central and northern Vietnam (IUCN/SSC/TFTSG 1991).

4.2.2 Habitat conservation

No data on habitat conservation measures in **Cambodia** is available.

China: According to the World Conservation Monitoring Centre (WCMC 1999) until 1993 29 nature reserves have been established in Hainan Province, where *Cuora galbinifrons serrata* and *Cuora galbinifrons haninansis* occur. In the autonomous region Guangxi, where populations of *Cuora galbinifrons galbinifrons* have been found, 51 nature reserves and two scenic areas have been established. However, none of these measures act specifically for this species.

Lao PDR: No data available.

Since 1962 **Vietnam** has created 87 reserves (Collins 1990). However, none of these measures act specifically for the protection of turtles.

4.2.3 Management measures

No information on the management of *Cuora galbinifrons* is available.

4.3 Control measures

4.3.1 International Trade

None. However, regarding the huge volume of the transborder wildlife trade, mainly between Vietnam and China, Li & Li (1997b) recommend to initiate a new wildlife trade permit system that should contain the name of a species on the permit which will be traded, and every species should have its own trade permit.

4.3.2 Domestic measures

No information available.

5. Information on Similar Species

For general information on similarities to other species please see section 5 in the proposal for *Cuora amboinensis*. The subspecies *Cuora galbinifrons serrata* is repeatedly discussed to be a distinct species, *Cuora serrata*, or a hybrid between *Cuora galbinifrons* and *Pyxidea mouhotii* (Fritz & Obst 1997) because it resembles the latter species in several characteristics. This ongoing discussion shows the similarity, especially regarding the branched carapace of both species. Nevertheless, according to Fritz & Obst (1997) the theory regarding a hybrid status has to be disregarded.

6. Other Comments

Cambodia, as a range state of at least three *Cuora* species (*C. amboinensis*, *C. galbinifrons* and *C. trifasciata*), will support this proposal (Cambodian Scientific Authority of Fisheries and Aquatic Animals, *in litt.* 1999).

7. Additional remarks

Cuora mccordi

1. Taxonomy:

- 1.1 Class: Reptilia
1.2 Order: Testudines (Chelonia)
1.3 Family: Bataguridae
1.4 Species: *Cuora mccordi* Ernst 1988
1.5 Scientific synonyms:

1.6 Common names:

- English: McCord's box turtle
French: Tortue-boite de McCord
Spanish:
Chinese:
Vietnamese: Rùa hộp lung den
German: McCord's Scharnierschildkröte

2. Biological Parameters

According to Artner (1998) and Rogner (1996) the carapace of *Cuora mccordi* is reddish-brown, has a dark edge and can grow to a length of 16,5cm. However, according to Ernst (cited in Fritz & Obst 1998) the maximal known size is 13,4 cm. Each marginal plate carries dark, wedge-shaped markings. The well-developed plastron is yellow, has a discernible mark in the middle and two black spots on its yellow coloured bridge. Its posterior is notched and so broad that it covers the hind legs when they are withdrawn. Because of the flexibility of the plastron *Cuora mccordi* is able to completely close its shell. The yellow upper part of the head carries a bright yellow black-edged stripe, which extends from the nose to the neck (Rogner 1996).

2.1 Distribution

Countries of origin: China

Cuora mccordi possibly occupies a small area in Bose in China's Guangxi Province (National Environmental Protection Agency of China 1998; Rogner 1996). McCord and Iverson (1991) stated that the holotype was collected nearby in Yunnan Province.

Because it is known only from markets, such as that in Bose, Guangxi Zhuan (Zhou & Zhou 1991; Iverson *et al.* 1998) no other information regarding the species' distribution is available.

2.2 Habitat Availability

Cuora mccordi is so far known only through its availability at **Chinese** markets. It has been associated with an area near Bose in Guangxi Autonomous Region, where it was discovered (Iverson *et al.* 1998; Ernst 1988). No information about its natural habitat or its status is available. Based on observations in captivity this species seems to be aquatic (Rogner 1996; Fritz & Obst 1998). In captivity the animals are nocturnal and hide by digging themselves into the ground during the day (Artner 1998).

It has to be assumed that the habitat of this species is affected by the large-scale deforestation within South West China (Studley 1998). Additionally, it is noteworthy that many waters suffer from severe chemical and particle pollution (Herrmann 1997; Maas 1995). According to the China Environment Report (Greenpeace 1998) China ranks first in the world's sulphur dioxide production with Guangxi and Guangdong, where *Cuora mccordi* obviously lives, belong to the areas being most affected by acid rain.

2.3 Population Status

The species is classified as "data deficient" by IUCN (1996) and in China's Red Data Book (National Environmental Protection Agency of China 1998).

Cuora mccordi was discovered only some years ago (Ernst 1988). Nothing is known about the animals' populations status in the wild. A total of 12 individuals has so far been sighted on sale in Bose in Guangxi Zhuang Autonomous Region (National Environmental Protection Agency of China 1998). According to Barzyk (1999) there are perhaps no more than 350 specimens known to exist all of which came out of the food markets and now are in private or zoo collections, many of which are in Japan. According to the International Species Information System five males, six females and three specimens of unknown sex are kept in zoos, while one hatchling has been reported within the last six months (ISIS, March 1999). Meier (1999c) reports 110 to 120 individuals to be kept in captivity, with about 70 in the U.S.A. and 40 to 45 in Europe (TABLE 4).

2.4 Population Trends

Over the course of the past three years *Cuora mccordi* has become increasingly scarce in Chinese food markets, and in some areas it is commercially extinct (Behler 1997; Meier, *pers. comm.* 1998b). This lack of availability indicates declining populations in the wild. Even at the food market in Bose, where the species was originally discovered, specimens have not been sighted in 1996 and 1997; since then only "a very few" specimens (Shiu, quoted in Barzyk 1999) were found. High prices in the western pet markets indicate the difficulties to obtain specimens of *Cuora mccordi* (Theiler 1998, *Pro Wildlife in prep.*). However, according to McCord (1999) a maximum of 10 specimens is found annually.

2.5 Geographic Trends

No data available.

2.6 Role of the species in its ecosystem

For general information on the central role of turtles in their ecosystems please see section 2.6. for *Cuora amboinensis*.

No information about the diet of this species in the wild is available. Animals in captivity prefer a carnivorous over a vegetarian diet (Rogner 1996).

2.7 Threats

Cuora mccordi is known only from food markets, the demand for which critically threatens its survival (National Environmental Protection Agency of China 1998). McCord (cited by Behler 1997) reported this species to be already commercially extinct.

Furthermore, there is a continuous demand of turtle enthusiasts in Europe for this species although *Cuora mccordi* is extremely rare and expensive on sale (*Pro Wildlife in prep.*).

Additionally, habitat loss and habitat degradation may impose further environmental pressure on this species (Jenkins 1995). This species might be affected by the deforestation within South West China (Studley 1998) as well as chemical pollution (Maas 1995; Herrmann 1997).

3. Utilisation and Trade

For general information on utilisation of and trade in Asian turtles please refer to the Introduction.

Cuora mccordi is highly demanded mainly on Asian food markets but also attractive for Western pet market.

3.1 National Utilisation

No detailed information on trade in *Cuora mccordi* is known. However, according to video footage obtained by McCord (1997) the species was available for sale in Chinese food markets in 1997 (McCord, *in litt.* 1998).

3.2 Legal International Trade

i) Food markets and Traditional Chinese Medicine

Most of the available specimens of *Cuora mccordi* are probably sold at the regional food markets in China.

ii) International pet trade

The export of *Cuora mccordi* for the Western pet trade occurs mainly via Hong Kong (Lau *et al.* 1995). Occasionally, in pet shops in Hong Kong specimens of McCord's box turtle are present in small numbers (Lau, *in litt.* 1999). However, according to McCord (1999) a maximum of 10 specimens is found annually.

Europe: European collectors will pay as much US\$ 1,700 per animal ("*Schildkröten-Fachmagazin*", 4/98). In Switzerland male specimens were traded for US\$ 1,980 and females for US\$ 2,100 in 1998 (Theiler 1998). According to Fritz & Obst (1998) in 1992 at least two specimens have been imported to Germany by wholesale-trader Peter Hoch, four further specimens in 1992/1993 came into Germany via a private turtle enthusiast.

Only about 40 animals are currently kept across the whole of Europe (Meier, *pers. comm.* 1998b). Nevertheless, 11% of specialist reptile shops and wholesalers in Germany, questioned in a recent survey, stated that they would be able to supply the species for between US\$ 790 and 1,600 at request (see TABLE 2).

U.S.A.: Specialist U.S. reptile dealers report being able to obtain small numbers of the animals, and will do so for special orders, or under other limited circumstances. One dealer who regularly imports from China / Hong Kong reports selling specimens for US\$ 2,500 / pair (Weissgold *in litt.* to the German CITES Scientific Authorities 1999). The population in captivity in the US is estimated to be 50 to 60 individuals (McCord *in litt.* to Weissgold 4th October 1999).

3.3 Illegal Trade

No data available.

3.4 Actual or Potential Trade Impacts

The price for *Cuora mccordi*, which has become increasingly scarce in food markets and therefore presumably also in the wild, has increased considerably during recent years. This in turn has led to intensified efforts to collect specimens from the wild. Trade specifically to supply Chinese food markets poses a severe threat to this species (National Environmental Protection Agency of China 1998). *Cuora mccordi* is reported to be already commercial extinct (McCord, cited in Behler 1997).

Despite the fact that the presence of McCord's box turtles in Western pet shops as a consequence of being almost extinct in the wild is minimal, any international trade in this *Cuora* species is a potential threat to the declining populations.

3.5 Captive breeding or artificial propagation for commercial purposes (outside Countries of origin)

Cuora mccordi is bred in small numbers by private breeders (Meier, *pers. comm.* 1999a; Internet publications by hobby-breeders). Artner (1998) reported captive breeding of this species to be very difficult, being only successful one time in Germany and two times in the USA. However, McCord (*in litt.* to Weissgold 4th October 1999) reports seven to 10 captive bred hatchlings per year in the U.S.A.. Breeding efforts on a commercial scale are currently not reported for this species.

4 Conservation and Management

4.1 Legal Status

4.1.1 National

China: As a species native to China like all wild animal populations turtles are protected by law (Wildlife Protection Law of 1988). Therefore capture, transport and trade in wild animals requires official permits (Li & Li 1997a). This law also applies to the transport of wild animals between national provinces (Wenjun *et al.* 1996).

The country's National Environmental Protection Agency (1998) recommends that the species be listed as "major protected wildlife" in order to prohibit any capture and trade.

4.1.2 International

None.

4.2 Species Management

4.2.1 Population Monitoring

China's National Environmental Protection Agency (1998) recommends surveys of *Cuora mccordi* and several other *Cuora* species in order to obtain information on population size and distribution as well as to conduct studies on conservation biology.

In 1991, the action plan of IUCN/SSC/Tortoise and Freshwater Turtle Specialist Group considered *Cuora mccordi* as a "species of restricted distribution in need of status investigation". As a consequence surveys and studies have been recommended to confirm taxonomic identity and continued existence of viable populations (IUCN/SSC/TFTSG 1991).

4.2.2 Habitat conservation

According to the World Conservation Monitoring Centre (WCMC 1999) until 1993 51 nature reserves and two scenic areas have been established in Guangxi Autonomous Region, where *Cuora mccordi* might occur. However, none of these measures act specifically for the protection of this species.

4.2.3 Management measures

No information on the management of *Cuora mccordi* was available.

4.3. Control measures

4.3.1 International Trade

None.

4.3.2 Domestic measures

None.

5. Information on Similar Species

For general information on similarities to other species please see section 5 in the proposal for *Cuora amboinensis*.

6. Other Comments

Cambodia, as a range state of at least three *Cuora* species (*C. amboinensis*, *C. galbinifrons* and *C. trifasciata*), will support this proposal (Cambodian Scientific Authority of Fisheries and Aquatic Animals, *in litt.* 1999).

7. Additional remarks

Cuora pani

1. Taxonomy:

1.1 Class:	Reptilia	
1.2 Order:	Testudines (Chelonia)	
1.3 Family:	Bataguridae	
1.4 Species:	<i>Cuora pani</i>	Song, 1984
1.5 Scientific synonyms:	<i>Cuora chriskarannarum</i>	(Ernst & McCord, 1987)
1.6 Common names:		
English:	Pan's box turtle, Green box turtle	
French:	Tortue-boite de Pan	
Spanish:		
Chinese:		
German:	Pan's Scharnierschildkröte	

2. Biological Parameters

According to Fritz & Obst (1998) *Cuora pani* looks similar to *Cuora aurocapitata* with its flattened elongated shell. The upper side of the head is usually greenish olive to yellow while specimens with a greenish olive head have always a yellow throat. The sides of the head have a striped pattern which is similar to *Cuora trifasciata*. The carapace is brownish, the sutures are very often bearing more or less developed black markings. Similar as in *Cuora aurocapitata*, the vertebrals may be lighter reddish brown, the costals may likewise have paler centres. The plastron of this species has entire black figure following the sutures. The largest specimen described had a carapace size of 16,1 cm (Fritz & Obst 1998). With a carapace length of 11,3 cm males are smaller than females (16 cm) and have a thicker tail (Rogner 1996; Artner 1998). According to the National Environmental Protection Agency of China (1998) this species' carapace is depressed and shows an indistinct vertebral keel. The nuchal is small. The plastron is rounded anteriorly, notched posteriorly and united to the carapace by ligamentous tissue. Because of the flexibility of the plastron *Cuora pani* is able to completely close its shell.

There is no detailed information on natural reproduction behaviour and nesting size. In captivity a clutch size of two to four eggs is reported by Artner (1998). The hatchling size is about 34 mm.

2.1 Distribution

Country of origin: China

Cuora pani is endemic to China, the local range described in Pingly county in Shaanxi Province which is the type locality and Yunnan (Iverson 1992; Zhao & Adler 1993). According to the National Environmental Protection Agency of China (1998) Bill McCord bought two males and 13 females said to be collected from Ta Lau Shan and Chin Ping (= Jinping County) in Yunnan Province for breeding purposes. According to the National Environmental Protection Agency of China (1998) *Cuora pani* has a discontinuous range with small populations.

2.2 Habitat Availability

According to the National Environmental Protection Agency of China (1998) Pan's box turtles inhabit irrigation canals besides ricefields at an elevation of 420 meters in Xujiaba village. Based on observations in captivity this species is described to be highly aquatic (Rogner 1996). *Cuora pani* is reported to live in rice fields, streams and ponds (Zhou & Zhou 1991). As a species occurring in Yunnan it is reasonable to assume that this species has been affected by the deforestation in South West China, which is worst in Yunnan (Studley 1998). Additionally, it is noteworthy that many waters suffer from severe chemical and particle pollution (Herrmann 1997). Furthermore, the habitat of this species might be impacted by the fragmentation of China's large rivers caused by dams (Fu 1997). Rice-paddies, streams and ponds which are the reported habitat of this species are affected by the extensive use of fertilisers and chemicals at least in some areas of China (Maas 1995).

2.3 Population Status

IUCN (1996) classifies *Cuora pani* as "data deficient", while as in the Red Data Book of China this species is listed as "critically endangered" (National Environmental Protection Agency 1998).

According to the National Environmental Protection Agency of China (1998) only 22 specimens of the Pan's box turtle have been known since 1984 when the species was described. However, according to Western keepers the number in captivity is much higher (see TABLE 4): According to the International

Species Information System ISIS (March 1999) 4 males and 6 females are kept in zoos, while no hatchling has been reported within the last six months. Meier (1999c) reports 150 to 160 individuals to be kept in captivity, with 100 to 120 in the U.S.A. and 45 to 50 in Europe (TABLE 4).

2.4 Population Trends

No data available.

2.5 Geographic Trends

No data available.

2.6 Role of the species in its ecosystem

For general information on the central role of turtles in their ecosystems please see section 2.6. for *Cuora amboinensis*.

In captivity the Pan's box turtle consumes carnivorous and vegetarian food (Rogner 1996). Details on the natural diet are not known (National Environmental Protection Agency of China 1998).

2.7 Threats

National as well as international demand in *Cuora pani* is high. As a consequence of this demand Bill McCord (cited in Behler 1997) reported this species to be already commercially extinct.

Exports related to the pet trade are of lesser importance. This species is very rare and expensive on sale. Nevertheless, any international trade in *Cuora pani* is a potential threat to this species.

Additionally to the pressure caused by national and international trade the populations are threatened by habitat destruction (Jenkins 1995). Large-scale deforestation in Southwest China, reported to be worst in China (Studley 1998), as well as environmental pollution (Maas 1995; Herrmann 1997) may affect the populations of the Pan's box turtle.

3. Utilisation and Trade

For general information on utilisation of and trade in Asian turtles please refer to the Introduction.

3.1 National Utilisation

Cuora pani is highly demanded at the food markets. Although being very rare it was observed at the Xing Ping market in Guangzhou (Meier, *in litt.* 1998a) and Shenzhen (McCord, *in litt.* 1998). However, one U.S. reptile dealer who has visited several Chinese food markets to examine species' availability reports never having seen a *Cuora pani* specimen for sale (Weissgold *in litt.* to the German CITES Scientific Authorities 1999). Data on use of this species in the TCM have not been available.

3.2 Legal International Trade

i) Food markets and Traditional Chinese Medicine

Facing the very small numbers of *Cuora pani* and the huge domestic demand in China it is unlikely that this species is exported to food markets in other Asian countries.

ii) International pet trade

In comparison to the consumption by the food markets a smaller proportion of animals is exported to supply the pet trade in the Western world. The export of *Cuora pani* for the Western pet trade occurs mainly via Hong Kong (Lau *et al.* 1995). Occasionally, in pet shops in Hong Kong specimens of Pan's box turtle are present in small numbers (Lau *in litt.* 1999).

Europe: The import of Pan's box turtles into the EU was banned some years ago. According to the World Conservation Monitoring Centre (*in litt.* 1998) no imports of *Cuora pani* have been recorded in 1987 and between 1993-1997. In Switzerland wild caught specimens of *Cuora pani* are offered for US\$ 1,000 per male and 1,200 per female (Theiler 1998; Auliya *in prep.*).

U.S.A.: The species is in high demand amongst specialised hobbyists. One U.S. importer reports selling the species for US\$ 1,000 to 1,2000 / pair (Weissgold *in litt.* to the German CITES Scientific Authorities 1999). The population in captivity in the US is estimated to be 50 to 60 specimens (McCord *in litt.* to Weissgold 4th October 1999).

3.3 Illegal Trade

No data available.

3.4 Actual or Potential Trade Impacts

As an endemic species to China *Cuora pani* is directly affected by the ever growing demand of the country's food markets. As a consequence of its small distribution range and its low reproduction rate *Cuora pani* is unlikely to withstand this pressure for long.

Additionally, this species is occasionally offered in the international pet market with high prices, e.g. in Switzerland at least three specimens have been on sale in October 1998 (Theiler 1998). Bill McCord (cited in Behler 1997) reports this species to be already commercially extinct. In contrary, there are still some specimens reported to be in the trade: According to Lau *et al.* (1995) Pan's box turtles are still exported from China via Hong Kong to western pet shops.

3.5 Captive breeding or artificial propagation for commercial purposes (outside country of origin)

Cuora pani is kept and bred in small numbers by private breeders (Meier, *pers. comm* 1999a; Barzyk 1999). The first successful captive breeding is reported by Artner to be in 1997, followed by five hatchlings in 1999 (Artner 1998, 1999).

McCord (*in litt.* to Weissgold 4th October 1999) reports three to five captive bred hatchlings in the U.S.A. per year. However, breeding efforts on a commercial scale are currently not reported for this species.

4. Conservation and Management

4.1 Legal Status

4.1.1 National

As a species native to China turtles are, like all wild animal populations, protected by law (Wildlife Protection Law of 1988). Therefore capture, transport and trade in wild animals, including *Cuora pani*, requires official permits (Li & Li 1997a). This law also applies to the transport of wild animals between national provinces (Wenjun *et al.* 1996).

According to Song (cited in National Environmental Protection Agency of China 1998) this species should be classified as major protected wildlife by Shaanxi and Yunnan Provinces. Then the catching and selling of Pan's box turtles would be strictly forbidden.

4.1.2 International

Cuora pani is listed in Annex B of the European Council Regulation (EC) 338/97 of 9th December 1996 on the protection of species of wild fauna and flora regulating trade therein.

4.2. Species Management

4.2.1 Population Monitoring

Song Mingtao who discovered this species recommends to carry out surveys to determine the distribution and abundance of Pan's box turtle and to study the conservation biology (National Environmental Protection Agency of China 1998).

In 1991, the action plan of IUCN/SSC/Tortoise and Freshwater Turtle Specialist Group considered *Cuora pani* (and the synonym "*Cuora chriskarannarum*") as a "species of restricted distribution in need of status investigation". As a consequence surveys and studies have been recommended to confirm taxonomic identity and continued existence of viable populations (IUCN/SSC/TFTSG 1991).

4.2.2 Habitat conservation

According to the World Conservation Monitoring Centre (WCMC 1999) until 1993 at least eight nature reserves have been established in Shaanxi Province, where *Cuora pani* occurs. In Yunnan Province at least 37 nature reserves and three scenic areas are documented.

However, none of these measures act specifically for the protection of turtles.

4.2.3 Management measures

No information on the management of *Cuora pani* was available.

4.3. Control measures

4.3.1. International Trade

According to the World Conservation Monitoring Centre (WCMC, *in litt.* 1998) no imports of *Cuora pani* have been recorded in 1987 and between 1993-1997.

4.3.2 Domestic measures

None.

5. Information on Similar Species

For general information on similarities to other species please see section 5 in the proposal for *Cuora amboinensis*.

6. Other Comments

Cambodia, as a range state of at least three *Cuora* species (*C. amboinensis*, *C. galbinifrons* and *C. trifasciata*), will support this proposal (Cambodian Scientific Authority of Fisheries and Aquatic Animals, *in litt.* 1999).

7. Additional remarks

Cuora trifasciata

1. Taxonomy:

1.1 Class:	Reptilia
1.2 Order:	Testudines (Chelonia)
1.3 Family:	Bataguridae
1.4 Species:	<i>Cuora trifasciata</i> (Bell, 1825)
1.5 Scientific synonyms:	<i>Sternothaerus trifasciatus</i> (Bell, 1825) <i>Cyclemys trifasciata</i> (Pope 1935)

1.6 Common names:

English:	Three-striped box turtle, Three-lined box turtle, Three-banded box turtle
French:	Tortue-boite à trois bandes
Spanish:	
Chinese:	
Vietnamese:	Rùa hop bar
German:	Dreistreifen-Scharnierschildkröte

2. Biological Parameters

According to Rogner (1996) *Cuora trifasciata* has a hazel coloured carapace measuring up to 20cm in length. With the exception of the median ridge, the three black-brown longitudinal ridges characteristic of juveniles become less pronounced as the animals grow older. The yellowish to white ventral shield is not patterned and is linked by two cross-joints. The webs between the toes are only poorly developed. The species is characterised by a bright yellow area, which extends from the entire width of the head to the beginning of the neck. A broad marbled black-brown band stretches from the nose across the animals' eyes to the end of the head. Because of the flexibility of the plastron *Cuora trifasciata* is able to completely close its shell.

The Three-striped box turtle lays one clutch of two eggs each year (Jenkins 1995). Clutches of up to four or six eggs have been produced in captivity (Meier, *in litt.* 1998a). According to Reckel (1999) life expectancy of this species in captivity is reported to be up to 26 years.

2.1 Distribution

Countries of origin: Cambodia (?), China, including Hong Kong, Taiwan, Lao PDR (?), Myanmar (?), Vietnam

According to Iverson (1992) *Cuora trifasciata* is distributed in southern China (Guangxi, Guangdong, Fujian Provinces, and Hainan) and North Vietnam (Tam Dao and Lang Son), while populations in northern Myanmar (Rogner 1996) are not confirmed. Zhao & Adler (1993) also add Taiwan. Populations have also been reported for Hong Kong (Ernst & Barbour 1989; Bogadek & Lau 1997).

Vietnamese traders have reported imports from Cambodia and Lao PDR although these populations have as yet not been confirmed reliably (Jenkins 1995).

2.2 Habitat Availability

Cuora trifasciata prefers clear streams at an altitude of 50-400m (Jenkins 1995) but can also be found in stagnant or slow flowing stretches of water and rice-paddies (Rogner 1996).

China: In southern Guangdong this species as being aquatic inhabits mountain streams at elevations between 50 and 400 meters (National Environmental Protection Agency of China 1998). Rice-paddies, ponds and swamps, which are also habitat of *Cuora trifasciata* are affected by the extensive use of fertilisers and chemicals at least in some areas of China (Maas 1995). According to the China Environment Report (Greenpeace 1998) China ranks first in the world's sulphur dioxide production with Guangxi and Guangdong, where *Cuora trifasciata* obviously lives, as areas being most affected by acid rain. Additionally, the forests in South West China have been logged dramatically within the last fifty years. (Studley 1998). It is likely to have effects on the habitat of *Cuora trifasciata*.

It must be assumed that populations of the Three-striped box turtle in **Cambodia, Lao PDR and Vietnam** are also affected by habitat loss which is described in Collins (1990), Martin & Phipps (1996) and Hardtke (1997).

2.3 Population Status

This species is classified as "endangered" by IUCN (1996) realising declining populations projected or suspected in the future based on actual or potential levels of exploitation.

China: This species is classified as "critically endangered" by the Chinese Red Data Book (National Environmental Protection Agency of China 1998).

During a survey of the Kadoorie Farm & Botanic Garden, Hong Kong, in southern China (Guangdong, Guangxi and Hainan) no single specimen was found although the hill streams seemed suitable for *Cuora trifasciata*. The situation in Hong Kong seems to be better: Several records are reported within the last 10 years which makes this population probably the healthiest in the world (Lau, *in litt.* 1999).

In **Vietnam** the species is listed as "vulnerable" (Red Data Book of Vietnam, Ministry of Science, Technology and Environment 1992).

Data on the natural population size are not available.

According to the International Species Information System ISIS (March 1999) 15 males, 9 females and 25 specimens of unknown sex are kept in zoos, while 6 hatchlings have been reported within the last six months.

2.4 Population Trends

Within the last decade *Cuora trifasciata* became the most desired and thus most expensive *Cuora* species (FIGURE 2; Behler 1997). It is therefore particularly attractive to traders. As a result of its popularity and the species' low reproductive rate *Cuora trifasciata* is particularly sensitive to overexploitation through trade. Already in 1995 Jenkins recommended to consider the possibility of including this species in the CITES appendices.

China: During a survey in Guangdong, Guangxi and Hainan Provinces, where *Cuora trifasciata* originally was distributed, no single specimen was observed. Local people declared this species became rare due to over-collecting (Lau, *in litt.* 1999).

Vietnam: A survey by Lehr revealed that in 1993 *Cuora trifasciata* could only occasionally be sighted in the areas included in the study, but was missed in 1996 (Lehr 1996, 1997).

The observations in Vietnam and China described above indicate that this species is approaching extinction in the wild. This is confirmed by observations of Western wholesalers. According to reports of European importers the abundance of *Cuora trifasciata* in the Western pet trade dramatically decreased within the last few years while the prices increased sharply. Most importers assume that this is a consequence of declining populations in the wild (Pro Wildlife *in prep.*, see TABLE 2).

2.5 Geographic Trends

According to Lau (*in litt.* 1999) no single specimen of *Cuora trifasciata* was found in three provinces (Guangdong, Guangxi and Hainan) during rapid surveys in over 40 forest areas, where this species was originally distributed.

2.6 Role of the species in its ecosystem

For general information on the central role of turtles in their ecosystems please see section 2.6. for *Cuora amboinensis*.

Cuora trifasciata feeds mainly on animal matter including insect larvae, earthworms, crustaceans, fish and even carrion (Rogner 1996). Because of its consumption of certain worms, from which some might act as intermediate hosts for various human diseases, this species may help to stem the diseases (R. Wirth, *pers. comm.* 1998).

2.7 Threats

Due to its high popularity as a food item and as an ingredient for Traditional Chinese Medicine (TCM) *Cuora trifasciata* is the most sought after Asian box turtle, with a market value approximately ten times higher than that of other species (Jenkins 1995). Even in 1993 prices of between US\$ 90 and US\$ 300 could be achieved in Hong Kong for a single specimen. In the meantime this figure has risen to US\$ 1,000 per kilogram (Behler 1997). According to Meier (*in litt.* 1998a) the price per adult specimen is about US\$ 3,000 (FIGURE 2).

Commercial demand for this species clearly outstrips availability. It can only rarely be found on Vietnamese and Chinese markets today. In contrast, Wenjun *et al.* (1996) claim that the species is still widely available in China's Guangdong and Guangxi Provinces at provincial markets and markets near the Vietnamese border.

Although *Cuora trifasciata* is very rare and expensive on sale in Europe there is a continuous demand of turtle enthusiasts for this species which puts further pressure to the declining populations (Pro Wildlife *in prep.*).

Habitat loss and habitat degradation may impose further environmental pressures on this species (Jenkins 1995). Main factors are large-scale deforestation and environmental pollution as described in section 2.2.

3. Utilisation and Trade

For general information on utilisation of and trade in Asian turtles please refer to the Introduction.

3.1 National Utilisation

Cuora trifasciata is the most sought-after and most expensive turtle species used for TCM purposes, and prices at food markets in China are ten times as high as those of most other species (FIGURE 2). Van Dijk states that "The Chinese Three-striped box turtle was the most sought-after species in pharmacies in Lang Ong St. in Hanoi; its high value is therefore apparently related to perceived medicinal properties. It is presumed to improve one's health and libido when eaten. A recent book on turtles stated that this turtle has "effective medicinal value". Animals from Southern China, which have soft pink skin, are apparently more desirable than those from Vietnam, which have grey skin. The species is now so sought after and expensive that even juveniles are bought at high prices to be raised in barrels behind houses until large enough for consumption." (Van Dijk, 1995, quoted by US Fish & Wildlife Service 1999). According to Meier (1999b) the consumption of this species is reported to heal cancer and impaired potency.

Cambodia: Turtle species native to Cambodia, which possibly still include *Cuora trifasciata*, are used to manufacture ornaments or as TCM ingredients. The animals' heads as well as their shell are frequently sold as tonics after childbirth (Martin & Phipps 1996).

China: The species plays an important role in food markets and TCM in southern China, where it was still readily available between 1990 and 1994 (Wenjun *et al.* 1996). In 1994, Wenjun *et al.* (1996) too were able to witness the species offered in large numbers in markets in Guangdong and Guangxi, as well as in markets near China's border with Vietnam. However, today this is no longer the case, and the species' increasing rarity is reflected by rapidly increasing prices. In 1985 single animals were sold for US\$ 100. Five years later, in 1990 the price had already doubled to US\$ 200 and had risen to US\$ 800 by 1997. Larger animals can achieve even higher prices of up to US\$ 3,000 (FIGURE 2), and albinotic specimens are traded at up to US\$ 10,000 each (Artnier 1998). However, since the middle of 1997 the species no longer seems to be available in either China (Meier, *pers. comm.* 1998b) or Vietnam (Streicher, *pers. comm.* 1998). Yet, in October 1998 more than 50 animals were sighted in three shops in Hong Kong (P.P. van Dijk, quoted by US Fish & Wildlife Service 1999). According to Lau (*in litt.* 1999) there are some collectors to catch them illegally in Hong Kong to satisfy the huge demand of food markets and traditional medicine. According to W. Williams (1999) the prices per specimen in Hong Kong increased from US\$ 10 fifteen years ago to now US\$ 1,200.

Vietnam: Lehr (1997) reported that in 1993 some specimens of *Cuora trifasciata* have been offered in markets in North Vietnam, while as in 1996 no single specimen was observed. In 1993 the price per specimen in Hanoi was US\$ 90-300 (Lehr 1996).

According to Streicher (*pers. comm.* 1998) no single specimen was observed on markets in Vietnam since the middle of 1997.

3.2 Legal International Trade

Because of the frequently uncertain origin of the animals, information provided in section 3.1 also applies to *Cuora trifasciata*. The overwhelming majority of animals in trade are destined for Asian food markets and for TCM (Lehr 1997; Martin & Phipps 1996; Lau *et al.* 1995).

i) Food markets and Traditional Chinese Medicine

Because of the frequently uncertain origin of this species, information presented in section 3.1 also applies here.

China: Large numbers of this species have long been exported from China to other Southeast Asian countries (National Environmental Protection Agency of China 1998). However, since this species is a Class II nationally protected animal, the capture, transport and trade requires official permits. It is not certain what proportion of the international trade is legal in China. Large individuals currently can achieve prices of up to US\$ 3,000 amongst international collectors, and albinotic specimens can sell for as much as US\$ 10,000 (Artnier 1998). According to Meier (*in litt.* 1998a) the species was no longer sighted by western collectors in Chinese food markets since the middle of 1997. In contrary to this report Lau (*in litt.* 1999) stated that *Cuora trifasciata* was still for sale in Hong Kong in the autumn of 1998.

U.S.A.: According to information obtained from the US Fish & Wildlife Service (1999) 20 specimens of the Three-striped box turtle were imported for pharmaceutical purposes.

Vietnam: Depending on weight, individual Three-striped box turtles were sold for between US\$ 90-300 in 1993. According to traders this price had already risen to US\$ 1,000 by 1997 (Lehr 1997), which reflects a growing scarcity in the wild. However, since 1997 this species was not observed at Vietnamese markets (Streicher, *pers. comm.* 1998)

ii) International pet trade

A smaller proportion of animals is exported to supply the pet trade in the Western world. Although this species became very rare relevant European magazines still describe Three-striped box turtles as an interesting pet species (e.g., Anon 1999).

Europe: According to Bringsoe (1991) *Cuora trifasciata* has been offered regularly in the European pet market in the 80ies. But these imports have been reduced sharply. A recent survey of 27 wholesalers and specialist pet shops in Germany revealed that two of the businesses questioned were still able to procure the species for a price of at least US\$ 950 (TABLE 2). Great Britain imported 827 specimens between 1986 and 1990 (Smart & Bride 1993). Regarding these data it is remarkable that only about 500 individuals are estimated to be currently held in captivity in Europe (Meier, *pers. comm.* 1999a).

U.S.A.: The number of animals imported to the U.S.A. has decreased during the 80ies (Bringsoe 1991). This trend is confirmed by TRAFFIC North America (Hoover 1996) who observed a declining in availability on price lists of pet shops while the prizes doubled from US\$ 143 in 1981 to US\$ 309 in 1996 (Hoover 1998). According to information obtained from the US Fish & Wildlife Service (1999) a total of 19 live individuals were imported into the US between 1995 and 1997. Over the same period the US registered the export of a single animal. Between 300 and 500 individuals are estimated to be kept in the US (McCord *in litt.* to Weissgold 4th October 1999).

Captive bred specimens are offered for US\$ 250 (Central Florida Reptile Farm 1999), while one specialised importer reports selling wild-caught specimens for US\$ 900 to 1,800 a piece, depending on the size of the animal (Weissgold *in litt.* to the German CITES Scientific Authorities 1999).

3.3 Illegal Trade

In **Cambodia** hunting and exporting native wildlife is forbidden via national law. Nevertheless there are large numbers of native turtles reported to be exported to Vietnam, Thailand and China, mostly through Phnom Penh. According to its own records, a single shop in Lomphat exports between 500-800 tonnes of turtles to Vietnam each year (Martin & Phipps 1996). This trade presumably includes specimens of *Cuora trifasciata*.

China: No information available.

Vietnam: No information available.

3.4 Actual or Potential Trade Impacts

Cuora trifasciata is the most sought after and most expensive turtle in food markets and TCM (FIGURE 2; Lehr 1997, Meier, *in litt.* 1998a). Because of this enormous demand commercial trade poses a particularly serious threat to this species. It appears that the species is no longer available in Vietnamese food markets today (Lehr 1997) and seems to have declined drastically in its natural habitat within at least three provinces of China (Guangdong, Guangxi and Hainan) where it was distributed in the past (Lau, *in litt.* 1999).

Due to the explosive economic growth and the continuously rising human population in South and East Asian countries (Vorholz 1997) it is most likely that the demand and therefore the trade pressure especially on this species is bound to increase even further.

Despite the fact that the presence of Three-striped box turtles in Western pet shops as a consequence of being almost extinct in the wild is minimal, any international trade of the Three-striped box turtle as pets is an additional impact to the declining populations.

Local population of *Cuora trifasciata* is protected by law in Hong Kong. However, due to the difficulty in distinguishing between locally-caught specimens and imported individuals, it is very difficult to enforce the legislation. Hence, illegal poaching pose a threat to the Hong Kong populations which may be the healthiest in the world (Lau, *in litt.* to the German CITES Scientific Authority 1999).

3.5 Captive breeding or artificial propagation for commercial purposes (outside Countries of origin)

Cuora trifasciata is kept and bred in small numbers by private breeders (Meier, *pers. comm.* 1999a; Internet publications by hobby-breeders). Breedings statistics for Germany report two hatchlings in 1994 (DGHT (*ed.*) 1996). According to Nietzsche (1998) captive breeding was the first time successful in 1991 by Zwartepoorte. In the U.S.A. McCord (*in litt.* to Weissgold 4th October 1999) reports 12 captive bred hatchlings a year.

As reported by Zhou & Zhou (1991) there are attempts in China to breed this species on a commercial scale for TCM purposes. Several family operations already breed this species in captivity (National Environmental Protection Agency of China 1998). According to Barzyk (1999) this is realised in small-scale "ranching" of *Cuora trifasciata*. However, as evidenced by recent price developments, these efforts do not sufficiently ease commercial pressures on wild populations. Chinese traders offer up to US\$ 150

for a young animal, which was captive bred in Europe (Meier, *pers. comm.* 1998b).

4. Conservation and Management

4.1 Legal Status

4.1.1 National

Cambodian law prohibits the hunting of all native wildlife as well as its export (Martin & Phipps 1996).

In **China** the species has been classified as "state major protected wildlife grade II" since 1988 (National Environmental Protection Agency of China 1998) which means capture, transport and trade need official permits (Li & Li 1997a). As all chelonians local population of *Cuora trifasciata* is protected in Hong Kong by law (Lau, *in litt.* 1999).

Vietnam: Due to its listing as "vulnerable" in Vietnam's Red Data Book, this species is excluded from trade (Ministry of Science, Technology and Environment 1992). Therefore capture, transport and trade in wild animals requires official permits. This law also applies to the transport of wild animals between national provinces (Wenjun *et al.* 1996).

4.1.2 International

None

4.2 Species Management

4.2.1 Population Monitoring

No information available.

4.2.2 Habitat conservation

According to the World Conservation Monitoring Centre (WCMC 1999) until 1993 128 nature reserves and seven scenic areas have been established in provinces and autonomous regions, where *Cuora trifasciata* occurs. Since 1962 Vietnam has created 87 reserves (Collins 1990).

However, none of these measures act specifically for the protection of turtles.

4.2.3 Management measures

No information on the management of *Cuora trifasciata* species was available.

4.3 Control measures

4.3.1 International Trade

None. Regarding the huge volume of the transborder wildlife trade, mainly between Vietnam and China, Li & Li (1997b) recommend to initiate a new wildlife trade permit system that should contain the name of a species on the permit which will be traded, and every species should have its own trade permit.

4.3.2 Domestic measures

No information available.

5. Information on Similar Species

For general information on similarities to other species please see section 5 in the proposal for *Cuora amboinensis*.

6. Other Comments

Cuora trifasciata as the most demanded species is directly threatened by Asian food markets. This species is approaching extinction caused by a fatal combination of low reproduction capacity and huge and even increasing demand for national and international trade. Therefore, already in 1995 Jenkins recommended to consider the possibility of including this species in the CITES appendices. This is also recommended by Lau *et al.* (1995).

Cambodia, as a range state of at least three *Cuora* species (*C. amboinensis*, *C. galbinifrons* and *C. trifasciata*), will support this proposal (Cambodian Scientific Authority of Fisheries and Aquatic Animals, *in litt.* 1999).

7. Additional remarks

Cuora yunnanensis

1. Taxonomy:

1.1 Class:	Reptilia	
1.2 Order:	Testudines (Chelonia)	
1.3 Family:	Bataguridae	
1.4 Species:	<i>Cuora yunnanensis</i>	(Boulenger, 1906)
1.5 Scientific synonyms:	<i>Cyclemys yunnanensis</i>	(Boulenger, 1906)

1.6 Common names:

English:	Yunnan box turtle
French:	Tortue-boite du Yunnan
Spanish:	
Chinese:	
German:	Yunnan-Scharnierschildkröte

2. Biological Parameters

According to Rogner (1996) the carapace of *Cuora yunnanensis* is extremely flat and reaches up to 12.6cm in males and 14cm in females. It is light to dark brown in colour and has three longitudinal ridges. The dark-brown plastron maintains a complete internal suture and its posterior edge is strongly serrated. On the animals' dark brown head, a fine yellow line runs from the nostrils to above the eye and ends as a lighter neck stripe. Throat and neck are covered in yellow or orange marks.

2.1 Distribution

Country of origin: China

Cuora yunnanensis was described from an altitude of 2,000m on the Yunnan Plateau in China. Iverson *et al.* (1998) reported Tunghuan Fu and Yunnanfu (= Kunming) in Yunnan Province as localities where this species has been found.

2.2 Habitat Availability

Although information on the natural habitat is not available it is likely that any surviving specimen of *Cuora yunnanensis* might be affected by the fragmentation of China's large rivers caused by dams (Fu 1997) and by the large-scale deforestation in Southwest China, which is worst in Yunnan Province (Studley 1998). Furthermore, the extensive use of fertilisers and chemicals at least in some areas of China might add further negative impacts (Maas 1995).

2.3 Population Status

IUCN (1996) lists the species as "data deficient", while in the Red Data Book of China this species is classified as "probably extinct in the wild" (National Environmental Protection Agency of China 1998). Information on population size and reproductive behaviour is not available for wild populations. Only six preserved specimens exist in the collections of the Natural History Museum in London and the Shanghai Museum of Natural History. According to the National Environmental Protection Agency of China (1998) the last wild specimen was sighted in 1906, and thus the species is probably already extinct. Reports by Wenjun *et al.* (1996), which state that the species is common in China's Guangdong Province and Guangxi Autonomous Region and is readily available at local markets there are therefore questionable.

2.4 Population Trends

No relevant information on population trends of *Cuora yunnanensis* is available and it is likely that the species is already extinct in the wild.

2.5 Geographic Trends

No data available.

2.6 Role of the species in its ecosystem

No data available.

2.7 Threats

Assuming that some specimens might have survived in the nature they are directly affected by the demand of the food markets. Additionally, there is a negative impact caused by large-scale deforestation (Studley 1998) and environmental pollution (Maas 1995).

3. Utilisation and Trade

3.1 National Utilisation

Despite conflicting reports by Wenjun *et al.* (1996), who claim that *Cuora yunnanensis* was still frequently on offer in Chinese food markets between 1990 and 1994 in the country's southern Guangdong Province and Guangxi Autonomous Region, various market surveys in the area failed to find this species (Lau *et al.* 1995; Li & Li, 1997a; Fellowes & Hau 1997; McCord *in litt.* 1998). Most herpetologists state that it has not been seen since 1906 and is therefore unlikely to be in trade.

3.2 Legal International Trade

No data available.

3.3 Illegal Trade

No data available.

3.4 Actual or Potential Trade Impacts

No data available.

3.5 Captive breeding or artificial propagation for commercial purposes (outside country of origin)

No data available.

4. Conservation and Management

4.1 Legal Status

4.1.1 National

China: Since 1988 *Cuora yunnanensis* has been classified as "second grade of state major protected wildlife". Therefore capture, transport and trade in wild animals requires official permits (Li & Li 1997a). This law also applies to the transport of wild animals between national provinces (Wenjun *et al.* 1996).

4.1.2 International

None.

4.2 Species Management

4.2.1 Population Monitoring

No information available.

In 1991, the action plan of IUCN/SSC/Tortoise and Freshwater Turtle Specialist Group considered *Cuora yunnanensis* as a "species of restricted distribution in need of status investigation". As a consequence surveys and studies have been recommended to confirm taxonomic identity and continued existence of viable populations (IUCN/SSC/TFTSG 1991).

4.2.2 Habitat conservation

According to the World Conservation Monitoring Centre (WCMC 1999) 37 nature reserves and three scenic areas have been established until 1993 in Yunnan Province, where *Cuora yunnanensis* was originally found. However, these measures do not act specifically for the protection of turtles.

4.2.3 Management measures

No data available.

4.3 Control measures

4.3.1 International Trade

None.

4.3.2 Domestic measures

No information available.

5. Information on Similar Species

For general information on similarities to other species please see section 5 in the proposal for *Cuora amboinensis*.

6. Other Comments

Cambodia, as a range state of at least three *Cuora* species (*C. amboinensis*, *C. galbinifrons* and *C. trifasciata*), will support this proposal (Cambodian Scientific Authority of Fisheries and Aquatic Animals, *in litt.* 1999).

7. Additional remarks

Cuora zhoui

1. Taxonomy:

1.1 Class:	Reptilia	
1.2 Order:	Testudines (Chelonia)	
1.3 Family:	Bataguridae	
1.4 Species:	<i>Cuora zhoui</i>	Zhao <i>et al.</i> 1990
1.5 Scientific synonyms:	<i>Cuora pallidicephala</i>	(McCord & Iverson, 1991)
1.6 Common names:		
English:	Zhou´s box turtle	
French:	Tortue-boite du Guangxi	
Spanish:		
Chinese:		
German:	Zhou´s Scharnierschildkröte, Zhou´s Dosenschildkröte	

2. Biological Parameters

According to Rogner (1996) *Cuora zhoui* has a moderately domed, smooth carapace which measures more than 16cm in length and features a supine central longitudinal ridge. The dark brown to black carapace is sprinkled with brown and yellow patches. According to Fritz & Obst (1998) the dark plastron, which is slightly convex at male animals, shows a dense pattern of radiating black lines on each scute. The carapace of male individuals is even darker with a maximum size of 16,9cm while females can grow up to 18,1cm (Fritz & Obst 1998). The plastron is almost as long as the carapace, and its pectoral and abdominal plates are linked by a flexible hinge. Because of the flexibility of the plastron *Cuora zhoui* is able to completely close its shell. (Rogner 1996). Black-edged narrow yellow lines run from above eye to the ear opening. The latter, as well as the animals' neck and throat are uniformly yellow. The upper part of the head is olive green. The dorsal parts of the front legs too are olive, while their ventral parts are salmon coloured. The posterior extremities are olive green on the outside and yellow on the inside (Rogner 1996).

Up to five eggs per clutch have been achieved in captivity (Meier, *in litt.* 1998a).

2.1 Distribution

Country of origin: China

So far all reported specimens stem from local markets in China's Yunnan Province and from Nanning Market in Guangxi Autonomous Region (Iverson *et al.* 1998). Zhao (in National Environmental Protection Agency 1998) also reports specimens from Pingxiang, Guangxi Autonomous Region.

As type locality for the scientific synonym *Cuora pallidicephala* McCord & Iverson (1991) provide the vicinity of Wuding Xian or Yuanmou Co. in Yunnan Province and southern Guangxi Autonomous Region. This information is based on statements from local people.

2.2 Habitat Availability

Although information on the natural habitat is not available it is likely that this species has been affected by habitat loss, e.g. large-scale deforestation which is worst in Yunnan (Studley 1998) or chemical pollution (Maas 1995). According to the China Environment Report (Greenpeace 1998) China ranks first in the world's sulphur dioxide production with Guangxi, where *Cuora zhoui* obviously lives, is one of the areas being most affected by acid rain.

2.3 Population Status

This species is listed as "data deficient" by IUCN (1996) and in the Chinese Red Data Book (National Environmental Protection Agency of China 1998).

Cuora zhoui was described only one decade ago (Zhao, Zhou & Ye 1990) and is known exclusively from local markets, where specimens have been sighted occasionally (National Environmental Protection Agency of China 1998). Information on population size and reproductive behaviour is not available.

According to Zhou (cited in Devaux 1999), who discovered this species in 1990, only three specimens have been found so far. In contrary Meier (1999c) reports about 50 individuals to be kept in captivity, with 25 to 30 in the U.S.A. and 21 in Europe (TABLE 4).

According to the International Species Information System this species is not kept in zoos (ISIS 1999).

2.4 Population Trends

The decreasing availability and sometimes total absence of *Cuora zhoui* from Chinese food markets indicate that the species is declining in the wild (Behler 1997; Meier, *pers. comm.* 1998b). Even at the market near Nanning, where the species was originally discovered, no specimens have been offered in 1996 and 1997 (Shiu, quoted in Barzyk 1999). In contrary, according to McCord (1999) a maximum of 10 specimens is found annually.

2.5 Geographic Trends

No data available.

2.6 Role of the species in its ecosystem

For general information on the central role of turtles in their ecosystems please see section 2.6. for *Cuora amboinensis*.

No information about the diet of *Cuora zhoui* in the wild is available. Animals in captivity are strictly carnivorous and refuse vegetarian food items (National Environmental Protection Agency of China 1998). Nevertheless, Rogner (1996) describes the diet of this species as preferably but not strictly carnivorous.

2.7 Threats

Cuora zhoui is known only from food markets, the demand for which critically threatens its survival (National Environmental Protection Agency of China 1998). Any exports related to the pet trade put additional pressure on the populations in the wild. Although *Cuora zhoui* is very rare and expensive on sale in western pet trade there is a continuous demand of turtle enthusiasts for this species (Pro Wildlife *in prep.*).

There is no detailed information available concerning the human impacts on the habitats of this species. It can be assumed that the habitat of this species is affected by the large-scale deforestation within South and South West China (Mackinnon et al. 1996; Studley 1998) and the environmental pollution caused by intense agriculture (Maas 1995).

3. Utilisation and Trade

For general information on utilisation of and trade in Asian turtles please refer to the Introduction. *Cuora zhoui* is highly demanded for food but also for the international pet trade.

3.1 National Utilisation

Cuora zhoui is one of the most sought-after species for sale at Chinese food markets although being offered only occasionally. Prices in Hong Kong have increased more than twofold from about US\$ 300 per animal in 1990, to as much as US\$ 800 in 1997 (FIGURE 2; Meier, *in litt.* 1998a).

3.2 Legal International Trade

i) Food markets and Traditional Chinese Medicine

Cuora zhoui is tied almost exclusively into China's domestic trade. Available species are sold at the regional markets (R. Wirth, *pers. comm.* 1998). An export to food markets in other Asian countries is therefore very unlikely.

ii) International pet trade

Occasionally, *Cuora zhoui* is exported to supply the pet trade in the Western world. According to McCord (1999) a maximum of 10 specimens is found annually.

Europe: *Cuora zhoui* is not widely distributed in European aquaria. Western turtle enthusiasts keep only a few specimens. A mere 21 individuals are believed to live in Europe today (Meier, 1999c). None of the German specialist pet shops and wholesalers questioned in a recent survey kept stocks of the species, or were able to obtain it (see TABLE 2).

USA: According to Fritz & Obst (1998) at least 26 specimens have been exported to the USA by the Hong Kong animal dealer Oscar Shiu. However McCord (*in litt.* to Weissgold 4th October 1999) reports a total of 15 individuals in the U.S.A., while captive breeding was not successful yet.

One specialised importer in the U.S. indicates that he has sold pairs of *Cuora zhoui*, imported from Hong Kong, for US\$ 3,000 (Weissgold *in litt.* to the German CITES Scientific Authorities 1999).

3.3 Illegal Trade

No data available.

3.4 Actual or Potential Trade Impacts

Although this species has been on sale only occasionally *Cuora zhoui* is one of the most sought after species on food markets and therefore has to be considered particularly threatened by commercial trade. Additional pressure to the populations is caused by the demand of western turtle enthusiasts (*Lau et al.* 1995, Fritz & Obst 1998).

3.5 Captive breeding or artificial propagation for commercial purposes (outside country of origin)

Cuora zhoui is kept and bred in very small numbers by private breeders (Meier, *pers. comm.* 1999a; Internet publications by hobby-breeders). According to Rogner (1996) the first captive breeding of this species has been successful in 1994. Nevertheless, breeding efforts on a commercial scale are currently not reported for this species.

4. Conservation and Management

4.1 Legal Status

4.1.1 National

The country's National Environmental Protection Agency (1998) recommends *Cuora zhoui* to be listed as "major protected wildlife" by the Guangxi Zhuang Autonomous Region in order to prohibit capture and trade.

4.1.2 International

None.

4.2 Species Management

4.2.1 Population Monitoring

Prof. Zhao Ermi, who described *Cuora zhoui* in 1990, recommends surveys of this species, together with some other species of *Cuora*, in order to obtain information on population size and distribution. He also urges to develop studies on conservation biology (National Environmental Protection Agency of China 1998).

4.2.2 Habitat conservation

According to the World Conservation Monitoring Centre (WCMC 1999) 51 nature reserves and two scenic areas have been established in Guangxi Autonomous Region and 37 national parks and three scenic areas in Yunnan Province until 1993. In both regions specimens of *Cuora zhoui* have been found. However, none of these measures act specifically for the protection of this species.

4.2.3 Management measures

No data available.

4.3 Control measures

4.3.1 International Trade

None.

4.3.2 Domestic measures

No information available.

5. Information on Similar Species

For general information on similarities to other species please see section 5 in the proposal for *Cuora amboinensis*.

6. Other Comments

Cambodia, as a range state of at least three *Cuora* species (*C. amboinensis*, *C. galbinifrons* and *C. trifasciata*), will support this proposal (Cambodian Scientific Authority of Fisheries and Aquatic Animals, *in litt.* 1999).

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APPENDIX

A. FIGURES:

FIGURE 1: Volume of food chelonians imported to Hong Kong

FIGURE 2: Increase of prices for *Cuora* spp. at markets in Hong Kong

B. TABLES:

TABLE 1: Situation of Asian box turtles – an overview (see section Introduction)

TABLE 2: Availability of various *Cuora* species from reptile pet shops and whole-salers in Germany.

TABLE 3: Indonesian Export Quotas for *Cuora amboinensis*

TABLE 4: Numbers of several *Cuora* species kept in captivity (according to Meier 1999c)

C. Letters of Range States

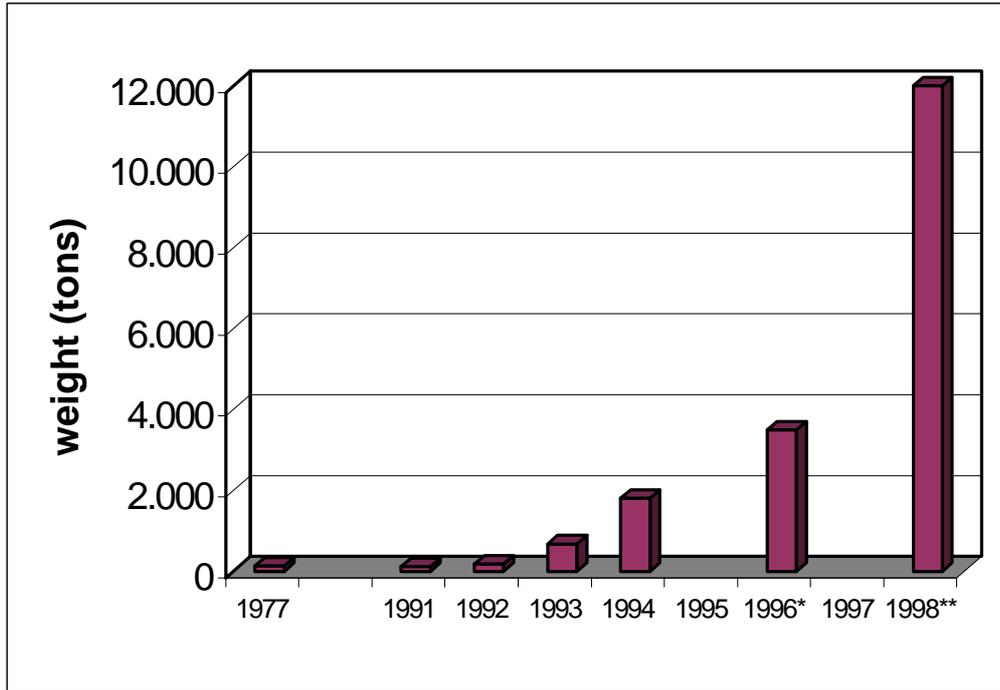


FIGURE 1: Volume of Food Chelonians Imported to Hong Kong

Until the early 90ies imports of chelonians were continuous. Since then, as a consequence of recent changes in Asian economics, spawned when Chinese currency became convertible and rapidly increasing human populations, the imports of food chelonians to Hong Kong explored dramatically. Data for the period 1977 to 1994 reported by *Lau et al. 1995*, for 1996* by Barzyk (1999) and for 1998** by Lee (1999).

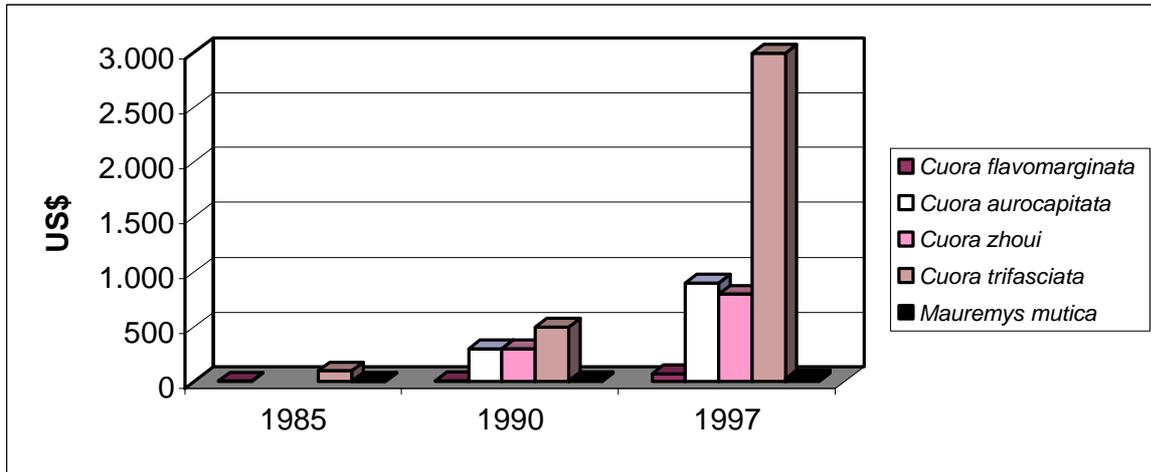


FIGURE 2: Increase of prices for *Cuora* spp. at markets in Hong Kong

The prices per specimen of four *Cuora* spp. and *Mauremys mutica* are compared. During the last decade *Cuora trifasciata* became the most expensive and most requested turtle on sale. *Cuora aurocapitata* and *Cuora zhoui* as very rare species, too are offered with significant higher prices than *Cuora flavomarginata* or species of other genera (for example *Mauremys mutica*).

(based on data of Meier, in litt. 1998)

TABLE 2: Availability of various Cuora species from reptile wholesalers and pet shops in Germany. *C. amb.* = *Cuora amboinensis*, *C. auro.* = *Cuora aurocapitata*, *C. flav.* = *Cuora flavomarginata*, *C. galb.* = *Cuora galbinifrons*, *C. mcc.* = *Cuora mccordi*, *C. trif.* = *Cuora trifasciata*). Survey of 27 reptile shops and wholesalers conducted in April 1999 (Pro Wildlife in prep.). Economic connections between wholesalers and pet shops are not taken into consideration.

Availability	<i>C. amb.</i>	<i>C. auro.</i>	<i>C. flav.</i>	<i>C. galb.</i>	<i>C. mcc.</i>	<i>C. trif.</i>
Available	44,5 %	0 %	48,2 %	44,5 %	0 %	0 %
Can be obtained	33,3 %	11,1 %	11,1 %	7,4 %	11,1 %	7,5 %
Impossible to obtain	22,2 %	88,9 %	40,7 %	48,1 %	88,9 %	93 %

TABLE 3: Indonesian Export Quotas for *Cuora amboinensis*, based on Jenkins (1995)

Year	1990	1991	1992	1993	1994
Number	unlimited	10,000	10,000	10,000	10,000

TABLE 4: Numbers of several *Cuora* species kept in captivity (according to Meier 1999c):

Species	USA	McCord (USA)	Europe	Meier (Europe)	in total
<i>Cuora aurocapitata</i>	25-30	14	45-50	22	70-80
<i>Cuora mccordi</i>	about 70	35	40-45	6	110-120
<i>Cuora pani</i>	100-120	30	45-50	4	150-160
<i>Cuora zhoui</i>	25-30	12	21	19	about 50