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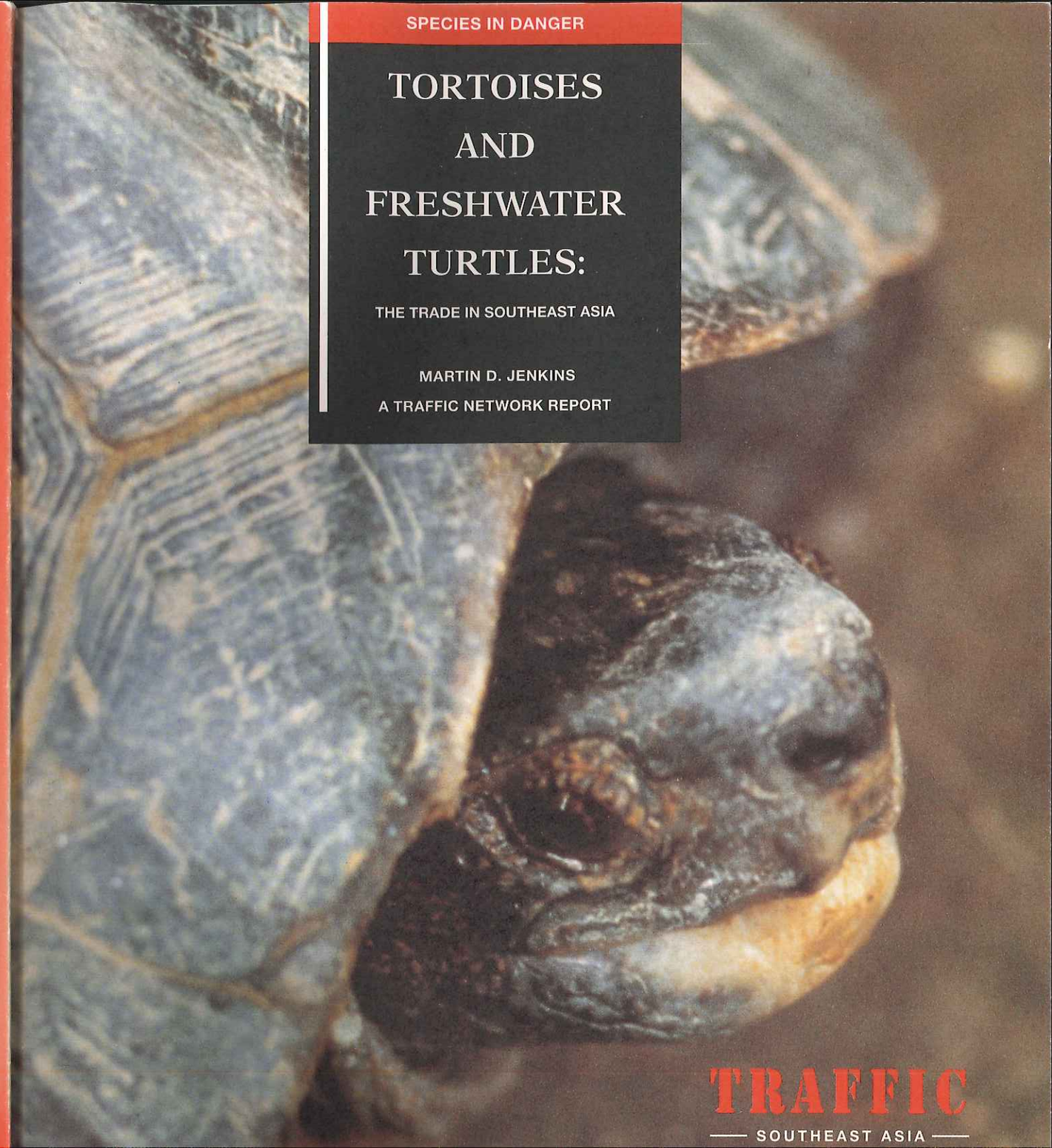
SPECIES IN DANGER

TORTOISES AND FRESHWATER TURTLES:

THE TRADE IN SOUTHEAST ASIA

MARTIN D. JENKINS

A TRAFFIC NETWORK REPORT



TRAFFIC
SOUTHEAST ASIA

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TORTOISES AND FRESHWATER TURTLES:

THE TRADE IN SOUTHEAST ASIA

Martin D. Jenkins[1]

CONTENTS

ACKNOWLEDGEMENTS

The genesis of this report lies in a series of field projects originally set up in 1993 by Stephen Nash, then Director of TRAFFIC Southeast Asia, and subsequently managed by his successor, Steven Broad. These projects were carried out in 1993 and 1994 by Steve Caskey (softshell trade in western Thailand) (Caskey, 1994), Oliver Puginier (tortoise and freshwater turtle trade in northern Thailand) (Puginier, 1994), the Centre for Resources Management and Environmental Studies, Hanoi (non-marine chelonian trade in Vietnam) (Le Dien Duc and Broad, 1995) and Dionysius K. Sharma of WWF Malaysia (summary of information on non-marine chelonian trade in Peninsular Malaysia) (Sharma, 1994). Useful information was also derived from a further TRAFFIC Southeast Asia field report by Ian Baird on wildlife trade in southern Lao PDR (Baird, 1993). Full citations for the reports resulting from these projects are included in the reference list.

The field projects were supported with funding from WWF International, the IUCN Species Survival Commission and the National Wildlife Federation of the United States.

The writing of this report was organised by TRAFFIC Southeast Asia Director Steven Broad, to whom special thanks are due for discussions, advice, support and hospitality. Thanks also go to Vanessa Alchin for generous hospitality.

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INTRODUCTION

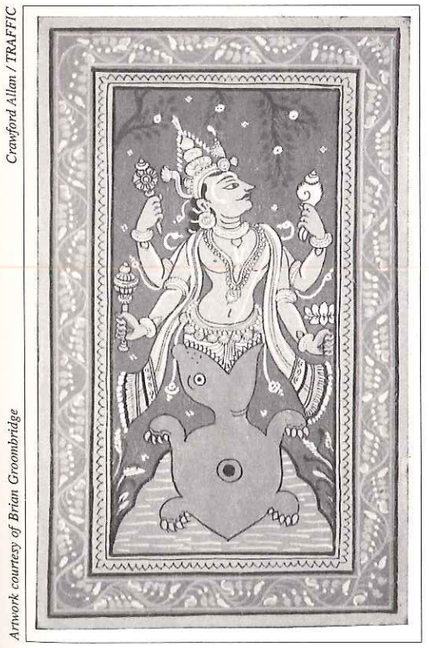
The tortoises, terrapins and turtles together comprise the order Chelonia, one of the most ancient, distinctive and familiar of all reptile groups. Modern classification systems divide the order into 12 families and around 257 species. Chelonians occur extremely widely in tropical and temperate regions of the world, including all the major oceans. They are a diverse group, ranging in size from the diminutive, 10cm Speckled Tortoise *Homopus signatus* of South Africa to the vast ocean-going Leatherback Turtle *Dermochelys coriacea* that can weigh more than 800kg.

The Southeast Asian region (here taken to include Myanmar, Thailand, Lao PDR, Vietnam, Cambodia, Malaysia, Indonesia, Singapore, Brunei and the Philippines) has a rich and varied chelonian fauna. Excluding the marine turtles in the families Cheloniidae and Dermochelyidae, which are not considered in this report, there are at least 44 species in six families present (Table 1). However, two families and three species (New Guinea Snapping Turtle *Elseya novaeguineae*, Red-bellied Short-necked Turtle *Emydura subglobosa* and Pig-nosed Turtle *Carettochelys insculpta*) are confined within the region to Irian Jaya. which is zoogeographically part of Australasia so these species are also not considered further here.

Turtles and man

Given their ubiquity and distinctive appearance, chelonians have always intrigued and fascinated mankind. They do not usually engender the feelings of fear and loathing widely induced by other reptiles but rather may be treated with affection, sometimes even with reverence. In many parts of the world, they are regarded as symbols of longevity, stability and strength. In Hindu cosmology, the tortoise is an avatar of the god Vishnu; in this form he was responsible for supporting the mountain that the gods and demons churned to produce the nectar which gave them immortality (Das, 1991). More fundamentally, early Hindu conceptions of the universe showed the earth supported by four elephants on the back of a huge turtle. Interestingly, the belief that the universe is supported on the back of a turtle is also held by some South American peoples. In Chinese mythology, the tortoise is one of four celestial beasts, the others being the dragon, the feng bird or phoenix and the Tiger. These four were present at the creation of the universe by P'an Ku. Each beast is associated with a cardinal point, a season and a colour. The tortoise is black and the lord of the north and winter (Walters, 1992). Turtles can also have other associations. The phallic appearance of turtle heads has resulted in their playing an overtly sexual role in many myths and folk tales, and is probably why turtle products are used to increase libido (discussed below).

Hindu mythological painting titled "Kurma Avatar", incarnation of God in the form of a turtle.



Artwork courtesy of Brian Groombridge *Crawford Allan / TRAFFIC*

The cultural significance attached to chelonians has not protected them from exploitation and, predictably, often has had quite the reverse effect. In Southeast Asia, as elsewhere, non-marine chelonians are, and always have been, taken from the wild for a wide range of purposes. They are used primarily for food, for Oriental medicines, for pets and as animals released in religious rites in temples or back to the wild.

Because of these varied uses, non-marine chelonians feature prominently in subsistence use and domestic and international trade within the region, to neighbouring countries and, to a lesser extent, to other markets such as North America and Europe.

Chelonians as food

In Southeast Asia, chelonians and their products are used most extensively for food. Virtually all species are utilised, although preference is for softshells (family Trionychidae), discussed in more detail below. Although widespread, use of adult chelonians for food is by no means ubiquitous. In particular, Islamic dietary restrictions forbid the eating of tortoises and turtles as they are regarded as amphibious creatures. Therefore, areas with a Muslim population, such as much of Indonesia and Malaysia, have traditionally seen much lower rates of exploitation than other areas. However, these regions also have non-Muslim inhabitants who harvest chelonians for food, so there are very few areas in the region where chelonians have not been harvested at all. The rapidly growing export trade to East Asia is also placing these areas under pressure, perhaps more so than elsewhere as they still have, or had until recently, substantial chelonian populations.

Eggs of chelonians are in demand as least as much as their meat. The Islamic prohibition on turtle meat does not apply to eggs; indeed these appear to be particularly highly esteemed in many Muslim areas, with the larger ones commanding prices well in excess of chicken eggs. Collection of eggs of the large river turtles is described later in this report.

Chelonians as medicines

As with so many other products in Asia, it is impossible and in some ways meaningless to draw a strict dividing line between use of chelonians for food and for medicine. While some peoples, such as the Karen hill tribes of the Thai-Myanmar border, appear to regard turtles as a simple food resource, many groups, particularly Chinese and Chinese-influenced peoples, ascribe specific medicinal properties to the meat or other products such as blood, fat, egg follicles or eggs.

Thus under Chinese dietary systems, turtle is regarded as a "hot food", to be taken during winter for curing and strengthening the body. Eggs are widely eaten as an aphrodisiac and the blood is reputed to increase energy and protein supply. In Southeast and East Asia, there have been widespread reports recently of athletes taking turtle blood to boost their performance in competitions. This practice is believed to have led to an increase in exploitation of turtles in recent time (Sharma, 1994).

In Chinese medicine, turtleshell products are yin-tonics or yin-nourishers. Softshell (*bie jia*) is distinguished from other chelonians (*gui ban*). In the former case, the active constituent is the carapace or top-shell; in the latter, it is the plastron. Turtleshell may be sold unprocessed or in a wide variety of products, including powders, tablets, poultices and jellies (Reid, 1993).

Gui ban is specifically stated to act as a kidney tonic and nutrient to sinew, bone and cartilage as well as a yin-tonic. It is recommended for treatment of a variety of symptoms including faint and weak voice, afternoon heat spells, nocturnal sweats, lumbago, failure of closure of fontanelles in babies and yin-deficiency owing to heat injury. It is also said to promote contractions in delayed or difficult childbirth. Its bodily affinities are with the kidneys, heart and liver.

Bie jia is recommended for reducing fever, clearing blockages and softening tumours. It treats some of the same symptoms as *gui ban*, and is also used in cases of swollen or infected pancreas, pain in the rib-cage and amenorrhoea. Its affinities are with the kidneys, spleen and liver (Reid, 1993).

Figure 1
Leaflet distributed with manufactured turtle and tortoise medicine

龟鳖丸使用说明书

(龟鳖养生胶囊)

本品取全龟、全鳖，依据中医学理论，经科学配伍研制而成。含龟鳖生理活性物质和营养素。具有治疗疾病和养生益寿的双重功效。

【药理作用】龟鳖丸具有显著增加机体免疫力，镇静催眠，促进性器官发育，增加性机能，升高白细胞，抗疲劳，增强耐力等作用，是一 味多环节作用的补益药。

【主要成份】全龟、全鳖

【功能与主治】益肾健骨，养血补心，滋阴潜阳，软坚散结，具有提高机体免疫功能。用于阴虚潮热，头晕目眩，心虚健忘。对慢性肝炎，久痔脱肛，妇女崩漏，男子阳萎，免疫功能低下，肿瘤放疗，化疗后白细胞减少和久病体虚具有辅助治疗作用。

【用量与用法】口服，一次2—3粒，一日两次，小儿酌减。

【注意事项】脾胃阳虚便溏慎用；孕妇忌服。

【规格】每粒0.5克。

【贮藏】密闭，置阴凉干燥处。

【使用期限】两年

【批准文号】琼卫药健字(93)Z－19号

【生产厂家】海南养生堂药业有限公司

The health capsule is scientifically formulated with turtle & tortoise according to the theory of traditional Chinese medicine. Since it contains turtle's and tortoise's physiological active substances and nutrients, the capsule has the dual effects of cure and health preserving.

【Properties】The content of capsule is yellow and white powder; slightly smelly, tasteless.

【Macological Action】Strengthening immunity, sedation and hyponotism; promoting development of sex organ and improving sexual function; Increasing amount of white blood cell; Strengthening fatigue resistance and stamina.

【Main Ingredient】Turtle, tortoise.

【Action and lication】Invigorating the kidney and bone, nourishing the blood and the heart, nourishing yin and suppressing hyperative yang, resolving the hard lumps, strengthening immunity.'It is mainly used to cure deficiency of yin, tidal fever, dizziness and amnesia. It also helps to cure chronic hepatitis, anal fistula and proctoptosis, metrorrhagia and metrostaxis, impotence, poor immunologic function, WBC decrease after radiotherapy and chemotherapy, valetudinarianism, etc.

【Administration and Dosage】Oral taking 2—3 capsules each time, twice a day. Less for children.

【Caution】Patient insufficient in the spleen—yang and patient of loose stool should be cautious to take this capsule. Pregnant woman is excluded from taking this capsule.

【Scifications】0.5g each capsule

【Storage】Store airtightly in a cool, dry place.

【Expiry Date】Two years

【Approval Document No】QWYJZ (93)Z—19

Produced by
Yangshengtang Pharmaceutical Co. Ltd. Hainan

亀鱉養生カプセル剤は，漢方医学の理論を根拠として，丸亀，丸鱉を採用し，科学的に配合して開発カしにもので，亀，鱉の生理活性物質と営養素を含有し，疾病の治療及び養生益年の二重効用を特っている。

【薬理作用】亀鱉丸は，有機体の免疫力を増加し，鎮静，催眠の作用があり，性器官の発育，性機能を促進し，白血球を上げ，疲労抵抗性，耐久性を増強する特効を持つて，有機体の各方面に作用する栄養剤である。

【主は成分】丸亀，丸鱉

【効能と適応症】補腎，健骨，養血，強心，陰陽滋養，病根解消，有機体の免疫力の増強すほどの効用を有する。陰虚，心虚，周期熱，目まい，健忘症ほどに特効があり，慢性肝炎，特疾，脱肛，女子月經不順血崩血漏，男子のインポテンツ，免疫機能低下，腫瘍放射線治療，化学治療后の白血球の減少と持病虚弱ほどに，輔助的ほ治療作用がある。

【用量と用法】内服，一日二回，毎回2～3粒，小児酌量減じる。

【注意事項】脾胃陽虚者，軟便者慎用；妊婦禁用。

【規格】毎粒0.5ｇ。

【貯法】密閉，日陰，乾燥の所に置く。

【有効期限】二年

【許可書番号】琼衛薬健字(93)Z－19号

【メーカー】海南養生堂薬業株式会社

生产厂家：海南养生堂药业有限公司
邮编：570006　电挂：5628

地址：海口金盘工业开发区
电话：701161　传真：766112

Table 1

Tortoises and freshwater turtles in Southeast Asia: species and distribution

Species	Common name	IUCN Red List	CITES	Distribution within Southeast Asia	Distribution elsewhere
Chelidae					
Elseya novaeguineae	New Guinea Snapping Turtle	—	—	Indonesia – Irian Jaya only	Palau?, Papua New Guinea
Emydura subglobosa	Red-bellied Short-necked Turtle	—	—	Indonesia – Irian Jaya only	Australia, Papua New Guinea
Carettochelyidae					
Carettochelys insculpta	Pig-nosed Turtle	K	—	Indonesia – Irian Jaya only	Australia, Papua New Guinea
Emydidae					
Batagur baska	Batagur	E	App. I	Cambodia?, Indonesia, Lao PDR?, Malaysia, Myanmar, Singapore?, Thailand, Vietnam?	Bangladesh, India
Callagur borneoensis	Painted Terrapin	E	—	Brunei?, Indonesia, Malaysia, Myanmar?, Thailand	—
Chinemys nigricans	Red-necked Pond Turtle	—	—	Vietnam?	China
Cuora amboinensis	Southeast Asian Box Turtle	—	—	Cambodia?, Indonesia, Lao PDR?, Malaysia, Myanmar, Philippines, Thailand, Vietnam, Singapore?	Bangladesh, India
Cuora galbinifrons	Indochinese Box Turtle	K	—	Lao PDR?, Vietnam	China
Cuora trifasciata	Chinese Three-striped Box Turtle	—	—	Cambodia?, Lao PDR?, Myanmar?, Vietnam	China
Cyclemys dentata (may include *C. tcheponensis*)	Asian Leaf Turtle	—	—	Brunei?, Cambodia?, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore?, Thailand, Vietnam	Bangladesh, Bhutan?, China, India, Nepal?

Table 1 continued

Species	Common name	IUCN Red List	CITES	Distribution within Southeast Asia	Distribution elsewhere
Cyclemys tcheponensis (*Geomyda tcheponensis*, possibly synonymous with *C. dentata*)	Stripe-necked Leaf Turtle	—	—	Cambodia?, Lao PDR?, Thailand, Vietnam	—
Geoemyda spengleri	Black-breasted Leaf Turtle	—	—	Lao PDR?, Vietnam	China, Japan
Heosemys depressa (*Geoemyda depressa*)	Arakan Forest Turtle	K		Myanmar	
Heosemys grandis (*Geoemyda grandis*)	Giant Asian Pond Turtle	—	—	Cambodia, Lao PDR?, Malaysia, Myanmar, Thailand, Vietnam	—
Heosemys leytensis (*Geoemyda leytensis*)	Philippine Pond Turtle	I	—	Philippines	—
Heosemys spinosa (*Geoemyda spinosa*)	Spiny Turtle	K	—	Brunei, Indonesia, Malaysia, Myanmar?, Singapore, Thailand	—
Hieremys annandalii	Yellow-headed Temple Turtle	—	—	Cambodia?, Lao PDR, Malaysia, Myanmar?, Thailand, Vietnam	—
Kachuga trivittata	Burmese Roofed Turtle	K	—	Myanmar	—
Malayemys subtrijuga (*Damonia subtrijuga*)	Malayan Snail-eating Turtle	—	—	Cambodia?, Indonesia, Lao PDR?, Malaysia, Thailand, Vietnam	—
Mauremys annamensis (*Annamemys annamensis, including A. merkleni*)	Annam Leaf Turtle	K	—	Vietnam	—

Table 1 continued

Species	Common name	IUCN Red List	CITES	Distribution within Southeast Asia	Distribution elsewhere
Mauremys mutica (*Clemmys mutica, Mauremys nigricans, Clemmys nigricans, Annamemys grochovskiae*)	Yellow Pond Turtle	—	—	Lao PDR?, Vietnam	China, Japan, territory of Taiwan
Melanochelys trijuga (*Geoemyda trijuga*)	Indian Black Turtle	—	—	Myanmar, Thailand?	Bangladesh, Bhutan?, India, Nepal, Sri Lanka
Morenia ocellata	Burmese Eyed Turtle	K	App. I	Myanmar	—
Notochelys platynota	Malayan Flat-shelled Turtle	—	—	Brunei, Cambodia?, Indonesia, Malaysia, Myanmar?, Thailand, Vietnam	—
Ocadia sinensis	Chinese Stripe-necked Turtle	—	—	Lao PDR?, Vietnam	China, territory of Taiwan
Orlitia borneensis	Malaysian Giant Turtle	K	—	Brunei?, Indonesia, Malaysia	—
Pyxidea mouhotii (*Cyclemmys mouhotii*)	Keeled Box Turtle	—	—	Lao PDR, Myanmar, Thailand?, Vietnam	China, India
Sacalia quadriocellata (*Clemmys quadriocellata*)	Four-eyed Turtle	—	—	Lao PDR?, Vietnam	China
Siebenrockiella crassicollis	Black Marsh Turtle	—	—	Brunei?, Cambodia?, Indonesia, Lao PDR?, Malaysia, Myanmar, Singapore?, Thailand, Vietnam	—
Platysternidae					
Platysternon megacephalum	Big-headed Turtle	—	—	Cambodia, Lao PDR, Myanmar, Thailand, Vietnam	China

Table 1 continued

Species	Common name	IUCN Red List	CITES	Distribution within Southeast Asia	Distribution elsewhere
Testudinidae					
Geochelone platynota	Burmese Star Tortoise	K	App. II	Myanmar	—
Indotestudo elongata (*Geochelone elongata*)	Elongated Tortoise	K	App. II	Cambodia, Lao PDR, Malaysia, Myanmar, Thailand, Vietnam	— Bangladesh, China, India, Nepal
Indotestudo forstenii (*Geochelone forstenii*, includes *Indotestudo (Geochelone) travancorica*)	Travancore Tortoise	R	App. II	Indonesia	India
Manouria emys (*Geochelone emys* includes *Testudo natapundi*)	Asian Brown Tortoise	V	App. II	Bangladesh, Cambodia?, China?, Indonesia, Lao PDR, Malaysia, Myanmar, Thailand, Vietnam?	India
Manouria impressa (*Geochelone impressa*)	Impressed Tortoise	K	App. II	Cambodia?, China?, Lao PDR?, Malaysia, Myanmar, Thailand, Vietnam	—
Trionychidae					
Lissemys punctata	Indian Flapshell Turtle	—	App. II	Myanmar	Bangladesh, Bhutan?, India, Nepal, Pakistan, Sri Lanka
Lissemys scutata	Burmese Flapshell Turtle	—	—	Myanmar, Thailand	—
Amyda cartilaginea (*Trionyx cartilagineus* includes *T. nakornsri-thammarajensis*)	Asiatic Softshell Turtle	—	—	Brunei?, Cambodia?, Indonesia, Lao PDR, Malaysia, Myanmar, Thailand, Vietnam, Singapore	—

Table 1 continued

Species	Common name	IUCN Red List	CITES	Distribution within Southeast Asia	Distribution elsewhere
Chitra indica (*Trionyx indicus*)	Narrow-headed Softshell Turtle	—	—	Malaysia?, Myanmar?, Thailand	Bangladesh, Bhutan?, India, Nepal, Pakistan
Dogania subplana (*Trionyx subplanus*)	Malayan Softshell Turtle	—	—	Brunei?, Indonesia, Malaysia, Myanmar, Thailand	—
Nilssonia formosa (*Trionyx formosanus*)	Burmese Peacock Softshell Turtle	—	—	Myanmar	—
Palea steindachneri (*Trionyx steindachneri*)	Wattle-necked Softshell Turtle	—	—	Vietnam	China, introduced to Hawaii
Pelochelys bibroni (*Trionyx bibroni*)	Asian Giant Softshell Turtle	—	—	Brunei?, Cambodia?, Indonesia, Lao PDR?, Malaysia, Myanmar, Philippines, Singapore? Thailand, Vietnam,	Bangladesh, India, Papua New Guinea
Pelodiscus sinensis (*Trionyx sinensis*)	Chinese Softshell Turtle	—	—	Vietnam, introduced to Thailand	China, Korea (North and South), Japan, Russia, territory of Taiwan

See annex for explanation of IUCN categories.

Demand for turtleshell products is unquantified but is evidently extremely high (see sections on the smaller emydids and tortoises) and is likely to account for a large proportion of the international trade in species other than softshells. The extent of differentiation between species in this trade is unclear at present. It seems that by and large tortoises and at least some emydid turtles are not distinguished, as several different species may be used, the numbers in trade from any one area apparently depending on availability. For example, the Southeast Asian Box Turtle *Cuora amboinensis* is exported in huge quantity from Sulawesi in Indonesia and the Elongated Tortoise *Indotestudo elongata* from Bangladesh and Vietnam seemingly for the same purpose. Price information indicates, however, that some species may be in particular high demand. The most notable example is the Chinese Three-striped Box Turtle *Cuora trifasciata* from Vietnam and possibly Lao PDR and Cambodia, commanding a price 10 times that of other species.

Chelonians as pets

In western eyes, the best known use of chelonians is as pets. Collection of Mediterranean species (chiefly the Spur-thighed Tortoise *Testudo graeca* and Hermann's Tortoise *Testudo hermanni*) in enormous numbers for sale in pet shops in northern Europe and elsewhere became an issue of considerable concern to conservationists and animal welfare activists in the late 1970s and early 1980s, resulting in virtual curtailing of the trade in wild specimens of these species. Keeping of chelonians as pets in Southeast Asia appears to be much less prevalent than in Europe and North America but is still not uncommon, and is increasing.

Interestingly, a high proportion of chelonians seen on sale for this purpose in major cities such as Bangkok and Kuala Lumpur are hatchlings of the North American Common Slider *Trachemys scripta*, which is the most abundant chelonian in the pet trade in Europe and North America. Concern has been expressed that these may escape and establish themselves in the wild, possibly acting as disease vectors or competitors for native species. Adult semi-captive *Trachemys* have been seen in ponds at Batu Caves near Kuala Lumpur in Peninsular Malaysia. Adult Common Sliders are also abundant in all Bangkok city park and temple ponds and have been released into reservoirs and canals and captured in the wild north of Bangkok (van Dijk, *in litt.*, 22 March 1995). Indian Star Tortoises *Geochelone elegans*, probably exported illegally from India, are also popular in Southeast Asia. Some local species appear in the trade, such as the Malayan Snail-eating Turtle *Malayemys subtrijuga* and the Black-breasted Leaf Turtle *Geoemyda spengleri* in Vietnam, and are apparently captive-bred for the purpose.

In general, Southeast Asian chelonians do not appear to play a particularly important part in the exotic pet trade in either Europe or North America. A relatively wide range of species appear in trade, but most do not command premium prices. Species offered for sale in the USA and Europe in 1990-91 included the Asian Brown Tortoise *Manouria emys*, Elongated Tortoise, Spiny Turtle *Heosemys spinosa* and Chinese Three-striped Box Turtle.

There is also some demand for larger species, such as Batagur *Batagur Baska*, Malaysian Giant Turtle *Orlitia borneensis*, Painted Terrapin *Callagur borneoensis*, Narrow-headed Softshell Turtle *Chitra indica*, among zoos and wealthy private collectors both within Southeast Asia and elsewhere; numbers involved are certainly small, although for some species, such as the Narrow-headed Softshell Turtle, they may place a considerable strain on already depleted populations.

Chelonians in temples and as release animals

Tortoises and freshwater turtles are associated with many temples in South and Southeast Asia, for example the Maha Myat Muni Temple in Mandalay, Myanmar; Wat Prayoon Temple in Bangkok, Thailand; Sam Poh Tong Temple in Ipoh, Malaysia; and the Kek Lok Si Temple in Penang in northern Peninsular Malaysia. Outside Southeast Asia, the only known population of the Black Softshell Turtle *Aspideretes nigricans* is found in Bangladesh in an artificial pond associated with the shrine of the Islamic Saint Byazid Bostami at Nasirabad (Groombridge, 1982). Many of these populations are long-established. In general, they do not seem to have any specific religious or sacred significance, but rather are products of tradition. However, among many people, particularly Buddhists, there is a belief that sending a turtle to a temple and therefore preventing anyone from eating it is considered as saving a life, an act which will be duly rewarded in one's next incarnation. Occasionally, turtles may also be released into the wild, with the same intention. Sometimes these are marked with red paint as a sign that they are release animals and therefore not to be recaptured or eaten. It is also reported that some Chinese people use tortoises as "scapegoats", by writing wishes or pious phrases on the shell and then releasing the animal in the belief that it will carry away their sins (Burkill, 1966; Sharma, 1994; Smith, 1931). Some temples may accumulate sizeable populations of turtles, particularly of tough species such as the appropriately named Yellow-headed Temple Turtle *Hieremys annandalii*, but it is unlikely that this has a significant effect on wild populations.

Chelonians as ornaments

Occasionally shells of non-marine species are used for decorative purposes, although this is rarely, if ever, the principal reason for harvest. Nonetheless, this use may be significant in some countries, such as Thailand. For example, souvenir stalls at Ban Phae ferry port had up to 50 dried *Melayemys* species, decorated with beads as eyes, for sale in March 1995. In Chiang Mai's night market and Bangkok's Chatuchak market, masks made of turtle carapaces decorated with silver eyes, ears, nose and mouth were being offered, normally in quantities of three and five, although one vendor had 45 available. Most of these masks were made of Tricaranate Hill Turtle *Melanochelys tricarinata*, a presumed rare species from Nepal and northern India. A few shells were *Cyclemys* and Elongated Tortoises *Indotestudo elongata*. Some of the shells had been wrapped in newspaper with Indian and English script (van Dijk, *in litt.*, 22 March 1995).

In Vietnam, turtle carapace and plastron are used as ornaments in the house, with wealthy families having their beds stand upon four turtle shells. Together with marine turtles, Elongated Tortoises and Malayan Flat-shelled Turtles *Notochelys platynota* are often used for ornamental purposes (Le Dien Duc and Broad, 1995).

Structure of the report

The following chapters review the use of non-marine chelonians in Southeast Asia. Different groups are treated separately, so that chapters are devoted to the softshells (family Trionychidae), tortoises (family Testudinidae), the large river turtles (four species of Emydidae) and the pond turtles (the remainder of the Emydidae); the Big-headed Turtle (family Platysteridae) is included with the pond turtles.

A brief introduction to each of the species is provided, with details of their distribution both within Southeast Asia and elsewhere. Distribution information is largely drawn from Iverson (1992) and Groombridge (1993); where additional information or corrections to these have been discovered they are referenced separately. Taxonomy follows Iverson (1992). For each chapter, information on use of that

group of chelonians within individual countries in Southeast Asia is provided where this was available. No information was gathered for Brunei, Singapore or the Philippines.

SOFTSHELL TURTLES — FAMILY TRIONYCHIDAE

The softshell turtles or Trionychidae comprise a distinctive and ancient group of chelonians. Currently, 23 living species are recognized (Meylan, 1987). The family is widespread, being found in North America east of the Rockies, Africa, the eastern Mediterranean and most of southern and eastern Asia as far east as Papua New Guinea. Softshells are absent from Australia, although the closely related Pig-nosed Turtle *Carettochelys insculpta* is found. Tropical Asia is undoubtedly the centre of diversity of softshells, with 15 recognized species found there. Of these, nine occur in Southeast Asia and four are confined to the region (although one is of dubious taxonomic status). Formerly, most softshells, including five of the Southeast Asian species, were included in one genus, *Trionyx*. A recent revision (Meylan, 1987) has split this genus, placing most of the species, including all the Southeast Asian ones, in their own genera. This revision is the subject of some disagreement, however, and the generic name *Trionyx* is still sometimes used for all these species (Iverson, 1992).

SPECIES

Indian Flapshell Turtle *Lissemys punctata*

Within the region, the Indian Flapshell Turtle is found in western Myanmar. Extralimitally it is found widely in the Indian subcontinent in Bangladesh, India, Nepal, Pakistan and perhaps Bhutan as well as Sri Lanka (Iverson, 1992). Until 1994, the nominate subspecies *L. punctata punctata* was included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). At the Ninth Meeting of the Conference of the Parties to CITES in November 1994, however, the nominate subspecies was downlisted to Appendix II, with a listing of the whole species in that Appendix, effective as of 16 February 1995. Species listed in Appendix I are prohibited in international commercial trade; those in Appendix II require a special permit.

This is one of the smaller softshell turtles. The largest females are around 37cm long and weigh up to 7kg. Males are mature at less than 15cm length. Clutch size is two to eight, exceptionally to 11, eggs (Das, 1991). It frequents slow-moving or still water, will move about on land at night and often buries itself in soft mud or sand (Pritchard, 1979).

Burmese Flapshell Turtle *Lissemys scutata* (= *Lissemys punctata scutata*)

The Burmese Flapshell Turtle is reported from only the Irawaddy, Sittang and Salween river basins in Myanmar. Its taxonomic status is controversial. Several authorities consider it a subspecies of *Lissemys punctata* as the two are very similar.

Asiatic Softshell Turtle *Amyda cartilaginea* (= *Trionyx cartilagineus*)

The Asiatic Softshell Turtle is confined to the Southeast Asian region where it is known to occur in Indonesia (Greater Sundas and at least Lombok in the Lesser Sundas), Lao PDR, Malaysia (Peninsular, Sabah and Sarawak), Myanmar, Singapore (Yong, 1990), Thailand and Vietnam. Undoubtedly, it also occurs in Brunei and Cambodia. Populations in southern (peninsular) Thailand, which have been referred

to as *Trionyx nakornsrithammarajensis* (Wirot, 1979), are generally considered to be of *Amyda cartilaginea*.

The Asiatic Softshell Turtle is a large species, with a carapace length of up to 70cm and a weight of up to 35kg. It reportedly inhabits both muddy, slow-flowing rivers and hill streams (Pritchard, 1979). Under favourable conditions, females may reportedly become mature in around 20 months. Three to four clutches a year may be laid, comprising six to 10 eggs in young females, rising up to 20-30 when fully grown (Wirot, 1979).

Narrow-headed Softshell Turtle *Chitra indica* (= *Trionyx indicus*)

The Narrow-headed Softshell Turtle occurs in Thailand and probably Myanmar in Southeast Asia. In Thailand it is confirmed only from the Mae Klong basin in the western part of the country. There are indications that it may occur in Peninsular Malaysia in the Pahang River in the area of Taman Negara. Extralimitally it is widely found in the Indian subcontinent in Bangladesh, India, Nepal, Pakistan and perhaps Bhutan. The Thai population is distinctive and may represent a separate species (van Dijk, *in litt.*, 5 January 1995). If there is indeed a population in Peninsular Malaysia, it will presumably be of this.

The Narrow-headed Softshell Turtle is potentially a very large species. There are good records of specimens with a carapace length of one metre, including a Thai specimen of 1.2m (van Dijk, *in litt.*, 22 March 1995), and unverified reports of individuals with an overall length of two metres. Along with the Asian Giant Softshell *Pelochelys bibroni*, this is the largest non-marine chelonian in Southeast Asia and one of the largest in the world. It is found mainly in large rivers in areas with a sandy bottom, and prefers clear water (Pritchard, 1979).

Malayan Softshell Turtle *Dogania subplana* (= *Trionyx subplanus*)

The Malayan Softshell Turtle is confined to Southeast Asia, being found in Indonesia (Greatern Sundas), Malaysia (Peninsular, Sabah, Sarawak), Myanmar, Singapore (Yong, 1990) and Thailand. It probably occurs in Brunei as well.

Malayan Softshell Turtle *Dogania subplana*.

D. Sharma / TRAFFIC

Along with the Indian Flapshell Turtle *Lissemys punctata*, this species is one of the smallest softshells, with the carapace of full grown adults measuring around 25cm. It prefers hill streams to large, slow-flowing rivers and frequently hides under rocks (Pritchard, 1979; Pritchard 1994).

Burmese Peacock Softshell Turtle *Nilssonia formosa* (= *Trionyx formosus*)

The Burmese Peacock Softshell Turtle is believed endemic to Myanmar where it is found widely in the Irawaddy-Salween river basin. It has been recorded close to the border with China, and therefore may occur there. It could also reach western Thailand.

This is a very little-known species, reported by Pritchard (1979) as not uncommon in the lower reaches of the Irawaddy. Adults normally reach a carapace length of around 40cm, although individuals formerly captive at the Maha Myat Muni Temple in Mandalay exceeded this (van Dijk, *in litt.*, 5 January 1995).

Wattle-necked Softshell Turtle *Palea steindachneri* (= *Trionyx steindachneri*)

The Wattle-necked Softshell Turtle has been recorded within the region only from northern Vietnam. Extralimitally it is known from southern China, including Hainan. This is a small species, adults generally measuring around 25cm in length. Very little is known of its ecology.

Asian Giant Softshell Turtle *Pelochelys bibroni* (= *Trionyx bibroni*)

The Asian Giant Softshell Turtle is a widespread species, recorded in the region from Cambodia, Indonesia (Sumatra to Irian Jaya), Lao PDR, Malaysia, Myanmar, Philippines, Thailand and Vietnam. It probably occurs in Brunei and Singapore as well. Extralimitally it is found in India, Bangladesh and Papua New Guinea. *Pelochelys* may in fact comprise several different species (Rhodin *et al.*, 1994).

This is potentially an extremely large species. A specimen recorded by de Rooij (1915) had a carapace length of 130cm. It is often found in sea water or brackish water, but is typically an inhabitant of freshwater, being found in small montane streams as well as large rivers. Clutch size may be as high as 27 and there may be more than one nesting in a season (Das 1991; Pritchard, 1979).

Chinese Softshell Turtle *Pelodiscus sinensis* (= *T. sinensis*)

The Chinese Softshell Turtle occurs only in north Vietnam in Southeast Asia. Extralimitally it is widespread in eastern Asia, occurring in China (including Hainan), Russia, North Korea, South Korea, Japan and the territory of Taiwan. It has also been introduced to Hawaii (Iverson, 1992). Two to four clutches of 17-28 eggs are reportedly laid annually. Captive females can reach maturity in six years (Pritchard, 1979).

USES OF SOFTSHELLS

The major use of softshell turtles is for food. In addition, they have more specific therapeutic value in Chinese medicine and are kept as pets and as release animals, into the wild or into temple ponds. One species, the Chinese Softshell Turtle, is widely farmed in Thailand, Malaysia and Indonesia and its potential has been studied in Singapore (Chou and Choo, 1986).

Softshells are generally regarded as the most palatable non-marine chelonians within Southeast Asia and are widely eaten by many ethnic groups, with the exception of Muslims who are forbidden to eat the meat (but not the eggs) of these and other chelonians under Islamic dietary rules. Palatability and desirability of different species appears to vary, although it is difficult to discern a consistent pattern. The Asian Giant Softshell Turtle is regarded, in Malaysia at least (see below), as not palatable although it is not clear if this is true throughout its range. Pope (1935) stated that the Wattle-necked Softshell Turtle was esteemed much more highly in Hainan than the Chinese Softshell Turtle. This may be a reflection of different dietary habits, with the former perhaps more herbivorous than the latter. Thai farmers aver that importers of farmed Chinese Softshell Turtles in the Far East will not accept Thai native species (notably Asiatic Softshell Turtles) while in Thailand the reverse appears the case. It is likely that this reflects a certain prejudice on the part of consumers rather than any real difference in palatability and indeed seems to be changing now that the Asiatic Softshell Turtle is becoming scarcer (van Dijk, *in litt.*, 22 March 1995).

Country reports

Cambodia (native species: Asiatic Softshell Turtle, perhaps Asian Giant Softshell Turtle)

There is little information on the status of softshells in Cambodia. Baird (1993) notes that there is large-scale collecting of softshells (presumably Asiatic Softshell Turtles) in the Selampao River, which forms the border between northern Cambodia and southwestern Lao PDR.

Cambodians who collected softshells in the Selampao sold a consignment of around 100 to a Laotian trader in February 1994 for 400 kip/kg (US$0.57/kg), considerably less than the reported value in Lao PDR (see below). However, softshell turtles are said to be sold at Stung Treng in northeast Cambodia for higher prices than in southern Lao PDR. They are also exported to Vietnam.

Indonesia (native species: Asian Giant Softshell Turtle, Asiatic Softshell Turtle, Malayan Softshell Turtle)

As elsewhere in Southeast Asia, softshells are the principal group of non-marine chelonians exploited for food. Although the Muslim population does not eat them, they are widely consumed by other groups including local Chinese (Van de Bunt, 1990). There is also a substantial volume of exports of live softshells, principally Asiatic Softshell Turtles, for consumption in countries in the Far East. Van de Bunt (1990) quotes official export statistics of 66 500kg of Asiatic Softshell Turtles from Sumatra in 1988. This trade has increased dramatically in the past few years and is spreading rapidly through Indonesia (F. Bambang Yuwono, *in litt.* to D. Jelden, Bundesamt für Naturschutz, Bonn, Germany, 16 December 94). Export quotas for this species have been set at a high level during the 1990s.

Lao PDR (native species: Asian Giant Softshell Turtle, Asiatic Softshell Turtle, perhaps Chinese Softshell Turtle, Wattle-necked Softshell Turtle)

As with most animal groups, there are very few details on the distribution and status of softshell turtles in Lao PDR, or even which species occur there. There appear to be definite records for only two, the Asiatic Softshell Turtle and the Asian Giant Softshell Turtle, although others may occur.

Baird (1994) documents large-scale and apparently rapidly expanding harvest of softshell turtles in southern Lao PDR. This harvest is for export to Vietnam and to a lesser extent to Cambodia for re-export to Vietnam. It is thought that a significant proportion of the trade may ultimately be destined for China. Trade operates through a network of Vietnamese traders and Lao counterparts and middlemen who encourage villagers to collect as many as possible.

Traders operate in Champasak, Sekong, Salavan, Attapeu and Savannakhet Provinces. In some areas (e.g. the Kamao Sub-district, Mun District, Champasak Province) this trade is very new, having only started in early 1994. Previously, softshell turtles were an incidental catch consumed locally.

Demand is for turtles less than 5kg in weight because larger turtles are difficult to transport to Vietnam. Hunting is most effective in the dry low-water season (January to April) when turtles can be trapped in burrows on the river banks, where they lay their eggs. Hunters may catch 10 to 20 turtles a day at this time. Considerable numbers of softshells are also caught in baited or barrier wicker basket traps set for large catfish in the middle Mekong during fish migration in the high water season (van Dijk, *in litt.*, 22 March 1995). Individual consignments of up to 100 turtles have been reported, and it is thought likely that several thousand turtles are traded annually in southern Lao PDR. There are indications that turtle populations in

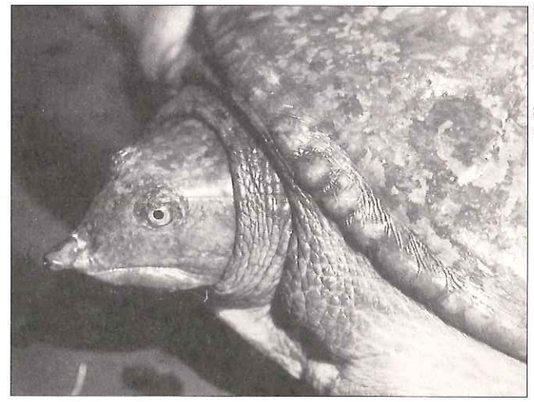
accessible areas have been depleted: collectors on the Selampao River, one of the main areas harvested, reportedly now have to travel further into remote areas to find good supplies. It is not known if similar trade exists in the northern part of the country.

Prices commanded are relatively high. Villagers sell turtles to Lao middlemen for 1 800 kip/kg (US$2.57/kg). Vietnamese traders within Lao PDR are quoted as paying 2 000 kip/kg (US$2.86/kg) and export the live turtles to Vietnam via the Savannakhet/Danang highway.

Baird (1994) states that it is illegal to trade softshell turtles in Lao PDR, although it is not known if provinces other than Sekong are enforcing this.

Malaysia (native species: Asian Giant Softshell Turtle, Asiatic Softshell Turtle, Malayan Softshell Turtle, possibly Narrow-headed Softshell Turtle)

Softshell turtles are the most commonly eaten chelonians in Peninsular Malaysia. Sought-after species are the Asiatic Softshell Turtle and the Malayan Softshell Turtle. The Asian Giant Softshell Turtle is apparently not considered a delicacy because its meat is tough . Sharma (1994) reported that Chinese anglers questioned in Terengganu stated that this turtle is generally released when caught as its meat is not tasty. From observations in markets and "pet-shops" (which sell animals for consumption as much as for keeping as pets) it seems that the Asiatic Softshell Turtle is the most commonly sold softshell, and along with the Southeast Asian Box Turtle, the most commonly sold chelonian in Peninsular Malaysia. There are indications, however, that Asiatic Softshell Turtles have become less readily available. In 1976, Moll found that Asiatic Softshell Turtles and Southeast Asian Box Turtles were the most abundant species on sale in a market in Teluk Anson (Teluk Intan) in Perak. In January and February 1987, he found Asiatic Softshell Turtles had become far less common in markets in northwestern Peninsular Malaysia. This seems likely to be because of a decrease in availability reflecting a decline in abundance in the wild, although it may be worth noting that the 1987 survey was during the monsoon and reports elsewhere indicate that softshells are more easily caught during "clear-water" periods, meaning the dry season (Moll, 1987).



Asiatic Softshell Turtle *Amyda cartilaginea* on sale in a Malaysian "pet shop".

D. Sharma / TRAFFIC

It is not clear whether the greater frequency of the Asiatic Softshell Turtle over the Malayan Softshell Turtle is a result of preference (owing probably to the former's larger size), greater abundance in the wild or greater ease of capture, or to a combination of all three. It may also be that some merchants do not differentiate between the two, but refer to both as *Labi-labi biasa* (common softshell).

Moll (1976) noted that softshell turtles were the most expensive chelonians in Peninsular Malaysia when sold for food. The Asiatic Softshell Turtle commanded a price of US$0.80 per kati (US$1.3 per kg). Sharma reported a price of RM30.00 (US$12) for a juvenile Asiatic Softshell Turtle in a shop in Petaling Jaya in 1991. A juvenile Asiatic Softshell Turtle on sale in Penang in September 1994 was priced at RM10.00 (US$4). Eggs of softshell species are eaten wherever they are found, with reports of Asian Giant Softshell Turtle eggs being eaten in Perak and Terengganu (Sharma, 1994).

There are few data on exports, although some Asian Giant Softshell Turtles and Asiatic Softshell Turtles caught in Setiu, Terengganu, are exported to Singapore (Kamarruddin Ibrahim, pers. comm. to Sharma, 1994). There is probably also some other small scale export for zoos and the exotic pet trade.

Farming, apparently mostly of Chinese Softshell Turtles, takes place in Peninsular Malaysia, although details are lacking. Small-scale farming was observed in Perak and there is at least one freshwater turtle farm in Johore and one in Selangor, both presumably raising this species. Hatchlings and juveniles are regularly seen for sale in night markets in Petaling Jaya (Section 17 and SS2) and SS18 in Subang Jaya. Sophisticated packaging implies that these are an expensive commodity although price information is not available. Interest in turtle farming appears to be increasing in Malaysia (Sharma, 1994).

Myanmar (native species: Burmese Flapshell Turtle, Indian Flapshell Turtle, Asian Giant Softshell Turtle, Asiatic Softshell Turtle, Burmese Peacock Softshell Turtle, Malayan Softshell Turtle, possibly Narrow-headed Softshell Turtle)

It is evident from studies in western Thailand that softshells are harvested in the hill regions of eastern Myanmar, both for local subsistence use by Karen hill people and for transborder trade with neighbouring regions of Thailand, most of which appear to have depleted softshell turtle stocks.

Softshell turtles are extensively harvested for food in at least some parts of Myanmar (van Dijk, 1993). In the Myitnge River (Doke-tha-wady) area south of Mandalay in central Myanmar, large numbers of Burmese Flapshell Turtles are collected. The softshells inhabit both permanent bodies of water and seasonal ponds. In the latter, they bury themselves in the mud during the dry season from January to May, re-emerging when the ponds fill during the monsoon (May to August) at a time they can be caught easily. Van Dijk (1993) recounts a report that in June 1992 two fishermen caught around 100 softshells in one day in a single pool a few hectares in extent. Turtles are caught by cast nets, in traps or by hand. In the main river, turtles are taken by diving for them. Turtles in general are regarded as an essential part of the diet of villagers in this region. It seems likely that softshells account for a significant proportion of turtle consumption.

Trade in turtles is forbidden. In 1994, it was rumoured that the Myanmar Forestry Department broke up a smuggling ring exporting live softshell turtles from the Mandalay area across Maymyo and Lashio into Yunnan in China (van Dijk, *in litt.*, 22 March 1995). This ring reportedly took all the large specimens of the endemic Burmese Peacock Softshell Turtle from the pond at the Maha Myat Muni Temple in Mandalay (van Dijk, *in litt.*, 5 January 1995).

Thailand (native species: Asian Giant Softshell Turtle, Asiatic Softshell Turtle (includes *Trionyx (Amyda) nakornsrithammarajensis*), Narrow-headed Softshell Turtle, Malayan Softshell Turtle)

Softshells are, or at least have been until recently, intensively exploited in Thailand. It appears that all species occurring in the country are harvested, although the most important economically is Asiatic Softshell Turtle.

Determining the extent of trade and any trends in harvest rates is difficult because much of the trade is effectively illegal, as all softshell species in Thailand are now protected by law. Knowledge of this legislation appears widespread among traders and much trade in softshell turtles, particularly in larger market centres, is therefore covert.

Despite this, there is evidence that availability of softshells has declined considerably in most parts of the country in the past five years or so. Only the Asiatic Softshell Turtle is now obtainable in any quantity, and even this is much scarcer in many regions, although apparently it remains common in more inaccessible regions, such as the forested hills along the Thai-Myanmar border. Increasingly, softshells in these regions appear to be obtained from the Myanmar side of the border. Generally most softshells are obtained during the dry season from January to June.

One informant noted that three to five years ago he would obtain mixed-species consignments from Khanchanaburi, Tak and Uthaitani Provinces of 150-200 softshells a week, which he sold at the weekend market in Bangkok. He stated that he now finds it very difficult to obtain any reliable large-scale supply.

Small-scale trade still exists, most of it local, often directly to restaurants and, increasingly, to turtle breeders. Caskey (1994) surveyed harvest in several areas of Thailand, chiefly along the Myanmar border including the Mae Klong basin in western central Thailand, which has populations of all four generally accepted Thai species. Fishermen at the Khao Laem Dam in Kanchanaburi Province near the border with Myanmar reported that there had been a drastic decline in the number of softshell turtles caught around the dam in the past five years. Most softshells taken were immature, weighing around 3-4kg, and were generally sold by fishmongers to local restaurants or to individuals for consumption at home. North of the dam, in Sangklaburi District, Karen people harvested softshells for subsistence use and generally did not sell them to dealers, although they were commercially available in the Three Pagodas Pass region.

In Ranong Province in southwest Thailand, softshells have also declined in availability over the past few years, but still remain reasonably abundant. Some restaurateurs obtained regular supplies from Myanmar across the border. Similarly, in the Kaeng Krachan Reservoir region in Phetburi Province, softshells are apparently not common but are still abundant in the hill streams forming the dam's catchment. Most softshells taken here were used by the local Karen hill peoples for consumption. The catchment is within Thailand and forms Kaeng Krachan National Park, where hunting and collection of wildlife is prohibited (van Dijk, *in litt.*, 22 March 1995).

In Mahongson and Tak Provinces in northwestern Thailand, commercial softshell trade again appears to be relatively small-scale. Most turtles here are also reportedly taken by Karen hill peoples for local consumption.

Few softshell turtles are now used for release animals at temples, although many temples have large specimens released years ago.

Prices paid to fishermen for softshell turtles (presumably mostly Asiatic Softshell Turtle) are variously quoted as in the region of 40-60 Baht (US$1.6-2.4) per kg, or the same price per individual turtle weighing 3-4kg. Middlemen then impose a mark-up of roughly 100% for sale to restaurants and individual consumers.

The Thai population of the Narrow-headed Softshell Turtle is confined to the Mae Klong basin where it is now regarded as highly threatened owing to habitat alteration (construction of reservoirs), pollution, subsistence hunting and, most importantly, demand for large softshells as pets (van Dijk, *in litt.*, 5 January 1995). Capture, of large specimens now appears to be a rare and noteworthy event. If taken alive, specimens are offered as live animals rather than for food, and can command large sums. One fish dealer in the Khao Laem Dam area reported that she had obtained a 76kg specimen in August 1993 from a Mon (Burmese hill tribe) fisherman. She paid 3 000 Baht (US$120) for the turtle and sold it to a softshell farmer

in Kanchanburi city for 16 000 Baht (US$640). The farmer reportedly intended to try to breed from it. A second specimen, a female weighing more than 60kg, was obtained in the same region in 1993 and sold to a zoo in Bangkok for breeding purposes, although it was then sold on because a male could not be procured.

Little information is available on the abundance of immature Narrow-headed Softshell Turtle but it appears that large adults are now very scarce in the wild.

Thailand appears to be the major breeding centre within Southeast Asia for softshell turtles, largely for export to China, Hong Kong, Japan, Korea and the territory of Taiwan. The non-native Chinese Softshell Turtle is the chief species involved. This species now also appears in significant numbers in Bangkok markets as native Asiatic Softshell Turtles have become scarce (van Dijk, *in litt.*, 22 March 1995).

As of early 1994, there were around 15 large-scale softshell farms in Thailand estimated to be producing between three and six million hatchlings of Chinese Softshell Turtles annually (Caskey, 1994). This species appears to adapt well to captive-breeding and matures rapidly in the tropics (van Dijk, *in litt.*, 22 March 1995). Females reportedly become mature at 1.5-2.0 years of age and lay multiple clutches of 10-20 eggs during a long laying season, from February to September. Eggs are placed in hatcheries and hatch after 60 days or so. On one farm, hatchling survival rate was given as 70-80%. Brood stock is fed a mixture of vegetable and animal matter (typically marine waste fish mixed with rice bran) and, in one farm at least, is turned over every six months or so. Hatchlings are fed boiled waste fish only and are usually exported at between one and 10 days old. Export price is reportedly around 25 Baht (US$1.0) per turtle, indicating the whole trade may be worth US$3-6 million annually.

This industry appears to be expanding rapidly. Some involved in it estimated that there could be as many as 100 softshell turtle farms in Thailand by 1996, with a potential production of up to 40 million hatchlings.

Efforts to breed native softshell species appear to be on a much smaller and less successful scale than breeding efforts with Chinese Softshells. Caskey interviewed a farmer in Chumporm Province who had amassed a stock of 300 softshells of three different species (presumably the Asiatic Softshell Turtle, Malayan Softshell Turtle and Asian Giant Softshell Turtle) ranging up to 50kg in weight, with the intention of breeding from them. However, he abandoned the effort after all of them died within a short period, almost certainly of disease brought about by incorrect husbandry techniques. At least one Chinese Softshell Turtle farmer has kept a stock of Thai native softshells for more than five years but has found breeding uneconomical to date probably owing to a shorter breeding season, smaller clutches and lower hatching and survival rates. The Asiatic Softshell Turtle is also not favoured by importers in the countries to which the turtles are exported. Legal protection of Thai softshells other than Asiatic Softshell Turtle also presents problems for potential breeders (Caskey, 1994).

Vietnam (native species: Asian Giant Softshell Turtle, Asiatic Softshell Turtle, Chinese Softshell Turtle, Wattle-necked Softshell Turtle)

Softshell turtles were observed in trade in Vietnam, although in relatively low volume (Le Dien Duc and Broad, 1995). All four native species were observed in trade, generally in similar or slightly smaller volumes than other chelonians. The Chinese Softshell Turtle and Wattle-necked Softshell Turtle were the two most commonly recorded species, with the Asian Giant Softshell Turtle and Asiatic Softshell Turtle seen rarely. With the exception of the extremely valuable Chinese Three-striped Box Turtle, used as a medicine, softshells generally commanded higher prices than other chelonians, in the range of

100 000-150 000 dong/kg (US$10-15 per kg), compared with prices of other chelonians of 40 000-100 000 dong/kg (US$4-10 per kg). These prices are, in dollar terms, considerably higher than those quoted for other countries in the region where prices are usually in the range of US$1.5-4 per kg.

Softshells form part of the large-scale export of chelonians to China, through land border crossings at Lang Song and Dong Dang and at the port of Mang Cai, although data are lacking on what proportion they represent of the total chelonian trade. Le Dien Duc and Broad (1995) estimate the total chelonian trade amounts to at least 200 000kg annually. An unknown but probably significant proportion of this trade originates in neighbouring Cambodia and Lao PDR.

POND TURTLES, FAMILY EMYDIDAE, AND THE LARGE-HEADED TURTLE, FAMILY PLATYSTERNIDAE

The Emydidae is by far the largest of the modern families of chelonians, its 96 currently recognized species comprising more than one-third of all living chelonian species. The family is largely confined to the Northern Hemisphere (where it is extremely widespread), although several Indonesian and a few South American species are found south of the equator. Pond Turtles are generally aquatic or semi-terrestrial and very variable in size and form. The family is divided into two sub-families, the Batagurinae and the Emydinae. All Southeast Asian species belong to the former.

Some 26 or 27 species are recorded as occurring in Southeast Asia, making the Emydidae the most diverse chelonian family in the region. Indochina (notably Vietnam) and Myanmar are particularly rich in species. Some species are little known and some are of doubtful taxonomic status.

In this report, the four largest estuarine or riverine species (the Batagur, *Batagur baska*, Painted Terrapin *Callagur borneoensis*, Burmese Roofed Turtle *Kachuga trivittata* and Malayan Giant Turtle *Orlitia borneensis*) are treated separately from the remaining species. These have a distinctive, shared biology and are faced with similar threats.

One further species will be considered along with the remaining emydids. This is the Large-headed Turtle *Platysternon megacephalum*, placed in its own monotypic family, the Platysternidae. The affinities of this family remain the subject of debate. Some experts consider it closely related to the Emydidae and the Testudinidae while others maintain it is nearest to the New World Snapping Turtles in the family Chelydridae. Biologically and in trade terms, it is similar to the smaller emydids and for this reason it is included here.

Species

Red-necked Pond Turtle *Chinemys nigricans* (= *Chinemys kwangtungensis*)

The Red-necked Pond Turtle is a southern Chinese species that may range into northern Vietnam (Felix, 1965 cited in Iverson, 1992), although there appear to be no definite records. It is an inhabitant of mountain streams and produces a clutch of only one or two eggs.

Southeast Asian Box Turtle *Cuora amboinensis*

The Southeast Asian Box Turtle is very widespread in Southeast Asia, occurring in much of Indonesia (Greater and Lesser Sundas, Sulawesi, Moluccas, Timor, Kalimantan), Malaysia (Peninsular, Sarawak, Sabah), Myanmar, Philippines, Thailand, Vietnam, and probably Cambodia, Lao PDR and Singapore. Extralimitally it has been recorded in Bangladesh and eastern India.

It is an omnivorous species apparently equally at home on land and in water, generally found in or near streams, ponds, marshes and rice paddies. Carapace length of adults may reach 22cm and they may weigh around 1.5kg. Females lay several clutches a year, each of two to three eggs (Das, 1991; Wirot, 1979).

Indochinese Box Turtle *Cuora galbinifrons*

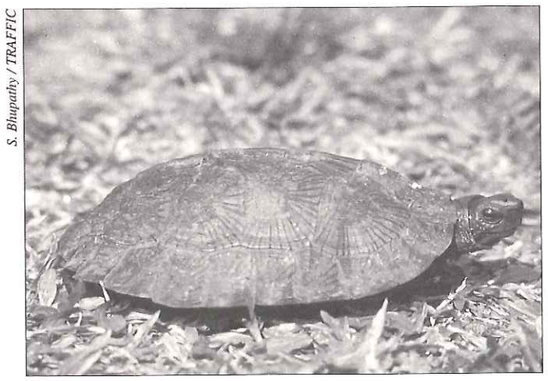
The Indochinese Box Turtle is known only from northern Vietnam and southern China, including Hainan. It may well also occur in Lao PDR. Nothing is known of its habits in the wild.

Chinese Three-striped Box Turtle *Cuora trifasciata*

The Chinese Three-striped Box Turtle has been recorded in only northern Vietnam and southern China, including Hainan, although specimens in trade in Vietnam are reported to have come from Lao PDR and Cambodia. Adults have a carapace length of around 20cm. In southern China it has been found in clear streams at 50-400m altitude. Laying of eggs takes place in May in this region; two eggs are laid in a clutch (Pritchard, 1979).

Asian Leaf Turtle *Cyclemys dentata* (may include *Cyclemys tcheponensis*)

Asian Leaf Turtle *Cyclemys dentata*.



S. Bhupathy / TRAFFIC

The Asian Leaf Turtle is a widespread Southeast Asian species, recorded in Indonesia (Greater Sundas), Lao PDR, Malaysia (Peninsular, Sabah, Sarawak), Myanmar, the Philippines, Thailand and Vietnam. It probably also occurs in Brunei, Cambodia and Singapore. Extralimitally it is found in eastern India, Bangladesh and China, and possibly in Bhutan and Nepal.

Adults have a carapace length of around 23cm and may weigh up to 1.5kg. The species is omnivorous and mostly aquatic (van Dijk, *in litt.*, 22 March 1995). Females become mature at 7-10 years of age and lay clutches of two to three eggs annually (Das, 1991).

Stripe-necked Leaf Turtle *Cyclemys tcheponensis* (*Geoemyda tcheponensis*, may be synonymous with *C. dentata*)

The taxonomic status of the Stripe-necked Leaf Turtle is open to dispute. Some authorities consider it a form of *Cyclemys dentata*, others maintain that it is a separate species. It is recorded from Lao PDR, Thailand and Vietnam and may occur in Cambodia. It is similar in size and appearance to *C. dentata* and presumably also in its biology.

Black-breasted Leaf Turtle *Geoemyda spengleri*

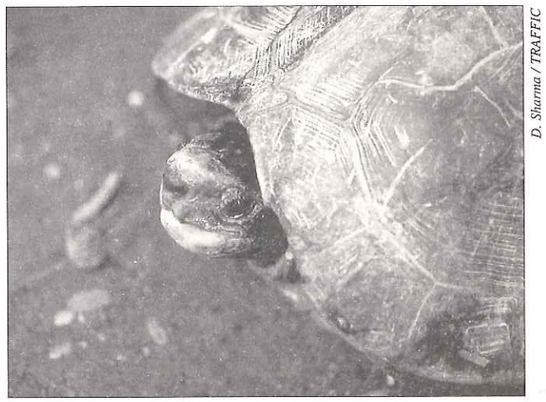
The Black-breasted Leaf Turtle is recorded from Vietnam, southern China and extreme southern Japan. It probably also occurs in Lao PDR. It is a small species, reaching a carapace length of around 13cm, and appears to be mainly terrestrial, although its feet are partially webbed.

Arakan Forest Turtle *Heosemys depressa* (= *Geoemyda depressa*)

The Arakan Forest Turtle is a very little-known species recorded only from the Arakan Hills region in coastal Myanmar. It has been collected only once (in 1908) since its discovery in the nineteenth century (van Dijk, *in litt.*, 22 March 1995). The original specimens had a carapace length of around 26cm. It is classified by IUCN as Insufficiently Known (K).

Giant Asian Pond Turtle *Heosemys grandis* (= *Geoemyda grandis*)

Giant Asian Pond Turtle *Heosemys grandis*.



D. Sharma / TRAFFIC

The Giant Asian Pond Turtle is confined to mainland Southeast Asia where it is recorded in Cambodia, Malaysia, Myanmar, Thailand and Vietnam. It almost certainly also occurs in Lao PDR. It is a large species, reaching a carapace length of around 45cm and weighing up to 12kg, and is largely aquatic (Wirot, 1979). Its habitat ranges from lowland swamps to seasonal hill streams (Thirakhupt and van Dijk, in press).

Philippine Pond Turtle *Heosemys leytensis*
(= *Geoemyda leytensis*)

The Philippine Pond Turtle is known from only four specimens from Palawan and Leyte Islands in the Philippines. It is classified by IUCN as Indeterminate (I).

Spiny Turtle *Heosemys spinosa* (= *Geoemyda spinosa*)

The Spiny Turtle is confined to Southeast Asia, where it occurs in Brunei, Indonesia (Sumatra and offshore islands and Kalimantan), Malaysia (Peninsular, Sabah, Sarawak), Singapore and southern Thailand. It probably also occurs in Tenasserim in southern Myanmar. IUCN classifies it as Insufficiently Known (K).

The Spiny Turtle is a small species, reaching a carapace length of around 20cm and weighing up to 1kg. It is reportedly almost entirely terrestrial, living in shady, humid areas.

Yellow-headed Temple Turtle *Hieremys annandalii*

The Yellow-headed Temple Turtle is confined to mainland Southeast Asia, where it is recorded from Cambodia, Malaysia, Thailand and Vietnam, probably also occurring in Lao PDR.

This is a large turtle, with a carapace length of up to 45cm and weighing around 12kg. It is herbivorous and predominantly aquatic, being found in lowland rivers, swamps and marshy fields. Adults are reputedly tough and adaptable, although juveniles are quite delicate (van Dijk, *in litt.*, 22 March 1995).

Malayan Snail-eating Turtle *Malayemys subtrijuga* (= *Damonia subtrijuga*)

The Malayan Snail-eating Turtle is recorded from Indonesia (Sumatra and Java), extreme northern Peninsular Malaysia, Thailand and Vietnam. It almost certainly occurs in Cambodia and Lao PDR. The Indonesia populations may be introduced (Dammerman, 1929). This turtle may reach a carapace length of

more than 30cm (Pritchard, 1979) although Wirot (1979) quotes an adult size of 17cm and a weight of 0.6kg. It inhabits streams, rivers, marshes and rice paddies and is apparently strictly carnivorous.

Annam Leaf Turtle *Mauremys annamensis* (= *Annamemys annamensis, Annamemys merkleni*)

Annam Leaf Turtle is known only from central Vietnam. Formerly placed in its own, monotypic genus, *Annamemys* is now included in the widespread genus *Mauremys* (Iverson and McCord, 1994). The species has been very rarely recorded and is classified by IUCN as Insufficiently Known (K). Its carapace length may exceed 20cm (van Dijk, *in litt.*, 22 March 1995).

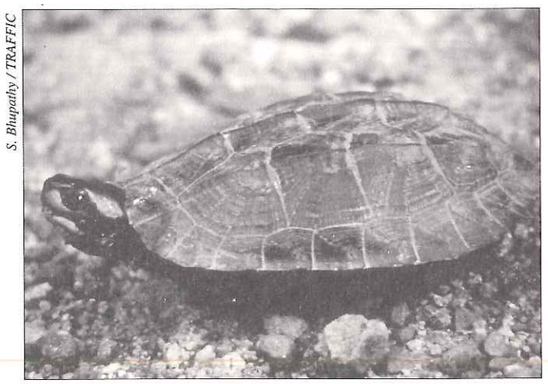
Yellow Pond Turtle *Mauremys mutica* (variously known as *Cyclemys mutica*, *Cyclemys nigricans*, *Mauremys nigricans* and *Annamemys grochovskiae*)

Within Southeast Asia, the Yellow Pond Turtle is known only from Vietnam, although it may also occur in Lao PDR. Outside the region, it occurs in China, the territory of Taiwan and the Ryukyu islands in extreme southern Japan. It is reported to be an aquatic, low-altitude species, reaching a length of around 20cm.

[An undescribed *Mauremys* species, apparently from northern Myanmar has entered the pet trade in the USA (Iverson, 1992). Further details are lacking.]

Indian Black Turtle
Melanochelys trijuga.

Indian Black Turtle *Melanochelys trijuga* (= *Geoemyda trijuga*)



S. Bhupathy / TRAFFIC

The Indian Black Turtle is recorded from Myanmar and western Thailand within Southeast Asia although van Dijk (*in litt.* to F. Lambert, IUCN Species Survival Commission, 23 November 92) stated that this species may not be indigenous in Thailand. It also occurs in India, Sri Lanka, Bangladesh, Nepal and probably Bhutan. Myanmar and Thai populations have a carapace length of around 25cm and weigh about 2kg. The species is omnivorous and found both in water and on land. Females are thought likely to lay several clutches of three to eight eggs each year (Das, 1991).

Burmese Eyed Turtle *Morenia ocellata*

The Burmese Eyed Turtle is recorded from only Myanmar. It is classified as Insufficiently Known (K) by IUCN and listed in Appendix I of CITES. The species is reportedly strictly aquatic. Adults have a carapace length of around 23cm.

Malayan Flat-shelled Turtle *Notochelys platynota*

The Malayan Flat-shelled Turtle is confined to Southeast Asia, where it is found in Indonesia (Greater Sundas), Malaysia (Peninsular, Sabah, Sarawak), southern Thailand and southern Vietnam. It almost certainly occurs in Brunei and probably Cambodia. Iverson (1992) notes that reports of the species in Myanmar may be in error. This is a moderately large species, reaching a carapace length of more than 30cm. It is largely aquatic, and apparently omnivorous.

Chinese Stripe-necked Turtle *Ocadia sinensis*

The Chinese Stripe-necked Turtle is recorded from northern Vietnam and probably also occurs in Lao PDR. Outside Southeast Asia, it is recorded from China, including Hainan and the territory of Taiwan. It is a fairly small species, with a carapace length of around 25cm, and inhabits quiet waters, generally in open country at low elevations. In captivity, it is predominantly herbivorous (Pritchard, 1979).

Keeled Box Turtle *Pyxidea mouhotii* (= *Cyclemys mouhoti, Geoemyda mouhoti*)

The Keeled Box Turtle is recorded in Southeast Asia from northern Vietnam, Lao PDR, Thailand and Myanmar although van Dijk (*in litt.* to F. Lambert, IUCN Species Survival Commission, 23 November 92) stated that this species may not be indigenous in Thailand. Outside the region, it is found in southern China and in Assam in eastern India. This is a small, entirely terrestrial species, which reaches a carapace length of around 17cm and a weight of 0.5kg (Das, 1991).

Four-eyed Turtle *Sacalia quadriocellata* (= *Clemmys quadriocellata*)

The Four-eyed Turtle is apparently confined to northern Vietnam and southern China, including Hainan. It may also occur in Lao PDR. It is a small species, reaching an adult carapace length of around 12cm, and apparently inhabits mountain streams. Clutch size is reportedly two.

Black Marsh Turtle *Siebenrockiella crassicollis*

The Black Marsh Turtle is confined to Southeast Asia where it is found in Indonesia (Greater Sundas), Malaysia (Peninsular, presumably Sabah and Sarawak), Myanmar, Thailand, Vietnam, presumably Cambodia and Brunei and perhaps Lao PDR and Singapore. It is usually a small species, with a carapace length of around 17cm, although large individuals may be twice this size. It is mainly carnivorous and largely aquatic, inhabiting ponds, marshes and sluggish streams.

Big-headed Turtle *Platysternon megacephalum*

The Big-headed Turtle is the sole living representative of the family Platysternidae and has been recorded from Cambodia, Lao PDR, Myanmar, Thailand and Vietnam as well as southern China, including Hainan. It is a fairly small species, with a carapace length rarely exceeding 20cm, and has a disproportionately large head that cannot be retracted and a tail roughly as long as the shell. It is mainly an inhabitant of swift-flowing, cool montane streams but is reported to be a good climber. It is exclusively carnivorous and produces clutches of two eggs.

Uses of pond turtles

The pond turtles feature in all types of chelonian trade in Southeast Asia. They are widely eaten, but are generally considered less desirable than softshells. Some species are heavily exploited for the medicinal trade. These smaller species are probably used more for release animals than the other groups (tortoises, softshells and the large river terrapins), although this is likely to be because they are generally less valuable for other purposes.

Country reports

Cambodia (native species: The fauna of Cambodia is extremely poorly catalogued. Species lists for the country are therefore largely derived by inference. There appear to be definite locality records for the Big-headed Turtle, Giant Asian Pond Turtle and Yellow-headed Temple Turtle (Iverson, 1992); the Black Marsh Turtle, Chinese Three-striped Box Turtle, Malayan Snail-eating Turtle and Southeast Asian Box Turtle all reportedly feature in the export trade, although the occurrence of both the Chinese Three-striped Box Turtle and the Malayan Flat-shelled Turtle seems unlikely (van Dijk, *in litt.*, 22 March 1995); the Asian Leaf Turtle and Stripe-necked Leaf Turtle may occur, based on their distribution in adjacent countries.)

Although there is virtually no direct information on exploitation and trade in emydids in Cambodia, a notable proportion of specimens in trade in Vietnam, most destined for export to China, originate in Cambodia (Le Dien Duc and Broad, 1995). Species to which this applies include the Big-headed Turtle, Chinese Three-striped Box Turtle, Southeast Asian Box Turtle and Yellow-headed Temple Turtle. It is likely that others are also involved.

Indonesia (native species: Asian Leaf Turtle, Black Marsh Turtle, Malayan Flat-shelled Turtle, Malayan Snail-eating Turtle, Southeast Asian Box Turtle, Spiny Turtle)

Information on local use and export of the smaller emydids in Indonesia is patchy. Nevertheless, there are indications of a substantial export trade. Van de Bunt (1990) reports official export statistics of 37 000 Southeast Asian Box Turtles from Sumatra in 1988. An even larger export trade exists for this species in Sulawesi. Giessen *et al.* (1991) recorded annual exports to Hong Kong of up to 13 tonnes of Southeast Asian Box Turtle plastron from Ujung Pandang in Sulawesi. This was estimated to represent up to 200 000 individuals. The plastron was reportedly cut off the living animal, the rest of which was discarded. Animals of all age and sex classes were used and it seemed likely that the trade was not sustainable.

Lao PDR (Like that of Cambodia, the fauna of Lao PDR is inadequately known; species lists are therefore usually based more on inference than on actual records. For example, a high proportion of species recorded from Vietnam may also occur in Lao PDR. The following species are based on definite records: Asian Leaf Turtle, Big-headed Turtle, Keeled Box Turtle; the following species are based on trade data: Black Marsh Turtle, Chinese Three-striped Box Turtle, Malayan Snail-eating Turtle; the following species are conjectured to occur, based on their occurrence in adjacent areas: Four-eyed Turtle, Giant Asian Pond Turtle, Indochinese Box Turtle, Stripe-necked Leaf Turtle, Yellow-headed Temple Turtle, Yellow Pond Turtle. Other Vietnamese species that could conceivably occur but are less likely (van Dijk, *in litt.*, 22 March 1995) are Annam Leaf Turtle, Black-breasted Leaf Turtle, Chinese Stripe-necked Turtle, Red-necked Pond Turtle.)

There appears to be extensive export of turtles from Lao PDR to Thailand and to Vietnam, although the latter remains unquantified.

It is reported that one metric ton of shell of Malayan Snail-eating Turtles is exported from Pakse to Thailand annually. The shells are collected over a period of many months before being exported once a year in bulk *via* Chong Mek. This species is considered still relatively common in southern Lao PDR. There is also small-scale export of the Black Marsh Turtle and Southeast Asian Box Turtle from Champasak to Thailand. Trade in the latter numbers an estimated 60-70 live specimens annually, most originating in Salavan Province east of Champasak and smuggled *via* Ban Mai. This species is considered

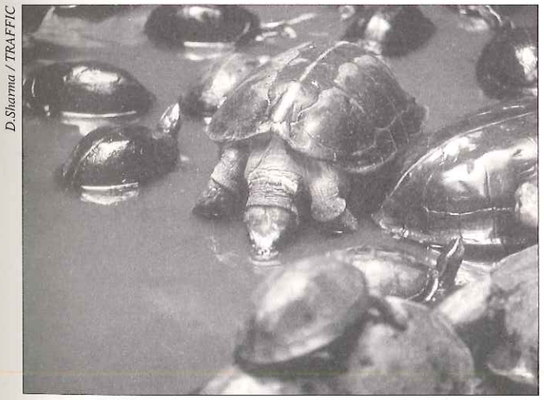
rare in southern Lao PDR. No estimate of numbers of Black Marsh Turtles in trade was available, although Lao Forestry Department officials stated that this species was commonly eaten in southern Lao PDR. A restaurant owner in Khong Chiam District in Thailand claimed that around 100 hard-shelled turtles were imported from Lao PDR *via* Ban Mai every month for sale as food (Baird, 1993).

Like Cambodia, the country is also an important supplier of the Vietnamese market, although the only species singled out by Le Dien Duc and Broad (1995) as definitely originating in Lao PDR is the Chinese Three-striped Box Turtle.

Malaysia (native species: Peninsular: Asian Leaf Turtle, Black Marsh Turtle, Giant Asian Pond Turtle, Malayan Flat-shelled Turtle, Malayan Snail-eating Turtle, Southeast Asian Box Turtle, Spiny Turtle, Yellow-headed Temple Turtle; Sabah and Sarawak: Asian Leaf Turtle, Malayan Flat-shelled Turtle, Southeast Asian Box Turtle, Spiny Turtle and presumably Black Marsh Turtle)

There appears to be a relatively low level but persistent use of emydid turtles in Peninsular Malaysia, chiefly for food but also for pets and as release animals. Most demand for pets is satisfied by imported Common Slider *Trachemys scripta* hatchlings from the USA, these being the most widely and abundantly offered turtles in pet shops in Penang, Perak (Ipoh and Taiping), Melaka, Terengganu and Kuala Lumpur (Sharma, 1994). The non-native Indian Star Tortoise *Geochelone elegans* also appears regularly.

Chelonians at Sam Poh Tong Temple in Ipoh.



D.Sharma / TRAFFIC

Native species, although fairly frequently sold in "pet shops" seem to be destined for human consumption. The most common in trade are the Black Marsh Turtle, Giant Asian Pond Turtle and Southeast Asian Box Turtle. The Giant Asian Pond Turtle features frequently as a temple turtle, partly because of its large size but also because it is seems particularly well adapted to the usually overcrowded and polluted conditions of temple ponds.

Other species observed for sale in the past few years include the Asian Leaf Turtle and Spiny Turtle. Evidence of subsistence consumption of the Malayan Flat-shelled Turtle was found in the north. It appears that these species were more widely used in the past. Moll, writing in 1987 noted that these, although still appearing in small numbers in markets in northwest Peninsular Malaysia, were far less abundant in trade than they had been in the mid-1970s (Moll, 1987).

The relative abundance of species in trade is thought likely to be a reflection of their abundance in the wild, assuming similar ease of capture (there is little evidence for differential demand for these species). Therefore, the decline in numbers of specimens in markets, and the non-appearance of the Malayan Snail-eating Turtle (and the Yellow-headed Temple Turtle, if this is a native species), is believed to be a reflection of a real decline in abundance in the wild. The absence of the Malayan Snail-eating Turtle is noteworthy as this species is the most abundant emydid in trade in both Thailand and Vietnam.

Thailand (native species: Asian Leaf Turtle, Big-headed Turtle, Black Marsh Turtle, Giant Asian Pond Turtle, Malayan Flat-shelled Turtle, Malayan Snail-eating Turtle, Southeast Asian Box Turtle, Spiny

Turtle, Stripe-necked Leaf Turtle, Yellow-headed Temple Turtle; reports of Indian Black Turtle and Keeled Box Turtle are conflicting).

Most evidence indicates that exploitation of smaller emydids and Big-headed Turtles in Thailand is at a fairly low level. As with tortoise trade, however, it is difficult to gather detailed information because of the increasing awareness among traders of the illegal nature of much of the trade.

Puginier (1994), in his survey of markets in northern Thailand, identified only three species in trade, the Indian Black Turtle, Malayan Snail-eating Turtle and Southeast Asian Box Turtle. Of these, the vast majority (75 out of 77 specimens) consisted of Malayan Snail-eating Turtles, the other two species being represented by only one specimen each. It is possible that the Indian Black Turtle was in fact a misidentified *Cyclemys* (van Dijk, *in litt.*, 22 March 1995).

In one market (Uttaradit) 17 Malayan Snail-eating Turtles were on sale associated with the festival of "Loi Krathong". Puginier was told that freshwater turtles were only occasionally actively hunted, mainly at that time of year for this festival. As with tortoises, turtles were regarded by traders as less profitable wild food items than other animals such as birds, lizards and snakes, although it was not clear if this was because they were considered less palatable or were now generally too rare to be collected and traded in systematically.

Van Dijk (*in litt.* to F. Lambert, IUCN Species Survival Commission, 23 November 1992) divided the smaller Thai emydids into two groups. The first were human-tolerant species able to survive in modified habitats such as ponds, canals, ditches and rice paddies and apparently capable of sustaining the relatively low level of exploitation currently observed. This group included the Black Marsh Turtle and the Malayan Snail-eating Turtle, and perhaps the Giant Asian Pond Turtle and Southeast Asian Box Turtle.

The second group were species which inhabited forests and forest-streams and were less tolerant of human disturbance. These species were thought likely to become increasingly dependent on enforced protected areas for their survival. They included the Asian Leaf Turtle, Big-headed Turtle, Indian Black Turtle, Keeled Box Turtle, Malayan Flat-shelled Turtle, Stripe-necked Leaf Turtle and Yellow-headed Temple Turtle, if the Keeled Box Turtle and Indian Black Turtle did indeed occur in Thailand.

The Spiny Turtle is the source of some concern. In Thailand it is confined to the south, where it is scarce. There is some local exploitation and it is suspected that the international pet trade may be of significance, although data are lacking (van Dijk, op. cit.).

Vietnam (native species: Annam Leaf Turtle, Asian Leaf Turtle, Big-headed Turtle, Black Marsh Turtle, Black-breasted Leaf Turtle, Chinese Stripe-necked Turtle, Chinese Three-striped Box Turtle, Four-eyed Turtle, Giant Asian Pond Turtle, Indochinese Box Turtle, Keeled Box Turtle, Malayan Snail-eating Turtle, Southeast Asian Box Turtle, Stripe-necked Leaf Turtle, Yellow-headed Temple Turtle, Yellow Pond Turtle; possibly Red-necked Pond Turtle. Van Dijk (*in litt.*, 22 March 1995) stated that a recorded Malayan Flat-shelled Turtle was probably misidentified *Cyclemys*)

Vietnam has easily the largest emydid fauna in Southeast Asia and one of the most diverse in the world, mainly because it combines elements from two faunal regions, the Indo-Malayan and the Far Eastern. Six Vietnamese species (possibly seven if the Red-necked Pond Turtle does occur there) belong to the latter category. A good proportion of these are likely to occur in Lao PDR and some in Cambodia, but this remains unconfirmed with the fauna of these two countries still very inadequately documented.

Field surveys in 1993-1994 recorded trade in 12 emydid species and in the Big-headed Turtle (Le Dien Duc and Broad, 1995). The only native species not recorded were the Asian Leaf Turtle, Black Marsh Turtle and Chinese Stripe-necked Turtle, although the Asian Leaf Turtle is very similar to and possibly synonymous with the Stripe-necked Leaf Turtle that was recorded. Records of the Annam Leaf Turtle in trade are intriguing. This very little-known species has only been recorded in the wild from central Vietnam, but was reported on sale in Ca Mau, Minh Hai Province, in the extreme south of the country (Le Dien Duc and Broad, 1995). Chelonians on sale at Ca Mau are all collected locally, in the Mekong Delta region and are usually sold to traders from Ho Chi Minh City, generally for ultimate export to China. If turtles of this species were on sale in Ca Mau, this may represent a significant range extension; however, the possibility of misidentification or transportation south from central Vietnam remains. The species occasionally appears in the pet trade in Europe and Bangkok, Thailand (van Dijk, *in litt.*, 22 March 1995).

The three most abundant species in trade were the Indochinese Box Turtle, Malayan Snail-eating Turtle and Southeast Asian Box Turtle. Distribution of the two *Cuora* species in markets corresponded to their known wild ranges: the Indochinese Box Turtle, which is confined to the northern part of the country, was only recorded on sale in the north while the Southeast Asian Box Turtle, which is found in the south, was recorded commonly on sale in markets in Ho Chi Minh city. The latter was also recorded in smaller numbers in northern markets, where it was presumably destined for export to China.

Market prices for most species appeared similar, mostly in the range of 20 000 dong/kg (US$2 per kilo) to 100 000 dong/kg (US$10 per kilo). Variation in price was often apparently as much to do with the location of the market as with the species involved. One significant exception to this was the Chinese Three-striped Box Turtle. This small northern species is in extremely high demand. The price for one in Hanoi in 1993 was 500 000-1 500 000 dong (US$50-150), roughly 10 times that of other native non-marine chelonians. The Chinese Three-striped Box Turtle was the most sought-after species in pharmacies in Lan 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

Box and packets of manufactured tortoiseshell medicine.

Crawford Allan / TRAFFIC

medicinal value" (Zhou and Zhou, 1992). 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, *in litt.*, 22 March 1995).

The only comparable prices to these for other species were recorded by Bezuijen (1994) in Cau Mong market, Ho Chi Minh City. A single individual of Spotted Turtle *Clemmys guttata*, a North American species, was priced at US$100 and two individuals of the Big-headed Turtle were valued at US$60. The price for the latter species is surprising, as surveys by the Centre for Natural Resources Management and Environmental Studies (CRES), University of Hanoi, found it valued at the same level as other emydids (40 000-100 000 dong/kg or US$4-10 per kg) in markets in north and central Vietnam (Le Dien Duc and Broad, 1995). Ho Chi Minh City is south of this turtle's known range in Vietnam and it is possible that a premium price was charged for the species because of its novelty value, although it is more likely that the price may have been deliberately inflated because the investigator was not Vietnamese.

As with other chelonians on the Vietnamese market, the vast majority of the trade is destined for export to China, mostly through the northern border-crossings at Dong Dang and Lang Son and port at Mong Cai. There are exceptions to this. What was apparently the single most numerous emydid in trade (and along with the Elongated Tortoise the most numerous chelonian), the Malayan Snail-eating Turtle, was also sold in large numbers, particularly in Ho Chi Minh City, as hatchlings for pets and as release animals. In addition, there was a small but regular trade in hatchlings of Black-breasted Leaf Turtles at Tam Dao Resort, Vinh Phu Province, a hill station 85km northwest of Hanoi. These were reportedly captive-bred. In view of the difficulty in collecting large numbers of hatchling turtles, a proportion of the young Malayan Snail-eating Turtles on sale may have been hatched in captivity but this could not be confirmed. Young Southeast Asian Box Turtles are also favoured as release animals, and could also conceivably be captive-bred. It is likely that the vast majority, if not all, of the rest of the trade is in wild-collected animals.

As with trade in tortoises and softshells, it is reported that a significant proportion of the Vietnamese trade originates in Cambodia and Lao PDR, although details are lacking.

LARGE RIVER TERRAPINS — FAMILY EMYDIDAE

Four Southeast Asian species of emydid share many aspects of their biology. Along with the giant softshell *Chitra indica*, they are also perhaps the most threatened chelonians in the region and among the most threatened in the world.

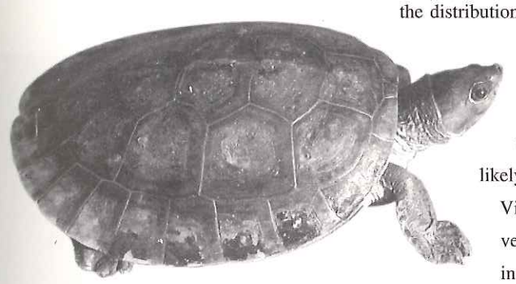
Species

Burmese Roofed Turtle *Kachuga trivittata*

The Burmese Roofed Turtle is only known from the Salween and Irrawaddy river basins in Myanmar, where it has been recorded as far north as Bhamo. It is the largest of the seven species of *Kachuga*, which are otherwise confined to the Indian subcontinent, and is closely related to *Kachuga kachuga*. Females can reportedly reach a carapace length of nearly 60cm, males are smaller (around 45cm). Virtually nothing is known of the status of the species, which is classified by IUCN as Insufficiently Known (K). Eggs are believed to be laid in sandbanks above tidal limits in December and January. Clutch size averages 25.

Batagur *Batagur baska*

Batagur *Batagur baska*.



S. Bhupathy / TRAFFIC

The Batagur, the sole member of its genus, is recorded within Southeast Asia from Indonesia (Sumatra), Peninsular Malaysia, Myanmar and southern Thailand, where it is virtually extinct. Early accounts refer to the distribution of the species as extending as far as Cochin China and the species is known from historical records from Cambodia's Tonie Sap and a few shells from Cambodia dating from the 1940s positively identified as belonging to this species (van Dijk, *in litt.*, 22 March 1995). It is likely, therefore, that the species also used to be found in Vietnam and Lao PDR and conceivably even survives in very low numbers in the region. Past or present occurrence in Lao PDR is the least likely as the species is usually found in the lower reaches of rivers. There do not appear to be any confirmed recent records for Indochina, and the species was not seen in trade in Vietnam in 1993-1994 (Le Dien Duc and Broad, 1995); its existence in Indochina therefore remains conjectural. Outside Southeast Asia, the Batagur is known from Bangladesh and India. The species is classified as Endangered (E) by IUCN and is listed in Appendix I of CITES.

The Batagur is a large aquatic species with a carapace length of up to 60cm, found outside the nesting season in brackish water at the mouth of large rivers and also upstream away from tidal influence, occasionally in freshwater lakes and canals. It is omnivorous although predominantly vegetarian, feeding particularly on fruits and leaves of the mangrove *Sonneratia*. Nesting is seasonal, typically colonial and usually takes place at traditional nesting sites. Mean clutch size on the Perak River in Peninsular Malaysia was 24. It is unclear how many clutches each female lays in one season. There are indications that up to three may be laid, although a study in Malaysia found that some females lay possibly only one (Moll, 1990). At the turn of the century, villagers in the Irrawaddy Delta reported that females laid three clutches a season, the first numbering around 30 eggs, diminishing to 10 by the end of the season. Hatchlings emerge after 70-80 days (Groombridge, 1982).

Painted Terrapin *Callagur borneoensis*

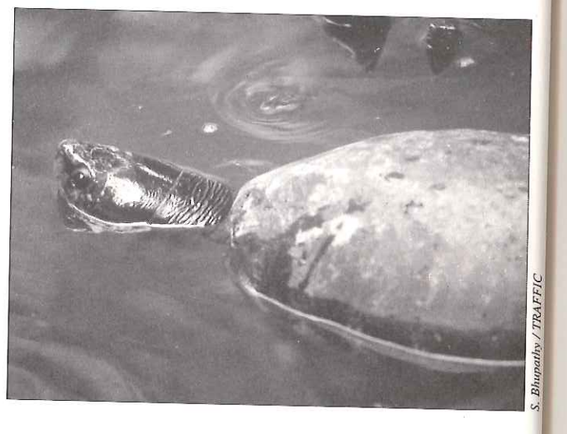
The Painted Terrapin, also in a monotypic genus, is confined to the Southeast Asian region, where it is known from southern Thailand where virtually extinct, Indonesia (Sumatra, Kalimantan), Malaysia (Peninsular Malaysia, Sarawak, perhaps Sabah) and perhaps Brunei. It could also occur in southern Myanmar adjacent to populations in Thailand. The species is classified as Endangered (E) by IUCN, but it is not covered by CITES.

The Painted Terrapin is typically somewhat smaller than the Batagur, normally reaching 50cm in carapace length, although de Rooij (1915) reported a specimen with a carapace length of 75cm, making it the largest emydid, along with the Malaysian Giant Turtle. It is aquatic and inhabits areas of tidal influence in medium to large rivers. Like the Batagur, it is omnivorous but primarily vegetarian, feeding particularly on fruits and leaves of the mangrove *Sonneratia*. Nesting pattern is similar to the Batagur, although the Painted Terrapin generally nests on ocean-facing sand beaches within a few kilometres of the mouth of the home river. These beaches are also used often for nesting by marine turtles. In mangrove areas where there are no suitable beaches nearby, nesting may take place on sandbanks within the river. There are reportedly only two clutches per season, each usually comprising 15-20 eggs. Hatchlings emerge in around 70 days and are

believed to make their way immediately to brackish waters, being unable to survive for long in pure sea water.

Malaysian Giant Turtle *Orlitia borneensis*

The Malaysian Giant Turtle is also in a monotypic genus confined to Southeast Asia, where it is recorded in Indonesia (Sumatra and Kalimantan) and Malaysia (Peninsular, Sarawak, perhaps Sabah) and may also occur in Brunei. It is classified by IUCN as Insufficiently Known (K) and is not covered by CITES. From what few data are available it seems that the Malaysian Giant Turtle is still rather more widespread and common in most of its range than the other species considered here. However, detailed population information is lacking. The Malaysian Giant Turtle is a very large species, reaching a reported maximum carapace length of around 75cm (de Rooij, 1915). Eggs are roughly the same size as those of the Painted Terrapin, from which it may be deduced that clutch size is also similar (15-20 eggs). The species is aquatic, but very little else appears to be known of its biology.



S. Blumathy / TRAFFIC

Malaysian Giant Turtle *Orlitia borneensis*.

USES OF LARGE RIVER TERRAPINS

The large river turtles, or at least the two species for which data are available (the Batagur and Painted Terrapin) are heavily exploited, chiefly for their eggs but also increasingly for food as adults.

Country reports

Indonesia (native species: Sumatra: Batagur, Malaysian Giant Turtle, Painted Terrapin; Kalimantan: Malaysian Giant Turtle, Painted Terrapin)

There is little quantitative information on the exploitation of the large river turtles in Indonesia although there is evidence that the market is increasing rapidly. Both Malaysian Giant Turtles and Painted Terrapins are harvested for meat in Kalimantan. The Malaysian Giant Turtle appears in markets in greater abundance than the Painted Terrapin, either because it is preferred or because it is more abundant or easily collected. Until the end of the 1980s, there was reportedly little, if any, export of these species from Kalimantan. Since then export for food has apparently increased dramatically, with the turtles commanding high prices.

Similarly, large-scale export ("truckloads") of turtles, including adult Malaysian Giant Turtles and Painted Terrapins and perhaps Batagurs, was reported from Medan in northern Sumatra in late 1994 (F. Bambang Yuwono, *in litt.* to D. Jelden, Bundesamt für Naturschutz, Bonn, Germany, 16 December 94). This was also a relatively new phenomenon. A survey in South Sumatra and Lampung Provinces in Sumatra in 1990 found virtually no local use of adult large turtles, of which Malaysian Giant Turtles were the most abundant in both tidal and upstream areas. This was because the predominantly Muslim local population do not eat turtle meat. The eggs, however, were widely harvested. In addition, logging companies had recently brought in workers from elsewhere, who would eat adult turtles, creating a demand for adults of these species (Moll, 1990).

Malaysia (native species: Peninsular: Batagur, Malaysian Giant Turtle, Painted Terrapin; Sarawak: Malaysian Giant Turtle, Painted Terrapin; Sabah: probably Malaysian Giant Turtle, Painted Terrapin)

Few details are available on the exploitation of the large river turtles in Sabah and Sarawak or on the status of the Malaysian Giant Turtle and Painted Terrapin populations there. The situation in Peninsular Malaysia is rather better known. Here, these turtles have been chiefly exploited for their eggs. The history of the egg harvest, particularly of the Batagurs in Perak, has been well documented as has the decline in population of this and the Painted Terrapin during the present century.

On Peninsular Malaysia, the best-documented and perhaps most historically important population of the Batagur is that on the Perak River in Perak State. Traditionally, the collection of eggs of the Batagur here was the prerogative of the Sultan of Perak. In 1915, the Perak Government passed the River Rights Enactment giving the Sultan of Perak sole and exclusive rights to harvest eggs of turtles of the genera *Batagur*, *Callagur*, *Orlitia* and *Hardella* (the last of these does not occur in Malaysia) from designated areas and to prevent anyone from killing turtles.

The harvest of the eggs around the turn of the century has been described (Moll, 1987, quoting Roff, 1967). Towards the end of each year, just before the start of the nesting season, guards would be sent by the Sultan downriver to the major Batagur nesting sites, particularly a large island called Pasir Telor, to prevent poaching. There were typically three mass-nestings each season. After the first nesting, the eggs were dug up and sent upriver to the Sultan; following the second laying, the nests were left intact and the Sultan was notified. This signalled the start of an annual holiday. The Sultan's entourage and their families, along with other dignitaries, would then move downriver to the nesting sites to spend two days digging up the eggs and enjoying themselves. The third laying was left untouched to hatch naturally, thereby helping to maintain the Batagur population.

This effective limiting of the harvest, and the fact that adults were generally not taken, allowed healthy Batagur populations to be maintained. It is estimated that, prior to World War II, the nesting population of Batagur females on the Perak may have approached 10 000, producing around 450 000-650 000 eggs per season. Individual nesting cohorts of females could number several hundred animals. However, during the Japanese occupation during World War II, food became extremely scarce and dietary laws were temporarily abandoned. As a result, adults began to be taken along with eggs and harvest of the latter ceased to be regulated. The Batagur population plummeted and has continued to decline ever since.

The egg-harvest regime changed considerably as the Sultan of Perak no longer supervised collection. Instead, licences were sold to individual collectors, under the condition that one-third of the harvest be given to the Sultan and one-third be reburied for hatching. In practice, only a token number of eggs were reburied, so egg harvest approached 100%. By the 1960s, egg harvests had dropped to a maximum of 20 000-30 000 each season and nesting cohorts of females rarely exceeded 50 animals. This suggests an overall nesting population of around 400-1 200 females, or perhaps 10% of the pre-war level. By the late 1980s, Moll estimated that the population may have declined by around 40% from the level in 1969-74, although he noted that there was considerable uncertainty, largely because it was not clear how many clutches each female laid. The largest cohort recorded in the main nesting area (Bota Kanan) in 1987-88 comprised only 19 females.

Although less well documented, the history of the Batagur population in Kedah State shows a similar pattern. Two rivers, the Sungei Muda and the Sungei Kedah, formerly had large nesting populations. Collection of eggs from these was traditionally the prerogative of the Sultan of Kedah. Up until the 1960s, egg collection here probably exceeded 100 000 eggs annually and at one of the main beaches, Pantai Raja on the Kedah, 700 turtles are reported to have been counted on one night. As at Perak, egg collection was something of a ceremonial occasion. The roads to the river would be shut off and boat traffic forbidden at night to avoid disturbing the nesting turtles. This breeding population has since collapsed, although not apparently through overharvest but rather because dam construction and removal of sand for building purposes has destroyed its traditional nesting beaches and prevented access to new ones.

The Painted Terrapin is rather more widespread in Peninsular Malaysia than the Batagur, but individual nesting populations are in general extremely small. Only the Setiu and Paka Rivers are believed to hold more than 100 nesting females each, with the former having a minimum of around 180 and the latter at least 80.

Egg-collection of the Painted Terrapin and Batagur has been a phenomenon of some economic importance. In the east coast states, a licence giving sole collection rights for Painted Terrapin eggs on a 2-3km stretch of beach may cost RM3 000-6 000 (US$1 200-2 400). The collector may then sell the eggs to the State Fisheries Department for hatching at RM1 (US$0.40) each or may dispose of them on the open market, where the retail price is around RM1.40 (US$0.56). A similar system operates with the Batagur in Perak. A licence to collect at one site reportedly costs RM20 (US$8) and eggs may be sold to the Department of Wildlife and National Parks (PERHILITAN) for RM1 (US$0.40).

D.Sharma / TRAFFIC

River Terrapin eggs at a hatchery in Perak, Malaysia.

There is little evidence at present of any exploitation of adult Batagurs, Malaysian Giant Turtles or Painted Terrapins in Peninsular Malaysia. There may be some small-scale export for the zoo and exotic pet trade, although the Batagur has been included in CITES Appendix I since 1975. Live animal exporters' price lists for the late 1980s included all three species. Malaysian Giant Turtle was the most expensive, priced at US$300-350 and described as very rare and difficult to obtain. Painted Terrapin prices were US$70-100 for females and US$200-280 for males. This difference in price between the two sexes presumably reflects both the greater difficulty of capturing males and their more attractive appearance and hence greater desirability for collectors. Batagurs were priced at US$70-170 each, including a price of US$100 for "babies".

Myanmar (native species: Batagur, Burmese Roofed Turtle, perhaps Painted Terrapin)

Very little information is available on current exploitation of these species in Myanmar. Van Dijk (1993) investigated status and use of turtles in the region of the Mytinge River (a tributary of the Irrawady) in central Myanmar south of Mandalay in January 1993. The Burmese Roofed Turtle was reported from this area and eggs believed to be of this species were collected in March. Aquatic turtles in general, presumably including *Kachuga*, were exploited year-round for local consumption. Villagers in the region considered turtle meat an essential part of their diet although it proved difficult to establish accurate figures for the numbers eaten. Although subsistence use of turtles was permitted, commercial trade was forbidden.

Thailand (native species: Batagur, Painted Terrapin)

There are only remnant populations of the Batagur and Painted Terrapin in Thailand, where both species are confined to the southernmost parts of the country, in Phattalung, Satun and Ranong Provinces. A 1990 survey found no sizeable population of either species, and very little evidence of breeding in the wild although there was a captive-breeding population of both species at the Freshwater Wildlife Preservation Station on the Klong River in Satun Province. Adults and eggs of both species were taken by local people for consumption when encountered. This and destruction of nesting beaches were identified as the major threats to the non-marine chelonians in Thailand, and it was concluded that the Batagur faced imminent extinction in the wild there unless extreme recovery efforts were made (Moll, 1990).

LAND TORTOISES — FAMILY TESTUDINIDAE

The Testudinidae comprises the familiar land tortoises of which some 40 living species are currently recognized. The family has a very wide distribution, being found in tropical and temperate terrestrial habitats throughout the world, with the exception of Australasia. Southeast Asia does not have a particularly diverse land tortoise fauna - only five living species are recorded from the region, one of which, the Travancore Tortoise *Indotestudo forstenii*, is of problematic origin. The Southeast Asian species were formerly all included in the genus *Geochelone*, but are now variously placed in this, *Indotestudo* and *Manouria*. The two species of *Manouria* are considered of particular scientific interest as they are widely regarded as the most primitive of all living Testudinidae, resembling aquatic emydid turtles in many respects (Groombridge, 1982). All members of the family found in Southeast Asia are included in CITES Appendix II.

Species

Burmese Star Tortoise *Geochelone platynota*

The Burmese Star Tortoise is confined to the southern part of Upper Myanmar in the dry vegetational zone, extending south to Moulmein but absent from Tenasserim (Groombridge, 1982). It is a small and very little-known tortoise, closely related to the Indian Star Tortoise. Females may attain 26cm carapace length; males rarely more than 15cm (Moll, 1989).

Elongated Tortoise *Indotestudo elongata* (= *Geochelone elongata*)

The Elongated Tortoise is a widespread species in mainland Southeast Asia, being found in Myanmar, Thailand, Cambodia, Vietnam, Lao PDR and northern Peninsular Malaysia. Extralimitally it is recorded from southern China, Bangladesh, India and Nepal; it could occur in Bhutan. This is a medium-sized tortoise, with a carapace length of up to 30cm and an average weight of over 2kg. It is generally found in deciduous forests (Moll, 1989; van Dijk, *in litt.*, 22 March 1995).

Travancore Tortoise *Indotestudo forsteni* (= *Geochelone forsteni*)

Within Southeast Asia, the Travancore Tortoise is known only from the island of Sulawesi, Indonesia, although it has also been reported from nearby Halmahera. Outside Southeast Asia, the species is confined to hills in the Travancore region of southwest peninsular India. It is classified by IUCN as Rare (R).

S. Bhupathy / TRAFFIC

Elongated Tortoise
Indotestudo elongata.

The status and origin of the population on Sulawesi (and on Halmahera if reports of its presence there are reliable) remain enigmatic. This population was originally regarded as specifically distinct from the Indian population, which was named *Geochelone travancorica*. The two have now been synonymised. In view of the dramatically disjunct distribution of this and the more widespread Indian population and the long association of tortoises and humans, it seems likely that the population is the product of human introduction (Groombridge, 1982).

Asian Brown Tortoise *Manouria emys* (= *Geochelone emys*)

The Asian Brown Tortoise is recorded within Southeast Asia in Indonesia (Sumatra and Kalimantan), Malaysia (Peninsular, Sarawak and probably Sabah), Myanmar and Thailand. It probably occurs in Brunei. Outside this range, it is known to occur in Bangladesh and India. Populations in northwest Thailand referred to as *Testudo natapundi* by Wirot (1979) are now included in this species. There are nineteenth and early twientieth century reports of the species in China and Vietnam, but it is thought that they may have been based on imported specimens (Moll, 1989). It is classified as Vulnerable (V) by IUCN.

This is the largest of the Asiatic tortoises, reaching 47cm in length and weighing up to 30kg. It is primarily confined to evergreen forests and is mainly herbivorous although it also takes small animals. Clutch size in captive animals ranges from 23 to 51, with an average of 40 (van Dijk, *in litt.*, 22 March 1995). The number of clutches annually is unknown.

Impressed Tortoise *Manouria impressa* (= *Geochelone impressa*)

The Impressed Tortoise is confined to Southeast Asia, where it is known to occur in Myanmar, Thailand, Peninsular Malaysia, Vietnam and Lao PDR (Pritchard, 1995). It is likely to occur in Cambodia as well. Extralimitally it may occur in China. It is classified by IUCN as Insufficiently Known (K). The species is moderately-sized, to about 28cm carapace length. It is strictly a hill or montane species found only at considerable altitude, usually in forest. Virtually nothing is known of its biology or behaviour in the wild, although it is said to be herbivorous (Moll, 1989).

USES OF TORTOISES

In terms of use, there appears to be very little distinction made between the land tortoises in Southeast Asia and many of the emydid turtles. It seems that, for example, plastron of the Elongated Tortoise is interchangeable with that of the Southeast Asian Box Turtle or, within China, of Reeves' Turtle *Chinemys reevesii* for use in medicinal compounds. Similarly, tortoises are evidently regarded in a similar fashion to emydids as food items. The international pet trade draws more distinction at species level. In general, tortoises such as the Burmese Star Tortoise and Elongated Tortoise can expect to be more sought-after than, for example, the majority of emydids. It is not, however, possible to assert that all tortoises are more desirable than all other species (e.g. the emydid Spiny Turtle is certainly more sought-after than the Asian Brown Tortoise).

Country reports

Cambodia (native species: Elongated Tortoise, possibly Impressed Tortoise, perhaps Asian Brown Tortoise)

Mundkur *et al.* (1995) observed that tortoises and turtles comprised the majority of wildlife seen in trade in Stung Treng, a market town on the Mekong. At least six species of chelonians were involved, including the Elongated Tortoise. Some trade was to Phnom Penh, but most was in the form of direct exports to Vietnam. The volume of the trade was reported to exceed several tonnes per month, although it is not known what proportion of this was Elongated Tortoises.

Le Dien Duc and Broad (1995) in their study of the tortoise and freshwater turtle trade in Vietnam noted that a substantial proportion of the Vietnamese trade in the Elongated Tortoise appeared to originate in Cambodia. This species is traded at a high level in Vietnam, with possibly well over 100 000 individuals in trade annually.

Indonesia (native species: Asian Brown Tortoise; debatably Travancore Tortoise)

Indonesia has an impoverished tortoise fauna. Only one species, the Asian Brown Tortoise, is definitely native. There is very little information on local exploitation of this species or the Travancore Tortoise, which is widely held to have been introduced to Indonesia from India. However, some export data are available as both species are included in CITES Appendix II. Around 450 Asian Brown Tortoises were recorded as exports by Indonesia in the period 1988-1993. All were recorded as live, presumably for the zoo and exotic pet trade, and 75% were exported to the USA.

Just over 1 700 Travancore Tortoises were recorded as exported in the same period, again all as live animals. Just under half were imported by the USA, the remainder was destined for the Netherlands, Japan, Thailand and Singapore and one shipment of 110 to an undeclared destination.

Export of this species is a matter of some interest as the population in Indonesia has hitherto been considered extremely rare. However, Yuwono (*in litt.*, 9 February 1995) reports that it is not uncommon in central Sulawesi, around Palu and Poso, and that up to 1 000 a year can be collected without much difficulty. However, demand on the international pet-trade market is not high, chiefly because the species is very similar to the Elongated Tortoise, which has been obtainable in large quantities and very cheaply.

Lao PDR (native species: Elongated Tortoise, Impressed Tortoise, perhaps Asian Brown Tortoise)

Pritchard (1995) observed local use of the Impressed Tortoise in Luang Prabang. Some 50 carapaces were seen in one store. The meat had been sold on the local market and the shells were for sale at 1 500 kip (*circa* US$2 each). Baird (1993) documented the illegal export of Elongated Tortoise to Thailand via Ban Mai. The trade involved an undetermined number of live animals and probably also shells of the species. It is also very likely that tortoises gathered in Lao PDR are exported to Vietnam for re-export to China. Trade routes for softshell turtles are well established, although Baird (1994) reported that Vietnamese softshell traders operating in Lao PDR were not interested in other chelonians.

Malaysia (native species: Asian Brown Tortoise, Elongated Tortoise, Impressed Tortoise)

Use of tortoise species within Peninsular Malaysia appears fairly limited at present. No specimens of any of the native species were seen for sale in a 1994 survey of pet shops, mostly in the Kuala Lumpur region,

although evidence of local consumption of Elongated Tortoises was found in Perlis in northern Peninsular Malaysia (Sharma, 1994). Moll (1987) also found tortoises to be uncommon in his 1987 survey of markets in northwestern Peninsular Malaysia. A few specimens of Elongated Tortoises were seen at animal dealers and a few Asian Brown Tortoises at temples. He noted that the latter had been more frequently observed in trade in the 1970s, although even then did not appear in large numbers (Moll *in litt.* to Brian Groombridge, IUCN/CMC, 1982).

A notable export of native species has been recorded in CITES annual reports. During the years 1990-1993, just under 8 300 tortoises of the three native species were recorded as exported, 96% of these to the USA and Japan. Recorded export is almost certainly largely for the exotic pet and zoo trade.

Table 2

Exports of native tortoises from Malaysia to USA and Japan (1990,1991 and 1993)

Species	USA	Japan
Elongated Tortoise *Indotestudo elongata*	1 653	3 782
Asian Brown Tortoise *Manouria emys*	509	723
Impressed Tortoise *Manouria impressa*	255	536
Total	2 923	5 041
Percentage of total exports	35	61

The Elongated Tortoise is only known in Malaysia from the far northern part of the peninsula. It is possible that a proportion of those exported originated elsewhere; this could also apply to the other two species. Some of the Asian Brown Tortoises exported may have originated in Sabah or Sarawak; this is the only one of the three species that occurs in these states. Export of Impressed Tortoises is noteworthy as this species is extremely difficult in captivity (Espenshade and Buskirk, 1994; McMorris and Burns, 1975). It is also very localised in Malaysia, being reported from only isolated uplands at Surgei Perak, the Larut Hills and Fraser's Hill (Groombridge, 1982).

Export prices from 1988-89 were in the region of US$100-110 for the Asian Brown Tortoises, US$28-40 for Elongated Tortoises and US$150-180 for Impressed Tortoises. The Asian Brown Tortoise was described by one exporter as rare but possible to obtain, the Impressed Tortoise as rare and hard to get and the Elongated Tortoise as regular in small quantities.

Malaysia accounts for the great majority of CITES-reported export of Impressed Tortoises and most of the recorded exports in Asian Brown Tortoises as well (Indonesia - discussed above - records much of the remainder). However, its export of Elongated Tortoises pales into insignificance compared with that reported from Bangladesh to Singapore, Hong Kong and China. Declared Bangladesh exports have risen from insignificant levels in 1988-1990 to nearly 80 000kg in 1991, *circa* 280 000kg in 1992 and 720 000kg in 1993.

Myanmar (native species: Asian Brown Tortoise, Burmese Star Tortoise, Elongated Tortoise, Impressed Tortoise)

Myanmar has the most diverse tortoise fauna in Southeast Asia. There is very little information on current use of tortoises although they are likely to be heavily exploited. The author of the original description of

the Burmese Star Tortoise, writing in 1863, stated that the indigenous population was so fond of eating this species that it was impossible to procure a living specimen. Empty shells were commonly used in Rangoon bazaar for baling oil (Groombridge, 1982).

Although Myanmar is not a party to CITES, some re-export, specifically of live Burmese Star Tortoises, has been recorded by other countries.

Table 3

CITES-reported trade in Burmese Star Tortoises Geochelone platynota for 1990-1992

Year	Country of Import	Country of Export	Declared country of origin	Quantity
1990	Japan	Singapore	Myanmar	150
1991	Japan	Singapore	Myanmar	526
1992	Japan	Singapore	Malaysia*	500

* 500 specimens declared of wild origin were also recorded by Singapore as imported from Malaysia in 1992, but these were not reported by Malaysia as exports. As *Geochelone platynota* only occurs naturally in Myanmar, these specimens were either misdeclared or imported from Myanmar to Malaysia without declaration by Malaysia.

Thailand (native species: Annam Leaf Turtle (includes *Testudo natapundi*), Elongated Tortoise, Impressed Tortoise)

Van Dijk (*in litt.* to F. Lambert, IUCN Species Survival Commission, 23 November 1992) reported that all three Thai tortoise species have been hunted intensively, mainly for local consumption, to such an extent that populations of the Elongated Tortoise (by far the most widespread species) collapsed in the 1970s and have not recovered. At that time, a hunter and a dog could collect around three tortoises per day; now it takes several days to find just one. Tortoises are still collected and eaten when encountered, mainly when they wander into crop areas or when people collect mushrooms in forests.

Puginier (1994) in a market survey in northern Thailand corroborated this, finding tortoises on sale on an incidental basis only. Ten individuals were found on sale during 14 days' observations at various markets. Eight of these were Elongated Tortoises and two were Impressed Tortoises. Sizes of Elongated Tortoises ranged from 15cm to 30cm and the price from 90 Baht (US$3.6) to 300 Baht (US$12) per tortoise. The two Impressed Tortoises were 18 and 22cm long respectively and priced at 200 Baht (US$8) each. All were sold for food and were not apparently considered to have any medicinal properties.

Tortoises were generally regarded by traders as less important and less profitable wild food items than other animals such as birds, snakes and lizards. It was not clear if this was because they were considered less palatable or because they were less easily obtained. Informants did report that tortoises were now too difficult to find to sell at markets on a regular basis. However, their scarcity did not appear to have led to higher premium prices.

Small tortoises are sold for release, although also on a small scale only.

Vietnam (native species: Elongated Tortoise, Impressed Tortoise)

Both native species of tortoise are widely used in Vietnam. The Elongated Tortoise appears in trade in far greater quantity than the Impressed Tortoise and was found to be one of the most abundant chelonians in

trade in a 1993 survey (Le Dien Duc and Broad, 1995), being readily available in most parts of the country.

Overall figures for consumption are not available although there are indications that very large numbers are traded annually. From interviews with traders, Le Dien Duc and Broad (1995) estimated that in 1993 about 500kg per day of Elongated Tortoises passed through Cau Mong Market in Ho Chi Minh City, corresponding to roughly 180 000kg per year. If each tortoise is taken as weighing 1-2kg, this represents well over 100 000 individuals passing through this market alone each year. Tortoises for sale in Hanoi chiefly originate in southern and central Vietnam (in particular Da Lat in Lam Dong Province and Gia Lai Province), from the mountain regions of the northwest and from Cambodia. It is not known what proportion of the tortoises in trade in Vietnam originate outside the country, in Cambodia and Lao PDR, although it is likely to be significant.

Tortoises are used both for food and medicinal purposes and to a lesser extent for pets, decoration and release animals. Live tortoises, presumably mostly destined for food, generally command a low to moderate price (33 000-100 000 dong or US$3.3-10 per kg for Elongated Tortoises, 50 000-60 000 dong or US$5-6 per kg for Impressed Tortoises). This indicates that they are less sought after than softshells but are of comparable desirability to most emydid turtles. The comparable prices of the two different species indicates similar demand and implies that the difference in frequency of the two in trade is a product of difference in abundance or ease of collection of wild populations.

Although not apparently particularly highly desired as a food, tortoises do appear to be sought-after for medicinal purposes. In Hanoi, most chelonian products available in pharmacies on Lan Ong street are of tortoise species. The plastron is the main part used with the carapace serving only as an additive. The former commands a higher price (30 000-40 000 dong or US$3-4 per kilo) than the latter (10 000 dong or US$1 per kilo).

Le Dien Duc and Broad (1995) reported that a very high proportion of chelonians in trade in Vietnam - perhaps as much as 90% - were destined for export to China, via land-crossings at Lang Son and Dong Dang or by boat from Mong Cai. Estimates for this trade are around 150 000-300 000kg of live animals, corresponding to perhaps 200 000-300 000 individuals of various species, exported annually. The proportion of this trade comprised of the Elongated Tortoise is not clear, although from sample observations it is likely to be reasonably high (the species accounted for 93 out of 375 individual chelonian specimens counted at traders' premises in Lang Son and Dong Dang on 21-22 July 1993). Total exports to China are likely to have a minimum value of around US$1 million annually and possibly considerably more, although direct government revenue does not appear to be accrued as most exports apparently take place unofficially (Le Dien Duc and Broad, 1995)

It is difficult to reconcile these figures with those quoted for Cau Mong Market: if the latter are accurate and 90% of the trade is indeed destined for export to China, then sale of this species from this market alone would account for up to 90% of all chelonian exports to China, which is self-evidently not the case. It is possible that a disproportionate number of this species is consumed locally or, more likely, that it is processed locally into tortoiseshell products for the medicinal trade and exported in this form (surveys at export points in northern Vietnam only looked at live animals and not at products such as tortoiseshell; it is also possible that tortoiseshell products are exported directly from Ho Chi Minh City by air).

NATIONAL LEGISLATION CONCERNING CHELONIANS IN SOUTHEAST ASIA

Cambodia

Cambodia's wildlife and fisheries legislation is unclear, though protected species lists are under development. In the meantime, the Departments of Fisheries and Forestry report that as a matter of policy, legal wildlife exports have been halted until legislative provisions and enforcement capability has been established. This policy extends to reptile species (Broad and Phipps, 1994).

Indonesia

A legal basis is provided for control of wildlife trade under the Act of the Republic of Indonesia on Conservation of Living Resources and Ecosystems 1990 (No. 5). Trade in species listed as protected is prohibited (unless approved for research or zoological purposes) and trade in other species is subject to regulation, principally through a capture and export quota system. The list of protected species includes Batagur (*Batagur baska*), Malaysian Giant Turtle *Orlitia borneensis*, Narrow-headed Softshell Turtle *Chitra indica* (not native to Indonesia) and the three chelonian species confined in Indonesia to Irian Jaya, which are not considered in this report. Non-protected species may be captured and exported if permitted under a quota system.

Table 4

Quotas for non-protected chelonian species during the period 1990-1995

Species	1990	1991	1992	1993	1994	1995
Travancore Tortoise *Indotestudo forstenii*	1 500	1 500	-	400	200	-
Asian Brown Tortoise *Manouria emys*	-	-	-	300	200	-
Southeast Asian Box Turtle *Cuora amboinensis*	U/l	10 000	10 000	10 000	10 000	?
Asiatic Softshell Turtle *Amyda cartilaginea*	U/l	100 000	50 000	50 000	50 000	?

U/l: unlimited

Lao PDR

There are two wildlife management categories under Lao legislation:

Prohibited Category (I): Valuable and nearly extinct species for which hunting is banned in all seasons.

Controlled Category (II): Rare species, which may be threatened with extinction if hunting is not controlled. Hunting is permitted only during the off (non-breeding) season, and only for food and not for sale or exchange.

The following chelonians are included in one or other of these categories (Salter, 1993):

Southeast Asian Box Turtle *Cuora amboinensis*	I
Black Marsh Turtle *Siebenrockiella crassicollis*	I
Elongated Tortoise *Indotestudo elongata* (as *Testudo elongata*)	II
Asian Brown Turtle *Geochelone emys* (as *Testudo natapundi*)	II
Asiatic Softshell Turtle *Amyda (Trionyx) cartilaginea*	II

Malaysia

Peninsular Malaysia

The most important piece of wild animal legislation, the Wildlife Protection Act, 1972, does not cover

turtles, fishes or amphibians. Disturbingly, a 1991 amendment to this law, which aimed to add all CITES-listed species to the schedules, omitted the CITES-listed chelonian species. The Federal Fisheries Act (1963) allowed for the control of the exploitation of inland fisheries and turtles to be a prerogative of the various States. This right was primarily intended for management of marine turtles and the Painted Terrapin *Callagur borneoensis*. The new Fisheries Act (1985) provides for similar action to be undertaken by the individual States. This act has been adopted by the following States: Johore, Kedah, Melaka, Negeri Sembilan, Perak, Penang and Perlis (Sharma, 1994).

Freshwater turtle species are protected in the individual states as follows (Sharma, 1994):

Perak: Batagur *Batagur baska*, Malaysian Giant Turtle *Orlitia borneensis* and Painted Terrapin *Callagur borneoensis* under the River Rights Enactment (1915).

Kedah: *Callagur picta* (= Painted Terrapin *Callagur borneoensis*) and "tuntong" (usually Batagur *Batagur baska*) under the Turtles Enactment 1972 and Turtles Rules 1975.

Kelantan: "tuntong" = River Terrapin and River Tortoise under the Fisheries Act 1963 and Fisheries (Turtles and Turtle Eggs) Rules 1978. River Terrapin is assumed to refer to the Batagur *Batagur baska*; what the name River Tortoise refers to is unclear.

Terengganu: "Tuntong" under the Turtle Enactment, 1951 and Amendments, 1987. In this State, tuntong has traditionally been taken to refer to Painted Terrapin *Callagur borneoensis* only and not the Batagur *Batagur baska*.

Pahang: Batagur *Batagur baska*, Painted Terrapin *Callagur borneoensis* and Malaysian Giant Turtle *Orlitia borneensis* under the Fisheries Enactment, 1937 and Fisheries Rules, 1938.

Johore: "Tuntong" under the Fisheries Act (1985) and Fisheries (Turtles and Turtle Eggs) Rules, 1984. Tuntong here refers to both the Painted Terrapin *Callagur borneoensis* and Batagur *Batagur baska*.

Melaka: Painted Terrapin *Callagur borneoensis* under the Fisheries Act (1985) and Fisheries (Turtles and Turtle Eggs) Rules (1989).

Sabah

Sabah established the Fauna Conservation Ordinance in 1963 (No. 11). It provides a legal framework for investigation, seizure and trade control relating to wildlife listed in its First Schedule (protected species); no non-marine chelonians are listed in this schedule.

Sarawak

Sarawak established the Wildlife Protection Ordinance 1990 as its legal mechanism for protecting wildlife and regulating the utilisation of species. "Totally protected animals" are listed in Part I of the Ordinance's first schedule which includes *Callagur borneoensis* and *Orlitis borneoensis* and "Protected Animals" are listed in Part II, which includes *Manouria emys*. Totally protected animals may be taken in exceptional circumstances for scientific or educational purposes, but protected animals may be taken commercially under licence.

Thailand

Thailand's Wild Animals Reservation and Protection Act B.E. 2535 1992 prohibits all trade (domestic and export) in "Protected and Reserved" wild animals. The list of Protected animals is provided under a

Ministerial regulation which includes all native chelonians (including some whose occurrence in the country is uncertain) as follows: Asian Giant Softshell Turtle *Pelochelys bibroni*, Asian Leaf Turtle *Cyclemys dentata*, Asiatic Softshell Turtle *Amyda cartilaginea*, the Batagur *Batagur Baska*, Black Marsh Turtle *Siebenrockiella crassicollis*, Big-headed Turtle *Platysternon megacephalum*, Burmese Peacock Softshell *Nilssonia formosa*, Elongated Tortoise *Indotestudo elongata*, Giant Asian Pond Turtle *Heosemys grandis*, Indian Black Turtle *Melanochelys trijuga*, Keeled Box Turtle *Pyxidea mouhotii*, Malayan Flat-shelled Turtle *Notochelys platynota*, Malayan Snail-eating Turtle *Malayemys subtrijuga*, Malayan Softshell Turtle *Dogania subplana*, Narrow-headed Softshell Turtle *Chitra indica*, Painted Terrapin *Callagur borneoensis*, Southeast Asian Box Turtle *Cuora amboinensis*, Spiny Turtle *Heosemys Spinosa*, Stripe-necked Leaf Turtle *Cyclemys tcheponensis*, Yellow-headed Temple Turtle *Hieremys annandalii*, Asian Brown Tortoise *Manouria emys* and Impressed Tortoise *Manouria impressa*. Under the Act, trade in protected animals is allowed only if derived from licensed captive-breeding operations and then only if the species is included in a list of species eligible for commercial breeding. To date, no chelonian species have been listed as eligible. Thai fisheries law also provides protection for some native chelonians.

Vietnam

Vietnam has adopted basic wildlife protection legislation, which restricts hunting and trade of two chelonian species, Asian Giant Softshell Turtle *Pelochelys bibroni* and Elongated Tortoise *Indotestudo elongata*, which are listed in Annex IIB of the January 1992 Decree of the Council of Ministers adopting a list of "Rare and Precious Forest Flora and Fauna" (Decree No. 18-HDBT). Animal species listed in Annex IIB may be trapped or captured only in essential circumstances, such as to create a breeding population, for scientific research or for international exchange (Le Dien Duc and Broad, 1995).

DISCUSSION

The preceding chapters have drawn together information on the exploitation of non-marine chelonians in Southeast Asia. The picture that emerges is a disturbing one. The available evidence suggests that virtually all species occurring in the region are subject to some form of exploitation in all or much of their range, primarily for food and medicinal purposes. Collecting for the pet trade and for sale as Buddhist release animals is evidently of far lesser importance. This exploitation is a very long-standing phenomenon. It seems safe to say that only in areas with a Muslim population have chelonians **not** been traditionally harvested for food and even here the eggs of many species, particularly the large river terrapins, are and always have been collected in large numbers.

In the last few years, however, the pattern of exploitation appears to have altered in an alarming fashion. Although international trade in these species and their products is by no means a new phenomenon, until recently harvest within countries was primarily for domestic consumption, often for subsistence use or sale in local markets. International trade, primarily to the Far East and particularly mainland China, has now become the prime motivation for collection. The dramatic increase in imports to mainland China dates from the time the Chinese currency became convertible. What had previously been a barter trade has become a cash-fuelled import to a vast and increasingly wealthy market (van Dijk, *in litt.*, 22 March 1995). As most of the species involved are not listed in the CITES Appendices, import and export statistics are patchy, but where figures are available they indicate that trade is often at a very high level and rapidly growing, both in numbers of animals involved and in the geographical area covered. Vietnamese workers suggest that the vast majority of non-marine chelonian trade in their country is destined for export to China and, moreover, many of the animals involved have been collected in neighbouring Lao PDR and

Cambodia. There is information on smuggling of chelonians out of Myanmar to China and strong indications (albeit largely anecdotal) of a massively increased export from parts of Indonesia, including Sumatra, Kalimantan and Sulawesi, either of food species such as softshells or of shell of other species (e.g. the Southeast Asian Box Turtle) for the medicinal trade. It is reported that exporters are travelling as far as Irian Jaya to try to meet demand. It is impossible to make even an approximate estimate of the numbers involved, but it is clear that the trade, which is in a number of species, accounts for many hundreds of thousands of individuals annually.

Corroborating evidence that trade is increasing comes from Bangladesh, just outside the Southeast Asian region. CITES records there indicate that exports of Elongated Tortoises to Singapore (undoubtedly as an entrepôt), Hong Kong and China increased from virtually zero in 1990 to around 720 000kg in 1993.

Unfortunately, so little is known of the status in the wild of the great majority of the species involved that it is impossible at present to quantify the effects of the trade. Probably the only reasonably well documented non-marine chelonians in the region are the Batagur populations in some parts of Peninsular Malaysia. These have shown a decline in the present century estimated at over 90%. This decline has been ascribed to a combination of causes, including sustained overharvest of eggs, sometime exploitation of adults (during the Second World War) and modification or destruction of habitat chiefly through construction of dams and sand-dredging on nesting beaches. Identifying which of these factors has played the major part is not easy. Anecdotal information from elsewhere, such as Thailand and Lao PDR, and for other species, such as softshells, indicates that hunters in many areas are having to travel further and further afield to harvest turtles in any number, suggesting substantial depletion of populations in accessible areas. Again it is impossible to quantify accurately the effects of different causal factors but it is likely that over-exploitation has played a significant part in population declines.

Judging by the current nature of the international trade, it is apparent that countries such as Lao PDR and areas such as parts of Indonesia hitherto assumed to have relatively secure chelonian populations are increasingly under pressure despite still having large areas of natural habitat and, probably, relatively low levels of subsistence use.

Possibilities of sustainable exploitation

The extent to which any of the species present prospects for sustainable management remains a moot point. Even if collection quotas for particular species in a given area were established, it is unclear how these would be enforced. An exception to this is egg harvest of species such as Batagurs, which follow predictable laying patterns (mass nesting at traditional sites). The account given above of harvest in the first part of this century demonstrates that a substantial and apparently sustainable harvest of eggs was possible until the relatively recent past. However, the sustainability depended on strict control of collecting that was itself evidently an activity carried out not solely for economic gain because there was no incentive to maximise harvests and profits in any given year. Once egg collecting was licensed to a large number of individuals whose aim was to maximise profits, it became essentially uncontrolled and started to contribute to the long-term decline of the population. Current management efforts in which government departments either guard particular beaches or buy eggs from commercial collectors at market prices for hatching are subsidised conservation activities rather than a manifestation of self-financing or self-regulating exploitation systems.

It may be argued that for most species exploitation will be ultimately self-regulating to the extent that populations could be reduced to such a low density that it would no longer be economically viable to

expend time and effort collecting them. This may hold in some cases, but not necessarily in all. Species such as the Chinese Three-striped Box Turtle command such high unit prices that it may well be worthwhile hunting out entire populations. Similarly, the Painted Terrapin habitually nests with marine turtles, so that even when laying populations are reduced to a handful of individuals it will generally still be advantageous to visit the nesting beach to collect its eggs along with those of the marine turtles. This has occurred in Myanmar with the Burmese Roofed Turtle and the Batagur (van Dijk, *in litt.*, 22 March 1995). More generally, it seems that in many areas, such as rural Thailand, tortoises and turtles are collected whenever encountered even if they are no longer actively hunted to any great extent. It is not clear whether this incidental harvest of already depleted populations is enough to drive them to local extinction or not.

Clearly the impact of collection will depend on a very wide range of factors, not least the reproductive biology of the species involved. As discussed earlier, many of the emydids involved in the trade produce only small clutches (one to three eggs), in some cases probably only once a year. Such species may be expected to be particularly sensitive to overharvest, although much depends on other factors such as age of maturity and percentage of females nesting each year. This information is lacking for virtually all the species considered here.

Current IUCN listings, with the exception of those for the Batagur, Painted Terrapin and the two tortoises, Travancore Tortoise and Asian Brown Tortoise (whose categorisations as Rare and Vulnerable respectively seem a trifle arbitrary), reflect this lack of knowledge. Our ignorance of the wild status of Southeast Asia's chelonian fauna is further emphasised by the lack of even tolerably reliable chelonian species lists for Lao PDR and Cambodia, two countries which on the basis of their geographical position can be expected to have particularly rich and important faunas and which, judging by what information is available, provide a very significant proportion of the animals in international trade.

Prospects for captive breeding

The extent to which captive breeding may be able to meet demand is likely to vary from group to group. Large scale and apparently rapidly expanding softshell (chiefly the Chinese Softshell Turtle) farming, especially in Thailand, indicates that this is certainly a viable commercial activity. However, it is not clear whether it will be able to meet demand sufficiently to remove pressure from wild populations. This seems unlikely while there are still accessible stocks of species such as the Asiatic Softshell Turtle, evidently highly profitable to export as wild-caught animals. For softshells, initial indications are that species other than the Chinese Softshell Turtle are less straightforward to breed in captivity. This may be because husbandry techniques have not been adequately developed for these others, or may reflect inherent differences in their suitability for captive-breeding.

For non-softshell species, captive-breeding may help to meet the demand for pets and for release animals but it seems likely that in the great majority of cases growth rates will be too slow to provide animals for the food and medicinal trades at an economic rate, at least while wild-collected animals are still available.

Farming of non-native species may present long-term problems. There is a high risk of escape, resulting in possible transmission of disease to populations of native species and, if feral populations become established, of competitive displacement or predation.

RECOMMENDATIONS

It is evident that before detailed plans for the conservation and management of these species can be drawn up, more information is needed on the status in the wild of virtually all of them.

Priority species for study:

Narrow-headed Softshell Turtle *Chitra indica*. This huge softshell may well be the most threatened chelonian in Southeast Asia. If it is indeed a different species from that found in the Indian subcontinent, then it may be one of the world's most threatened chelonians. There is a possibility that the species exists in the wild in Peninsular Malaysia. If not, then the Southeast Asian population is apparently confined to the Khwae Noi - Khwae Yai - Mae Klong (Ratburi River) basin in central western Thailand. Here it faces a wide range of threats, including destruction of nesting beaches, degradation of its freshwater habitat through increased turbidity and pollution and severe hunting pressure (van Dijk, *in litt.* to F. Lambert, IUCN Species Survival Commission, 23 November 1992 and *in litt.*, 5 January 1995). A thorough assessment of its status in the wild and the development of a conservation plan for the species should be accorded a high priority.

Chinese Three-striped Box Turtle *Cuora trifasciata*. The very high price commanded by this small species in Vietnam, and its limited range give cause for concern. Virtually nothing appears to be known of its status in the wild. Intriguingly the species appears in the pet trade in the USA where its price, although high, is actually lower than that quoted within Vietnam, implying either that the specimens are obtained from elsewhere in its range (i.e. China), or have been captive-bred. This requires further investigation.

The Batagur *Batagur baska*, Burmese Roofed Turtle *Kachuga trivittata*, Malaysian Giant Turtle *Orlitia borneensis* and Painted Terrapin *Callagur borneoensis*. These species should be accorded high priority in further research and conservation efforts, not solely because of their threatened status but also because they represent a potentially valuable renewable resource in the region. WWF Malaysia is currently undertaking a project on the distribution and conservation status of various estuarine reptiles in Peninsular Malaysia, including the Painted Terrapin. Investigation of the status of this species, the Malaysian Giant Turtle on Borneo and all three species on Sumatra (the Batagur, Malaysian Giant Turtle and Painted Terrapin) should also be priorities.

Priority countries for study:

Cambodia and Lao PDR. As discussed above, both these countries have extremely poorly known but almost certainly diverse chelonian faunas. Both are experiencing intensive exploitation of these faunas for domestic consumption and, probably more importantly, export to the neighbouring countries of Thailand and Vietnam. Baseline surveys on chelonians and their use in these countries should be undertaken.

Malaysia. Malaysia possesses internationally important populations of three of the four large river terrapins considered here. It is also one of the few countries in the region where systematic studies of two of these species have been carried out. It is important that such studies be continued and extended as they could serve as the basis for management plans for these species both here and elsewhere in the region.

Myanmar. Myanmar has one of the most diverse chelonian faunas in the region, with seven endemic species (following current taxonomy). Very little is known of the wild status of most of these, although it is evident that chelonians are intensively harvested in at least some parts of the country (van Dijk, 1993). Turtle conservation along the Irrawaddy basin was identified as a priority in the Indomalayan Realm in the

IUCN/SSC Tortoise and Freshwater Turtle Action Plan (IUCN/SSC Tortoise and Freshwater Turtle Specialist Group, 1989).

Vietnam. Vietnam has one of the richest non-marine chelonian faunas in the region. As demonstrated in Le Dien Duc and Broad (1995) and discussed in this report, it is also the centre for a very large and probably increasing commercial trade in chelonians, mostly to mainland China. As called for by Le Dien Duc and Broad (1995), action should include review of existing legislation and current Vietnamese Red Data Book listings; improvement of law enforcement; and a national public awareness campaign.

Review of national legislation

Many species of chelonian, including several identified as threatened, remain unprotected in part or all of their range. National legislation for the countries in Southeast Asia should be reviewed by responsible government departments and improvements or amendments should be made for the inclusion of known threatened species on protected species schedules.

Review of international trade controls

Export legislation of the countries within the region as it applies to non-marine chelonians should be reviewed. The possibility of including the following species or genera in the CITES appendices should be considered:

- Painted Terrapin *Callagur borneoensis*
- Malaysian Giant Turtle *Orlitia borneensis*
- Burmese Roofed Turtle *Kachuga trivittata*
- Southeast Asian Box Turtle *Cuora amboinensis*
- Chinese Three-striped Box Turtle *Cuora trifasciata*
- (possibly all *Cuora* species because of lookalike problems).
- Some or all Trionychidae.

Study of markets in East Asia

It is increasingly evident that the export market to East Asia may be the most important factor driving the large-scale exploitation of chelonians in Southeast Asia. A more comprehensive study of this market should be undertaken. Such a study should attempt to quantify demand as well as examine sources of turtle products outside Southeast Asia, the present and potential role of captive-breeding in satisfying demand and the potential role of sustainable substitutes in the trade. Particular attention should be paid to the role of Bangladesh in supplying turtle products (most likely at least in part as a channel for the illegal export of products from India).

Public awareness activities

Conservation measures for chelonians should be supported by public awareness campaigns and particularly the provision of educational materials. Species identification material should be prepared and distributed to individuals and agencies engaged in the control of domestic, regional and international wildlife trade.

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NOTES

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ANNEX

IUCN THREATENED SPECIES CATEGORIES

The existing IUCN system for categorising threatened species will shortly be replaced by an improved system, the specification of which is now nearing completion. The new system will be employed for the 1996 Red List. The following current category names and definitions are those used in this report.

EX — EXTINCT

Species not definitely located in the wild during the past 50 years (criterion as used by the Convention on International Trade in Endangered Species of Wild Fauna and Flora). NB On a few occasions, the category Ex? has been assigned; this denotes that it is virtually certain that the taxon has recently become extinct.

E — ENDANGERED

Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included are taxa whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction. Also included are taxa that may be extinct but have definitely been seen in the wild in the past 50 years.

V — VULNERABLE

Taxa believed likely to move into the "Endangered" category in the near future if the causal factors continue operating. Included are taxa of which most or all the populations are decreasing because of over-exploitation, extensive destruction of habitat or other environmental disturbance; taxa with populations that have been seriously depleted and whose ultimate security has not yet been assured; and taxa with populations that are still abundant but are under threat from severe adverse factors throughout their range.

NB In practice, "Endangered" and "Vulnerable" categories may include, temporarily, taxa whose populations are beginning to recover as a result of remedial action, but whose recovery is insufficient to justify their transfer to another category.

R — RARE

Taxa with small world populations that are not at present "Endangered" or "Vulnerable", but are at risk. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range.

I — INDETERMINATE

Taxa *known* to be "Endangered", "Vulnerable" or "Rare" but where there is not enough information to say which of the three categories is appropriate.

K — INSUFFICIENTLY KNOWN

Taxa that are *suspected* but not definitely known to belong to any of the above categories, because of lack of information.