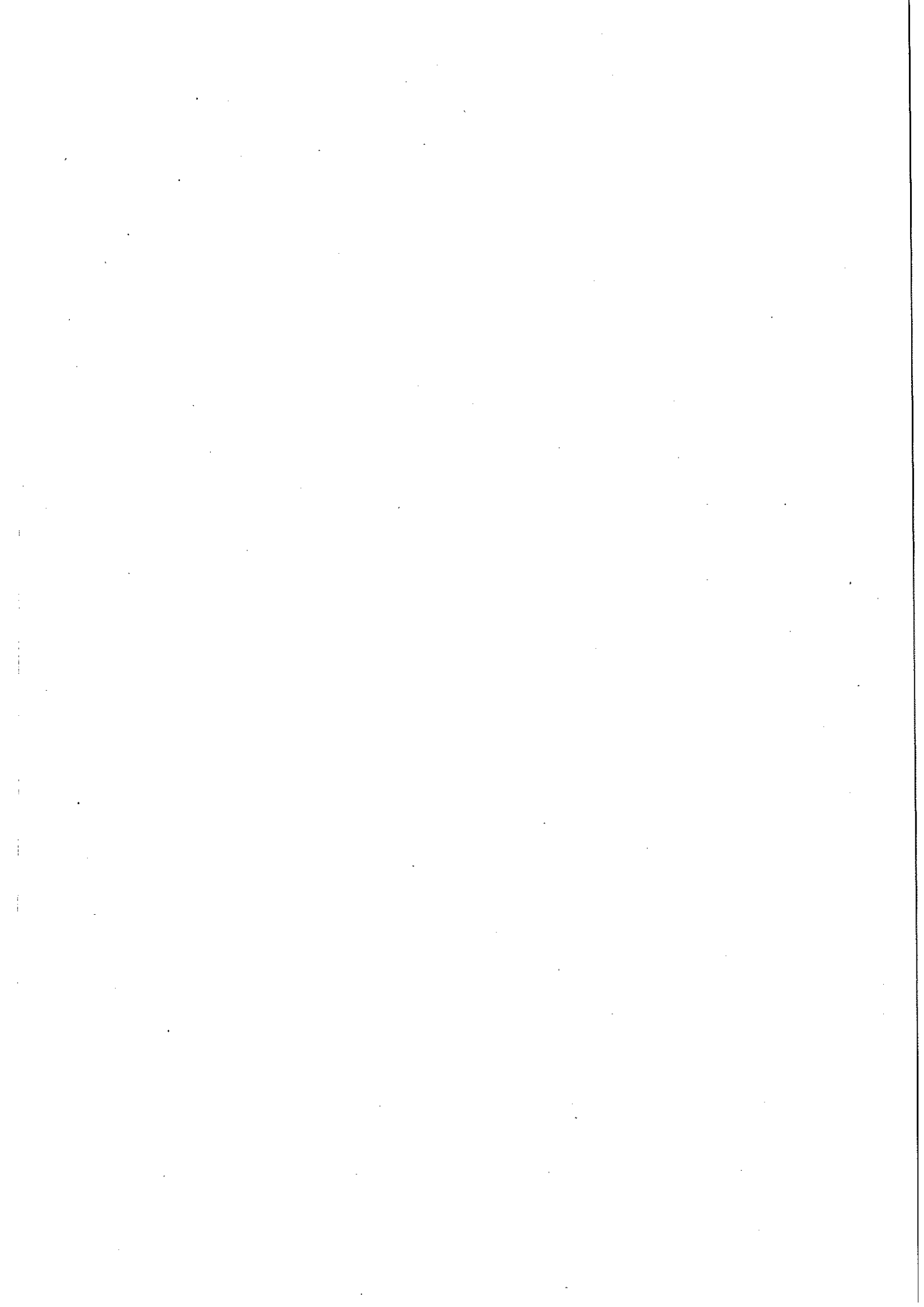


**International trade in live *Testudinidae*:
Review of trade levels and trends over two decades**

A TRAFFIC Europe paper presented at the
1st International Congress of the Genus Testudo in Hyères,
7-10 March 2001

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TRAFFIC
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Abstract

Since 1977, all *Testudinidae* are listed under CITES – the Convention on International Trade in Endangered Species of Wild Fauna and Flora. This Convention, created in 1975, aims to regulate international trade in endangered species to ensure that trade does not threaten the survival of the species in the wild. This paper presents and discusses the volumes and variety, as well as the trends and major origins and destinations of live *Testudinidae* in international trade since the listing of the family under CITES. In addition it discusses the role of CITES as well as other regulatory instruments, such as the EU Wildlife Trade Regulations, in managing and controlling this trade. The information that is provided is based on an analysis of official CITES trade data for the years 1977 to 1999 and on information extracted from TRAFFIC studies and publications and on other relevant sources.

Résumé

Depuis 1977, toutes les espèces *Testudinidae* sont inscrites aux annexes de la CITES – la Convention sur le commerce international des espèces de faune et de flore sauvages menacées d'extinction. Cette Convention, créée en 1975, a pour but de réglementer le commerce international des espèces en voie de disparition afin d'assurer que le commerce ne menace pas la survie des espèces sauvages. Ce document présente et examine, sur un plan commercial, les quantités et la diversité, ainsi que les tendances du marché, les origines et les destinations les plus répandues des individus *Testudinidae* vivants depuis que cette famille d'espèces de tortues terrestres est couverte par la CITES. En outre, cette étude précise le rôle de la CITES autant que celui d'autres procédures légales en vigueur, telles que la législation européenne qui réglemente le commerce des espèces sauvages. L'information avancée se base sur l'analyse des données commerciales officielles de la CITES de 1977 à 1999 et sur les renseignements extraits d'études effectuées et de publications préparées par TRAFFIC, ainsi que sur d'autres sources concernées.

INTRODUCTION

What is CITES ?

CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, was created in 1975. This Convention regulates and monitors international trade in specimens of endangered animal and plant species with the aim to ensure that trade in these species and products thereof is conducted in a sustainable manner and does not threaten the survival of the species in the wild. CITES is based on a system of permits and certificates, which can be issued if certain conditions are met and have to be presented before consignments leave or enter a country. The animal and plant species included in CITES are subject to different degree of regulation and are listed in three different Appendices. Appendix I is the most strict and trade in species listed in Appendix I is allowed only in exceptional circumstances and for non-commercial purposes. Species listed under Appendix II can be traded for commercial purposes but strictly require a permit before such trade can take place. Appendix III includes species that are for example subject to regulation in a particular country and species originating from this country require specific certificates.

In the past 25 years, CITES has become one of the largest and most important species conservation treaties, and to date 154 countries have joined the Convention.

CITES in the European Union

The European Union with the USA and Japan represents one of the largest markets for international wildlife trade. It is estimated that a third of the global annual trade in CITES listed specimens is imported by the European Union Member States.

Fourteen of the fifteen EU Member States are Parties to CITES (Ireland has still not yet joined the Convention) and although the Community is not yet a Party in its own right, it has been fully implementing CITES since 1984 by a Regulation. In July 1997, this Regulation was replaced by a more comprehensive and sophisticated wildlife trade regulation: Council Regulation No 338/97. This new regulation not only fully implements the provisions of CITES in the 15 EU Member States, but goes beyond CITES in many instances. For example, the EU Wildlife Trade Regulation contain species that are not listed in CITES and several species are given higher regulation status. Under Article 4(6) of Regulation 338/97 the EU can restrict or even suspend the importation of a certain species to the EU. These import restrictions can be imposed in case of species suffering high mortality in transport, unlikely to survive in captivity, or proven to cause ecological threat to native species. In general these import restrictions apply for wild specimens originating from a specific country. These import restrictions are binding in all 15 Member States, established on a temporary basis, and will be lifted when no longer justified.

Species subject to EU Regulation 338/97 are, similar to the CITES, listed in four Annexes (Annex A-D) with Annex A being the most strict. In general, these Annexes are similar to the CITES Appendices; however some important differences exist: e.g. the EU Annexes also contain species that are not listed under CITES, there are stricter import conditions for species listed in Annex A and B (Annex B species require export and import permits); an import notification is required for species listed in Annex C and D (Annex D is an additional Annex, the so-called monitoring list of the EU Regulation 338/97, that does not have a CITES equivalent).

History of Testudinidae under CITES and the EU Wildlife Trade Regulations

Since 1977 all *Testudinidae* are listed in the CITES Appendices: six *Testudinidae* species (*Geochelone nigra*, *G. radiata*, *G. yniphora*, *Gopherus flavomarginata*, *Psammobates geometricus*, *Testudo kleinmanni*) are included in Appendix I of CITES. All other *Testudinidae* species are listed in Appendix II. The genus *Testudo* was already listed in Appendix II of CITES in 1975. As mentioned above the EU Wildlife Trade Regulation 338/97 is in some ways stricter than CITES, and this also applies to its provisions for regulating the trade in *Testudinidae* to and from the EU. In addition to the six *Testudinidae* species listed in CITES Appendix I another six species are listed in Annex A under the EU Regulation (*Homopus bergeri*, *Malachocerus tornieri*, *Pyxis planicaudia*, *Testudo graeca*, *T. hermanni* and *Testudo marginata*). All other *Testudinidae* species are listed in Annex B. Currently the EU has imposed import restrictions under Article 4(6) for 25 *Testudinidae* species (see Table 1).

Conservation Status of *Testudinidae*

30 of the 40 *Testudinidae* species that are listed in the CITES Appendices are included in the 2000 IUCN Red List of Threatened Species. 23 are considered threatened, and hence either categorised as VU - vulnerable, EN - endangered or CR - critically endangered.

Table 1 provides an overview of the status of the 40 *Testudinidae* species listed in CITES, the EU Wildlife Trade Regulation, the 2000 IUCN Redlist and whether the importation into the EU is currently restricted or suspended.

Table 1: Overview of the status of the 40 *Testudinidae* species listed in CITES, the EU Wildlife Trade Regulation 338/97, the 2000 IUCN Redlist. The table also shows whether the importation of the species into the EU is currently restricted or suspended under Article 4(6) (the letters in the column *Basis* refer to the basis in Article 4(6) taken to restrict the importation, see OJ L29/12, 31.1.2201). IUCN Redlist categories: LR – Lower Risk, VU-Vulnerable, EN – Endangered, CR – Critically Endangered. Countries of origin for which the import restriction is imposed are listed in the two-letter ISO country codes.

TAXON	CITES App.	EU Annex	IUCN Redlist	EU Import Restriction under Art. 4(6)				
				Yes/No	Source	Specimens	Country of Origin	Basis
<i>Chersina angulata</i>	II	B		No				
<i>Geochelone carbonaria</i>	II	B		No				
<i>Geochelone chilensis</i>	II	B	VU	Yes	Wild	All	AG	b
					Wild	Live	All	c
<i>Geochelone denticulata</i>	II	B	VU	Yes	Wild	All	BO, EC	b
					Wild	Live	All	c
<i>Geochelone elegans</i>	II	B		Yes	Wild	All	BD, PK	b
					Wild	Live	All	c
<i>Geochelone gigantea</i>	II	B	VU	Yes	Wild	All	SC	b
<i>Geochelone nigra</i>	I	A	VU	No				
<i>Geochelone pardalis</i>	II	B		Yes	Wild	All	CD, MZ, TZ, ZM	b
					Ranched	All	MZ	b
<i>Geochelone platynota</i>	II	B	CR	Yes	Wild	All	MM	b
<i>Geochelone radiata</i>	I	A	VU	No				
<i>Geochelone sulcata</i>	II	B	VU	No				
<i>Geochelone yniphora</i>	I	A	EN	No				
<i>Gopherus agassizii</i>	II	B	VU	Yes	Wild	All	All	b
<i>Gopherus berlandieri</i>	II	B	LR	Yes	Wild	All	All	b
<i>Gopherus flavomarginata</i>	I	A	VU	No				
<i>Gopherus polyphemus</i>	II	B	VU	Yes	Wild	All	US	b
<i>Homopus areolatus</i>	II	B		Yes	Wild	Live	All	c
<i>Homopus bergeri</i>	II	A	VU	No				
<i>Homopus boulengeri</i>	II	B		Yes	Wild	Live	All	c
<i>Homopus femoralis</i>	II	B		Yes	Wild	Live	All	c
<i>Homopus signatus</i>	II	B	LR	Yes	Wild	Live	All	b
<i>Indotestudo elongata</i>	II	B	EN	Yes	Wild	All	BG, CN	b
<i>Indotestudo forstenii</i>	II	B	EN	Yes	Wild	All	All	b
<i>Kinixys belliana</i>	II	B		Yes	Wild	All	MZ	b
					Ranched	All	MZ, BJ	b
					Wild	Live	All	c
<i>Kinixys erosa</i>	II	B	DD	Yes	Wild	All	TG	b
					Wild	Live	All	c
<i>Kinixys homeana</i>	II	B	DD	Yes	Wild	Live	All	c
					Ranched	All	BJ	b
<i>Kinixys natalensis</i>	II	B	LR	Yes	Wild	All	All	c
<i>Malacochersus tornieri</i>	II	A	VU	No				
<i>Manouria emys</i>	II	B	EN	Yes	Wild	All	BG, BN, KH, CN, IN, ID, LA, MM, TH, VN	b
					Wild	Live	All	c
<i>Manouria impressa</i>	II	B	VU	Yes	Wild	All	All	b
					Wild	Live	All	c
<i>Psammobates geometricus</i>	I	A	EN	Yes	Wild	Live	All	c
<i>Psammobates oculiferus</i>	II	B		Yes	Wild	Live	All	c
<i>Psammobates tentorius</i>	II	B		Yes	Wild	Live	All	c
<i>Pyxis arachnoides</i>	II	B	VU	Yes	Wild	All	All	b
					Wild	Live	All	c
<i>Pyxis planicauda</i>	II	A	EN	No				
<i>Testudo graeca</i>	II	A	VU	No				
<i>Testudo hermanni</i>	II	A	LR	No				
<i>Testudo horsfieldii</i>	II	B	VU	Yes	Wild	Live	All	c
<i>Testudo kleinmanni</i>	I	A	EN	No				
<i>Testudo marginata</i>	II	A	LR	No				

METHODOLOGY

Source and Analysis of trade data

The trade data presented in this paper are based on the Annual CITES Reports of the Parties to CITES, which are held in a database by the UNEP-World Conservation Monitoring Centre. Hence these data represent the officially reported CITES trade. The trade data reported in the Annual Report allow a comparison of trade transactions that were reported by the country of export with the reported trade of the alleged country of import. However, these often reveal great discrepancies between export and import figures which may be caused by a number of reasons, e.g. differences in reporting between the countries, the failure to submit annual reports, trade with Non-Parties (many countries are not party to CITES or joined the Convention only recently). Nevertheless, the data still present a valuable and important source of information and provide a good indication of the trade volumes, variety, dynamics and trends over a time.

The trade data presented in this paper represent the net trade (= net trade is the positive difference between all imports and all exports/re-exports in a particular year. This presentation follows the Taxonomy and Nomenclature used in the CITES Appendices for Testudines by Iverson 1992.

RESULTS

Volumes and variety in trade

According to the reported CITES trade data a total of 2,389,462 live specimens of *Testudinidae* were traded between 1977 and 1999 (Table 2). 39 of the 40 *Testudinidae* species listed under CITES have been reported in international trade during this period. The genus *Testudo* is by far the most important *Testudinidae* genus with 1,888,198 live specimens in trade accounting for almost 80% of all recorded trade.

Species traded in high volumes of more than 100,000 specimens between 1977 and 1999 are *Testudo horsfieldii* (969,194), *Testudo graeca* (630,237), *Testudo hermanni* (227,971) and *Geochelone pardalis* (123,694) (Fig. 1).

Table 2: Live *Testudinidae* reported in international trade between 1977 and 1999. / Individus *Testudinidae* vivants enregistrés dans le commerce international de 1977 à 1999. (Source : UNEP-WCMC, 2001)

Taxa	No. of species in trade	No. of specimens in trade	% of specimens in trade
<i>Chersina angulata</i>		1,587	< 1%
<i>Geochelone</i> spp. (Subtotal)	11	243,374	10 %
<i>Geochelone pardalis</i>		123,694	
<i>Geochelone sulcata</i>		38,224	
<i>Geochelone carbonaria</i>		32,678	
<i>Geochelone chilensis</i>		17,711	
<i>Geochelone denticulata</i>		12,679	
<i>Geochelone elegans</i>		9,049	
<i>Geochelone gigantea</i>		1,759	
<i>Geochelone nigra</i>		264	
<i>Geochelone platynota</i>		1,761	
<i>Geochelone radiata</i>		1,029	
<i>Geochelone yniphora</i>		105	
<i>Geochelone</i> spp. ¹		4,421	
<i>Gopherus</i> spp. (Subtotal)	3	92	< 1 %
<i>Gopherus agassizii</i>		36	
<i>Gopherus berlandieri</i>		43	
<i>Gopherus polyphemus</i>		10	
<i>Gopherus</i> spp. ¹		3	

Table 2 continued:

Taxa	No. of species in trade	No. of specimens in trade	% of specimens in trade
<i>Homopus spp. (Subtotal)</i>	5	794	< 1%
<i>Homopus areolatus</i>		425	
<i>Homopus bergeri</i>		2	
<i>Homopus boulengeri</i>		51	
<i>Homopus femoralis</i>		17	
<i>Homopus signatus</i>		225	
<i>Homopus spp.</i> ¹		74	
<i>Indotestudo spp. (Subtotal)</i>	2	34,086	1 %
<i>Indotestudo elongata</i> ²		27,916	
<i>Indotestudo forsterii</i>		6,143	
<i>Indotestudo spp.</i> ¹		27	
<i>Kinixys spp. (Subtotal)</i>	4	166,609	7 %
<i>Kinixys belliana</i>		93,266	
<i>Kinixys homeana</i>		42,220	
<i>Kinixys erosa</i>		8,167	
<i>Kinixys natalensis</i>		25	
<i>Kinixys spp.</i> ¹		22,931	
<i>Malacochersus tornieri</i>		22,036	1 %
<i>Manouria spp. (Subtotal)</i>	2	16,261	1 %
<i>Manouria emys</i>		11,176	
<i>Manouria impressa</i>		5,075	
<i>Manouria spp.</i> ¹		10	
<i>Psammobates spp. (Subtotal)</i>	3	451	<1%
<i>Psammobates oculiferus</i>		303	
<i>Psammobates geometricus</i>		2	
<i>Psammobates tentorius</i>		112	
<i>Psammobates spp.</i> ¹		34	
<i>Pyxis spp. (Subtotal)</i>	2	509	<1%
<i>Pyxis arachnoides</i>		251	
<i>Pyxis planicaudia</i>		113	
<i>Pyxis spp.</i> ¹		145	
<i>Testudo spp. (Subtotal)</i>	5	1,888,198	79 %
<i>Testudo horsfieldii</i>		969,194	
<i>Testudo graeca</i>		630,237	
<i>Testudo hermanni</i>		227,971	
<i>Testudo kleinmanni</i>		7,195	
<i>Testudo marginata</i>		5,031	
<i>Testudo spp.</i> ¹		48,569	
<i>Testudinidae spp.</i> ¹		15,465	1 %
Total	39	2,389,462	100 %

¹ species not specified / ¹ Espèce non spécifiée

² plus a total of 1080 t of live *Indotestudo elongata* traded in 1991, 1992 and 1993 / Plus un total de 1080 t de *Indotestudo elongata* vivants ayant fait l'objet d'un commerce en 1991, 1992 et 1993

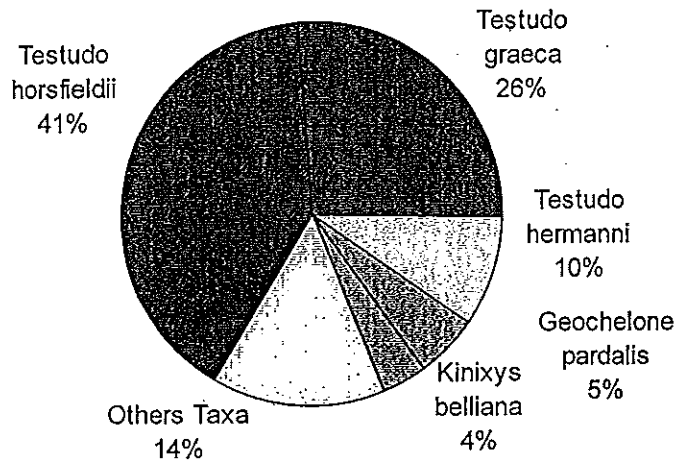


Fig.1: Percentage of *Testudinidae* species in international trade between 1977-1999. (Total: 2,389,462 live specimens). / Pourcentage d'espèces de *Testudinidae* enregistrés dans le commerce international de 1977 à 1999. (Total : 2,389,462 de spécimens vivants). (Source : UNEP-WCMC, 2000)

Trends

The trade trends over the 23 year period show a drastic decrease in the annual trade volumes of live *Testudinidae* (Fig. 2). In the late 1970s between 150,000 and 330,000 live specimens were reported in international trade each year. In the early 1980s the annual trade volumes decreased sharply and in 1986 dropped to its lowest recorded level of approximately 25,000 specimens. Interestingly, this decrease in the annual trade volume appears shortly after the EU closed its market for a number of popular tortoise pet species, in particular for the two Mediterranean tortoise species *T. hermanni* and *T. graeca*, which were imported by EU Member States in volumes of more than 100,000 live specimens a year in the 1970s. Since this drop, the annual trade volumes of all *Testudinidae* species has risen slightly and by the end of the 1990s has reached a volume of around 100,000 specimens (113,000 in 1998, 90,000 in 1999).

The increased levels of captive bred specimens in international trade that are discussed below have most likely also contributed to the increase in the annual trade volumes.

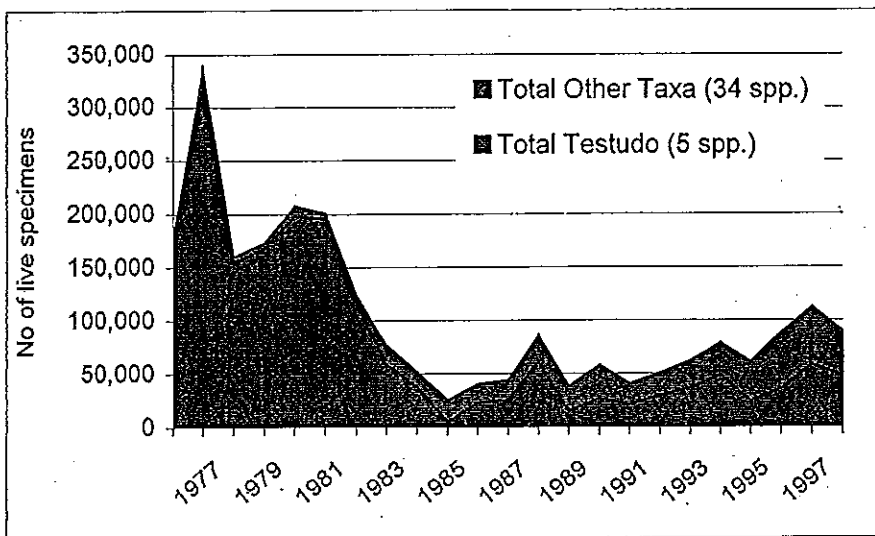


Fig. 2: Annual trade volumes of live *Testudinidae* reported in trade between 1977 and 1999. / Volume annuel du commerce de *Testudinidae* vivants enregistrés dans le commerce international de 1977 à 1999. (Source : UNEP-WCMC, 2001)

Parallel to the drop in the annual import volumes the number of species recorded in trade increased slightly. In the 1980s, on average some 25 different *Testudinidae* species were recorded in international trade each year, in the 1990s a greater variety appeared in trade with an average of 30 species a year. Until the 1980s more than 95% of the international trade in *Testudinidae* was in specimens of the genus *Testudo*. Since 1984 (and since the EU restricted the importation for four *Testudo* species), the share of *Testudo* species in international trade decreased and nowadays accounts for around 50% of all trade in *Testudinidae*.

These trends in the overall trade volumes and species composition suggest that the international trade in *Testudinidae* species has shifted in the past 20 years from a mass trade in a relatively small number of species (usually the typical pet tortoise *Testudo graeca* and *Testudo hermanni*) to a quantitatively much smaller but diverse trade that involves a greater variety of species.

Origins and destinations of *Testudinidae* in international trade

The main importers of live *Testudinidae* have changed significantly over the past 23 years (see Table 2 and Fig. 3 and 4). Even though the general trade volumes of *Testudinidae* in trade decreased over the past two decades imports into the USA and Japan have increased many-fold. In the 1980s (1980-1989) the EU Member States imported around 70% of all *Testudinidae* imports; 11% went to the USA and less than 1% were imported by Japan. In the 1990s (1990-1999) the percentage of the EU imports decreased from 70% to 22% and almost 75% of all *Testudinidae* in trade were now imported by the USA and Japan (40% by the USA and 35% by Japan).

Table 2: Main Importers of live *Testudinidae* in the 1980s and in the 1990s. / Importateurs principaux de *Testudinidae* vivants de puis les années 1980 aux années 1990.

Importer	1980-1989		1990-1999	
	No.	%	No.	%
EU	727,281	70	147,635	22
USA	108,484	11	269,575	40
Japan	14,359	1	238,140	35
Others	182,956	18	26,783	4
Total	1,033,080	100	682,133	100

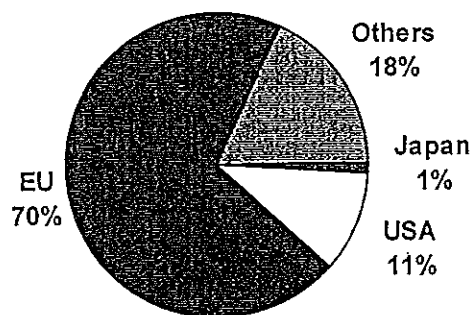


Fig. 3: Net imports of live *Testudinidae* reported in trade between 1980 and 1989. / Importations nettes de *Testudinidae* vivants enregistrés dans le commerce entre 1980 et 1989. Total : 1,033,080. (Source : UNEP-WCMC, 2000)

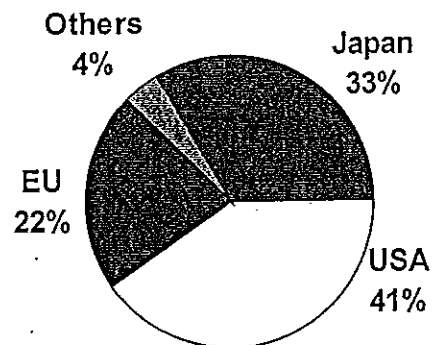


Fig. 4: Net imports of live *Testudinidae* reported in trade between 1990 and 1999. / Importations nettes de *Testudinidae* vivants enregistrés dans le commerce entre 1990 et 1999. Total : 1,033,080. (Source : UNEP-WCMC, 2000)

The main exporters of live *Testudinidae* are the countries of the former Soviet Union (Russian Federation and Commonwealth of Independent States - CIS), the Central and Eastern European Countries and countries of the African continent (Table 3). The percentage of *Testudinidae* exported from Russia and the CIS has decreased only slightly in the past two decades, accounting for around 44% in the 1980s to 38% in the 1990s (the majority of these exports consist of exports of the Russian tortoise *Testudo horsfieldii*) (Fig. 5 and 6). At the same time exports from African countries increased in the same period in volume and percentage of total export and accounted for 38% in the 1990s. Interestingly, exports from Central and Eastern European countries decreased in the past two decades both in volume and percentage, and totalled between 1990-1999 a volume of 50,051 live specimens (7% of all exports). This decrease in export volumes of the C/E could be due to the fact that these countries have mainly exported Mediterranean tortoises (*T. greaca* and *T. hermanni*) to the EU which could no longer be exported following the implementation of the new Wildlife Trade Regulations in 1984.

Table 3: Main Exporters of *Testudinidae* in the 1980s and in the 1990s. Exportateurs principaux de *Testudinidae* entre les années 1980 et les années 1990.

Exporter	1980-1989		1990-1999	
	No.	%	No.	%
Russia & CIS	450,840	44	257,017	38
C/E Europe	424,233	41	50,051	7
Africa	93,287	9	257,389	38
Others	64,720	6	117,676	17
Total	1,033,080	100	682,133	100

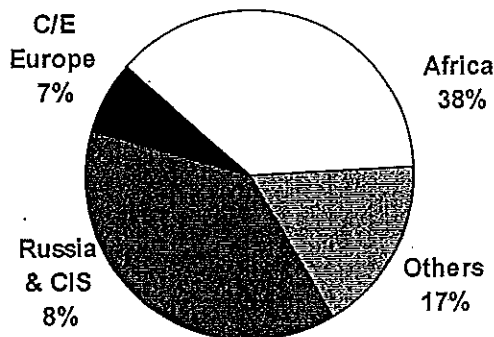


Fig. 5: Reported net exports of live *Testudinidae* between 1980 and 1989. / Exportations nettes de *Testudinidae* vivants enregistrés entre 1980 et 1989. Total : 1,033,080. (Source: UNEP-WCMC, 2001)

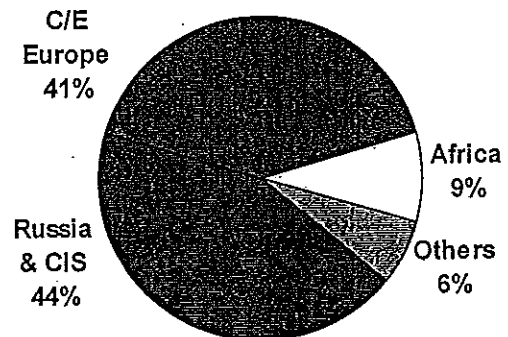


Fig. 6: Reported net exports of live *Testudinidae* between 1990 and 1999. / Exportations nettes de *Testudinidae* vivants enregistrés entre 1990 et 1999. Total : 682,133. (Source: UNEP-WCMC, 2001)

Source of *Testudinidae* in trade

The majority of the *Testudinidae* reported in international trade are of wild origin. Captive bred specimens account for only 3% of the overall trade volumes of 2,389,462 live *Testudinidae* reported in trade between 1977 and 1999. However, these figures are based on the reported international trade between CITES parties. Internal trade in captive bred specimens, which is considered to be substantial and e.g. takes place in the USA and between EU Member States, is not reflected in these figures. Therefore the overall number of animals that are captive bred in Europe and that appears on European markets is probably notably higher than these figures suggest. In addition, CITES parties sometimes fail to report the source, which would also led to an underestimate of the actual figure of captive bred tortoises in trade.

The numbers of captive bred animals reported in trade have been increasing steadily over the last decade. Whereas in the mid- to late 1980s the levels of captive bred specimens in trade accounted for only 1% of all specimens trade, levels have risen significantly in the mid 1990s and in 1999 to almost 17% of all *Testudinidae* reported in international trade. The levels of captive bred specimens per taxon varies greatly between the 39 *Testudinidae* species reported in trade. More than 50 % of all *Testudinidae* species in trade are only rarely traded as captive bred specimens (less than 2% of all trade in captive bred specimens) and nine of the 39 taxa have not been recorded as captive bred specimens at all.

In three species the levels of captive bred specimens in international trade account for more than 50%: *Geochelone gigantea*: 58% of the 1,759 specimens traded originate from captive bred sources, *Geochelone sulcata*: 63% of the 38,224 specimens in trade originate from captive bred sources, and *T. marginata*: 70% of the 5,031 specimens recorded in international trade originate from captive bred sources.

Illegal trade

Illegal trade in tortoises - as with many other wildlife species that are valued as pets - does exist, and even though its exact volumes remains unknown its impact on tortoise conservation especially on endangered species can be significant. Of particular concern is the demand among certain people for rare tortoises or tortoises known to or thought to represent new species, because the prices in the pet trade are often directly related to the rarity of the species.

Another area of particular concern is paper fraud which can e.g. include falsifying official documents, mis-declaration of the number or source of the specimens traded (declared as captive bred instead of wild). Especially the intentional mis-declaration of the origin of the specimen (captive bred instead of wild) seems to become a 'popular' methodology to illegally import tortoises that are of wild origin and for which the importation is only allowed for captive bred specimens. A well documented example of such trade is an investigation undertaken by the Belgian Federal Police in the late 1990s ('Operation Apalone') that revealed illegal trade in several *Testudo* species falsely declared as being captive bred. In some cases such fraud can be revealed by checking the size and other morphological features of the specimens. However, this requires careful and thorough inspections by trained enforcement officers, and unfortunately the conditions and capacities to ensure this are not always given. Therefore, the CITES Scientific Authorities in the EU should carefully check such claims, try to obtain as much information as possible before issuing an import permit and when in doubt refuse the issuance of the required permits.

Captive Breeding and Ranching

There are three terms which are often used to refer to the source of a 'non-wild' tortoise: 'captive bred', 'born and bred in captivity' and 'ranching'. Under CITES all these three terms are (more or less) clearly defined in order to avoid confusion and misuse of these terms (see Wijnstekers, 2000).

Captive breeding and ranching of tortoise species, even on a commercial basis to supply the pet market, may provide a significant contribution to alleviate the pressure from wild populations. In addition, studbook programmes and other initiatives undertaken by zoos as well as dedicated amateur circles provide a valuable component especially in the genetic management of endangered tortoise species. Many popular pet tortoises are nowadays regularly offered as captive bred specimens and may be even more attractive for hobbyist as they are generally regarded as being more resistant and hence easier to keep.

However, the issue of captive breeding and ranching is a complex one that needs careful discussions and considerations. For example commercial captive breeding and ranching operations are not always thoroughly documented which make it difficult to determine their actual production, their need for wild-harvested animals to maintain their breeding stock and to assess and monitor the effects of such harvest on wild populations. Moreover, captive breeding in non-range countries bears the risk of escape and establishment of exotic species to an environment where they can have detrimental effects on the native fauna and flora. Several captive breeding initiatives and programmes undertaken aim to recover wild tortoise populations. However, this practice

does hold various risks and can eventually have detrimental effects on the wild population e.g. when introducing accidentally infections or viruses into wild populations.; Likewise the introduction of animals from other intra-specific populations can similarly put a risk to the wild population and can endanger the intra-specific genetic variation of this species. The same may apply to introduction programmes that introduce animals into an area that once belonged to the species home range but where the species has disappeared, or into an area that lays outside the recorded distribution range of the species at all.

One measure that has made commercial breeding to supply the pet markets of the North America and in the EU less attractive is the so-called 'four-inch rule' that was imposed by the USA and Canada as a measure to limit mass trade in potentially *Salmonella*-bearing farmed hatchlings. This regulation makes the import of hatchlings of less than four inch (=10 cm) shell length illegal, and thus forces the pet trade to deal in larger, and often wild collected animals.

CONCLUSION

To summarise, the following conclusions can be drawn:

- > Overall levels of international reported trade in live specimens of *Testudinidae* decreased significantly since 1977 (150,000 to 300,000 live specimens traded per year in the late 1970s, reduced to approximately 100,000 specimens per year in the late 1990s). However, this trend is preliminary caused by the sharp decrease of imports to the EU, the largest importer of live tortoises in the 1970s, following the imposition of import restrictions on a number of very popular tortoise species. In contrast to the decreased EU import, the imports of live tortoises to the USA and Japan have increased considerably over the period under review: in the 1990s the US imports more than doubled compared to the decade before (1980-1989: 108,484 tortoises imported; 1990-1999: 269,575 tortoises imported) and importation to Japan even increased 16-fold (1980-1989: 14,359 tortoises imported; 1990-1999: 238,140 tortoises imported).
- > The variety of species in trade has increased since the early 1980s (in the 1990s an average of 30 *Testudinidae* species are recorded in international trade). Until the early 1983, more than 95% of all live *Testudinidae* belonged to the Genus *Testudo*. In the late 1990s, however the percentage of *Testudo* species in international trade reduced to approximately 50% and consequently other taxa e.g. species of the genus *Geochelone* or *Kinixys* are traded in higher volumes.
- > Levels of captive bred specimens in international trade are low but increasing (the domestic trade in EU and North America is probably considerably larger). In the 1970s and 1980s less than 1% of all *Testudinidae* in trade originated from captive bred sources, however since then levels have been increasing steadily and in the late 1990s more than 17% of all *Testudinidae* in trade are captive bred.
- > Exports of live *Testudinidae* from Africa have increased over the past two decades, whereas African countries exported less than 10% of all *Testudinidae* in trade in the 1980s, exports increased to 38% of the total exports in the 1990s. Likewise, exports from the Central and Eastern European countries (=the main exporter of *Testudo* species) decreased over the past two decades from 41% in the 1980s to 7% in the 1990s.

The main conclusion of this review is that the international pet market shifted from a mass trade in a relatively small number of pet tortoise species to a quantitative much smaller but diverse trade that involves a greater variety of species. Since all *Testudinidae* species have been listed under CITES since 1977 there is no immediate need to review the levels of regulatory measures

RECOMMENDATIONS

Ensure that international trade in live *Testudinidae* is legal and not a threat to wild tortoise populations (nor to populations of other species)

The following recommendations are made and are directed to:

Exporting countries of *Testudinidae*

- Monitor harvests, production of captive bred and ranched specimens, and examine impact of such activities on wild populations (e.g. need to for wild-harvested animals to maintain breedstock, etc.),
- Assess the need to develop control systems for harvest, captive breeding and ranching operations in exporting countries
- Strengthen CITES implementation in exporting countries, and effective enforcement of all of its provisions

Scientific audiences in particular to scientific authorities in major importing countries

- Improve the regulatory and scientific basis for verifying claims of captive bred, pre-convention and ranched specimens imported into the EU
- Encourage conservative, scientifically based and non-detrimental quota setting for wild caught tortoises
- Collect information on the numbers and variety of *Testudinidae* species that are traded to for purposes other than to supply pet markets i.e. for food and medicinal purposes, and assess its impact on wild populations

To management authorities and enforcement agencies

- Promote a coherent seizure and confiscation policy and develop sensible solutions and guidelines (scientific and technical) for the disposal of confiscated specimens
- Ensure international transport of live specimens is conducted in accordance with IATA Regulations
- Strengthen international collaboration among enforcement agencies, including targeted investigations and training initiatives
- Promote awareness and education among traders, tortoise keepers, buyers and breeders.

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