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

_____

Twenty-seventh meeting of the Animals Committee
Veracruz (Mexico), 28 April – 3 May 2014

Species trade and conservation

IUCN RED LIST ASSESSMENTS OF ASIAN SNAKE SPECIES
[DECISION 16.104]

1. The attached information document has been submitted by IUCN (International Union for Conservation of Nature)[*]. It related to agenda item 19.

[*] *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat or the United Nations Environment Programme concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

Global Species Programme
219c Huntingdon Road
Cambridge CB3 ODL
United Kingdom

Tel. +44 (0) 1223 277 966
Fax +44 (0) 1223 277 845
www.iucn.org

IUCN Red List assessments of Asian snake species

[Decision 16.104]

1. Introduction

At its 16th meeting (CoP16, Bangkok, 2013), the Conference of the Parties adopted Decision 16.104, directed to the Animals Committee, as follows:

> *The Animals Committee shall, at its 27th meeting, consider the final IUCN Red List assessments for Asian snake species and, if available, incorporate new information and data and make appropriate recommendations, including recommendations to the Standing Committee.*

This document draws together relevant information from The IUCN Red List of Threatened Species regarding the snake species of southeast Asia.

The IUCN Red List of Threatened Species™ (or The IUCN Red List) is the world's most comprehensive information source on the global conservation status of plant, animal and fungi species. It is based on an objective system for assessing the risk of extinction of species' that draws on a global network of experts.

Information from the IUCN Red List on southeast Asian snakes results largely from assessments carried out at workshops convened in the Philippines (2007), India (2011), China (2011), and Australia (2009; global sea snakes and homolopsid water snakes) as well as through the Sampled Red List Index project at the Zoological Society of London[1]. While the majority of the assessments prepared at these workshops are published on the IUCN Red List, some (usually species whose range extends beyond the region of focus) have not yet been published.

This summary considers all the snake species assessed for the IUCN Red List whose ranges overlap the region shown in Figure 1. However, not every snake species from this region has been assessed.

Figure 1: The area of focus in Southeast Asia

[1] Funding for these workshops was generously provided by the United States Fish and Wildlife Service, the Critical Ecosystem Partnership Fund, New Hampshire Charitable Foundation, the Thomas W. Haas Foundation, and a private donor whose funds were directed through the office of Russell A. Mittermeier (President, Conservation International).

2. Summary of published IUCN Red List assessments

There are 676 south-east Asian snake species, from 20 families, with published global IUCN Red List assessments. This excludes four species (*Naja oxiana*, *Natrix natrix*, *Python molurus*, and *Thermophis baileyi*) which were assessed in 1996 and whose assessments are therefore out of date, lack supporting documentation, and use the old version (2.3) of the IUCN Red List Categories. Provisional assessments of an additional 106 species have been initiated but require additional work before publication. In this report we focus on the 676 species with published accounts, but also provide information on species with provisional assessments.

Fifty eight (8.6%) of the 676 species are in a threatened category (Critically Endangered, Endangered, or Vulnerable), whilst 201 (29.7%) have insufficient information with which to make an assessment (Table 1).

Table 1: Number of snake species with published global IUCN Red List assessments whose range overlaps the area of interest, divided by family and IUCN Red List category.

Family	CR	EN	VU	NT	LC	DD	Total
Acrochordidae					3		**3**
Anomochilidae					1	2	**3**
Calamariidae	2*	2	2		40	27	**73**
Colubridae	3	5	10	5	124	47	**194**
Cylindrophiidae					1	2	**3**
Elapidae		1	6	2	50	18	**77**
Gerrhopilidae						6	**6**
Homalopsidae		2	1		17	15	**35**
Natricidae		3	2	5	55	25	**90**
Pareatidae					10	2	**12**
Psammophiidae					3		**3**
Pseudoxenodontidae					6	4	**10**
Pseudoxyrhophiidae†					1		**1**
Pythonidae			2		5		**7**
Typhlopidae	1	2			8	27	**38**
Uropeltidae		2	2	3	16	14	**37**
Viperidae		6	4	4	45	7	**66**
Xenodermatidae					11	3	**14**
Xenopeltidae					2		**2**
Xenophiidae						2	**2**
TOTAL	**6***	**23**	**29**	**19**	**398**	**201**	**676**

* Of which one species (*Calamaria prakkei*) is tagged as Possibly Extinct

† Although used on the IUCN Red List, this family is not widely recognised, generally being classified under Lamprophiidae

2.a. Threats

Out of 99 threat types in the IUCN Red List threat classification scheme, 67 are recorded in these Asian snake assessments. The conversion of natural habitats into agriculture, urbanization and logging, were most frequently recorded as threats to snake species (Table 2). In total, 75 (11.1%) out of 676 species have “intentional use” recorded as a threat (see Appendix I), whilst 16 (27.8%) of the 58 threatened species have “intentional use” recorded as a threat.

Table 2: Threats recorded in the Asian snake assessments, ordered by the frequency with which they were recorded. Rows relating to intentional use of the species are shaded.

Rank	Threat code	Threat description	Number of species assessments listing this threat	% of species assessments listing this threat	Number of threatened species assessments listing this threat	% of threatened species assessments listing this threat
1	2.1.2	**Agriculture & aquaculture** -> Annual & perennial non-timber crops -> Small-holder farming	90	13.3%	17	29.3%
2	2.1.1	**Agriculture & aquaculture** -> Annual & perennial non-timber crops -> Shifting agriculture	86	12.7%	15	25.9%
3	1.1	**Residential & commercial development** **->** Housing & urban areas	68	10.1%	12	20.7%
4	5.3.5	**Biological resource use** -> Logging & wood harvesting -> Motivation Unknown/Unrecorded	64	9.5%	17	29.3%
5	5.1.1	**Biological resource use** -> Hunting & collecting terrestrial animals -> Intentional use (species being assessed is the target)	56	8.3%	16	27.6%
6=	2.1.3	**Agriculture & aquaculture** **->** Annual & perennial non-timber crops -> Agro-industry farming	39	5.8%	9	15.5%
6=	5.3.3	**Biological resource use** **->** Logging & wood harvesting -> Unintentional effects: subsistence/small scale (species being assessed is not the target)	39	5.8%	5	8.6%
8	2.1.4	**Agriculture & aquaculture** -> Annual & perennial non-timber crops -> Scale Unknown/Unrecorded	35	5.2%	4	6.9%
9=	4.1	**Transportation & service corridors** **->** Roads & railroads	32	4.7%	2	3.4%
9=	5.4.4	**Biological resource use** **->** Fishing & harvesting aquatic resources -> Unintentional effects: large scale (species being assessed is not the target)	32	4.7%	0	0.0%
11	1.3	**Residential & commercial development** **->** Tourism & recreation areas	30	4.4%	8	13.8%
12	5.1.3	**Biological resource use** **->** Hunting & collecting terrestrial animals -> Persecution/control	28	4.1%	4	6.9%
13=	1.2	**Residential & commercial development** **->** Commercial & industrial areas	19	2.8%	1	1.7%
13=	5.3.4	**Biological resource use** **->** Logging & wood harvesting -> Unintentional effects: large scale (species being assessed is not the target)	19	2.8%	2	3.4%
15	3.2	**Energy production & mining** **->** Mining & quarrying	17	2.5%	4	6.9%
16	5.4.1	**Biological resource use** -> Fishing & harvesting aquatic resources -> Intentional use: subsistence/small scale (species being assessed is the target)	16	2.4%	0	0.0%
…						
22=	5.4.2	**Biological resource use** -> Fishing & harvesting aquatic resources -> Intentional use: large scale (species being assessed is the target)	8	1.2%	0	0.0%

For comparison, worldwide, 1679 snake species have been globally assessed, of which 184 (11.0%) are threatened (again, assessments from 1996 are excluded here). Globally, a lower percentage of assessed snakes have “intentional use” recorded as a threat than those is southeast Asia, and that difference is greater when limited to threatened species (Figure 2). Since snakes have not yet been comprehensively assessed for the IUCN Red List, care should be taken in interpreting these figures and no firm conclusions can be drawn from these regarding the situation in south-east Asia compared to that worldwide. However, since nearly half of snake species worldwide have been assessed, and there are reasons to suspect intentional use of snakes in south-east Asia to be particularly prevalent, these data may be indicative of a genuine overall difference.

The threat data also allow comparison of the relative extinction risk of snake species which are impacted by different threatening processes. Amongst species where intentional use is recorded as a threat, 21.0% are assessed as Critically Endangered, Endangered or Vulnerable. Amongst species which are threatened by any threat other than intentional use (including those which are threatened by both intentional use and other factors), the percentage in these categories (Critically Endangered, Endangered and Vulnerable) is smaller: 16.2%.

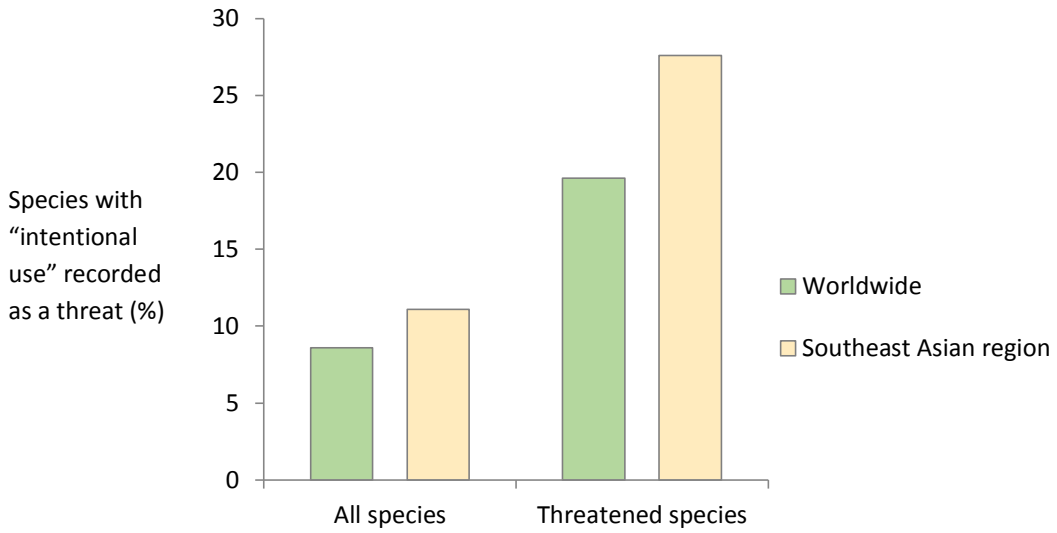

Figure 2: The percentage of assessed species for which "intentional use" is recorded as a threat, for both all assessed snake species worldwide and those whose range overlaps the Southeast Asian region of interest.

2.b. Use and Trade

In the “Use and trade” section of the Red List assessments, 109 of the assessed Asian snake species have details of utilization recorded. This includes all but six of the 75 species which have “intentional use” recorded as a threat. The six species which have “intentional use” recorded as a threat but which do not have any details entered in the “use and trade” section of the assessment are as follows:

Bungarus slowinskii	VU B1ab(iii)
Python kyaiktiyo	VU D2
Cryptelytrops honsonensis	VU D2
Parias malcolmi	NT

Trimeresurus flavomaculatus LC
Viridovipera truongsonensis EN B1ab(iii)

For each of these except *Trimeresurus flavomaculatus*, the assessment text indicates that although there is no recorded use of or trade in the species, there is likely to be demand (e.g. because it is a recently described attractive species, or because closely related species are utilized). For *Trimeresurus flavomaculatus*, there is known trade which is not recorded in the "use and trade" section of the assessment – but the text indicates that is unlikely to constitute a major threat to the species.

Six different end uses were recorded and several species have multiple end uses (Table 3). The most frequently recorded end use is for pets / display animals (66 species), and this is also the end use for which international trade is most commonly recorded (53 species). Amongst the threatened species, the most frequently recorded end use is human food, and the end use for which international trade is most commonly recorded is for pets / display animals. The collection of snakes for food and medicine appears to be driven mainly by domestic demand.

In total, out of 109 species with utilization details recorded, 79 are recorded as being traded internationally.

Table 3: The total number of species and number of threatened species for each end use recorded in the assessments, along with the total number of species and number of threatened species for which international trade is recorded for each end use.

	All species with this end use		**International trade for this end use**	
	Total	**Threatened**	**Total**	**Threatened**
Food – animal	12	1	1	0
Food – human	37	8	13	3
Handicrafts, jewellery, decorations, curios, etc.	4	3	4	3
Medicine - human and veterinary	32	5	11	5
Pets/display animals, horticulture	66	6	53	6
Wearing apparel, accessories	30	5	24	3
Unknown	2	1	0	0

2.c. Overlap between international trade and intentional use being a threat

There are 56 species which are recorded as traded internationally and threatened by use and trade. (Figure 3, Appendix II). A breakdown by family is shown in Table 4. When considering all of the assessed species, the three families with the highest percentages of species in this "overlap" section are Acrochordidae, Pythonidae, and Xenopeltidae. Amongst the threatened species, the three families with the highest percentages of species in this "overlap" section are Pythonidae, Elapidae, and Viperidae.

Fourteen of these species are listed in CITES Appendix II, and 12 are listed as threatened or Near Threatened on the IUCN Red List (Table 5). International trade is a potential concern for

these 12 species, along with five of the species (all except *Trimeresurus flavomaculatus*) which have "intentional use" recorded as a threat but which have no details in the "use and trade" section of the assessment. Further details on all 17 of these are given in section 3.

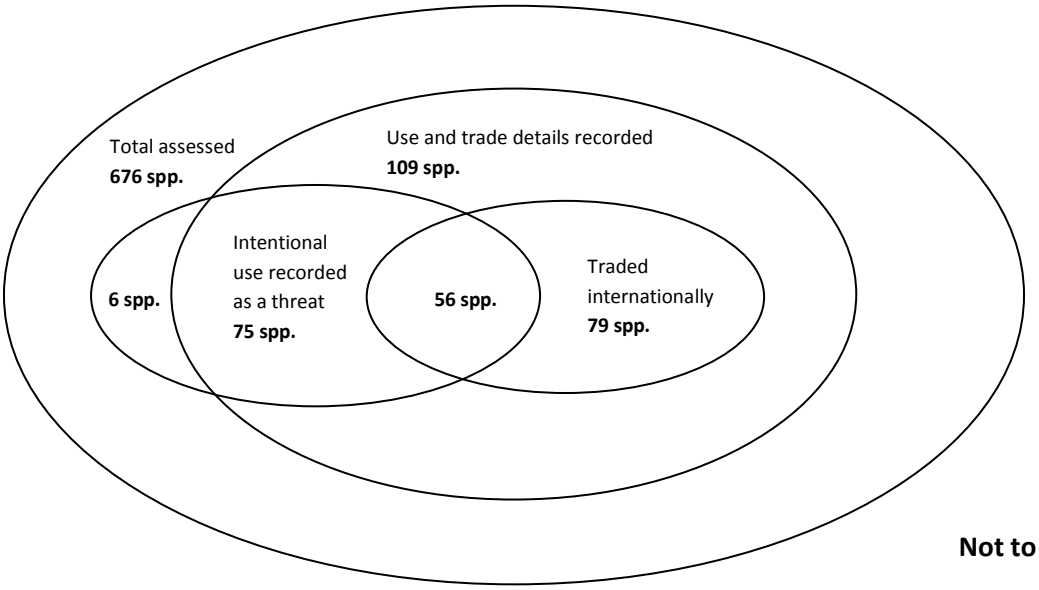

Figure 3: A diagram illustrating the overlap between species where intentional use is recorded as a possible threat to the species, and species which are recorded as being traded internationally.

Table 4: A summary, by family, of the percentage of species which have intentional use recorded as a threat, the percentage of species which have international trade recorded, and the percentage with both utilisation recorded as a threat and international trade recorded. These statistics are summarised for all species and for threatened species.

Family	All species				Threatened species			
	No. assessed	% with intentional use as a threat	% with international trade recorded	% in "overlap" section	No. assessed	% with intentional use as a threat	% with international trade recorded	% in "overlap" section
Acrochordidae	3	100.0%	100.0%	100.0%	0	-	-	-
Anomochilidae	3	0.0%	0.0%	0.0%	0	-	-	-
Calamariidae	73	0.0%	0.0%	0.0%	6	0.0%	0.0%	0.0%
Colubridae	194	3.1%	8.8%	3.1%	18	11.1%	11.1%	11.1%
Cylindrophiidae	3	33.3%	0.0%	0.0%	0	-	-	-
Elapidae	77	31.2%	28.6%	24.7%	7	57.1%	42.9%	42.9%
Gerrhopilidae	6	0.0%	0.0%	0.0%	0	-	-	-
Homalopsidae	35	22.9%	14.3%	14.3%	3	33.3%	0.0%	0.0%
Natricidae	90	4.4%	5.6%	3.3%	5	0.0%	0.0%	0.0%
Pareatidae	12	0.0%	0.0%	0.0%	0	-	-	-
Psammophiidae	3	0.0%	0.0%	0.0%	0	-	-	-
Pseudoxenodontidae	10	0.0%	10.0%	0.0%	0	-	-	-
Pseudoxyrhophiidae†	1	0.0%	0.0%	0.0%	0	-	-	-
Pythonidae	7	100.0%	71.4%	71.4%	2	100.0%	50.0%	50.0%

Typhlopidae	38	0.0%	0.0%	0.0%	3	0.0%	0.0%	0.0%
Uropeltidae	37	0.0%	0.0%	0.0%	4	0.0%	0.0%	0.0%
Viperidae	66	31.8%	30.3%	21.2%	10	70.0%	40.0%	40.0%
Xenodermatidae	14	0.0%	0.0%	0.0%	0	-	-	-
Xenopeltidae	2	50.0%	50.0%	50.0%	0	-	-	-
Xenophiidae	2	0.0%	0.0%	0.0%	0	-	-	-
Total	**676**	**11.1%**	**11.7%**	**8.3%**	**58**	**27.6%**	**17.2%**	**17.2%**

† Although used on the IUCN Red List, this family is not widely recognized, generally being classified under Lamprophiidae

Table 5: The use and trade details for each of the 12 threatened or Near Threatened species which are both traded internationally and threatened by intentional use. "Source" describes the origin of the traded material, either 'wild' or 'captive breeding/farming'. "Scale" shows the level at which the utilisation takes place: subsistence (S), national (N) or international (I). All of these use and trade records showed either trade in live individuals or trade in parts which were lethally removed.

Family	Species	Red List Cat.	End use recorded on IUCN Red List	Source	Scale		
					S	N	I
COLUBRIDAE	*Euprepiophis perlacea*	EN	Food - human	Wild		✓	✓
			Wearing apparel, accessories	Wild		✓	✓
COLUBRIDAE	*Orthriophis moellendorfi*	VU	Food - human	Wild	✓	✓	
			Medicine - human and veterinary	Wild	✓	✓	✓
			Wearing apparel, accessories	Wild	✓	✓	
ELAPIDAE	*Laticauda semifasciata*	NT	Food - human	Wild	✓	✓	✓
			Wearing apparel, accessories	Wild		✓	✓
ELAPIDAE	*Naja mandalayensis*	VU	Food - human	Wild		✓	✓
			Medicine - human and veterinary	Wild			✓
			Handicrafts, jewellery, etc.	Wild			✓
ELAPIDAE	*Naja philippinensis*	NT	Food - human	Wild	✓	✓	✓
			Pets/display animals, horticulture	Wild	✓	✓	✓
ELAPIDAE	*Naja siamensis*	VU	Food - human	Wild	✓	✓	
				Captive	✓	✓	
			Medicine - human and veterinary	Wild	✓	✓	✓
			Wearing apparel, accessories	Wild	✓	✓	
ELAPIDAE	*Ophiophagus hannah*	VU	Food - human	Wild	✓	✓	
			Medicine - human and veterinary	Wild	✓	✓	✓
			Wearing apparel, accessories	Wild	✓	✓	✓
			Handicrafts, jewellery, etc.	Wild	✓	✓	✓
			Pets/display animals, horticulture	Wild	✓	✓	✓
PYTHONIDAE	*Python bivittatus*	VU	Food - human	Wild	✓	✓	✓
			Medicine - human and veterinary	Wild	✓	✓	✓
			Wearing apparel, accessories	Wild	✓	✓	✓
			Handicrafts, jewellery, etc.	Wild	✓	✓	✓
			Pets/display animals, horticulture	Wild	✓	✓	✓
				Captive		✓	
VIPERIDAE	*Cryptelytrops kanburiensis*	EN	Pets/display animals, horticulture	Wild			✓
VIPERIDAE	*Popeia buniana*	EN	Pets/display animals, horticulture	Wild			✓
VIPERIDAE	*Popeia nebularis*	VU	Pets/display animals, horticulture	Wild			✓
VIPERIDAE	*Protobothrops mangshanensis*	EN	Pets/display animals, horticulture	Wild			✓

3. Further details on species for which international trade is a potential concern

3.a. Species accounts of threatened and Near Threatened species

The following section covers threats and use and trade details of the seventeen threatened (CR, EN & VU) and Near Threatened snake species from the region which have published global IUCN Red List assessments and have been identified above as having a potential concern regarding international trade. Seven of these species are already listed in CITES Appendix II.

As outlined above, these seventeen species comprise:

- twelve which are both traded internationally and have a recorded threat from intentional use (as listed in Table 5)
- five which have no use and trade details recorded in the assessment but do have a recorded threat from intentional use (as discussed in sections 2.a. and 2.b.).

Some of the latter five may not currently be in international trade but are included in this section precautionarily in the absence of further information.

The extracts below from IUCN Red List assessments (ordered by family) are reproduced exactly as written in the assessment. The "Use and Trade" text does not currently appear in the published version of any assessment (i.e. public-facing website), but forms part of the supporting documentation and will become available online in the near future.

i. *Euprepiophis perlacea* – Sichuan Rat Snake EN B2ab(iii)

Population trend: decreasing

CITES status: not listed

Extracts from IUCN Red List assessment - Zhou, Guo and Jiang 2012

Threats

"This is a species with a very narrow distribution. There is a decline in the quality of habitat outside of protected areas, through new development of housing and deforestation (logging). There is some poaching of this species (Wang and Xie 2009)."

Use and Trade

"This species is utilised (Wang and Xie 2009), presumably for meat and skins."

ii. *Orthriophis moellendorfi* – Moellendorff's Trinket Snake VU A2d

Population trend: decreasing

CITES status: not listed

Extracts from IUCN Red List assessment – Zhou, Lau and Nguyen 2012

Threats

"Overexploitation is the main threat to this species. Its meat is used for food, medicinal liquor, and the skin is used for making bags, shoes etc."

Use and Trade

"Li and Li (1998) reported that this species appeared in live animal trade from Viet Nam to China during 1993-1996. China Wildlife Conservation Association, WildAid (2006) reported consumption of this species as food in China, but provided no further data on quantity. He and Peng (1999) investigated the market in Guangzhou City, Guangdong Province of China, and estimated that the annual sale quantity in that city is about 129.9 ton. Zhou and Jiang (2004) reported that 340,390 live snakes and 195,700 pieces of skin of this species were exported from China 1990-2000, while 30,000 pieces of skin were imported into China from 1991-2001. The CITES workshop on snakes in 2011 reported that export of snakes in China decreased very quickly since 2004."

iii. *Bungarus slowinskii* – Red River Krait VU B1ab(iii)

Population trend: unknown

CITES status: not listed

Extracts from IUCN Red List assessment – Stuart and Nguyen 2012

Threats

"This snake is known from a heavily-modified area in the Red River Valley in the north of the snake's range, which has a long history of human habitation and habitat modification. It is unclear whether it is threatened in central Viet Nam, as the forest in this area is protected. If it occurs in adjacent areas of Lao PDR, the snake may be able to persist in the extensive areas of remaining forest in this region (B. Stuart and Q.T. Nguyen pers. comm. 2011). However, road-building and encroachment of slash-and-burn agriculture into forested areas may still pose a threat to this species in these areas (Q.T. Nguyen pers. comm.2011). While this very rare snake has never been reported in trade, other species of Krait are exploited for use in rice wine and for traditional Chinese medicine, and this might also represent a risk to this snake."

Use and Trade

"It is not known whether there is any use or trade in this species."

iv. *Laticauda semifasciata* – Chinese Sea Snake NT

Population trend: unknown

CITES status: not listed

Extracts from IUCN Red List assessment – Lane and Gatus 2010

Threats

"Major threats to this species may include anthropogenic disturbances such as coastal development and habitat destruction.

"The skin and smoked sea snake trade in the Philippines was historically a very significant threat. The extensive harvest has now stopped since the crash in the population in the 1980s. In 1974 the number of snakes captured was 450,000, and by 1981 it had dropped to 1,454 individuals (Dunson 1975, Bacolod 1983). There is still a smaller harvest for smoked sea snake for the Japanese market (J. Gatus pers. comm. 2009). It is also harvested heavily in the Ryuku Islands (Dunson 1975).

"Amphibious Laticaudine sea kraits predominantly utilize the inter-tidal region whilst on land and require suitable cover (such as beach rocks) 1-4 m from the waters edge (Saint

Girons 1964, Ineich and LaBoute 2002, A. Lane pers. comm 2009). If suitable habitat in the inter-tidal region is lost due to rising sea levels associated with global warming (Meehl *et al*. 2005, Bindoff *et al*. 2007), this is expected to constitute a direct threat. Furthermore, Laticauda spp. have specific oviposition requirements which have been recorded only rarely (Bacolod 1983, M. Guinea pers. comm.). In these instances egg laying was observed in rocky inter-tidal caves, accessible to kraits only at certain tides. If sea level changes prevent access to suitable laying sites, or render these sites unusable, this would also directly threaten the persistence of Laticaudine sea kraits.

"This species is strongly associated with coral reefs and the degradation of this habitat is likely to pose a threat to species persistence. Mass coral bleaching occurs in association with episodes of elevated sea surface temperature and results in significant losses of live coral (Hoegh-Guldberg 1999). This reduces habitat complexity, with a consequent decrease in prey abundance (Pratchett *et al*. 2008) and the loss of refuge sites. Climate change may thus threaten all sea snakes which are coral reef specialists (Francis 2006)."

Use and Trade

"This sea snake was intensively harvested in the central Philippines, both for food and skins. Because of large declines in population numbers, and some protection (e.g. Gato Island sea snake sanctuary), collection is now thought to be limited."

v. *Naja mandalayensis* – Mandalay Cobra VU B1ab(iii,v)

Population trend: decreasing

CITES status: listed in Appendix II

Extracts from IUCN Red List assessment – Wogan and Stuart 2012

Threats

"The genus *Naja* is in high demand in China for medicinal purposes, and evidence of this species in trade indicates that it may be at risk from collectors. This species' limited extent of occurrence within Myanmar's central dry zone and its apparently low population density suggests that it may well be vulnerable to overharvesting. Much of the habitat in the species' range has been converted to agricultural land; while the species appears tolerant of this modification (Slowinski and Wüster 2000) these activities may represent a decline in habitat quality. The whole dry zone is considered to represent one location due to the extensive network of trade and collection for this species throughout the area."

Use and Trade

"Most specimens in the type series were obtained by commercial snake collectors (Slowinski and Wüster 2000), and so the species is in commercial trade. The international snake trade in this region is quite extensive, and this species is likely to be commonly collected for this purpose. It is traded mainly for medicinal use (especially for export to China), food and skin."

vi. *Naja philippinensis* – Philippine Common Cobra NT

Population trend: decreasing

CITES status: listed in Appendix II

Extracts from IUCN Red List assessment – Sy, Brown, Afuang, Diesmos and Gonzalez 2009

Threats

"The species is widely persecuted, especially in and around agricultural areas. Animals are collected for the exotic food trade (within the Philippines), and to a much lesser degree, for the pet trade. This snake is also collected and used for anti-venom production by the Research Institute for Tropical Medicine (RITM)."

Use and Trade

No narrative text given

vii. *Naja siamensis* – Black And White Spitting Cobra VU A2ad

Population trend: decreasing

CITES status: listed in Appendix II

Extracts from IUCN Red List assessment – Stuart, Thy, Chan-Ard, Nguyen and Bain 2012

Threats

"Like other cobras, this species is heavily harvested in Vietnam, Cambodia, and Lao PDR where it is used for traditional Chinese medicine (B. Stuart pers. comm. 2011). This is the primary cause of observed population declines in this species, which is highly tolerant of habitat modification. This species is sometimes harvested for the skin trade, but this is only a minor threat as the skin quality is not high."

Use and Trade

"This species is heavily harvested in Vietnam, Cambodia, and Lao PDR for both domestic use and export to China, where it is used in traditional medicine (Li and Li 1998, Li and Wang 1999 [as *Naja naja*], B. Stuart pers. comm. 2011). The species is also exported between Indochinese countries for medicinal use (T. Neang and B. Stuart pers. comm. 2011). This snake is sometimes harvested for the skin trade, and it is also exploited for snake wine, where it is among the most commonly-found species (Somaweera and Somaweera 2010). There is an export ban in Thailand. The species is successfully bred in captivity in Vietnam, and many restaurants in Vietnam are now supplied from captive-bred sources (Q.T. Nguyen pers. comm. 2011), although this may not suppress demand for wild-caught animals (B. Stuart pers. comm. 2011)."

viii. *Ophiophagus hannah* – King Cobra VU A2acd

Population trend: decreasing

CITES status: listed in Appendix II

Extracts from IUCN Red List assessment – Stuart, Wogan, Grismer, Auliya, Inger, Lilley, Chan-Ard, Thy, Nguyen, Srinivasulu and Jelić 2012

Threats

"This species is threatened by destruction of habitat due to logging and agricultural expansion, as Southeast Asia is experiencing one of the highest rates of deforestation in the tropics (Sodhi *et al*. 2009) and this species appears to be most abundant in forested habitats. Snakes can however survive in a range of degraded habitats and so this is

unlikely to be the primary threat to this species globally. The extent to which degraded areas can maintain viable populations of this snake is unknown; in the Chitwan area of Nepal it has been observed that mostly young animals are encountered in agricultural lands, always close to forest, and these areas may simply be feeding grounds, or may be population sinks (D. Jelić pers. comm. 2012). Deforestation is however likely to exert strong pressure at local scales, particularly where snakes are also hunted, and is likely to lead to declines in many of the snakes on which this species feeds (R.P.H. Lilley pers. comm. 2011). In Nepal, the Therai lowlands have undergone a rapid increase in population since the eradication of malaria from this region, and most of this area is now under cultivation or exposed to pollution, with forests remaining only in protected areas (D. Jelić pers. comm. 2012). The king cobra is, however, particularly at risk from the harvesting of individuals for skin, food, pets, and especially traditional Chinese medicine. As the world's largest venomous snake, it is also suffers high levels of persecution by humans throughout its range. The possibility of this snake actually representing a complex of species makes all of these threats even more acute, as individual species within the complex will occur over a smaller area and as smaller populations than the currently recognized *Ophiophagus hannah*."

Use and Trade

"This species is harvested for skin, food, and especially medicinal purposes in China. It is heavily harvested for the medicinal trade in many parts of its range, particularly Viet Nam, Lao PDR, Cambodia and Myanmar, both for domestic purposes and for export to China. It is also traded in Java and exported to China for medicine, local consumption and trophies, which is not traceable and so is unregulated (M. Auliya pers. comm. 2011). In Bali, hunting takes place primarily to supply zoos and international collectors, but the snake is also occasionally found for sale in snake restaurants (R.P.H. Lilley pers. obs. 2011). It is also used in snake wine in Vietnam (Somaweera and Somaweera 2010). It is found in the domestic and international pet trade throughout its range (M. Auliya pers. comm. 2010). Between 2000 and 2011, there was an annual quota of 90 specimens for the pet trade in Indonesia. Almost 2,000 live animals were exported for the pet and venom trade between 2000 and 2009 from Indonesia, and internationally the medicinal trade in this species is considerably larger. Three thousand specimens from Myanmar, reported to have been ranched, were found in a single shipment from Myanmar to Vietnam in 2006 (CITES trade data), although researchers in this area are unaware of the existence of snake farms in Myanmar (G. Wogan and M. Auliya pers. comm. 2011). The major exporting countries for the pet trade are Indonesia and Malaysia, although it is exported from Peninsular Malaysia only in small numbers (L. Grismer pers. comm. 2011)."

ix. *Python bivittatus* – Burmese Python VU A2acd

Population trend: decreasing

CITES status: listed in Appendix II

Extracts from IUCN Red List assessment – Stuart, Nguyen, Thy, Grismer, Chan-Ard, Iskandar, Golynsky and Lau 2012

Threats

"This species is under threat due to illegal trade; in China it has been heavily impacted by overexploitation for food and skins, the latter for use both in leather and in traditional

musical instruments such as Erheen, Sanxian and hand drums (CITES 2011) and Vietnamese populations are under pressure from a combination of use in food and leather production, export to supply the pet trade, and consumption in snake wine. Similar pressures are presumed to account for the rarity of this species throughout the remainder of its range, for which no quantitative data is available. The subspecies *P. b. progschai*, which has a restricted range in southern Sulawesi, is of some interest in the commercial international pet trade, and may be vulnerable to exploitation, the type specimen having been recorded in a trader's collection (M. Auliya pers. comm. September 2011, Jacobs *et al*. 2009). Despite its designation as a protected species in this country, populations in China exhibit no evidence of recovery, and illegal harvesting is ongoing (M. Lau pers. comm. September 2011).

"Habitat degradation through slash and burn agriculture in upland areas (Q.T. Nguyen pers. comm. August 2011) may pose a risk by eliminating this snake's prey and making it more vulnerable to exploitation by humans (T. Neang pers. comm. August 2011).

"Ironically, this is an invasive species that is firmly established in southern Florida, USA, and poses a threat to the ecosystem there by consuming native wildlife (Snow *et al*. 2007, Dorcas *et al*. 2012)."

Use and Trade

"This large constrictor is harvested for food, skin for use in the leather industry, medicinal purposes, and the pet trade. It is known to be used in snake wine in Viet Nam, but in small numbers, with 13 individuals recorded in one recent study (Somaweera and Somaweera 2010). The species is commercially bred in Viet Nam and China, however, production systems vary and Vietnamese operations are reliant on breeding wild-caught individuals, while Chinese systems also breed subsequent captive generations and so are not reliant on a regular wild source (M. Auliya pers. comm. March 2012). Trade in this species is illegal in much of its range due to national protection, however, the species is illegally imported into China and source populations for this trade cannot be traced (M. Lau pers. comm. September 2011). The species is kept by collectors and as pets in much of its range (M. Auliya pers. comm. September 2011). Despite public concerns about the introduction of pythons to the Florida Everglades and their low commercial value, thousands are still imported into the United States from Viet Nam as pets (M. Auliya pers. comm. September 2011). The species is also still imported to Europe. China has recently developed a market for low-quality snake skins, largely supplied from west Malaysia, and pythons may also be supplied for this trade."

x. *Python kyaiktiyo* (no common name) VU D2

Population trend: unknown

CITES status: listed in Appendix II

Extracts from IUCN Red List assessment – Wogan and Chan-Ard 2012

Threats

"This species may be threatened in the future by harvesting for food, leather, and traditional medicine purposes. Given the value of pythons in the international pet trade, and the beauty and rarity of this newly described species, it is very likely to be in high demand for the international pet trade. The species appears to be tolerant of some forest disturbance based on the locality of the holotype (and only known) specimen."

Use and Trade

"There is no information available on use and trade of this species. However, other species in the *P. curtus* species complex are heavily exploited for the international pet trade and for international trades in skins and medicine, as are other python species in Myanmar, and animals from Myanmar may be included in exports from other countries in the region (M. Auliya pers. comm. December 2011). It is unknown whether historical exports of *Python brongersmai* from Thailand have included this species (M. Auliya pers. comm. December 2011). Pythons are also used as a local food source. More research is needed to determine whether this species is used."

xi. *Cryptelytrops honsonensis* – Hon Son Pit Viper VU D2

Population trend: stable

CITES status: not listed

Extracts from IUCN Red List assessment – Grismer 2012a

Threats

"As this snake appears to use mostly rocky habitats, it is unknown whether it is exposed to major threats. If this species becomes a target for collectors it could be at risk from over-collecting, given its apparently very limited distribution."

Use and Trade

"Although collecting, selling, and exporting reptiles from islands in Rach Gia Bay is illegal, being that these islands are protected as part of the Kien Giang Biosphere Reserve, there is high commercial demand for Southeast Asian pit vipers for the international pet trade (Grismer *et al.* 2008). So far there is no known use or trade in this recently-described species (L. Grismer pers. comm. September 2011)."

xii. *Cryptelytrops kanburiensis* – Kanburi Pit Viper EN B1ab(v)

Population trend: unknown

CITES status: not listed

Extracts from IUCN Red List assessment – Chan-Ard, Grismer and Stuart 2012

Threats

"This rare and beautiful species is targeted by the illegal international pet trade."

Use and Trade

"The species is in high demand in the international pet trade."

xiii. *Parias malcolmi* – Kinabalu Green Pit Viper NT

Population trend: unknown

CITES status: not listed

Extracts from IUCN Red List assessment – Das, Vogel, Inger, Auliya, Iskandar, Lilley and Dehling 2012

Threats

"The international pet trade is a potential threat to the species, as it is a charismatic snake and is known from an easily-accessible tourist site."

Use and Trade

"There are no reports of this species being utilized or traded, however it is potentially attractive to collectors."

xiv. *Popeia buniana* – Pulau Tioman Pit Viper EN B1ab(v)

Population trend: unknown

CITES status: not listed

Extracts from IUCN Red List assessment – Grismer 2012b

Threats

"The main threat to this species is the illegal pet trade."

Use and Trade

"This species is very valuable in the illegal pet trade."

xv. *Popeia nebularis* – Cameron Highlands Pit Viper VU B1ab(v)

Population trend: unknown

CITES status: not listed

Extracts from IUCN Red List assessment – Grismer 2012c

Threats

"The main threat to this species is illegal collection for pet trade."

Use and Trade

"This species is exploited for the pet trade."

xvi. *Protobothrops mangshanensis* – Mangshan Pit Viper EN B1ab(v)+2ab(v)

Population trend: decreasing

CITES status: listed in Appendix II (as *Trimeresurus mangshanensis*)

Extracts from IUCN Red List assessment – Zhou 2012

Threats

"Illegal collection for the pet trade remains a threat to this species. Between the 1950s and the 1980s, deforestation within the species range significantly reduced its distribution."

Use and Trade

"This species is in high demand for the international pet trade (Weissgold and Leuteritz 2011)."

xvii. *Viridovipera truongsonensis* – Truong Son Pit Viper EN B1ab(iii)

Population trend: unknown

CITES status: not listed

Extracts from IUCN Red List assessment – Stuart, Grismer and Nguyen 2012

Threats

"This species may be impacted by habitat degradation and loss as deforestation is occurring within the Annamites. Illegal logging for hardwoods and slash-and-burn agriculture are the major threats to this area, but occur at only small scales. If this snake is targeted for the pet trade, overharvesting is likely to become a significant threat very rapidly as a result of its restricted distribution and apparent rarity."

Use and Trade

"This beautiful snake is likely to be highly desirable within the pet trade, particularly as it has only recently been described and is very rare, but as yet there have been no reports of this snake within the international pet trade."

3.b. Least Concern and Data Deficient species

International trade may also be of concern to some species which are not currently in the threatened or Near Threatened categories. Out of the 56 species which were both recorded as being in international trade and listed as having a threat from intentional use, 42 are assessed as Least Concern and 2 are assessed as Data Deficient (Appendix II). The two data deficient species, *Hydrophis pachycercos* and *Trimeresurus mcgregori*, should be considered alongside the threatened and Near Threatened species as the lack of data does not necessarily mean they are any less at risk.

4. Species for which global IUCN Red List assessments are currently unavailable

A further 106 Asian snake species have draft assessments in various stages of completion (this includes reassessments of the four species which have out of date published assessments from 1996, as explained in section 2.). These species are listed in Table 6, along with whether any international trade in the species has been recorded in the draft assessment and whether intentional use has been listed as a threat.

Sixteen of these species, based on a combination of the contents of the draft assessments and expert opinion, may be threatened by international trade (Table 6; Section 4.a.)

Table 6 (continues across and overleaf): Additional species for which draft assessments were prepared at the workshops, but whose assessments have not yet been published on the IUCN Red List. Where international trade is recorded in the draft assessment, and where intentional use of the species is listed as a threat, this is shown below – however the assessments vary in their completeness. Species for which international trade may be a significant threat are shaded. This is based on a combination of the contents of the draft assessments and expert opinion.

Family	Species	International trade recorded?	Intentional use listed as a threat?
Boidae	*Eryx miliaris*	✓	
Boidae	*Eryx tataricus*	✓	
Colubridae	*Ahaetulla nasuta*	✓	✓
Colubridae	*Boiga cyanea*		
Colubridae	*Boiga dendrophila*	✓	
Colubridae	*Boiga gokool*	✓	

Colubridae	*Boiga multomaculata*		
Colubridae	*Boiga ochracea*	✓	
Colubridae	*Boiga quincunciata*		
Colubridae	*Boiga siamensis*		
Colubridae	*Chrysopelea ornata*	✓	
Colubridae	*Chrysopelea paradisi*	✓	
Colubridae	*Coelognathus erythrurus*	✓	
Colubridae	*Coelognathus radiatus*		✓
Colubridae	*Cyclophiops doriae*		
Colubridae	*Cyclophiops major*	✓	
Colubridae	*Dendrelaphis caudolineatus*	✓	
Colubridae	*Dendrelaphis biloreatus*		
Colubridae	*Dendrelaphis pictus*		
Colubridae	*Dendrelaphis tristis*		
Colubridae	*Elaphe anomala*	✓	✓
Colubridae	*Elaphe carinata*	✓	✓
Colubridae	*Elaphe davidi*	✓	
Colubridae	*Elaphe dione*		
Colubridae	*Elaphe schrenckii*		✓
Colubridae	*Hemorrhois ravergieri*		
Colubridae	*Hierophis spinalis*		
Colubridae	*Lycodon aulicus*		
Colubridae	*Lycodon fasciatus*		
Colubridae	*Lycodon rufozonatus*	✓	
Colubridae	*Lycodon ruhstrati*		
Colubridae	*Lycodon septentrionalis*		
Colubridae	*Lycodon striatus*		
Colubridae	*Oligodon albocinctus*		
Colubridae	*Oligodon catenatus*		
Colubridae	*Oligodon dorsalis*		
Colubridae	*Oligodon formosanus*		
Colubridae	*Oligodon melanozonatus*		
Colubridae	*Oreocryptophis porphyraceus*		✓
Colubridae	*Orthriophis cantoris*		
Colubridae	*Orthriophis hodgsonii*		
Colubridae	*Orthriophis taeniurus*	✓	✓
Colubridae	*Ptyas dhumnades*	✓	✓
Colubridae	*Ptyas korros*	✓	✓
Colubridae	*Ptyas mucosa*	✓	✓
Colubridae	*Ptyas nigromarginatus*	✓	✓
Colubridae	*Rhabdops bicolor*		
Colubridae	*Rhadinophis frenatum*	✓	
Colubridae	*Sibynophis chinensis*		
Colubridae	*Sibynophis triangularis*		
Colubridae	*Trachischium monticola*		
Colubridae	*Trachischium tenuiceps*		
Colubridae	*Thermophis baileyi*		

Dipsadidae	*Thermophis zhaoermii*		
Elapidae	*Bungarus bungaroides*		✓
Elapidae	*Naja atra*	✓	✓
Elapidae	*Naja oxiana*	✓	✓
Elapidae	*Sinomicrurus macclellandi*		
Gerrhopilidae	*Gerrhopilus ater*		
Lamprophiidae	*Psammodynastes pictus*		
Lamprophiidae	*Psammodynastes pulverulentus*		
Natricidae	*Amphiesma atemporale*		
Natricidae	*Amphiesma craspedogaster*		
Natricidae	*Amphiesma johannis*		
Natricidae	*Amphiesma khasiense*		
Natricidae	*Amphiesma octolineatum*		
Natricidae	*Amphiesma optatum*		
Natricidae	*Amphiesma parallelum*		
Natricidae	*Amphiesma platyceps*		
Natricidae	*Amphiesma stolatum*	✓	
Natricidae	*Amphiesma vibakari*		
Natricidae	*Amphiesma xenura*		
Natricidae	*Macropisthodon plumbicolor*		
Natricidae	*Natrix natrix*	✓	
Natricidae	*Natrix tessellata*	✓	✓
Natricidae	*Opisthotropis balteata*		
Natricidae	*Opisthotropis kuatunensis*		
Natricidae	*Rhabdophis himalayanus*		
Natricidae	*Rhabdophis tigrinus*		
Natricidae	*Sinonatrix annularis*	✓	✓
Natricidae	*Xenochrophis piscator*		✓
Natricidae	*Xenochrophis sanctijohannis*		
Pareatidae	*Pareas macularius*		
Pareatidae	*Pareas monticola*		
Psammophiidae	*Psammophis lineolatus*		
Pseudoxenodontidae	*Pseudoxenodon karlschmidti*	✓	
Pseudoxenodontidae	*Pseudoxenodon stejnegeri*		
Pythonidae	*Python curtus*	✓	✓
Pythonidae	*Python molurus*	✓	✓
Pythonidae	*Python reticulatus*	✓	✓
Typhlopidae	*Ramphotyphlops braminus*		
Typhlopidae	*Ramphotyphlops olivaceus*		
Typhlopidae	*Typhlops jerdonii*		
Typhlopidae	*Typhlops khoratensis*		
Typhlopidae	*Typhlops porrectus*		
Viperidae	*Cryptelytrops venustus*	✓	✓
Viperidae	*Daboia russelii*	✓	
Viperidae	*Deinagkistrodon acutus*	✓	✓

Viperidae	*Gloydius brevicaudus*	✓	✓
Viperidae	*Gloydius intermedius*		✓
Viperidae	*Gloydius lijianlii*		
Viperidae	*Gloydius strauchi*		
Viperidae	*Gloydius ussurensis*		✓
Viperidae	*Vipera berus*		✓
Viperidae	*Vipera renardi*	✓	✓
Xenodermatidae	*Achalinus hainanensis*		

4.a. Further details on relevant species without published assessments

The species shaded in Table 6 are those without published IUCN Red List assessments which may be at risk from international trade. Further details on these are given below, including the preliminary IUCN Red List category assigned to each, the current population trend, whether they are currently CITES-listed, and a summary of the relevant threats and utilisation information.

Elaphe anomala (no common name)

- Provisional category: VU
- Population trend: decreasing
- CITES status: not listed
- Overexploitation for the food trade is the main threat to this species. Some of the trade of this species is thought to be illegal.

Elaphe carinata – Keeled Rat Snake

- Provisional category: VU
- Population trend: decreasing
- CITES status: not listed
- It was intensively traded for its skin, and this overexploitation was the major drive behind the population reduction resulting in the provisional VU listing. However, the 2011 CITES workshop on snakes reported that in China this trade has decreased very quickly since 2004.

Lycodon rufozonatus – Red Large-toothed Snake

- Preliminary category: LC
- Population trend: stable
- CITES status: not listed
- This species is traded internationally for food and skins. Ranching in China uses individuals raised from wild-collected eggs. Zhou and Jiang (2004) reported that 11,789 live snakes and 20,000 skins of this species were exported from China from 1990 to 2000. The 2011 CITES workshop on snakes reported that consumption in China has decreased sharply since 2004.

Orthriophis taeniurus – Cave Racer

- Provisional category: VU
- Population trend: decreasing
- CITES status: not listed

- Overharvesting is a major threat to this species. It is found in the international pet trade, and is also heavily collected for food and skins.

Ptyas dhumnades – Black-striped Rat Snake

- Provisional category: VU
- Population trend: decreasing
- CITES status: not listed
- This species is traded internationally for food, medicine, and skins. Zhou and Jiang (2004) reported that 30,373 live snakes and 541,490 pieces of skin were exported from China 1990-2000, while 145,150 pieces of skin were imported to China from 1991-2001. The 2011 CITES snakes workshop reported that export of snakes from China has decreased sharply since 2004.

Ptyas korros – Javan Rat Snake

- Provisional category: NT
- Population trend: decreasing
- CITES status: not listed
- Used for food and traditional medicine, this species is consumed locally and traded internationally (mainly to China from Indonesia, Myanmar & Viet Nam). Trade is illegal in Thailand, but occurs to meet demand. Exploitation is the major threat and has lead to declines of 50% in Viet Nam (Dang *et al*. 2007) and 30% in China (Wang and Xie 2009) over 10 years.

Ptyas mucosa – Oriental Rat Snake

- Preliminary category: LC
- Population trend: decreasing
- CITES status: listed in Appendix II (as *Ptyas mucosus*)
- It is consumed locally, and traded for food, medicine and skins in Indonesia. The heavy exploitation is thought to be leading to a high rate of population decline in some areas.

Naja atra – Chinese Cobra

- Provisional category: VU
- Population trend: decreasing
- CITES status: listed in Appendix II
- Along with pollution, exploitation is the major threat to this species, which is traded internationally for food and medicinal products. Ranching and captive breeding have been successful in Zhejiang Province.

Naja oxiana – Central Asian Cobra

- Provisional category: VU
- Population trend: decreasing
- CITES status: listed in Appendix II
- The major threat to this species is the over-collection of animals for their use in anti-venom production, for which there is international trade. Many thousands of individuals are captured for this, including from protected areas throughout the species' range.

Sinonatrix annularis – Ringed Keelback Water Snake

- Provisional category: NT
- Population trend: decreasing

- CITES status: not listed
- The international trade in this species for food and skins is a significant threat. Zhou and Jiang (2004) reported that 2,000 live snakes and 7,500 pieces of skin of this species were exported from China in 1990-2000. The 2011 CITES workshop on snakes reported that export of snakes in China has decreased sharply since 2004.

Python curtus – Sumatran Short-tailed Python

- Preliminary category: LC
- Population trend: unknown
- CITES status: listed in Appendix II
- Collection is the main threat to this species – mainly for the international skin trade but to a lesser extent also for traditional medicine, the pet trade, and food. Exploitation in Indonesia is increasing and is believed to be above the quota of 1,890 skins and 450 specimens for the pet trade.

Python molurus – Indian Python

- Provisional category: NT
- Population trend: decreasing
- CITES status: listed in Appendix II
- This species is under threat from over-exploitation. Internationally, it is in high demand for its skin (leather industry) and is smuggled extensively for the pet trade. Locally and nationally, this species is consumed for food and its fat deposits are used in the pharmaceutical industry.

Python reticulatus – Reticulated Python

- Preliminary category: LC
- Population trend: decreasing
- CITES status: listed in Appendix II
- This species is heavily hunted and traded through most of its range, mainly for skins but also for food, medicinal products and the pet trade. Exports of this species from Indonesia increased by 400% from 1999 to 2008 based on CITES figures. More than 500,000 individuals are harvested annually from Sumatra and Borneo (Groombridge and Luxmoore 1991). Exploitation is believed to be significantly impacting population dynamics in some areas.

Cryptelytrops venustus – Beautiful Pit Viper

- Provisional category: VU
- Population trend: unknown
- CITES status: not listed
- A major threat to this species is commercial collecting for the international pet trade, for which it is commonly sought after. This trade is believed to be driving a continuing population decline of over 30% in three generations. As a habitat specialist it is easily over-exploited.

Deinagkistrodon acutus – Chinese Moccasin

- Provisional category: VU
- Population trend: decreasing
- CITES status: not listed

- Although habitat degradation and fragmentation is the main threat to this species, the threat from exploitation is also significant. It is traded internationally for food and the pet trade, and as well as being used for traditional medicine it is used for venom extraction for biomedical activities. Zhou and Jiang (2004) reported that 4,195 live snakes of this species were exported from China from 1990 to 2000.

Gloydius brevicaudus (no common name)

- Provisional category: VU
- Population trend: decreasing
- CITES status: not listed
- Overexploitation is considered to be a threat to this species, which is traded internationally for food, skins, and medicinal products. Zhou and Jiang (2004) reported that 422,440 live snakes and 5,010 pieces of skin of this species were exported from China 1990-2000. The 2011 CITES snakes workshop reported that export of snakes from China has decreased sharply since 2004.

References

Bacolod, P.T. 1983. Reproductive biology of two sea snakes of the genus *Laticauda* from the central Philippines. *The Philippine Scientist* 21: 155-163.

Bindoff, N.L., Willebrand, J., Artale, V., Cazenave, A., Gregory, J., Gulev, S., Hanawa, K., Le Quere, C., Levitus, S., Nojiri, Y., Shum, C.K., Talley, L.D. and Unnikrishnan, A. 2007. Observations: Oceanic Climate Change and Sea Level. In: S.D. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tigor, H.L Miller (ed.), Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdon and New York, USA.

Chan-Ard, T., Grismer, L. & Stuart, B. 2012. *Cryptelytrops kanburiensis*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **02 April 2014**.

China Wildlife Conservation Association, WildAid. 2006. Survey report on situation of eating wildlife and public altitude to wildlife consumption. China Wildlife Conservation Association, Beijing.

Dang, N.T., Tran, K., Tran, Dang, H.H., Nguyen, T.N., Nguyen, Y.H. and Dang, D.T. (eds.). 2007. *Vietnam Red Data Book. Part I. Animals*.

Das, I., Vogel, G., Inger, R.F., Auliya, M., Iskandar, D., Lilley, R. & Dehling, M. 2013. *Parias malcolmi*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **19 March 2014**.

Dorcas, M.E., Wilson, J.D., Reed, R.N., Snow, R.W., Rochford, M.R., Miller, M.A., Mesheka Jr., W.E., Andreadis, P.T., Mazzotti, F.J., Romagosa, C.M. and Hart, K.M. 2012. Severe mammal declines coincide with proliferation of invasive Burmese pythons in Everglades National Park. *Proceedings of the National Academy of Sciences* 109(7): 2418-2422.

Dunson, W.A. (ed). 1975. *The biology of sea snakes*. University Park Press, Baltimore.

Francis, E.J. 2006. Morphology, population and distribution of the Dusky Seasnake *Aipysurus fuscus*. University of Wollongong.

Grismer, L. 2012a. *Cryptelytrops honsonensis*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **19 March 2014**.

Grismer, L. 2012b. *Popeia buniana*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **02 April 2014**.

Grismer, L. 2012c. *Popeia nebularis*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **02 April 2014**.

Grismer, L.L., Tri, N.V. and Grismer, J.L. 2008. A new species of insular pitviper of the genus *Cryptelytrops* (Squamata: Viperidae) from southern Vietnam. *Zootaxa* 1715(57-68).

Groombridge, B. and Luxmoore, R. 1991. Pythons in South-East Asia. A review of distribution, status and trade in three selected species. Report to CITES Secretariat, Lausanne.

He H., Peng X. 1999. Primary survey on snake market in Guangzhou City. *Sichuan Journal of Zoology* 18(3): 139-141.

Hoegh-Guldberg, O. 1999. Climate change, coral bleaching and the future of the world's coral reefs. *Marine and Freshwater Research* 50: 839-866.

Ineich, I. and LaBoute, P. 2002. *Sea snakes of New Caledonia*. IRD, Paris

Jacobs, H.J., Auliya, M. and Böhme, W. 2009. On the taxonomy of the Burmese Python,*Python molurus bivittatus* KUHL, 1820, specifically on the Sulawesi population. *Sauria*31(3): 5-11.

Lane, A. & Gatus, J. 2010. *Laticauda semifasciata*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **02 April 2014**.

Li Y., Li D. 1998. The dynamics of trade in live wildlife across the Guangxi border between China and Vietnam during 1993-1996 and its control strategies. *Biodiversity and Conservation* 1998(7): 895-914.

Li, W. and Wang, H. 1999. Wildlife trade in Yunnan Province, China, at the border with Vietnam. *TRAFFIC Bulletin* 18(1): 21-30.

Meehl, G.A., Washington, W.M., Collines, W.D., Arblaster, J.M., Hu, A.X., Buja, L.E., Strand, W.G. and Teng, H.Y. 2005. How much more global warming and sea level rise? *Science* 307: 1769-1772.

Pratchett, M.S., Munday, P.L., Wilson, S.K., Graham, N.A.J., Cinner, J.E., Bellwood, D.R., Jones, G.P., Polunin, N.V.C. and McClanahan, T.R. 2008. Effects of climate-induced coral bleaching on coral reef fishes - Ecological and economic consequences. *Oceanography and Marine Biology: An Annual Review* 46: 251-296.

Saint Girons, H. 1964. Notes on the ecology and population structure of the Laticaudinae (Serpentes, Hydrophidae) in New Calendonia. *La Terre et la Vie* 2-1964: 185-214.

Slowinski, J.B. and Wüster, W. 2000. A new cobra (Elapidae: Naja) from Myanmar (Burma). *Herpetologica* 56(2): 257-270.

Snow, R. W., Krysko, K.L., Enge, K.M., Oberhofer, L., Warren-Bradley, A. and Wilkins, L. 2007. Introduced populations of *Boa constrictor* (Boidae) and *Python molurus bivittatus*(Pythonidae) in southern Florida. In: R.W. Henderson and R. Powell (eds), *Biology of the Boas and Pythons*, pp. 416-438. Eagle Mountain Publishing, Eagle Mountain.

Sodhi, N.S., Lee, T.M., Koh, L.P. and Brook, B.W. 2009. A meta-analysis of the impact of anthropogenic forest disturbance on Southeast Asias biotas. *Biotropica* 41: 103-109.

Somaweera, R. and Somaweera, N. 2010. Serpents in jars: the snake wine industry in Vietnam. *Journal of Threatened Taxa* 2(11): 1251-1260.

Stuart, B., Grismer, L. & Nguyen, T.Q. 2012. *Viridovipera truongsonensis*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **19 March 2014**.

Stuart, B. & Nguyen, T.Q. 2012. *Bungarus slowinskii*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **19 March 2014**.

Stuart, B., Nguyen, T.Q., Thy, N., Grismer, L., Chan-Ard, T., Iskandar, D., Golynsky, E. & Lau, M.W.N. 2012. *Python bivittatus*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **19 March 2014**.

Stuart, B., Thy, N., Chan-Ard, T., Nguyen, T.Q. & Bain, R. 2012. *Naja siamensis*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **19 March 2014**.

Stuart, B., Wogan, G., Grismer, L., Auliya, M., Inger, R.F., Lilley, R., Chan-Ard, T., Thy, N., Nguyen, T.Q., Srinivasulu, C. & Jelić, D. 2012. *Ophiophagus hannah*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **19 March 2014**.

Sy, E., Brown, R., Afuang, L., Diesmos, A. & Gonzalez, J.C. 2009. *Naja philippinensis*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **02 April 2014**.

Wang, S. and Xie, Y. (eds.). 2009. *China Species Red List Vol. II - Vertebrates Part 2*. Biodiversity Working Group of China Council for International Cooperation on Environment and Development, Beijing.

Weissgold, B. and Leuteritz, T. 2011. Presentation of the US. *CITES Asian Snake Trade Workshop, Guangzhou, China*.

Wogan, G. & Chan-Ard, T. 2012. *Python kyaiktiyo*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **19 March 2014**.

Wogan, G. & Stuart, B. 2012. *Naja mandalayensis*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **19 March 2014**.

Zhou, Z. 2012. *Protobothrops mangshanensis*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **02 April 2014**.

Zhou, Z., Guo, P. & Jiang, J. 2012. *Euprepiophis perlacea*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **19 March 2014**.

Zhou, Z. and Jaing, Z. 2004. International trade status and crisis for snake species in China. *Conservation Biology* 18: 1386-1394.

Zhou, Z., Lau, M. & Nguyen, T.Q. 2012. *Orthriophis moellendorfi*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on **19 March 2014**.

Appendix I

Details of the "intentional use" threats for each of the 75 species with any of the three "intentional use" threats recorded in their assessments. The timing, scope, and severity of the threats are not included, as for most of the assessments these optional fields were not completed. Threat descriptions have been abbreviated but all reflect utilisation where the species is the target – bycatch, persecution, etc have been excluded.

Family	Species	Cat.	Threat
Acrochordidae	*Acrochordus arafurae*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
Acrochordidae	*Acrochordus granulatus*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
Acrochordidae	*Acrochordus javanicus*	LC	Fishing & harvesting aquatic resources (l. scale)
Colubridae	*Ahaetulla prasina*	LC	Hunting & trapping terrestrial animals
Colubridae	*Chrysopelea pelias*	LC	Hunting & trapping terrestrial animals
Colubridae	*Euprepiophis mandarinus*	LC	Hunting & trapping terrestrial animals
Colubridae	*Euprepiophis perlacea*	EN	Hunting & trapping terrestrial animals
Colubridae	*Orthriophis moellendorfi*	VU	Hunting & trapping terrestrial animals
Colubridae	*Ptyas carinata*	LC	Hunting & trapping terrestrial animals
Cylindrophiidae	*Cylindrophis ruffus*	LC	Fishing & harvesting aquatic resources (l. scale)
Elapidae	*Bungarus candidus*	LC	Hunting & trapping terrestrial animals
Elapidae	*Bungarus fasciatus*	LC	Hunting & trapping terrestrial animals
Elapidae	*Bungarus magnimaculatus*	LC	Hunting & trapping terrestrial animals
Elapidae	*Bungarus multicinctus*	LC	Hunting & trapping terrestrial animals
Elapidae	*Bungarus slowinskii*	VU	Hunting & trapping terrestrial animals
Elapidae	*Bungarus wanghaotingi*	LC	Hunting & trapping terrestrial animals
Elapidae	*Enhydrina schistosa*	LC	Fishing & harvesting aquatic resources (l. scale)
Elapidae	*Hydrophis lamberti*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
Elapidae	*Hydrophis lapemoides*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
Elapidae	*Hydrophis pachycercos*	DD	Fishing & harvesting aquatic resources (subs. / s. scale)
Elapidae	*Hydrophis spiralis*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
Elapidae	*Kerilia jerdoni*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
Elapidae	*Lapemis curtus*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
Elapidae	*Laticauda colubrina*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
Elapidae	*Laticauda semifasciata*	NT	Fishing & harvesting aquatic resources (subs. / s. scale)
			Fishing & harvesting aquatic resources (l. scale)
Elapidae	*Naja kaouthia*	LC	Hunting & trapping terrestrial animals
Elapidae	*Naja mandalayensis*	VU	Hunting & trapping terrestrial animals
Elapidae	*Naja philippinensis*	NT	Hunting & trapping terrestrial animals
Elapidae	*Naja samarensis*	LC	Hunting & trapping terrestrial animals
Elapidae	*Naja siamensis*	VU	Hunting & trapping terrestrial animals
Elapidae	*Naja sputatrix*	LC	Hunting & trapping terrestrial animals

Elapidae	*Naja sumatrana*	LC	Hunting & trapping terrestrial animals
Elapidae	*Ophiophagus hannah*	VU	Hunting & trapping terrestrial animals
Elapidae	*Thalassophina viperina*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
Homalopsidae	*Cerberus rynchops*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
			Fishing & harvesting aquatic resources (l. scale)
Homalopsidae	*Enhydris bocourti*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
			Fishing & harvesting aquatic resources (l. scale)
Homalopsidae	*Enhydris chinensis*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
			Fishing & harvesting aquatic resources (l. scale)
Homalopsidae	*Enhydris enhydris*	LC	Hunting & trapping terrestrial animals
Homalopsidae	*Enhydris longicauda*	VU	Hunting & trapping terrestrial animals
Homalopsidae	*Enhydris subtaeniata*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
Homalopsidae	*Erpeton tentaculatum*	LC	Hunting & trapping terrestrial animals
Homalopsidae	*Homalopsis buccata*	LC	Fishing & harvesting aquatic resources (subs. / s. scale)
			Fishing & harvesting aquatic resources (l. scale)
Natricidae	*Atretium schistosum*	LC	Hunting & trapping terrestrial animals
Natricidae	*Macropisthodon rudis*	LC	Hunting & trapping terrestrial animals
Natricidae	*Natrix tessellata*	LC	Hunting & trapping terrestrial animals
Natricidae	*Xenochrophis flavipunctatus*	LC	Hunting & trapping terrestrial animals
Pythonidae	*Morelia amethistina*	LC	Hunting & trapping terrestrial animals
Pythonidae	*Morelia spilota*	LC	Hunting & trapping terrestrial animals
Pythonidae	*Morelia viridis*	LC	Hunting & trapping terrestrial animals
Pythonidae	*Python bivittatus*	VU	Hunting & trapping terrestrial animals
Pythonidae	*Python breitensteini*	LC	Hunting & trapping terrestrial animals
Pythonidae	*Python brongersmai*	LC	Hunting & trapping terrestrial animals
Pythonidae	*Python kyaiktiyo*	VU	Hunting & trapping terrestrial animals
Viperidae	*Azemiops feae*	LC	Hunting & trapping terrestrial animals
Viperidae	*Cryptelytrops albolabris*	LC	Hunting & trapping terrestrial animals
Viperidae	*Cryptelytrops honsonensis*	VU	Hunting & trapping terrestrial animals
Viperidae	*Cryptelytrops insularis*	LC	Hunting & trapping terrestrial animals
Viperidae	*Cryptelytrops kanburiensis*	EN	Hunting & trapping terrestrial animals
Viperidae	*Cryptelytrops purpureomaculatus*	LC	Hunting & trapping terrestrial animals
Viperidae	*Cryptelytrops rubeus*	VU	Hunting & trapping terrestrial animals
Viperidae	*Daboia siamensis*	LC	Hunting & trapping terrestrial animals
Viperidae	*Gloydius saxatilis*	LC	Hunting & trapping terrestrial animals
Viperidae	*Ovophis convictus*	LC	Hunting & trapping terrestrial animals
Viperidae	*Parias malcolmi*	NT	Hunting & trapping terrestrial animals
Viperidae	*Popeia buniana*	EN	Hunting & trapping terrestrial animals
Viperidae	*Popeia nebularis*	VU	Hunting & trapping terrestrial animals
Viperidae	*Protobothrops mangshanensis*	EN	Hunting & trapping terrestrial animals

Viperidae	*Pseudocerastes persicus*	LC	Hunting & trapping terrestrial animals
Viperidae	*Trimeresurus flavomaculatus*	LC	Hunting & trapping terrestrial animals
Viperidae	*Trimeresurus mcgregori*	DD	Hunting & trapping terrestrial animals
Viperidae	*Trimeresurus puniceus*	LC	Hunting & trapping terrestrial animals
Viperidae	*Tropidolaemus subannulatus*	LC	Hunting & trapping terrestrial animals
Viperidae	*Tropidolaemus wagleri*	LC	Hunting & trapping terrestrial animals
Viperidae	*Viridovipera truongsonensis*	EN	Hunting & trapping terrestrial animals
Xenopeltidae	*Xenopeltis unicolor*	LC	Hunting & trapping terrestrial animals

Appendix II

Details of the 56 species with published assessments which are both traded internationally and threatened by intentional use , giving IUCN Red List categories, population trends, CITES status and end uses for which there is international trade. Those marked with an asterisk in the first column have further details given in section 3.

	Family	Species	Cat.	Pop. trend	CITES status	End use(s) for which there is international trade
	Acrochordidae	*Acrochordus arafurae*	LC	?	not listed	Pets/display animals
	Acrochordidae	*Acrochordus granulatus*	LC	→	not listed	Pets/display animals
	Acrochordidae	*Acrochordus javanicus*	LC	→	not listed	Wearing apparel, accessories Pets/display animals
	Colubridae	*Ahaetulla prasina*	LC	→	not listed	Pets/display animals
	Colubridae	*Chrysopelea pelias*	LC	?	not listed	Pets/display animals
	Colubridae	*Euprepiophis mandarinus*	LC	↓	not listed	Pets/display animals
*	Colubridae	*Euprepiophis perlacea*	EN	↓	not listed	Food - human Wearing apparel, accessories
*	Colubridae	*Orthriophis moellendorfi*	VU	↓	not listed	Medicine - human & veterinary
	Colubridae	*Ptyas carinata*	LC	↓	not listed	Pets/display animals
	Elapidae	*Bungarus candidus*	LC	?	not listed	Handicrafts, jewellery, etc.
	Elapidae	*Bungarus fasciatus*	LC	→	not listed	Medicine - human & veterinary
	Elapidae	*Bungarus magnimaculatus*	LC	?	not listed	Medicine - human & veterinary
	Elapidae	*Enhydrina schistosa*	LC	→	not listed	Medicine - human & veterinary
	Elapidae	*Hydrophis lamberti*	LC	?	not listed	Food - human Wearing apparel, accessories
	Elapidae	*Hydrophis lapemoides*	LC	?	not listed	Wearing apparel, accessories
	Elapidae	*Hydrophis pachycercos*	DD	?	not listed	Wearing apparel, accessories
	Elapidae	*Hydrophis spiralis*	LC	?	not listed	Wearing apparel, accessories
	Elapidae	*Lapemis curtus*	LC	?	not listed	Food - human Wearing apparel, accessories
	Elapidae	*Laticauda colubrina*	LC	→	not listed	Food - human
*	Elapidae	*Laticauda semifasciata*	NT	?	not listed	Food - human Wearing apparel, accessories

	Elapidae	*Naja kaouthia*	LC	↓	Appendix II	Medicine - human & veterinary Wearing apparel, accessories
*	Elapidae	*Naja mandalayensis*	VU	↓	Appendix II	Food - human Medicine - human & veterinary Handicrafts, jewellery, etc.
*	Elapidae	*Naja philippinensis*	NT	↓	Appendix II	Food - human Pets/display animals
	Elapidae	*Naja samarensis*	LC	?	Appendix II	Pets/display animals
*	Elapidae	*Naja siamensis*	VU	↓	Appendix II	Medicine - human & veterinary
	Elapidae	*Naja sputatrix*	LC	?	Appendix II	Food - human Wearing apparel, accessories
	Elapidae	*Naja sumatrana*	LC	↑	Appendix II	Medicine - human & veterinary Pets/display animals
*	Elapidae	*Ophiophagus hannah*	VU	↓	Appendix II	Medicine - human & veterinary Wearing apparel, accessories Handicrafts, jewellery, etc. Pets/display animals
	Homalopsidae	*Cerberus rynchops*	LC	?	Appendix III (India)	Wearing apparel, accessories
	Homalopsidae	*Enhydris bocourti*	LC	?	not listed	Food - human Wearing apparel, accessories
	Homalopsidae	*Enhydris chinensis*	LC	↑	not listed	Wearing apparel, accessories
	Homalopsidae	*Enhydris enhydris*	LC	?	not listed	Food - human
	Homalopsidae	*Homalopsis buccata*	LC	?	not listed	Food - human Wearing apparel, accessories
	Natricidae	*Atretium schistosum*	LC	→	not listed	Wearing apparel, accessories
	Natricidae	*Macropisthodon rudis*	LC	→	not listed	Food - human Wearing apparel, accessories
	Natricidae	*Natrix tessellata*	LC	↓	not listed	Pets/display animals
	Pythonidae	*Morelia amethistina*	LC	?	Appendix II	Pets/display animals
	Pythonidae	*Morelia spilota*	LC	↓	Appendix II	Pets/display animals
	Pythonidae	*Morelia viridis*	LC	?	Appendix II	Pets/display animals
*	Pythonidae	*Python bivittatus*	VU	↓	Appendix II	Food - human Medicine - human & veterinary Wearing apparel, accessories Handicrafts, jewellery, etc.
	Pythonidae	*Python brongersmai*	LC	↑	Appendix II	Wearing apparel, accessories Pets/display animals
	Viperidae	*Azemiops feae*	LC	?	not listed	Pets/display animals

	Viperidae	*Cryptelytrops insularis*	LC	?	not listed	Pets/display animals
*	Viperidae	*Cryptelytrops kanburiensis*	EN	?	not listed	Pets/display animals
	Viperidae	*Cryptelytrops purpureomaculatus*	LC	→	not listed	Pets/display animals
	Viperidae	*Daboia siamensis*	LC	↓	Appendix III (India) [1]	Medicine - human & veterinary Wearing apparel, accessories
	Viperidae	*Ovophis convictus*	LC	?	not listed	Pets/display animals
*	Viperidae	*Popeia buniana*	EN	?	not listed	Pets/display animals
*	Viperidae	*Popeia nebularis*	VU	?	not listed	Pets/display animals
*	Viperidae	*Protobothrops mangshanensis*	EN	↓	Appendix II [2]	Pets/display animals
	Viperidae	*Pseudocerastes persicus*	LC	↓	not listed	Wearing apparel, accessories Pets/display animals
	Viperidae	*Trimeresurus mcgregori*	DD	?	not listed	Pets/display animals
	Viperidae	*Trimeresurus puniceus*	LC	?	not listed	Pets/display animals
	Viperidae	*Tropidolaemus subannulatus*	LC	?	not listed	Pets/display animals
	Viperidae	*Tropidolaemus wagleri*	LC	→	not listed	Pets/display animals
	Xenopeltidae	*Xenopeltis unicolor*	LC	→	not listed	Wearing apparel, accessories Pets/display animals

[1] as *Daboia russelii*

[2] as *Trimeresurus mangshanensis*