# Threatened and alien species in Vietnam: background and recommendations for the content of the national Biodiversity Law

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## Glossary of terms

*Threatened species*. A species which is facing an extremely high, very high, or high risk of extinction in the wild, and is thus categorised as *Critically Endangered, Endangered, or Vulnerabl*e. For detailed definitions of these terms and others pertaining to threat assessment (*Extinct, Extinct in the Wild, Near Threatened, Least Concern, Data Deficient, and Not Evaluated*) see Annex 7.

*Alien Invasive Species (or Invasive Alien Species)*. A species, subspecies or lower taxon, introduced outside its natural past or present distribution whose introduction and/or spread threaten biological diversity; includes any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce[1].

## Abbreviations and acronyms

| | |
|---|---|
| CBD | Convention on Biological Diversity |
| CITES | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| DoE | Department of Environment |
| FIPI | Forest Inventory and Planning Institute |
| IBA[2] | Important Bird Area |
| ISSG | Invasive Species Specialist Group of IUCN |
| IUCN | World Conservation Union |
| KBA[2] | Key Biodiversity Area |
| MARD | Ministry of Agriculture and Rural Development |
| MoF | Ministry of Fishery |
| MoNRE | Ministry of Natural Resources and Environment |
| MoSTE | Ministry of Science, Technology and the Environment |
| OEPP | Office of Environmental Policy and Planning, Thailand |
| RSPB | Royal Society for the Protection of Birds (the BirdLife partner in the UK) |
| UNEP | United Nations Environment Programme |
| VEPA | Vietnam Environment Protection Agency |

[1] Convention on Biological Diversity <*http://www.biodiv.org/programmes/cross-cutting/alien/resources/terms.shtml*>

[2] IBAs and KBAs are internationally standardised and recognised areas of high biodiversity value, classified by four quantitative criteria, based on the presence of species for which site-scale conservation is appropriate: (1) globally threatened species; (2) restricted-range species; (3) congregations of species; and (4) biome-restricted species assemblages.

# 1. Executive Summary

Vietnam is one of the most biodiversity-rich countries in the world, holding much biodiversity not found elsewhere. However, Vietnam also ranks as one of the countries in the world with the most biodiversity under threat. Current Vietnamese legislation goes some way to protecting national biodiversity, and addressing threats to it, but is still dispersed and incomplete. This has led to the need for a new, unifying Biodiversity Law. At the request of the Department of Environment, Ministry of Natural Resources and Environment of Vietnam, this document analyses the current situation with regard to threatened and alien species in Vietnam, current legislation that relates to such species, gaps and discrepancies in this legislation, and international legal experience that could help to instruct Vietnam in developing a new Biodiversity Law. Finally, recommendations are provided on provisions, relating to threatened and alien species, to be included in the new Biodiversity Law.

Overall, key needs identified (given in more detail in sections 6 and 10) are:

*Threatened species*

1. Introduction of legal status for Vietnamese Red Data Books and synchronisation of protected lists with national and global threatened species lists;
2. Significant augmentation and standardisation of lists of protected ('rare and precious') species;
3. Further legislation to enable existing terrestrial habitat protection stipulations for threatened species;
4. Authorisation of a national focal body or bodies to deal with inland water and marine conservation, backed by new legislation to provide the basis for aquatic protected areas systems;
5. Designation and protection of Ramsar sites;
6. Substantially increased penalties for breaking laws related to biodiversity, specifically including exploitation or trading of protected species.

*Alien species*

1. Authorisation of a national focal body responsible for invasive alien species issues, including development of a comprehensive strategy;
2. Strict measures and financial penalties to prevent intentional introduction of invasive alien species;
3. Quarantine regulations and restrictions on trade of pets and ornamental plants to prevent unintentional introductions;
4. Stipulations requiring eradication, or at least control and containment, of invasive alien species once established, with priority to Special-use forests and critical natural habitats for threatened species, such as Important Bird Areas and Key Biodiversity Areas.

# 2. Introduction

Vietnam is consistently ranked among the top twenty most biologically diverse countries in the world. For some groups of species, such as primates, it is among the top five. Terrestrially, there are over 13,700 described plant species in the country (MoNRE *et al*. 2005), and around 870 regularly occurring fish (MoNRE *et al*. 2005), 310 mammal (MoNRE *et al*. 2005), 822 bird (BirdLife International 2006), 286 reptile (MoNRE *et al*. 2005), and 145 amphibian species (IUCN *et al*. 2006). Marine environments support similar levels of diversity, with over 11,000 species recorded to date (MoNRE *et al*. 2005). Vietnam is also a country in which much biodiversity remains to be discovered – with large numbers of plants, reptiles, and amphibians, and even four new large mammal species and three new bird species described by scientists in the last 15 years (Sterling *et al*. 2006).

Vietnam's greatest biodiversity conservation value lies in its endemic species – those which are not found anywhere else in the world. These restricted-range species are also often among the most threatened. Around 10% of Vietnam's plants are believed to be endemic (UNEP 2001), as are eight bird (of which six are globally threatened), five globally threatened mammal, one globally threatened reptile, and 39 amphibian (four globally threatened) species (IUCN *et al*. 2006).

Recognising the importance of national biodiversity, and the threats that it is under, the Government of Vietnam is sued Decision No. 35/2003/QD-TTg, dated 6th March 2003, to assign the Ministry of Natural Resources and Environment (MoNRE) to develop a Biodiversity Law. This first Biodiversity Law of Vietnam will be developed through a consultative approach, ensuring broad and wide participation of key organisations and a wide range of citizens. The Law should also enable Vietnam to fulfill its obligations under international agreements, and as a member of the World Conservation Union (IUCN). The National Assembly will begin consideration of the draft Biodiversity Law in early 2007. The 1st draft of the Law must be ready in July 2006. Recognising the threatened species expertise of BirdLife International both at the global level (as the official IUCN Red List authority for birds) and at the regional level, within Vietnam and neighbouring countries, MoNRE's Department of Environment (DoE) invited BirdLife International to prepare a background study on threatened and alien species and recommendations for the content of the Biodiversity Law.

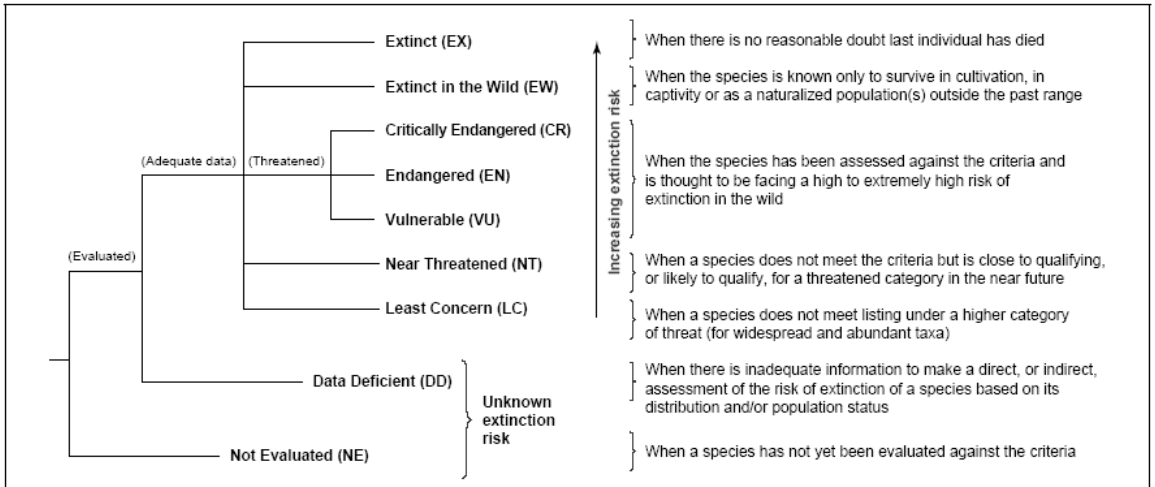
# 3. Overview of the status of threatened species in Vietnam

## 3.1 Listing of threatened species

Although it is difficult to comprehensively assess the threat status of all species known from Vietnam when some are still so poorly known, great progress has been made. The IUCN 'Red List of Threatened Species' (www.iucnredlist.org) is the single most comprehensive source of information on threatened species, and the IUCN Red List is increasingly accepted by governments and inter-governmental organisations as "the global standard for threatened species" (Rodrigues *et al*. 2006). As a member of IUCN, the Government of Vietnam must have "as one of its central

purposes the achievement of IUCN's mission". It can best achieve this by adopting the IUCN Red List and incorporating IUCN Red Listed species into protected species legislation. Quantitative criteria are used to assess species and assign them to hierarchical categories of threat (Figure 1), with species considered threatened if they are categorised as Critically Endangered (CR), Endangered (EN), or Vulnerable (VU).

**Figure 1: The IUCN Red List categories[a] and a simplified overview of the criteria[b].**




| Criterion | Critically Endangered | Endangered | Vulnerable | Qualifiers and notes |
|---|---|---|---|---|
| A1: reduction in population size | ≥90% | ≥70% | ≥50% | Over ten years/three generations[c] in the past, where causes of the reduction are clearly reversible AND understood AND ceased |
| A2–4: reduction in population size | ≥80% | ≥50% | ≥30% | Over ten years/three generations[c] in past, future or combination |
| B1: small range (extent of occurrence) | <100km$^2$ | <5000 km$^2$ | <20 000 km$^2$ | Plus two of (a) severe fragmentation and/or few locations (1, ≤5, ≤10); (b) continuing decline; (c) extreme fluctuation |
| B2: small range (area of occupancy) | <10km$^2$ | <500 km$^2$ | <2000 km$^2$ | Plus two of (a) severe fragmentation and/or few locations (1, ≤5, ≤10); (b) continuing decline; (c) extreme fluctuation |
| C: small and declining population | <250 | <2500 | <10 000 | Mature individuals. Continuing decline either: (1) over specified rates and time periods; or (2) with (a) specified population structure or (b) extreme fluctuation |
| D1: very small population | <50 | <250 | <1000 | Mature individuals |
| D2: very restricted population | N/A | N/A | <20 km$^2$ area of occupancy or ≤five locations | Capable of becoming Critically Endangered or even Extinct within a very short time frame |
| E: quantitative analysis | ≥50% in ten years/ three generations[c] | ≥20% in 20 years/ five generations[c] | ≥10% in 100 years | Estimated extinction risk using quantitative models (e.g. population viability analyses) |

Red Lists and Red Data Books have also been prepared at a national level, with one on fauna in 1992 (MoSTE 1992), updated in 2000 (MoSTE 2000), followed by one on flora in 1996 (MoSTE 1996). Because listing of threatened species was still in its infancy, these early Vietnamese assessments were modelled on the India Red Data Book. Later Red Data Books (MoNRE and Vietnamese Academy of Science and Technology in prep. a,b) will more closely follow current IUCN guidelines (IUCN 1994). A more rigorous and standardised global system (IUCN 2001), applicable at national levels (IUCN 2003), now exists for future assessments to follow.

[a] *Adapted, with permission, from IUCN (2001)*
[b] *Adapted, with permission, from Butchart* et al. *(2005)*
[c] *Whichever is longer*

## 3.2 Threatened species in Vietnam

The latest IUCN Red List (IUCN 2006) lists 311 species that occur in Vietnam as globally threatened, while the latest Vietnamese Red Data Books (MoSTE 1996, 2000) categorise 522 species (526 taxa) as nationally threatened (i.e., Endangered, Vulnerable, or Rare: Table 1, Annex 1). However, the Vietnamese Red Data Books – in part due to their use of old criteria – omit many of the threatened species listed globally; only 117 (38%) Vietnamese species listed as threatened by the IUCN are listed in the most recent published Vietnamese Red Data Books. Conversely, assessments of many taxa have not been undertaken globally by the IUCN, and so the Vietnamese Red Data Books list an additional 328 species (particularly plants, molluscs, and fish) that may be globally threatened. These two lists serve different purposes and so will have slightly different methodologies (IUCN 2003), but there is clearly room for greater synchrony between them. A key action within Vietnam should be to ensure the Red Data Book assessments more closely follow IUCN guidelines and assess, at a minimum, all Vietnamese species listed as globally threatened or Near Threatened by IUCN.

The large number of globally threatened species in Vietnam puts the country 19th in the world for species under threat; higher than any other country in Indochina. It also ranks within the top 15 for mammals, top 20 for birds, and top 30 for plants and amphibians (IUCN 2006). Of course, species listed as threatened are only those that are both known and assessed – many additional species in Vietnam are also likely to be under threat of extinction.

**Table 1: Threatened species known from Vietnam**

| | Globally listed as threatened | | | | Nationally listed as threatened | | | |
|---|---|---|---|---|---|---|---|---|
| | CR | EN | VU | **Total** | E | V | R | **Total** |
| Plants | 25 | 38 | 85 | **148** | 25 | 61 | 156 | **242** |
| Mammals | 11 | 11 | 23 | **45** | 31 | 25 | 21 | **77** |
| Birds | 5[3] | 13 | 23[4] | **41** | 15 | 6 | 28 | **49** |
| Reptiles | 7 | 14[5] | 8 | **29** | 9 | 16 | 7 | **32** |
| Amphibians | 0 | 5 | 13 | **18** | 1 | 2 | 3 | **6** |
| Fish | 4 | 6 | 20 | **30** | 6 | 21 | 28 | **55** |
| Other | 0 | 0 | 0 | **0** | 11 | 22 | 28 | **61** |
| **Total** | **52** | **87** | **172** | **311** | **98** | **153** | **271** | **522** |

## 3.3 Threats to species

Globally, the main pressure on threatened species has been overwhelmingly identified as habitat loss and fragmentation. Additional major threats are overexploitation, invasive species, pollution, and disease (Baillie *et al*. 2004). This is reflected in threats to Vietnamese species – for ex-

[3]Includes *Fregata andrewsi* (which has occurred as a vagrant in Vietnam).
[4]Includes *Larus relictus* and *Mycteria cinerea* (which have occurred as vagrants in Vietnam), but excludes *Haliaeetus leucoryphus*, for which there are no reliable records.
[5]Includes *Caretta caretta* and *Lepidochelys olivacea*, not listed by IUCN for Vietnam, but apparently present.

ample, every globally threatened amphibian species in Vietnam is being impacted by habitat loss and fragmentation, 47% by pollution, and 20% by overexploitation (IUCN *et al*. 2006). Similarly, 57% of threatened birds in Vietnam are being impacted by habitat loss and fragmentation, 44% by overexploitation, and 25% by pollution (BirdLife International 2006).

Since the natural habitat of most of Vietnam was forest, most habitat loss impacts have been felt due to forest loss and degradation. Although official statistics show increases in forest cover over the last ten years, to over 37% in 2004, less than a third of total forest is natural and only a tiny fraction (<5%) of the total forest area is considered 'rich/closed-canopy forest' (MoNRE *et al*. 2005). Thus most increases have been due to plantation forest, which is of limited biodiversity value and, indeed, often of lower biodiversity value than the non-forest habitats it replaces. Overall, natural forests in Vietnam continu e to be degraded and fragmented (MoNRE *et al*. 2005). Overexploitation in Vietnam is largely due to hunting for food and traditional medicine (and for timber and ornamentation in the case of plants), but trapping for pets is also a significant factor (e.g., to 25% of birds threatened by overexploitation; BirdLife International 2006).

## 3.4 Actions to conserve threatened species

A diverse set of actions are being taken to ensure the continued persistence of threatened species in Vietnam, but even more are necessary. These conservation efforts can be categorised as (i) policy and institutional, (ii) protected areas, (iii) wider landscape, (iv) financing, and (v) community involvement (MoNRE *et al*. 2005). Earlier analysis has revealed particular gaps that are relevant here (MoNRE *et al*. 2005). Analysis of the Special-use forest system showed that wetland habitats, notably lowland rivers and coastal wetlands, were underrepresented within the current system, as was lowland evergreen forests (MoNRE *et al*. 2005). In addition, the coverage is inadequate for some species (MoNRE *et al*. 2005). Further protected areas or landscape conservation are priorities to fill these gaps.

Information on conservation measures in place, and necessary, is increasingly being collated for globally threatened species by the IUCN. For example, BirdLife International – the Red List authority for birds – list over 200 specific conservation actions necessary for Vietnamese birds; of which 37% are habitat-based, 34% research-based, and 13% policy-based (BirdLife International 2006). Likewise, necessary conservation actions listed by IUCN for Vietnamese amphibians are 39% research-based, 38% habitat-based, and 6% policy-based (IUCN *et al*. 2006). Most conservation measures currently in place in Vietnam are habitat-based (e.g. 79% of those for amphibians), primarily through the existing national Special-use forest system of national parks, nature reserves, and landscape-protected areas. Overall, policy actions, such as legislation, are a small, but absolutely essential part of overall conservation needs.

## 3.5 International policy commitments relevant to threatened species

Vietnam is signatory to a number of international agreements relevant to threatened species conservation:

***Convention on Biological Diversity*** (www.biodiv.org)
This convention aims to conserve biological diversity through sustainable development. Vietnam

joined in 1994, with the Vietnam Environmental Protection Agency as the primary national focal point. Under Article 8, Vietnam commits to "develop or maintain necessary legislation and/or other regulatory provisions for the protection of threatened species and populations". In decision VI/26 of the 6th Conference of the Parties (April 2002), Vietnam further committed to "achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level". An officially proposed indicator for this target is the Red List Index, based on the status of globally threatened species (Butchart *et al*. 2005). Pursuant to this commitment, Vietnam should ensure that all threatened species listed on the IUCN Red List and in the Vietnam Red Data Books are also listed under national law as protected species.

***Convention on International Trade in Endangered Species of Wild Fauna and Flora*** (www.cites.org)
This convention aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Vietnam signed in 1994, with the Forest Protection Department as the national Management Authority and the Institute of Ecology and Biological Resources and the Centre for Natural Resources and Environmental Studies as the Scientific Authorities. Under this convention, Vietnam commits to regulate and monitor international trade in species on CITES appendices, i.e. species recognised as threatened by international trade. Given that all of these should be listed globally – and most regionally – as threatened, inclusion of all threatened species listed on the IUCN Red List and in the Vietnam Red Data Books under national law as protected species would be a significant contribution to meeting Vietnam's commitments to CITES.

***World Conservation Union*** (www.iucn.org)
The IUCN aims to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. Vietnam became a state member of the IUCN in 1993. As a member of IUCN, the Government of Vietnam must have "as one of its central purposes the achievement of IUCN's mission" and, as such, has a responsibility to adopt the IUCN Red List and incorporate IUCN Red Listed species into protected species legislation.

***Ramsar Convention on Wetlands*** (www.ramsar.org)
This convention provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Vietnam joined in 1989, with the Vietnam Environmental Protection Agency as the relevant administrative authority. Under Article 2, Vietnam is commits to "designate suitable wetlands within its territory for inclusion in a List of Wetlands of International Importance... In the first instance wetlands of international importance to waterfowl at any season should be included." and, under Article 3, to "promote the conservation of wetlands and waterfowl by establishing nature reserves on wetlands". Pursuant to this commitment, Vietnam should ensure at a minimum that all sites filling Ramsar criteria are designated as Ramsar sites and included within the national protected areas system. 27 sites have already been identified by BirdLife International as fulfilling Ramsar criteria (BirdLife International 2005), but only two have so far been designated.

***Convention on Migratory Species of Wild Animals*** (www.cms.int)
This convention aims to conserve terrestrial, marine and avian migratory species throughout

their range. Vietnam is in the advance stages of signing the Convention on Migratory Species. Under this agreement, Vietnam would commit to "provide immediate protection for migratory species included in Appendix I" and to "conclude Agreements covering the conservation and management of migratory species included in Appendix II". Parties commit to prohibit the taking of animals belonging to Appendix I species, as well as to implement other habitat protection and threat reduction measures. Species relevant to Vietnam are listed in Annex 2 of this report. Pursuant to this forthcoming commitment, Vietnam should ensure at a minimum that all species listed on Appendix I of the Convention on Migratory Species are also listed under national law as protected species.

## 4. Overview of international experience of legal provisions on the management and conservation of threatened species

In many countries, legislation on management and conservation of threatened species is mainly restricted to prohibiting or limiting use of individual listed 'protected' species. Thus, such legislation almost exclusively deals with prevention of extraction or trade in individual animals and plants, rather narrowly defined. However, it is clear that the protection of a species necessitates the maintenance or restoration of all conditions, particularly its habitat, necessary for its persistence.

In some cases, exploitation or trade of a given species may be of little or no importance to its conservation. Therefore some have questioned the compilation of long lists of species intended solely to prohibit their exploitation or trade. Nonetheless, any threats such as extraction, however minor, should be addressed for threatened species that are already under pressure. In particular, even if no heavy exploitation or trade exist at a certain point of time, such prohibitions act as precautionary measures in case of the appearance of a sudden demand for the species concerned. Of course, legislative measures addressing threats to species would best result from a case-by-case analysis but, until the capacity exists to analyse, stipulate, and enforce, such complex legislation, blanket prohibitions on possession of, or trading in, threatened species are likely to remain the best legislative method. In the longer term, species recovery or management plans should be developed and used to identify specific threats to, and critical habitats for, threatened species (de Klemm and Shine 1993). Such principles are already enshrined, for example, in the requirements of such major donors to Vietnam as the World Bank, which "does not support projects that, in the Bank's opinion, involve the significant conversion or degradation of critical natural habitats" (World Bank 2004).

Since loss of natural habitat is usually the main threat to species, conservation of habitats of threatened species – irrespective of whether they are protected from exploitation – has been the prevalent legislative measure globally, through protected area systems analagous to Vietnam's Special-use Forests and Marine Protected Areas. However, such protection of habitat is not only expensive but is often difficult or unfeasible due to competing land interests. In such cases, land-use controls or imposition of certain management categories are a potential option. However, experience has shown that such restrictions are often not willingly accepted for the sake of a threatened species that has no relevance to land managers, particularly on private land. Restrictions must be accompanied by fair compensation to stakeholders (de Klemm and Shine 1993).

A better approach may be to develop management agreements which are, wherever possible, binding upon successors in land title. Such agreements can be supported by the possibility of compulsory purchase of, or revocation of, the land in question, as a last resort if the land manager refuses to sign an agreement or does not comply with the conservation obligations set out in the agreement. However, the conditions of the agreement should be sufficiently attractive to ensure that the presence of a threatened species should be considered by the land manager concerned as an asset rather than a liability (de Klemm and Shine 1993). A failure to meet this requirement has been viewed as the main flaw of the United States Endangered Species Act's 'critical habitat' provision. Despite the requirement to designate 'Critical Habitat' for Endangered Species, this has been designated for only one third of species. This is largely due to limited funding from the government, leading to a decision to allocate scarce resources to the listing of new species, and to a limited belief by the implementing agency, the US Fish and Wildlife Service, in the value of designating Critical Habitats. The European Community Habitats Directive – as a proactive and government-supported, rather than public petition-driven, process – has perhaps had more success, in listing species for which Special Areas of Conservation must be established to ensure protection of their habitats (European Community 1992; Box 1).

**Box 1: The European Community Habitats Directive - Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora**

The main aim of the EC Habitats Directive is to promote the maintenance of biodiversity by requiring member states to take measures to maintain or restore natural habitats and wild species at a favourable conservation status, introducing robust protection for those habitats and species of European importance. The Directive requires member states to introduce a range of measures including the protection of species listed in the Annexes and undertaking of surveillance of habitats and species. The 189 habitats listed in Annex I of the Directive and the 788 species listed in Annex II, are to be protected by means of a network of sites. Each member state is required to prepare and propose a national list of sites for evaluation in order to form a European network of Sites of Community Importance (SCIs). Once adopted, these are designated by member states as Special Areas of Conservation (SACs), and along with Special Protection Areas (SPAs) classified under the EC Birds Directive, form a network of protected areas known as Natura 2000.

Importantly, the Habitats Directive introduces for the first time, for protected areas in Europe, the precautionary principle; that is that projects can only be permitted once it is ascertained that there are no adverse effects on the integrity of an SCI. Projects may still be permitted if there are no alternatives, and there are imperative reasons of overriding public interest. In such cases compensation measures will be necessary to ensure the overall integrity of network of sites. As a consequence of amendments to the Birds Directive these measures are to be applied to SPAs also.

Source: Joint Nature Conservation Committee (undated)

# 5. Vietnamese legislation related to threatened species

## 5.1 Current legislation relating to threatened species

The first legal document on threatened species in (the then People's Republic of) Vietnam was Prime Ministerial Instruction 134-TTg, of 21 June 1960 prohibiting shooting of elephants. This was soon followed by Decree No. 39-CP of 5 April 1963 stipulating temporary regulations on the hunting of forest birds and mammals. This decree not only included the first list of protected species, but also regulated hunting methods and seasons. Lists of protected 'rare' or 'precious' species have been further developed, in recent years specifically through Decree 18-HDBT in 1992, subsequently amended ten years later by Decree 48/2002/ND-CP. Very recently, a revised list of protected species was approved under Decree 32/2006/ND-CP of 30 March 2006. All of these decrees separate species into two main categories, with exploitation and use of those under Appendix II restricted, and under Appendix I strictly forbidden. The full list of protected species can be found in Annex 1 of this document. Although the use of Appendix I species is more restricted, violations of relating to species on either Appendix are treated equally under the Criminal Law.

Habitat conservation is also specified for threatened species under these three decrees.

**Decree 32/2006/ND-CP** states:

> **Chapter I. General description**
>
> **Article 3. Governmental policy on the management of endangered, precious and rare forest animals and plants.**
>
> 1) "The Government will invest to manage and protect endangered, precious and rare forest animals and plants in Special-use forests, and in the rescue centres for confiscated endangered, precious and rare forest animals and plants."
>
> **Chapter II. Management of endangered, precious and rare forest animals and plants**
>
> **Article 5. Protection of endangered, precious and rare forest animals and plants**
>
> 1) "A forest that supports an assemblage of endangered, precious and rare forest animals and plants shall be considered for establishment of a Special-use forest in accordance with current legislation."
>
> 2) "Organisations, families or individuals, who carry out any production, construction, survey, recreation, tourism, or similar activity, in forest that supports endangered, precious or rare forest animals and plants shall obey regulations set out in this Decree and others in the Law of Forest Protection and Development and in the Environment Law."
>
> **Article 12. Rights and responsibilities of forest owner (contractee)**
>
> 3) "Prepare and implement projects to manage and protect the endangered, precious and rare forest animals and plants in their contracted areas."
>
> 4) "Monitor and report to authorised officials on the status of endangered, precious and rare forest animals and plants in their contracted areas..."
>
> 5) "Demarcate and post regulation boards to protect each forest area inhabited by endangered, precious or rare forest animals and plants."

Overall, the conservation of threatened species has been mentioned in a number of key laws and other legislative documents, as follows:

**Decree 18-HDBT** of 17 January 1992 issuing a list of rare and precious forest animals and plants and regulations for their management and protection.

(superceded by Decree 48/2002/ND-CP in 2002)

**Instruction 359/TTg** of 29 May 1996 on urgent measures for protection and recovery of wild animals

This instruction proposes measures including control of hunting, transport, and trade of rare and precious wild animals, prohibits restaurants, hotels and shops from selling wild animal dishes or products, controls the use of guns and other hunting instruments, and encourages pilot activities to rear wild animals (including rare and precious species), to review and improve legislation on management and protection of wild animals, and to raise public awareness on protection of rare and precious species.

**Criminal Law** (2000)

**Section 17. Environmental offences**

**Article 188. Crime of destroying aquatic resources**

1) "Anyone who violates the regulations on aquatic resource protection, as detailed below, causing serious damages, or being a repeat offender, be subject to a fine of 10,000,000-100,000,000 Vietnamese Dong, non-detained re-education to three years, or punishment by imprisonment from six months to three years:

c) Exploiting species in protected lists issued by government;

d) Destroying the habitats of species protected by governmental regulations."

**Article 189. Crime of destroying forests**

1) "Anyone who violates the regulations on forest resource protection, as detailed below, causing serious damages, or being a repeat offender, be subject to a fine of 10,000,000-100,000,000 Vietnamese Dong, non-detained re-education to three years, or punishment by imprisonment from six months to three years:

...c) Exploiting the 'rare and precious' plant species in protected lists issued by government."

**Article 190. Crime of breaching regulations on protected wild animals**

1) "Anyone who exploits, transports, or illegally trades 'rare and precious' animal species listed in protected species lists issued by government, be subject to a fine of 5,000,000-50,000,000 Vietnamese Dong, non-detained re-education to three years, or punishment by imprisonment from six months to three years."

2) "A person be punished by imprisonment of two to seven years if convicted of the following:

a) Premeditated offence;

b) Making corrupt use of his (her) position to offend;

d) Causing serious damage..."

**Decree 48/2002/ND-CP** of 22 April 2002 regarding revision and supplementing of the list of rare and precious forest animals and plants in Decree 18-HDBT

(superceded by Decree 32/2006/ND-CP in 2006)

**Law of Fishery Resources Protection** (2003)

**Chapter II. Protection and development of fishery resources**

**Article 7. Protection of habitats for aquatic species**

3) "All organisations and individuals when constructing, renovating or removing any construction that may impact the breeding or migratory habitats of aquatic species must implement an environmental impact assessment in accordance with current legislative prescriptions on environmental protection."

4) "All organisations and individuals, who are exploiting aquatic products using fish-traps, weirs, set-nets or others in rivers, lakes, lagoons etc. must leave a corridor for the movement of aquatic species in accordance with regulations issued by local authorities."

**Article 8. Conservation, protection, reproduction and development of the fishery resources**

1) "Government has (or is responsible for issuing) policies to conserve and protect fishery resources, especially threatened and 'rare and precious' species, and those of high economic or high scientific value..."

3) " The Ministry of Fishery will periodically issue:

a) A list of aquatic species included in the Vietnam Red Data Book and of other species of restricted exploitation, and of species with limited exploitation seasons and durations of restriction."

**Article 9: Planning and management of inland water protected areas and marine protected areas**

1) "Based on the level of biodiversity, following national and international standards, inland water and marine protected areas shall be categorised into national parks, species and habitat conservation areas, and aquatic resource reserves."

2) "Government shall issue standards to classify and gazette protected areas, execute the planning, establishment and management allocation for inland water and marine protected areas, and issue regulations for management of protected areas of national and international importance.

Provincial People's Committees shall issue regulations for management of protected areas assigned under provincial management in accordance with instructions of the Ministry of Fishery."

3) "Government shall invest in conserving aquatic genetic resources and biodiversity, issue policies to encourage international and domestic organisations and individuals to invest in establishment and participate in management of the protected areas, and issue policies to support enhanced income generation, resettlement etc. to secure benefits for people inhabiting protected areas."

**Instruction 12/2003/CT–TTg** of 16 May 2003 on strengthening urgent measures on forest protection and development

1) "Chairmen of Provincial Peoples' Committees shall lead, in collaboration with the rel-

evant ministries and sectors, ...to instantly implement the following work...

e) ...to revoke business licenses of those illegally trading wood and stalls and restaurants preparing dishes out of rare and precious animals…"

**Decree No. 109/2003/ND-CP** of 23 September 2003 on the Conservation and Sustainable Development of Wetlands

**Article 11. Planning responsibilities and approval power**

1) "The Ministry of Natural Resources and Environment shall be primarily responsible for planning the conservation and sustainable development of wetlands..." (and)

**Article 13. Power of decision on the establishment of wetland protected areas**

1) ...submit to the Prime Minister its proposals for establishment of wetland protected areas..."

**Law of Forest Protection and Management** (2004)

**Article 12. Acts to be prohibited**

2) "Illegal hunting in any form, keeping, and killing wild animals."

9) "Illegal transporting, processing, advertising, trading, using, consuming, storing, exporting and importing forest animals and plants."

**Article 41. Protection of forest animal and plants**

3) "Endangered and rare forest animals and plants, and 'rare and precious' animal and plant genetic resources need specific protection.

The Prime Minister is responsible for issuing regulations for protection of endangered, precious and rare forest animals and plants, and a list of endangered, precious and rare forest animals.

The Ministry of Agriculture and Rural Development is responsible for issuing prescriptions on exploitation of forest animals and plants..."

(The 1991 Law on Forest Protection and Development also contained a clause, in Article 3, stating "Forest owners are entitled to special incentive policies if they successfully protect and develop rare and precious species.")

**Decree No. 139/2004/ND-CP** of 25 June 2004 on the processing of administrative infringements on forest management and protection and forest product management

**Article 34. Treatment of exhibits and equipment related to infringements**

1) "Exhibits, which are fresh or live parts of unsound or injured wild animal species not included in Appendix IB and fresh forest products not included in Appendix IA... shall be recorded and sold..."

2. "Forest Protection Departments shall be responsible for maintaining confiscated forest products and equipment:

a. For weak or injured wild animals able to recover: transfer to rescue centres for recovery before releasing to the wild; for healthy animals: organise release into the wild, in favourable habitat."

(These regulations receive continued support from Decree 32/2006/ND-CP)

**Law of Environmental Protection** (2005)

**Article 7. Acts to be prohibited**

3) "Exploitation, trade, consumption, or use of wild animal and plant species listed in protected species lists issued by the governmental or competent agencies."

Article 30. Biodiversity protection

3) "Species, which are threatened with extinction will be protected by:

a) Listing and categorising in order to manage and protect them in relation to their level of threat;

b) Preparing protection plans and applying appropriate measures to control their hunting, exploitation, trade and use;

c) Implementing species-specific programs of caring, rearing and protection, and setting up a system of animal rescue centres."

**Decree 32/2006/ND-CP** of 30 March 2006 regarding the management of endangered, rare and precious forest animals and plants

This Decree is the most recent legal document on the protection of forest animals and plants, replacing Decrees 18-HDBT and 48/ND-CP. It issues lists of protected species, as follows (full lists in Annex 1 of this document):

**Group I**. Strictly forbids the exploitation and use for commercial purposes of forest animals and plants of special value for science, the environment or the economy, that only occur in small populations in the wild or are facing extinction:

**Appendix IA**. (forest plants): 15 taxa

**Appendix IB**. (forest animals): 62 taxa

**Group II**. Restricts the exploitation and use for commercial purposes of forest animals and plants of special value for science, the environment or the economy, that only occur in small populations in the wild or are facing extinction:

**Appendix IIA**. (forest plants): 37 taxa

**Appendix IIB**. (forest animals): 89 taxa

The Decree also stipulates a range of activities for management and protection of endangered, rare and precious forest animals and plants, including monitoring, protection, exploitation, transportation, growth, processing and trading of wildlife products. It also outlines penalty systems for violation of these regulations.

**Decision 186/2006/QD-TTg** of 14 August 2006 promulgating the regulation on forest management

This Decision supercedes Decision No. 08/2001/QD-TTg of January 11 2001 and reiterates and strengthens previous legislation on hunting.

**Article 12. Hunting, trapping and catching of forest animals**

1) "All acts of hunting, trapping or catching wild animals in special-use forests, being national parks or nature conservation zones, are prohibited"

2) For protection and production forests, "All acts of hunting, trapping or catching forest animals on the list of... Decree No. 32/2006/ND-CP... are prohibited"

## 5.2 Gaps and discrepancies in current threatened species legislation

Major gaps in the coverage of existing Vietnamese legislation are as follows:

***Species listed as protected***

Decrees 18-HDBT in 1992, 48/2002/ND-CP in 2002, and Decree 32/2006/ND-CP (approved on 30 March 2006) are an important step in protecting threatened species, but have fallen short in both the number and scope of species listed. The most recent legislation lists just over 200 species, far short of the number threatened and thus needing protection. More importantly, many of the most threatened species are not protected, with particular disparities in different taxonomic groups (Table 2, Annex 1). Under the most recent legislation, 58% of globally threatened mammals are protected at some level, but less than 10% of plants, reptiles, amphibians, and fish. Currently the IUCN Red List and Vietnam Red Data Books are considered scientific, not legal, documents. The fundamental disconnect in Vietnam between Red Lists and protected species lists is the one single biggest problem that Vietnam must correct in order to grant legal protection to its threatened species. Although there is some difference in intention between threatened species lists and protected species lists, their overlap is so great that they should not be developed separately in Vietnam. There is thus an urgent need to bring lists of protected species in line with lists of threatened species (as committed by Vietnam as a party to the Convention on Biological Diversity).

### Table 2: Number of globally threatened species* protected in Vietnam

| **Decree** | **18-HDBT 1992** | | **48/2002/ND-CP** | | **32/2006/ND-CP** | | |
|---|---|---|---|---|---|---|---|
| **Appendix** | **I** | **II** | **I** | **II** | **I** | **II** | **Total** |
| Plants | 4 | 9 | 2 | 10 | 3 | 11 | **14 (9%)** |
| Mammals | 12 | 7 | 10 | 3 | 20 | 6 | **26 (58%)** |
| Birds | 2 | 0 | 3 | 3† | 6 | 6 | **12 (29%)** |
| Reptiles | 0 | 1 | 0 | 4 | 0 | 5 | **5 (17%)** |
| Amphibians | 1 | 0 | 1 | 0 | 0 | 1 | **1 (6%)** |
| Fish | 0 | 0 | 1 | 0 | 0 | 0 | **0** |
| **Total** | **19** | **17** | **17** | **20** | **29** | **29** | **58 (19%)** |

*based on numbers of threatened species on the 2006 IUCN Red List (Table 1).
† includes *Garrulax konkakinhensis* and *G. ngoclinhensis* under '*Garrulax* spp.'

One other issue regarding current lists of threatened species (MoSTE 1996, 2000), and lists of protected species in Vietnamese legal documents, is inconsistency in spelling, taxonomy, and nomenclature. This leads to further confusing discrepancies between these lists themselves, and also between other international standards.

***Penalties for breaking laws related to biodiversity***

Current penalties for breaking laws related to biodiversity range from 5,000,000 to 100,000,000 Vietnamese Dong. Such penalties are serious disincentives if applied to exploitation of, for example, one individual of one protected species. However, especially given the low likelihood of being prosecuted for biodiversity offences, current penalties are not strong if applied to large transgressions of the law such as a shipment or truck full of protected species. Even the largest

fines, which are not often applied, are low enough relative to the value of illegally traded wildlife and plants that they serve to act only as a minor tax on illegal exploitation, rather than any serious disincentive. To remedy this, penalties need to be applied *per individual animal or plant*, or maximum penalties need to be considerably raised and more often applied.

***Habitat protection***

Vietnamese Criminal Law addresses destruction of the habitat of species in government protected lists (which should, as per the previous section here, be those which are threatened) and protection and management of habitat needed by threatened species is mentioned in Decree 32/2006/ND-CP and cursorily, for Special-use forest, Decree No. 08/2001/QD-TTg. However, a large part – and sometimes the majority – of the population of many threatened species in Vietnam remains outside of Special-use forest (MoNRE *et al*. 2005) and the recent Prime Ministerial Instruction No. 38/2005/CT-TTg (dated 5/12/05) recommends no increase in the area of Special-use forest. Current legal provisions for habitat protection outside Special-use forest provide only regulations rather than incentives for land managers, although the now superceded 1991 Law on Forest Protection and Development contained a clause, in Article 3, stating "Forest owners are entitled to special incentive policies if they successfully protect and develop rare and precious species." Reinstating such a measure in current legislation, and implementing it, would go a long way towards much-needed conservation of threatened species outside of Special-use forest.

***Aquatic habitats***

Most existing legislation refers only to "forest" plant and animal species. Despite the high level of threat to wetland habitats in Vietnam (VEPA 2005), only a few aquatic (almost all marine) animal species are covered in current protected species lists. More importantly, the mandate for management of wetlands in Vietnam is unclear and sometimes overlapping. Several different government ministries have responsibilities for wetlands, including MARD, MoNRE, and MoF. For instance, all existing wetland protected areas fall under management of MARD as Special-use forests, while some wetland resources, such as fishes, are managed by MoF. As stated by VEPA (2005) "Wetland management in Viet Nam remains sector-based, overlapping, uncoordinated, scattered, and a management mandate on wetlands has not yet been clearly defined". As a result, it has not been possible to effectively tackle conservation issues facing wetlands in Vietnam. Proposed lists exist of 79 wetland protected areas (MoSTE and NEA 2000, IUCN *et al*. 2001) and 17 marine protected areas (MoF 2004). Some wetland and marine areas are included within the national Special-use forest system (e.g., at Cat Tien, Mui Ca Mau, Tram Chim, U Minh Thuong, and Xuan Thuy [inland and coastal wetlands], and Con Dao, Cat Ba, and Phu Quoc [island and marine areas] National Parks). Notably, the Law of Fishery Resources requires protection of aquatic species' habitats in inland water and marine projected areas in accordance with 'protected area regulations'. However, such regulations for management – l*et al*one a protected area system – do not yet exist. To date, proposals to designate national networks of wetland or marine protected areas have thus not been enacted due to the lack of a solid legislative basis for doing so. Nonetheless, two pilot marine protected areas have been established, namely Hon Mun and Cu Lao Cham, and more are planned.

*Ownership of natural resources*

Article 5 of the Land Law (2003) states that "Land belongs to the whole population and the Government plays the role of owner representative." This Article then goes on to define responsibilities on land tenure, use, taxes, etc. The Constitution of the Socialist Republic of Vietnam (1960, amended in 1980 and 1992) states government ownership of all natural resources, but does not go into detail. The most detailed legislation on ownership of natural resources is probably Article 3 of the Law of Fishery Resources Protection (2003), which states that "Fishery resources belong to the whole population, and are wholly managed by the Government." Clearly, further legal clarification is necessary to elaborate this situation.

## 6. Recommendations on provisions to be included in the Biodiversity Law regarding the management and conservation of threatened species

The Biodiversity Law should include the following key provisions related to threatened species, in order to comply with Vietnam's international commitments and to address current gaps and discrepancies in national legislation:

(i) A standard taxonomy and scientific nomenclature should be agreed upon and then followed carefully and consistently;

(ii) Vietnamese Red Data Books should receive legal recognition and more closely follow current IUCN guidelines. They should assess, at a minimum, all Vietnamese species listed as globally threatened or Near Threatened by IUCN[6] ;

(iii) All threatened species listed for Vietnam on the current IUCN Red List and in the Vietnam Red Data Books should be listed under national law as protected ('rare and precious') species[7] . Note that this does not mean all uses of these species are banned – listing on Appendix II should actually support sustainable use. Near Threatened species listed for Vietnam on the current IUCN Red List should also be considered for listing;

(iv) Provision should be made for development of recovery plans for the most threatened species in Vietnam (perhaps all Critically Endangered species), in order that legislation can more specifically address individual species' management needs in the future.

(v) Current regulations stipulating protection of terrestrial critical habitat for protected ('rare and precious') species outside of Special-use forest should be enabled by positive (ideally financial) incentives, such as those alluded to in the, now superceded, 1991 Law on Forest Protection and Development, Article 3 (and guidelines for identification of such areas will be needed);

(vi) Authorisation of a national focal body or bodies to deal with inland water and marine conservation. This may just require clarification of existing responsibilities and removal of overlaps. This body will also require new legislation to provide the basis for inland water and marine protected areas systems;

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[6]A species-by-species comparison can be found in Annex 1 of this document.

[7]A detailed species-by-species listing of necessary inclusions is presented in Annex 1 of this document.

(vii) At a minimum, all sites fulfilling quantitative Ramsar criteria (criteria 2,5, 6 and 9) should be designated as Ramsar sites and appropriate conservation measures introduced (perhaps including incorporation within the national protected area system);
(viii) Further legal clarification of government ownership of natural resources, as this relates to biodiversity;
(ix) Penalties and implementation of the law need strengthening. Current penalties need to be applied per individual animal or plant, or maximum penalties need to be considerably raised and more often applied.

# 7. Overview of the status of alien species in Vietnam

## 7.1 Alien species in Vietnam

Alien species in this document shall refer solely to invasive, or potentially invasive, alien species. Many other alien species are common in agriculture and horticulture, but do not necessarily pose a significant threat to Vietnam's environment. In addition to threats to the environment of Vietnam, alien species can have severe negative economic impacts. Worldwide, invasive species cause an estimated loss to agriculture of $55 billion to $248 billion annually (Bright 1999). In Vietnam, alien invasive species also dramatically impacted the freshwater and agricultural systems and caused severely economical damages. For example, Golden Apple Snail has become established as one of the most serious rice pests in Vietnam, costing millions of dollars in lost rice production each year (MoNRE *et al*. 2005).

Invasive alien species were not paid significant attention in Vietnam until the mid-1990s, when there was an outbreak of Golden Apple Snail *Pomacea canaliculata* in the Mekong and Red River Deltas. Following this, invasive alien species have been progressively recognised as an issue in Vietnam. However, studies on invasive alien species have been inadequate and largely uncoordinated to date. The most noteworthy research to date has been on *Mimosa pigra* and other invasive alien species in the Mekong Delta (Tran Triet *et al*. 2001, 2004, Tran Triet 2005), on *Pomacea canaliculata* (Plant Protection Department 2000), and several alien aquatic species studies that focused on fish (Pham Anh Tuan 2002, Le Khiet Binh 2005).

There have been two significant reviews of the status of invasive alien species in Vietnam. The first was by the IUCN (Nguyen Cong Minh 2005) for terrestrial species, and used a matrix approach to identify 23 alien species that posed particular threats to plant diversity (Annex 3). Many of these were plants, reflecting the greater study of such species to date in Vietnam. The second study, by the Ministry of Fisheries (Le Khiet Binh 2005), drew up a list of 41 aquatic alien species in Vietnam (Annex 4), of which just nine were judged as harmless, based on a classification system of invasive potentiality (Annex 5). Available information on some of the higher threat, or better studied, invasive alien species in Vietnam is summarised below. All of these species are listed among "100 of the world's worst invasive species" (ISSG 2001). At present, invasive alien species do not seem to be as numerous, widespread, or damaging in Vietnam as they have become in many other countries – particularly island nations. However, the fact remains that most invasive,

or potentially invasive, species have not been identified or studied in Vietnam and, without further studies and preventative controls, significant impacts can be expected into the future.

**Mimosa *Mimosa pigra***

Reviews to date seem to reach concensus that Mimosa pigra is one of the highest invasive alien species threats in Vietnam (Duong Minh Tu and Pham Dinh Viet Hong 2003, Nguyen Cong Minh 2005). This species has been relatively well studied in Vietnam (Napompeth 1983 in Tran Triet 2005, Storrs *et al*. 2001, Samouth 2004 in Tran Triet 2005, Tran Triet *et al*. 2004, Tran Triet 2000, 2005) and occurs across natural and agricultural habitats in land, freshwater and coastal areas, mainly in areas adjacent to freshwater. The species originated in the American Tropics and was first introduced to Asia at the end of the 19th Century. It spread slowly at first, and was only first recorded in the Mekong Delta of Vietnam in 1979 (Moc Hoa District, Long An Province; Tran Triet *et al*. 2004), but is now present almost throughout. It was reported as a serious weed in Thailand in the early 1980s (Napompeth 1983; in Tran Triet 2005) and became a serious weed in the Lower Mekong Basin only quite recently. It is common in public lands, such as protected areas, roadsides, canals and streams but is not abundant in private lands, perhaps due to regular control by land owners (Tran Triet 2005). The species is becoming a serious problem (see Box 2) for wetland areas such as in Tram Chim, Cat Tien, and Yok Don National Parks, Bien Lac Lake, and Tri An and Dong Mo-Ngai Son Reservoirs.

**Box 2: Case study of impacts of *Mimosa pigra* on wetland biodiversity at Tram Chim National Park, Dong Thap Province, Vietnam**

Tram Chim, a 7,600 ha wetland National Park, is in the northeast of the Mekong Delta, c. 20 km from the main Mekong channel, and contains a mosaic of seasonally inundated grasslands, *Melaleuca* swamp forests and permanently inundated swamps and old riverbeds. The Tram Chim wetlands are home to an array of freshwater biodiversity characteristic of the Mekong Delta, and are well known for the presence of a significant dry-season population of Eastern Sarus Cranes (*Grus antigone sharpii*). However, Tram Chim is heavily infested by *M. pigra*, which has posed a serious threat to the park's wetland biodiversity.

*M. pigra* was first noted in Tram Chim in 1984-1985. By May 2000, the area of infestation was 490 ha, and had increased to 1,846 ha by May 2002 (Tran Triet *et al*. 2004). Seasonally inundated grassland at Tram Chim was most susceptible to invasion, which first occurred along peripheral canals and then invaded the grasslands. *M. pigra* is also found under the canopy of *Melaleuca* swamp forests, though not at high density. Dense *M. pigra* stands now cover most of the shallow inundated grasslands in the core zone of Tram Chim. Remaining grassland in A1 compartment – the largest wetland block in the core zone of Tram Chim – is now under tremendous threat of being invaded, particularly since the construction of a new canal cutting through the core zone for fire control in 2003.

*M. pigra* at Tram Chim is quite tolerant to flooding; even producing flowers and fruits when most of the plant is under water. Tran Chim's soil seed bank has c. 300 *M. pigra* seeds per $m^2$ with a 75% seed viability (Tran Triet *et al*. 2004).

The major impact of *M. pigra* on the wetlands of Tram Chim National Park stems from its ability to invade quickly and replace native vegetation. In turn, loss of native vegetation negatively impacts native animal communities, most notably the avifauna. This is particularly significant since grasslands at Tram Chim host several globally threatened bird species, including Sarus Crane and Bengal Florican *Houbaropsis bengalensis*. The *Eleocharis* sedge beds in Tram Chim's core zone were the main feeding ground of cranes, but many are now densely covered by *M. pigra* and abandoned by cranes. Largely as a consequence of this, crane numbers at Tram Chim have been reduced dramatically; from 600-800 cranes in the mid 1990s to <100 cranes in 2003 (Tran Triet and Nguyen Phuc Bao Hoa 2002, 2003).

Source: Tran Triet (2005)

**Golden Apple Snail *Pomacea canaliculata***

*P. canaliculata* is also recognised by reviews to date as one of the highest invasive alien species threats in Vietnam (Duong Minh Tu and Pham Dinh Viet Hong 2003, Nguyen Cong Minh 2005). The species was introduced to southern Vietnam before 1975 for ornamental purposes. In 1989, two farms were established (in Cu Chi District, Ho Chi Minh City) to breed and export *P. canaliculata* and, in 1990, experiments to rear *P. canaliculata* were also started in northern Vietnam. Due to its short life cycle, under favourable climatic conditions, *P. canaliculata* has spread rapidly along water courses and has now been recorded in almost all areas of Vietnam (Plant Protection Department 2000). It can feed on almost aquatic plant subjects and is therefore poses severe threats to both biodiversity and agricultural production.

**Water Hyacinth *Eichhornia crassipes***

*E. crassipes* was introduced from Japan in 1902 for ornamental reasons. In favourable conditions it can double its invaded area in ten days, and has now spread to most freshwater systems in Vietnam. It covers water surfaces and lowers dissolved oxygen levels as it decays, consequently killing many fish. As with most invasive alien species, it also causes significant economic problems; not only blocking river traffic, but also slowing water currents in reservoirs and thus reducing power generation ability and irrigation potential, and increasing maintenance costs.

**Lantana *Lantana camara***

*L. camara* was introduced to Vietnam at the beginning of the 20$^{th}$ Century for ornamental reasons, and is now planted throughout Vietnam. IUCN (2003) warned that this plant was a potentially serious invasive. Currently, it is unclear whether it will become a problem in Vietnam.

**Nutria *Myocastor coypus***

*M. coypus* was imported widely to Vietnam at the end of the 20$^{th}$ Century as an alternative livestock species, to provide meat for food, leather and fur for exportation, and guts for autolysis thread production. Fortunately, with early warnings from scientists, the Agriculture and Forestry Extension Department and the Department of Animal Health acted swiftly to prevent importation of the species to Vietnam and established a task force to solve issues related to the species. By the end of 2002, c. 4,000 had been confiscated and destroyed, and the species is now believed eradicated.

## 7.2 Actions to address alien species

Although several invasive alien species have been identified in Vietnam as causing severe negative impacts to biodiversity, and significant economic costs, very little has been done to control them. Some experiments have been conducted to find suitable control methods for *M. pigra* in Vietnam (Nguyen Hong Son *et al*. 2004, Nguyen Thi Lan Thi *et al*. 2004). In all cases, preventing establishment of invasive species is found to be cheaper and more effective than controlling them once established and, if prevention fails, early intervention has been proved to be the next best step (e.g., for *M. pigra*; Tran Triet *et al*. 2001). For areas heavily infested by invasive alien plants, promotion of economic uses for these species by local communities has been a favourite option. In the Mekong Delta, *M. pigra* stems are used as fuel wood, and experiments are also showing success in the use of young stems for goat food, and in *M. pigra* biomass as a mushroom growing medium. Likewise, in recent years, *Eichhornia crassipes* has begun to be used for purposes such as manure production, production of ethanol, and artistic weaving material. Unfortunately, creating economic value for these invasive species may ultimately create a disincentive to eradication. If economic uses cannot be found, the government has sometimes just mobilised enormous numbers of the public to help control invasive species. A program in the 1990s collected hundreds of tonnes of *Pomacea canaliculata* and their eggs, and then provided training courses for farmers on integrated management to control this species. A number of case studies are available globally for many of the species which currently, or potentially, are invasive problems for Vietnam. Integrated management usually includes chemical treatment, biological control using natural predators (though, unfortunately, misapplication has directly introduced more invasive species through much of the world) and, for the snails, botanical attractants to concentrate individuals for removal. Large waterbirds, such as Asian Openbill *Anastomus oscitans*, have been instrumental in mitigating the damage from *Pomacea canaliculata* in Thailand (OEPP 2002).

All the relatively local initiatives listed above are extremely useful, but invasion areas are usually not isolated, and so a successful management program will requires a national – and, indeed, regional – approach. Control priority should be given first to areas of conservation significance, such as existing nature reserves and national parks and other areas that have been identified as of high biodiversity value, such as Important Bird Areas (IBAs; Tordoff *et al*. 2002) and Key Biodiversity Areas (KBAs; Eken *et al*. 2004).

## 7.3 International policy commitments relevant to alien species

Vietnam is signatory to two main international agreements relevant to alien species management:

***Convention on Biological Diversity*** (www.biodiv.org)
This convention aims to conserve biological diversity through sustainable development. Vietnam joined in 1994, with the Vietnam Environmental Protection Agency as the primary national focal point. Under Article 8, Vietnam commits to "Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species." Furthermore, in Decision VI/23 (Guiding Principles on implementation of Article 8, adopted in April 2002 at the Sixth Conference of the Parties to the Convention on Biological Diversity), Vietnam is committed to measures to prevent the spread of invasive alien species, with an emphasis on border controls,

quarantine measures, information exchange and capacity building (the least expensive and most effective measures).

Of particular relevance here, the Principles of Decision VI/23 – reinforced by compliance recommendations in Decision VII/13 and Decision VIII/27 – recommend that Vietnam, and other CBD parties:

- "(r)eview... relevant policies, legislation and institutions to identify gaps, inconsistencies and conflicts, and, as appropriate, adjust or develop policies, legislation and institutions."

  (this requirement can be fulfilled by this document, and adoption of its recommendations in the new Biodiversity Law)
- (p)romote and carry out, as appropriate, national research and assessments on invasive species, vulnerability of ecosystems to invasive species, "...development of environmentally benign methods to control and eradicate invasive alien species, including measures for use in quarantine and to control fouling of ship hulls", and "...costs and benefits of the use of biocontrol agents to control and eradicate invasive alien species."
- "...have the opportunity to provide prior authorisation before the first intentional introduction of potentially invasive alien species."

  (this recommendation is important in the face of pressure from some parties to ensure trade concerns receive priority over invasive alien species concerns)
- "...implement border controls and quarantine measures for alien species that are or could become invasive to ensure that: (a) Intentional introductions of alien species are subject to appropriate authorization...; (b) Unintentional or unauthorized introductions of alien species are minimized."

Overall guiding principles focus on the precautionary principle – "(w)here there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation" – and on the fact that "(p)revention is generally far more cost-effective and environmentally desirable than measures taken following introduction and establishment of an invasive alien species."

***Ramsar Convention on Wetlands* (www.ramsar.org)**

This convention provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Vietnam joined in 1989, with the Vietnam Environmental Protection Agency as the relevant administrative authority. Under Resolution VII.14, Vietnam is urged to carry out a number of actions relevant to invasive alien species including, of particular relevance here:

- "prepare... an inventory of alien species in wetlands and to assess them so as to identify and prioritise those which pose a threat to wetlands and wetland species ('risk assessment'), and those which may be adequately controlled or eradicated"
- "establish programmes to target priority invasive species with a view to control or eradication..."
- "address... the environmental, economic and social impact of the movement and transport of alien species on the global spread of invasive wetland species"

- "...adopt legislation and programmes to prevent the introduction of new and environmentally dangerous alien species into their jurisdictions and the movement or trade of such species within their jurisdictions"
- "develop capacity for the identification of new and environmentally dangerous alien species" and "facilitate awareness of, and... identification and control of, new and environmentally dangerous alien species"

## 8. Overview of international experience of legal provisions on the management and conservation of alien species

Recent case studies carried out within the framework of the Global Invasive Species Programme (www.gisp.org), together with a review of legislation and literature, point to considerable global unevenness in the treatment of invasive alien species in national legislation.

In most countries, provisions related to alien species are distributed across legislation concerning nature conservation, water resources, agroforestry, fishing, quarantine and, in some cases, in recent legislation dealing with control of genetically modified organisms. Relevant provisions may also be found in hunting, fishing and wildlife regulations that address the introduction or release of species for re-stocking purposes. The reasons for this sectoral approach are usually historical or administrative rather than scientific or technical (Shine *et al*. 2000). As a result, common problems can be broadly categorised as follows:

***Fragmented legal and institutional frameworks***

- Absence of a strategic approach, with alien-related issues consequently ignored or having low profile.
- Low levels of coordination and/or familiarity between agencies responsible for phytosanitary matters, trade, natural resource conservation, and other sectors.
- Dispersed existing provisions and inconsistent legislative treatment, reflected in different institutions, definitions, criteria, standards and procedures.

***Weak coverage and terminology***

- Taxonomic: frameworks often do not follow standard taxonomic authorities, or state whether they go beyond the species or subspecies level.
- Gaps in scope: common omissions include alien fish and microorganisms or introductions to certain ecosystem types.
- Narrow objectives: some countries have no legal basis for prohibiting introductions of alien species unless these would harm agricultural or fishery interests.
- Non-existent or inconsistent definitions of key terms.
- Risk analysis and permit procedures that are cumbersome, time-consuming and costly.

***Compliance, enforcement and management issues***

- Absence of legally backed requirements for monitoring.
- Exclusive reliance on regulatory approaches, with little use of economic incentives to deter unwanted introductions or promote eradication and control.

*Model state practice*

Some National Biodiversity Strategies and Action Plans specifically provide for inventories of alien species. In Poland, for example, specific funding has been allocated to monitoring invasive species, with scientific institutions and botanical gardens given responsibility for this task (Krzywkowska 1999; in Shine *et al*. 2000). Likewise, Argentina's draft biodiversity strategy provides for the creation of a database of native and alien species, including historical information and available data on harmful impacts (Di Paola and Kravetz 1999; in Shine *et al*. 2000). In Australia, the 1999 Environment Protection and Biodiversity Conservation Act goes even further, in establishing formal requirements for identifying and monitoring biodiversity, linked to the criteria in Annex I of the Convention on Biological Diversity. Specific planning and management requirements apply to processes determined to be "threatening" to the survival, abundance or evolutionary development of a native species or ecological community. Clearly, many invasive alien species fall within this category.

# 9. Vietnamese legislation related to alien species

## 9.1 Current legislation relating to alien species

Invasive alien species have not been thoroughly or systematically addressed by Vietnamese legislation. They have only been mentioned *ad hoc* in stipulations concerning to biodiversity conservation and plant protection. The main legislative articles and provisions referring to invasive alien species are as follows:

**Ordinance on Plant Protection and Quarantine** of the Parliament's Steering Committee Order No. 36/2001/PL-UBTVQH10 of 25 July 2001

> **Article 27** states that "It is strictly forbidden to bring into Vietnam or spread from one region to another in the country harmful alien organisms."

**Decree No. 58/2002/ND-CP** of 3 June 2002 promulgating regulations on plant protection, regulations on plant quarantine and regulations on management of plant protection chemicals

**Regulations on plant quarantine**

> **Article 16.**
>
> "It is strictly forbidden to introduce into Vietnam live parts of any growth stage of plant species covered by the plant quarantine list, or potentially harmful alien species; where introduction for research is necessary, the permission of the Minister of Agriculture and Rural Development is required."
>
> (the plant quarantine list, from Decision 117/2000/QD/BNN-BVTV, is included in Annex 6 of this document)

**Law on Fishery Resources Protection** (2003)

> **Chapter 1. General setting**
>
> **Article 6. Acts to be prohibited**
>
> 12) "Grow new aquatic product breeds or species in the prohibition list without permission from the Ministry of Fisheries."
>
> (note: a prohibition list has not yet been issued)

**Government Decree No. 109/2003/ND-CP** of September 23 2003 on the Conservation and Sustainable Development of Wetlands

**Article 7. Acts to be prohibited**

5) "Introduction of alien species of fauna and flora into wetland environments causing unbalanced ecology or modified genetics of indigenous species of fauna and flora."

**Law on Forest Protection and Development** (2004)

**Chapter 1. General setting**

**Article 12. Acts to be prohibited**

12) "Keep, plant, or release into Special-use forests non-native animal and plant species without permission from governmental authorised agencies."

**Ordinance on crop varieties**. Approved by Order No. 03/2004/L/CTN of April 5 2004 of President of Vietnam Tran Duc Luong

**Chapter I. Stipulations**

**Article 9. Acts to be prohibited**

6) "Importation of genes, and production or trading of crop varieties, which are harmful to human health, environment and ecosystems."

**Ordinance on domestic animal breeds**. Approved by Order No. 04/2004/L/CTN of April 5 2004 of President of SR Vietnam Tran Duc Luong

**Chapter I. Stipulations**

**Article 9. Acts to be prohibited**

5) "Production or trading of animal breeds which are harmful to human health, environment and ecosystems."

**Ordinance on animal health** of the Parliament's Steering Committee Order No. 18/2004/PL-UBTVQH11 of 29 April 2004

Stipulates species that require quarantine: "...animal species that are harmful to human and animal health, environment and ecosystems..."

**Resolution No. 41** of November 15 2004 of the Central Committee of Vietnam's Communist Party on the environmental protection in the context of intensifying industrialisation and modelisation.

**Chapter C. Tasks**

**1. Overall tasks**

c) "Conduct investigations for better understanding of natural resources, and to plan for protection, sustainable exploitation and biodiversity conservation... Protect wildlife, especially threatened species; control the invasion of alien species and genetically modified organisms harmful to the environment and humans."

In addition, a few stipulations have been issued on specific invasive alien species. However, these have almost all been in cases where invasive alien species have already become a significant problem, and so many are provincial. Some key examples are listed below:

**Instruction No. 528-TTg** of 29 September 1994 from the Prime Minister on prohibition of keeping Golden Apple Snails *Pomacea canaliculata* and eradication of this species.

**Instruction No. 151/TTg** of 11 March 1995 from the Prime Minister on mobilisation of resources to promptly eradicate Golden Apple Snail *Pomacea canaliculata* outbreaks.

**Interministerial Circular 4-LB/TT** of 23 March 1995 guiding the execution of Prime Ministerial Instruction No. 151/TTg (above).

**Official Notice No. 914/TB-KNKL** of 9 August 2002 announcing the conclusions of the Agriculture and Forestry Extension Department on the consignment of nutrias of Thien Tan Co. Ltd.

**Decision No. 488/QĐ-TY** of 14 August 2002 of the Department of Animal Health on the prevention of illegal importation of nutrias to Vietnam and the establishment of a task force to solve nutria-related problems.

## 9.2 Gaps and discrepancies in current alien species legislation

As can be seen above, invasive alien species have only been addressed ad hoc in Vietnamese legislation. Thus, there is a need for a comprehensive new legal framework to effectively manage and control invasive alien species. To avoid duplication, recommendations regarding such a framework are set forth in section 10 below.

In addition, there is a need for an agency to be legally authorised to be responsible for invasive alien species issues, particularly conducting risk assessment on introduction of alien species to the country, listing of potentially harmful species, quarantining to prevent international introduction of invasive species, and control of alien species already extant within Vietnam.

## 10. Recommendations on provisions to be included in the Biodiversity Law regarding the management of alien species

There is a need for a single unified chapter in the Biodiversity Law on invasive alien species. As recommended by the Convention on Biological Diversity, priority should be given to *preventing* the introduction of invasive alien species into Vietnam and to eradicating existing invasive alien species. If an invasive alien species has been introduced, early detection and rapid action are crucial to prevent its establishment. A chapter on invasive alien species should include at least:

(i) Authorisation of a national focal body responsible for invasive alien species issues. This body should develop a strategy on invasive alien species. In particular, the responsibilities of this body should include identifying, listing, monitoring the spread of, researching impacts of, researching control of, developing management plans for, and disseminating information on, potentially invasive alien species, with such species defined based on experience from Vietnam, experience in other countries, or taxonomic or ecological characteristics which would suggest a predisposition to invasion;

(ii) Strict measures to prevent intentional introduction of potentially invasive alien species. Intentional introductions should be prohibited without a permit and should be subject to a high-level environmental impact assessment, in accordance with the precautionary approach, to determine potential consequences of the introduction;

(iii) Quarantine regulations to limit the risk of unintentional introductions of potentially invasive species through pathways such as ballast water discharge or escape from contained facilities;

(iv) Measures to stop trade in potentially invasive alien pet species and ornamental plants as a precaution against their abandonment or accidental introduction into natural ecosystems;

(v) Stipulations requiring all appropriate efforts to eradicate or, where eradication is not feasible, contain and control established invasive alien species which may significantly disrupt ecosystems. This should include all of those in Special-use forests and those in critical natural habitats for threatened species, such as Important Bird Areas and Key Biodiversity Areas;

(vi) Provision for financial penalties – through at least civil and possibly criminal systems – on individuals or entities responsible for intentional or reckless introduction of invasive alien species commensurate with the costs of eradication or control measures.

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## Annex 2. Vietnamese species listed on the Convention for Migratory Species

These species should be added to the Vietnamese protected species list, to fulfill Vietnam's international legal obligations, if Vietnam joins the Convention for Migratory Species.

**Appendix I**

*Bos sauveli* Kouprey
*Aythya nyroca* Ferruginous Duck
*Aquila clanga* Greater Spotted Eagle
*Aquila heliaca* Imperial Eagle
*Tringa guttifer* Spotted Greenshank
*Eurynorhynchus pygmeus* Spoon-billed Sandpiper
*Larus saundersi* Saunders's Gull
*Chelonia mydas* Green Turtle
*Eretmochelys imbricata* Hawksbill Turtle
*Carcharodon carcharias* Great White Shark
*Pangasianodon gigas* Mekong Giant Catfish

**Appendix II**

*Neophocaena phocaenoides* Finless Porpoise
*Sousa chinensis* Indo-Pacific Humpbacked Dolphin
*Stenella longirostris* Spinner Dolphin
*Lagenodelphis hosei* Fraser's Dolphin
*Orcinus orca* Killer Whale
*Dugong dugon* Dugong
Accipitridae – all migratory spp.
Falconidae – all migratory spp.
Recurvirostridae – all migratory spp.
Charadriidae – all migratory spp.
Scolopacidae – all migratory spp.
Muscicapidae – all migratory spp.
*Ciconia nigra* Black Stork
*Plegadis falcinellus* Glossy Ibis
*Pandion haliaetus* Osprey
*Grus antigone* Sarus Crane
*Burhinus oedicnemus* Eurasian Thick-knee
*Sterna albifrons* Little Tern
*Crocodylus porosus* Saltwater Crocodile
*Eretmochelys imbricata* Hawksbill Turtle
*Rhincodon typus* Whale Shark

## Annex 3. Matrix of (alien and non-alien) invasive species posing threats to plant diversity in Vietnam

(adapted from Nguyen Cong Minh 2005)

Note that if a species is listed more frequently in the matrix, it does not necessarily mean that it is of higher impact.

| Habitat / Subjects | Terrestrial | Freshwater | Marine and Coastal Areas | Other areas such as urban areas |
|---|---|---|---|---|
| **Biodiversity priority areas** | *1. Mimosa pigra*<br>*2. Ipomoea eberhardtii*<br>*3. Mimosa diplotricha*<br>*4. Pennisetum polystachyon*<br>*5. Lantana camara*<br>*6. Imperata cylindrica*<br>*7. Eupatorium odoratum*<br>*8. Bidens pilosa* | *1. Mimosa pigra*<br>*2. Eichhornia crassipes*<br>*3. Pistia stratiotes*<br>*4. Brachiaria mutica*<br>*5. Pomacea* spp.<br>*6. Ciprinus carpio*<br>*7. Clarias batrachus* | *1. Mikania micrantha*<br>*2. Stacghytarpheta cayennensis* | *1. Bidens pilosa* |
| **Important Plant Areas** | *1. Mimosa pigra*<br>*2. Ipomoea eberhardtii*<br>*3. Mimosa diplotricha*<br>*4. Pennisetum polystachyon*<br>*5. Lantana camara*<br>*6. Imperata cylindrica*<br>*7. Eupatorium odoratum*<br>*8. Pueria lobata* | *1. Mimosa pigra*<br>*2. Eichhornia crassipes*<br>*3. Pistia stratiotes*<br>*4. Brachiaria mutica*<br>*5. Pomacea* spp. | *1. Mimosa pigra*<br>*2. Mikania micrantha*<br>*3. Stacghytarpheta cayennensis* | *1. Bidens pilosa* |
| **Protected areas** | *1. Mimosa pigra*<br>*2. Ipomoea eberhardtii*<br>*3. Mimosa diplotricha*<br>*4. Pennisetum polystachyon*<br>*5. Lantana camara*<br>*6. Eupatorium odoratum*<br>*7. Imperata cylindrica* | *1. Mimosa pigra*<br>*2. Eichhornia crassipes*<br>*3. Pistia stratiotes*<br>*4. Brachiaria mutica*<br>*5. Pomacea* spp. | *1. Mimosa pigra*<br>*2. Mikania micrantha*<br>*3. Stacghytarpheta cayennensis* | *1. Bidens pilosa* |
| **Agricultural biodiversity†*** | *1. Brontispa longissima*<br>*2. Trogoderma granarium*<br>*3. Phytophthora cinnamomi*<br>*4. Lolium temulentum*<br>*5. Banana bunchy top virus*<br>*6. Imperata cylindrica*<br>*7. Arundo donax*<br>*8. Mimosa diplotricha*<br>*9. Lantana camara*<br>*10. Penisetum polystachion*<br>*11. Bidens pilosa* | *1. Pomacea caniculata*<br>*2. Eichhornia crassipes*<br>*3. Mimosa pigra*<br>*4. Pistia stratiotes*<br>*5. Brachiaria mutica* | *1. Mimosa pigra*<br>*2. Mikania micrantha*<br>*3. Stacghytarpheta cayennensis*<br>*4. Bidens pilosa*<br>*5. Erigeron canadense* | *1. Brontispa longissima* |
| **Economically valuable plants** | | | | |
| **Red Data lists** | | | | |

† Duong Minh Tu and Pham Dinh Viet Hong (2003) also listed Yellow Mealworm Beetle *Tenebrio molitor* and Nutria *Myocastor coypus* as among the five highest invasive alien species threats to agriculture in Vietnam.

* additionally, the following invasive alien species, listed by Tran Triet.(2000) from the Mekong Delta, could be expected to be threats to at least agricultural biodiversity: *Ageratum conyzoides; Mimosa pudica; Hyptis rhomboidea; Cynodon dactylon; Leersia hexandra; Panicum repens.*

## Annex 4. List of aquatic alien species in Vietnam

(Le Khiet Binh 2005), categorised by potential harm (greatest to least from black to white; Annex 5)

1. European Eel *Anguilla anguilla* WHITE
2. Japanese Eel *Anguilla japonica* WHITE
3. Bighead Carp *Aristichthys nobilis* WHITE
4. Brine Shrimp (Sea Monkeys) *Artemia salina* WHITE
5. Pirapitinga (Red Pacu) *Piaractus (Colossoma) brachypomus* GREY
6. Pirapitinga (Pacu) *Piaractus mesopotamicus* BLACK
7. Catla *Catla catla* GREY
8. Mrigal *Cirrhinus cirrhosus (C. mrigal)* GREY
9. Red Claw *Crayfish Cherax quadricarinatus* BLACK
10. North *African Catfish Clarias gariepinus* BLACK
11. Cuban *Crocodile Crocodylus rhombifer* BLACK
12. Grass Carp *Ctenopharyngodon idella* WHITE
13. Common Carps *Cyprinus carpio subspp*. GREY
14. Kissing *Gourami Helostoma temminkii* WHITE
15. Chinese *Sturgeon Acipenser sinensis* WHITE
16. Pond Smelt *Hypomesus olidus* WHITE
17. Silver Carp *Hypophthalmichthys molitrix* BLACK
18. Common Pleco *Hypostomus punctatus* BLACK
19. Bigmouth buffalo *Ictiobus cyprinellus* GREY
20. Rohu *Labeo rohita* GREY
21. West Coast White Shrimp *Litopenaeus vannamei* BLACK
22. Smallmouth Bass *Micropterus dolomieu* GREY
23. Largemouth Bass *Micropterus salmoides* GREY
24. Nutria *Myocastor coypus* BLACK
25. Silver Fish (Icefish) *Neosalanx taihuensis* GREY
26. Blue Tilapia *Oreochromis aureus* GREY
27. Nile Tilapia *Oreochromis niloticus* GREY
28. Mozambique Tilapia *Oreochromis mossambicus* GREY
29. Red Tilapia *Oreochromis sp*. GREY
30. Giant gourami *Osphronemus goramy* WHITE
31. Golden Apple Snail *Pomacea canaliculata* BLACK
32. Bullfrog *Rana catesbeiana* GREY
33. Red Drum *Sciaenops ocellatus* GREY
34. Wels catfish *Silurus glanis* GREY
35. Red-eared Slider Terrapin *Trachemys scripta* BLACK
36. Goldfish *Carassius auratus* GREY
37. Mosquitofish *Gambusia affinis* GREY
38. Golden Mahseer *Tor putitora* BLACK
39. Murray Cod *Maccullochella peelii* GREY
40. Chinese Perch *Siniperca chuatsi* BLACK
41. Red Piranha *Pygocentrus nattereri (Serrasalmus ternetzi)* BLACK

## Annex 5. Classification of invasive potentiality

(after Wittenberg and Cock 2001, Shine *et al*. 2000)

**Black lists** (of known invasive alien species; highest threat)

Species on such lists are those that may pose a serious threat to ecosystems, habitats or species. Their intentional introduction should be prohibited. Black lists are useful for border control and monitoring, but are reactive or 'crisis management' – only listing species after they have been shown to be invasive (Mooney 1999; in Shine *et al*. 2000). Such lists can never be fully accurate or exhaustive.

**White lists** (of species assessed as harmless or beneficial; lowest threat)

These may be useful for groups of species with relatively few members, such as vertebrates. However, they are unworkable for most plant, invertebrate, and micro-organism groups. Where a species is assessed as harmless or beneficial and given an entry permit, it can be included on a white list to simplify future assessments. However, requirements for white list entry must be very stringent and, even then, mistakes will occur.

**Grey lists**

These can help to rate the risk of species proposed for introduction. Species (if not yet white- or black- listed) may be grouped into: species of known invasiveness elsewhere (high risk); species of unknown invasiveness, but with a reasonable likelihood of entering the country (medium risk); species where the risk of invasiveness is not yet known, and species are very unlikely to enter the country anyway (low risk).

## Annex 6. Plant quarantine list

(from Decision 117/2000/QD/BNN-BVTV of 20 November 2000 issuing the quarantine list of the Socialist Republic of Vietnam)

**Appendix I**: Organisms that bear potential diseases, not occurring in Vietnam.

**A/ Insects:**

| | |
|---|---|
| 1. Ruồi đục quả Nam Mỹ | *Anastrepha fraterculus* (Wiedemann) |
| 2. Ruồi đục quả Mêxico | *Anastrepha ludens* (Loew) |
| 3. Ruồi đục quả Địa Trung Hải | *Ceratitis capitata* (Wiedemann) |
| 4. Ruồi đục quả châu Úc | *Bactrocera tryoni* (Froggatt) |
| 5. Ruồi đục quả Trung Quốc | *Bactrocera tsuneonis* (Miyake) |
| 6. Ruồi đục quả *Natal* | *Ceratitis rosa* Karsch |
| 7. Mọt lạc | *Pachymerus pallidus* Olivier |
| 8. Bướm trắng Mỹ | *Hyphantria cunea* (Drury) |
| 9. Bọ dừa Nhật Bản | *Popillia japonica* Newman |
| 10. Mọt to vòi | *Caulophilus latinasus* Say |
| 11. Mọt cứng đốt | *Trogoderma granarium* Everts |
| 12. Mọt da vệt thận | *Trogoderma inclusum* LeConte |
| 13. Bọ đầu dài hại quả bông | *Anthonomus grandis* Boheman |
| 14. Bọ trĩ cam | *Scirtothrips aurantii* Faure |
| 15. Sâu cánh cứng hại khoai tây | *Leptinotarsa decemlineata* Say |
| 16. Mọt thóc | *Sitophilus granarius* (Linnaeus) |
| 17. Mọt đục hạt lớn | *Prostephanus truncatus* Horn |
| 18. Mọt đậu Mexico | *Zabrotes subfasciatus* (Boheman) |
| 19. Rệp sáp vảy ốc đen | *Quadraspidiotus perniciosus* (Comstock) |
| 20. Bọ dừa viền trắng | *Graphognathus leucoloma* (Boheman) |
| 21. Xén tóc hại gỗ (vector for *Bursaphelenchus xylophilus*) | *Monochamus alternatus* Hope |
| 22. Rầy hại lúa (vector for Rice hoja blanca virus) | *Tagosodes orizicolus* Muir |
| 23. Rầy hại hạt lúa (vector for Rice hoja blanca virus) | *Tagosodes cubanus* D. L. Crawford |

**B/ Plant diseases (microorganisms):**

| | |
|---|---|
| 24. Bệnh khô cành cam, quýt | *Deuterophoma tracheiphila* Petri |
| 25. Bệnh thối rễ bông | *Phymatotrichum omnivorum* (Shear) Duggar |
| 26. Bệnh rụng lá cao su | *Microcyclus ulei* (P. Henn.) V. Arx |
| 27. Bệnh ung thư khoai tây | *Synchytrium endobioticum* (Schilb.) Percival |
| 28. Bệnh phấn đen lúa mỳ | *Tilletia indica* Mitra |
| 29. Bệnh cây hương lúa | *Ephelis oryzae* Sydow |
| 30. Bệnh đốm lá cà phê | *Pseudomonas garcae* Amaral, Teixeira & Pinheiro |
| 31. Bệnh virus trắng lá lúa | Rice hoja blanca virus |
| 32. Bệnh đốm vòng cà phê | Coffee ring spot virus |
| 33. Bệnh héo vàng bông | *Verticillium albo-atrum* Reinke & Berthold |

**C/ Nematodes:**

| | |
|---|---|
| 34. Tuyến trùng gây thối củ | *Ditylenchus destructor* Thorne |
| 35. Tuyến trùng bào nang khoai tây | *Globodera pallida* (Stone) Mulvey & Stone |
| 36. Tuyến trùng bào nang ánh vàng khoai tây | *Globodera rostochiensis* (Wollenweber) Mulvey & Stone |
| 37. Tuyến trùng thối thân, rễ cọ dầu, dừa | *Rhadinaphelenchus cocophilus* (Cobb) Goodey |
| 38. Tuyến trùng hại thông | *Bursaphelenchus xylophilus* (Steiner & Burher) Nickle |

**D/ Weed plants:**

| | |
|---|---|
| 39. Cỏ ma kí sinh Ai Cập | *Striga hermonthica* (Del.) Bentham |
| 40. Cỏ ma ký sinh S. d | *Striga densiflora* (Benth.) Bentham |
| 41. Cỏ mạch đen độc | *Lolium temulentum* L |
| 42. Cây kế đồng | *Cirsium arvense* (L.) Scop |
| 43. Cỏ chổi hoa sò | *Orobanche crenata* Forskal |
| 44. Cỏ chổi hoa rủ | *Orobanche cernua* Loefl. |
| 45. Cỏ chổi ramo | *Orobanche ramosa* L |
| 46. Cỏ chổi Ai Cập | *Orobanche aegyptiaca* Pers. |

**Appendix II:** Organisms that bear potential diseases, with limited ranges in Vietnam.

**A/ Insects:**

| | |
|---|---|
| 47. Rệp sáp dâu | *Pseudaulacaspis pentagona* (Targioni) |
| 48. Ngài củ khoai tây | *Phthorimaea operculella* (Zeller) |
| 49. Mọt đậu nành | *Acanthoscelides obtectus* (Say) |
| 50. Bọ cánh cứng ăn lá (vector for *Erwinia stewartii* (Smith) Dye) | *Chaetocnema pulicaria* (Melsheimer) |

**B/ Plant diseases (microorganisms):**

| | |
|---|---|
| 51. Bệnh ghẻ bột khoai tây | *Spongospora subterranea*(Wallr.) Lagerh. f. sp. *subterranea* Tomlinson |
| 52. Bệnh virus sọc lá lạc | Peanut stripe virus |
| 53. Bệnh héo rũ ngô | *Erwinia stewartii* (Smith) Dye |
| 54. Bệnh sợi đen ngô | *Sphacelotheca reiliana* (Kuhn) Clinton |
| 55. Bệnh tàn lụi cam, quýt | Citrus tristeza virus |

**C/ Nematodes:**

| | |
|---|---|
| 56. Tuyến trùng đục thân, củ | *Radopholus similis* (Cobb) Thorne |
| 57. Tuyến trùng thân | *Ditylenchus dipsaci* (Kuhn) Filipjev |

**D/ Weed plants:**

| | |
|---|---|
| 58. Cỏ ma ký sinh S. a | *Striga angustifolia* (Don.) C. J. Saldanha |
| 59. Cỏ ma ký sinh S. l | *Striga lutea* Lour. |
| 60. Tơ hồng Nam | *Cuscuta australis* R. Br. |
| 61. Tơ hồng Trung Quốc | *Cuscuta chinensis* Lam |

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## Annex 7. Threatened Species: Key Definitions[18]

**1. Threatened species**

A species which is facing an extremely high, very high, or high risk of extinction in the wild, and is thus categorised as Critically Endangered, Endangered, or Vulnerable.

**2. Critically Endangered**

A taxon is Critically Endangered when it is considered to be facing an extremely high risk of extinction in the wild, due to (as explained in depth and continually updated at www.iucnredlist.org):

(i) a reduction in population size of ≥90% over ten years/three generations (whichever is longer) in the past, where the causes of the reduction are clearly reversible and understood and ceased;

(ii) a reduction in population size of ≥80% over 10 years/three generations (whichever is longer) in the past or future;

(iii) an extent of occurrence of <100km2 or an area of occupancy of <10km2, plus two of (a) severe fragmentation and/or only known from one location, (b) continuing decline, (c) extreme fluctuations;

(iv) <250 mature individuals and a continuing decline of ≥25% within three years/one generation (whichever is longer), or <250 mature individuals and a smaller continuing decline plus either (a) subpopulation problems or (b) extreme fluctuations;

(v) <50 mature individuals; or

(vi) a quantitative analysis (e.g., population viability analysis) showing the probability of extinction in the wild is ≥50% in 10 years/three generations (whichever is longer).

**3. Endangered**

A taxon is Endangered when it is considered to be facing a very high risk of extinction in the wild, due to (as explained in depth and continually updated at www.iucnredlist.org):

(i) a reduction in population size of ≥70% over ten years/three generations (whichever is longer) in the past, where the causes of the reduction are clearly reversible and understood and ceased;

(ii) a reduction in population size of ≥50% over 10 years/three generations (whichever is longer) in the past or future;

(iii) an extent of occurrence of <5000km2 or an area of occupancy of <500km2, plus two of (a) severe fragmentation and/or only known from ≤5 locations, (b) continuing decline, (c) extreme fluctuations;

(iv) <2500 mature individuals and a continuing decline of ≥20% within five years/two generations (whichever is longer), or <2500 mature individuals and a smaller continuing decline plus either (a) subpopulation problems or (b) extreme fluctuations;

[18] These are mainly copied directly from the authoritative source: IUCN (2001) IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK. <http://www.iucnredlist.org/info/categories_criteria2001>

(v) <250 mature individuals; or

(vi) a quantitative analysis (e.g., population viability analysis) showing the probability of extinction in the wild is ≥20% in 20 years/five generations (whichever is longer).

**4. Vulnerable**
A taxon is Vulnerable when it is considered to be facing a high risk of extinction in the wild, due to (as explained in depth and continually updated at www.iucnredlist.org):

(i) a reduction in population size of ≥50% over ten years/three generations (whichever is longer) in the past, where the causes of the reduction are clearly reversible and understood and ceased;

(ii) a reduction in population size of ≥30% over 10 years/three generations (whichever is longer) in the past or future;

(iii) an extent of occurrence of <20000km2 or an area of occupancy of <2000km2, plus two of (a) severe fragmentation and/or only known from ≤10 locations, (b) continuing decline, (c) extreme fluctuations;

(iv) <10000 mature individuals and a continuing decline of ≥10% within 10 years/three generations (whichever is longer), or <10000 mature individuals and a smaller continuing decline plus either (a) subpopulation problems or (b) extreme fluctuations;

(v) <1000 mature individuals; or

(vi) a quantitative analysis (e.g., population viability analysis) showing the probability of extinction in the wild is ≥10% in 100 years.

**5. Extinct**
A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

**6. Extinct in the Wild**
A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

**7. Near Threatened**
A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

**8. Least Concern**

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

**9. Data Deficient**

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between Data Deficient and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

**10. Not Evaluated**

A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.