Bioinvasion and Global Environmental Governance: The Transnational Policy Network on Invasive Alien Species

China's Actions on IAS

Description[1]

The People's Republic of China is a communist state in East Asia, bordering the East China Sea, Korea Bay, Yellow Sea, and South China Sea, between North Korea and Vietnam. For centuries China stood as a leading civilization, outpacing the rest of the world in the arts and sciences, but in the 19th and early 20th centuries, the country was beset by civil unrest, major famines, military defeats, and foreign occupation. The claimed area of the ROC includes Mainland China and several off-shore islands (Taiwan, Outer Mongolia, Northern Burma, and Tuva, which is now Russian territory). The current President Ma Ying-jeou reinstated the ROC's claim to be the sole legitimate government of China and the claim that mainland China is part of ROC's territory. The extremely diverse climate; tropical in south to subarctic in north, varies over the diverse terrain, mostly mountains, high plateaus, deserts in west; plains, deltas, and hills in east.

After 1978, Deng Xiaoping and other leaders focused on market-oriented economic development and by 2000 output had quadrupled. Economic development has been more rapid in coastal provinces than in the interior, and approximately 200 million rural laborers and their dependents have relocated to urban areas to find work. One demographic consequence of the "one child" policy is that China is now one of the most rapidly aging countries in the world. For much of the population (1.3 billion), living standards have improved dramatically and the room for personal choice has expanded, yet political controls remain tight. China is a member of the United Nations Security Council.

Overview of Biodiversity

Being one of the megadiverse countries, China is home to approximately 6,347 species of vertebrates, including 581 animal, 1,244 bird, 376 reptile, 284 amphibian, and 3,862 fish species. Well-known among them are giant panda, golden monkey, South China tiger, Tibetan antelope, baiji and Chinese alligator. China has more than 30,000 higher plants, ranking third in the world.

- CBD Country Profile
- Earth Trends Country Profile on Biodiversity and Protected Areas
- Conserving China's Biodiversity Website

Legislation relating to IAS

- *The PRC Domestic Animals Epidemic Prevention Regulation and PRC Plant Quarantine Regulations* were issued in 1983 and revised in 1992.[2]
- The Quarantine Law on Import and Export of Animals and Plants[11]
- The Protection Law for Wildlife[11]
- The Forestry Law of the P.R. China (1991)[10]
- Regulations of Forest Pest Insect and Disease Control (1998).[10]

Government Agencies/Programs/Ministries dealing with IAS

- Ministry of Environmental Protection
- Ministry of Forestry
- Ministry of Agriculture

Major Invasive Alien Species[3]

Achatina fulica (mollusc)
Ageratumm conyzoides (plant)[2]
Alternanthera philoxeroides (plant)
Alternanthera pungens (plant)[2]
Amaranthu spp. (Plant)[2]
Ambrosia artemisiifolia (herb)
Ampullaria gigas (mollusks)[2]
Anser Canadensis (bird)[2]
Aristichthys nobilis (fish)[2]
Blattella germanica (Insects)[2]
Bursaphelenchus xylophilus (nematode)
Cacacatua sulpurea (bird)[2]
Cactaceae spp. (plant)[2]
Ceratocystis fimbriata (fungi)[2]
Chenopodium ambrosioides (plant)[2]
Conyza spp. (plant)[2]
Dendroctonus valens (insect)
Eichhornia crassipes (aquatic plant)
Erigeron annuus (plant)[2]
Eriosoma lanigerum (insects)[2]
Eupatorium adenophorum (plant)[2]
Eupatorium cannabinum (herb)
Gambusia affinis (fish)
Hemiberlesia pitysophila (insect)
Hyphantria cunea (insect)
Lantana camara (shrub)
Liriomyza sativae (insects)[2]
Lissorhoptrus oryzophilus (insects)[2]
Lolium temulentum (plant)[2]
Mikania micrantha (vine, climber)
Myocastor coypus (mammal)
Ondatra zibethicus (mammal)[2]
Opogona sacchari (insects)[2]
Oracella acuta (insect)
Pancreatic Necrosis Virus (fish diseases)[2]
Perca fluviatilis (fish)
Periplaneta americana (insects)[2]
Phylloxera vitifolii (insects)[2]
Plantago spp. (plant)[2]
Pomacea canaliculata (mollusc)
Procambius clarkia (crustaceans)[2]
Pseudorasbora parva (fish)[2]
Rattus norvegicus (mammal)
Rattus tanezumi (mammal)[2]
Setaria verticillata (grass)
Solanum aculeatissimum (plant)[2]
Solidago altissma (plant)[2]
Sorghum halepense (grass)
Spartina anglica (plant)[2]
Technomyrmex albipes (insect)
Termitidae spp. (insects)[2]
Tradescantia spathacea (herb)
Trihoglossus haematotus (bird)[2]
Triodanis (plant)[2]

Native Species Exported/Introduced to Non-Native Environments [3]

Abelmoschus moschatus (herb, shrub)
Acanthogobius flavimanus (fish)
Acer ginnala (tree)
Adelges tsugae (insect)
Agrilus planipennis (insect)
Ailanthus altissima (tree, shrub)
Alternanthera sessilis (herb)
Ampelopsis brevipedunculata (vine)
Anoplophora glabripennis (insect)
Aristichthys nobilis (fish)
Asterias amurensis (sea star)
Aulacaspis yasumatsui (insect)
Azolla pinnata (aquatic plant)
Bromus inermis (grass)
Butomus umbellatus (aquatic plant)
Carassius auratus (fish)
Caulerpa taxifolia (algae)
Celastrus orbiculatus (vine, climber)

Channa marulius (fish)
Charybdis japonica (crustacean)
Cirsium arvense (herb)
Corbula amurensis (mollusc)
Corvus splendens (bird)
Cryphonectria parasitica (fungus)
Ctenopharyngodon idella (fish)
Cyprinus carpio (fish)
Dioscorea oppositifolia (herb, vine, climber)
Elaeagnus pungens (shrub)
Elaeagnus umbellata (tree, shrub)
Eriocheir sinensis (crustacean)
Fallopia japonica (herb, shrub)
Frangula alnus (shrub)
Harmonia axyridis (insect)
Herpestes javanicus (mammal)
Houttuynia cordata (aquatic plant, shrub)
Leuciscus idus (fish)
Limnophila sessiliflora (herb)
Lotus corniculatus (herb)
Lutjanus kasmira (fish)
Panicum repens (grass)
Perna viridis (mollusc)
Pyrus calleryana (tree)
Rubus niveus (shrub)
Sagittaria sagittifolia (aquatic plant)
Tinca tinca (fish)
Tomicus piniperda (insect)
Tridentiger trigonocephalus (fish)
Typha latifolia (aquatic plant)

Table 1 Actions to prevent, detect and manage IAS categorized into three themes: biodiversity, human health, and economic

Note: Actions (such as projects, publications and programs) are classified according to the most obvious theme but may also fit into the dimensions of another.

Theme	Action
Biodiversity	• Conserving China's Biodiversity a combined effort of the Wildlife Conservation Soceity and Insitutie of Zoology. Compiled a list of Invasive Alien Species in China. • In the Conservation of the Eco-Environment section of China's Guidelines on Information Disclosure for Ministry of Environmental Protection, the management of biological safety includes the "management over environmental safety of alien invasive species." • In 2002, the impact of IAS towards biodiversity became more of a serious issue. IAS such as water hyacinth, smooth cord-grass, crofton weed, mile-a-minute weed, have made seriously damaged China's biodiversity and eco-environment and caused enormous economic loss.[9] As such, in successive years the Report on the State of the Environment in China included a section on "Prevention and Control of the Invasion of Alien Species"(see following 3 bullet points). • In 2003, the Ministry of Agriculture established the "Office for the Management of Invasive Alien Species" and the "Center for the Prevention and Control of Invasive Alien Species". Experimental projects were implemented in Liaoning Province, Kaiyuan City (Yunnan Province), Tengchong County (Yunnan Province), Xichang City (Sichuan Province), Ningnan City (Sichuan Province), and Renhe District of Panzhihua City (Sichuan Province) to eliminate invasive alien species such as bitterweed and crofton weed. 8 million people participated in activities for eliminating

	bitterweed anc crofton weed. 19.2 billion bitterweeds had been elimated on 860,000 hectares. In key areas, the elimination rate of bitterweeds was over 80%. 4,000 hectares of crofton weed had also been eliminated.[8] • In 2005, the Ministry of Agriculture formulated and issued the *Contingency Plan for Major Agricultural Incidents Concerning Harmful Species and Alien Invasive Species*, collected the information and data of over 300 alien invasive species, established the database of alien invasive species in China and compiled the *Catalogue of Major Agricultural and Forest Alien Invasive Species in China*. In addition, the ministry also conducted adaptability risk assessment of 10 major potential invasive species. It carried out the demonstration of comprehensive technologies on the prevention and control of 8 invasive weed species and four invasive insects, continued the initiative of wiping out alien invasive species in 100 counties of 10 provinces by mobilizing more than 10 million person/time to carry out concentrated wiping out of such weeds as purple-stem *herba lycopi*, ragweed, *alternanthera philoxeroides* and little-blossom caltrop. As a result, the above mentioned plants were eliminated on over 20 million mu of land or waters.[5] • In 2006, the Ministry of Environment carried out investigations on the invasion of hazardous alien species in 26 national nature reserves across China. The findings show that there is such invasion in all 26 nature reserves with total 131 species. Low latitude regions such as islands and tropical areas are subject to relatively severe threats with more invasion species. And high latitude regions have lighter threats with less invasive species. At present, Crofton weed (Eupatorium adenophorum Spreng) is still the most hazardous alien species in Southwest China. The Ministry of Agriculture continued the organization and implementation of Elimination of the Hazardous Alien Species in 100 Counties of 10 Provinces, focusing on collective elimination of 8 species of alien plants with severe threats including Ambrosia artemisiifolia L.,Solidago Canadensis and crofton weed with 14.43 million mu (15 mu = 1 ha) of such plants destroyed and 530,000 mu demonstration sites on comprehensive prevention and control of such plants established. [7] • 3.5.1 Endemic Fish Species in the Upper Reaches of the Yangtze River: In the spring and autumn of 2006, two field investigations were carried out in such river sections of the upper reaches of the Yangtze River as Panzhihua, Yibin, Hejiang, Mudong, Fuling, Wanzhou and Yichang with catch of 127 fish species. 28 of them were endemic fishes in the upper reaches of the Yangtze River. 6 of them were invasive alien species including Acipenser schrencki, Tincaeus, Letalurus Punetaus, Letalurus melas, Microptorus salmonoides and Tilapia mossambica. Acipenser schrencki was discovered for the first time in Panzhihua section of the river. Apart

	from some change of the catch mix in Wanzhou section of the river, there was no obvious change of the catch fish mix in other sections of the Yangtze River compared with that of 2005.[6]
Human health	• *The PRC Domestic Animals Epidemic Prevention Regulation and PRC Plant Quarantine Regulations* compiles lists of epidemic and parasitic diseases of animals imported from other countries into the PRC, a list of animals, animal products and other quarantine goods which are forbidden to be carried or mailed into the PRC, a species list of dangerous diseases, insects and weeds; a named list of prohibited goods for importation was issued by Ministry of Agriculture in 1993 (Yu Dahai and Cui Yanlin, 1997; Liu Yuanzhi, *et al*., 1998). However, all these laws and regulations are for quarantine of diseases, pests and weeds. Laws or regulations do not presently exist to prevent damage to local ecosystems and native species from invasive species. Such laws are needed and should be promoted. For example, a possible approach would be to prohibit large-scale use of non-indigenous species until small-scale trials of several generations show no signs of threats to local ecosystems. Legislation is also needed to restrict use of alien species in protected areas, and to encourage the use of domestic species in reforestation programmes.[2] • To prevent the diseases like mad cow and mouth-foot from entering China, the Chinese government has launched sets of official notifications to forbid direct and indirect import from those countries that suffer from "mad cow diseases" of cow, cow embryo, sperm, beef and the beef products and ruminant foodstuff. It is forbidden to import the artiodactyl and its products from those countries with foot and mouth diseases. Strict quarantine controlling work has been undertaken to those passengers and goods that come from the "epidemic areas". These regulations have played an important role in prevent those pathogens getting into China in the emergent situations.[11]
Economic	• In 1993, the Ministry of Agriculture included the rubber termite in its Species List of Dangerous Diseases, Insects and Weeds and Name List of Goods Forbidden to Import.[2] • A preliminary study of the economic losses in China from IAS estimates them to be $14.5US. "Although China has begun to recognize biological invasions as severe environmental problems and has provided some funding to support the research and management of these species (Xia 2004), a national campaign against bioiogical invasions is stiñ in its infancy. For most local governments, the prime goal is GDP growth, not environmental protection; invasive species are largely ignored. […]The enactment and strict enforcement of national quarantine regulations are particularly important for preventing the entry of invasive alien species into China and their inland dispersal, as well as for

	controlling already firmly entrenched invaders in the country. […]Worthy goals would include minimizing costly belated campaigns, such as Beijing's current war on the American webworm, and combating new biological invaders at the outset, rather than after they have extracted a heavy economic and environmental toll."[4] • Facing with all those damages caused by the alien invasive species, China has strengthened the management over quarantine systems to prevent the invasion of alien species. There are over 200 quarantine departments established at the ports, which formulate a comparatively complete supervision and monitoring network. For example, after the Sino-US Agreement on Agriculture Cooperation has been signed by the two governments, China has been seriously implement this Agreement by conducting strict quarantine work over wheat and other grains. In addition, China has also established the approval procedure and system on aquatic and terrestrial wildlife. [11]

Table 2 Actions on IAS in cooperation with other countries

Agreement/ Organization	Countries/ Member	Action
Sino-Japan Friendship Center for Environmental Protection	China and Japan	It is a platform for Sino-Japan environmental protection, international environmental exchanges, opening up to the society, and for providing management and technical supports to SEPA. Its work fields covers the following areas, including research on environmental policies, environmental publicity and education, management of environmental information, study on and services for analyzing and testing technologies, research and manufacturing of samples for environmental standards, management of solid wastes, environmental impact assessment, environmental certification, and study and exchanges on international environmental issues. [IAS not mention directly]
Japan-China Comprehensive Forum on Environmental Cooperation	China and Japan	Environmental cooperation between Japan and China is conducted not only between the two governments but also involves various implementation bodies, such as private enterprises, local governments, academics and NGOs. Japan-China Comprehensive Forum on Environmental Cooperation was first held in May 1996 to provide a forum for comprehensive dialogue to further promote collaboration between the parties

		concerned. The Forum has since been held regularly, greatly contributing to the progress of environmental cooperation between Japan and China, by tostering among others, common awareness of the challenges for environmental cooperation between the two countries. [IAS not mention directly]
Northeast Asian Conference on Environmental Cooperation	China, Japan, Mongolia, Russia, South Korea along with experts from UNEP, UNDP, and UNESCAP participating as observers.	This conference has been held annually since 1992 to exchange views and policy dialogue among environment experts and for deeper discussions on environmental cooperation in the region. In the 13th NEAC, held in Seoul, Korea in December 2004, a symposium on Air Quality Management Policy in Metropolitan Area was held, and discussions covered three subjects: Species Restoration, Ecological Restoration in Local Government, and Sustainable Management of Industrial Complexes. [does not specifically mention IAS]
Asia-Pacific Forest Invasive Species Network	Australia, Bangladesh, Bhutan, Cambodia, China, Fiji, India, Indonesia, Japan, Republic of Korea, Laos, Malaysia, Maldives, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, US, Vanuatu, Vietnam, Tuvalu, Kiribati, France, and Russia	The APFISN has been established as a response to the immense costs and dangers posed by invasive species to the sustainable management of forests in the Asia-Pacific region. It is a cooperative alliance of 32 member countries of the Asia-Pacific Forestry Commission (APFC). The network operates under the umbrella of APFC which is a statutory body of the Food and Agricultural Organization of the United Nations. The APFISN focuses on inter-country cooperation that helps to detect, prevent, monitor, eradicate and/or control forest invasive species in the Asia-Pacific region. 1. Raises awareness of FIS throughout the Asia-Pacific region 2. Exchanges and shares information on FIS among member countries 3. Facilitates access to technical expertise, research results and training and education opportunities 4. Strengthens capacities of member countries to conduct research, manage FIS and prevent new incursions Develop strategies for regional cooperation and collaboration in combating threats posed by FIS Forest Invasive Species: Country Report- P.R. China (see case study section below)

Case Studies

Forest Invasive Species: Country Report- P.R. China[10]

II. Status of the forest pest in China

Forest diseases and insect pests is one of important disasters. People think it as non-smoking forest fire. There are complex climates, various locations and abundant vegetations in China. All of these constitute diverse forest ecological environments. And because diverse environments may produce sorts of germs, insects and rats, they are harmful to people's survival. According to the results of the National Forest Disease and Insect Pests Inventory, there are over 8000 known forest pest insects, disease and rodents in the country, among which there are 5020 species of forest pests, 2918 species of diseases and about 160 species of rats respectively. For the time being, there are about 100 species of plant disease and insects pests leading to disasters in the whole China. According to statistics, the damaged area of forest pests has increased several-fold every 10 years from 1950's to 1980's. Forest diseases and insect pests annually occurred in an area about one million ha in 1950's. Since1980's, the damaged area was not less than 6.67 million ha, and the largest damaged area was up to 11 million ha. In recent decade, forest diseases and insect pests also occurred above 8 million ha every year.

[…]

IV Strategies and policies for management of forest pest invasions

1. Plant quarantine is the first line of defense against introduction and managing of exotic or invasive pests and diseases by regulating the flow of plant materials.
2. Quarantine controls on the entry of plants and plant products at the border, and quarantine policy based on risk assessment, are designed to identify and minimize the threats to China forests and forest industries from incursions of exotic pests.
3. Develop, strengthen or introduce new legislations or regulatory procedures regarding quarantine, inspection, intentional introduction of plants or animals with more attention to risk assessment before approval and follow-up monitoring after introduction.
4. Carry out monitoring survey for early detection of dangerous pest, and develop early-warning and response systems for invasive species.
5. Strengthen both basic and applied research on invasive species.
6. Raise public awareness of invasive species threats to conservation.

Invasive Species in China -- An Overview

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Abstract
China is a vast country with rich biodiversity, which makes China especially vulnerable to invasive species. It has a long history of introduction of non-native species, especially those with perceived beneficial impacts. Its rapid economic development, including an explosive growth in international trade and transportation, has increased the potential for new introductions. Currently, alien species are widespread in the country; occur in may ecosystems; represent most

major taxonomic groups; and are introduced unintentionally as well as intentionally for cultivation. The paper lists various cases of invasive species which have caused significant threats or damages to local natural or artificial ecosystems, and indicates that two example industries (fresh water fisheries and lawn grasses) have brought or tend to bring in many invasive species and hence have caused or will cause changes and loss of biodiversity in local ecosystems. Based on these studies, it is suggested that China combat the problem through enhancing awareness, development of a database on invasive species, strengthening international co-operation, preparing case studies and introducing the necessary legislation, regulations and monitoring.

References

1. Country descriptions are compiled from the Central Intelligence Agency's World FactBook, available at https://www.cia.gov/library/publications/the-world-factbook/, and Wikipedia: The Free Encyclopaedia, available at http://en.wikipedia.org/wiki/Main_Page.
2. XIE Yan, LI Zhenyu, William P. Gregg, LI Dianmo. (2000) "Invasive Species in China—An Overview." *Biodiversity and Conservation* 10(8):1317-1341. Retrieved 2 February 2008, from http://www.chinabiodiversity.com/shwdyx/technical-report-e/x-1e.htm
3. Global Invasive Specie Database. (no date) "China." Retrieved 2 February 2008, from http://www.issg.org/database/species/search.asp?sts=sss&st=sss&fr=1&x=0&y=0&sn=&rn=china&hci=-1&ei=-1&lang=EN
4. Ding, Jianqing, Richard N. Mack, Ping Lu Mingzuan Ren, and Hongwen Huang. (2008) "China's Booming Economy is Sparking and Accelerating Biological Invasions." *BioScience* 58(4): 317-324.
5. China Ministry of Environment. (2005) "Report on the state of the Environment in China" Retrieved 2 February 2008, from http://english.mep.gov.cn/standards_reports/soe/soe2005/200708/t20070828_108515.htm
6. China Ministry of Environment. (2008-02-18) "Chapter 3 State of the Natural Ecological Environment" Retrieved 2 February 2008, from http://english.mep.gov.cn/standards_reports/threegorgesbulletin/Bulletin_2007/200802/t20080218_118242.htm
7. China Ministry of Environment. (2006) "Report on the state of the Environment in China" Retrieved 2 February 2008, from http://english.mep.gov.cn/standards_reports/soe/SOE2006/200711/t20071105_112560.htm
8. China Ministry of Environment. (2003) "Report on the state of the Environment in China" Retrieved 2 February 2008, from http://english.mep.gov.cn/SOE/soechina2003/biodiversity.htm
9. China Ministry of Environment. (2002) "Report on the state of the Environment in China" Retrieved 2 February 2008, from http://english.mep.gov.cn/SOE/soechina2002/biodiversity.htm
10. Asia-Pacific Forest Invasive Species Network. (no date) "Forest Invasive Species: Country Report- P.R. China" Retrieved 2 February 2008, from http://apfisn.net/country_report/China.pdf
11. Biodiversity Clearing-House Mechanism of China. "Invasive Alien Species." Retrieved 2 February 2008, from http://english.biodiv.gov.cn/rdwt/200603/t20060323_30675.htm