

WWF Project Technical Report

China Herpetological Conservation Action Plan

I: Amphibians



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Target 1. Establishing an Institution for the China Amphibian Conservation Action Plan

China, encompassing both Palaearctic and Oriental ecozones, is geographically, climatically and ecologically diverse. There is a rich species diversity of amphibians, many of which are commercially valuable. The study of China's amphibians has important scientific and social interest, with almost one hundred institutions being currently involved in related studies, and more young scholars entering this field of study. Regardless of this heightened interest, there remains a lack of coordination between the application of scientific research and the implementation of conservation action. This is an issue that the Amphibian Specialist Group (ASG) China Region, established in 2005 by the International Union for Conservation of Nature (IUCN), continually aims to redress. Whilst there is only a limited resource base for amphibian research and conservation, due to the lack of unity between organizations, much manpower and funding is wasted on the repetition of studies in the same regions. There is an urgent need, therefore, to consolidate the work of different organizations and individuals. By compiling important information such as the distribution and conservation status of China's amphibians, it will be possible to delineate units for conservation prioritization, direct research effort, and effectively designate funding.

1.1 Introduction

In recent years, research on amphibians has become increasingly popular. However there is a distinct lack of organization to coordinate efforts for their protection. Prior to the ASG – China Region, China's Reptile and Amphibian Specialist Group was established under the World Conservation Union Species Survival Commission (IUCN SSC). The specialist group conducted a number of biological surveys, publishing reports on amphibian and reptile biodiversity and effectively promoting research and conservation interest for the herpetofauna in the region. Unfortunately the conservation action plan provided by the group was not effectively implemented, with the Chinese group of Declining Amphibian Populations Task Force (DAPTF) only carrying out the recommended conservation actions for a few species. The DAPTF's failure to perform incentivized those in charge of the two organizations (Zhao Ermi, Fang Zili, Li Pipeng, Wang Yuezhao, Shi Haitao) to assess the challenges involved in the coordination of amphibian conservation, and resulted in a systematic and comprehensive evaluation of 398 amphibian species. The project entitled the "Global Amphibian Assessment - East Asia", was organized by Conservation International (CI) and implemented in 2002.

In addition to the GAA, with the financial support of the government's Wildlife Authority, the China Wildlife Conservation Association, WWF, the Ocean Park Conservation Foundation - Hong Kong and other NGOs, research has been conducted on some of the regions critically endangered and endangered species. Furthermore, increased funding has allowed for extensive biodiversity surveys in some ecologically important areas of the region, such as Hengduan Mountain, Hainan, Tibet and the Lingnan region. Currently, conservation action plans for *Andrias davidianus*, *Echinotriton chinhaiensis*, *Tylototriton wenxianensis*, *Hynobius amjiensis* and *Odorrana wuchuanensis* are in progress.

In 2005, the World Conservation Union Species Survival Commission (IUCN SSC) set up Amphibian Specialist Group (ASG) and ASG-China Region to target at amphibian conservation. In 2008, the conference for the China Amphibian Conservation Action Plan was held with the support of CI. The conference covered topics including the prioritization of protected areas and species, Amphibian Ark, biodiversity surveying and monitoring, disease control and resource management. Li Pipeng, Xie Feng, Wang Yuezhao, Jiang Jianping, Liu Huining, and Li Yiming were commissioned as the drafting committee of the Action Plan. Following this conference, in August 2010, a follow up meeting held in Guilin, brought together committee members and herpetologists. It was here that the China Amphibian Conservation Action Plan was initiated and formulated.

To ensure the action plan can be effectively implemented, there is an urgent need to establish a secretariat. The secretariat would be responsible for strengthening communication and collaboration among Chinese conservationists, researchers and scientists as well as aiding in the coordination and implementation of the action plan. The secretariat will function as a central body for regional amphibian conservation, providing a communication platform for foreign researchers and ecotourism practitioners, collaborating with NGOs on conservation projects, offering expertise and support for local governments and management authorities and organizing nationwide amphibian conservation education campaigns.

1.2 Responsibilities of the Secretariat

In order for researchers, NGOs and funding agency to establish a close connection and develop the conservation plan under the support of government, a high level of organization and coordination is required. Additionally, a key function of the secretariat would be the promotion of amphibian conservation through education. Education is an important aspect to sustain conservation work as it raises and maintains awareness and encourages public participation.

To ensure the proper organization and coordination of amphibian conservation strategies, the secretariat would be responsible for communicating with governmental and non-governmental organizations, collaborating with the IUCN SSC ASG to develop projects in China, and most importantly provide a means of communication between researchers and conservation practitioners.

The major responsibility of the secretariat includes 1) coordinating conservation projects and scientific research relating to amphibians in China, 2) assisting the implementation of conservation planning, 3) communicating and coordinating with governmental and non-governmental organizations, 4) working on education and the popularization of science, 5) communicating with IUCN SSC ASG directors and secretaries.

1.3 Public Education

There is limited awareness among the general public concerning the importance of amphibians in their natural environment. Many people believe that most amphibians are dispensable, and undeserving of attention or special concern. Although it is difficult to change this mindset, with effective education campaigns it is possible to improve the public's perception of amphibians. For example, the "2008 Year of the Frog" awareness campaign focused amphibian conservation and greatly contributed to educating the public on the issue. The publication of books such as the "Atlas of Amphibians of China" and the "Colored Atlas of Chinese Amphibians" in conjunction with increased media coverage has introduced China's rich amphibian biodiversity to the general public and improved their awareness of the benefits of protecting them. With Taiwan and Hong Kong being relatively more advanced in terms of popular science publications and education, mainland China should be the primary focus of further educational initiatives.

Through collaborating with the government, NGOs, publishers and amphibian specialist, the secretariat will be required to compile popular science books and educational literature aimed at the general public. The secretariat will also be expected to organize training workshops, seminars and symposiums for school teachers, conservation practitioners and young hobbyists to promote the importance of amphibian conservation in China.

1.4 Building a Network with NGOs

Amphibian conservation has begun to receive increasing attention from the Chinese government as well as NGOs such as WWF and the ASG. By networking with NGOs, amphibian conservation in China will remain consistent with international practice. Additionally, through the collaboration of conservation practitioners and researchers, a general consensus can be arrived upon concerning the prioritization of conservation work.

Currently, the China Herpetological Society, led by the China Association for Science and Technology, is the only academic institution that specializes in herpetological research. Many of its members have collaborations with NGOs. It is important for conservation planning as a whole to have the secretariat to coordinate and keep conservation organizations informed about current scientific developments. Developing links with researchers will be a crucial aspect of the secretariat's work. It is becoming a pressing need to have a secretariat to coordinate and provide crucial information for researchers, to designate new protected species and protected areas.

1.5 Establishing an online database of amphibians of China

Besides a large number of journal articles on amphibian research being published each year in China, there is also a substantial amount of newly acquired amphibian DNA sequences. This, in addition to data from academic theses and digital photos of amphibians taken by interested parties, is a significant source of data and information. However, this valuable data cannot be effectively utilized by researchers and conservation practitioners due to a lack of an appropriate information sharing platform. China, as a developing country, should aim to utilize these valuable resources more effectively.

It is advisable to commission the Chinese Academy of Science, the Chengdu Institute of Biology and the Herpetological Museum to establish a website that includes the following: 1) archives of relevant published papers, 2) a database with photos and/or videos of specimens and live animals, 3) direct linkage to Genbank to facilitate the search of DNA sequences and barcoding data, 4) a database containing information on the distribution and natural history of China's amphibian species, with a linkage to AmphibiaWeb, GAA and REBIOMA, 5) a database containing frog call recordings, 6) graduate theses about amphibians of China.

1.6 Problems

Over recent years amphibian research in China has dramatically increased. However, there remains a lack of effective planning and coordination between the government, NGOs and researchers. An institution is urgently needed to redress this problem and to provide a full assessment of the status of the regions amphibians..

1.7 Action Plan

The Action Plan Secretariat should be formed by outstanding amphibian researchers and social activists, by recommendations from organizations such as the IUCN, CI, ASG China Region and WWF. The responsibility of the secretariat will be to advise the government on how best to adopt the amphibian conservation action plan, whilst ensuring financial aid from NGOs to support amphibian conservation projects.

Target 2. The survey and inventory of native amphibian species in China

2.1 Introduction

As documented in “Amphibian Species of the World” in December, 2010, there are approximately 430 species of amphibian in China, making it the most amphibian rich country in the Old World and putting it among the most diverse countries in the world in terms of amphibian taxa. Additionally there is a high degree of endemism in the region, with 66 percent of all China’s amphibians (230 species) being endemic. The biota of China is ancient and complex and is home to many ancient amphibians, such as the "living fossils" *Andrias davidianus* and *Hynobius amjiensis*.

In the early 20th century, Chinese scientists began to collect amphibian specimens and conduct taxonomic research. Researchers at the Chengdu Institute of Biology and the Kunming Institute of Zoology carried out nationwide studies, while other research institutions and universities completed a large amount of field work and classification work on a regional scale. Since the 1980s, many provincial records have also been published. Since 2002, three volumes of ‘Fauna Sinica: Amphibia’ have been published in China. This series of books includes individual studies of 353 species of amphibian from 11 families of Caudata, Gymnophiona and Anura. The series also describes six newly recognized species of Caudata. Additionally, the “Colored Atlas of Chinese Amphibians” published in 2010, documented approximately 370 species and subspecies of Chinese amphibian. Thus far, the survey and inventory of Chinese amphibians has resulted in significant scientific advancements, with research continuing to progress.

The majority of amphibian specimens that have been collected in China are stored in the Chengdu Institute of Biology and the Kunming Institute of Zoology. However, there are a considerable amount of specimens, including some of great scientific importance, that are housed in other research institutions and universities. Currently, due to the absence of a national amphibian database, there is no platform to share this information. Additionally, many universities and research institutions lack adequate funding to ensure the proper storage of specimens. There are also cases where, following the departure of researchers, collections have become scattered and specimens poorly managed. Although the Chinese Academy of Sciences and the Ministry of Education highly values specimen management and provides

funding for the organization and inventory of specimens, the development of amphibian specimen management and related work in colleges and universities remains inadequate.

From the 1950s to the 1980s, Liu Chengzhao and his colleagues organized large-scale field investigations of Chinese amphibians. Similarly, provincial and regional records were also being collected in an attempt to develop preliminary investigations into the establishment of conservation areas. In recent years, numerous studies of amphibian diversity have been conducted in the biologically important regions of Tibet, Hainan Island, Mount Wuyi and the Nanling and Wuling mountains. Despite these efforts, some important areas remain to be thoroughly surveyed. With the advancement of amphibian taxonomic and theoretical studies, it is clear that a substantial number of unrecognized species in biodiversity-rich areas such as southern China are yet to be discovered.

2.2 Problems

The inventory of information regarding Chinese amphibians has a short history. There is a lack of baseline data for many species and the collection and storage of specimens is still limited. Additionally, a number of newly discovered species and genera, along with information regarding their distribution, are yet to be catalogued in the “Fauna Sinica: Amphibia”. There is also an inconsistency in the usage of scientific and Chinese names, insufficient digitalized biological information and low levels of information sharing via networks and a lack of taxonomic research, training and funding.

2.3 Action Plan

Action 2.1 The Compilation of a national survey of amphibians and the investigation and inventory of species

By collating data garnered from holotypes and other existing specimens situated in various colleges and universities and through the implementation of nationwide surveys of amphibians and their habitats, a comprehensive inventory of known and newly discovered species can be compiled. This inventory should include the common and scientific name of each species as well as their abundance and geographical distribution. By consolidating local records and establishing the status of the nation’s amphibian populations, monitoring and management mechanisms can be implemented more efficiently and a national reporting system can be formed to provide scientific evidence for the sustainable conservation of amphibians in China.

Action 2.2 Constructing a digital museum of amphibian specimens and a platform for information sharing

By constructing a national museum for amphibian specimens modeled on that of the Chengdu Institute of Biology, a comprehensive and effective information and specimens sharing platform among research institutions and universities can be created. The collection, which would ideally be located at the Herpetological Museum of the Chengdu Institute of Biology, should also be accompanied by an online inquiry services. The collection should be set up in accordance with international technical standards and regulations. In conjunction, a digital database should also be generated. The database should include photographs of each specimen along with information relating to their habitat requirements and distribution. This again will aid in the sharing of information whilst enabling the statistical analysis of amphibian specimen data.

Action 2.3 Collecting amphibian auditory information and tadpole specimens to get complete species information

Collecting call information of anurans and tadpole specimens, standardizing terminologies for descriptions, completing and digitally processing the auditory information of anurans and tadpole specimens, supplementing the constructions of museum and information platform.

Target 3. The assessment of the conservation status of amphibians in China

3.1 Introduction

In 1989, in accordance with the “Law of the People’s Republic of China on the Protection of Wildlife”, the State Council authorized the compilation of a “List of Wild Animals under State Protection” which was issued by the State Forestry Administration and the Ministry of Agriculture. Amphibians that appear on this list and thus receive special state protection include: *Andrias davidianus*, *Tylotriton verrucosus*, *T. asperrimus*, *T. chinhaiensis*, *T. kweichowensis*, *T. taliangensis* and *Hoplobatrachus rugulosus*. In 1998, the Ministry of Environmental Protection and the Endangered Species Scientific Committee of the People's Republic of China published the “China Red Data Book of Endangered Animals - Amphibia and Reptilia”, which lists 29 species of amphibian of 8 families from 3 orders. In 2000, the State Forestry Administration issued a “List of terrestrial wildlife under state protection, which are beneficial or of important economic or scientific value”. The list includes 291 species of 10 families from 3 orders of amphibian. In 2002, with the support of the IUCN and CI, a preliminary assessment of the threatened status of amphibians was completed, the resultant “China Species Red List (Volume I)” was published in 2004 and includes information on 321 species of 11 families from 3 orders. In 1995, the State Forestry Administration initiated a terrestrial wildlife survey that included the compilation of information on several important amphibian species.

The study of amphibian species diversity and their distribution along with the monitoring of known populations is the basis of amphibian conservation. A plethora of recent studies reveal that many species of amphibian are confronted by the pressures of overexploitation and environmental change, with the most severe declines being due to habitat fragmentation, loss and degradation. There is a need to survey and continually assess the effects of these factors on amphibian diversity, population size and richness through the participation of researchers in the field of amphibian conservation and diversity.

China, which covers a vast territory and spans both the Palaeartic and Oriental ecozones, is rich in amphibian diversity. It is therefore important to monitor and assess the status of some key amphibian species, including species of economic value, rare and endangered species and endemics, as well as those from numerous important and representative areas.. Of Particular importance is the Oriental realm, which encompasses a large proportion of the mainland as well

as major islands such as Hainan Island and Taiwan. This ecozone contains some significant biodiversity hotspots that extend from east to west.

Due to the highly diverse range of habitat requirements and life history traits displayed by amphibians, a variety of monitoring and assessment techniques must be employed. This is particularly so for frogs inhabiting forested areas. Until knowledge is acquired concerning the breeding seasons and stages of tadpole development for such species there will remain a dearth of valuable biological information. It is pivotal to take from and make reference to the methodologies of relevant action plans adopted overseas in order to establish assessment and detection standards for different amphibian populations in China. Commencing regular rapid detection and assessment programs is important to achieving this goal.

3.2 Problems

As China is one of the richest countries in terms of biological diversity and natural resources, the endangered status of biological resources is relatively complex and thus the assessment standard of IUCN does not entirely suit the situation in China. It is therefore necessary to learn from the assessment standards of IUCN and others like it to improve the evaluation system of the survival status of amphibians in China. Studies of amphibian population dynamics and the collection of monitoring data are seriously lagging behind and lack standardized investigation and monitoring procedures. It is likely that amphibians will continue to suffer due to factors such as environmental change, land transformation and infectious disease; therefore we would expect to see the emergence of newly threatened species in the future. Almost 10 years have elapsed since the completion of the first Red List of Amphibians in 2002, hence, there is a need to update this list as soon as possible. There is also a lack of dynamic monitoring and assessment of the survival status of 7 species in the “List of Wild Animals under State Protection”. Additionally, there is a need to survey and evaluate rare and endangered species inhabiting areas of biological importance and areas experiencing relatively severe habitat destruction.

3.3 Action Plan

Action 3.1 Establishing a scientific evaluation system of the conservation status of amphibians, and assessing the survival status of amphibians

To ensure the proper protection of amphibians in China, the selection process and protection standards for endangered species must be formulated in conjunction with the “IUCN Red List Categories and Criteria”, whilst taking into consideration the current situation in the region. By evaluating the survival status of amphibian’s endemic to the region and those considered to be rare and endangered it will be possible to prioritize species and genera for conservation effort. Additionally, it is important to thoroughly investigate and assess those species that occur in areas that have undergone extreme habitat degradation.

Action 3.2 Assessing the conservation status of species under special protection

Standardized, monitoring techniques and investigative procedures are needed to enable the commencement of a nationwide assessment of the conservation status of amphibians under special state and provincial protection. Such assessments must continually monitor population dynamics and assess the effectiveness of any recommended conservation activities being carried out.

Action 3.3 Updating the “China Species Red List” for amphibians

In accordance with the monitoring and assessment results of species survival status, updating the records of species and their endangered status in the “China Species Red List” before 2015 must be carried out. Additional information acquired regarding those species discovered since 2002 should also be included.

Target 4. Monitoring and research of amphibian pathogen

4.1 Introduction

Amphibian populations are vulnerable to a number of bacteria and viruses. Prominent examples are that of rana virus and *Elizabethkingia meningoseptica* which are known to affect Chinese bullfrogs (*Hoplobatrachus chinensis*) under artificial breeding conditions. In Recent years, chytrid fungus (*Batrachochytrium dendrobatidis*) has received global attention due to its fatal impact on amphibian species around the world. Deaths of amphibians caused by this particular fungus have been widely reported in a variety of regions. However this problem has very rarely been considered in surveys carried out in China. Currently, due to the absence of effective treatments against the disease, the invasion of this fungus is a serious threat. The import of frogs and other fauna and flora, as well as materials for construction purposes, creates the means for a possible invasion. In addition, the changing climate could also facilitate the spread of this pathogen, increasing the risk of infection.

In Yunnan, the presence of chytrid fungus has already been reported by researchers. Infection has been noted in both non-native species (*Rana catesbeiana*) and local species (*R. pleuradan*, *R. chaochiaoensis*, *Odorrana andersonii* and *Bombina maxima*).

Chytrid fungus, which is capable of causing massive die-offs of amphibians, is one of the top three causes of global amphibian declines. Although the fungus was originally discovered in 1930 by scientists working on laboratory specimens, it was only confirmed to be a killer species of amphibians in 1998. Chytrid has been found to affect not only amphibians in Australia, America, Europe and Africa, but also native and non-native species in some Asian countries such as Japan, Indonesian and Korea.

4.2 Problem

Testing for amphibian pathogens has been largely neglected and there is a lack of systematic field survey studies. Without an amphibian population monitoring system in place, we lack effective preventative and curative measures. Additionally, within the amphibian trade, there is a distinct lack of quick and effective pathogen monitoring methods and skills.

4.3 Action Plan

Action 4.1 Commencement of amphibian pathogen testing and monitoring

On a national scale, testing for and monitoring of amphibian pathogens should be a main focal point, with particular attention being paid to *Batrachochytrium dendrobatidis*. Emphasis should be placed on both introduced and native species in provincial regions where artificial breeding of frogs is prominent. We will establish a long-term protocol for regular monitoring of the health status of amphibian populations, and devise effective preventative measures and contingency plans against outbreaks of amphibian pathogens.

Action 4.2 Establishment of amphibian pathogen monitoring centre

By utilizing the laboratory of Dr. Li Yi Ming located in the Chinese Academy of Sciences Institute of Zoology as a base, we will set up an amphibian pathogen monitoring center to establish quick and effective tests for amphibian pathogens. Additionally, it is important to train animal inspection personnel in related government departments, such as the Customs, to insure against pathogen outbreaks.

Target 5. Protection of important area displaying high amphibian diversity

5.1 Introduction

China has a vast land area with unique and rich biodiversity. One and a half of the world's 34 currently designated biodiversity hotspots occur within China's borders. In addition, the Chinese government has designated a further 17 areas as regional biodiversity hotspot having global conservation significance. Out of the 17 areas, 14 contain a high diversity of terrestrial species, including amphibians, and comprise approximately 400 protected areas. Some areas that occur within these regional biodiversity hotspots include the Hengduan Mountains northern and southern ranges, the Min Mountains, the Yunnan Xishuangbanna area, mountains within the Hunan, Guizhou, Sichuan and Hubei boundary, and the area between Zhejiang, Fujian and Jiangxi, Qin Mountains and Baekdu Mountains.

There are multiple areas in China that are biologically rich and unique in amphibian species diversity. These include the Tibetan Plateau eastern range to the Hengduan Mountains, the Qin Mountains, the Min Mountains, the Daba Mountains, the Wuyi Mountains, the Nanling Mountains, the Wuling Mountains, the Guangxi-Hubei-Yunnan boundary area and Hainan Island. In recent years a number of newly described species have been discovered in these areas. There is a need therefore to carry out comprehensive biodiversity surveys and implement conservation action plans in these biologically important areas.

5.2 Problems

An increase in public awareness concerning the conservation of biologically significant areas such as those mentioned above is required. Additional research relating to the conservation biology of amphibians found in these areas also needs to be improved. The completion of conservation status assessments for rare and endangered amphibian species should be a primary focus, especially in areas where anthropogenic disturbances, such as construction projects, pose a major threat to species survival.

5.3 Action Plan

Action 5.1 Enhancing the protection of amphibians in protected area

More scientific assessment and monitoring are needed in important areas. The level of protection can be enhanced by upgrading the category of protected area and extending management authority. More rare, endangered or endemic species should be included in the list of protected species in the protected area. Within protected areas, population and species restoration and rescue plans should be established. Areas which contain rare, endangered and endemic species of amphibian that are not yet officially protected should be assessed.

Action 5.2 Establish a scientific conservation system in important amphibian areas

When implementing amphibian conservation it is important to consider the biological characteristics of each species. Research should draw upon a plethora of disciplines, such as conservation biology, conservation genetics, amphibian ecology and biogeography. Through research, a scientific conservation system can be gradually established for biologically important areas in China.

Action 5.3 Assessing the impact on amphibians by economy development projects

Comprehensive Environmental Impact Assessments should be carried out when considering economy development projects within areas that contain rare or endemic species of amphibian. These assessments should include a mandate to ensure the implementation of ecological mitigation and restoration measures in an attempt to minimize the impacts of development projects on amphibian habitats. The effectiveness of such measures should be continuously monitored and assessed. Development projects that may result in the pollution of water bodies should be prohibited.

Action 5.4 Establishment of a conservation area for demonstration

It is recommended to establish a case demonstration of conservation on a certain species or population. A case demonstration such as this will increase management experience whilst promoting nationwide conservation action in other biologically important areas.

Target 6. Conservation and research on amphibian diversity in agricultural areas

6.1 Introduction

China, a vast country that is extensively cultivated for agricultural purposes, highly values the development of ecological agriculture. The country encourages the usage of biological pesticides and organic fertilizers for the management of farmland weeds, pest control and soil fertility, whilst developing national and local multi-level management and role models of ecological agriculture. Counties practicing ecological agriculture constitute in excess of 7% of agricultural land in China. China has also established approximately 320 state ecological demonstration areas, and has issued the standard of the construction of state ecological villages. Furthermore, organic farming and agricultural tri-dimension planting and cultivation systems are being developed. These measures have positive impacts on the protection of amphibians in agricultural land, especially in paddy fields.

Several laboratories in China have begun research into the effects of a variety of pesticides, insecticides and fertilizers on tadpoles. These studies are from the perspective of a diverse range of disciplines such as environmental toxicology, genetic toxicology, ecotoxicology and behavioral ecology.

6.2 Problems

A lack of awareness concerning biodiversity conservation in agricultural land, and the excessive use of pesticides, insecticides and fertilizers has resulted in a severe decline in farmland amphibian populations. The effects of different types of pesticides, insecticides and fertilizers on amphibians (especially tadpoles) remains poorly studied. Consequently, there is insufficient scientific evidence to support the appropriate dosages of these chemicals.

6.3 Action Plan

Action 6.1 Commencing a thorough research on the toxicological effects of pesticides, insecticides and fertilizers

In accordance with international standards and techniques of the toxicological research on pesticides, insecticides and fertilizers, and through the integration of zoological theories, studies

should be carried out to investigate the synergistic and long-term effects of single and multiple pesticide, insecticide and/or fertilizer use on amphibian population.

Action 6.2 Monitoring and studying the effects of the usage of pesticides, insecticides and fertilizers on the decline of amphibian populations

In agricultural regions such as the Yangzi River, the Zhujiang River and the Yellow River Delta paddy fields occupy the majority of these areas. There needs to be careful monitoring into the effects of pesticide, insecticide and fertilizer use on amphibian populations and on surrounding water and soil quality. In order to fully understand the effects of pesticides, insecticides and fertilizers on amphibians, results from indoor modeling experiments, field observations, toxicological experiments, and monitoring and assessment programs need to be integrated.

Action 6.3 Commencing the research and implementation of the control of amphibians on agricultural pests

Research is required into the effectiveness of introducing native species of frog and toad into agricultural areas as a method of natural pest control. This type of research, which should consider the ecosystem as a whole, could aid in the development of green agricultural zones, ecological farming zones or pollution-free cultivation areas. Studies should aim to utilize representative lands plots from China's major agricultural areas and should be carried out with the cooperation of the Plant Protection Authorities.

Target 7. In-situ and ex-situ conservation and a recovery plan for threatened and endangered species in China

7.1 Introduction

In order to ensure the protection and rehabilitation of wildlife and their natural habitats, the Chinese government has successively enacted the “Law of the People's Republic of China on the Protection of Wildlife”, the “List of Wildlife under Special State Protection”, the “Regulations of the People's Republic of China on Nature Reserves”, and the “List of terrestrial wildlife under state protection, which are beneficial or of important economic or scientific value”. Provincial governments, autonomous regions and municipalities have also successively enacted lists of local wildlife for special protection. Currently, seven amphibian species are under special state protection.

In order to continue and develop the effective protection and management of wild flora and fauna and their corresponding habitats, the State Forestry Administration published the “National Master Plan for the Protection of Wild Flora and Fauna and the Establishment of Nature Reserves” in 2011. The main objectives of this plan are to raise public awareness in wild flora and fauna protection, to encourage public engagement and support in wild flora and fauna protection and to establish protected areas for the sustainable, steady and healthy growth of wild flora and fauna. Projects relating to amphibian conservation include the protection and preservation of wild animals and their genetic diversity, the commencement of species rescue projects and the preservation of germplasm collections. From 2001 to 2010, the implementation of such projects, has afforded the effective protection of 90% of all species under special state protection. We aim to restore and increase the number of species under special state protection to 60% by 2030 and 85% by 2050.

In 2008, the IUCN China Amphibian Specialist Group listed 10 species of amphibian to be placed under priority protection. Consequently, considerable work has been carried out on the captive breeding and release of the Chinese giant salamander (*Andrias davidianus*), Chinhai spiny newt (*Echinotriton chinhaiensis*) and Anji Hynobiid (*Hynobius amjiensis*).

Relocation propagation, relocation conservation and captive breeding are effective methods of replenishing dwindling wild populations and protecting rare and endangered species. Through relocation propagation and relocation conservation, we can not only achieve the effective recovery and healthy development of endangered amphibian populations, but also accumulate

experience in captive breeding and animal husbandry. Additionally, such projects will further develop our knowledge of rare and endangered species, through the study of breeding behavior and characteristics, something which is often difficult to observe in the wild. Furthermore, in addition to being important targets for research purposes, these rare species are often harvested for the pet trade, which creates an even greater pressure on their populations.

Our priority is to commence relocation propagation of highly endangered and key species. In order to ensure the proper recovery of wild populations, such projects should aim to identify which species to breed, evaluate how best to release these animals into the wild, and develop effective post-release management.

To facilitate relocation propagation programs, we aim to establish both national and local breeding and conservation facilities, as well as research centers. Here, the identification and commencement of breeding programs for ecologically important species will take place. Those species of particular concern will be those that are of high economic value and those that are vulnerable to threats such as chytrid infection.

Through breeding, we can also introduce a small number of individuals to zoos and exhibitions as to promote environmental education and wildlife conservation, and to raise public awareness of the importance of amphibian conservation.

7.2 Problems

Amphibians are the most threatened and endangered group of vertebrates. Yet, they do not receive an equal level of attention compared to other protected animals. Although the use of protected areas as a means of in-situ conservation has covered the majority of endangered amphibians, the results are not ideal due to management, technical and funding constraints. There is a lack of breeding facilities that focus specifically on amphibian conservation. Neither zoos nor aquariums pay sufficient attention to amphibian protection, and the Amphibian Ark, relocation conservation and population recovery projects have not yet officially began. Additionally, a scientific protocol to evaluate the results of in-situ conservation of threatened species has yet to be developed.

7.3 Action Plan

Action 7.1 Reinforcement of in-situ conservation of threatened and protected species

Based on the methods employed in 2008 to select 10 target amphibian species for conservation priority, a system will be established and promoted to prioritize additional species. Research should aim to reinforce theory and develop methodologies for the protection of endangered amphibians. Research on five endangered species should act as an initial blueprint for in-situ conservation projects and will be used as a promotional demonstration. We will strengthen protection of endemic and rare species and their habitats, as well as species of medicinal and economic value whilst creating relatively stable environmental conditions for these species within the protected areas.

Action 7.2 Construction of small protected areas and setting up of a protected area network

Through the establishment a network of small protected areas of different habitat type, we aim to achieve the effective conservation of rare and threatened species. Special attention will be given to those species that are narrowly distributed and those that are currently located outside of protected areas. Through the establishment of such a network it will be possible to protect and enlarge the habitat available for these endangered species.

Action 7.3 Establishment of amphibian breeding centers to facilitate ex-situ conservation and release of captive bred individuals

We will encourage zoos and aquaria in conserving and breeding amphibians and raise their value in ex-situ conservation of amphibians. We will establish national and local amphibian breeding centers and develop projects to artificially breed rare and endangered species with the intent of subsequently releasing them into the wild.

Action 7.4 Reinforcement of research on in-situ conservation

By encouraging the participation of the general public and local enterprises we aim to improve our knowledge of ex-situ amphibian conservation and reinforce the development of better techniques for in vitro preservation of amphibian specimens, tissue, organs, sperm and DNA. Through systematically investigating the techniques and methods of ex-situ conservation, we hope to improve the results of protection.

Action 7.5 Development of systemic monitoring and evaluation of threatened species

We will develop a system to monitor amphibians in China that focuses mainly on endangered species. By periodically conducting field surveys and monitoring techniques and through the collection and analyses of monitoring results, we aim to understand the population dynamics of the threatened populations. We will investigate the scientific evaluation protocol of threatened and endangered species, as well as conduct scientific evaluation on the effectiveness of both in-situ and ex-situ conservation.

Target 8. Research on the model for sustainable use of Chinese amphibians

8.1 Introduction

The conservation and sustainable use of wildlife is of high importance to the Chinese government. In 2003 the State Forestry Administration of China published a document “List of Commercially Exploitable Terrestrial Animals for Which Domestication and Artificial Breeding Techniques are Developed” (商业性经营利用驯养繁殖技术成熟的陆生野生动物名单). According to the list, only four species of amphibians, *Rana chensinensis*, *Rana amurensis*, *Rana rugulosa* and *Rana grylio* are permitted for commercial use, thus other amphibians are effectively protected. In 2001, the State Forestry Administration published “Master Plan for Nationwide Wildlife Conservation and Protected Area Establishment” (全国野生动植物保护及自然保护区建设工程概况). The document proposed the wise use of resource utilizing modern technology and high efficiency methods, regulating market flow of resource and products, establishing a market of professional and centralized management, implementing wildlife product labeling system, reinforcing license regulation, enhancing market monitoring and preventing illegal sourced wildlife products from entering the market place. All these measures aim to strictly control the consumption of resource. In 2007, the State Environmental Protection Administration published the “National Plan for the Protection and Utilization of Species”. The goal of the plan is to promote harmony between humans and nature by using modern scientific techniques and technology in conjunction with traditional knowledge to protect species and their habitats while utilizing biological resources in a sustainable and fair way.

It is proposed that research on resource utilization is enhanced in line with the goals of the plan. As baseline biological resource information and conservation work improve, technology can be developed to exploit certain species in a sustainable manner for hunting and animal products. The following research areas should be further promoted and supported by 2015: 1) genetic erosion and restoration of captive animal population, 2) domestication and captive breeding, 3) infectious disease prevention and control, 4) techniques for verification of active medicinal ingredients in animal products and development of substitutes, 5) techniques for industrialization of economic wild animals and large-scale breeding, 6) techniques for exploiting transgenic animals and animal products, 7) management techniques for monitoring the wildlife

resource industry and identifying and solving related problem, 8) developing monitoring systems for wildlife population dynamics and early warning systems for disease control and prevention.

There is a long history of the utilization of wood frogs, *Andrias Davidianus*, *Rana rugulosa*, toads, spiny frogs and other amphibians in China. In recent years there have been positive developments in *ex-situ* breeding techniques. However the wild populations of giant salamander and spiny frog keep declining. The Zoological Society of London recently published a list of the 100 most endangered species of which the Chinese giant salamander was a top species. *Rana catesberana*, *Rana grylio*, *Rana heckscheri* and *Hoplobatrachus rugulosus* have been introduced for large-scale farming. Moreover, studies are being undertaken to assess the impact of escaped bullfrogs from captive facility, and to investigate the breeding and trading of *Hoplobatrachus rugulosus* in Hainan. In additions, amphibians are also becoming increasingly popular pets in China.

8.2 Problems

The tadpoles of most wood frogs are cultured in artificial incubation and then develop naturally in a sealed ditches, techniques for fully artificial breeding are still in their early stages. Breeding of *Paa spinosa* and *Paa boulengeri* is still under development and yet to be improved, tadpoles are vulnerable to diseases and research in basic biology is lacking. Existing models for the conservation and sustainable use of amphibians are rare and lack innovation. The utilization demand for amphibians is huge and illegal harvesting is still a serious issue. Basic research relating to amphibian husbandry techniques receive inadequate attention, monitoring of the trade in amphibians is deficient, management of the amphibian pet trade is incomplete and illegal trades are rampant.

8.3 Action Plan

Action 8.1 Strengthening exploration for models of the conservation and sustainable use of amphibians

Focusing on amphibian resources utilization, existing conservation and resource use models need to be extensively investigated. Experimental studies should be carried out to provide knowledge with which to develop a scientific and practical sustainable use model. Case studies should be produced based on the biological characteristics of different species, their population status and threats in order to develop innovative models for breeding and utilization.

Action 8.2 Further develop the foundation scientific research on breeding amphibians

From populations, to individuals, to cells and all the way to molecular level, basic research on breeding amphibians needs to be undertaken to ensure scientific breeding protocols can be developed and more effective in areas such as diseases prevention and control. In relation functional genomics and functional proteomics, amphibian genes with medicinal value need to be identified to develop new strands.

Action 8.3 Constructing sustainable development models for threatened amphibians in China

Referring to the operative model of the "preservation of species, scientific research, sustainable use" (3R model, Resources, Research, and Resolution Model), in line with the concept of "integrated zoology", foundational researches on useful but threatened and endangered amphibians should be conducted to solve the key problems between conservation and utilization; exploring techniques for species conservation and artificial breeding to develop a sustainable model in which conservation and utilization can coexist.

Action 8.4 Perfecting the monitoring of conservation and utilization

Collaborations between enterprises, research institutions and researchers should be developed to create a benefit-sharing mechanism in accordance with national priorities and international practices. This collaboration should ensure the sustainable use of amphibians through good science and effective conservation. Institutions, amphibian researchers, conservationists and the public should be involved in monitoring progress to improve the management of conservation and utilization of amphibians.

Action 8.5 Establishing standard bases of conservation and sustainable use of amphibians for demonstration

Government departments should select some advanced models of conservation and sustainable use of amphibians and establish demonstration centers to promote them.

Target 9. Improving public awareness of amphibian conservation

9.1 Introduction

The inclusion of amphibian conservation issues in broader environmental education programs has been greatly supported by various governmental departments with environmental education now being included in the curriculum of some schools and colleges. Additionally the government has been active in promoting environmental awareness during global environmental days such as International Biodiversity Day, World Environmental Day and Earth Day. The Ministry of Agriculture and State Forestry Administration also organized an "Aquatic Wildlife Awareness Month" and "Wildlife Awareness Month" along with other activities.

Since 2004, the China Wildlife Conservation Association launched the "National Wildlife Conservation Education Base" scheme which has designated 87 bases for environmental education over the past 6 years and proposed 4 National Science and Technology Education Base to the China Association for Science and Technology. These educational bases have been visited by over ten million people and have played an important role in wildlife conservation education in China. In addition, a large number of websites and communities focusing specifically on amphibian conservation have been established. Researchers and communities have collaborated with NGOs such as WWF and Hong Kong Ocean Park Conservation Foundation to hold educational activities for amphibian conservation.

9.2 Problems

A basic knowledge and appreciation of amphibians and their conservation is generally lacking among the general public. Current education initiatives can be repetitive and at present there is no standardized plan for the incorporation of amphibian conservation into environmental education. Museums and grass roots educational organizations rarely pay enough attention to promoting amphibian conservation and lack access to adequate educational resources. There are only a few organizations capable of carrying out amphibian conservation education is small. Additionally, the publication of educational literature focusing specifically on amphibians is often neglected.

9.3 Action Plan

Action 9.1 Improving governmental amphibian education programs

Developing an educational strategy for amphibian conservation based around biodiversity conservation will provide the basis for academic curriculums and support the publication of educational literature. Based on the success of the 2008 Year of the Frog, we can establish an amphibian awareness week. Other initiatives such as increasing investment of specific funds, setting up a comprehensive education plans, and building a web site will all aid with improving public awareness efforts.

Action 9.2 Improving educational strategies to promote amphibian conservation

Building enthusiasm for amphibian research and conservation through initiatives such as "into the campus - out of homes" can be implemented through primary and middle schools, colleges, and through various summer camp activities. Projects can also be developed to help foster a desire to protect and respect amphibians.

Action 9.3 Strengthening publication and distribution of popular science books to promote the sustainable development of amphibian conservation

There should be an organized effort to bring together experts, scholars and students to compile a popular science publication focusing on the conservation and sustainable use of amphibians. By collaborating with publishers, a series of publications targeting a variety of audiences should be produced in order to improve the public's understanding of amphibian biodiversity conservation.

Appendix

Appendix 1: List of Wild Animals under State Protection

(Excerpted from Amphibian part)

National key protected wild animal list

(Authorized by the State Council on December 10th, 1988; promulgated by the Republic of China Ministry of Agriculture and Ministry of Forestry, Order No. 7, on January 14th, 1989)

	Scientific name	Level of priority for the protection	
		Level I	Level II
AMPHIBIA			
CAUDATA			
Cryptobranchidae	*Andrias davidianus		II
Salamandridae	*Tylototriton asperrimus		II
	*Tylototriton chinhaiensis		II
	*Tylototriton kweichowensis		II
	*Tylototriton taliangensis		II
	*Tylototriton verrucosus		II
ANURA			
Ranidae	Rana tigrina		II

Notes: * represents the species falling under the responsibility of the department of fisheries; all others are fall under the department of forestry.

Appendix 2: List of terrestrial wildlife under state protection, which are beneficial or of important economic or scientific value

(Excerpted from the amphibian part)

In order to further implement the "Wild Animal Protection Act of the Republic of China" (hereinafter referred to as "Wild Animal Protection Act"), to strengthen our national and local protection and management of terrestrial wild animals outside the protected wildlife areas, "List of terrestrial wildlife under state protection, which are beneficial or of important economic or scientific value" was enacted by the State Council of administrative department of wildlife as the State Forestry Administration Order No. 7 in 1st August, 2000.

MAMMALIA	6 orders	14 families	88 species
AVES	18 orders	61 families	707 species
AMPHIBIA	3 orders	10 families	291 species
REPTILIA	2 orders	20 families	395 species
INSECTA	17 orders	72 families	120 genus, with another 110 species

Total 5 classes 46 orders 177 families 1591 species and for insects 120 genus with another 110 species.

Amphibia 3 Order 10 Family 291

Species

Apoda or Gymnophiona

Ichthyophidae

1 Ichthyophis bannanica

Caudata (Urodela)

2 Batrachuperus karlschmidti

Hynobiidae

3 Batrachuperus londongensis

4 Batrachuperus pinchonii

5 Batrachuperus tibetanus

6 Batrachuperus yanyuanensis

7 Hynobius amjiensis

8 Hynobius chinensis

9 Hynobius formosanus

Salamandridae

- 10 *Hynobius leechii*
- 11 *Hynobius mantchuricus*
- 12 *Hynobius sonani*
- 13 *Liua shihi*
- 14 *Onychodactylus fischeri*
- 15 *Pachyhynobius shangchengensis*
- 16 *Ranodon sibiricus*
- 17 *Ranodon tsinpaensis*
- 18 *Salamandrella keyserlingii*
- 19 *Cynops chenggongensis*
- 20 *Cynops cyanurus*
- 21 *Cynops orientalis*
- 22 *Cynops orphicus*
- 23 *Cynops wolterstorffi*
- 24 *Echinotriton andersoni*
- 25 *Pachytriton brevipes*
- 26 *Pachytriton labiatus*
- 27 *Paramesotriton caudopunctatus*
- 28 *Paramesotriton chinesis*
- 29 *Paramesotriton fuzhongensis*
- 30 *Paramesotriton guangziensis*
- 31 *Paramesotriton hongkongensis*
- 32 *Paramesotriton verrucosus*

Salientia(Anura)

Bombinidae

- 33 *Bombina fortinuptialis*
- 34 *Bombina maxima*
- 35 *Bombina microdeladigitora*
- 36 *Bombina orientalis*

Megophryidae

- 37 *Atympanophrys shapingensis*
- 38 *Brachytarsophrys carinensis*
- 39 *Brachytarsophrys feae*
- 40 *Brachytarsophrys platyparistus*
- 41 *Leptobrachium chapaense*
- 42 *Leptobrachium basseltii*
- 43 *Leptolalax alpinus*
- 44 *Leptolalax oshanensis*
- 45 *Leptolalax pelodytoides*
- 46 *Leptolalax ventripunctatus*
- 47 *Megophrys boettgeri*
- 48 *Megophrys brachykolos*
- 49 *Megophrys caudoprocta*
- 50 *Megophrys daweimontis*
- 51 *Megophrys giganticus*
- 52 *Megophrys glandulosa*

53 *Megophrys kempii*
54 *Megophrys kuatunensis*
55 *Megophrys lateralis*
56 *Megophrys mangshanensis*
57 *Megophrys minor*
58 *Megophrys nankiangensis*
59 *Megophrys omeimontis*
60 *Megophrys pachyproctus*
61 *Megophrys palpebralespinosa*
62 *Megophrys parva*
63 *Megophrys spinatus*
64 *Ophryophryne microstoma*
65 *Ophryophryne pachyproctus*
66 *Oreolalax chuanbeiensis*
67 *Oreolalax granulatus*
68 *Oreolalax jingdongensis*
69 *Oreolalax lichuanensis*
70 *Oreolalax major*
71 *Oreolalax multipunctatus*
72 *Oreolalax omeimontis*
73 *Oreolalax pingli*
74 *Oreolalax popei*
75 *Oreolalax rhodostigmatus*
76 *Oreolalax rugosus*
77 *Oreolalax schmidti*
78 *Oreolalax xiangchengensis*
79 *Scutiger alticola*
80 *Scutiger boulengeri*
81 *Scutiger chintingensis*
82 *Scutiger glandulatus*
83 *Scutiger gongshanensis*
84 *Scutiger liupanensis*
85 *Scutiger maculatus*
86 *Scutiger mammatus*
87 *Scutiger ningshanensis*
88 *Scutiger nyingchiensis*
89 *Scutiger pingwuensis*
90 *Scutiger sikimmensis*
91 *Scutiger sikkimensis*
92 *Scutiger tuberculatus*
93 *Scutiger weigoldi*
94 *Vibrissaphora ailaonica*
95 *Vibrissaphora boringli*

Bufo

- 96 *Vibrissaphora leishanensis*
- 97 *Vibrissaphora liui*
- 98 *Bufo ailaoanus*
- 99 *Bufo andrewsi*
- 100 *Bufo bankorensis*
- 101 *Bufo cryptotympanicus*
- 102 *Bufo galeatus*
- 103 *Bufo gargarizans*
- 104 *Bufo himalayanus*
- 105 *Bufo kabischi*
- 106 *Bufo melanostictus*
- 107 *Bufo minshanicus*
- 108 *Bufo nouettei*
- 109 *Bufo raddei*
- 110 *Bufo stejnegeri*
- 111 *Bufo tibetanus*
- 112 *Bufo tuberculatus*
- 113 *Bufo viridis*
- 114 *Bufo wolongensis*
- 115 *Pelophryne scalpta*

Hyla

- 116 *Torrentophryne aspinia*
- 117 *Torrentophryne tuberospinia*
- 118 *Hyla annectans annectans*
- 119 *Hyla chinensis*
- 120 *Hyla gongshanensis*
- 121 *Hyla japonica*
- 122 *Hyla sanchiangensis*
- 123 *Hyla simplex*
- 124 *Hyla tsinlingensis*
- 125 *Hyla zhaopingensis*

Microhyla

- 126 *Calluella yunnanensis*
- 127 *Kalophrynus interlineatus*
- 128 *Kalophrynus menglienicus*
- 129 *Kaloula borealis*
- 130 *Kaloula pulchra*
- 131 *Kaloula rugifera*
- 132 *Kaloula verrucosa*
- 133 *Microhyla berdmorei*
- 134 *Microhyla butleri*
- 135 *Microhyla Heymonsi*
- 136 *Microhyla mixtura*
- 137 *Microhyla ornata*
- 138 *Microhyla pulchra*

Ranidae

- 139 *Micryletta inornata*
- 140 *Microhyla steinegeri*
- 141 *Amolops afghanus*
- 142 *Amolops chunganensis*
- 143 *Amolops granulosis*
- 144 *Amolops hainanensis*
- 145 *Amolops hongkongensis*
- 146 *Amolops kangtingensis*
- 147 *Amolops liangshanensis*
- 148 *Amolops lifanensis*
- 149 *Amolops loloensis*
- 150 *Amolops macrorhynchus*
- 151 *Amolops mantzorum*
- 152 *Amolops mengyangensis*
- 153 *Amolops monticola*
- 154 *Amolops ricketti*
- 155 *Amolops torrentis*
- 156 *Amolops viridimaculatus*
- 157 *Amolops wuyiensis*
- 158 *Micrixalus borealis*
- 159 *Micrixalus liui*
- 160 *Micrixalus reticulatus*
- 161 *Micrixalus xizangensis*
- 162 *Nanorana parkeri*
- 163 *Nanorana pleskei*
- 164 *Nanorana ventripunctata*
- 165 *Occidozyga lima*
- 166 *Occidozyga martensii*
- 167 *Paa arnoldi*
- 168 *Paa blanfordii*
- 169 *Paa boulengeri*
- 170 *Paa conaensis*
- 171 *Paa exilispinosa*
- 172 *Paa feae*
- 173 *Paa jiulongensis*
- 174 *Paa liebigii*
- 175 *Paa liui*
- 176 *Paa maculosa*
- 177 *Paa polunini*
- 178 *Paa robertingeri*
- 179 *Paa shini*
- 180 *Paa spinosa*
- 181 *Paa yunnanensis*

182 *Pana adenopleura*
183 *Pana altaica*
184 *Rana amurensis*
185 *Rana andersoni*
186 *Rana anlungensis*
187 *Rana asiatica*
188 *Rana bananica*
189 *Rana cancrivora*
190 *Rana chaochiaoensis*
191 *Rana chensinensis*
192 *Rana chevronta*
193 *Rana daunchina*
194 *Rana dybowskii*
195 *Rana fragilis*
196 *Rana gerbillus*
197 *Rana grahami*
198 *Rana guentheri*
199 *Rana bejiangensis*
200 *Rana huanrenensis*
201 *Rana japonica*
202 *Rana kuangwuensis*
203 *Rana kuhlii*
204 *Rana kunyuensis*
205 *Rana latouchii*
206 *Rana limnocharis*
207 *Rana lini*
208 *Rana livida*
209 *Rana longicrus*
210 *Rana lungshengensis*
211 *Rana macrodactyla*
212 *Rana margaretae*
213 *Rana minima*
214 *Rana multidenticulata*
215 *Rana nigrolineata*
216 *Rana nigromaculata*
217 *Rana nigrotympanica*
218 *Rana nigrovittata*
219 *Rana plancyi*
220 *Rana pleuraden*
221 *Rana psaltes*
222 *Rana quadranus*
223 *Rana ridibunda*
224 *Rana rugosa*

225 *Rana sanguinea*
226 *Rana sangzhiensis*
227 *Rana sauteri*
228 *Rana schmackeri*
229 *Rana shuchinae*
230 *Rana spinulosa*
231 *Rana swinhoana*
232 *Rana taipehensis*
233 *Rana tenggerensis*
234 *Rana tiannanensis*
235 *Rana tientaiensis*
236 *Rana tormotus*
237 *Rana unculuanus*
238 *Rana versabilis*
239 *Rana weiningensis*
240 *Rana wuchuanensis*
241 *Rana zhengi*
242 *Buergeria japonica*
243 *Buergeria oxycephala*
244 *Buergeria robusta*
245 *Chirixalus doriae*
246 *Chirixalus eiffingeri*
247 *Chirixalus idiotocus*
248 *Chirixalus vittatus*
249 *Philautus albopunctatus*
250 *Philautus andersoni*
251 *Philautus cavirostris*
252 *Philautus gracilipes*
253 *Philautus jinxiuensis*
254 *Philautus longchuanensis*
255 *Philautus medogensis*
256 *Philautus menglaensis*
257 *Philautus ocellatus*
258 *Philautus palpebralis*
259 *Philautus rhododiscus*
260 *Philautus romeri*
261 *Polypedates chenfui*
262 *Polypedates dennysi*
263 *Polypedates dugritei*
264 *Polypedates feae*
265 *Polypedates hungfuensis*
266 *Polypedates megacephalus*
267 *Polypedates mutus*

Rhacophoridae

- 268 *Polypedates nigropunctatus*
- 269 *Polypedates omeimontis*
- 270 *Polypedates pingbianensis*
- 271 *Polypedates puerensis*
- 272 *Polypedates zhaojuensis*
- 273 *Rhacophorus arvalis*
- 274 *Rhacophorus aurantiventris*
- 275 *Rhacophorus bipunctatus*
- 276 *Rhacophorus gongshanensis*
- 277 *Rhacophorus jerdonii*
- 278 *Rhacophorus maximus*
- 279 *Rhacophorus moltrechti*
- 280 *Rhacophorus naso*
- 281 *Rhacophorus prasinatus*
- 282 *Rhacophorus reinwardtii*
- 283 *Rhacophorus rhodopus*
- 284 *Rhacophorus taipeianus*
- 285 *Rhacophorus translineatus*
- 286 *Rhacophorus tuberculatus*
- 287 *Rhacophorus verrucopus*
- 288 *Rhacophorus yaoshanensis*
- 289 *Theلودerma asperum*
- 290 *Theلودerma kwangsiensis*
- 291 *Theلودerma moloch*

Appendix 3: List of Commercially Exploitable Terrestrial Animals for which Domestication and Artificial Breeding Techniques are Developed

In response to the concurrent conflicts between wildlife conservation and captive breeding for utilization, and requested in “Note for stricter enforcement of ban on illegal hunting and wildlife trade operation” by a total 12 departments including the State Forestry Administration, the Supreme People's Court, the Ministry of Public Security, Ministry of Railways, Ministry of Information Industry, Ministry of Commerce, Ministry of Health, Customs Headquarters, State Administration for Industry and Commerce, General Administration of Quality Supervision, Inspection and Quarantine, and General Administration of Civil Aviation of China, reported by the forestry administrative departments in provinces, autonomous regions and municipalities, and appraised by experts who are called in by the State Forestry Administration, a total of 54 species of terrestrial wild animals including Sika deer of which domestication and artificial

breeding techniques are developed, and are now announced to be permitted to be used commercially for domestication and utilization in accordance with China's relevant laws.

Domestication and breeding of the listed species must only be operated by persons with qualification according to the law, and meet the requirement of "United Notice", standardizing the management and prevent animals from illegal hunting and smuggling source to enter the market. Prevention and monitoring of animal disease must be employed according to the law, animals for foods must be tested and monitored according to the law and meet the legal requirement of the national law of food and hygiene. For those alien species listed, measurements must be employed to prevent animal escape during breeding, transport, utilization, export and import and all other operation procedures, in order to prevent damage on ecology.

In addition to the listed species, wild terrestrial animals used for scientific research, appreciation, medicine and other special need, should meet relevant laws and the "United Notice".

All levels of the forestry administration departments should implement the "Three Represents" ideology, practice the concept of "governing for the people", by giving practical importance to supporting and regulating the work of domestication and breeding of terrestrial wild animals; and should also administrate by law, enhance service awareness, constitute and implement gradually the quota system to manage utilization and trading of wild animals, promote uniform marking system, simplify procedures, improve efficiency, to create a good environment for healthy development of domestication and breeding of wild animals.

Notice is hereby given

August 4th 2003

(excerpted from amphibian part)

No.	Scientific name	
46	<i>Rana chensinensis</i>	
47	<i>Rana amurensis</i>	
48	<i>Rana grylio</i>	*alien species
49	<i>Rana rugulosa</i>	