

REPORT

Establishing an international cooperative strategy for the conservation of Oriental White Storks in Northeast Asia

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Abstract The status and tactics of conservation policies for the Oriental White Stork are different in Russia, China, South Korea and Japan. To better help the storks through collaboration we need to establish effective international networks for communication. The reintroduction project of the Oriental White Storks was initiated in 2005 in Toyooka area, Hyogo Prefecture, Japan. Subsequently, the Toyooka stork population has increased with an average of 5.4 birds added per year although 1.8 birds died each year. Most of the young storks left and then returned to Toyooka. Only a few have not as yet returned and remain elsewhere in Japan. Two storks from mainland Asia visited Toyooka area to breed. Such cases promote genetic exchange between the Japanese reintroduced population and mainland wild population. In Hyogo Prefecture, Hyogo Park of the Oriental White Stork (HPOWS) has been established as a center for captive breeding and reintroduction projects of storks and has three basic functions; aviculture, research and education. There have been many successes and failures. The knowledge and skills developed at HPOWS, can perhaps be helpful for conservation and introduction projects of storks in other areas of Japan and in other countries. Because original breeding populations in South Korea and Japan, declined and then disappeared, it was assumed there was little genetic flow among the populations and that eventually inbreeding promoted attrition of the populations. Russia had the most successful breeding population towards the end of the recent century, and it was assumed that genetic stock from that populations might facilitate success with reintroduced populations in Japan and South Korea. Continued exchanges of information and studies, and aviculturists and researchers among the range nations of the Oriental

White Stork are needed to develop an International Conservation Plan (ICP) for the Oriental White Stork throughout its wide range in Northeast Asia.

Key words Oriental White Stork, Northeast Asia, International cooperative strategy, Conservation, Information and studies, Aviculturists and researchers

Introduction

An international conference titled “AMUR’ 2000-Oriental Stork and Wetland Conservation at Amur River Basin” was held in Khabarovsk, Russia in 2000. Aviculturists, researchers and members of NGOs from Russia, China, Japan, South Korea, Belgium and the USA discussed strategies for international cooperation in the conservation of the Oriental White Stork in Northeast Asia (Darman 2000). During the past decade, the wild populations of storks in Russia and China have been monitored, flourishing captive populations were established in Japan and South Korea, and since 1992, efforts have been underway in Japan to reestablish a wild population (Ryabinin 2008). However, worldwide population of Oriental White Storks is still small, ca. 3,000 birds (Delany and Scott 2006) although this species is protected throughout its range and listed on the IUCN Red List. Wild storks are distributed mainly in Russia and China where they migrate between breeding grounds in northern China and southeastern Russia, to major wintering grounds on lakes associated with the floodplain of the Yangtze River in southern China. Russia and China have the responsibility to conserve and manage the breeding grounds and China has the task of protecting the wintering ground. The goal of the reintroduction project in Japan is establishing a self-sustaining resident (non-migratory) population. The same project is planned in South Korea. Although there are unique challenges for the conservation of the Oriental White Stork in each of the range nations, many shared problems can be effectively addressed through interna-

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tional communication and collaboration.

Status of the reintroduced and immigrant Oriental White Storks in Japan

The Japanese native population of storks became extinct in the wild in 1971 and in captivity in 1986 (Ikeda 2000). The reintroduction project of Oriental White Storks was started in 2005 in Toyooka area of Tajima region, Hyogo Prefecture, Japan (Ohsako et al. 2008) according to the IUCN guidelines for reintroduction (IUCN 1998). The ecological conditions necessary for establishing a sustainable population of the storks in the wild were as follows: Dispersion, breeding, self-living, increase in abundance, expansion in distribution and increase in genetic diversity. After release in 2005, the storks were monitored to collect data on population parameters and movements by direct observation and satellite tracking. The records of wild storks visiting Japan from the mainland between 2000 and 2009 were collected.

1. Increase of Toyooka population

A total of 27 birds were released into the wild between 2005 and 2010, of which three birds died (a traffic accident, electrocution and starvation), and four birds were taken back into captivity for various reasons (failure to live in the wild, avoiding inbreeding of the released birds, injury). Nineteen birds excluding a missing one were living in the wild mainly in Toyooka area in 2010.

A total of nine adult birds left Toyooka area after release until 2010. One of them travelled more than 530km and another was travelling for 49 days. However, every stork returned back to Toyooka area except a missing bird. This perhaps indicates that the natal area is defined in the stork's brain but the area in which they fledged, and following widespread dispersal, storks return to the natal area to breed.

Pairs have been formed since 2006 and seven pairs had their own home ranges in Toyooka area in 2010. The first pair started breeding in 2006 and the second pair reared one young successfully in 2007. The averages of fledging success and mortality of the stork population were 5.4 birds/year and 1.8 birds/year respectively, so the population was growing, reaching to 41 birds in 2010.

2. Dispersal of young storks of Toyooka population

A total of 23 young storks that were hatched in the wild of Toyooka area left there in 42 times until 2010, to visit wide-ranged area from Tohoku to Kyushu District, Japan. The longest distance of dispersal was more than 700km far directly from Toyooka area. However, most of the storks returned back to Toyooka area and several storks stayed outside it: J0006 (2y.o., ♀) in Kurashiki City, Okayama, J0009 (2y.o., ♀) in Seiyo City, Ehime, J0022 (0y.o., ♀) in Gobo City, Wakayama, as of 26th October, 2010. Especially, J0009 moved seasonally as like migration between Miyagi Prefecture and Ehime Prefecture.

3. Immigration of wild storks into Toyooka population

A total of 169 sighting records of the storks were collected between 2000 and 2009 (Fig. 1). One or two wild storks visited Japan from the mainland mainly every autumn. Thirty four birds were at least identified by patterns of plumage, of which seven birds were recorded to stay within Japan more than one year (Ohsako and Mitsuhashi 2010, 2011).



Fig. 1. Stopover and staging sites of wild storks visiting Japan from the Far Eastern mainland between 2000 and 2009 (modified after Ohsako and Mitsuhashi 2010, 2011).

The wild storks visited Toyooka area in 2002 and 2005, of which one bird (male) built his nests by himself from 2003 to 2006 and died in 2007, and another bird (female) started breeding with a released one in 2009 and raised up two chicks in 2010. Such cases are expected to occur also in the future which will increase genetic exchange between the Japanese reintroduced population and mainland wild population.

Basic functions of the Hyogo Park of the Oriental White Stork

Hyogo Park of the Oriental White Stork (HPOWS) was opened in 1999 as a center of aviculture, research and education (Fig. 2) (Committee for the reintroduction of the Oriental White Stork 2003).

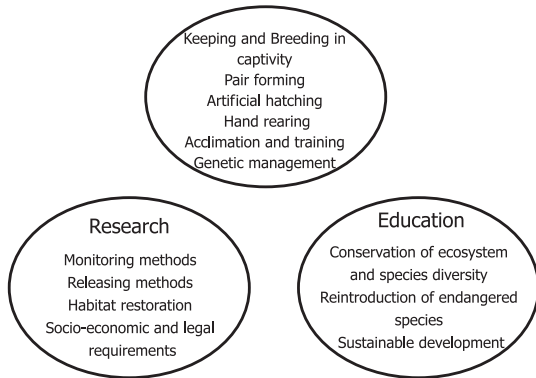


Fig. 2. Basic functions of Hyogo Park of the Oriental White Stork, Japan (after Committee for the reintroduction of the Oriental White Stork 2003).

The first function, aviculture is the practice of keeping and breeding birds. The endangered storks were preserved in captivity for artificial propagation and management of the genetic diversity through aviculture. Furthermore, the captive storks were acclimated and trained for living in the wild, and were quarantined for health check before being released to the wild. The released storks that were wounded or in trouble were captured for inspection and treatment in captivity.

The second function, research focuses on approaches of keeping and breeding in captivity, releasing, monitoring and managing in the wild, landscape analyzes for habitat improvement and socio-economic or legal analyzes for regional development. The revised tactics based on the monitoring results were applied to manage the habitat and to promote regional development.

The third function, education focuses on public awareness for creating an environment where the humans co-exist with the storks. Educational programs and teaching materials, and interpreting technique on conservation of ecosystem and species diversity, the reintroduction of endangered species, and sustainable development were improved to deepen understanding of citizens and students.

Since 1965, HPOWS has maintained the last of the

storks once native to Japan. Those birds never reproduced. Captive stock that originated from the mainland was imported and in 1989 these storks bred for the first time in captivity at HPOWS. Since 2005 we have continued to release and manage the storks for reintroduction. From our many years of efforts with many failures but some successes, we have learned a great deal about the Oriental White Stork, and we are eager to share such information with colleagues in other areas of Japan and in the other range nations of the storks.

Metapopulation dynamics of the Oriental White Stork

There are breeding grounds of the storks in Far Eastern Russia and northeastern China and wintering grounds of the storks in southeastern China, Japan and South Korea (Fig. 3) (BirdLife International 2000). The breeding populations existed both in Japan and South Korea in the past (Hancock et al. 1992). The mainland population of the storks migrates between Russia and China. On the other hand, around 2000, some storks started breeding on the wintering ground in China (Anqing Forest Bureau 2001; Wang et al. 2002; Ji and Wu 2004; Yang et al. 2007). There is now a non-migratory population and a migratory population in China. Non-migratory populations will be reestablished both in Japan and South Korea.

Each of breeding populations in northeastern China, Japan and South Korea was considered as a local population that had a tendency to immobilize the genetic diversity. Immigration of the storks from the biggest population in Russia might enhance genetic diversity within the



Fig. 3. Metapopulation dynamics of the Oriental White Stork in the Far East (modified after BirdLife International 2000).

patchy populations in the past. Such distribution pattern is called 'metapopulation'. The metapopulation dynamics might keep and drive evolution of the Oriental White Stork before extinction of the stork population in Japan and South Korea. The whole conservation of the Oriental White Storks depended on the sustainability of each population. We should restore such population dynamics to prevent decrease and extinction of the storks.

Establishing international cooperative strategy for the conservation of Oriental White Storks

For conservation of the endangered species, there are two methods; i) in-situ or on-site conservation where the conservation is implemented within the natural habitats and ii) ex-situ or off-site conservation where conservation is implemented outside of the natural habitats (Primack 2004). Both of the measures are necessary for conservation of the endangered storks. Habitat management, habitat restoration and reservoir establishment are useful as tactics of in-situ conservation. Captive breeding and genetic management are useful as tactics of ex-situ conservation.

For decreasing rate of extinction of Oriental White Storks, reestablishment of the breeding populations, conservation of flyway sites and conservation of the wintering populations are needed (Fig. 4). Reestablishment of the breeding populations is achieved by translocation of the storks, for example by reintroduction and supplementation. Conservation of flyway sites covers many countries along the path of stork migration routes. Conservation of the wintering populations is achieved by habitat management and improvement, and removing any threats,

for examples pesticide, pollution, human disturbance, poaching and overfishing.

To establish local populations, there are two methods; i) reintroduction and ii) supplementation. The former method was applied in areas where the storks became extinct and the latter method was applied in areas where the population was facing a rapid decline (Soorae 2010). It is possible to revive or reinforce the stork populations by conducting reintroduction in Japan and South Korea, and by conducting supplementation in areas of Russia and China from which storks have been extirpated.

A reintroduction project requires a multidisciplinary approach involving a team of persons drawn from a variety of backgrounds. As well as government personnel, they may include persons from governmental natural resource management agencies; non-governmental organizations; funding bodies; universities; veterinary institutions; zoos (and private animal breeders) and/or botanic gardens, with a full range of suitable expertise (IUCN 1998). Hyogo Prefecture of Japan plays a part in conservation of worldwide Oriental White Storks through the reintroduction project. Furthermore, we will promote cooperation not only with the zoos and facilities for breeding and conservation of the storks within Japan but also with such organizations in Russia, China and South Korea where wild populations of the storks are distributed.

The storks do not see international boundaries. Therefore, it is important for colleagues in the four range states to work together to assure a safe future for this magnificent bird. To facilitate and promote the international cooperative strategy, we need to exchange information and studies, and exchange aviculturists and researchers among Russia, China, South Korea and Japan (Fig. 4).

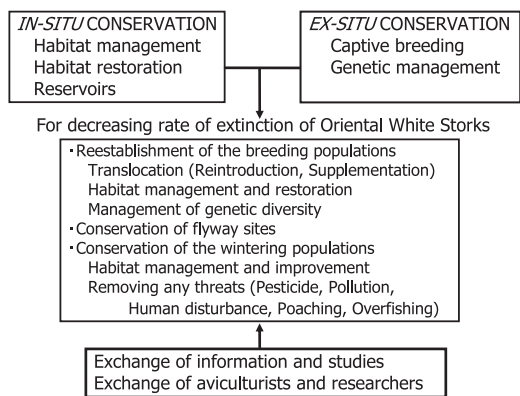


Fig. 4. Establishing an international cooperative strategy for conservation of Oriental White Storks in Northeast Asia.

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北東アジアにおけるコウノトリの保全のための国際連携の確立に向けて

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コウノトリの現状と保全方針は、その種の分布するロシア、中国、韓国、日本において異なっている。協力関係を通してより効果的に本種を保護するには、私たちは情報交換のために効果的な国際ネットワークを確立することが必要である。本種の再導入計画は、日本の兵庫県豊岡市で2005年に開始され、その後、この豊岡個体群は、年平均1.8羽が死亡するものの年平均5.4羽の割合で増加している。野外で巣立った若鳥のほとんどは豊岡市を離れても戻ってきたが、2、3羽の個体は戻らないで豊岡市以外の場所に留まっている。大陸から2羽の野生個体が豊岡市に飛来し繁殖を試みたことがある。この移入は、日本の再導入個体群と大陸の野生個体群の遺伝的交流を促進することになる。兵庫県では、コウノトリの郷公園が、本種の保護増殖と再導入計画のセンターとして設置され、飼育・繁殖、研究と普及啓発の3つの基本機能を有している。2010年までの試験放鳥で、コウノトリの郷公園は多くの成功と失敗を行ってきた。これらの知識と技術は、日本国内および他国での本種の保全と導入の計画に役立てることができるであろう。日本と韓国の在来個体群はともに減少し最後は絶滅したため、両個体群の間で遺伝的交流はほとんどなく、また、近親交配により遺伝的に劣化したと推定される。しかし、ロシアの繁殖個体群を導入したことで、日本と韓国の再導入個体群の遺伝的多様性を促進することができると考えられる。コウノトリに関する情報と研究および鳥類飼育技術者と研究者の交流を継続するためには、北東アジアの分布国の間で本種の国際保全計画を策定・実施することが必要である。

キーワード コウノトリ、北東アジア、国際連携、保全、情報と研究、鳥類飼育技術者と研究者