

Critical species of Odonata in Japan

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Key words: Odonata, dragonfly, IUCN, critical species, conservation, Japan.

ABSTRACT

Japan is a small country but ranges from the subtropical to the subarctic zone. Every year during spring to autumn, many typhoons bring tropical taxa, which occasionally establish in Japan. Up to now, 215 odonate taxa have been recorded, 34 of which are regarded as critical species. Intensive research on Odonata – supported by identification guides – has been carried out mainly after 1945. The current IUCN Red List does not sufficiently reflect present knowledge of the threat status of Odonata in Japan. Therefore changes for an updated global Red List are suggested and explained. The most critical sites are situated in suburban areas and in the isolated islands; the latter host many endemics. Conservation priorities and recommendations are stated and the importance of publicity is stressed. The Division of Nature Conservation of the Japanese Society for Odonatology is currently very active, and it is expected that the activity of all 15 committees will even increase in the future. The so-called “Dragonfly Citizen Summit” has been carried out every year since 1990. With this festival the number of dragonfly lovers has increased remarkably, and the knowledge and consent on conservation of Odonata and their habitats have made a good progress.

REGIONAL DEFINITION

Japan comprises four main islands accompanied by many smaller islands, ranging between 122°15'E and 154°E and between 23°50'N and 45°30'N. Mountainous areas are widespread with Mount Fuji (3,776 m a.s.l.) and many other mountains above 2,000 m. Most districts are in the temperate zone. The northern parts and mountainous areas are in the subarctic zone, while the southern parts are in the subtropical zone. Every year typhoons bring odonate species of Tropical origin over the Pacific Ocean, while the north wind carries immigrants from the Continent over the Japan Sea. Some of the immigrants are established, overwintering as larvae, while others are mere visitors. These features, together with the rich precipitation, result in a rather rich odonate fauna.

STATE OF THE ART

Studies on taxonomy, ecology and biodiversity

Until today 215 taxa have been recorded from Japan (Inoue & Tani 2003). Among them, 74 taxa are endemic to Japan (Sugimura et al. 1999; Inoue & Tani 2003). No species is extinct, but many taxa are endangered, largely due to habitat destruction.

Japanese modern odonatology began with the collection of P.F. von Siebold (1796-1866), whose Odonata collection went to Leiden and then to Selys (Asahina 1974). The standard work of Japanese systematic odonatology was published by Selys (1883): it lists 67 'species' with many new descriptions. The specimens originated from the Siebold collection, the MacLachlan collection, and the museum collections of Genoa, Zurich and Berlin (Asahina 1974).

In the meantime Japanese entomologists conducted research on Odonata. M. Namie produced very fine coloured plates of Odonata (1901-1904) which were identified and named by P.P. Calvert (Asahina 1974). As an authentic Odonata specialist we have K. Oguma (1885-1971). Then S. Asahina started studying Odonata in 1933 (Asahina 1974). After 1945, Asahina reckoned the Odonata of Japan proper to be 118 taxa, excluding those of the Ryukyu Islands. In 1974 Japanese Odonata comprised nearly 180 taxa, including the species of the Ryukyus and Bonin Islands (Asahina 1974).

The first step toward formalizing intercommunication among odonatologists appear to have been taken in Japan (Asahina 1989; Corbet 1999). In Nagoya, I. Matsui established the 'Dragonfly Lovers' Association' in 1956 (Asahina 1988) and issued the 'Japanese odonatological bibliography' (Andoh & Inoue 1989). In 1958 Asahina established the 'Society of Odonatology, Tokyo' (Asahina 1974) and started its journal 'Tombo Acta Odonatologica'. This society changed its name into 'Japanese Society for Odonatology' under the presidency of S. Eda in 1998, and changed the name of the journal to 'Tombo Acta Odonatologica Japonica'.

The Society set up 'Division of Nature Conservation' in 1998 with three committees, and then added 12 new committees as follows:

- (1) *Libellula angelina*, chaired by K. Matsuki
- (2) *Mortonagrion Hirosei*, chaired by T. Someya
- (3) *Sympetrum maculatum*, chaired by H. Karube
- (4) *Orthetrum poecilops miyajimaense*, chaired by B. Kagimoto
- (5) *Paracercion plagiosum* & *Copera tokyoensis*, chaired by K. Kano
- (6) *Lestes japonicus*, chaired by S. Nishu
- (7) *Coenagrion hylas* and *Leucorrhinia intermedia ijimai*, chaired by T. Yokoyama
- (8) *Rhyothemis severini*, chaired by S. Sasahara
- (9) Endemic species of Ogasawara Islands, chaired by H. Karube
- (10) *Sympetrum uniforme*, chaired by T. Miyazaki
- (11) *Ceriagrion nipponicum*, chaired by S. Shimura
- (12) *Platycnemis foliacea sasakii*, chaired by S. Shimura
- (13) *Sympetrum gracile*, chaired by T. Miyazaki
- (14) Conservation of habitats with diverse Odonata, chaired by Y. Arai
- (15) Exotic carnivorous fish protection, chaired by S. Suda

The members of these committees collected literatures on distribution, visited the habitats, and held meetings. The results were reported on occasion of the division meetings which have been held mainly during the annual meetings of the Society.

Identification guides

The first complete identification guide for Japanese Odonata was provided by Asahina (1950). It illustrates 118 taxa. Then he published a series of annotated lists (Asahina 1956a-h, 1957a-f, 1958a-f), in which all known 158 taxa are included with an illustration of their larva. Later he published a complete guide to Japanese Libellulidae (Asahina 1961).

Year after year, the knowledge on Japanese Odonata has been complemented and renewed. New taxa have been found and described, and a good number of foreign taxa have been discovered in Japan. In 1985 a huge volume was published by Hamada & Inoue (1985a, 1985b). It illustrates all the 203 taxa that have been recorded until that time. The enlarged colour photographs of living coloured specimens and detailed texts enabled easy identification. Ishida (1996) published a monograph on larvae. It gives figures of larvae and explanatory text.

During 14 years after the publication of Hamada & Inoue (1985a, 1985b), 11 taxa were added to the Japanese odonate fauna, and Sugimura et al. (1999) published a complete guide book for the identification of adults and larvae.

Faunal lists

Sugimura et al. (1999) give an almost complete faunal list of 214 taxa, and the English version of this book (Sugimura et al. 2001) will be more comprehensive to non-Japanese speaking researchers. After this publication, *Sympetrum vulgatum imitans* (Selys, 1886) was discovered in three districts along the Japan Sea in 2002. Inoue & Tani (2003) list also this taxon for the first time in Japan.

The Japanese faunal list of 215 taxa includes some species which have been found only once or twice so far. They are immigrants visiting Japan over the ocean. They might be omitted from the faunal list. But there are some cases where it cannot be decided whether a species is established in Japan or not.

For example, one of the Southeast Asian libellulids, *Brachythemis contaminata* (Fabricius, 1793), was found at Yonaguni Island in 1963. Many adults and exuviae were collected, and copulation and oviposition were observed. But in the following years this species had disappeared. In 1984 it was rediscovered, and then continuously observed every year. Now it is considered to be established at this and two adjacent islands: Ishigaki and Iriomote (Sugimura et al. 1999). But it may disappear again in the future.

Another example: one of the continental libellulids, *Sympetrum depressiusculum* (Selys, 1841) is found in autumn in large numbers every year, mainly along the Japan Sea coast. It is believed to have migrated on the northerly wind which is dominant in this season (Sugimura et al. 1999). Females copulate and oviposit, but

no evidence of emergence of the succeeding generation was proved until 31 August 1991, when M. Aiura discovered two young females in Tsushima Island (Inoue & Aiura 1991). In 1993 Aiura caught 10 males and eight females of this species on 9 June (Inoue & Aiura 1993). They were immature and very likely to have emerged there. But in general this species seems not established yet. Some females mated with males of *S. frequens* (Selys, 1883) (Osawa 1977) and produced hybrids (Obana & Inoue 1982). Most of the early instar larvae of this species are very likely being preyed upon by the larvae of the bigger congener, *S. frequens*, in natural conditions.

In conclusion, it is difficult to decide in all cases whether a species is established in Japan or not. Thus the Japanese odonate faunal list includes some species with only occasional records. But of course this is no matter, because in this paper we should concentrate on the taxa endemic to Japan.

Table 1. Odonata species previously red-listed (RL 2003) and suggested Red List (sRL) categories for an updated rating. CR: critically endangered; EN: endangered; VU: vulnerable; NT: near threatened; DD: data deficient.

Species	Occurrence	RL2003	sRL
Calopterygidae			
<i>Matrona basilaris japonica</i> Förster, 1897	Amami Island, Okinawa Island	EN	-
Chlorocyphidae			
<i>Rhinocypha ogasawarensis</i> Oguma, 1913	Ogasawara Islands	CR	VU
<i>uenoi</i> Asahina, 1964	Iriomote Island	EN	-
Euphaeidae			
<i>Bayadera brevicauda ishigakiana</i> Asahina, 1964	Ishigaki Island, Iriomote Island	EN	-
Lestidae			
<i>Indolestes boninensis</i> (Asahina, 1952)	Ogasawara Islands	CR	CR
<i>Lestes japonicus</i> Selys, 1883	Several localities in Japan, Korea and China	-	VU
Megapodagrionidae			
<i>Rhipidolestes okinawanus</i> Asahina, 1951	Okinawa Island	EN	-
Coenagrionidae			
<i>Boninagrion ezoin</i> Asahina, 1952	Ogasawara Islands	CR	VU
<i>Paracercion plagiosum</i> (Needham, 1930)	Ten prefectures in Japan and some localities in N and C China	-	EN
<i>Ceriagrion nipponicum</i> Asahina, 1957	Several localities in Japan and China	-	VU
<i>Erythromma humerale</i> Selys, 1887	N and E parts of Hokkaido and NE part of China to Siberia	-	NT
<i>Mortonagrion hirosei</i> Asahina, 1972	Several loc. in Japan and Hongkong	EN	CR
<i>Nehalennia speciosa</i> (Charpentier, 1840)	N part of Japan, Siberia to Europe	-	NT

Species	Occurrence	RL2003	sRL
Platycnemididae			
<i>Coeliccia flavicauda masakii</i> Asahina, 1951	Ishigaki Island, Iriomote Island	EN	-
<i>ryukyuensis amamii</i> Asahina, 1962	Amami Island	EN	-
<i>r. ryukyuensis</i> Asahina, 1951	Okinawa Island	EN	-
<i>Copera tokyoensis</i> Asahina, 1948	Several localities in Japan and China	-	EN
<i>Platycnemis foliacea sasakii</i> Asahina, 1949	Several localities in Japan	-	VU
Aeshnidae			
<i>Planaeschna i. ishigakiana</i> Asahina, 1951	Ishigaki Island, Iriomote Island	EN	NT
<i>i. nagaminei</i> Asahina, 1988	Amami Island	EN	NT
<i>risi sakishimana</i> Asahina, 1964	Ishigaki Island, Iriomote Island	EN	-
<i>Sarasaeschna kunigamiensis</i> (Ishida, 1972)	Okinawa Island	EN	NT
Gomphidae			
<i>Asiagomphus a. amamiensis</i> (Asahina, 1962)	Amami Island	EN	NT
<i>a. okinawanus</i> (Asahina, 1964)	Okinawa Island	EN	NT
<i>yayeyamensis</i> (Oguma, 1926)	Ishigaki Island, Iriomote Island	EN	NT
<i>Davidius moiwanus sawanoi</i> Asahina et Inoue, 1973	Shimane, Okayama, Hiroshima Prefs	-	NT
<i>Leptogomphus yayeyamensis</i> (Oguma, 1926)	Ishigaki Island, Iriomote Island	EN	-
<i>Stylogomphus ryukyuensis asatoi</i> Asahina, 1972	Okinawa Island	EN	-
<i>shirozui watanabei</i> Asahina, 1984	Ishigaki Island, Iriomote Island	EN	-
Cordulegastridae			
<i>Chlorogomphus b. brunneus</i> Oguma, 1926	Okinawa Island	EN	-
<i>b. keramensis</i> Asahina, 1972	Kerama Island	CR	NT
<i>iriomotensis</i> Ishida, 1972	Iriomote Island	EN	-
<i>okinawensis</i> Ishida, 1964	Okinawa Island	EN	NT
Corduliidae			
<i>Hemicordulia mindana nipponica</i> Asahina, 1980	SW part of Japan and Taiwan	EN	-
<i>ogasawarensis</i> Oguma, 1913	Ogasawara Islands	EN	EN
<i>okinawensis</i> Asahina, 1947	Amami Island, Okinawa Island	VU	-
<i>Macromidia ishidai</i> Asahina, 1964	Ishigaki Island, Iriomote Island	EN	-
<i>Macromia daimoji</i> Okumura, 1949	Several localities in Japan and Korea	-	VU
<i>kubokaiya</i> Asahina, 1964	Okinawa Island	EN	NT
<i>urania</i> Ris, 1916	Ishigaki Island, Iriomote Island, China	EN	NT
Libellulidae			
<i>Boninthemis insularis</i> (Matsumura, 1913)	Ogasawara Islands	CR	VU
<i>Diplacodes bipunctatus</i> (Brauer, 1865)	Ogasawara Islands, Oceania	-	NT
<i>Leucorrhinia intermedia ijimai</i> Asahina, 1961	Hokkaido	-	VU
<i>Libellula angelina</i> Selys, 1883	Several prefectures in Main Island	CR	CR
<i>Lyriothemis tricolor</i> Ris, 1916	Iriomote Island, SE Asia to S Asia	EN	-
<i>Orthetrum poecilops miyajimaensis</i> Yuki & Doi, 1938	Miyajima Island, Hong Kong	EN	CR
<i>Rhyothemis severini</i> Ris, 1913	Amami Island, Taiwan, Vietnam	-	NT
<i>Sympetrum gracile</i> Oguma, 1915	Several prefectures in Main Island	-	VU
<i>maculatum</i> Oguma, 1915	Several prefectures in Main Island	-	EN
<i>uniforme</i> (Selys, 1883)	Several prefectures in Main Island	-	VU

CRITICAL SPECIES

Notes on the species previously listed by IUCN

For Japan 35 odonate taxa are listed in the Red List of threatened species (Moore 1997; IUCN 2003) (Table 1: RL 2003 column):

as critically endangered [CR]

six taxa

as endangered [EN]

28 taxa

as vulnerable [VU]

one taxon

The following changes with respect to the taxonomy of species listed in the 2003 Red List (IUCN 2003) shall be noted: *Cercion plagiosum* is now *Paracercion plagiosum* (Weekers et al. 2004), *Chlorogomphus brevistigma okinawensis* is now *C. okinawensis* (Sugimura et al. 1999), *Macromidia ishidae* was erroneously spelled as '*Macromia ishidae*' and *Oligoeschna kunigamiensis* is now *Sarasaeschna kunigamiensis* (Karube & Yeh 2001).

Moore (1997) also listed:

Epiophlebia superstes (Selys, 1889)

as 'taxonomically isolated species'

Boninagrion ezoin

as 'species of monotypic genus confined to one country'

Boninthemis insularis

as 'species of monotypic genus confined to one country'

Mortonagrion hirosei

as 'species which is special because of its unusual biology'

Species to be considered

Changes concerning the current Red List ratings (IUCN 2003) are suggested in Table 1 in accordance with the Environment Agency of Japanese Government, which will result in a new listing of 33 species:

as critically endangered [CR]

four taxa

as endangered [EN]

four taxa

as vulnerable [VU]

10 taxa

as near threatened [NT]

15 taxa

Transfer between categories

The reason to move a species from a lower threat category to a higher one is mainly caused by destruction of habitats. Those taxa were not much threatened in former days, but filling up ponds and marshes has caused destruction of the habitats of sensitive species. A species was moved from a higher threat category to a lower one if additional habitats or additional distribution areas were discovered due to increasing research.

The species currently listed from the Southwestern Islands – Iriomote, Ishigaki, Okinawa and Amami, accompanied by many adjacent islands – have been considered threatened, but some researchers meanwhile made an extensive survey on the islands, and most of the listed species are now considered not much threatened. Thus 17 taxa should be deleted from the 2003 Red List. For example, *Matrona basilaris japonica*, two subspecies of *Coeliccia ryukyuensis*, *Chlorogomphus b. brunneus* and *Lyriothemis tricolor* are definitely not rare species at present.

On the other hand, *Mnais pruinosa costalis* populations in Boso Peninsula, including the male and female colour form ‘*edai*’, were considered not endangered when the IUCN Red List was decided. The males and females have opaque wings in contrast to the ordinary forms, the male form ‘*costalis*’, the male form ‘*ogumai*’ and the female form ‘*asahinai*’, which have orange transparent or hyaline wings. We noticed that the population size is diminishing, and it was nationally listed at the LP (local population) rank. But in 2002 and 2003 no individuals of the colour form ‘*edai*’ were found. It is very likely that some collectors caught too many, causing a severe decrease. We are afraid that the colour form might be threatened by extinction. It is not included in Table 1, because the IUCN Red List refers to taxa of the species group only.

Endemic taxa

On the global basis, endemic taxa are much more important. If they are extinct, it means extinction from the globe. Thus the globally focused Red List should deal with endemic taxa in its center. Some taxa, for example *Libellula angelina*, are not endemic to Japan: this species is also recorded from Korea and China. But through a series of extensive research, it revealed that this species is very likely extinct in Korea. The situation in China is not well known, and we are afraid of extinction in China (Inoue et al. 2002). Thus certain non-endemic taxa should be treated with the same concern as endemic taxa.

Taxa living in Japan at the edge of their range of distribution

Some taxa have their centre of distribution in Southeast Asia and are distributed also in Japan at the edge of their ranges. With these taxa, even if their habitats in Japan might be lost, there is no risk of being endangered globally. Yet the fact that such taxa are able to live in Japan should be noted.

CRITICAL SITES AND THREATS

Habitats suitable for Odonata are getting lost or critically degraded all over the world, and at an accelerating rate (Corbet 1999). This is also the case with Japan.

Suburban areas

The major threat to Odonata in Japan, in general, is the rapid urbanizing of suburban areas. Imported vegetables are much cheaper than those cultivated in Japan, and many farmers stopped farming. The farms have been sold and turned into housing lots, so-called “new towns”. The wetlands and rice fields were among the best habitats for a certain number of odonate species, and the ponds and irrigation ditches for rice fields were suitable habitats of still water species. When the rice fields are lost, these ponds and irrigation ditches become of no use and are filled up and converted to housing lots and factory sites. Thus a greater part of Odonata habitats have been lost in the last three decades (Inoue 1984; Inoue & Tani 1999).

Pollution of water in ponds and rivers by the effluents of factories and houses has been much reduced by sewage treatment plants and waste water disposal plants. The use of agricultural chemicals has been diminished, yet is still harmful to odonates.

The natural banks of ponds and rivers have been replaced by artificial banks covered by concrete blocks and placed in straight lines. Poor-quality streamside vegetation is a typical result. River beds are often built of concrete. People welcome such ‘improvement’ work because they are not aware of decreasing animals. The Japan Ministry of Land, Infrastructure and Transport started the “neonatural river reconstruction”. This is so to speak the Japanese version of German “naturnaher Wasserbau”, although being much modified by using such traditional Japanese materials as bamboo cages filled with rocks. Most river construction work is still carried out by artificial and non-natural methods, but the new construction method is being used more and more frequently .

The American crawfish *Procambarus clarkii* was first imported from the USA during 1920-1930, and this animal had been spread everywhere throughout rice fields, ponds and slow-running rivers soon after 1945. It preys on odonate larvae, on the prey of the larvae, and on aquatic vegetation, causing a decline in Odonata (Inoue 1984; Ecological Society of Japan 2002). But the introduction of a carnivorous fish, the Largemouth Bass *Micropterus salmoides* from the USA, has caused the most severe damage to both larvae and adults of Odonata. This fish preys heavily on odonate larvae in stagnant or slow-running water, and even catches patrolling males and ovipositing females of Odonata. Adults of *Epitheca bimaculata sibirica* Selys, 1887, *Cordulia amurensis* Selys, 1887 and *Enallagma boreale circumlatum* Selys, 1883 were common prey of the Largemouth Bass (Furusawa et al. 2002). *M. salmoides* was first imported in 1925 for food or fishing, then after 1965 it was brought to many other still water areas for lure fishing. At present it is very difficult to find a pond without Largemouth Bass. Most naturalists are aware of its harmfulness, but the lure fishing lovers and fishing equipment dealers

are very actively promoting Largemouth Bass fishing. They gathered one million signatories supporting the spreading of this carnivorous fish against the planned regulation law.

As the consequence of above mentioned issues, the most critical sites are suburban areas in Japan. Thus many species which had been considered 'common' or 'rather common' are much threatened now. This tendency is reflected by the fact that many formerly common species are transferred here to a higher threat category.

The only exception is Boso Peninsula in Chiba Prefecture. *Mnais pruinosa costalis*, including the male and female form 'edai', is much threatened, and the present situation seems to be one of near extinction (see above).

Isolated islands

The other critical sites are habitats on isolated islands inhabited by endemic species. Ogasawara Islands are situated in the subtropical zone in the Pacific Ocean some 1,000 km SSE of Tokyo. Thirteen species of Odonata have been recorded there, five species and two genera among them endemic to these islands (Inoue & Tani 1999). After 1980, most endemic species have much decreased. The first stage of decline was most probably caused by deforestation and reclamation. Then the introduction of goats followed. But the most critical situation was caused by introducing lizards, green anole *Anolis carolinensis* from USA, most probably by US soldiers as pets in the years when they occupied the islands. It is a strong carnivorous lizard, climbing high in the trees, and preying on every kind of insect (Ecological Society of Japan 2002; Karube 2002a, 2002b). Four among the 13 odonate species are designated as precious natural products by the Agency for Cultural Affairs, and collection is prohibited. But this law is, of course, of no use for protection from green anoles.

The other critical sites in the isolated islands are in the Southwestern Islands, namely Iriomote, Ishigaki, Okinawa and Amami islands, accompanied by many adjacent islands in the Ryukyu Archipelago, which lies between the Pacific Ocean and East China Sea. These islands are also subtropical and are inhabited by 35 endemic odonate taxa. Most of them were considered much threatened, but through extensive researches by frequently visiting and also resident odonatologists, the odonate fauna is now better known. Thus some taxa have been deleted from the Japanese Government Red List or transferred to a lower threat category. On the contrary, some habitats are being destroyed by construction and widening of woodland paths, and some odonate taxa are again facing threats at this time.

CONSERVATION PRIORITIES AND RECOMMENDATIONS

The odonate fauna of Japan is one of the better studied in the world. Year after year faunal lists – district lists as well the list of all Japan – are increasing. Yet most studies have been carried out without adequate quantitative measures. Thus the evaluation was made in an odd way: placing CR + EN in contrast to CR or EN. After the evaluation was made, some taxa have been quantitatively studied by the

members of the respective committees in the Division of Nature Conservation of the Japanese Society for Odonatology, and the revisional work of the Japanese Government Red List is on its way since 2003.

Suburban areas

Libellula angelina, one of the rather common species before the 1970s, is much endangered due to rapid urbanizing of suburban areas. This is one of the most sensitive species in its habitat preference. Females oviposit flying among the reeds in shallow ponds. Farmers traditionally keep the ponds with moderate density of reeds to keep the water quality fit for cultivation. It had been fit also as a habitat for *L. angelina*. When the farmers stop cultivating, ponds are left uncared for. If the reeds grow too densely, the females cannot fly among them. Females and immature males need refuges in the vicinity, sparse forest or open grass fields. These refuges are often lost when the farmers stop farming. In such way most of the habitats of *L. angelina* have been lost. This species was formerly recorded at 86 localities in 29 prefectures, but in 2000 its occurrence is confirmed at only 18 localities in six prefectures.

One of the good habitats, Okegaya-numa Pond, Iwata City, Shizuoka Prefecture, was at great risk of destruction due to the construction plan of a golf practice land. Some enthusiastic researchers and nature lovers started a movement to protect the pond from destruction in 1986. It was very fortunate that Iwata City and Shizuoka Prefecture bought the pond and the surrounding area to conserve nature there in 1989. This is one of the most fortunate cases, and the population of *L. angelina* has been conserved.

In 2001 a movement started to conserve *L. angelina* in Noyori-shin Pond, Nakatsu City, Oita Prefecture. At the first step, representatives of the farmers were not willing to sell the pond and the surrounding refuge areas. But through the enthusiastic explanation that this species is very precious, they agreed to sell and continue maintenance to keep the pond fit for this species. This pond contains a variety of species, including a number of Red List species beside *L. angelina*. This project was essentially to conserve the pond including its surroundings. Some blueprints of a nature park with the pond in its center were prepared. But the economic situation has turned much worse than in 1989, and neither Nakatsu City nor Oita Prefecture could afford to buy the area. The Environment Agency (now Ministry of Environment) started to protect this species in 1993 with a control law which prohibits collection of the species. The Ministry has some systems in which lands are bought by the Government to conserve nature. But one system is designed for untouched nature, while the others have too small budgets, shared by many candidates. Thus the plan is still suspended. It is strongly recommended that the Ministry of Environment will budget sufficient funds to buy or to help buy such real estate for conservation.

Elimination of alien carnivorous fish such as Largemouth Bass and Bluegill should be started as soon as possible. It is recommended that the Ministry of Environment stops the introduction of these fishes into ponds by law and enforcement. In 2003 the Prefectural Government of Shiga passed a law to prohibit

“catch-and-release” of these carnivorous fish at Lake Biwa. Lure fishing lovers and fishing equipment dealers are standing against the law or simply ignore it. When once these fishes are introduced in a pond or lake, it is impossible to exterminate them until they become cannibalistic after predation on all other aquatic animals.

Isolated islands

As to Ogasawara Islands, the most urgent matter is to start a system to protect Odonata and other endemic animals from the predation of the green anole. Some substantial measures are necessary to prohibit both bringing this animal to an island and dispersing them into the forest. To eliminate this animal from its present distribution is also urgently needed, although it is not an easy procedure.

As to the Southwestern Islands, it is recommended that destruction of natural resources should be stopped or minimized in balance with the inhabitants' welfare.

Publicity work

Odonata symbolize courage, strength, victory, and happiness in Japan (Asahina 1974; Corbet 1999). Traditional perceptions of dragonflies in East Asia and Europe differ markedly. In East Asian countries, such as China and Japan, Odonata are widely regarded as benign and auspicious, perhaps partly because the adults are abundant in rice fields on which people depend for their subsistence (Hayama 1982; Inoue 1989). Farmers also love dragonflies, and it is a pleasure for them to watch these insects flying above the ponds and rice fields. Even so, when they are considering to sell the real estate including the pond, it is not easy to have their consent to maintain good habitat dragonflies rather than selling. They do not know whether an endangered species breeds in their pond or not. Thus public relations work is necessary. On such occasion, an updated Red Data Book is necessary.

The Environment Agency (now Ministry of Environment) published the revised edition of the Red Data Book on plants in two volumes (Environment Agency 2000a, 2000b). It is planned to print the Japanese Government Red List of odonate taxa in the revised edition of the Red Data Book on insects, but its publication has been much delayed. In the meantime, the revision of the Japanese Government Red List started in 2003. It seems better to wait until the results are fixed and to print the latest version.

Finally, to achieve these ends when the practical results of agricultural policy and the aims of conservation continue to diverge, farmers will need to be helped, not merely exhorted, to conserve wildlife and landscape in addition to providing food (Moore 1977).

CURRENT ACTIVITIES

The Japanese Government raised the status of the Environment Agency to Ministry in January 2001. This is a remarkable event when most ministries and other agencies have to be downscaled and/or merged. It is expected that the Ministry of

Environment will extend its activity further. The Division of Nature Conservation of the Japanese Society for Odonatology is currently in a very active phase, and it is expected that the whole 15 committees will extend their activity to the future.

The publicity work to propagate knowledge about Odonata and dragonfly conservation to the people is on its way in various measures. The festival so-called "Dragonfly Citizen Summit" has been carried out every year in different localities since 1990. At first it was a small-scale one with very limited number of enthusiastic researchers and dragonfly lovers, but step by step it has developed into a big event gathering more than thousand participants. Localities so far were:

1990 – Yokohama City, Kanagawa Pref.; 1991 – Arakawa-ku, Tokyo; 1992 – Yorii-machi, Saitama Pref.; 1993 – Iwata City, Shizuoka Pref.; 1994 – Yokohama City, Kanagawa Pref.; 1995 – Nagoya City, Aichi Pref.; 1996 – Saga City, Saga Pref.; 1997 – Shiunji-machi, Niigata Pref.; 1998 – Kobe City, Hyogo Pref.; 1999 – Nakamura City, Kochi Pref.; 2000 – Kaizuka City, Osaka Pref.; 2001 – Ichikawa City, Chiba Pref.; 2002 – Tsuruga City, Fukui Pref.; 2003 – Nakatsu City, Oita Pref.

It is scheduled the 15th summit will be held in June 2004 in Kasama City, Ibaraki Pref. With this festival the number of dragonfly lovers has increased remarkably, and the knowledge and consent on conservation of dragonflies and their habitats have made some progress.

To conclude this report, I would like to say that the conservation of dragonflies and their habitats in Japan is in a good phase, yet many necessary measures remain to be carried out very soon.

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