

Indicator Fact Sheet

(BDIV07d) Non-indigenous species in rivers and lakes

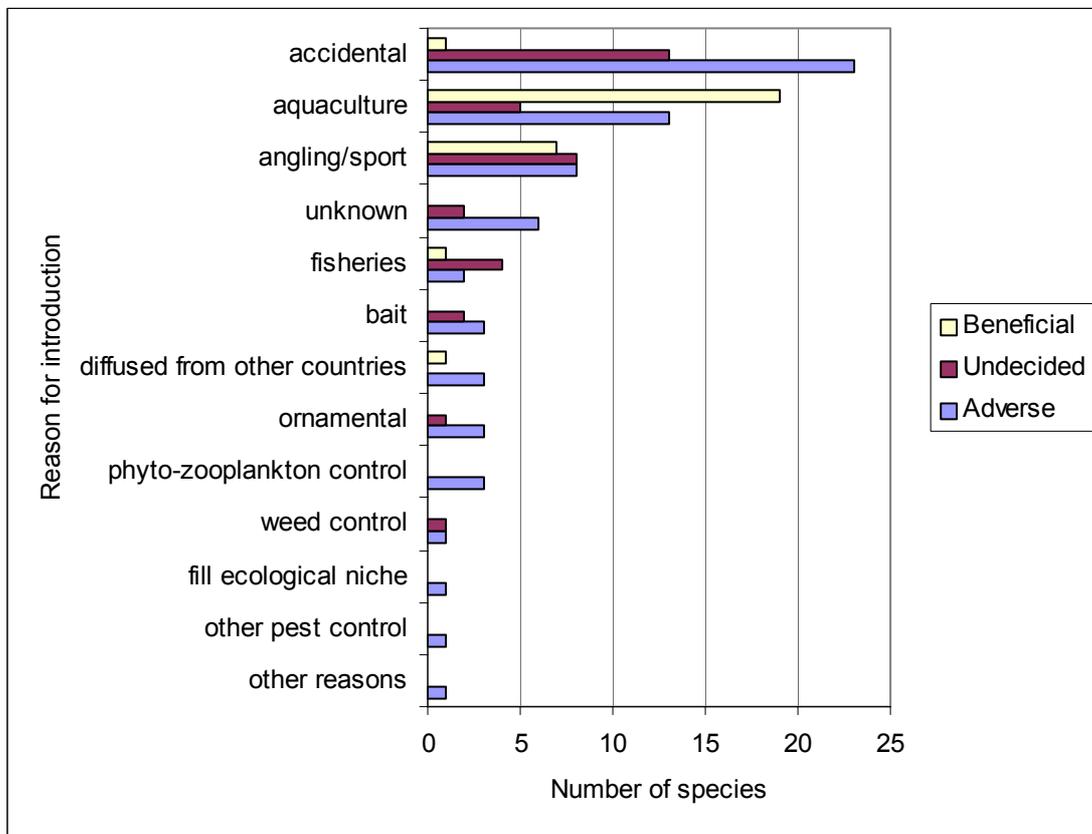
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Key message

★ The two most common reasons for introduction of non-indigenous species to rivers and lakes are by accident or from aquaculture, many of these non-indigenous species are having an adverse effect on river and lake ecosystems.

Figure 1: Number of introduced freshwater species, which have an ecological effect. Graph shows the ecological effect (beneficial, undecided or adverse) by reason for introduction.



Notes:

Sources: ETC/NPB and FAO (Database on Introductions of Aquatic Species (DIAS))
<http://www.fao.org/fi/statist/fisoft/dias/index.htm>

Countries included: Austria, Belgium, Croatia, Czech Rep., Slovak Rep., Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, UK

Results and assessment

Policy relevance:

Introductions of non-indigenous freshwater species occur often as a result of trade. For example, most intentional introductions are for aquaculture and unintentional introductions occur due to the movement of goods and people. There are therefore difficulties in producing regulations to control the problem since trade agreements tend to try to reduce the restriction on



the movement of goods rather than increase them. In fact, one of the cornerstones of the EU internal market is the free movement of goods. However, the economic burden caused by non-native species is massive. For example, in the US estimates of economic losses, due to non-native species, range up to several billion dollars (World Resources Institute).

Some guidelines exist to control the problems caused by non-native species and this is listed below:

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive) aims to establish 'favourable conservation status' for habitat types and species that require protection. Article 22(b) states that Member States shall ensure that the deliberate introduction into the wild of any species which is not native to their territory is regulated so as not to prejudice natural habitats within their natural range or the wild native fauna and flora and, if they consider it necessary, prohibit such introduction.

The International Convention on Biological Diversity (1992) calls on participating nations, as far as possible and as appropriate, [to] prevent the introduction of, [to] control, or [to] eradicate those alien species that threaten ecosystems, habitats, or species.

The Convention on the Conservation of European Wildlife and Natural Habitats (19 Sept. 1979 adopted. 1 June 1982 in force) aims to ensure conservation of wild flora and fauna species and their habitats. It has been ratified by 45 countries (mostly European). Article 11(2)(b) states that each contracting Party undertakes to strictly control the introduction of non-native species.

The IUCN has produced Guidelines for the prevention of biodiversity loss caused by alien invasive species (2000). These aim to help countries prevent and control the problem of non-native species.

The International Maritime Organisation has voluntary guidelines under MARPOL 73/78 (*'International Convention for the prevention of pollution from ships'*) for the control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and pathogens (Resolution A.868(20), 1997). It is hoped that mandatory guidelines will be in place by 2003. This is relevant to fresh waters, as some freshwater species have been transferred via ballast water (e.g. the Chinese Mitten Crab).

Environmental context:

A non-native species is an organism in an ecosystem other than the one in which it evolved and because it did not evolve it may cause havoc in its new environment, for example, by preying on and competing with native species, and disrupting food webs and introducing diseases. In fact, the introduction of non-native species is ranked as the second most important threat to biodiversity (World Conservation Union) (the first being habitat destruction).

There are numerous examples of the ecological devastation that the introduction of non-native species can cause. For example, Chinese Mitten Crabs (*Eriocheir sinensis*), originally from East Asia, now have a European distribution from Finland to Southern France (Clark et al, 1998). It is predominantly a freshwater species but migrates to the sea to breed and is believed to have arrived in the Thames in the ballast water of ships. They cause riverbank erosion and destabilise unprotected engineering earthworks since they can burrow deeply into them. They can also cross dry land to invade other river systems where they cause damage to the freshwater community. In the UK, for example, they prey on the native crayfish, *Austropotamobius pallipes*, which is already under threat from other non-native crayfish.

Assessment:

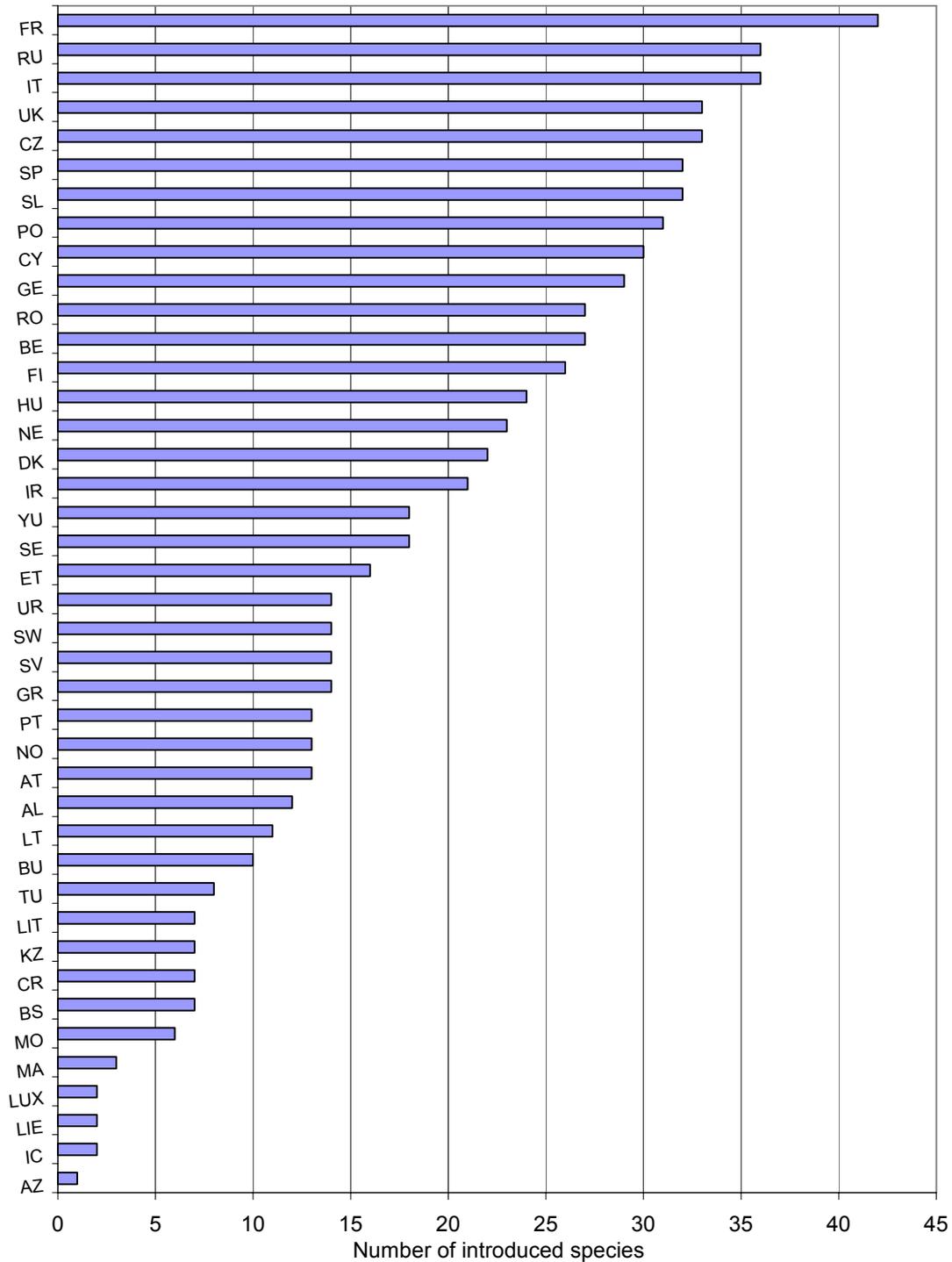
The majority of non-native freshwater species listed for EEA countries in the Database on Introductions of Aquatic Species (DIAS) have an adverse ecological effect. Adverse ecological effects may include introduction of parasites, habitat alterations, genetic deterioration and trophic alterations. The main reasons that non-native species have been introduced are accidentally, for aquaculture and for angling. Preventing future accidental introductions is the most difficult to tackle since it involves placing restrictions on the transfer of goods and people but introductions for aquaculture and angling could be strictly controlled.

Sub-indicators

Key message

☹ France, Russian Federation and Italy have the most recorded introduced freshwater fish species.

Figure 2: Number of introduced freshwater fish species by country



Notes:

Sources: Adapted from Carmona and Villarejo, 2002



References

- Carmona J. A. and Villarejeo, I. D. (2002) Identification of introduced freshwater fishes established in Europe and assessment of their geographical origin, current distribution, motivation for their introduction and type of impacts produced, ETC/NPB 2001 Work Programme
- Clark, P. F., Rainbow P. S., Robbins, R. S., Smith, B., Yeomans, W. E., Thomas, M., Dobson, G. (1998) The alien Chinese mitten crab, *Eriocheir sinensis* (Crustacea: Decapoda: Brachyura), in the Thames catchment. *J. Mar. Biol. Ass. U.K.* 78, 1215-1221.
- Invasive Species Specialist Group, IUCN (2000) Guidelines of the prevention of biodiversity loss caused by alien invasive species
<http://www.iucn.org/themes/ssc/pubs/policy/invasivesEng.htm#PREVENTION%20AND%20INTROD>
- Revenga, C., Henninger, N., Kassem, K., Payne, R. (2000) Pilot analysis of global ecosystems: Freshwater systems ISBN 1-56973-460-7

Data

Spreadsheet file: 0.1_fw_non_indigenous_species_DATA_30May03.xls

Meta data

Technical information

1. Data source: FAO, Database on Introductions of Aquatic species (DIAS) and Carmona and Villarejeo, 2002.
2. Description of data: DIAS lists the introduced species for each country and where they came from. There is also various other information in the database is such as the reason for introduction and the effects (ecological and social).
3. Geographical coverage: Global by country
4. Temporal coverage: NA
5. Methodology and frequency of data collection: The FAO database was started in the early 1980's consisting primarily of freshwater introduces species. In the 1990's a questionnaire was sent to national experts and the database now also includes marine species. The FAO now ask people to write in if they know of species that should be included. The report by Carmona and Villarejo does not mention where the data is from although it looks like it is also mostly from DIAS.
6. Methodology of data manipulation, including making 'early estimates': Records were selected by whether they were listed as having an ecological impact. Records for marine species were removed.

Quality information

7. Strength and weakness (at data level): Many species are listed as having an unknown ecological effect and so in many cases the data was not detailed enough for this indicator.
8. Reliability, accuracy, robustness, uncertainty (at data level): The data is not particularly reliable as it does not appear to be as a result of a robust scientific investigation but rather a list supplied by each countries. No doubt some countries have more detailed records on non-native species that others but that does not mean that the problem is worse in that country.
9. Overall scoring (give 1 to 3 points: 1=no major problems, 3=major reservations):

Relevancy: 2

Accuracy: 2

Comparability over time: 3

Comparability over space: 2

Further work required

Obtain the whole database from FAO and then ask each EEA member country to validate the data and give further details about the ecological effects of the non-native species.