Common Midwife Toads © Matthew Fisher

POLICY BRIEF

Wildlife Diseases on the Increase: a Serious Threat for Europe's Biodiversity

The example of the *Bd* fungus disease

Severe infectious diseases of wildlife are on the increase mainly due to the globalization of trade leading to increased mobility of pathogens, including invasive alien species. These epidemics are a serious threat to biodiversity and result in the degradation of ecosystem functioning. Research by the BiodivERsA-funded RACE project on the pathogenic fungus *Batrachochytrium dendrobatidis* (*Bd*), which has caused population declines and extinction in amphibians worldwide, brings evidence of this threat in Europe.

The EU Biodiversity Strategy calls for halting biodiversity loss by 2020. Policy action is needed to engage with the increasing threat of wildlife diseases, and preclude and mitigate the adverse effects of newly emerging pathogens on Europe's biodiversity. Several EU policies (wildlife trade, invasive species and animal health) and better coordination of measures among them could contribute to addressing the problem and help reach the 2020 targets.

- **Dramatic declines** and mass-mortalities of amphibian species in Europe due to *Bd* spread
- **Widespread distribution** of the *Bd* fungus, now present in at least 17 European countries
- Threat of introducing **new highly virulent strains of *Bd*** into Europe

- It is suggested that EU legislation, especially on **wildlife trade, invasive species**, and **animal health**, better addresses the threat posed by wildlife diseases to biodiversity
- **Better regulation of trade** in vector species (e.g. infected amphibians) would reduce disease spread
- Full enforcement in the EU of the **recommendations of the World Organization for Animal Health** (OIE) is advised
- Wildlife diseases need to be better reflected in reporting on the conservation status of species under the **EU Habitats Directive**
- **Better coordination** of EU measures tackling wildlife epidemics is recommended

The context

The spread of new infectious diseases harming animal and plant species across natural landscapes is growing. Examples include diseases of forest trees (ash dieback and sudden oak death) and animals (crayfish plague, squirrel parapoxvirus, avian pox, bird trichomonosis and amphibian ranavirus), which includes fungal and non-fungal pathogens.

The *Bd* fungus has caused declines in amphibian populations worldwide which have resulted in several amphibian species extinctions. Chytridiomycosis, the disease caused by *Bd*, has impacted many amphibian species in tropical rainforests causing rapid population declines and local extinction of 40% of affected species. This has led to significant consequences on ecosystem functioning by changing the ecology of aquatic and terrestrial habitats where amphibians are important components of foodwebs (food for many species, predators on insects).

Chytridiomycosis was first detected in Europe (Spain) in 1999 where it led to the nearly total loss of once common montane populations of midwife toads. Knowledge on the wider scale and extent of the impact of the pathogen on the biodiversity of European amphibians is still largely lacking.

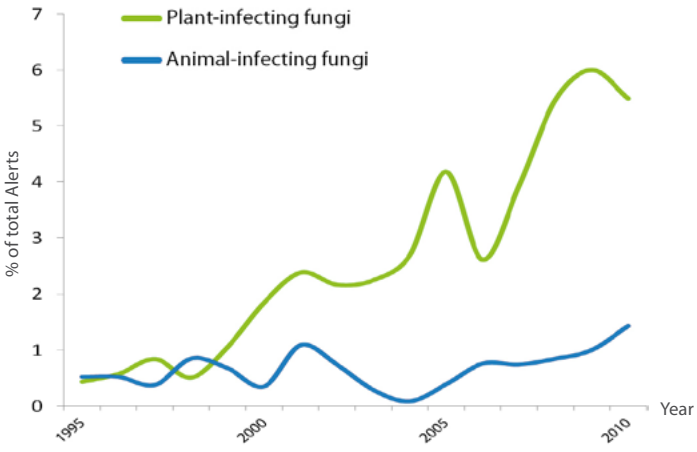

Figure 1: Trends of disease alerts worldwide in the ProMED database (http://www.fas.org/promed) for pathogenic fungi of animals and plants, RACE project (appeared in *Nature*, vol.484, no. 7393, 2012).

The BiodivERsA-funded RACE project has carried out research on the *Bd* fungus and has quantified the threat posed in Europe by the fungus while improving knowledge on the key causes of its spread. The final outcome of the project is a European Threat Abatement Plan soon to be released. The alarming data revealed by the project shows the need to address the problems posed by the increasing spread and impact of wildlife diseases in Europe by developing and adopting adequate policy action.

Key research results

Europe-wide distribution

The RACE project revealed that the *Bd* fungus is widely spread in Europe. The fungus has been detected in 17 EU Member and affiliated states, in French Guiana (an outermost region of the EU), and on Mediterranean islands (including Corsica, Sardinia and Mallorca) which harbour a large proportion of endemic amphibian species. It is likely that the *Bd* fungus has not yet been detected in other European areas due to insufficient sampling, implying an underestimation of the damages and risks for the future. Multiple strains of the fungus have been identified, which differ in their virulence. Some strains have been detected in the amphibian trade but not in nature, showing that there is a risk of introducing new *Bd* strains into Europe.

Figure 2: Presence of the *Bd* fungus on the European continent: the size of circles indicates the numbers of amphibians sampled and the colour indicates the % infected with *Bd* at the country-level, RACE project (www.bd-maps.net). The data on Sweden come from the National Swedish Veterinary Institute.

Population declines of amphibian species across Europe

The *Bd* fungus has been implicated in declines of several European amphibian species (listed in the Annexes of the EU Habitats Directive). These declines have been especially severe in previously common species, such as the midwife toad. The prevalence of the *Bd* fungus and the severity of disease it causes vary between species.

Some species have suffered extensive mortality leading to a significant decline of their natural populations. Examples are found on mainland Spain and Portugal (Common midwife toads and Fire salamanders), on the island of Mallorca (e.g. Mallorcan midwife toad) and on Sardinia (Tyrrhenian painted frog).

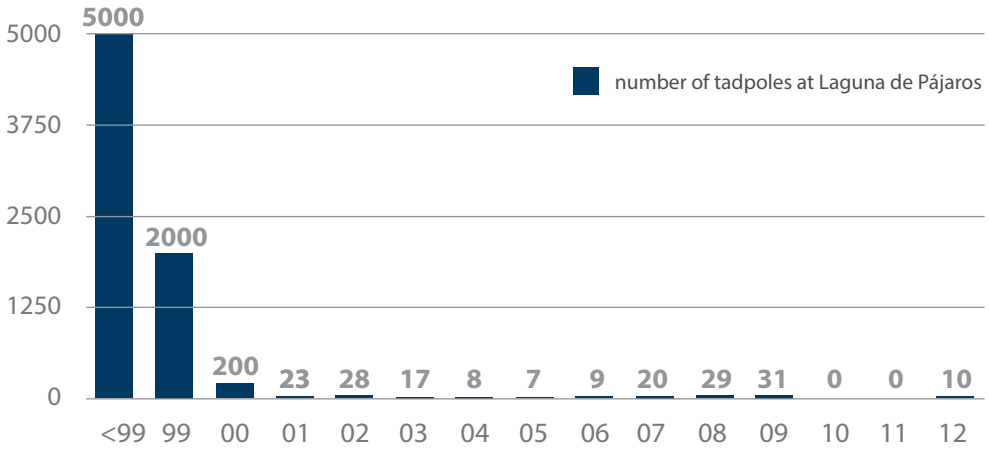

Figure 3: Rapid declines of midwife toads in the Sierra de Guadaramma, Spain, RACE project (Dr Jaime Bosch).

Human-induced movement

Movement of amphibians between continents mainly for trade purposes is one of the major causes of *Bd* spread worldwide. The global amphibian trade moves millions of frogs annually for a variety of purposes, such as food, animal pets and biomedical research. While a large amount of frogs intended for human consumption are imported frozen, a substantial amount is imported as live frogs (e.g. Switzerland imports 450,000 live frogs for human consumption annually). Human movement of *Bd*-infected amphibians is known to contribute to the introduction of the pathogen on the European continent, and amphibians that are traded may carry novel strains of the infection. Many of the traded amphibian species which can be infected are alien to Europe and their introduction contributes to biological invasions.

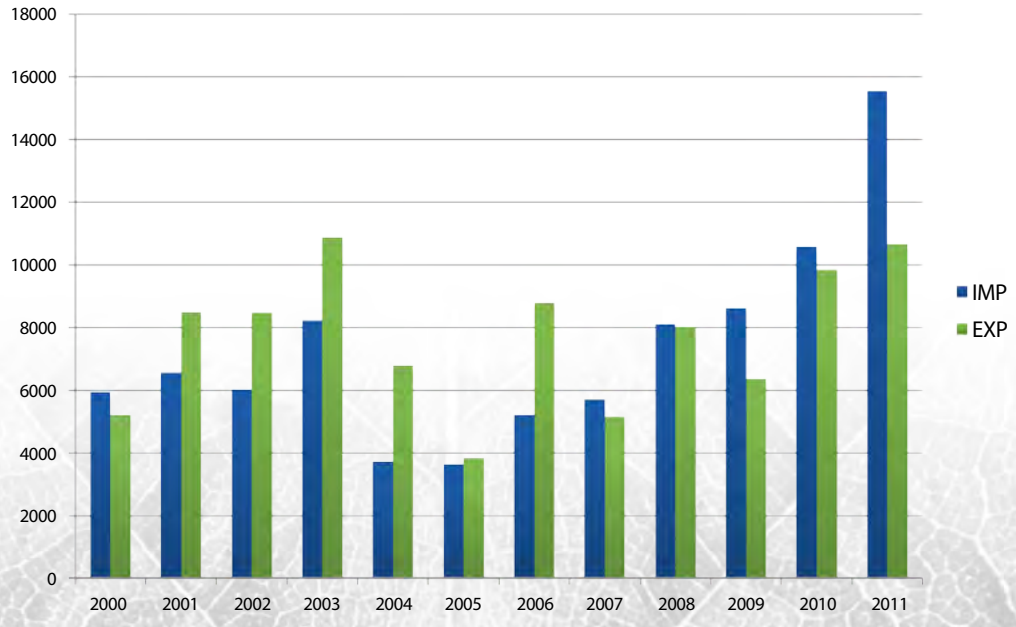

Figure 4: EU imports (blue bars) and export (red bars) of 60 amphibians listed in Annexes A-D of the EU Wildlife Trade Regulations during the period 2000-2011. Of all exports reported, 95.3% are live animals. Data from CITES Trade database by UNEP-WCMC.

Policy recommendations

The research results indicate that action against spread of wildlife disease affecting species is needed to halt biodiversity loss by 2020, as called for by the **EU Biodiversity Strategy**. Although no specific studies were conducted by RACE or during the production of this brief on the effectiveness and cohesion of current policies, the knowledge produced highlights measures which can help address the problem of wildlife diseases in a sufficient and cohesive way.

Annex B of the **EU Wildlife Trade Regulations** lists species whose conservation status may be threatened by trade, and species which, if introduced into the EU, could pose an ecological threat to native European species. Further research into species carrying diseases, their countries of export and the volumes of imports into the EU would facilitate decision-making concerning new potential listings. Restrictions on the form in which infected species are traded (processed, frozen, etc.) and/or on countries of origin, could be adopted. Complementary to this would be the development of a specific code for vector species in the **Harmonised System of the World Customs Organization** which would allow for monitoring of trade in specific species, even if these are not listed in the Annexes of the EU Wildlife Trade Regulations.

Invasive pathogens responsible for infectious diseases, such as the *Bd* fungus, need to be duly considered in the upcoming **EU legislation on Invasive Alien Species**. Alignment of the new legislation with existing measures, such as on wildlife trade, is recommended. It is suggested that traded exotic species carrying diseases are subject to specific prevention measures and regulation of movement within EU boundaries. Enforcing codes of conduct for the trade in recreational and ornamental invasive species would be an additional measure (the Council of Europe has produced a European Code on Conduct on Zoological Gardens and Aquaria on Invasive Alien Species, *T-PVS/Inf (2011) 26 revised)*.

Infectious diseases are among the main threats to biodiversity and they are not entirely recognized in EU biodiversity policy. The Annex II of the **EU Habitats Directive** lists species for which necessary conservation measures shall be established. In the case of the *Bd* fungus, several amphibian species listed in the Directive's Annex are known to suffer widespread mortality due to the disease the fungus causes. It is advised that reporting on the conservation status of species better reflects that wildlife diseases are a threat to biodiversity.

The proposal of the European Commission for an **EU Animal Health Law** recognises that diseases occurring in wild animal populations may have a detrimental effect on the environment and biodiversity. The Commission is tasked with listing the diseases which will be regulated under the Law in synergy with the **World Organization for Animal Health (OIE)** listings, and enforcing appropriate biosecurity and monitoring. These proposed measures for tackling wildlife disease need to correspond to adequate and coordinated enforcement.

To identify, then control and reduce, the spread of wildlife diseases impacting biodiversity in Europe, appropriate regulation and monitoring based on **enactment and enforcement of the recommendations of the OIE** are suggested. Due to the fact that little is known about the extent of impact of wildlife infectious diseases on biodiversity, a rapid, prompt and effective response to any potential threat is needed in order to prevent future epidemics.

Better coordination of measures tackling wildlife epidemics is recommended. In addition, training of relevant stakeholders on biosecurity measures and methods of combating emerging disease in nature would be beneficial, as would maintaining science-policy dialogue at national and EU levels.

Links to sources

RACE scientific papers
http://www.biodiversa.org/130
RACE maps
http://www.bd-maps.net/

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About this Policy Brief

This Policy Brief is part of a series aiming to inform policy-makers on the key results of the biodiversity research projects funded by BiodivERsA and provide recommendations to policy-makers based on research results.

The series of BiodivERsA Policy Briefs can be found at www.biodiversa.org/policybriefs.

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The key research results presented here were validated by Prof. Matthew C. Fisher (Imperial College School of Public Health, London), leader of the RACE project and project colleagues. Input was provided by IUCN Amphibian, Wildlife Health and Invasive Species Specialist Groups, TRAFFIC, the Amphibian Survival Alliance and the Swedish National Veterinary Institute.

The policy recommendations made do not necessarily reflect the views of all BiodivERsA partners, nor of IUCN.

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