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For several years, a group of researchers from the Department of Ecology of the Charles University Faculty of Science and the Institute of Botany of the Academy of Sciences of the Czech Republic have been collaborating within the DAISIE international research project studying biological invasions. The project which has delivered many important findings and implications can also become a unique tool of environment protection on a global scale. On the Czech part, the project leaders are Prof. RNDr. Vojtěch Jarošík, CSc., deputy head of the Department of Ecology of the Charles University Faculty of Science, and Doc. RNDr. Petr Pyšek, CSc. from the Institute of Botany of the ASCR, deputy director and head of the Department of Ecology of Invasive Plants. He is currently working in New Zealand because “New Zealand is the promised land for the invasion biologist…”

What makes the DAISIE European project unique and how many countries and research centres took part in it? How was the project divided?

The DAISIE project was unique in that it gathered all the existing information on biological invasions in Europe into one database. We are gradually analysing it and learning a lot about invasions that would otherwise be impossible to learn only by studying invasions in individual regions.

It was also unique in that it covered the complete range of invasive organisms – plants, fungi, invertebrates as well as vertebrates in all types of environments – on land, in freshwater and marine ecosystems. It required the cooperation of many people who until then had worked separately according to their respective specializations. Therefore many valuable contacts were forged and the cooperation has continued even after the project concluded. Eighteen institutions from 15 countries took part in it, the Czech partner being the Institute of Botany of the ASCR. We had a number of collaborators from across Europe, so the monograph summarizing the outcomes of the project has almost 200 authors. The crucial part of the project was the creation of a database; other parts included writing detailed papers on the 100 most significant invasive species in Europe and monitoring their occurrence. Another outcome is the aforementioned monograph and a database of experts on invasions. Data analyses and ensuing publications in scientific journals were another important part.

From left to right: Prof. RNDr. Petr Pyšek, CSc., the Institute of Botany of the ASCR, head of the Department of Invasion Ecology, Prof. RNDr. Vojtěch Jaroších, CSc., deputy head of the Department of Ecology of the Charles University Faculty of Science

What are the outcomes of the project and how will it affect the approach to environment protection in Europe and worldwide?

Thanks to DAISIE we now know that there are about 11,000 non-indigenous organisms in Europe and the invasion continues, even accelerates. Even though most of them aren't harmful in any way, the minority which is, very much

affects all types of Europe's ecosystems. In one paper we summarized the ecological and economic consequences of invasions and showed that the level of contamination of individual countries can be very well described by the level of their economy. DAISIE can serve as a model for cooperation in other parts of the world because the problem of invasions is really global and needs to be tackled on an international level. The outcomes of DAISIE have served as a scientific base during the preparations of a European strategy for tackling invasive species.

Do biological invasions of non-indigenous plants and animals have any positive aspects, too?
Definitely, even though we should use the word "introduction" rather than invasion in this context. Humankind is dependent on non-indigenous flora and fauna. Take for example food production: most staple crops in our country are not native. But there is little positive to the invasion itself, the uncontrolled proliferation.
Can you imagine different parts of the world without the introduced non-indigenous species? Has there ever been such a time or would anything like that be even possible?
Our countryside was last free from non-native species before the start of the Neolithic Era and it's perhaps clear that no one can imagine a return to such a state, but it's not the point in the first place. After all, the boundaries of occurrence of plants and animals always changed and species spread into new habitats. It became a problem when these processes assumed large dimensions and great intensity owing to humans. The aim is not to eradicate all non-native species; we would miss many of them because we are used to them and perceive them as inherent to our ecosystems. It is necessary to define the priorities and focus on those species which do cause unwanted changes – they squeeze out the native species, alter the landscape, change the basic functions of ecosystems, threaten human health etc. And as for the other species, we can live with them quite well. It is also important to create an efficient system limiting introduction to a bare minimum (there are a number of possibilities in controlling the movement of goods), to concentrate on the dangerous routes of introduction, to monitor the occurrence of new species and respond quickly in the case of a dangerous species, to have first-rate, well-sorted and accessible information, to raise awareness among the population. In the case of invasions, just like in medicine for example, prevention is more efficient and cheaper than treatment.
Is it possible to calculate the losses caused by the invasive species? How much money do European states spend on fighting existing invasions? Is the introduction of non-indigenous species more critical in the case of plant or animal species?
There are a large number of estimates as to how much invasion is costing us. One frequently cited study estimated that at the turn of the millennium invasions swallowed five percent of the gross world product every year. What is perhaps most interesting for us is the recent estimate, partly based on DAISIE data, that invasions are costing the EU almost 13 billion euro each year. And that is certainly a conservative estimate because for the United Kingdom alone the estimate is 1.7 billion pounds. Of course, individual estimates differ according to the method of calculation and quality of data but whether the figures are accurate or not, no doubt huge amounts are in question. And cultural, irreversible losses related to the extinction of a certain species are usually not included because there is in fact no way of expressing them in numbers. And we cannot say that either plant or animal invasions are more serious; it depends on the specific species, region and conditions.
What affects the introduction of invasion species more: travelling and transport or climate change?
Most definitely travelling and transport but mainly trade and economic factors in general. Climate change creates more favourable conditions for certain specific species but it is probable that others will recede because the new conditions will not suit them. But regarding the potential influence of climate change on invasions we are still in the realm of guesswork because invasions are complex, they depend on a number of factors and therefore predictions are difficult.
Thank you for talking to i-Forum.
(Marie Kohoutová)