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Conclusion

Invasive species
Part 1: general aspects and biodiversity
Part 2: concrete examples

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From the various contributions to these two thematic issues of the OIE *Scientific and Technical Review*, it is clear that, since prehistoric times, humans have invaded every region of the globe and all its ecosystems, in many cases modifying them decisively. During their migrations, humans have carried along with them, intentionally or otherwise, a whole host of animal species, both domestic and non-domestic, some of which have gone on to become established in the newly conquered territories. The articles in these two issues of the *Review* provide numerous examples of this. The number of cases of invasion increased with the domestication of the horse and the Age of Discovery, and continues to increase in the current climate of globalisation.

Accompanying these changes is the degradation of ecosystems, such as the ongoing deforestation of primeval forest.

Another remarkable fact is that potentially invasive species exist in every part of the plant and animal world; among vertebrates, they include mammals, birds, reptiles, amphibians and fish.

The year 2010 is the International Year of Biodiversity and the articles gathered here reveal a clear link between loss of biodiversity and the presence of certain invasive species (by whatever definition, academic or pragmatic). The example that comes most readily to mind is the introduction of domestic species (such as the goat) into the emblematic ecosystem of the Galapagos Islands, or that of placental mammals into Australia, with their significant impact on the indigenous marsupial fauna. Most extraordinary of all is the discovery that there still exist in these lands undescribed species that have escaped observation for centuries. This is the case of the pink and black land iguana which was discovered only recently on the slopes of a volcano on Isabela Island in the Galapagos (1). Only 200 individuals of this species are said to remain!

Maintaining biodiversity (ecosystems, species) and intraspecific variability is crucial in enabling evolution to continue, and in envisaging the selective breeding of domestic animal species in directions other than those currently followed. The study of the processes of the ancient and modern-day selective breeding of the chicken (*Gallus gallus*), a species that has become so important today, towards ever more genetically homogenous breeding lines, is a prime example of loss of variability on a global scale (3).

Conversely, the selective breeding of numerous canine breeds to meet virtually the whole gamut of human requirements (including as companion and working animals), is an example of maintaining variability (5). Now that the canine genome sequence is complete, this variability is proving very useful in comparative pathology, and ought to make it possible to pinpoint the genetic root of a number of human and animal diseases.

The fashion for new companion animals should be viewed with caution. In general, the veterinary community lacks validated scientific information concerning these species, which can not only become invasive themselves, but can also be the source of introductions of little-known or unknown new pathogens, with unexpected consequences.

One of the articles in this compendium signals the importance of insect pollinators, such as the honey bee and various hymenoptera, in ensuring the viability of certain fruits, vegetables, cereals and other crops. Insects such as bumble bees can be used in a confined-production context. However, at global level, we are seeing a steady deterioration in the situation of domestic bee colonies for various reasons, including human activities. Given that bees play such a major role in the production of certain agricultural crops, the possible consequences of this deterioration give cause for concern. The importation into Australia of beetles intended to process ruminant dung is another example of the use of insects for agronomic or environmental purposes (2); the potential longer-term consequences of this have not been evaluated.

While the implications of invasive species may be easy enough to grasp, in practice they seem tricky to address (4). How can the evolutionary and adaptive potential of diversity in domestic and wild animals and plants (including micro-organisms) be retained in a 'globalised' world that is undergoing radical upheavals, in such a way as to provide decent food for more than 6 billion human beings, while at the same time preventing biodiversity degradation and human, plant and animal epidemics?

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