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for sustainable agriculture in Europe**

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**Conflicts between wildlife  
and agriculture**

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## Introduction

About 8000 years ago, Europe saw a radical change in our ancestors' economic and social behaviour. They began cultivating plants and rearing domestic animals, thus becoming settled tillers of the soil and livestock breeders. From that time onwards human beings had constantly to fend off a variety of herbivores, rodents and birds, which had hitherto been potential prey but had now become animal competitors. The large carnivores merely strengthened their competitor status, having now been lured into man's immediate vicinity by the presence of livestock. The Neolithic revolution was conditioned by environmental change and certainly brought about radical upheavals in habitats, which had a whole series of ecological consequences. This was the beginning of an era when human beings were to begin impinging seriously upon their natural environment. Starting off from the Fertile Crescent to the north of Arabia, this revolution has, over the millennia, spread to cover virtually the whole earth's surface. Natural habitats have inexorably retreated before the advance of milieus indelibly marked by a permanent or recurrent human presence, bringing about successive transformations (roads, houses, fields with crops and livestock, etc). Alongside this human advance carnivorous and herbivorous wildlife species either became extinct or came into conflict with man and his crops and herds. For over fifty years now, however, this trend has been reversing. Thanks not only to the changing modes of agricultural production but also to the depopulation of rural areas in Europe, forests have now made a comeback and are taking over a great deal of the territory in some countries (See Table 1). Nevertheless, the conflicts are continuing, indeed worsening, between wildlife and farming activities. Despite the use of pesticides certain insect species have undergone genetic mutations and eventually developed a resistance to these substances. Other species which were on the verge of extinction, eg some bird species and large carnivores, are now recovering thanks to international legislation on wildlife protection. The ungulates, most of which are game species, have benefited from the increased availability of fodder, the current disappearance of the larger predators and also and above all, the hunting plans introduced by most European hunters, which have led to an ungulate "boom". Those involved in managing environments and species are thus faced with burgeoning populations, after some decades of crisis for the great majority of species. The types of conflict between wildlife and farming activities are as many and varied as the species involved. Furthermore, different countries adopt different approaches to conflicts with individual species. This report is not aimed at presenting one specific approach to each conflict, but rather at providing a pan-European overview. At a time when the principle of rational and sustainable use of natural resources is recognised by the main actors involved in environmental issues, a balanced point of view should be maintained on the interests of agriculture and biological diversity in order to encourage a joint approach, as Ms Véronique Herrenschmidt, Chair of the Working Group on Agriculture and Environment, has pointed out in the context of the work on the Council of Europe's Pan-European Biological and Landscape Diversity Strategy.

## 1. Legal framework

The measures taken in cases where wild animal species damage farming activities (crops or livestock) depend directly on the legal status of the species inflicting the damage. There are several possible scenarios, depending on whether the animals in question are classified as “protected” or “game” species.

In the case of protected species, the damage caused is usually subject to a system of compensation by the State that has ratified the protection agreements. For game species, compensation for damage comes from a variety of sources. It depends not only on the status of the game species (before actual hunting) in the country in question (see Table 1), but also on the texts governing hunting activities in each country.

**Table 1. General data – hunting rights**

	% wooded areas	Legal status of game
<b>E.U.</b>	<b>36</b>	
Austria	40	<i>res nullius</i>
Germany	30	<i>res nullius</i>
Belgium	20	<i>res nullius</i>
Denmark	10	<i>res nullius</i>
Spain	21	<i>res nullius</i>
Finland	58	<i>res nullius</i>
France	25	<i>res nullius</i>
Ireland	6	<i>res propria</i>
Italy*	29	<i>res publica</i>
Luxembourg	32	<i>res nullius</i>
Netherlands	9	<i>res nullius</i>
Portugal	38	<i>res nullius</i>
United Kingdom	9	<i>res nullius</i>
Sweden	49	<i>res nullius</i>
<b>Non-EU</b>		
Hungary	18	<i>res communis</i>
Lithuania	28	n.d.
Norway	23	<i>res nullius</i>
Poland	28	<i>res nullius</i>
Czech Republic	34	<i>res nullius</i>
Romania	26	See comments
Slovakia	40	<i>res nullius</i>
Slovenia	50	<i>res communis</i>
Switzerland	30	<i>res nullius</i>

\*excluding Sardinia  
n.d. : no data available

At the European level, there are three legal texts dealing with the protection and/or conservation of wildlife: the Bern Convention, the EEC Directive on Fauna, Flora and Habitats and the EEC Directive on Birds.

### 1.1. The Bern Convention

This Convention concerns the conservation of wildlife and the natural environment in Europe. When a member state of the Council of Europe ratifies this text, this state is required, under Article 6, to take the appropriate measures to protect wild fauna species, as well as their natural habitats. These measures are supposed to help maintain wild fauna and flora populations at levels corresponding to ecological, scientific and cultural requirements or to increase them to such levels, while also taking account of economic and recreational considerations. However, Article 9 of the Bern Convention

provides for possible exceptions to this strict protection obligation. This exception facility is aimed at enabling states to prevent serious damage to crops or livestock, provided that there is no satisfactory alternative and that the exception will not be detrimental to the survival of the species causing the damage.

## **1.2. European Union Directives**

### **1.2.1. The Directive on “Fauna, Flora, Habitats”, 92/43/CEE**

This Directive parallels the Bern Convention, but only applies at European Union level. It concerns the conservation of natural habitats and the wild fauna and flora species present in these habitats, and is aimed at ensuring the preservation of biological diversity and the maintenance in or restoration to a positive state of conservation of natural habitats and wild fauna and flora species of Community interest. Article 12 of the Directive requires Member States to take the necessary measures to establish a system of strict protection for animal species of Community interest. Nevertheless, Article 16 provides for derogation from such strict protection provided that there is no satisfactory alternative and that the derogation is not detrimental to the survival of the potentially damaging species. Such derogation must be such as to prevent damage to crops, livestock, forests, fisheries, water or any other types of property.

### **1.2.2. Directive “Birds”, 79/409/CEE**

This was the very first EU Directive on wildlife, and, as its title would suggest, it deals exclusively with avifauna. Its purpose is to guarantee optimum protection for birds in the European Union while at the same time permitting the restricted culling of specimens. Such culling may be effected in the context of hunting activities or, as stipulated in Article 9, in the interests of public health or air safety or in order to prevent serious damage to crops, livestock, forests, fisheries and water.

## **2. Conflicts**

### **2.1. Carnivores**

Conflicts between European carnivores and agriculture are concentrated in the area of stockbreeding, and affect all the activities in this field from fish farming to cattle and horse breeding. The only carnivorous species liable to damage crops is the bear, which consumes fruit and, less commonly, cereals. It should be noted that game reserves, which are treated as equivalent to agricultural undertakings, have very few problems with large carnivores in that such reserves allow animals neither in nor out.

Having been chased, or even eradicated, from most of the European regions, over the past few years the large carnivores have been recovering in number, mainly thanks to the new strict protection regulations. The large carnivores in question are the brown bear (*Ursus arctos*), the wolf (*Canis lupus*), the lynx (*lynx lynx*) and the wolverine (*Gulo gulo*). The latter only concerns the northernmost part of the continent, whereas the other three species are to be found in almost all the Member States of the European Union and the Council of Europe. The geographical distribution of these species (cross-border mountain areas) and the dimensions of their living environments (several tens of thousands of hectares) highlight the importance of the international legislation protecting them.

The protection accorded to these species (Bern Convention and “Habitats” Directive”) is the main factor enabling them to recover the territories they had abandoned. Nevertheless, other factors to be considered are the general increase in wooded areas, the human depopulation of rural areas and the recent concern to maintain corridors for wildlife movement. The natural bear and lynx populations have further been reinforced with releases of additional specimens, mainly from Eastern Europe.

After the disappearance of the large carnivores, stockbreeders no longer had to take any account of the “predator” factor, and breeding methods began to orient towards extensive grazing without close supervision (by full-time shepherds or sheepdogs, with enclosures, etc). The obvious consequence of the return of the large carnivores was therefore a clash with the stockbreeders, who have been unreceptive to the biological and political rationale behind the return of these potential competitors. This incomprehension is reflected in a phenomenon of rejection of the large carnivorous species, despite the compensation on offer. It should be noted that “natural” losses from a herd average approximately 3.5% per year, whereas when large carnivores are involved this percentage rises to 6%.

The type of livestock most prone to attacks from large carnivores are sheep and goats. These two species are attacked by all large carnivores without exception. Larger livestock species such as cattle, horses and reindeer herds in the Nordic countries are mainly attacked by lone bears and wolf packs, whereas the lynx and the wolverine prefer smaller prey.

Large carnivore populations fare differently from country to country, but those in Central Europe are currently the most viable. The viability of wolf and lynx populations in Western Europe is improving, and the compensation paid to stockbreeders keeps step with increases in these populations. There is no single document recapitulating the amounts of compensation paid for damage caused by large carnivores in Europe, but we might take the example of the French State: between 1993 and 1999 the Government paid 6 million French francs in compensation for 5 250 animals killed by some thirty wolves. Questions are beginning to be asked about regulation of the sums used to compensate for damage caused by protected large carnivore, because given that public monies are earmarked for the purpose, the debate is a political one, which is not necessarily a good thing, in biological terms, for the species concerned. The town- and city-dwelling majority are against regulating the large carnivores, but the victims of the attacks are country-dwellers, who end up feeling frustrated at being “abandoned to their fate”. In central European countries the large carnivores are regulated by hunting, which soothes stockbreeder resentment without jeopardising population viability.

#### Countries authorising regulated wolf hunting (hunting season):

- Bulgaria (all year round)
- Czech Republic (all year round)
- Estonia (all year round)
- Latvia (all year round)
- Lithuanie (01/07 to 01/04)

#### Countries authorising regulated bear hunting (hunting season):

- Bulgaria (01/09 to 31/12 and 01/03 to 15/04)
- Czech Republic (all year round)
- Estonia (01/08 to 31/10)
- Romania (all year round)
- Slovenia (01/10 to 30/04)

#### Countries authorising regulated lynx hunting (hunting season):

- Estonia (01/11 to 28/02)
- Czech Republic (01/01 to 28/02)
- Latvia (01/10 to 15/03)
- Romania (15/09 to 31/03)

The policy on large predators in one country may have repercussions on a neighbouring country. In Scandinavia, for instance, Norway has been invaded by “Swedish” wolves, a glaring example of what is happening and is liable to happen increasingly in the next few years in other regions of Europe. This leaves us with no choice but to introduce a genuine Community policy for managing the large carnivores.

However, these large carnivores are not the only ones that clash with farming activities: smaller species also make inroads into the resources provided by stockbreeding. Given that prey size is proportional to predator size, most of the attacks by smaller carnivores concern poultry farms. The red fox (*Vulpes vulpes*) is foremost among the smaller destructive carnivores. Its populations have exponentially increased in recent years thanks to the anti-rabies vaccination campaigns aimed at

eradicating this epizootic, which is transmissible to human beings. The fox is classified as a game species, or even a “pest”, in all European countries. Despite the heavy hunting pressure its populations are constantly growing, and more and more fox colonies are to be found in the towns and cities.

Where small carnivores are concerned, the European otter (*Lutra lutra*) is the only protected species likely to have any impact on agricultural activities, particularly fish farming. The Czech Republic is the only European country with sufficiently large otter populations to require culling. The species may be hunted throughout the year, although a special licence is required.

## 2.2. Ungulates

There are 13 species of European ungulate: the wild boar (*Sus scrofa*), roe deer (*Capreolus capreolus*), red deer (*Cervus elaphus*), fallow deer (*Dama dama*), Sika deer (*Cervus nippon*), white-tailed deer (*Odocoileus virginianus*), reindeer (*Rangifer tarandus*), elk (*Alces alces*), mouflon (*Ovis aamon*), chamois (*Rupicapra rupicapra*), Alpine ibex (*Capra ibex*), muntjac (*Muntiacus muntjak*) and Chinese water deer (*Hydropotes inermis*). Only the United Kingdom has significant populations of the last two species.

Damage to agricultural and forestry activities from wild ungulates is a real technical and economic problem that is liable to jeopardise future croCCPng and woodland renewal. Throughout Europe ungulate populations are experiencing simultaneous geographical and demographic expansion. The two phenomena combined is inexorably leading to increasing conflict with farming activities. This situation stems from the increasing numbers and size of areas where ungulates can thrive and the emergence of maize monocultures where they can take shelter and feed. However, the main factor in ungulate expansion has been the management policies pursued by hunters, which set out selective hunting plans and restrict the hunting seasons, two modes of damage limitation and prevention commonly applied in most European countries (see Table 2). Furthermore, there are no exceptions to this combination of factors in any of the non-EU countries in Europe (although wild boar may be hunted all year long in Norway, this species is not regarded as native to the country). On the other hand, there are considerable exceptions in the European Union.

The only restriction in Denmark and the United Kingdom is a limited hunting season. Again, the only measure taken by Portugal in this field is to subject ungulate game species to compulsory culling plans. Some member states go so far as to make inter-species distinctions in matters of regulation. In Belgium, for instance, fallow deer and mouflon are only subject to limited hunting periods, though this measure applies exclusively to Wallonia.

Alongside species management measures, technical steps are taken to prevent damage to farmlands or forests (eg electric fencing around crops), and the relevant provisions are fairly uniform at the European level. Measures to prevent agricultural damage are optional in all countries, except Belgian Flanders, where they are not practised, and Hungary, where they are systematic.

**Table 2. Organisation of population regulation**

	Roe deer	Red deer	Fallow deer	Sika deer	White-tailed deer	Reindeer	Elk	Mouflon	Chamois	Ibex	Muntjac	Chinese water-deer	Wild boar
E.U.													
Austria	CCP + HPL	CCP + HPL							CCP + HPL	CCP + HPL			CCP + HPL
Germany	CCP + HPL	CCP + HPL	CCP + HPL	CCP + HPL			Spec.licence	CCP + HPL	CCP + HPL	Protected			CCP + HPL
Belgium	CCP+HPL (F+W)	CCP+HPL (W)	HPL (W)					HPL (W)					CCP (F+W)
Denmark	HPL	HPL	HPL	HPL									
Spain	CCP + HPL	CCP + HPL	CCP + HPL						CCP + HPL	CCP + HPL			CCP + HPL
Finland	CCP + HPL		CCP + HPL		CCP + HPL	Protected	CCP + HPL	CCP + HPL					HPL
France	CCP + HPL	CCP + HPL	CCP + HPL	CCP + HPL				CCP + HPL	CCP + HPL	Protected			FH/CCP+HPL L
Ireland		CCP + HPL	CCP + HPL	CCP + HPL					CCP + HPL				
Italy	CCP + HPL	CCP + HPL	CCP + HPL					CCP + HPL	CCP + HPL	Protected			CCP + HPL
Luxembourg	CCP + HPL	CCP + HPL	HPL					CCP + HPL					HPL
Netherlands	CCP + HPL	CCP + HPL	CCP + HPL					Protégé CCP					CCP + HPL CCP
Portugal	CCP	CCP	CCP										
United Kingdom	HPL	HPL	HPL	HPL							HPL	HPL	
Sweden	HPL	CCP + HPL	HPL				CCP + HPL						HPL
Non E.U.													
Hungary	CCP + HPL	CCP + HPL	CCP + HPL					CCP + HPL					CCP + HPL
Lithuanie	CCP + HPL	CCP + HPL	CCP + HPL										CCP + HPL
Norway	CCP + HPL	CCP + HPL				CCP + HPL	CCP + HPL						FH
Poland	CCP + HPL	CCP + HPL	CCP + HPL	CCP + HPL			CCP + HPL	CCP + HPL	Protected				CCP + HPL
Czech Rep.	CCP + HPL	CCP + HPL	CCP + HPL	CCP + HPL	CCP + HPL		Protected	CCP + HPL	CCP + HPL	CCP + HPL			CCP + HPL
Romania	CCP + HPL	CCP + HPL	CCP + HPL				Protected	CCP + HPL	CCP + HPL				CCP + HPL
Slovakia	CCP + HPL	CCP + HPL	CCP + HPL				Protected	CCP + HPL	Protected				CCP + HPL
Slovenia	CCP + HPL	CCP + HPL	CCP + HPL					CCP + HPL	CCP + HPL	CCP + HPL			CCP + HPL
Switzerland	CCP + HPL	CCP + HPL						CCP + HPL	CCP + HPL	CCP + HPL			CCP + HPL

For Belgium, F = Flanders and W = Wallonia

- HPL = Hunting period limitation
- CCP = Compulsory culling plan
- FH = Free hunting



Despite all the efforts at management and prevention, the damage caused is increasing year by year, and most countries now provide compensation. In France, annual compensation paid for agricultural damage increased from 4.6 million francs to 147 million between 1970 and 1999. In two-thirds of all cases farmers have to comply with strict eligibility criteria for such compensation. Where damage to farming activities is concerned, only Ireland and the United Kingdom provide no compensation whatever, whereas in Luxembourg and Hungary compensation is automatic.

It is interesting to note that in all cases of agricultural damage the compensation is provided by hunters, except in Denmark, Finland and Norway.

### 2.3. Birds

Conflicts between agricultural activities and avifauna populations are dealt with in many different ways. Distinctions have to be drawn between protected and game, and sedentary and migratory species, not forgetting dietary differences (there are carnivorous, piscivorous, frugivorous and granivorous birds). Most “problem” birds are migratory and, like the large carnivores, affect several parts of the European continent, or indeed areas beyond the western Palaearctic region. This aspect increases the importance of securing as broad an international legal framework as possible, while also allowing for locally based, grass-roots conflict management.

For the purposes of this report the “dietary” approach would seem the most suitable in that conflicts with agricultural activities usually concern the search for food.

Carnivorous birds (birds of prey): of all the birds of prey present on the European continent, the goshawk (*Accipiter gentilis*), being a bird-eater, presents poultry farmers with the greatest problems. Nevertheless, the damage it causes should be put into perspective, since it is usually limited in time and in the number of specimens killed. All birds of prey are protected, but they can be captured and taken to sites remote from sensitive areas (open-air poultry farms).

Piscivorous birds (fish-eaters): for some ten years now many fish farmers have been reporting a constant increase in predation by cormorants (*Phalacrocorax carbo*) from extensive fish-farming basins. Ornithological monitoring has confirmed that this species is in good health and geographically expanding. The nesting population in the southern parts of the North Sea (Germany, Netherlands, Denmark and Poland) increased from 10 000 pairs in 1960 to over 80 000 in 1995. Even though they are protected, derogations have been granted in order to reduce the pressure in extensive fish-farming regions. In Estonia and Romania the cormorant has been classified as a game species. During the first half of the 20th century it was a northern European culinary tradition to raid cormorant nests. The prohibition of this practice naturally contributed to the population boom.

The grey heron (*Ardea cinerea*) are not, as yet, inflicting the same levels of damage as the cormorant, but fish farmers are expecting a similar scenario in the near future. Nevertheless, given that the heron’s diet by no means consists exclusively of fish and that it only hunts alongside the basins, it presents much less potential for conflict than the cormorant.

Frugivorous birds: many birds are fruit-eaters, which makes them potential pests. The decisive factor is their population density. The starling (*Sturnus vulgaris*) is the species that causes most damage in fruit and wine producing areas. Every year the northern and central European populations migrate right across the continent in huge flocks comprising several thousand individuals each. This species is classified as game or even as pests, but insufficient numbers are killed to prevent extensive destruction of fruit crops.

Granivorous birds: agricultural conflicts with this type of bird are concentrated on two separate periods, namely sowing/germination time and the grain ripening phase. The main species involved are the wood pigeon (*Columba palumbus*), the crane (*Grus grus*), the greater flamingo (*Phoenicopterus ruber*), the greylag goose (*Anser anser*), the bean goose (*Anser fabalis*), the white-fronted goose (*Anser albifrons*) and the brent goose (*Branta bernicla*).

The wood pigeon is considered a major pest in regions specialising in pea production, where it causes extensive damage mainly at sowing time, but also during harvesting. The use of certain pesticides (Promet 500, furathiocarb) has killed thousands of wood pigeons and other species. These pesticides should be gradually withdrawn from the market, but this will nevertheless leave the problem of the damage intact.

The greater flamingo can cause occasional problems in rice-producing regions, as in the Camargue, where preventive measures (eg planting high hedges) have reduced its impact on rice-growing activities.

There are several species of so-called “wild” geese, differently distributed from region to region. Density fluctuations are such that they are classified as game in some places and protected in others. These birds migrate in flocks of several thousand individuals, gathering in food-rich areas prior to and during migration. The areas in question are usually fields of winter or spring cereals, with the geese feeding on the young shoots. In northern Germany, where farmers are no longer able to cope with the geese concentrations, an innovative management strategy has been jointly developed by hunters and ornithologists. The birds are hunted only in sensitive cropping areas, whereas the local wetlands are out of bounds for hunters, leaving the birds with a haven of peace. Some countries provide compensation for the damage caused, but not systematically. The crane is in a similar situation, but it is never hunted and has smaller populations than geese. Preventive measures also include leaving certain crop fields for birds to feed, and maize stubble fields may also be leased from farmers so that they are not ploughed immediately after harvesting.

Where conflicts with avifauna populations are concerned, we should not overlook the impact of farming on all species (particularly insect-eating birds). While some birds can damage crops, the use of chemical pesticides and consolidation of agricultural holdings can lead, and has already led, to a major reduction in many bird populations. We might mention the grey partridge (*Perdix perdix*), Montagu's harrier (*Circus pygargus*) and the corn bunting (*Miliaria calandra*). In these cases the conflict is there, but it is the animal species that are losing out.

## 2.4. Rodents

For a very long time rodents were the main threat to crops in Europe. Far more formidable than the tusks of a wild boar or the teeth of any larger animals, rodents' incisors endangered cereal crops, cabbages, market gardens, vines and young fruit trees. Cropping methods gradually changed, heralding a succession of rodenticides which all but exterminated such hitherto abundant species as the common hamster (*Cricetus cricetus*). This species is now protected, but it is nonetheless just above the extinction level. The last remaining large pockets of hamster population are in central Europe, where chemical extermination methods are as yet little used or unknown.

The ground vole (*Arvicola terrestris*), on the other hand, is still thriving, and continuing to cause serious damage in the regions in which it is present. In order to combat this scourge farmers have used such highly toxic substances as Bromadiolone, a non-selective poison which destroys not only the ground vole but also all other rodents which are not present in excessive numbers. The complete disappearance of these rodents is causing imbalance in prey populations and the predators are turning to other species, which can jeopardise the whole balance of a given biocoenosis. Moreover, rodent carcasses are eaten by carrion-feeding species, which then die in turn from bio-accumulation.

The brown hare (*Lepus europaeus*) and the rabbit (*Oryctolagus cuniculus*) can now be regarded as having fallen prey to farming techniques. At one time these two species were indeed pests and did damage crops, but for some twenty years now their populations have been dwindling. The rabbit is still very much at large in a small number of areas, where it causes damage to the immediate environs of hunting grounds (browse lines), but generally speaking the species has succumbed under the pressure of disappearing hedgerows and myxomatosis, which was introduced in the mid-20th century in order to limit populations. If presented with the right conditions, The rabbit would very quickly recover its original densities thanks to its high reproductive capacity. Hare populations have also plummeted in a very few years. Changes to crop rotation systems (concentrating on single-crop farming), agricultural machinery (the danger of leverets being crushed) and the emergence of new diseases (eg the European Brown Hare Syndrome) are the main reasons for this drop in numbers. The damage caused by hare is more dispersed (browse circles) than that caused by rabbits, and is therefore less serious for farmers. The species is very adaptable, and the introduction of agri-environmental measures is/would be sufficient to maintain satisfactory densities.

## 2.5. Insects

Entomofauna is the wild life group with the largest number of species, most of which are harmless or indeed useful to agriculture. However, some of them find certain crops irresistible. A separate report would be needed to take stock of all the species involved, but we might mention the example of the European corn borer, which has expanded in proportion to cereal crops. Throughout the second half of the 20th century colossal chemical resources were implemented to eradicate crop-destroying insects, in vain. Today, not only have we failed to eradicate these insects, but they now present genetic features adapted to the pesticides used. Agriculture is gradually turning towards an integrated mode of combat which consists in using predatory insects or pheromone traps to regulate insect pests.

## 2.6. Invasive species

Damage caused by animal or vegetable “aliens” totals billions of dollars. Biodiversity really is under threat from “invasive species”, which are micro-organisms, plants and animals that are transplanted accidentally or intentionally from their natural habitat and behave like conquering imperialists, eliminating local species. The consequences of “bio-invasions” therefore go far beyond a mere loss of biodiversity. In addition to their ecological cost, they occasion serious economic losses: the International Union for the Conservation of Nature (IUCN) estimates that controlling the one hundred or so animal or vegetable “aliens” it has identified would cost several tens of thousands of dollars per year. The French authorities are beginning to address the issue. In 2000 the French Ministry of the Environment launched a three-year research programme on biological invasions (Invabio), which is to cost 7 million francs.

Where ungulates are concerned, Sika deer in Ireland provide a significant example. A number of individuals escaped from captivity, reproduced, and have now formed populations which are in direct competition with red deer for food. The result has been an increase in damage to forests as well as genetic contamination, with the emergence of a hybrid species resulting from cross-breeding between the species. There are also invasive species of rodent, such as the coypu (*Myocastor coypus*) and the muskrat (*Ondatra zibethicus*), two species which cause serious damage to dams and crops adjacent to their burrows. More recently, Italy has seen the emergence of the grey squirrel (*Sciurus carolinensis*), a species imported from North America which is threatening the red squirrel (*Sciurus vulgaris*) and also making considerable inroads into crops. On the insect front, the Colorado potato beetle (*Leptinotarsa decemlineata*) has been increasingly invading Europe, aided and abetted by international trade.

## 3. Recommendations

Until recently the issue of conflicts between wildlife and agricultural activities have tended to be seen in black and white. One side has regarded wildlife as a negligible quantity to be eliminated in the interests of productivity, while the other has considered (intensive) agriculture as the scourge of biodiversity. After half a century of confrontation, many species have considerably dwindled or become extinct, while others have adapted to innovations and are posing a very real threat to future agricultural resources. There have been more and better publications and research projects on the impact of agriculture on wildlife than on the impact of wildlife on agriculture.

In the case of the large carnivores, the problems are concentrated on extensive livestock farming. It would be absurd to advocate abolishing this farming method in order to stop the attacks by these animals. Such attacks can never constitute a sufficient reason for abolishing extensive livestock farming, as this would entail changing the system over to intensive farming, with a concomitant need for crops, mechanisation, pesticides, transformation of landscapes and an eventual loss of biodiversity. The situation is still steeped in the emotional arguments for or against the large carnivores. It is vital to sidestep this deadlock and work on the basis of reliable scientific data, although the lack of funds mean that these are not always available. European legislation authorises regulation, while providing for exceptions and derogations. This is valid for precarious and/or

threatened animal populations, but the fact is that some large predators are no longer in this situation and would survive or even benefit from selective culling. Why should the rational exploitation of large carnivores not be an option for Europe? The African model, where hunting brings in foreign currency to help shaky economies, could be applied in central European countries, while in European Union countries revenue from hunting could be injected into prevention, compensation and research. Norway, where the wolverine has been subject to hunting plans since 1993, provides an excellent example of this approach. Every year, up to a maximum of some fifty specimens may be hunted, some thirty animals are actually killed and the population remains in a very healthy state of conservation. Of course this solution requires the State to be involved in species management, with 100% of the money made available being invested in overall improvement of the "large carnivores" issue. Moreover, this solution would have the advantage of maintaining economic activity (hunting and "green" tourism) in regions reeling from the effects of rural depopulation. In this way the large predators could be regarded as an asset by local populations, who would have to be involved in the front line of Community policy-making in the field of protecting animal species.

The debate on conflicts between ungulates and farming is liable to become more heated over the next few years. Ungulate populations are constantly growing and are being increasingly hunted, but hunters will be powerless to prevent damage in the long term. The natural solution might be an epizootic bringing population levels down to levels compatible with agricultural activities. Some regions already have cases of swine fever, which affects wild boar, keratoconjunctivitis in chamois, and an as yet unknown ailment which is decimating the excessive roe deer populations. These veterinary health questions should be taken very seriously, because some diseases might be transmitted to domestic herds, leading to yet another new type of conflict between wildlife and farming activities.

It must be said that Community policies have so far failed to calm the controversy surrounding all the animal species involved, but particularly the large carnivores, migratory birds and invasive species. The admission of new countries into the European Union will only fuel additional conflicts because these new countries will have a different approach to wildlife management. It is unfortunate that 23 years after the entry into force of the "Birds" Directive it is still proving impossible to set out European guidelines on the management of migratory bird species. There is no official network guaranteeing reliable, up-to-date information on wildlife in Europe, as such information is generally obtained after six months of painstaking research. There is an obvious reason for this situation, ie the fact that debates are based on subjective rather than objective elements. The only way out of this legislative, but above-all ecological no-win situation is to set up an independent supranational body responsible for managing wildlife in Europe. Wildlife is part of the natural heritage shared by all Europeans. Its management should be neither dictated by dogmatic criteria nor monopolised by minority fringes of the population (such as hunters, anglers, naturalists). The main role of such a body would be to manage the large carnivores, migratory birds and invasive species. Drawing on the examples already existing in Canada and the United States, Europe might even improve on them by including agricultural and forestry issues right from the outset and going beyond the problem of wildlife in the narrow sense. The body could be financed by all the countries of Europe, and would provide centralised information on wildlife to be subsequently used for the implementation of Community law.

## **Conclusions**

In the debate on conflicts between wildlife and agriculture, it is vital to realise that these are not one-way clashes, since not only can farming techniques have adverse effects on wildlife but, as we have seen, the reverse is also true. In the second half of the 20th century the exponential expansion of chemical pesticides combined with the ever-increasing use of agricultural machinery led to the "supremacy" of farming activities. Many species have fallen prey to such changes. Today, when European agriculture is facing a series of environmental and food-related scandals, attitudes seem to be gravitating towards taking greater account of rural biodiversity issues in agricultural policy. However, we must also beware of the opposite extreme. It is illusory to attempt to implement "hermetically sealed" agricultural policies, which often boil down to removing human beings from

their natural environment. Whether we like it or not, the European natural environment has been subject to enormous human influence, though this does not mean the death of nature, on the contrary. Wherever environment-friendly agriculture is practised, the biodiversity observed is equal to or greater than that to be found in uncultivated tracts of the countryside. Cropping techniques geared to improving cohabitation between wildlife and agriculture are being constantly perfected. These agri-environmental measures are expensive in the short term, although costs can provisionally be covered from public subsidies. Nevertheless, in the long run the consumer will have to pay for a sound environment. This is where the institutional and political world must take up the challenge of transferring the debate on rational use of natural resources from the ecological sphere to the economic field. The fact is that farmers, particularly the younger ones, are quite willing to practise sustainable agriculture, but such farming methods has a higher cost, which must be reflected in the final product.

Hunters must be urged to take responsibility for the vital issue of damage caused by wildlife, especially that inflicted on crops and forestry by ungulates. Even if the damage is often taken care of by hunters, we cannot allow certain ungulate populations to bring to naught the best efforts of farmers and foresters. Attitudes must change, and this process has already begun, as it has in the agricultural world.

After half a century of blunders, cohabitation between wildlife and farming would seem to be taking a new direction. The European institutions must support this endeavour in order, finally, to secure peaceful coexistence.

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