GUIDELINES FOR ACTION PLANS FOR ANIMAL SPECIES: PLANNING RECOVERY

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Executive Summary

This study, prepared under the terms of a contract (26 February 1997), analyses the way Action Plans for threatened animal species are presently drafted and proposes guidelines for future Action Plans. It is accomplished in accordance with Recommendations 43/1995, 48/1996 and 51/1956 of the Standing Committee of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention).

Habitat protection and ecologically sound management of ecosystems is the most cost-effective approach to preserve the diversity of species in a given territory. However, in many cases, species highly threatened with extinction require urgent measures to stop their fate. This species-oriented approach to conservation varies from country to country and even within different adminis-trations, but basically, the response will involve specific protection measures and, eventually, specially oriented management activities. The latter are termed recovery management.

Recovery planning may take place at different levels. It covers everything from global programmes or guidelines for action (international, regional, etc.) which have to be further developed, to the more implementation oriented Recovery Plans or Projects. These final outputs of recovery planning are technical workplans that programme the activities needed to return the targeted species to a status in which it can survive on its own within the ecosystem.

A first chapter is devoted to analyse the policy and legal background for animal recovery planning at the international, European and national levels. The analysis is not exhaustive, but covers the most outstanding cases, giving a qualitative view of the general policy context and legislative framework involved. There is not a single approach, nor should it be.

In the next chapter, the different types of existing plans, whether formal or informal, are studied from the structural point of view. Particular emphasis is given to those – like the United States Species Recovery Plans– which have a long tradition and implementation record. The European experience (scope, content of plans, co-ordination, etc.) is considered also with some detail.

Net results from recovery activities are varied and have been assessed in many cases. Based on the recommendations extracted from the literature, and as a result of the analysis accomplished in this study, a set of considerations and recommendation for future recovery planning are presented. These rank from terminological aspects to target units, species recovery responsibility, scale and scope of action, status assessment, criteria for listing and species selection for recovery, contents of plans, public involvement and implementation. Some technical and scientific aspects are also discussed, as well as public awareness and funding. Conceptual differences between Species Programmes, Species Action Plans, Recovery Plans and Recovery Projects have been established in order to avoid confusion.

The study has been contractually restricted to animal species and focuses mainly on Europe, although, much of the discussion and recommendations apply equally to plants and can likewise be useful in regions outside of Europe. The following extract is not complete, but contains perhaps the most outstanding considerations from the organisational point of view :

a) Integrated ecosystem management and habitat protection hold greater advantages for the preservation of biodiversity than species-by-species efforts. Species recovery should be restrictive and considered only for crisis situations.

b) Species recovery involves assessing, planning and implementing actions related only to species that are at risk of extinction (threatened species) and should be conceptually separated from general species conservation or management activities.

c) Species recovery efforts improve considerably when action is assumed by specialised governmental agencies and there is national legislation providing the legal framework for protection and the necessary instruments -like Recovery Plans- to implement recovery action. Recovery Plans benefit from having a legal basis.

d) The Convention on Biological Diversity and the Pan-European Biological and Landscape Diversity Strategy provide a good policy context to frame the development of domestic law for threatened species oriented recovery.

e) International non-governmental organisations and secretariats of regional conventions are well positioned to act in species recovery on an international scale, assessing status of multi-country ranging species, proposing action in a coherent manner, helping to co-ordinate the action and monitoring results with a global scope. Action Plans of multi-country species should always involve experts and interested parties from as many range states as possible.

f) Governments should promote the assessment of the conservation status of all species within their jurisdiction. The inclusion of any species in an official catalogue or list of threatened species, should always be preceded by a thorough process of status assessment conducted strictly in biological terms. The use of the new IUCN system of categorisation is recommended.

g) The initiative for proposing species to be registered in the official lists should be open to universities or any interested group or individual, with the understanding that such proposals have to be appropriately documented and justified.

h) Clear selection criteria should be established to reduce the list of species for recovery action to realistic terms. Umbrella species should receive high priority because of their inclusive benefits for conservation. Endemic species should also receive preference (Endemism Responsibility Principle).

i) Multi-species recovery planning is preferable to single-species planning, when the life history of the species are equivalent or when the solutions to their problems are coincident in time and place. The establishment of legal provisions should provide the opportunity for multi-species processes.

j) A community approach seems to be more efficient in planning conservation and recovery of almost "sedentary" invertebrates, like snails and many insects. A combined plant-invertebrate strategy is preferable for those cases.

k) In order to avoid academically biased or unrealistic results, experienced conservation managers should participate in the preparation of Action and Recovery Plans.

l) Mechanisms for public participation in recovery planning should be enabled at least for those cases where species recovery actions are like to have socio-economic impacts.

m) In order to facilitate their general acceptance and funding chances, Action Plans prepared by co-operative efforts of non-governmental organisations should seek the endorsement of inter-governmental bodies (e.g. Council of Europe).

n) Recovery planning should rely on <u>state-of-the-art principles</u> and practices to enhance the chances for success. However, some data-hungry quantitative models should be considered with caution in order to avoid everlasting research. There should be an eclectic trade-off between the wish for more rigor in the planning and the need for producing results as soon as possible.

o) Species Action Plans and Recovery Plans should have explicitly stated <u>objectives</u> that can be used for evaluation of recovery performance. Action related to those objectives should be prioritised. The "do-everything" approach is to be rejected.

p) <u>Recovery action</u> should basically be oriented first towards protecting and stabilising the existing population, and then, to restore part of the historical distribution and to link isolated population. Restocking and re-introduction may be considered under this scope.

q) <u>Monitoring</u> is an essential part of Recovery Plans. It should be adequately budgeted and planned as research directed to follow-up the results of recovery activities implemented. Plan review should be grounded in good monitoring.

r) It is more preferable to design flexible and general public <u>education</u> programmes relating to threatened species rather than embedding specific programmes in each Action or Recovery Plan. Targeted public awareness campaigns are to be used as a tool when the recovery of a species requires special public support or confronts controversy.

s) A tuned <u>co-ordination</u> structure has to be established in multi-party implemented Recovery Plans. Statement as to who is the primarily responsible partner should not be vague.

t) Recovery Plans and Projects have to be directly funded and supported in order to be implemented in real life. <u>Cost estimates</u> should be responsible and reflect priorities expressed. Eventual land-acquisition costs should be budgeted separately.

u) Recovery success is highly dependent on <u>professional and organisational performance</u>. Badly staffed or newly involved agencies in species recovery should give priority to the recruitment of professionals or the training of existing personnel. Training should include "adaptive management" as it is considered to be fundamental for sound recovery implementation.

No doubt that species recovery is a rather complex and challenging activity where much effort is involved. However, it is worth the attempt and morally rewarding, even if we do not see all the results expected. The effort itself is a noble cause.

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1.   INTRODUCTION

1.1 Conservation today

The increasingly intensive and extensive impact of human activities and technology in the biosphere has provoked a parallel reaction of interest in the conservation of nature and natural resources. In the last few decades, conservation has become a concern and is an accepted activity in most societies ; the Earth Summit of Rio (June 1992), just being a conspicuous example of this tendency.

Starting from the initial venal public reactions against the destruction of beautiful sites or the disappearance of lovely animals, we have ended with devoted professionals trying to apply solid biological conservation science to crude socio-economic development strategies. The gap between is paved with all sorts of intermediate situations. Science is value free, but conservation as an applied science, is heavily value laden. Therefore, cultural and economic differences between the countries, as well as special administrative styles, have generated a varied scenario. The goals may be the same, but the approaches, manifold.

At the end of the 20th century, conservation efforts have achieved reasonable results, but clearly, not sufficient to overturn the balance (c.f. WCMC, 1992). The erosion of genetic diversity, the climatic drift, expansive pollution, soil loss, forest shrinkage and other man made or influenced calamities are still pinch points for humanity. There will be no future development without more conclusive conservation; nature assets are to become exhausted or ruined for man.

In the recent First World Conservation Congress (Montreal 1996) the message of Jeff McNeely, Chief Scientist of IUCN, was clear. The world is now more conscious of the environment and conservation needs; that was what we intended, and we won the battle we defined 20 years ago. The new battle ahead is implementation (c.f. Holdgate, 1996); how do we put in practice the ideas of sustainable development in today's complex world. New approaches based on the better knowledge of systems dynamics are emerging. Ecosystem management and restoration ecology (Cairns, 1991a) are bringing new light to modern conservation, but this does not invalidate habitats or species-specific conservation as traditionally addressed. Perhaps, we should improve them, but not forget about them.

1.2 Species extinction

Shrinking the scope to the preservation of biodiversity, the panorama seems to be very challenging. According to Peter Raven estimates (1987) the planet was losing 100 species a day in 1995 and this pace would increase to 250 by the year 2005. Edward O. Wilson (1989) predicts an overall reduction of 20% in species numbers in the next decade or two. These types of predictions may be over-emphasised or "inflated" to better market conservation concern, but even so, there is general agreement that the present extinction rate is higher than it would have been without man's influence (Barbault & Sastrapradja, 1995). Actual records of extinction show that island endemics and some species of economic interest are the most drastically affected (c.f. Bibby et al. 1992).

Extinction is defined as the irrevocable loss of a biological element (Gilpin & Soulé, 1986). When a species goes extinct, we lose all potential uses (medical, agricultural, industrial, etc.) ; the normal functioning of ecosystems may be disengaged, and the integrity of nature is pruned. Moreover, "every form of life is unique, warranting respect regardless of its worth to man" (Preamble, U.N. World Charter for Nature).

Extinction is forever and, if man was the cause, the only thing we can do is reflect on it and learn from it. There are many other species on the path of extinction. The most recent assessment of the status of the European fauna is found in the last edition of the «IUCN Red List of Threatened animals» (IUCN, 1996) ; see Table I.

Table I. Number of threatened species in European Countries (IUCN 1996)

Country	Mammals	Birds	Reptiles	Amphibians	Fishes	Invertebr.
Albania	2	7	1	0	7	3
Andorra	0	0	0	0	0	2
Austria	7	5	1	0	7	41
Belarus	4	4	0	0	0	6
Belgium	6	3	0	0	1	13
Bosnia and Herzegovina	10	2	0	1	6	6
Bulgaria	13	12	1	0	8	7
Croatia	10	4	0	1	20	8
Czech Republic	7	6	0	0	6	17
Denmark	3+1	2	0	0	0	10
Estonia	4	2	0	0	1	3
Finland	4	4	0	0	1	8
France	13	7	3	2	3	61
Germany	8	5	0	0	7	29
Greece	13	10	6	1	16	9
Hungary	8	10	1	0	11	26
Iceland	1	0	0	0	0	0
Ireland	2	1	0	0	1	2
Italy	10	7	4	4	9	41
Latvia	4	6	0	0	1	6
Liechtenstein	0	1	0	0	0	4
Lithuania	5	4	0	0	1	5
Luxembourg	3	1	0	0	0	4
TFYROMacedonia	10	3	1	0	4	2
Malta	0	2	0	0	0	3
Moldova	2	7	1	0	9	5
Monaco	0	0	0	0	0	0
Netherlands	6	3	0	0	1	9
Norway	4	3	0	0	1	8
Poland	10	6	0	0	2	13
Portugal	13	7	0	1	9	67
Romania	16	11	2	0	11	21
Slovakia	8	4	0	0	7	20
Slovenia	10	3	0	1	5	38
Spain	19	10	6	3	10	57
Sweden	5	4	0	0	1	13
Switzerland	6	4	0	0	4	25
United Kingdom	4+1	2+1	0	0	1	10+2
Yugoslavia	12	8	1	0	13	19

This threatened species evaluation is the most objective and scientifically-based available, having re-assessed most of the species evaluated in the 1994 Red List. Obviously, it is far from complete

in groups like invertebrates, but gives a rather accurate picture for terrestrial vertebrates, and particularly for birds. Invertebrates, as we will see, merit a separate treatment.

In the United States, some 3000 plants and animals species are considered official candidates for protection but about 10% may become extinct before any formal action can be taken (Meese, 1989 in Clark et al. 1994). The world picture is not much different with 20% of total mammal species, 11% of birds, 20% of reptiles, 25% of amphibians, and 34% of fishes (mostly fresh-water) being considered as threatened with extinction (IUCN, 1996). It seems that endangered species problems are increasing faster than society is able to cope (Lawton & May, 1994). However, as the U.S. Fish and Wildlife Service endorses, "endangered means, there's still time".

1.3 Recovery management

When a species is threatened with extinction, the logical reaction is to try to amend that situation. Which species are threatened ; why are they threatened ; which factors are more critical ; how can we deactivate those factors ; is it feasible to recover ; how can we increase the population ; which actions are more efficient ; who is going to do it ; who is covering the costs ; how do we know if we have success... There are many questions involved in recovery efforts.

In the following chapters we deal with these issues. Firstly, we will consider the policy and legal framework available. Responsibilities vary from country to country. Some have specific legislation to cope with the protection of species, including special agencies and the legally backed instruments for recovery action ; other countries undertake recovery efforts within a more loose and global policy context. There are cases where the non governmental sector is the one leading the actions, and, of course, there is also an international commitment incorporated in Conventions and other "hard" or "soft" international law. Needless to say, there are cases where little exists and nothing happens. The situation is far from being homogeneous and satisfying.

A second chapter is devoted to analyse a variety of existing recovery instruments, with special attention to their scope (world, regional, etc.), species or group orientation and level of detail (more programmatic, hands-on, with or without budgets, etc.). The different ways of naming these documents does not always correspond with differences in content, and vice-versa. Some clarification is needed in order to be able to establish comparisons.

Species restoration programmes, recovery plans, conservation action plans or whatever name is utilised, may be new instruments in many countries. In Europe the attention has traditionally concentrated more on species re-introductions than on other aspects (c.f. Mourin & Olivier, 1996), and only recently, there is more concrete interest in integrated action. Fortunately, the United States has a history of more than twenty years of professional recovery. At present, the US Fish and Wildlife Service manages 440 approved recovery plans (FWS update, October 31, 1996). Some cover more than one species, and a few species have separate plans covering different parts of their ranges. But, the most significant is the large experience accumulated and the many reviews and assessments that have been undertaken by different authors since official recovery action started in 1973 (i.e., GAO[1], 1988 ; Yaffee, 1992 ; GAO 1992 ; Houck, 1993 ; Tear et al. 1993 ; Duffus III, 1994 ; Clark, 1994 ; Carroll et al. 1996). Australia has also provided some interesting studies (i.e. Male, 1994 ; Bennelt et al. 1995, Stephens & Maxwell, 1997).

The retrospective analysis of success and failure has put into question the efficiency of implementing species recovery in the United States, at least, in the way they have been oriented

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[1] GAO is the General Accounting Office, of the United States. It reports upon Congressional request.

(Tear et al. 1993). In 1992, only some five or six threatened species have been fully recovered (GAO, 1992) ; nonetheless, the U.S. Administration is still trying hard.

Extinction is viewed largely as a biological phenomenon, and as Clark et al. (1994) noted, the dominant professional and organisational response has been to focus on biology, obscuring critical non-biological dimensions of the problem. The reflections available in published reviews and assessments point out these dimension, which vary according to social perception, economics or fiscal policy. As in other conservation issues, "we need action that is economically feasible, ecologically sound, politically palatable, socially acceptable and legally enforceable" (McNeely, 1997).

Because of cultural and organisational differences, one cannot apply U.S. or Australian lessons *mutatis-mutandis* to an European context. However, reading all these reports, there is a flow of common sense that cannot be overlooked, and the European approach can and should benefit from it.

Some countries in Europe, like Spain, have recently incorporated recovery planning in their legislation ; others may be in the process of doing so and others are accomplishing good recovery without specific legislation to do it. The European Union's Bird and Habitat Directives were more habitat oriented and very timid in promoting species oriented action. Nonetheless, more recent agreements, like the Convention of Biological Diversity or the Pan-European Biological and Landscape Strategy, open new possibilities and the Standing Committee of the Bern Convention –supported by the Council of Europe– is becoming more interested in species recovery. This present study is a good example. Therefore, the third and last chapter incorporates suggestions and guidelines for recovery efforts mainly oriented towards Europe.

If one can amend previous errors and introduce more flexibility and pragmatism in the planning and implementing process, there is still room for hope. Many people feel that, because humans are the source of the problems so many species face, we are morally obligated to do everything we can to help threatened plants and animals recover (v. Wilcove, 1989). Thus, species recovery is worth trying and morally rewarding, even if we do not see all results expected. At least, the effort itself is a noble cause.

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2. Policy and legal framework

As many writers have already stated, legislation is not the panacea for nature or biodiversity conservation. One cannot expect too much from it. The law may mandate people to do things, but it does not provide political commitment or enthusiasm to those same people. However, legislation helps to build a framework where much of the needed action must be grounded, embedding conservation philosophy, setting up goals, limiting private rights, assigning needed funds, guiding administrative action and promoting the necessary inter-agency co-operation. On the other hand, it also establishes procedures by which people's rights are shielded from over-enthusiastic or messianic administrators and ecologists. This is very important for democratically legitimated conservation, the only kind we should seek.

Not less important is the time-frame imposed by legal instruments, which usually overrun electoral periods, providing the required continuity for species recovery (15-20 years or more). On the other hand, legislation also implies bureaucracy, which in severe cases may be a threat in itself for the survival of a given species. The private initiative may be more efficient in some circumstances, but no one would dare to leave the fate of nature alone in the hands of the private sector. Conservation has to be a government business and legislation must be involved for the good and the bad. Legislation can also be improved, something that is forgotten in many places.

Two general orientations in preserving biodiversity have emerged in conservation doctrine. The so called «habitat approach» (protected areas policy, ecological corridors, buffer zones, etc.) and the «species approach». They are not contradictory, just complementary (Cade & Temple,1994). It is true that all species need a habitat to live in and that much preservation of species is achieved by protecting their habitats. But in many cases this is not sufficient and the «species approach», although less developed, is being increasingly addressed by the more recent legal instruments.

In the following sections we consider only legislation directly or indirectly related with positive measures for protection of species. Area-based laws and treaties or those regulating trade or exploitation of wild animals is not discussed. There is a clear difference between the so called "passive protection" (restrictive measures) and "active conservation", which means management (Remmert, 1988). Both types of approaches are involved in species recovery, but management is considered as the most specific one. Therefore, we will concentrate on it.

We will focus on Europe, selecting national as well as regional legislation and the primary international treaties that apply. The latter group usually provides more general principles which are reflected and eventually developed in domestic law (de Klemm & Shine, 1993). Not less important is the inspiring role of "soft" law, just moral binding declarations or recommendations like charters or resolutions of international organisations (United Nations, Stockholm Conference, World Conservation Congress, etc.).

Once it comes to obligations, we have to keep in mind that there may be also a considerable amount of soft law ("good-will clauses") within "hard" looking treaties, and that the signing parties may be less committed to accomplish them. Moreover, a common procedure in international wildlife law is to hold regular meetings to produce recommendations for improving the implementation of the treaty (Lyster, 1985). Obviously, these recommendations do not have the same legal force as the text of the original treaty, but by ruling in this way there have been significant results achieved.

2.1 International

2.1.1 The World Charter for Nature

The World Charter for Nature was adopted on 28 October 1982 by the United Nations General Assembly. It recognises the moral duty of man to respect and preserve all life forms because of their intrinsic value and not because of the utilitarian interest of man. More precisely, the second of the general principles states :

> *The genetic viability on the Earth shall not be compromised, the population levels of all life forms, wild and domesticated, must be at least sufficient for their survival and to this end, necessary habitats shall be safeguarded.*

2.1.2 The «Bonn Convention»

The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), derived from the Stockholm Conference Action Plan (1972) was adopted in Bonn on 23 June 1979. It is a sectoral treaty aiming to promote the needed protective measures for migratory species whose range extends over several countries. It entered into force in 1992 and the contracting parties –although still a reduced number– include Europe, Africa, Asia and America.

The fundamental principle of this Convention is to avoid any migratory species becoming endangered (Article 2), but once they are endangered (to be listed in Appendix I), it provides, without mentioning the term recovery, a good menu for such purpose :

> *Article III. Endangered migratory species. Appendix I.*
>
> ...
>
> *4. Parties that are Range States of a migratory species listed in Appendix I shall endeavour :*
> *a) to conserve and, where feasible and appropriate, restore those habitats of the species which are of importance in removing the species from danger of extinction ;*
> *b) to prevent, remove, compensate for or minimise, as appropriate, the adverse effects of activities or obstacles that seriously impede or prevent the migration of the species ; and*
> *c) to the extent feasible and appropriate, to prevent, reduce or control factors that are endangering or are likely to further endanger the species, including strictly controlling the introduction of, or controlling or eliminating, already introduced exotic species.*

Moreover, the Conferences of the Parties may recommend to those Parties which are range states of an endangered migratory species that they take further measures considered appropriate to benefit the species. The Conference of the Parties is also responsible for including severely threatened species in Appendix I, to which one presumes the above article shall apply. At present, the list of animal species includes 18 mammals (incl. the monk-seal) , 24 birds, 8 reptiles and 1 fish. According to de Klemms & Shine (1993), the appendix does not claim to be an exhaustive list of all endangered migratory species, but rather a representative sample of the most threatened species. The only problem with this Convention is that the range states of many of these listed threatened species are not Parties to the Convention.

An interesting outcome of the Bonn Convention is the recent Agreement for the Conservation of Afro-Euro-Asian Migratory Waterfowl (The Hague, 1995) in accordance with article 4.3 of the Convention. Action Plans for Specific Species are considered in Annex 3, item 2.2; this being a clear international reference to species recovery, but it is still pending ratification of at least 14 countries before entering into force (expected in 1998).

2.1.3 The «Biodiversity Convention»

The United Nations Convention on Biological Diversity (Biodiversity Convention) was adopted on 5 June 1992 at the United Nations Conference on Environment and Development held in Rio de Janeiro. It was initially signed by 157 countries (a world record !) and entered into force on 29 December 1993. This convention is perhaps the most outstanding example of the «new breed» (Tinker, 1995) of international treaties that started after the Stockholm Conference (1972), trying to integrate environment and development. Moreover, it is the first important treaty in this context that is not limited to a particular region nor to a group of species. It is a truly "world convention" with great potential for co-operation with regional ones (Fernández -Galiano, 1994).

The Biodiversity Convention crates a general obligation for all States to conserve biological diversity. It is surprisingly "ecocentric" in the sense of recognising the intrinsic value of species for their own sake, and that they should be preserved for the continuation of evolution and the maintenance of the life-supporting systems of the biosphere (de Klemm & Shine, 1993). It is clear that species are the bearers of genetic diversity and the building blocks of ecosystems, but preserving species alone is not enough to protect biological diversity. The Convention is grounded in a broad ecosystem approach to conservation and sustainable use of biological diversity (Tinker, 1995). It lays down performance obligations, but without defining the specific means of how to proceed. The Parties have the choice and must therefore enact or further develop their national legislation for that purpose.

The Biodiversity Convention is not really species oriented. At present, it does not contain a list of species to be protected. However, it establishes the obligation to identify and monitor species considered to be important elements of biological diversity, providing in Annex I a list of categories of species which may meet that criterion and be considered as priority species for conservation. The categories include threatened species ; wild relatives of domesticated or cultivated species ; species of medicinal, agricultural or other economic value ; species of social scientific or cultural importance, or of importance to research relevant to the conservation and sustainable use of biodiversity (such as indicator species), and, within species, described genomes and genes of social, scientific and economic importance.

Under this context, recovery of threatened species may be seen as a particular case of conservation of priority species. Provisions for identification and monitoring of such species are described in Article 7, .."*paying particular attention to those requiring urgent conservation measures*". The background for recovery action is provided by Articles 7 and 8, but as in many other conventions, the obligations are not absolute. They are pragmatically qualified by the phrase "*...as far as possible and as appropriate*". Not all countries are in the same position to fulfil the performance obligations.

> *Article 8. In-situ conservation. Each Contracting Party shall, as ...*
> *(f) Rehabilitate and restore degraded ecosystems and promote the recovery of*
> *threatened species, inter alia, through the development and implementation of plans or*
> *other management strategies.*
>
> *Article 9. Ex-situ conservation. Each Contracting Party shall, as...*
> *(c) adopt measures for the recovery and rehabilitation of threatened species and for*
> *their reintroduction into their natural habitats under appropriate conditions.*

Under the umbrella of the Biodiversity Convention, most European countries are establishing «National Biodiversity Action Plans», which may consider Species Action Plans as a need. The Convention is increasingly being invoked in all new important conservation initiatives and shall have a further seminating role in the future.

2.1.4 International non-governmental organisations

The International Union for the Conservation of Nature and Natural Resources (IUCN) and the World Wide Fund for Nature (WWF) are two major international non-governmental organisations in the field of nature conservation that have devoted continuous attention and efforts to the preservation of species.

IUCN is probably the organisation most influential in building up international conservation doctrine. Most of this labour is to be credited to its Commissions, a voluntary network of scientists and technicians that co-operate under common objectives. The Species Survival Commission (SSC), with more than 7000 members, has been providing leadership for conservation efforts of specific plant and animal groups for almost four decades. Their purpose is expressed in the following goals :

- To assess the conservation priorities for species and their habitats
- To develop plans for their conservation
- To initiate actions needed for survival of species
- To provide an expert resource network on the conservation of biodiversity

This species-group orientation instead of single-species is, perhaps, one of the characteristics of the SSC approach. The first «Conservation Action Plan» was published in 1987 (African primates) and up to now there are 38 such publications (cranes ; zebras, asses and horses ; antelopes ; dolphins, porpoises and whales; Old World fruit bats ; crocodiles ; swallowtail butterflies ; pigs, peccaries and hippos, etc.) and another 30 (plants excluded) are in preparation. The title of the plans is tending towards standardisation in the form of «X-taxa, status survey and conservation action plan». In fact, a significant part of them is devoted to the crucial task of assessing the status of species (heavy involvement of group specialists). Hence, the priority actions derived normally include the implementation of recovery plans for critically endangered species. The Pheasant Conservation Action Plan, for instance, included about 25 projects throughout Asia, to be initiated in 1995 and concluded in 1999 (Garson, 1996).

The SSC conducted a review of effectiveness of the implementation of 23 Conservation Action Plans, at the end of 1992. The results showed that a very large amount of implementation had taken place, though in some cases it was not clear to what degree the Action Plans themselves were directly responsible for the actions (Giménez Dixon & Stuart, 1993). It is also true that Action Plans have served as a background overview of the status, biology and world-wide conservation needs of the targeted species, but many times implementation just means more and more studies. There is always a risk of hobby-horse riding in scientist-minded plans.

WWF has traditionally concentrated mainly on charismatic species and has produced or financed global conservation programmes on its own, or sometimes in close collaboration with governments (i.e. the Giant Panda Conservation Plan, with the Chinese Ministry of Forestry). There has been a shift in this approach, a good example of this is the Large Carnivore Initiative for Europe, started by WWF in collaboration with partner organisations and experts in 17 European countries (Pratesi Urquhart, W.1996 in litt.). Under this initiative Species Action Plans are being prepared for the brown bear, Eurasian lynx, Iberian lynx, wolf and wolverine. The range is limited to Europe and the aim is to produce an umbrella conservation strategy for the five species. Once the Action Plans are finished (involving workshops and a wide consultation process) they will be presented to the Bern Convention for endorsement.

In the past, non-governmental organisations (international or not) have produced and exposed their documents to free usage of interested parties, or have tried to finance their implementation by themselves. At present, the endorsement of their products by some type of official body is

becoming more desirable. The support of the Council of Europe given to the Action Plans of globally threatened birds in Europe produced by BirdLife International, with the collaboration of the Royal Society for the Protection of Birds and Wetlands International, is a good example. This type of situation has been favoured by the extensive process of consultation, consent and, as far as possible, consensus between governmental agencies, NGOs and individuals. Obviously, the official backing of such plans is of great help when it comes to fighting for funds to finance implementation (European Union LIFE-Nature, for instance).

2.2 European

2.2.1 The «Bern Convention»

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) was signed in Bern on 19 September 1979, under the auspices of the Council of Europe. It is considered a regional conservation treaty, but membership is not restricted to member-Sates of the Council of Europe. Countries like Burkina-Faso, Senegal and Tunisia in Africa are parties of the Bern Convention. The European Union is also a contracting party.

The Bern Convention aims *"...to conserve wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the cooperation of several states"...* with particular emphasis to be given *"...to endangered and vulnerable species..."*, including the migratory ones (Article1). It strictly limits the killing, capture and other forms of exploitation or deliberate damage (i.e. destruction of nest sites) of species listed in their appendices (protected species), but does not provide much detail regarding active conservation measures for those species that are threatened :

> *Article 2. The Contracting Parties shall take requisite measures to maintain the population of wild flora and fauna at, or adapt it to, a level which corresponds in particular to ecological, scientific and cultural requirements, while taking account of economic and recreational requirements and the needs of sub-species, varieties or forms at risk locally.*

> *Article 3.1. Each Contracting Party shall take steps to promote national policies for the conservation of wild flora, wild fauna and natural habitats, with particular attention to endangered and vulnerable species, especially endemic ones, and endangered habitats, in accordance with the provisions of this Convention.*

In relation to these general and imprecise mandates, the Standing Committee of the Convention has taken the responsibility to draw up the list of species and habitats which require priority attention for conservation. On the other hand, the Standing Committee has also promoted a set of recommendations (recalling Article 1.2) which are directly oriented towards species recovery, being these, the only specific and formal reference to "recovery plans" at the European level (see list in page 74).

- «Recommendation No. 40 (1993) on the elaboration of conservation or recovery plans for species in Appendix I to the convention». This applies only to plants (see also Jackson & Akeroyd, 1996).

- «Guidelines for recovery plans for species of amphibians and reptiles» These guidelines are the output of a seminar held in El Hierro (Canary Islands) in 1993. They have not been approved as a formal recommendation, but as "soft-law" its power is almost equal. The emphasis on the species and the need of recovery action for threatened ones is clearly presented as a policy statement, and action from the parties is requested as a responsibility

under the provisions of Article 2. These guidelines include criteria for identification of population in need of recovery, some orientation for the elaboration of the plan (team composition, support, finances, etc.) and short comments on the contents of the plan. Recovery action is requested for at least 24 reptiles and 11 amphibians, in some cases across the whole range, in others to a significant part of it. A group of 37 additional herptiles are in need of research to assess if they are a good target for recovery plans.

- «Recommendation No. 43 (1995) on the conservation of threatened mammals in Europe». Based on previous recommendations asking for special conservation attention (No. 6, 10, 11, 17, 19, 20, 31 37), a list of 30 terrestrial and 8 marine mammals are considered as taxa needing recovery plans. A further larger group is proposed for evaluation as candidates for recovery. It is worth noting that, the same as with the listing of herptiles (previous paragraph), several mammal species in both cases are not even included in the Convention's appendices. This recommendation provides also valuable guidelines for designing recovery plans (evaluations, re-introduction, co-ordination, public involvement, etc.).

- «Recommendation No. 48 (1996) on the conservation of European globally threatened birds». The Contracting Parties and even the observers to the Standing Committee sessions are invited to implement (or, if appropriate, reinforce) national action plans in the vein of the action plans on European globally threatened birds presented by BirdLife and Wetlands International (c.f. Borja et al. 1996). The species referred to in this work are the same as those listed in the appendix of the recommendation (9 Macaronesian and Iberian endemics, 7 waterbird species and 7 non-waterbird species). See list in page 74.

- «Recommendation No. 51 (1996) on action plans for invertebrate species in the Appendices of the Convention». It is recommended that contracting parties develop recovery plans (sic) for a set of invertebrate species that have been previously designated as in need of special attention (recommendations 18, 21, 22, 28, 35 and 36). The total number of species listed are 11 insects, 1 crustacean and two molluscs as first priority species, and 10 further insects species as second priority.

Under supplementary provisions, Article 11.2a of the Convention invites the Contracting parties *"to encourage the reintroduction of native species of wild flora and fauna when this would contribute to the conservation of an endangered species, provided that a study is first made in the light of the experiences of the other Contracting Parties to establish that such reintroduction would be effective and acceptable".* In this context, recommendation 15 (1985) of the Council of Europe Committee of Ministers to member States on the re-introduction of wildlife species develops how re-introduction operations should be conducted.

Involving normally charismatic or exploited species (wolf, otter, owl, bearded vulture, salmon, butterflies, etc.), re-introductions appear to have been very popular in Europe during recent decades[1], but not exempted from problems and controversy (Maurin & Olivier, 1996). It seems that many of these problems where generated because re-introductions, restorations, translocations or restockings practices –whatever may apply (Price et al., 1996)– have not been examined under a broader conservation scope or as part of recovery plans, but merely as an undertaking in itself and, very frequently, in an irresponsible way. It is a pity that the Convention's text does not link these activities explicitly to a more integrated recovery approach.

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[1] Number 82 (1996) of *Naturopa*, one of Council of Europe's magazines, is dedicated to the reintroduction of species.

2.2.2 The «Barcelona Convention»

One of the regional seas conventions promoted by the United Nations Environment Programme (UNEP) is that for the Mediterranean[1], known as the Barcelona Convention. It focused originally on the prevention of pollution in the sea, but several Protocols extended the scope, like one oriented towards the establishment of marine protected areas (Geneva, 1982). None considered the protection of species. However, in the 4th ordinary meeting of the 21 Parties (known as the «Genoa Declaration», September 1985) the protection of three marine species (e.g. Monk seal and Mediterranean sea turtle) was adopted (point 17.e) as a matter of priority during the second decade of the Mediterranean Action plan. Thereafter, Action Plans for the Conservation of the Monk seal, marine turtles and cetaceans were developed.

A new Protocol concerning Specially Protected Areas and Biological Diversity was adopted in June 1995 and has been submitted for ratification (two years). This Protocol will replace the previous one on protected areas (1982) and incorporates a special provision for threatened species.

> *Article 12.3. The parties shall prohibit the destruction of and damage to the habitat of species listed in the Annex relating to the List of Endangered or Threatened Species and shall formulate and implement action plans for their conservation or recovery. They shall continue to cooperate in implementing the relevant action plans already adopted.*

2.2.3 The «Bird Directive»

Under the Treaty of Rome, the European Community initially had very limited jurisdiction over environmental matters, and the Bird Directive[2] (79/409 CEE) was adopted under article 235, based on the fact that the effective bird protection was a trans-frontier environmental problem entailing common responsibilities. This is the fundamental reason why this first Directive included only birds. It implements the Bern Convention within the Community for birds and as all Directives, it is binding in the sense that each Member state of the European Union is required to comply with its terms.

> *Article 2. Member states shall take the requisite measures to maintain the population of the species referred to in Article 1* [naturally occurring wild birds] *at a level which corresponds in particular to ecological, scientific and cultural requirements, while taking account of economic and recreational requirements, or to adapt the population of these species to that level.*

There are no specific provisions for active species conservation measures, except the very general mandate expressed in Article 2. However, species listed in Annex I (amended in 91/244/CEE), which include several threatened categories, are the subject of special conservation measures, whereas these measures can be only related to their habitat (Article 4). It is very uncommon that international or even national legislation obligates the establishing of protected areas for the purpose of protecting threatened species. This Directive –as well as the next one– is an exception, and requests the development of a system of so called «Special Protection Areas», for birds obviously. The pending question is whether all listed species are really threatened, or if this instrument has been used as a way to develop non-existing systems of protected areas. Its application has not been homogeneous throughout the Member states.

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[1] Convention for the Protection of the Mediterranean Sea against Pollution and its Protocols, adopted at Barcelona on 16 February 1976.
[2] The official name is "Directive of the Council of the European Economic Community on the Conservation of Wild Birds (79/409 CEE)"

2.2.4 The «Habitat Directive»

The European Single Act of 1986, further extended by the Maastricht Treaty of 1991, gives broad jurisdiction in the field of environment, where the protection of nature is considered. Therefore, the Community was able to further implement the Bern Convention covering plants and animals other than birds. The result was the Directive 92/43 CEE on the Conservation of Natural Habitats and of Wild Fauna and Flora, known as the Habitat Directive.

Annex IV sets out a list of animal and plant species of Community interest in need of strict protection, including a fairly long list of invertebrates. This list includes species protected under the Bern Convention, but excludes birds as these continue to be covered by the Bird Directive. The same type of prohibitions apply but additional provisions for monitoring are included. Incorporation of new species to the list must be adopted unanimously.

In addition to this direct individual-oriented protection, Annex II lists plants and animals of community interest whose conservation requires the designation of «Special Areas of Conservation». Some 22 animal species are marked as "priority species" meaning that their host sites are automatically deemed to be «Sites of Community Importance». Member States shall...

> *Article 3.1 ..enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range.*

> *Article 4.1. ... For animal species ranging over wide areas these sites shall correspond to the places within the natural range of such species which present the physical or biological factors essential to their life and reproduction. ...*

This species-habitat linked protection is in full accordance with needed recovery efforts, supplemented by a sound protection regime (prohibitions and controls) established in Articles 12-16 (species-oriented section). However, in neither case or elsewhere in the Directive are active measures on the species explicitly regarded, with the exception of a precautionary provision (Article 22) on how re-introductions of strictly protected species should be conducted (see above comments on re-introductions at the end of 2.2.1 The Bern Convention).

2.2.5 The Pan-European Biological and Landscape Diversity Strategy

The Pan-European Biological and Landscape Diversity Strategy (hereinafter PEBLDS), promoted by the Council of Europe, the United Nations Environmental Programme (UNEP) and the European Centre for Nature Conservation (ECNC) was endorsed by the «Environment for Europe» Ministerial Conference at Sofia, October 1995. It has a twenty-year horizon, but «Action Themes» contained therein have been conceived for five-year periods up to the year 2000. It has been termed a vade-mecum for biological management for European ministers of the environment (J.P. Ribaut *in* Heredia et al. 1996), whereas its reach is much wider.

The Strategy has no legal binding force such as that of many signed and ratified international treaties. It is just a rational policy framework, established and agreed to by 55 European countries, with the participation of major international governmental and non-governmental organisations, and its implementation is based on the willingness of the actors involved. Anyone interested –not just the supporting countries (c.f. point 2.6)– can adopt their aims and apply to their own separate activities, the agreed principles and priorities. Likewise, funding bodies can profit from the Strategy when allocating funds to submitted projects. In this way, and if involvement is extensive, consistency of efforts at the European scale may be achieved, while still ensuring the freedom of countries, organisations and individuals (Rientjes & Drucker, 1996). In this sort of amalgamating spirit, the PEBLDS provides also a consistent framework for regional

and national implementation of the Biodiversity Convention, to which, among others, it is logically linked.

The Action Plan for 1996-2000 is divided into 11 action themes, to be fully elaborated into projects during this period. Action theme 11 «Action for threatened species» aims... *"to reverse declining trends in genetic diversity of wild, domesticated and cultivated species, their numbers and distribution, and promote concerted European action for species not, or not yet, sufficiently protected by habitat measures, [or from] illegal hunting and trade. "* Within this framework the three following objectives are of particular relevance to our discussion :

> *11.1   Develop species action plans for all species and their genetic diversity being threatened at the Pan-European level, targeting threatened species with popular appeal (otter, Monk seal....), negative appeal (wolf, snakes...), cultural relevance (storks,...) and economic relevance (salmon...).*
>
> *11.3   Establish a Pan-European list of threatened and protected species by reviewing and assessing lists in existing treaties, conventions and programmes.*
>
> *11.5   Encourage countries to develop and implement regional lists and action plans for threatened species.*

Worth noting also are two of the ten «Strategic Principles» included in item 2.4. Principle 7 deals with restoration ecology and re-introductions, two activities that are likely to occur in European countries, which have been extensively and intensively exploited for centuries.

> *6   The Principle of Ecological Integrity : the ecological processes responsible for the survival of species should be protected and the habitats on which their survival depends maintained.*
>
> *7   The Principle of Restoration and (Re)Creation : where possible biological and landscape diversity should be restored and/or (re)created if it can be demonstrated by reference studies that the original state could be re-established where practicable, and thereby adopting measures for the recovery and rehabilitation of threatened species and for their reintroduction into their habitat under appropriate conditions.*

This new regional Strategy is very recent, but much is expected out of its innovative and proactive approach. A European Action Programme on Threatened Species, including a draft programme of activities to be developed from 1997 to 2000, was proposed. in October 1996 under Action Theme 11. In the Executive Bureau Meeting of November 1996, the co-ordination of Action Theme 11 was assigned to the Bern Convention, with initial funding provided by the Council of Europe

2.3 National

Nations do not have the sovereignty problems that may be faced by international legislation. Thus, existing domestic law on nature conservation is immense and overwhelms the scope of this report. However, under national legislation there can be found the very few cases where the law addresses the problem of conservation from the point of view of the species as such (de Klemm, & Shine, 1993). We will concentrate on these cases, particularly in the United States large experience, leaving aside the other legislation which traditionally focuses on habitats (protected areas, etc.) or almost exclusively on protection from capture of and trade of individual animals. The selection does not pretend to be exhaustive, but to give a panorama of different situations and approaches. Furthermore, included are some examples of good active conservation that are not directly supported by legislation ; some are even promoted by the non-governmental or the private sector. Their plans may be not binding, but results are great.

2.3.1 Australia

Australia had some State-level legislation useful for undertaking species-oriented conservation (i.e. The Flora and Fauna Guarantee Act of 1988 of the Australian State of Victoria), but efforts undertaken, often with assistance from the national government, were lacking consistency, co-ordination and a national perspective. In 1989 a ten-year Endangered Species Programme started with the good luck that in 1992 the Endangered Species Protection Bill passed, providing a general and more focused framework for action. Its aim is to promote the recovery of species and ecological communities that are endangered or vulnerable, as well as preventing others from becoming endangered.

The new Act establishes an official national list of threatened animals and plants, covering already 299 endangered and 726 vulnerable species and subspecies (plants and animals together). The listing procedures are also open for threatened communities, as well as "key threatening processes". Australian endemics, for instance, have serious problems with introduced exotics, like in many other island ecosystems (c.f. Vitousek et al. 1996). Much of the fight for species recovery turns into fight against other species (those on the "black list").

According to Male (1994), in June 1993 there were 139 vertebrate species recorded as endangered or vulnerable ; 23 recovery plans were being implemented and 29 just prepared or in preparation. The first case of delisting of a species in Australia because of good scientific research and conservation management has already occurred. The «woylie», a rock wallabie, has been removed from the threatened list to the "conservation dependent" category (fox control, still needed), due to a Recovery Plan started in 1990 (Burbridge, 1996).

The new legislation demands that the government develop Recovery Plans for all listed species (and communities !) on only federal lands and waters, and, therefore, to seek cooperative agreements with state and territory governments where these species live. At present, a Threatened Species Strategy is part of the National Strategy for Conservation of Australia's Biological Diversity, which is linked to the Convention on Biodiversity and backed by an intergovernmental agreement on the environment. This is a good example of how such political initiatives can help organising action within a complex territory. Three main objectives are to develop and implement :

   a) *mechanisms to enable the identification of endangered and vulnerable species and communities and to identify threatening processes ;*
   b) *recovery plans for endangered and vulnerable species and communities, covering the full geographic range of species and ecological communities and deal with cross-jurisdictional problems ;*
   c) *plans for mitigating or eliminating the effects of threatening processes.*

2.3.2 Finland

The Finnish Nature Conservation Act (promulgated in 1923, amended 1991) demands that the Ministers of the Environment and of Agriculture and Forestry monitor the status of threatened species and to prepare Conservation Plans for specially protected species. Where such a plan has been developed, the Administration must to inform the landowners of the presence of that species on their land and of the activities that may affect it, which are subject to precautionary measures. A negotiation may result in the establishment of a reserve, subject to compensation being paid to the landowner. Compulsory purchase of that land is also possible.

2.3.3 France

The French Ministry of the Environment has compiled an ample Action Programme for Fauna and Flora under the scope of Biodiversity in France. Several dispersed initiatives and future

planned actions are integrated in a coherent way. Threatened species within France are grouped or individually treated. Expert groups will be involved in the elaboration of Action Plans, Conservation Plans or Restoration Plans, as needed, and a Validation Team is also foreseen (which theoretically should not include the same experts that prepared the plans). Implementation outlines are heavily focused on research and monitoring. There is no specific legislation ruling this programme, but co-operative and contractual protocols are to be established between the Government and multiple partners. There is much expectation in the French Administration in this co-operative approach.

2.3.4 New Zealand

New Zealand provides an interesting case of co-operative recovery initiative involving the corporate sector. The Kiwi Recovery Programme is a five-year project (1991-1996) developed by the Department of Conservation, the Royal Forest and Bird Protection Society of New Zealand, and the Bank of New Zealand, whose financial support made it possible to start the plan immediately. The kiwis (3 species) being a national symbol of New Zealand, may have been enough reason for the bankers to attach their name to the initiative. The technical document itself, the Kiwi Recovery Plan (Butler and McLennan, 1990) is very synthetic and practical, and a good example of the multi-species planning approach (see table of contents Appendix C).

The Department of Conservation of New Zealand has a long tradition in preparing Recovery Plans. At present they have published 20 of them, which include several skinks, bats, tuatara, frogs, birds, snails, sea-lions, etc. Elements of isolated island biotas are more exposed to extinction than others due to the impact of introduced exotic species.

2.3.5 The Netherlands

Since 1986, the Netherlands have produced several Action Plans (sometimes termed Recovery Plans) for species or groups of species of conservation concern (bat, otter, 30 butterflies, partridge, black grouse, spoonbill and barn owl). The Action Plans do not have a legal basis in the Netherlands. They are documents that are developed on the initiative of the Dutch government with a direct expert input, and later approved by the Dutch government. The Dutch Nature Policy Plan[1] is the policy basis of the Species Action Plans of the Dutch government. It clearly states that protective measures only are not sufficient, and that more active measures are needed to protect, reinstate or manage certain species, including a list of those deserving high priority. The Nature Policy Plan itself has its basis in national law.

The set of existing Dutch Action Plans for species are a good example of how serious recovery activity can be promoted by a committed Administration not even having specific legislation to regulate it. Budgets are normally foreseen for a 5-year period. Several actors are involved (authorities, land owners, land managers and private organisations) and concrete specific measures are being addressed : habitat management and rehabilitation, education, research, re-introductions, etc. Species like the partridge, a game bird, have been considered a conservation target because of its value as an ecological indicator for arable areas. This implies that conservation measures taken for the partridge will also benefit a wide range of other species. The whole Dutch species policy is very ecologically oriented, particularly, to rural ecosystems.

2.3.6 Spain

In 1983 Spain's national conservation agency (ICONA) started species recovery action with three informal Recovery Plans on highly endangered animals (White-headed duck, Houbara bustard and Hierro's giant lizard). However, as conservation competencies were progressively transferred

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[1] Nature Policy Plan of the Netherlands. 1990. Ministry of Agriculture, Nature Management and Fisheries, The Hague, 103 pp.

to the newly established Autonomous Regions, further recovery efforts were advanced through Activity Co-ordination Plans, as the range of the target species –Brown bear and Cinereous vulture– covered several Autonomous Regions. European Union's LIFE programme supported the process but the situation was becoming complex.

In 1989 the needed legal framework for conservation in the new autonomous Spain was established by an Statutory Law 4/1989 on the Conservation of Natural Areas and of Wild Flora and Fauna, much in the same vein as the Habitat Directive. This law provided a basic regime to be further developed by the Autonomous Parliaments.

The National Catalogue of Threatened Species may include species in four categories : (E) In danger of extinction, (SH) Sensible to habitat alteration (V) Vulnerable and (Ie) of Special Interest, although the latter is not at all a threatened category[1]. A basic protection regime applies automatically to listed species prohibiting, for instance, the wilful[2] alteration of, damage to, destruction of or interference with their habitat or environment. More enhanced and specific protection can be enacted by the Autonomies, which can also install their own Catalogue of Threatened Species (very few, for the time being).

There is a general obligation to the Autonomous governments to undertake active conservation measures for species listed in the National Catalogue. They have to prepare and approve :

- Recovery Plans for Endangered species (E)
- Habitat Conservation Plans for Species sensible to habitat alterations (SH)
- Conservation Plans for Vulnerable species (V), and eventually, habitat protection.
- Management Plans for Species of special interest (Ie)

Recovery Plans should define "the needed measures to eliminate the risk of extinction", and Management Plans, defining those "necessary to maintain the populations at appropriate levels". No further explanations are given, and the content of the other plans has to be inferred from their names and type of species associated. However, when preparing such plans, the Autonomous governments are also asked to consider, if appropriate, the establishment of any of the defined types of protected areas (section 3 of the National Law) for a part or the totality of the habitat of the listed species.

The listing of species is further regulated in 1990 (Royal Decree 439/1990), giving the power to catalogue, to change category or removal from the list to the National Commission for the Protection of Nature, integrated by all Autonomies and one representative of the Central government. Upon a formal application, the Commission has to take a decision in 3 months on the basis of :

Article 3....
a) Appropriate information regarding the size of the affected population[3] and its
   natural distribution area.
b) A detailed description of their characteristic habitats.

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[1] Species not included in previous categories and that may deserve special attention due to their scientific, ecological and cultural value, or because of their singularity.

[2] The need for an element of intention, indicated by the term "wilful" greatly restricts the application (farming and other legitimate activities). Likewise in the Habitat Directive, Irish Nature Conservation Act of 1976, etc..

[3] As in many other cases, Spanish law considers three levels of listing : species, subspecies and populations.

c) An analysis of the factors that negatively influence their conservation or that of their habitats.

d) Based on the previous data, a recommendation of the category that should be assigned, and, eventually, of the specific measures that would be required for their conservation.

It is noteworthy, that by listing the species based on its conservation status (risk assessment), both a protective regime and a request for active measures apply automatically (no way to get one without the other). There is not a formal second step to assess the protection needs of listed species, except from the previous considerations under point (d) above, regarding the category listing itself. But high threat does not always require big protection measures. This approach "threatened status = protection = action to be taken" may favour either an unprotection crisis (species kept out of the listing) or an overwhelming of unnecessary obligations regarding active measures. The Spanish situation gets more complicated as not all categories in the Catalogue are threatened ones.

The Catalogue was fed at once in 1990 (by Royal Decree) with 2 fishes, 1 amphibian, 1 reptile, 11 birds and 4 mammals under «Endangered» category. This seems fairly workable. However, the list of «Species of especial interest» grows up to 5 fishes, 20 amphibians, 40 reptiles, 268 and 34 mammals, almost half of Spain's fauna. The other categories were not used. The challenge is great and some results on priority species are already available (see Table II). Once approved as a Decree, they are published in the Official Bulletin, which gives them compulsory power.

Table II. Legally approved Species Recovery and Management Plans in Spain

Recovery plans		
Black stork	*Ciconia nigra*	Castile and Leon (1995)
Bonelli's eagle	*Hieraetus fasciatus*	Navarre (1996)
Brown bear	*Ursus arctos*	Castile and Leon (1989) Cantabria (1989), Asturias (1991), Galicia (1992), Navarre (1996)
Pyrenean ibex	*Capra pyrenaica*	Aragón (1993)
White headed duck	*Oxyura leucocephala*	Castile-La Mancha (1995)
Lammergeier	*Gypaetus barbatus*	Catalonia (1994), Aragon (1995), Navarre (1995)
Native river crab[1]	*Austropotamobius pallipes*	Navarre (1996)
Management plans		
Cave bat	*Miniopterus schreibersi*	Asturias (1995)
Geoffroy's bat	*Myotis emarginatus*	Asturias (1995)
River otter	*Lutra lutra*	Asturias (1993)
Sand martin	*Riparia riparia*	Asturias (1993)

When a species ranges over more than one Autonomous region, the National Commission for the Protection of Nature will provide guidelines for co-ordination and the Central Administration can provide technical and economic assistance. Grants for supporting private efforts are also provided (regulated in RD 873/1990).

2.3.7 Sweden

The Swedish Environmental Protection Agency (SEPA) is the responsible authority concerning the preservation of threatened species. They have developed Action Programmes as a tool for

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[1] This Plan was published simultaneously with a Plan for the Regulation of Exotic crabs.

recovering some species in numbers and distribution. Presently five Programmes have been adopted (3 for animal species : woodland brown butterfly, pearl mussel and peregrine falcon) and 10-15 more are in the pipe-line (amphibians, sand lizard, lynx, wolf, wolverine, arctic fox, fishes, etc.).

The Action Programmes are not based on any particular legislation. They run for limited time, which is usually 3 years, before they are revised. Objectives are stated in terms of population sizes or distribution areas required to regard the species as assured or saved. Further research needs are also incorporated, but the operative part is essential, where actions to be conducted within the time limits of the programme are described.

2.3.8 United Kingdom

Recovery of threatened species is not addressed by domestic law in the United Kingdom. Despite this legal situation, the UK is undertaking recovery efforts in a positive and successful way. English Nature[1] launched a Species Recovery Programme in 1991 intended to address many of the UK Biodiversity Action Plan objectives[2] (linked to the Convention on Biological Diversity). The Programme has a high profile within English Nature and the UK. Long terms objectives are to achieve the survival of the species and establishing or reinstate self-sustaining populations in the wild. Medium term conservation strategies are developed for each species, of at least seven years duration, only beyond the short term Recovery Projects.

As defined by English Nature (1996), the Species Recovery Programme consists of a range of partnership projects that aim to restore, maintain or enhance populations of plants and animals that are in severe decline or currently under threat of extinction. Extirpated species (= extinct just in the country) are also regarded and some, like the Great Blue, have been reintroduced to Britain with success.

There is also a Species Recovery Programme Grants Scheme which encourages more individuals and organisations to become involved. Funding work is focused on species protected by the Wildlife and Countryside Act (1981), those listed as endangered and vulnerable in British Red Data Books and Lists, and also those included in the E.U. Habitats and Bird Directives. Grants may cover up to 50% of work[3] costs related to :

- assess current status of species, provided this is clearly a part of a species recovery programme ;
- prepare detailed species recovery plans ;
- manage sites to achieve specific recovery objectives ;
- monitor species populations following initiation of a recovery programme.

As of July 1996, six recovery projects were claimed to have largely met original recovery objectives (dormouse, wart-biter and field crickets, large blue butterfly, natterjack toad and New Forest cicada). Projects in the working list of 1996/97 include 31 species, with a high proportion of invertebrates involved (sandworms, mussels, crayfish, moths, etc), which reflect the particular sensitivity of English citizens towards any form of life, including nonhuman species (s. Norton, 1986). At least twelve more insects are being listed for pre-recovery projects, consolidating the important pioneering activity of English Nature in insect recovery efforts.

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[1] English Nature is the statutory advisor to the Government on nature conservation in England and promotes conservation of wildlife and natural features within the country (English Nature, 1994).
[2] A comprehensive overview can be found in the «Government Response to the UK Steering Group Report on Biodiversity». London: HMSO, May 1996, 49 pp.
[3] Grants can include payments for volunteer expenses and the purchase of equipment for management and monitoring, but nothing else.

Coloured single-sheet leaflets providing brief information on the ecology, threats and recovery objectives for some species in the Programme are produced. Annual meetings are scheduled for all those involved, and the review of its first five years is to be undertaken in 1997. Also a Species Recovery Programme Award has been established to stimulate partnership and volunteer co-operation. These types of measures seem very appropriate if one seeks to gain broad participation.

Obviously, English Nature's initiative does not stand alone in the United Kingdom. The sister agency of Wales works on species recovery but not under the umbrella of a specified programme ; that of Scotland already started its own Species Action Programme two years ago (R. Mitchell, in litt. 1997). Voluntary conservation organisations and institutions (eg. London Zoo) also contribute significantly. For instance, about 188 Species Action Plans for birds have been produced by the RSPB (Royal Society for the Preservation of Birds) in association with the Joint Nature Conservation Committee, the three statutory country conservation agencies, and eventually, the Wildfowl and Wetlands Trust. These action plans cover species of particular interest to conservation, due to their declining, rare, localised or internationally relevant populations. Some of them are used by the country's conservation agencies as a starting point to develop their own plans. The UK Steering Group Report on Biodiversity (1995) contains a list of some 1250 species, of which 300 species (70 are animals) should have action plans.

2.3.9 United States of America

The U.S. have the most specific and elaborated legislation for active conservation of threatened species, deserving a more detailed analysis. Beginning in early 1966 with the Endangered Species Preservation Act, followed by the Endangered Species Conservation Act of 1996 and ending in 1973 with the Endangered Species Act (known as ESA), the same year as CITES[1] was approved. In recent decades ESA has been amended with provisions several times (in 1978, 1982 and 1988), and due to continuous review process (see # 1.3 in the Introduction) and still pending critics (c.f. Reffalt, 1988), new changes may be expected. Very recently, for instance, the Ecological Society of America (Carroll et al. 1996) undertook an analysis of ESA, with the objective of assessing how the Act could be made more effective through better use of scientific information.

The Endangered Species Act imposes a general obligation on all federal agencies to further the purposes of the Act, but the Fish and Wildlife Service of the Department of Interior is the primary and directly responsible agency, followed by the National Marine Fisheries Service. Co-operation extends to the State level including public agencies, universities and NGOs. In latter cases, the content is not binding.

ESA, as amended in 1988, identifies species that are at risk of extinction in order to implement a process for reducing that risk by limiting additional sources of harm and to develop and implement a recovery programme. The major stages in this process are :

1. listening a species as threatened[2] or endangered,
2. designating the habitat that is critical[3] for survival of the species (automatically sets in motion habitat protection measures),

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[1] Convention on International Trade in Endangered Species of Wild Fauna and Flora.

[2] By definition, «endangered species» is an animal or plant listed by regulation as being in danger of extinction. A «threatened species» is any animal or plant that is likely to become endangered within the foreseeable future. This concept of threatened is not exactly the same being utilised by IUCN in its categories (see Appendix A) and used throughout this study.

[3] «Critical habitat» is defined as the minimal area that is needed to supply the species with its immediate survival needs.

3. providing immediate protection and prohibition of acts that would further harm the species,
4. developing and implementing recovery plans, and
5. delisting the species once it has been restored to a viable state.

The cataloguing or listing of species in the Federal Register and its effects has been one of the controversial issues that provoked past amendments. At present it is a very detailed petition process with listing criteria, findings requirements, public-comment periods, hearings, notifications and time limits for final action. The initiative may be made by anyone, but documented. Judicial review has also been enacted.

In order to avoid the so-called biopolitics (Tilt, 1989) criteria for listing cannot take into account economic or other factors different from the following (Section 4 (A) 1) :

    a) the present or threatened destruction, modification, or curtailment of its habitat or range;

    b) overutilization for commercial, recreational, scientific, or educational purposes;

    c) disease or predation;

    d) the inadequacy of existing regulatory mechanisms;

    e) other natural or manmade factors affecting its continued existence.

According to Reffalt (1988) the list and the listing process have thus become a focus of attention and a means of controlling the pace of the entire ESA effort. Other writers complain (Rholf, 1991) arguing that several species may not survive the pre-listing and go extinct still being in a "candidate" category (above 3000 species, at present) . The delay in processing such requests has also dismayed many who otherwise strongly support the goals of such laws (Bean, 1984).

The ESA calls for the development and implementation of recovery plans for listed species, but due to limitations of human and financial resources in the US Fish and Wildlife Service (as in all agencies, elsewhere), not all listed species are subject to Recovery Plans. Shortly after listing, the extent of knowledge of recovery needs and funds available is evaluated, in order to reduce the number of selected species for recovery to realistic implementation levels. Species' recovery priority is ranked according to degree of threat, recovery potential, taxonomic distinctness and presence of an actual or imminent conflict. However, other factors may alter these guidelines, like a short number of easy recovery tasks to be accomplished (opportunity of delisting species, even if not priority ones) or Congressional action directing specific funds to a concrete species.

Occasionally, individuals of a given listed species are not found in the wild and the preparation of Recovery Plans has to be deferred. It may also happen that individual Recovery Plans are not necessary because recent policy in the US Fish and Wildlife Service encourages the development of multi-species recovery planning, focusing on ecosystem initiatives (U.S. FWS, 1996).

The number of Recovery Plans is less than the number of species in need of such plans (i.e. species listed) ; see updated situation in Table III. It is also necessary to mention that foreign species may be listed in the US Federal Register and protective measures apply when US citizens are involved, but Recovery Plans are drawn up only for species that occur in the United States.

ESA Recovery Plans are documents prepared for "endangered" or "threatened" species (ESA terminology) that detail the specific tasks needed to recover those species. They provide a blueprint for private, federal and state co-operation in the conservation of threatened species. Depending on the species, plans are either prepared by a panel of experts under the direction of a Fish and Wildlife Service employee, or they are contracted to an external consultant. Ideally, plans should be written within two and a half years of the species' date of listing.

Table III. Listing and Recovery Plans in the United States as of October 31, 1996.

Group	Endangered U.S.	Endangered Foreign	Threatened U.S.	Threatened Foreign	Total listing	Recovery Plans
Mammals	55	252	9	19	335	40
Birds	74	178	16	6	274	73
Reptiles	14	65	19	15	113	30
Amphibians	7	8	6	1	22	11
Fishes	67	11	39	0	117	72
Snails	15	1	7	0	23	18
Clams	51	2	6	0	59	43
Crustaceans	14	0	3	0	17	5
Insects	20	4	9	0	33	20
Arachnids	5	0	0	0	5	2
Animals subtotal	322	521	114	41	998	314
Plant subtotal	513	1	100	2	616	317
Grand total	835	522	214	43	1614	631

U.S. Fish and Wildlife Service (1996)

Recovery Plans work by identifying a wide range of actions available, clustered in "recovery tasks" and are ranked as essential: to prevent extinction of the target species (priority 1), to avoid significant further decline (priority 2), and to other activities necessary to achieve recovery (priority 3). The type of activities involved are land acquisition and management, landowner agreements that preserve or enhance habitat, captive breeding, re-introductions into formerly occupied habitat, habitat restoration and protection, research, population assessment, technical assistance for private landowners and public education programs.

In 1994 the U.S. Government started a participatory policy providing guidance to the Fish and Wildlife Service to involve the public in recovery planning and implementation (normally, at the regional level), including the need of other agencies to consider public comments. All comments are reviewed and addressed in the final plan. Monitoring of candidates and recovered species is also required (ESA amendments of 1988) and reports are produced annually on all monitoring activities.

Being the United States a federal system, funding may be provided to State agencies through the Cooperative Endangered Species Conservation Fund (ESA, section 6), if the State legislation enables that possibility and co-operation agreements are fixed. At present 38 States and Puerto Rico have such agreements covering both animals and plant species, while 12 States and 2 Territories have agreed only on animals. (US FWS, 1996)

There are few successful recovery cases : Bald eagle, American and Arctic peregrine falcons, Eastern brown pelican, Aleutian Canada goose, American alligator and California condor. However, if not fully recovered, the recovery efforts are claimed to hold those species with declining populations to an overall average of 35 percent ; while delisted species because of extinction (7 species between 1968 and 1993) count only 1% (U.S. FWS 1996). More information regarding overall performance of the Endangered Species Act is to be found in Campbell (1988) and Clark (1996).

Species Survival Plans (SSP)

Species Survival Plans are copyright registered by the American Zoo and Aquarium Association. They began in 1981 as the result of a co-operative population management and conservation programme for selected wildlife species in North American zoos and aquariums. Their stated aim

is to help ensure the survival of these species. The underlying argument is that, if properly managed, these ex-situ populations serve as both an important public resource and as a kind of "conservation insurance" against extinction of these species in the wild (ISIS 1996). Selected species are often "flagship species", well-known animals which arouse strong feelings in the public for their preservation and the protection of their habitat (for instance, Lowland gorilla, Giant panda, Siberian tiger).

Each Species Survival Plan "carefully manages the breeding of a species in order to maintain a healthy and self-sustaining captive population that is both genetically diverse and demographically stable". A Master Plan provides recommendations for each animal with consideration given to the logistics and feasibility of transfers between institutions. Family trees of captive populations are kept in order to achieve maximum genetic diversity and demographic stability. Vital records (births, deaths, lineage, etc.) are registered in Studbooks and experience in diet and care of species in captivity are recorded in specific Husbandry Manuals. There is also a Taxon Advisory Group that manages conservation programmes for related groups of species (great apes, bears, herptiles, freshwater fishes, etc.). Species Survival Plans vary greatly in content and are a sort of guide for action and strategic co-operation between the partner organisations. Re-introductions in the wild may be also regarded as specific projects and, when dealing with native endangered species of the United States, are often linked to the official Fish and Wildlife Service's Species Recovery Plans.

2.4 Concluding remarks

The analysis above is not exhaustive nor was that the intention, but is seems that in the majority of countries, a policy and legal framework for species recovery is totally missing. Other countries are beginning, and only a very few (i.e. Australia, Finland, Spain and the United States) have consolidated domestic laws addressing the issue. However, species recovery efforts have arisen in situations with no specific legislation, but with committed authorities or strongly dedicated voluntary groups (conservation organisations). The participatory spirit of a given society and its tradition in co-operative work has much influence. In optimal cases, legislation would not even be required. Yet, in real practice, we badly need the public administration to take over the responsibility of reducing the rate of man-caused extinctions. In this rather heterogeneous scenario, the general principles and policy statements to be found in international treaties and documents are much appreciated. Of particular relevance is the Convention on Biological Diversity, which involves almost all the countries of the world.

Private entrepreneurs may need only the conviction (and good money) to undertake recovery efforts, but the public administration requires a mandate –whether general or particular– to be legitimated to do so. Likewise, when the activities involved imply restrictions of private rights, legislation is unavoidable. Plants are the property of the owner of the land on which they grow. Animals –our study-case– may be easier to deal with because they are either State property or *res nullius* (de Klemm and Shine, 1993) ; however, their habitat can be equally subject to infringement of property rights. Needless to say, a given case changes completely when required management is to happen on private or public land. The need for appropriate legislation emerges from many sides.

Species recovery must be understood as a very specific case of species conservation, and applies only when a species (subspecies or population) survival is at risk and one actively tries to revert the situation. Nearly all national legislation for species conservation is centred on the protection of individual specimens (capturing and exporting prohibitions, hunting and fishing regulations, etc.) and, as already commented, very few focus on the whole species as such. Simple protective measures are helpful, but are not sufficient. Threatened species deserve an integrated protection approach considering all relevant factors (Marcot, 1994).

Accordingly, significant steps in species recovery legislation have been the obligation or the possibility to set aside suitable habitat (or restoration of it) for targeted species, enabling mechanisms to control damaging activities (e.g. consultations, Environmental Impact Assessments), and a clear mandate to a responsible agency to do whatever necessary to actively raise the populations to safe levels (habitat management, predator control, captive breeding, re-introductions, etc.). The latter may or may not figure explicitly as recovery plans.

First of all, the conservation status of animal populations is assessed. Then, a normal procedure to enact administrative action is to fix a public register (lists, catalogues) where threatened species are formally recognised. This step seems to be one of the key bottlenecks of species recovery. Ideally, the initial appraisal should consider existing risks and population trends (listing criteria). The many scientific studies, like the Red Data Books, are very valuable at this stage. Once listed, a second evaluation should take place (recovery criteria) in order to judge if it is worth undertaking special active management measures, i.e. recovery planning. Automatic protective measures –including eventual habitat protection– may become sufficient ; other times intended actions are not feasible or perhaps they imply too much effort compared with other parallel cases. Inflated lists without these provisions may lead up to unworkable situations which are always counter-productive (Bean, 1984).

The official lists and catalogues may express the threatened status of species, the protection level assigned, or both at the same time. In the first and perhaps in the latter cases, the aim of recovery action could be the delisting of the species (i.e. ESA), meaning that the species is not any longer threatened. This could give rise, at least theoretically, to a vicious cycle (Figure 1) as pointed out by de Klemm and Shine (1993). Once, delisted (no more protection), the threatening factors could act again and bring the species back as a candidate ; and so the cycle starts again. The problem has to be judged accordingly when it is deemed to happen.
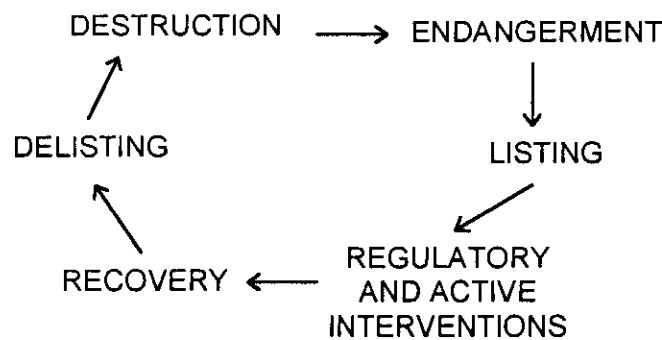
DESTRUCTION ⟶ ENDANGERMENT

DELISTING ⟶ LISTING

RECOVERY ⟵ REGULATORY AND ACTIVE INTERVENTIONS

Figure 1. The vicious cycle of listing - delisting

Indeed, species recovery efforts should end with the rescue of the target species. Yet this is a very long chain of decisions and measures that also involve multiple actors. Legislation has much to say where the chain should start and who has to participate. However, there is not a single plan that covers the whole extent of that chain (see next chapter), and the whole planning process varies depending on the different pathways by which the interest in species recovery arose. There are two basic approaches :

- A general mandate or policy statement for the preservation of biodiversity or of threatened species is further developed and from the top-down. General assessments of fauna or group of animals identify those that are in need of recovery. Then, a formal decision is taken and

recovery action is planned. This is the "structured approach" which normally is aware of the actors, instruments, resources and real possibilities available, ending in rather coherent results. This approach is more desirable, but requires well organised and mature administrations.

- Some species or taxonomic groups are directly selected because of their obvious critical situation or because there are individuals or groups of people (scientists, associations, etc.) specially interested in them. Everything needed for their recovery is asked for. Very often there is no sense of realism, and the list of requirements becomes a mere theoretical exercise or turns into a kind of "wish list" to the Three Holy Kings. Apart from these potential deviations, this "incidental approach" usually provides good quality information on the status of the species and very frequently, accurate orientations. Historically it has played a significant role in pushing the cause of species recovery, and it is still needed.
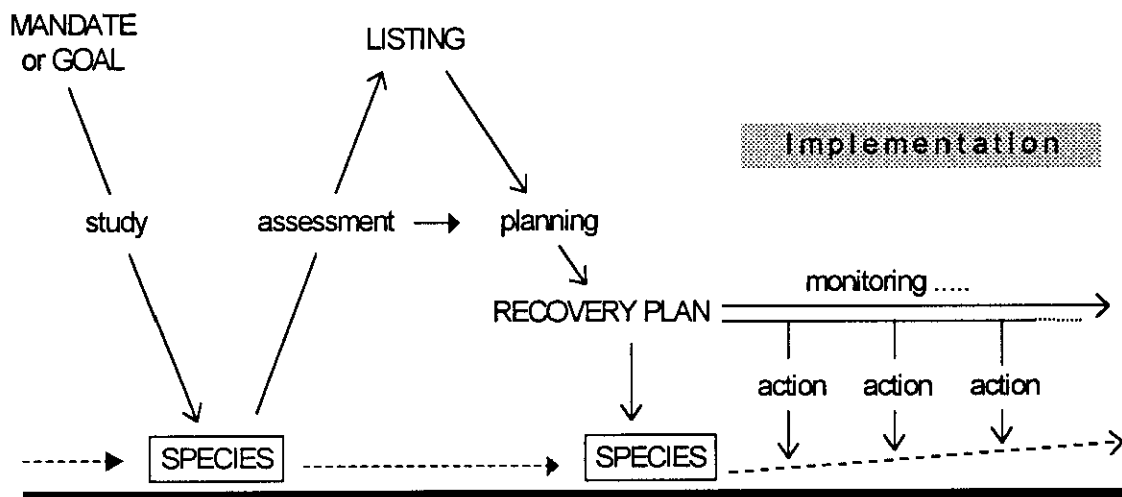
Figure 2. The recovery chain

In principle, the structured approach seems to be more desirable, but it is not easy to achieve. In any case, it is important to keep in mind that species recovery is to be conceived only on "emergency" basis ; as a crisis stage. As in medicine, preventive efforts are wiser than filling the hospital with cases to cure (= listed species). Wise resource use (c.f. Robertson, 1991) and good ecosystem oriented land planning (c.f. Saunier & Meganck, 1995) is the best policy. In this context, ecological and multi-species recovery strategies seem to be progressively gaining acceptance.

* * *

3. ANALYSIS OF EXISTING PLANS

The policy and legal framework to help understand existing "action plans" has been explained in the previous chapter. As shown, there are many parameters involved in species recovery : the international or national level, the organisations involved ; the taxonomic group or target species ; the geographic scope ; the type of actions regarded and, logically, the existence or non-existence of a legal basis. Likewise, the documents or plans that result from recovery planning differ not only in their names, but in content, to whom they are addressed, their legal reach and the capacity for generating real field action. Such a kaleidoscopic situation is not easy to order in a logical scheme, so much the worse if the issue seems to be in "evolutionary crisis".

3.1 Overview

In this chapter we will further analyse plans that have already been mentioned, and some others that may not. Table IV provides a general overview, showing that there is an underlying nomenclatorial problem that has to be faced somehow. Similar plans may have different names ; the same name may apply to different contents, and sometimes, the same entity uses indistinctly one or the other name to refer to identical issues.

Table IV. Overview of some existing types of Action Plans (*sensu lato*)

LEGAL BASIS / PROMOTER / ADVOCATE	STRATEGIC	IMPLEMENTATION
Biodiversity Convention	Biodiversity Action Plan	[recovery + plan]
Bern Convention's Recommendations	Action / Recovery Plan	National Action Plan
		Recovery plan
Barcelona Convention, Protocol 1995	Action Plan for the Recovery/ Conservation of (Sp/Spp)	
Pan European Biol. Land. Div. Strategy	Species Action Plan	Projects
Australian legislation	Endangered Species Program	Recovery Plan
Finnish legislation	Conservation Plan	
French Biodiversity Programme	(Sp/Spp) Action Programme	Restoration Plan
Netherlands conservation policy		Action/Recovery Plan
New Zealand conservation policy	Species Recovery Programme	Recovery Plan
Spanish legislation	Co-ordination guidelines	Recovery Plan
		Conservation Plan
		Management Plan
Swedish conservation policy		Action Programme
United Kingdom conservation policy	Species Recovery Programme	Recovery Project
United States legislation	Recovery Plan	Recovery Plan
American Zoo & Aquarium Association	Species Survival Plan	
BirdLife / Council of Europe	(Sp) Action Plan	National Action Plan
IUCN	Conservation Action Plan	Conservation Project
WWF	(Sp/Spp) Conservation Plan	
	[Spp] Action Plan	

«Sp» refers to a single species and «Spp» to a group of species.

As already mentioned, the content of these plans varies because of institutional idiosyncrasies, formal legal requirements and other factors, among them, the kind of species or group of species treated. Their different life histories (whether migrant or not, bugs fixed to plants, etc.), habitat requirements and the sort of factors that are likely to put them at risk (pollution, over-collecting, etc.) influence greatly the contents of the plan. However, independent from these particularities, the shape or structure of the plans can be more stable. We will concentrate on that in the next section. A few cases have been selected.

3.2 Structure of plans

3.2.1 IUCN Conservation Action Plans

The context in which IUCN elaborates Conservation Action Plans for groups of species was explained in section 2.1.4. Once published, they serve mainly as a background overview of their status, biology and conservation needs world-wide. In this context, the taxonomic multi-species approach of IUCN is very valuable. The Action Plans are implicitly addressed to governments, institutions and other actors active in the countries where the species are present. All the output is recommendatory, as always happens in non-governmental international affairs.

An important part of the plans consists of information on the biology, dynamics and detailed status of the species in their whole range. In fact, the present tendency is to separate this section as a «Status Survey» from the Action Plan itself (also in the title). The content of such publications varies significantly with the biological function and geographical range of the group of species treated, but traditionally they have been structured around three major areas :

* Identification of the threatened species
* Prioritisation of conservation action
* Outline of project briefs for the most urgent cases (most often geographical units)

Priority actions in many cases consist of the preparation of Recovery plans for critically endangered species (c.f. Fjeldsa, J. 1996). Further field studies and monitoring are frequently completed by members of the IUCN Species Survival Commission specialist groups.
Recently revised plans (e.g. Asian rhinos in 1996) provide more specific proposals and project outlines as well as the overall pictures of programmatic and financial needs for conservation.
There are cases, like the Eurasian Insectivore and tree Shrews Action Plan (Stone et al., 1996), where individual Action Plans for some species are included as appendices : for instance, the Russian desman and the Pyrenean desman.

3.2.2 Action Plans for the Conservation of Mediterranean marine species

The Action Plan analysed is that for the conservation of the Mediterranean marine turtles prepared within the framework of the Mediterranean Action Plan (see Genoa Declaration in 2.2.2). It is defined as a regional strategy and it basically outlines objectives, priorities, and actions co-ordinating structures. Addressed are the Mediterranean riparian countries. Biannual programmes of activities are submitted to the Parties for approval and funding.

An introduction gives a very brief statement –one page– on the situation of decreasing populations, and the most serious threats faced by these animals. Objectives include the protection, conservation and, where possible, the increasing of the populations. Priorities are set accordingly, with the addition of public awareness and research on new nesting areas and behaviour of the species. The actions are organised as follows :

a) Protection and management
* legal protection for marine turtles and legislation for protected areas is requested (to be developed if non-existing)
* protection and management of nesting areas (with information campaign)
* banning of exploitation and/or minimising accidental catches (includes campaigning)
* establishment of a Mediterranean network of marine and coastal protected areas for marine turtles (includes an inventory of all nesting areas to assess declarations)
* information (awareness programme for fishermen, tourists, etc.) and training of officers.

b) Research
- scientific research (survey of nesting beaches, population dynamics and migration, etc.)
- data collection and dissemination

c) Co-ordination structure

3.2.3 Action Plans for globally threatened birds in Europe

The 23 Action Plans co-ordinated by BirdLife International (see «Recommendation 48» in #2.2.1) are included in one single volume published by the Council of Europe (Heredia et al. 1996). It is the result of a three-year period of intensive collaboration between several organisations, involving 370 experts from almost every European country.

Based on information from previous surveys (Tucker and Heath, 1994), the 195 recognised threatened bird species regularly occurring in Europe were grouped in four categories :

SPEC 1 Species of global conservation concern. Species that are globally threatened, conservation dependent or data deficient according to IUCN categories (see Appendix A). 24 species.

SPEC 2 Species whose world populations are concentrated in Europe (i.e. over 50% of the total population or range occurs in Europe) and have an unfavourable conservation status. 41 species.

SPEC 3 Species whose world populations are not concentrated in Europe, but have an unfavourable conservation status in Europe. 130 species.

SPEC 4 Species that have a favourable conservation status (= not threatened !) but whose populations are concentrated in Europe. 83 species.

Species selected for Action Plans were those in SPEC 1 and an additional five exceptions ; one from SPEC2, two from SPEC3 and the Azorean bullfinch joined in. The Plans aim "to define specific actions which are required to prevent further deterioration in their status and where, appropriate, to begin their recovery". They "should form the basis for decisions at an international level and provide a framework for more detailed planning at a national level." In fact, the need of National Action Plans is clearly addressed for many species.

The structure of all plans is basically the same, with some minor differences when the species lives in only one country. Each Plan is headed by two statements : one regarding when to review and update the document (normally 2-4 years) and the other fixing its geographical scope. There is also a synoptic summary of the threats and limiting factors as well as of the conservation priorities preceding the main body of the plan. The latter is organised as follows (headlines in italics, comments in brackets) :

A. *Introduction*
B. *Background information* (synthesis of very extensive compilation)
Distribution and population (providing quantitative figures)
Life history (divided in : taxonomic status, breeding, feeding and habitat requirements)
Threats and limiting factors (threats are rated according to a given scale)
Conservation status and recent conservation measures (broken down by countries)
C. *Aims and objectives*
Aims[1] (one or two, placed in short, medium and long terms)
Objectives (broken down into briefly described actions with a priority rating and time-scale)
- *Policy and legislation* (addressing both international and national instruments)

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[1] Aims are very specific. For instance, that for Zino's Petrel reads : "To increase the breeding population to at least 40 pairs by the year 2000, by eliminating the factors which are adversely affecting the species"

- *Species and habitat conservation* (very specific and varied, e.g., site management, pollutant control, artificial nests, captive breeding, wardening, etc.)
- *Monitoring and research* (surveys, monitor mortality, etc.)
- *Public awareness and training* (national and international specific campaigns)

D. *Annex. Recommended conservation actions by country* (accurate, very often repetitious)

There is no evaluation of costs nor of the implementation capacity of institutions and organisations in the countries. As with many strategic plans, what needs to be done seems to be clear ; but what is required is the commitment of actors and resources to carry out the necessary work. However, these type of Action Plans are very valuable in that they generate a coherence to actions throughout the whole range of given species. Large-scale habitat requirements –as in the case of the conservation of large carnivores– has been seen as essential for the work of maintaining and restoring nature, and for the promotion of ecological networks.

The Large Carnivore Co-ordination Group has just approved (April 1997) internal guidelines for developing Action Plans for Europe's large carnivores based on the present BirdLife approach and on the IUCN Species Conservation Action Plans. The structure adopted is very similar, although with more details (see Appendix B). Socio-economic and political issues have been incorporated.

3.2.4 Pan-European Strategy Action Plans and Projects

Action Plans conceived under the Pan-European Biological and Landscape Diversity Strategy (see # 2.2.5) are to provide a framework which contributes to a common European response to the Biodiversity Convention and in particular, the National Biodiversity Strategies. The time frame of the Strategy is from 1996 to 2016, a period of 20 years that is to be divided in 5-year Action Plans. None of these Plans have been developed yet, but several other initiatives now being planned are likely to join the Strategy's principles and goals. That is the spirit of the Strategy, a willingness to amalgamate efforts instead of trying to conform rigid structures.

Plans should identify the fundamental actions towards the realisation of each set of five-year goals. These fundamental actions can be fully elaborated into Projects which can be undertaken by international agencies, government authorities, economic sectors or NGOs as separate, individual or free-standing activities under three circumstances :
- they fall within their National Biodiversity Strategy
- they fall within their own existing work programmes
- they are initiated in direct response to the Strategy Action Plan

Projects should be innovative, proactive, cross-sectorial, achievable (within a five-year time frame) and acceptable to the public, who has to be involved. Their outlines should incorporate :
- concrete activities
- time frames
- funding mechanisms
- costs and actors
- instruments (including incentives)

Moreover, some typical project-management criteria for prioritisation into Action Plans are provided at the end of item 2.7.

1. *Need to address urgent issues*
2. *Possibility to take advantage of unique opportunities*
3. *Potential to ensure concrete action and produce results within a set time frame*
4. *Need to undertake activities in a structured and co-ordinated sequence*

If a European Threatened Species Programme is to be developed in the framework of this Strategy (J.P. Ribaut, in Heredia et al. 1996), one would expect to have, in the near future, several Species Action Plans and Projects elaborated with this new "style".

3.2.5 Spain's Recovery and Management Plans

Recent Spanish conservation law contemplates four types of plans : Recovery Plans, Habitat Conservation Plans, Conservation Plans and Management Plans yet only Recovery and Management Plans have been approved (see Table II). These plans have been prepared by the Autonomous governments and published as a Decree.

As the protection regime for species established by the Spanish Nature Conservation Act is very general and the Autonomous Parliaments have not further developed it, several of the Decrees that promulgate the Recovery Plans incorporate a specific protection regime for the target species and related issues. The Autonomy of Navarre, for instance, establishes a rating scale for the compensation of livestock killed by Brown bears. Recovery or Management Plans do not have the legal reach for introducing restrictions on property rights or any other if it has not been previously contemplated by the law. Therefore, the Decree has to assume these provisions. The structure of the Decree[1] for the Black stork serves as a good example :

Article 1	*Purpose*
Article 2	*Approval of the Recovery Plan*
Article 3	*General protection regime* (National regime for the direct protection of individuals is applied to the jurisdiction of the Autonomy)
Article 4	*Specific protection measures* (regulating forest and fish activities)
Article 5	*Critical areas* (provisions for the declaration, regulation of activities within critical areas, link to environmental assessment procedures, etc.)
Article 6	*Administration and management* (regarding responsibilities)
Article 7	*Means* (obligation to provide necessary human resources and funds)
Annex	*The Recovery Plan* (the full text)

(Examples of annexes)

Recovery Plan (Pyrenean Ibex)	Management Plan (Sand martin)
Introduction	*Analysis of the situation*
Conservation problems	*Purpose*
Existing conservation measures	*Coverage*
Justification	*Operational objectives*
Objectives	*Guidelines and activities*
Guidelines and activities	*Conservation*
Habitat improvement	*Research on the species*
Captive breeding	*Co-ordination of activities*
Re-introduction	*Execution and co-ordination*
Research and monitoring	*(responsibility)*
Co-operation	*Follow-up*
Divulgation and Awareness	*Project life and review*
Execution and co-ordination	
Follow-up	

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[1] Decree 83/1995 of 11 May, approving the Recovery Plan for the Black stork and enacting complementary measures for its protection in the [Autonomous] Community of Castile and Leon.

The National conservation law does not provide guidelines of how to elaborate created plans (see 2.3.6). Nonetheless, the published cases are rather coincident in their structure, perhaps inspired by early guidelines proposed by Machado (1989), at a time when there was no legislation considering the issue.

3.2.6 ESA Species Recovery Plans

Species Recovery Plans according to the Endangered Species Act (1973) of the united States were largely commented in section 2.3.9. They are legally based and have a great value in setting objectives, determining what must be done and allocating the various tasks amongst the most appropriate bodies.

The U.S. Fish and Wildlife Service (1990) has published policy and guidelines for planning and co-ordinating recovery of endangered and threatened species. They are shaped, obviously, according to U.S. administrative practices and institutional culture, which in the case of the Fish and Wildlife Service, is rather pragmatic. Unnecessary information is kept away from the final document. The end products are precise, clear and very "handy". They have been designed as daily work documents.

A Recovery Plan has basically three chapters : (I) Introduction, (II) Recovery and (III) Implementation Schedule, followed by some appendices. The composition of the recovery team and acknowledgements are placed at the beginning or at the end of the Plan. In Table V the content of the Alala[1] Recovery Plan (Burr et al., 1982) is shown as an example.

Table V. Contents of the Alala Recovery Plan

I. Introduction
Former status
Current Status
Reasons for decline
Life history and populations dynamics
Habitat requirements
Mortality factors
Productivity considerations
II. Recovery
Step-down outline
Narrative
1.   Determine biological & ecological requirements
2.   Secure habitat areas
3.   Secure wild populations of Alala
4.   Monitor habitat and population
5.   Public information and education programme
References
III Implementation Schedule

Appendix : Essential habitat for the Alala
Appendix : Agencies contacted during Agency review

The Introduction starts with a brief summary of facts related to the species (existing research, legal protection, listing, etc.) and contains the essential information on its distribution (historic and present), life history and ecology, as well as the known reasons for decline. In the second

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[1] The "Alala" *(Corvus tropicus)* is a crow endemic to the island of Hawaii

chapter, recovery objectives are stated and explained, followed by a step-by-step outline that consists of a systematic scheme of tasks assigned to each objective. This gives a good overview of the full "menu". In the Narrative section, the whole proposal is explained in common language.

Recovery tasks are actions needed to reduce or resolve the threats of limiting factors that contributed to the status of the species. These tasks are designed to assist the achievement of recovery objectives. They are individually numbered and prioritised according to the following categories :

Priority 1. Absolutely essential to prevent extinction
Priority 2. Necessary to avoid significant further decline
Priority 3. Necessary to achieve full recovery

The implementation schedule (Part III) is very synthetic and presented in the form of a table. It is a sort of the showing head of the iceberg below. Headings of column tables are :

- General category
- Plan Task (synoptic title): Task number : Task priority : Task duration
- Responsible agency (FWS with region and programme and/or others)
- Costs (estimate) by fiscal years (normally 3-5)
- Comments /notes

The estimates are useful for planning but do not reflect actual spending. As the FWS (1996) explains, "the recovery plan is best thought of as a menu. To have a healthy meal in a restaurant, one would not total an entire menu to arrive at the cost of one dinner". Not all the tasks in a recovery plan need be implemented to reach the recovery goal. Furthermore, costs may be reduced when actions from different Recovery Plans can be planned and combined together. That is the case, for instance, of the «Watershed implementation schedules for fifteen mussels in Alabama, Illinois, Kentucky, Tennessee and Virginia». The individual 15 Recovery Plans were written in 1984-1985.

Appendices contain some needed provisions, like the list of agencies formally consulted according to legal provisions, as well as other informal consultations. Of particular importance is the precise delimitation of the habitat considered to be "critical", as special legal protection will apply to it (see #2.3.9).

3.3 Concluding remarks

As in any planning process, recovery planning goes from the general and global to the specific and detailed, in a step-like manner that may be followed by sequential documents. One could expect a single organisation to produce a coherent set of documents, but having so many involved, it is almost utopian.

A first group of plans addresses only the global and strategic aspects (the starting end of the chain) identifying which should be the target group or species and what is needed to be done. They have necessarily to be further developed by subsequent planning. This is a frequent approach in plans produced by international organisations and conventions related activities. The other end of the chain –the "real-time" implementation at the ground level– is more likely to be developed by governmental specialised agencies or field active NGOs. This second group of plans gets down to the how, when and who is going to do what is needed. Financial provisions are normally incorporated.

Another criteria used in the attempted classification below is whether a plan entails only one or more of the three basic types of activities implied in integrated species protection. As The Nature Conservancy summarises (Stein & Chipley, 1996), these are : (1) habitat protection, (2) control of damaging processes, and (3) promotion of positive measures.

The classification that follows does not pretend to be definitive. It is a first approach to help clarify the mare-magnum of existing plans according to the above criteria and to achieve an understanding of technical concepts like "conservation" and "recovery", being the latter a particular and more restricted case of the former. The system adopted contains four classes, two for each of the groups mentioned above. The limits set between them are merely conceptual, and in no circumstances imply any sense of inappropriateness. It is not surprising to find good "hybrids". The names given to each type are just for guidance, perhaps only the most used, but as already said, there exist all sorts of combinations.

Type 1 [Programmes]. Programmatic and strategic level plans where general principles and long term goals or aims are set ; they usually involve large groups (or all biodiversity) and very often large regions (e.g. European Action Theme 11 of the PEBLDS). Focus may vary from very broad matters, including sustainable development (e.g. Mediterranean Action Plan), to conservation or recovery, specifically. (e.g. Species Recovery Programme of English Nature). When they are institutionally produced, there is usually a budgetary line attached to it (or just being created). They seek to enact further action (research, legislation development , more planning, etc.). When promoted by international bodies, an almost *"urbi et orbe"* addressing is not infrequent, whether explicit or implicit ; but usually restricted to their constituency.

Type 2 [Species[1] Action Plans]. Strategic level plans where needed actions are assessed. Very often, plans of plans ("metaplans"). They may face general conservation issues (maintenance of species, regulating exploitation, legislation development, agreements, etc.), or they may focus more on the preservation of species or groups of species (X-taxon Action Plans), including, but not necessarily, strict recovery aspects. It would be preferable to call them «Conservation Plans» when their purpose is conservation and not just recovery. In the latter case their approach is usually rather integrated (all types of actions) but they need to be further developed. Species are normally considered in their full geographical range and if multi-country, a common recommendation is that each country prepare National Action Plans or eventually, develop their own Recovery Plans. Conventions and INGOs promoted plans deal normally with multi-country ranging species, and because of jurisdiction they cannot transcend this "umbrella" level. The same may also apply in some federal systems. It is rare that this type of plan contains budgets as they are not designed for direct implementation. Some of the instruments they call for may eventually not exist. On the other hand, one would expect to find valuable information on the natural history of the species, accurate conservation status assessments (attached or incorporated) and precise goal setting.

Type 3 [Recovery Plans] are the result of implementation oriented planning that focus on the kind of activities needed to be undertaken in recovery efforts, and on how and by whom they will be implemented. If recovery is not implied, but instead normal conservation activities, we would speak of «Management Plans», also a type 3 plan but not in our discussion. Recovery plans deal only with threatened species (*sensu* IUCN 1996) and

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[1] It seems to be convenient to introduce the term "Species" as there are Action Plans for many other issues, for instance the .Action Plan for the Mediterranean, National Biodiversity Action Plans, Habitat Action Plans and Site Action Plans in the United Kingdom (Williams et al. 1994), etc..

basically with the promotion of positive measures. Habitat protection may be also considered, enabling agreements for management or identifying critical habitat for seeking legal protection (automatic or to be requested). Status assessment of the species is not a part of them (already known), however, they usually include synoptic information on the biology, threatening factors and existing conservation measures. These types of plans are ordinarily regulated and have legal basis, are promoted by a responsible governmental agency and are normally restricted to a specific country or jurisdiction. Thus, very frequently they will not cover the whole range of a species. Recovery tasks may be directly assigned to specific actors or presented as a menu to pick from. They make use only of existing instruments. Global costs are estimated for a period of some 4-5 years, which is a common time-frame for planning at this level ; then the whole plan is customarily reviewed. Some organisations may not need further recovery planning and can start activity at this level by splitting the tasks foreseen into their ordinary working schemes and processes (i.e. annual working plans, etc.).

Type 4 [Recovery projects]. Projects are ready for "real-time" execution. Detailed budget and timing of activities (tasks) are stated as well as the responsible person or section in charge. Time-frames for recovery projects varies from one or two years to many years (long lasting projects). As previously said, not all implementing agencies or organisations need to develop projects down to this level, but it is not infrequent that Recovery Plans generate several Projects, each one addressing specific aspects (habitat management, breeding, etc.) or particular geographical units. For instance, re-introduction projects are Type 4 «Recovery Projects» when linked to Action or to Recovery Plans and not independently promoted as "ecological gardening" (c.f. Machado, 1989). There are also cases where Recovery Projects are directly initiated following a given overall-goal (mission statements of NGOs, for instance) without the need to be linked to other types of plans.

* * *

4. GUIDELINES FOR FUTURE ACTION PLANS

There is general agreement that the ecosystem oriented and habitat conservation approaches are more far reaching and cost-effective for the continuance of biodiversity, than a species-by-species conservation approach. Nonetheless, in the case of many animal species legal protection and habitat preservation may be insufficient to halt population declines and save threatened species from extinction (Cade & Temple, 1995). There is not only room for active species recovery, but also a need for it.

On a global scale, species recovery is a shared responsibility and a multi-party undertaking where some participants have long experience behind them and others may be just starting at the gate. All parts should benefit from the experience gained by others. Guides or guidelines for recovery planning have been produced by some governmental agencies (i.e., U.S. FWS, 1983, 1990), and by collective or individual authors (i.e., Machado, 1989; Clark & Cragun, 1996). Actually, species recovery is a speciality that is crystallising and the growing list of titles addressing the issue is the best evidence for it (Norton, 1986 ; Culbert & Blair, 1989 ; Clark et al. 1994, Kareiva, 1994 ; Ballou et al. 1995, *Ibis* 132, Suppl. 1995 ; Bowles & Whelan, 1996 ; Stephen & Maxwell, 1997 ; etc.). There was also a «Symposium on Recovery and Restoration of Endangered Plants and Animals» held in Chicago in 1990, and organised for the Second Annual Conference of the Society for Ecological Restoration.

The following sections are a mix of the essence extracted from the previous chapters, the "doctrine" contained in the literature and our own personal ideas. Because of contractual constraints, the comments and recommendations are shaped around animal species recovery, but most are equally valid for plant recovery. The basic intention is to be helpful in future recovery planning, but with a particular focus on Europe.

4.1 Species recovery responsibility

There are many important reasons why species should not become extinct or even threatened (cf Cairns, 1991b). The functioning of ecosystems is dependent on species as well as is our civilisation. There is also a sense of respect or love for nature and its integrity ; each piece is worth keeping (c.f. Norton, 1986). Besides this more or less "egoistic" or "altruistic" interest, many people also feel that, because we are the source of the problems so many species face, we are morally obligated to do everything we can to help threatened species to recover.

Upon accepting any of these reasons, species recovery becomes a shared responsibility of humankind, the same as conservation of nature in general. All sectors of society should accept their share, but for practical reasons the Public Administration has a major role to play in such a specialised conservation issue. It is true, that in many places governments do not undertake this type of action spontaneously; therefore, the catalytic role of NGOs is of vital importance. Moreover, there is a certain and greater moral obligation for countries where particular species are restricted to their jurisdiction. If endemics are threatened, the affected country should give them preference in recovery efforts as a matter of international solidarity and public affair. We like to call this the «Endemism Responsibility Principle» and it should be reflected in international and national legislation. It applies to all kind of species.

4.2 Scope and scale of action

To effectively revert the situation of declining species, recovery efforts must materialise in the field, at a scale of 1:1 (= real life). But for this to happen, it is usually necessary to start with the initiative at the higher policy decision levels. Beyond the responsible (or voluntary) body performing the actual work, there can be many other actors involved in assessing or planning

species recovery at international > regional > national > sub-national > local scale. Some actors may be better suited than others for specific areas. There may be the need for an integrated approach in order to understand the situation and plan the recovery of a migrant species, but there may be restrictions of sovereignty to act. Nations are a clear reference in species recovery affairs, and should stay so.

Recovery efforts (assessing, planning, implementing) must be based on the species' ecological requirements (habitat range, etc.) but adapted to the political multi-national or federated framework that exists. International non-governmental organisations and secretariats of regional conventions, for instance, are well positioned to act on an international scale, assessing the status of multi-country ranging species, proposing action in a coherent manner, helping to co-ordinate the action and monitoring the results with on a global scope. Recovery action is more likely to be implemented at a national or sub-national level. It may also happen, that the scope of some recovery efforts do not transcend the limits of a country. Species "extirpations" (v. Muton, 1987) for instance, refer to populations of a given species that became extinct in a country, but the species is present elsewhere. There is a different situation when species are endemic, and due to the principle of responsibility above mentioned, they acquire international relevance and should not be treated as a domestic affair. The scope of recovery efforts may also vary regarding the taxonomic group involved, but this aspect will be discussed under # 4.4.1 Target units.

4.3 Policy and legal support

Countries that have not developed their own conservation policy, or have not focused on the problem of extinction of species from the species approach, can benefit from international treaties and policy statements to start building a conceptual framework for species recovery. Such a policy "umbrella" for European countries could be found in the following sequence :

World Charter		Biodiversity		Pan-European Biological and		Domestic
for Nature	>	Convention	>	Landscape Diversity Strategy	>	Law

Species protection normally implies control of human activities and eventual limitations of property rights. This can be achieved only with ad-hoc legislation. Moreover, species recovery efforts seem to improve considerably when national legislation specifically addresses the issue and provides the necessary instruments -like Recovery Plans- to implement recovery action. Both single-species and multi-species processes should be enabled. It is therefore desirable that domestic law moves towards this end. International bodies with experience in the field can provide technical assistance for developing such legislation. It is not a matter of reinventing the wheel, but only to select the more appropriate one from the many available.

Multi-country Action Plans that are elaborated by cooperative efforts of non-governmental organisations should seek the endorsement of some intergovernmental body. By doing so, they do not gain legal binding force, but the governments addressed will be more inclined to take them into consideration, and funding possibilities will also be favoured. The Council of Europe through its Committee of Ministers or the Bern Convention's Standing Committee are in excellent position for endorsing such Plans.

4.4 Species selection

4.4.1 Target units

Each species, subspecies and population is a particular case, and as such should be addressed in legislation and recovery efforts. As Meffe & Carroll (1994b) summarise : "conserve diversity, not Latin binomials". The scientific justification for extending protection and management action

to distinct population segments of species is that genetic diversity provides the raw material for adaptation of a species to changing conditions (Carroll et al. 1996). The National Marine Fisheries Service of the United States has introduced the term «evolutionarily significant unit». In other words, the species-by-species approach, whether or not explicitly stated, should be able to "zoom" in to the population level whenever necessary.

Notwithstanding, status assessment may benefit from collective efforts, and the dynamics and problems of specific groups are better interpreted when their components are studied collectively. There is much in common in the first stages of recovery planning, and the scope of programmes and action plans benefit from a species-group approach, particularly when they range over several countries. The group definition has traditionally been taxonomic, but other sorts of groupings should be explored. An attempt at ecological grouping of vertebrates covered by the Bern Convention was presented to the Council of Europe in 1984 (groups are listed in Appendix D). Species with similar ecology are like to suffer from similar conservation problems.

On the other hand, life history of species may differ from each other, but very often, related species may have equivalent requirements, or the solutions to their problems are coincident in time and place. In such cases, multi-species recovery planning is highly desirable (Marcot, 1994). The case of invertebrates is a particular one because of the size of the individuals and the over-whelming number of species involved. Experience is limited, but it seems preferable to adopt a community-approach for many almost "sedentary" invertebrates, like snails and many insects. Micro-reserves established for plants[1] could be equally useful for invertebrate protection and better results would always be achieved if a combined plants-invertebrate strategy is adopted. Obviously, habitat management should be planned accordingly. The legal provisions adopted should provide the opportunity for multi-species processes.

It also makes good ecological sense to choose species that serve as protective "umbrellas" for other species. Such a single-species effort avoids many bureaucracies and provides many "inclusive benefits" (Carroll et al. 1996). Umbrella-species are species whose own area requirements provide some index on the area requirements of the ecological systems that support them. Top carnivores or other large-bodied, long-lived, slowly reproducing species at the top of their ecosystem's food-chain are good examples (Schaffer, 1994). The North-American spotted owl is a paradigmatic case (v. Yaffee, 1994). This and other specific qualities of target species will be discussed further under species selection criteria (# 4.4.4).

4.4.2 Assessment of species conservation status

Assessing the conservation status of a species has been a long-held concern in conservation affairs. Actually, there is much more experience behind categorisation of threatened species than in "real-time" recovery practice. It is, however, an important aspect, as [formal] recovery efforts start when a species survival is [officially] considered to be at risk. Status assessment becomes the anteroom for recovery.

In 1984 a Symposium held by the IUCN Species Survival Commission was fully dedicated to the problems of categorising the status of taxa threatened with extinction. In the publication of the proceedings (Fitter & Fitter, 1987) there is an appendix compiling many –38– of the different categorisation systems that were current at that time (Munton, 1987). Most of the technical problems discussed in that publication are still valid, and it makes good reading.

Realistically, there is no way to have everybody using the same criteria : some criteria are more loose, others more strict. Terminology also plays an important role, particularly, when definitions

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[1] The Government of Valencia, for instance, has created the figure of micro-reserves for the protection of wild-plants (D. 218/1994). The British Sites of Scientific Importance are also a good example.

of categories are incorporated into domestic legislation. Nevertheless, there is a real need of having at least reference criteria –a "common currency"– in order to be able to compare situations of the same species in different countries. IUCN Red List categories[1] have been playing this role since they started to circulate in the early 60's. Initially, they were largely subjective and, in addition to other problems (c.f. Mace et al. 1992), "inflation" has very often been an issue and even a nightmare when applied at the local level and with parochial approaches.
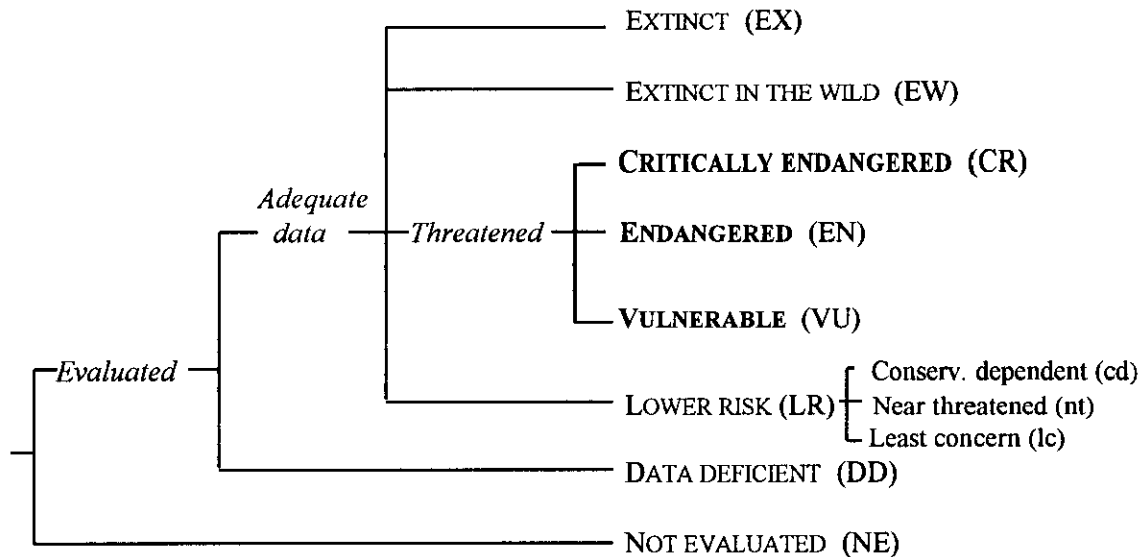
Figure 3. Outline of the new IUCN categories for conservation status (1996)

Revised categories and new criteria have been approved by IUCN and applied in *« The 1996 IUCN Red List of Threatened Animals »* .The new system is more objective and tries to base the assessment on available evidence, on taxon numbers, trends and distribution. The structure of the system is shown in Figure 3 and the criteria and subcriteria applicable in Appendix A. It is not easy to decipher the whole system at once, but the *Red List* has excellent explanations and examples (see also Mace & Collar, 1994). Of note are the three "threatened" categories, highlighted with bold fonts in Figure 3. They are different from the categories «endangered » and «threatened» used by U.S. legislation. We recommend that IUCN categories be utilised. Also worth noting is that «Conservation dependent» is a non-threatened category, but it must be understood that the survival of the species will be at risk if the conservation action ceases (habitat protection, predator control, etc.).

Very often, available information is not homogeneous throughout the whole range of a given species. "Intelligent inferences" are to be made according to IUCN's guidelines : *"Although the criteria for each of the categories of threat are based on quantitative thresholds, inference and projection are permitted so that taxa for which there is very little information can also be assessed. Therefore, the person conducting an assessment is expected to use the best available information, in combination with inference and projection to test a taxon against the criteria. If there is any reasonable concern* [underlining is ours] *that a species is threatened with extinction, it should qualify for the criteria of one of the categories of threat "*. In any case, whether or not subjective, the assessment process shall be conducted exclusively in biological terms.

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[1] The IUCN system used until 1996 has been : Extinct (Ex), Endangered (E), Vulnerable (V), Rare (R), Indeterminate (I), Insufficiently known (K) and Out of danger (O).

A given fauna assessed under the old criteria may change considerably when re-assessed with the new system. For instance, Finland's Red List had 17 threatened mammals, 38 birds, 1 reptile, 1 amphibian and 12 fishes (Rassi & Väisänen, 1987). The new figures in the world list (IUCN, 1996) read : 4, 4, 0, 0, 1 and 8 respectively. It is wise to use IUCN categories throughout the continents, and specially when assessing multi-country ranging species. But local lists based on the old IUCN categories cannot been translated *mutatis mutandis* into the new ones without causing great errors. Also, the new system requires that the criteria used must be mentioned along with the category. This forces a re-evaluation of the species (eg. EN:A1; B1+B2c) and that should be a stimuli for anyone active in this field.

Certainly, some countries may prefer to develop their own categorisation system, yet it is crucial, as said, that the process is strictly conducted in biological terms, and legislation should provide the needed measures for preventing social, economic or political factors from influencing the assessment.

4.4.3 Species listing

The "listing" or inclusion of species in an official register is a delicate step in species recovery. It should always be preceded by a thorough process of status assessment. Irresponsible –although enthusiastic– "mass listing" should be avoided. Of course, a status assessment should not mean that threatened species are automatically listed. Other criteria may apply, and the pace of listing may be used to control the whole process. There is no single solution.

Official lists normally imply a protection regime for the taxa included, and sometimes the automatic duty to start recovery action (which may end in unworkable situations). In such cases, the decision for species recovery should be taken separately (see next paragraph). In order to avoid possible distortions, the official registers should be associated with the protection regimes rather than with the threatened status. A given conservation status (threat category) does not always imply the same type of protection requirements. In other words, if automatic protection or recovery regimes are enabled, it is preferable to establish "Catalogues of Protected Species" instead of "Catalogues of Threatened Species".

The initiative for proposing species to be registered in the official lists should be open to universities or any interested group or individual, with the understanding that such proposals have to be appropriately documented and justified.

4.4.4 Selection criteria for species recovery

Firstly, all species listed –whether in threatened or protected catalogues– may not necessarily require recovery action. For some of them, the knowledge may be insufficient to even warrant an attempt. Others may continue quite well with passive protective measures. Each case is different and should be analysed independently to segregate recovery from non-recovery species.

Secondly, species recovery is expensive and specialised professionals and time are scarce. The capacity of responsible agencies for undertaking Recovery Plans is normally limited and, unfortunately, the number of threatened species in a given country easily overruns such capacity. Some formal or informal criteria for selection of species for recovery have to be enabled in order to reduce the number and adapt to existing capacity. Species in need of recovery, but presently not selected, should be maintained in a "recovery waiting list".

It is scientifically reasonable to give high priority to species immediately threatened with extinction, to umbrella species, and to taxonomically unique species (Carroll et al. 1996). However, here there is room for introducing many other considerations: the ecological role of species in the ecosystem ; whether it is only a population or a full subspecies or species involved ; their genetic

distinctness, potential uses (industry, biotechnology, etc.), international interest, political opportunity, chances of success, etc.

Table VI provides an example of how priority-setting could operate. A «Recovery priority index» is utilised, in which different parameters add up points to a maximum of 10. In the case of highly conflictive species, half a point is subtracted. Other equally valid combinations can be formed, and the basic idea is to produce a clear ranking system using some sort of numbers.

Table VI Recovery priority index

Parameter	Points
Level of threat (EN / CR)	2 – 3
Subspecies / Species	0.5 – 1
Umbrella species	1 – 2
Key-stone species	1
Charismatic species	0.5
Endemicity level (sp. /gen.)	1 – 1.5
Good chance of success	1
Highly conflictive species	- 0.5

The U.S. Fish and Wildlife Service utilises a two-step priority. It is based first on the degree of threat, recovery potential and taxonomic distinctness. Then it considers the conflict between the conservation efforts and the development or other economic activities in the recovery area. An explanation of how it works is to be found in Male (1994, p. 201)

4.5 Recovery planning

Species recovery aims to restore populations that are threatened with extinction to a level where they are self-sustaining in the wild. As with many endeavours, the probability of success increases with good planning. Thus, recovery of species must be assisted by the careful setting of objectives and planning of needed activities. This is called recovery (sometimes, restoration) planning. *Endangered Species UPDATE* published by the School of Natural Resources of the University of Michigan has devoted a Special Issue (Vol. 6 No. 10, August 1989) to recovery planning. Clark and Cragun (1996) have written an excellent essay, particularly focused on organisational and managerial guidelines. At the end of it, there is a useful 14-step procedure for analysing problems and developing "action plans for species recovery", including self-explanatory examples of work sheets to assist the planning team. The paper by Male (1994) is also of interest here.

4.5.1 Terminology
For the benefit of easier interpretation, it is desirable that a more coherent terminology for the naming of future plans be consolidated. There is no single forum where such a terminology could be adopted. With this in mind, the following scheme based on some simple conditions is suggested. Strict definitions are avoided in order to maintain flexibility and allow each individual organisation to adapt to their own legal constraints and idiosyncrasies.

  a) Species Programmes : Policy statements ; scope, goal & objective setting.
  b) Species Action Plans : Action outlines ; all type of species-related conservation measures; general addressing to interested parties ; not legally binding.
  c) Recovery Plans : Restricted to recovery specific measures ; task assignment and, eventually, cost estimates ; have a legal basis ; uses existing instruments.
  d) Recovery Projects : Are executive (planned undertaking); include a budget ; one actor.

If any term should be used generically, "Action Plans" seems to be the most appropriate, as all of them seek action of some kind. "Conservation Plans" include, and may eventually be restricted to passive protection, in which case they should not be related to recovery efforts (= active or hands-on conservation).

4.5.2 The Planning team

It is almost impossible that a single person or one single type of professional could prepare action plans for species recovery without biasing the whole process or missing important questions. Recovery Plans should ideally be prepared by a planning team that incorporates all possible perspectives of a matter that has been demonstrated to be very complex, and in many cases, embracing biology, ecology, psychology, conservation, conflict management, civil engineering, legal issues, etc. (c.f. Kellert, 1986 ; Clark, 1994). The specific combination of professionals should be determined case-by-case, depending on the type of problems and conflicts involved. Recovery Plans are the bridge from the realm of theory to the world of practice.

Many of the existing Action Plans are mostly written by scientists who lack a sense of "practice". They would have benefited from the inclusion of experienced conservation managers, who may not know much about the biology of the species and their needs, but can surely assist in finding solutions and giving advise when proposed activities are not realistic. Such field experienced people should also participate in workshops where Action Plans are elaborated.

4.5.3 Public participation

Arguments for and against public involvement in recovery planning have been expressed (v. Clark & al. 1994). Formal and obligatory public consultation may overload the process with unnecessary bureaucracy, but it is a common practice for obtaining information about an affected community and can help to reduce or eliminate conflicts (c.f. Martin, 1995). On the other hand, when species are known to be conflictive (i.e. wolf, bear, seals, etc.), early public involvement proves to be an essential component of success. Perhaps the most reasonable approach is to enable a mechanism that allows the Planning Team to call for public involvement if they so wish, or that, upon the reasonable request of any person, they have to do so.

4.5.4 Threats rating

The principal cause of most species decline is considered to be habitat loss (Cubert and Blair, 1989). In Table VII some other common threatening factors are listed. Case by case, threatening factors have to be studied and rated in relation to its present or potential impact on the population. In theory, an insight of existing threats should have been provided by prior status assessment. However, it is necessary to have a clear sense of their significance in order to prioritise related activities accordingly. The rating scale may be very simple and conceptual (severe - medium - low) or just follow a numerical scale (1 to 5). BirdLife used a more complicated system for threat rating based on four categories (Heredia et al. 1996), yet bird populations are normally better known than other groups. (Mace & Collar, 1994).

critical   *a factor that could lead to the extinction of the species in 20 years or less*

high   *a factor that could lead to a decline of more than 20% of the population in 20 years or less*

medium   *a factor that could lead to a decline of less than 20% of the population over significant parts of its range in 20 years or less*

low   *a factor that only affects the species at a local level*

Obviously, threat assessment can be thoroughly conducted and the rating be more accurate (c.f. Master, 1991). Very often threats are not fully understood or even known, and oriented research is needed and planned before any counter-action or mitigation activity can be designed.

Table VII Most common threat factors to animal species

- Habitat reduction
- Habitat fragmentation
- Habitat change (included degradation and succession)
- Decrease in food availability (quality and quantity)
- Pollution (chemical intoxication by poisons, pesticides, etc.)
- Decrease in host-species
- Disturbance in critical life-periods (reproduction, etc.)
- Excessive isolation among individuals
- Inbreeding depression
- Excess of predators
- Increase of competitors (exotic species, etc.)
- Disease increase (included parasitism)
- Over-exploitation
- Accidental killing
- Excessive collectionism (egg removal, sampling, etc.)
- Catastrophic events (important for isolated populations)

4.5.5 Recovery objectives

The ultimate goal of species recovery is well known and generally accepted : to bring the species to a self-sustaining non-threatened situation. Carroll et al. (1996) recommend subsequent goals for achieving viable populations :

1. the establishment of multiple populations, distributed so that migration among them is possible so that a single catastrophic event cannot wipe out the whole species ;
2. to stop known threats that guarantee the continued decline and eventual extinction of population, and
3. to achieve annual population growth rates greater than zero, which will increase the size of populations to levels where demographic and normal environmental uncertainties are less threatening.

But a Recovery Plan should describe more precisely the specific objectives by which this desired situation is to be achieved. Quantitative terms of the numbers of individuals or separate populations are commonly stated, but any similar target-setting that can be tested upon completion is valid. Because populations fluctuate naturally, some authors (Schemske et al. 1994) prefer to base such criteria on the biological status of the species, rather than on any current number. In any case, success or failure of a given Plan can only be checked against explicitly described objectives. Furthermore, delisting of a species may be legally likened to the fulfilment of such objectives.

For practical reasons, defined recovery objectives can be further divided into a hierarchical structure and recovery tasks can be assigned accordingly. This subsequent "operational objectives" are to be defined and redefined by feedback input during the planning process (see Figure 4). The more the objectives can be focused in realistic terms, the better. The "do everything" approach of many current action plans should be forgotten.

A word of caution. Species listings and sometimes recovery actions may be used for purposes other than those formally declared in recovery action. The case of the Snail darter in the United

States is paradigmatic, when a tiny fish was used by environmentalists to try to stop a million-dollar dam (Tilt, 1989). Recovery planning should be conducted free of hidden objectives and "biopolitics". However, both planning and planners should be innovative, practical and flexible in order to respond to and benefit from changes and pressures in the political and social landscapes which inevitably influence conservation activities (Martin, 1995).

4.5.6 Action prioritisation

The Nature Conservancy links success in protecting biological resources on the careful targeting of conservation actions (Stein & Chipley, 1996). They refer to "conservation by design". Applied to species recovery it would focus on setting priorities based on the conservation status of the species, the threats to these and the opportunity to maximise recovery efforts.
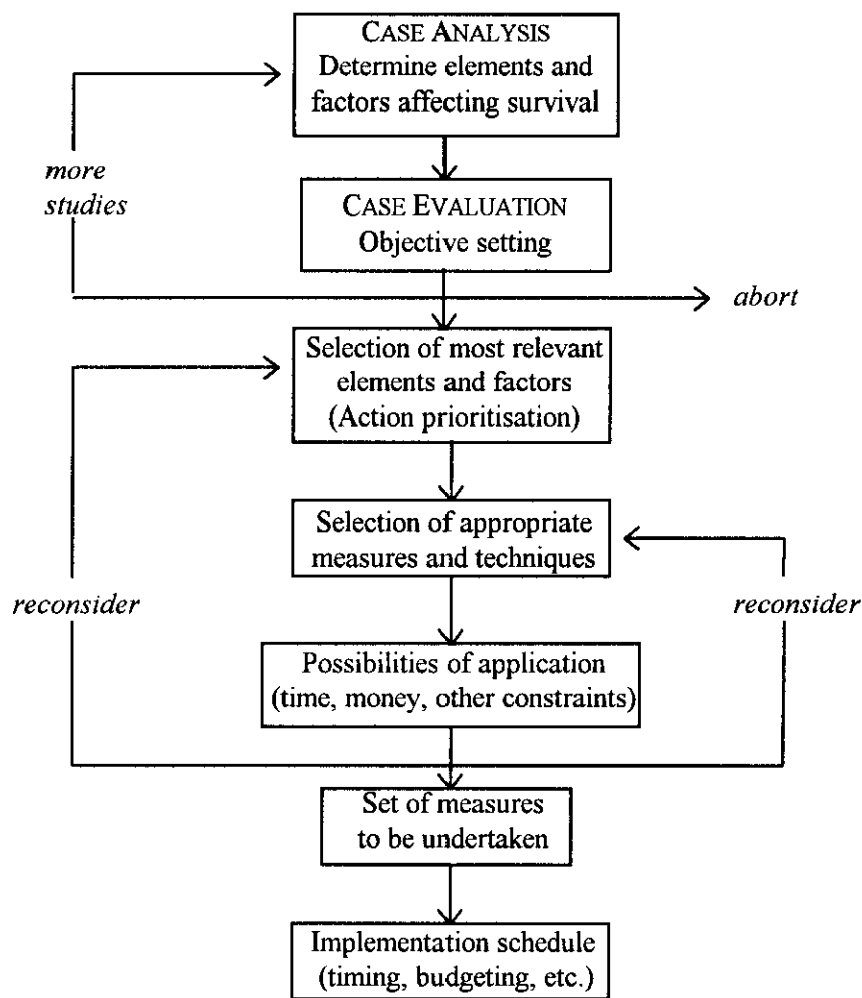
Figure 4 Feedback in recovery planning proccess

Once the threats and other problems (socio-political, etc.) faced by the species are known, objectives for recovery can be defined and the needed actions considered. Such actions shall be oriented towards solving one or several of the problems detected, and are to be organised under the respective objective. In Recovery Plans and Projects actions are normally broken down into specific activities or recovery tasks, which further focus on and approach the problem solution, like a zoom. Actions can be taken on the target species, on other species, on the habitat and on human activities.

Evidently, all actions or tasks are not equally important, as are not the underlying problems. It is reasonable to adopt a step-by-step action strategy, starting with the most urgent actions. Therefore, prioritisation of actions is highly recommended, and it is almost unavoidable when financial and human resources are scarce.

There are two basic strategical steps : firstly, to protect and to stabilise the existing population, and then, to restore part of the historical distribution and to link isolated populations. In this venue, the U.S. Fish and Wildlife Service utilises a very simple priority system of three levels that we are inclined to recommend :

Priority 1 : activities necessary to prevent extinction ;
Priority 2 : activities to avoid significant further decline, and
Priority 3 : other activities necessary to achieve recovery.

The action prioritisation scheme used by BirdLife (Heredia et al. 1996) is more detailed and obviously correlates with the threat categorisation explained above (# 4.5.4), and reads similarly. Action priorities are classified as:

essential | an action that is needed to prevent a large decline in the population which could lead to the species' extinction
high | an action that is needed to prevent a decline of more than 20% of the population in 20 years or less
medium | an action that is needed to prevent a decline of less than 20% of the population in 20 years or less
low | an action that is needed to prevent local population declines or which is likely to have only a small impact on the population across the range.

Action and task prioritisation is a prophylactic exercise to prevent developing a complete shopping-list where all types of imaginable activities are proposed, whether important or marginal.

4.5.7 Content of plans

In this study we have presented the structure of several action and recovery plans in order to give the reader an opportunity to gain an insight of plan contents. We are reluctant to recommend any specific structure for plans, because they should be designed in accordance with their scope, range, country context and other circumstances that have been already discussed . The following outline for Recovery Plans is included only for those who may want to use it for guidance.

Recovery Plan (model outline)
Introduction
• Context of Plan
• Territorial coverage & time frame
Analysis of the situation
Life History
Aims and objectives
Guidelines and activities
• Species management
• Habitat management
• Research and monitoring
• Information and awareness
Co-ordination / co-operation
[Implementation / Cost estimation]
Follow-Up and Review
Maps and Annexes

Plans normally have two kinds of information : the one on which the plan is based and justified (expositive part), and the dispositions and implementation oriented information (operative part). The expositive part should allow a revision of the plan and the operative part has to guide action in the direction and terms we want. It is good practice to keep them separate. We also recommend an "iceberg" approach, keeping the background or detailed information (the big submerged part) aside and available, or just annexed. The plan itself (the visible head) should be simple and written with executive style. One could apply the "KISS" (= keep-it-simple,-stupid) principle.

Maps are frequent components of recovery plans and should have as much detail as needed (critical habitat, corridors, etc.). However, for some sensitive species and sites one would not provide certain details to avoid compromising the recovery work

4.6 Scientific & technical support

Professionals involved in species recovery planning and implementation should be knowledgeable about the species and the problems it faces, well grounded in their disciplines and up-to-date in both concepts and methods for conserving and recovering declining populations (Carroll et al. 1994). Recovery Plans should rely on state-of-the-art principles and practices to enhance the chances for success.

Anyone embarking on recovery planning should take time to look at the available information, both the theoretical produced by scholars as well as the reviews and evaluation of homologous plans. Fortunately, present communication technology (e.g. Internet) facilitates the location and exchange of information in a way that was unthinkable a few years ago. Recent books on conservation biology (i.e. Meffe & Carroll, 1994a) and specialised magazines (Species UPDATE, Conservation Biology, etc.) frequently address recovery-related theory (population viability analysis, island biogeography, extinction and metapopulation theory, gap analysis, indicator species, etc.). Volume 75 of *Ecology* has dedicated its special feature to *«Ecological theory and endangered Species»* (v. Kareiva, 1994).

Several authors (Male, 1994; Schemske et al., 1994; Carroll et al. 1966, etc.) complain that recovery planning has not incorporated the conceptual guidelines and quantitative tools developed largely by ecologists and population biologists. On the other hand, academics have not provided clear guidance regarding the most valuable and cost effective approaches for managers. There has been a sort of "divorce" between actual recovery practice and recovery theory. Perhaps we are at a stage where a general Symposium involving both "worlds" could bring some insight as to why this is happening.

Ecology has been accused as being a "soft" science because of the limited predictive capacity of their models (v. Peters, 1991). Models in science are intended for understanding processes and for prediction. It is true that most ecological quantitative models operate with such few parameters, from the many really involved, that predictions normally fail. Conservation biology is generating complicated theories of population dynamics, community complexity or spatial structuring (metapopulations) that suffer from the same handicap. Data deficiency is another serious handicap in conservation biology, but using theory to make the most of what data is available is an under-appreciated role for theory to play (Doack & Mills, 1994). In any case, all these models have at least a real qualitative value in helping to understand the phenomena. If not for predictions, they can be used for orientation.

In the following paragraphs we comment shortly on some scientific and technical aspects of species recovery that may be of interest. This is not a full discussion. Species recovery can be considered a speciality of wildlife management and there are excellent general works dealing with

the technical aspects and the background theory ; for instance *«Managing animal populations»* by Jewel (1974) ; *«Conservation Biology»* edited by Michael E. Soulé (1986) ; the same title by Fiedler & Jain (1992), *«Advances in animal conservation»* by Hearn & Hodges (1985), *«Wildlife conservation evaluation»* by Usher (1986), *«Conservation biology in theory and practice»* by Caughley & Gunn (1995), *«Principles of Conservation Biology»* by Meffe & Carroll (1994a), or the classic and practical *«Wildlife Management Techniques»* from the Wildlife Society (Giles, 1971) that has been updated recently (Bookhout, 1994). More references for further reading will be given as appropriate.

4.6.1 Critical habitat

The term «critical habitat» is utilised in U.S. legislation to refer to the minimal area that is required to supply the species with its immediate survival needs, and which may demand special management or protection. The responsible agency has to designate such critical habitat "to the maximum extent prudent and determinable", and, unlike the listing of species, an economic impact analysis is required for that designation (Martin, 1995). The basic idea is that enough suitable habitat has to be secured for the perpetual survival of the species. How much is enough and for how long ; these are the tricky questions.

In some cases, the existing habitat may not even be sufficient and habilitation of new habitat is necessary. Habitat restoration is largely addressed in the specialised literature (v. Jordan et al. 1987), but often the best approach is to control the source of the degradation and let nature take its course. However, if active restoration is practised, a reasonable approach is to design a set of different restoration patches so that more than one hypothesis about the functioning of the community can be tested .

Threatened species may be spot-localised, have a continuous area or be patchily distributed in a spatially structured habitat mosaic. The interrelations between these patches of fragmented populations are not always clear. Populations living in high quality habitats tend to export excess individuals that move to lower quality habitats, where death rates are higher than birth rates. Identification of "source" and "sink" habitats (Caroll et al. 1996) is crucial before selecting critical habitat for the species, but it is not an easy task.

Metapopulation modelling uses spatially explicit modelling of populations of interacting populations (= metapopulations) as an aid to understanding how habitat fragmentation influences particular species (c.f. Doak & Mills, 1994). To be accurate, this type of modelling requires empirical information on demography, dispersal and distribution of the target species. They have been tested mainly by conservation theory researchers, and whether it can be applied on a routine basis without excessive research is still a pending question. Hanski & Gilpin (1991) provide an excellent review of metapopulation dynamics.

The eventual need (or legal obligation) of setting aside critical habitat for threatened species brings us to the design of nature reserves or the kind of protected area that is more appropriate. It is a poor approach to focus just on the autoecology of one single species. Other design criteria for nature reserves *(sensu lato)* have been widely discussed in the literature (c.f. Shafer, 1990 ; Meffe & Carroll, 1994d) and one should try to get the most from any conservation effort. The U.S. Fish and Wildlife Service has developed a full system of Wildlife Refuges related to species recovery (37.000 km^2 of secure habitat in 487 units). Some 24% of listed species find suitable habitat in such refuges (Young, 1993).

4.6.2 Population viability assessment

There have been several recent additions to the conservationists' toolbox. Some of them have already been used with satisfactory results (e.g. PVA in IUCN 1996 Red List), but there is still a

long time until their usage is extensive. Unfortunately, we operate in a model-rich but data-poor world. On the other hand, there is also no full consensus in the scientific community on which models are better suited for assisting conservation problems (c.f. Hendrick et al. 1996).

Minimum Viable Population (MVP), Population Viability Analysis (PVA) and Population and Habitat Viability Analysis (PHVA) are scientific procedures used to estimate the probability of survival of a population for a specified period of time. Several authors have contributed to developing these models (i.e. Soulé, 1987 ; Gilpin, 1989 ; Boyce, 1992 ; Schaffer 1994) but there is no consensus on the quantity and type of data each PVA should include. They are based on the known life history of the species and specified management or non-management options. Factors considered are : habitat loss, environmental uncertainty (including catastrophes), demographic stochasticity and genetics (inbreeding depression, loss of genetic variability). Deterministic extinctions are considered as well as chance extinctions, and extinction probabilities can be estimated for arbitrary time gaps[1].

In estimating the minimum number of organisms of a particular species that constitutes a viable population (MVP) each case is unique, and collecting sufficient data for all the parameters involved in reliable estimates is simply not practical in most cases. Boyce (1992) maintains that PVA ought to be an integral part of any species management plan. He sees it as a broader assessment process that spans from full-blown and data hungry PVA to simple rules-of-thumb.
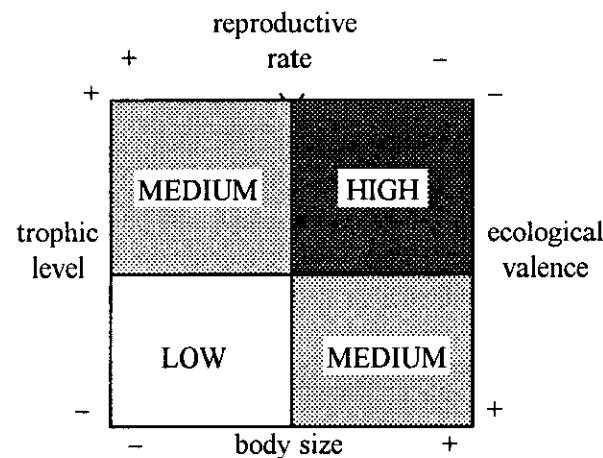
Figure 5 Species fragility box

Conservation management strategies based on viable populations are discussed in Foose et al. (1995), but much is still to be written until we arrive at with some practical tool for ordinary recovery planning. However, some basic and useful ideas stand out. The ultimate causes of extinction are primarily ecological (habitat loss and degradation), and these trigger different negative processes in the populations (Hanski et al. 1995). Smaller populations are more likely to go extinct than larger ones because of chance events (catastrophes, weather change, etc.) and due to inbreeding depression and genetic drift. Genetic variability within a species increases its chances of survival.

Several characteristics of the species and its life history also have an important share in extinction processes. Anthropic alterations of the environment or any other ecological stress tends to have greater effects on species that occupy terminal levels of food chains, have large individual size,

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[1] A computer programme called VORTEX has been produced by R. Lay and T. Kreeger for assessing species population viability on the basis of genetic demographic, ecological and catastrophic factors. It is available through the Captive Breeding Specialist Group of the IUCN Species Survival Commission.

reproduce relatively slowly and are specialist. In Figure 5 we have summarised these intrinsic features that condition the fragility of a species against ecological stress. Gilpin and Soulé (1986) speak of species vulnerability.

4.6.3 Captive breeding, restocking and re-introductions

The need for maintenance of ex-situ animal populations or gametes is not always so clear as that of plant species, where seed-bank and gardening are much easier to accomplish, allowing for a "cheap" insurance against extinctions in the wild (c.f. Olsen & Amklit, 1979). Cryopreservation of gametes has been attempted with some species (California condor, for example) but biotechnology has to continue developing in this field until it can serve conservation purposes (c.f. Moore, 1985) .

There is a different situation when a threatened animal species has to be reproduced in captivity to increase the numbers of individuals with the purpose of releasing them in the wild. Captive breeding as a recovery strategy is questioned by some authors because it is expensive, can save only one species at a time, and very often unexpected consequences may arise (Povilitis, 1990). Moreover, they may draw attention away from the need to protect or restore habitats, something that cannot be substituted by ex-situ captive breeding. In general, however, it is an accepted and extended practice (Conway, 1980 ; Morton, 1983). Information on breeding endangered species in captivity can be found in Martin (1975) and Gibbons et al. (1995). IUCN Survival Species Commission has a very active Conservation Breeding Specialist Group that is easily contacted in the World Wide Web. The site address is http: //www.cbsg.org.

Even more controversial has been the way in which "re-introductions" have been accomplished. Firstly, it is necessary to distinguish that re-introduction strictly means an attempt to resettle a species within their historical area of distribution. If that is not the case, we are facing plain introductions (which may include exotic species). The release of animals in order to enhance their still existing population should be termed restocking or reinforcement. Another common practice in recovery are translocations, when individuals threatened in one location are moved to another within its range. The mix-up of these different situations and the irresponsible practice in many cases, has caused the celebration of several seminars and workshops[1] to discuss the problem. Diseases and infections or unwanted genes can be easily transferred and spread without natural control, disrupting healthy structures of the recipient population and exposing animals to serious and even fatal conflicts (v. Nechay, 1996).

In practice, re-introduction is not an easy endeavour. Scientific and policy aspects of re-introductions are discussed in Campbell (1980), Junguis (1985) and Price et al. (1996). IUCN/SSC Specialist Group for Reintroduction began functioning in 1988 and publishes regular newsletters *(Reintroduction News)* with useful information. This group revised IUCN's original Position Statement of Translocation of Living Organisms (1987) and produced detailed guidelines for re-introductions (approved 1995), which have not yet been published but can be accessed in the World Wide Webb[2]. Successful re-introduction is a good indication that recovery is working. The World Zoo Organisation reports that from more than 120 re-introduction and restocking projects, fifteen of these re-introductions have resulted in the establishment of self-sufficient populations (IUDZG et al. 1993).

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[1] *Legal aspects of the introduction and reintroduction of wildlife species in Europe*. Council of Europe. Convention on the Conservation of European Wildlife and Natural Habitats. Trinquelle, I. T-PVS (92).
[2] IUCN/SSC Guidelines for re-introductions in *http://www.rbgkew.org.uk/conservation /RSGguidelines. html*

4.6.4 Evaluation of genetic diversity

Genetics are important if one seeks to preserve the maximum biological diversity. Many authors are calling for a more genetically-oriented conservation practice (c.f. Ballou et al. 1995). Meffe & Carroll (1994c p. 172), for instance, give qualitative guidelines for genetically based conservation. In principle, saving the sole surviving member of a genus should have higher priority than saving species within a large genus, and saving a whole species is preferable to that of just a subspecies or population. The purpose is almost clear, but underlying genetic diversity patterns among taxa are not always simple to infer.

Geographic surveys of biochemical (isozymes) and molecular (DNA) variations can be accomplished with modern biotechnology (Griffin & Griffin, 1995). These marker genes provide estimates of allele diversity and levels of heterozygosity within populations as well as measures of the distribution of existing variations among populations. Some authors have developed more or less complex formulas to assess priorities for conservation based on taxonomic and genetic diversity (Faith, 1992, 1994). The basic idea is that, being all things equal, if one has to choose between different species or different populations within a given species, the one showing more genetic variability should be chosen. In captive breeding programs it can be used to test the presence of enough genetic diversity in order to avoid endogamy (c.f. Lande, 1995).

Modern molecular genetic technology is advancing with giant steps and reducing costs, but even so, this is a very expensive technique and as a conservation tool could be applied only in selected cases. In many organisms the genetic variability can also be inferred from morphological or other external characters. The essay of Avise et al. (1995) provides a brief description of the most widely employed molecular methods used in conservation of small populations and of the nature of the genetic data provided by each as well as examples of applications of these methods to conservation issues.

4.7 Research and monitoring

Schemske et al. (1994) surveyed several ESA Recovery Plans for plants, stating that they all lacked sufficient biological information to assess the dynamics of the populations or of the meta-populations for any of the species. This situation probably applies to most of the animal species recovery plans, and can surely be extrapolated in the near future.

One cannot start recovery planning with some hope of success without a minimum of information on the species biology and its situation. Eventually, this information may be already available, but research is in most cases an essential part of the recovery process. On the other hand, neither can one fall in the undying search for data seeking non-existent security. As explained, many ecological models are excessively data hungry, and they even do not provide accurate predictions. There always exists a delicate trade-off between the wish for more rigor in the planning and the need of having results as soon as possible. It may not be comfortable, but when time is pushing, rigor and facts are on opposite sides of the tightrope.

The U.S. Fish and Wildlife Service Guidelines for Recovery Planning (1990) are explicit : "Quantifying recovery criteria calls for creative thought, and developing the criteria may require educated guesswork. This may be difficult for scientists accustomed to basing their statements on hard data rather than conjecture".

Decision-oriented information needs have to be clearly analysed to be able to design "eclectic" research accordingly. The views of conservation biologists or managers may differ from those of theoretical or academic researchers. This is why it is important to have mixed planning teams. The reach and available time for research has to be fixed in advance, because very often research is conducted on the initiative of scientists who find a sense in the research itself and do not

equally feel the need of starting recovery activities as soon as possible. Of course, it is necessary to know the life-history of the species ; whether complex or not, but in the recovery context, research has to be mainly shaped in order to suit conservation needs.

But there are Species Action Plans which focus on more and more research with no glimpse of an end, and threatened species are used as a justification for financing research (and researchers) that may even not be directly related to recovery. In fact, Schmemske and other authors may complain from the lack of biological information in Recovery Plans, but one has also the opposite impression : that there is to much research activity –at least in many Action Plans– and not enough practical recovery.

Monitoring is an essential part of Recovery Plans and as such is to be planned thoroughly (c.f. Ripley, 1971). It is research oriented to follow-up the implementation of all recovery activities, test the results and allow for adaptive management when deviations are considered significant. Regular revision of any plan should also be grounded in good monitoring. This kind of monitoring is linked to plan or project implementation and as such should be embedded in it. However, monitoring of species populations for a pre-determined time should also take place after a successful recovery has been concluded. An ample treatment of monitoring policy and techniques is to be found in Goldsmith (1991).

A different type and scale of monitoring is the general follow-up of the conservation status of populations whether subject to recovery action or not. This is commonly addressed by many Action Plans and an ordinary activity of several research institutions, like the IUCN Species Survival Commission. Other international bodies are also well-placed to monitor overall implementation of recovery activity on a regional scale. That is the case, for instance, of the Secretariat of the Bern Convention in Europe.

4.8 Education and public awareness

Education and public awareness campaigns are a common request of Action Plans, but many times one has the impression that it is merely a routine addition, and little has happened thereafter. Threatened species problems have many aspects in common that can be effectively explained to the public for educational purposes, without needing to reinvent the wheel every time. It seems more reasonable to design an education programme or general public awareness campaign that deals with the whole issue of species recovery, and then is used and adapted to particular examples of on-going cases. This approach is more synergetic and cost effective, and should be considered by the responsible body as an independent –although related– activity, and not as a part of each Action Plan. Obviously, species recovery has much to benefit from a general public support.

A different issue is awareness (or lobby) activities when aiming to solve specific problems faced by a given species. Species recovery is often controversial and politically unpopular among socially defined groups or powerful sectors. The potential problems of implementing unpopular plans are often ignored and should be taken "on board". Culbert & Blair (1989) complain that perhaps the greatest weakness in the recovery planning process in the U.S. is the general absence of a political feasibility analysis.

One can try to avoid this gap by including sociologists or public relations professionals in the planning team. A Recovery Plan can focus more precisely on the sensitive aspects that need support from the public or at least, their understanding and acceptance. Such needs should derive from the planning process and be rather concrete. Obviously, the planned activities (radio programs, civic group meetings, booklets, field trips, newspaper articles, conferences, etc.) should be part of the implementation of the Recovery Plan, with their own budgets and task

assignments. It is not infrequent, that the fate of highly conflictive species rely more on effective public awareness than on strict biological management.

4.9 Co-operation and co-ordination

Action Plans of multi-country species should be elaborated in specific workshops involving experts and interested partners from as many range states as possible. One partner (INGOs, for instance) can take the leading role. This facilitates the availability of the latest information on the status, distribution, limiting factors, threats and other key data concerning the species. A compiler or team of compilers can be appointed and they will circulate the draft plan to all partners. Consensus Action Plans elaborated by co-operative effort have much better chances to find resources and succeed than any others.

Co-operation in implementing trans-frontier recovery action may face jurisdictional or sovereignty problems. In such cases, a simple bilateral memorandum of co-operation between the affected conservation agencies may be easier to achieve than seeking international treaties or complicated agreements.

Co-operation of independent and voluntary partners can be used as an implementation strategy for many Action Plans. In such cases, a menu of actions is offered for free choice by the interested parties (private conservation groups, landowners, local agencies, etc.). Co-ordination of efforts is essential and at least one party has to assume the overall monitoring of collective results. The distribution of information and user-friendly guidelines also contributes to achieving the desired synergy.

Very frequently the implementation of a Recovery Plan involves formally or informally a number of governmental and non-governmental participants. This is common when recovery activities fall under the jurisdiction of several agencies or affects private land owners and managers. The co-ordinated action is pivotal for recovery success, but not easy to obtain. Each participant may possess a distinct perspective of the plan and tend to evaluate success under their own particular and partial scope (captive breeding, data collection, public acceptance, etc.). Disagreement and conflict may easily arise if there is not a clear co-ordination and permanent reminder of the general context and approved recovery objectives. Clark & Harvey (1994) report frequent "goal displacement" when one agency becomes more focused on power/goal control than on the substantive biological objectives. Unfortunately, there is no insurance against such deviations, but it helps if the responsibility for controlling the whole recovery process is clearly assigned to one agency, either by law or in the Recovery Plan itself. Vague language should be avoided.

Similar problems of co-ordination are faced by Action and Recovery Plans that are developed throughout a federal systems. A Joint-committee or any other co-ordinating structure is to be established from the very beginning (starting with the planning team). Depending on the legal reach of the plan, memoranda of co-operation may be a good way to assign specific responsibilities.

Conservation action is gaining presence in several countries and, frequently, as the result of many independent initiatives. Thus, the probability of duplicating efforts is increasing. The planning team should scan thoroughly existing Recovery Plans and protected areas networks in order to avoid redundant or unnecessary measures. Habitat protection is one of the obvious cases. Specific or additional guidelines for habitat management can be provided for those that are already responsible for the management. Very often, it implies a mere shift in their daily activities. On-going education programmes can easily incorporate aspects related to our recovery efforts. The same may apply to monitoring programmes, and so on. Species recovery greatly benefits from sound co-ordination.

4.10 Funding / Financing

Action needs money, and as Maurice Strong likes to remind us (World Conservation Congress, 1996), only what is financiable can be financed. Action plan drafting should keep this in mind. Plans should not be only visions of what is desirable for the successful recovery of a species.

Recovery Plans and Projects have to be directly funded and supported, so that they will be conducted in reality. Plans provide cost estimates for complete recovery and needed funds are ordinarily provided by government agencies. However, specific budgets for species recovery are not likely to be the most healthy in overall conservation context. Culbert and Blair (1986) complain that in the United States recovery plans budgets are often inflated, asking for millions of dollars and are not consistent with the priorities contained in the text of the plans. This is counter-productive. Budgets in plans should be responsible estimates and reflect priorities expressed. Moreover, if land acquisition is involved, a separate and specific budget for that purpose should be created.

Obviously, species recovery is not a cheap endeavour, but as experience is gained within a same organisation, each new recovery case can build upon the results of previous cases. Common patterns will emerge and species recovery will become more cost-effective (Carroll et al. 1996).

In general, Recovery Plans do not directly commit funds or personnel, but they are used for setting priorities in current budgets. The enthusiastic conservation biologist sometimes finds it hard to understand these operational rules. Very often, species with high level of public support or embroiled in controversy do capture the attention of politicians. Consequently, this high-profile species may receive a higher share of available resources. Griffin & French (1992) report that 50% of the budget of the U.S. Fish and Wildlife Service was spent on just 10 species. This sort of favouritism is hard to challenge.

A common way to facilitate co-operative action in species recovery is to assist the partners financially. One proven procedure is to establish a grant programme with a separate budget entry. Carlton (1986) discusses some of the financial mechanisms that can be explored : monetary incentives to private owners, programmes involving purchase or exchange of rights to land, or the removal or easing of real or perceived restrictions on land.

It is true that ecosystems and habitat protection protects more human interest and, ultimately, saves more species than do expensive efforts to protect particular species. However, in rich countries species recovery seems to be affordable and the benefits far outweigh the costs. But for many underdeveloped countries species recovery is an impossible luxury (Norton, 1986). Developed nations may help other less developed countries in their conservation efforts with due regard to sovereignty problems. Bi-lateral co-operation (foreign-aid) or assistance under an international agreement is a way out. Other sources of international funds are available for conservation affairs, but the struggle for such funds is becoming so competitive that only high performance fund-raising "specialists" are likely to succeed. The emerging paradigm : "To lobby or not to be".

European Union's LIFE-Nature funds are automatically accessible if the species under recovery action is covered by the Habitat or Bird directives. Agri-Environmental Measures or the Fourth Framework Programme for Research and Technological Development can also be explored. Outside the European Union, there are other possibilities :

- Biodiversity Support Programme
- European Investment Bank
- Global Environment Facility

- National charities
- Programmes of OECD countries for bilateral aid
- USAID. Bureau for Europe and Newly Independent States
- World Bank
- World Wide Fund for Nature

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4.11 Implementation

The implementation of a Recovery Plan is perhaps the most challenging part of the recovery process. Well-designed plans are useless unless they can be put into action (Culbert & Blair, 1989), and action is carried out by people. Clark et al. (1994) have emphasised the importance of professional and organisational performance in the implementation of Recovery Plans : "The ability of organisations to solve endangered species problems is a product of their structure, culture and management system as well as the setting in which they operate". Professionals in recovery planning and implementation are badly needed and responsible organisations should staff accordingly unless all activity is to be left in the hands of third parties.

It is common practice in many countries (the United States, Australia, New Zealand, etc.) to set up Recovery Teams. Their components may emanate from the Planning Team but normally incorporate other representation to facilitate impartial management. Male (1994) gives a list of possible components :

- Principal governmental agency responsible for species recovery (chair) ;
- representatives of other agencies involved ;
- specialist biologist (university, research institutes, consultants, etc.) ;
- person(s) undertaking research or management action ;
- funding agency representatives (sponsors, etc.) ;
- representative from captive breeding institutions, and
- community representatives if appropriate (landowners, field naturalist, etc.).

Plans should not be a sort of "bible" nor seek the single best answer. There must be a room for flexibility and co-adaptation to changing circumstances. Moreover, before starting an important recovery Plan, a quick assessment of its real possibilities of success should pay for itself, and for very critical populations, this may include risk-analysis. Very often, conditions may have changed since the plan was originally drafted. The technical rationality of much of the existing planning is perhaps to be balanced –or substituted– by the so called "reflective practice" (Clark and Harvey, 1988). Further insight of Planning and Recovery teams can by found in Westrum (1994).

The importance of monitoring implementation (see # 4.7) should not be underestimated. If good monitoring has been planned, early dysfunction can be detected and activities re-shaped accordingly. Sound management heavily relies on adequate monitoring. Secondly, one can learn from the efforts taken, whether successful or mistaken. Monitoring expenditures are probably the most cost-effective expenditures of a given organisation involved in recovery implementation. Evaluation of recovery allows the development of develop more efficient programmes and thereby increases the chances for successful species recovery.

4.12 Final remarks

A clear message emanates from all the previous chapters and we are inclined to repeat it once more. Species recovery should be restrictive. In principle, human and financial resources should be directed towards ecosystem management and habitat protection rather than managing individual species. Only "crisis" situations justify a species-by-species approach, and even then it

is not always a certain solution. If a single species extinction can be stopped, those countries that can afford it should pay for the effort and not take it lying down.

Species recovery has to deal with complex and prompting situations, uncertainties and lack of biological information, numerous participants, limited resources, and very often controversial public situations, among other difficulties. These factors combine to make species recovery a complicated, interactive, technical and administrative challenge where intense co-operation and good co-ordination is essential (Clark & Harvey, 1988).

Table VIII. Outline of the recovery process

1. Assessment of the conservation status of species
2. Official register of threatened species (if necessary to enable species recovery)
3. Selection of species for recovery action
4. Research to obtain further information needed to plan recovery action
5. Preparation of a recovery plan to assess the potential for recovery, timetable and costs
6. Implementation, monitoring and evaluation of the success of various stages of the plan
7. Re-evaluation of conservation status and reclassification of status as appropriate, or abandonment if the situation is assessed as hopeless
8. Monitoring for a pre-determined time after reclassification to ensure that the recovery action has had a lasting effect

(based on Male (1994), modified)

The weak performance of recovery efforts in the United States, for instance, is well documented, but poorly understood. We believe it is fundamental that whoever participates in species recovery has a full understanding of the process he is involved in (see Table VIII). A realistic selection of target species, the use of the best scientific and technical knowledge available, flexible planning, responsible implementation and tight monitoring are factors that will surely contribute to increased performance. Species recovery is essentially a practical issue, and as such, it will gain with practice over time.

* * *

The most outstanding considerations of this chapter from the organisational point to view, have been extracted in 21 points and included in the Executive summary at the beginning of the document.

5. ACKNOWLEDGEMENTS

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* * *

7. APPENDICES

Appendix A. IUCN categories and criteria for assessing threatened species

Use any of the A-E criteria	Critically Endangered	Endangered	Vulnerable

A. Declining Population
population decline rate at least
 	
using either
1. population reduction observed, estimated, inferred, or suspected in the past or
2. population decline projected or suspected in the future based on :
  a. direct observation
  b. an index of abundance appropriate for the taxon
  c. a decline in the area of occupancy, extent of occurrence and/or quality of habitat
  d. actual or potential levels of exploitation
  e. the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors, or parasites
	80% in 10 years or 3 generations	50% in 10 years or 3 generations	20% in 10 years or 3 generations

B. Small distribution and decline or fluctuation
Either extent of occurrence
or area or occupancy
 	
and two of the following three :
1. either severely fragmented : (isolated subpopulations with a reduced probability of recolonization, if once extinct) or known to exist at a number of locations)
2. continuing decline in any of the following :
  a. extent of occurrence
  b. area of occupancy
  c. area, extent and/or quality of habitat
  d. number of locations or subpopulations
  e. number of mature individuals
3. fluctuating in any of the following :
  a. extent of occurrence
  b. area of occupancy
  c. number of locations or subpopulations
  d .number of mature individuals
	< 100 km^2
	< 10 km^2
	
	$= 1$
	
	any rate
	
	> 1 order/mag.
		$< 5,000$ km^2
		< 500 km^2
		
		≤ 1
		
		any rate
		
		> 1order/mag.
			$< 20,000$ km^2
			< 2.000 km^2
			
			≤ 10
			
			any rate
			
			> 1 order/mag.

C. Small population size and decline
Number of mature individuals
and one of the following two
 	
1. rapid decline rate
 	
2. continuing decline and either
  a. fragmented or
  b. all individuals in a single population
	< 250
	
	25% in 3 years or 1 generation
	
	any rate
	all sub-pops ≤ 50
		$< 2,500$
		
		20% in 3 years or 2 generation
		
		any rate
		all sub-pops ≤ 250
			$< 10,000$
			
			10% in 3 years or 3 generation
			
			any rate
			all sub-pops ≤ 1000

D. Very small or restricted Either 1. Number of mature individuals or 2. Population is susceptible	< 50 (not applicable)	< 250 (not applicable)	$< 1,000$ area of occupancy <100 km^2 or num. of locations < 5
E. Quantitative analysis Indicating the probability of extinction in the wild to be at least	50% in 10 years or 3 generations	20% in 20 years or 5 generations	10% in 100 years

Appendix B. LCI Guidelines for Species Action Plans

These guidelines were elaborated within the Large Carnivore Initiative (LCI), which was initiated by WWF International and is implemented in co-operation with partner organisations from 17 European countries. These guidelines have been based on IUCN and BirdLife Action Plans and were approved by the Large Carnivore Co-ordination Group which administrates the LCI (April 1997).

1 Introduction
2 Background information
2.1 Description of the species
2.2 Distribution and population numbers
- on population level
- within national boundaries

2.3 Life history
- feeding
- habitat requirements

2.4. Threats and limiting factors
- habitat loss
- hunting and poaching
- other human caused mortality
- food availability
- other factors

2.5 Conservation status and recent conservation measures
2.5.1 International agreements
- IUCN listing
- CITES listing
- Conventions
- Directives

2.5.2 Listing of individual countries
- legal status
- main threats
- conservation and research activities
- public attitudes
- socio-economic and political conditions
- development trends

3. Goals and Objectives
3.1 Goals
3.2 Objectives
- policy and legislative
- species and habitat protection
- conflicts with humans
- socio-economic incentives
- public awareness
- monitoring and research

4 Conservation actions
4.1 International actions
4.2 Listing of individual countries with necessary actions

Appendix C. Table of contents of the Kiwi Recovery Plan
(Butler and McLennan, 1990)

Appendix D. Ecological grouping of vertebrates in the Appendices of the Bern Convention[1]

Groups embrace species with similar "capacities" and which may be exposed to equivalent conservation problems.

Group designation	Examples
Strictly sea mammals	Whales, dolphins, roqual
Offshore land-breeding species	Turtles, petrels, shearwaters, seals
Inshore species	Gannet, razorbill, auk, quillemot, puffin
Coastal species	Cormorant, plovers, curlew, gulls, terns
Inland nesting seabirds	Divers, scoter, phalaropes, skuas
Colonial wading bird	Herons, egrets, spoonbill, lapwing, flamingo
Non-colonial wading birds	Bitterns, plovers, cranes, sandpipers, snipes
Freshwater swimming birds	Grebes, geese, ducks, merganser, coots
Marsh birds	Rail, crakes, reed warbler, bunting, moorhen
Riverside insectivore birds	Kingfisher, wagtails, dipper, Cetti's warbler
Riverside amphibians & reptiles	Salamanders, newts, frogs, Grass snake,
Riverside mammals	Desman, mink, otter
Plant-eating terrestrial reptiles	Tortoises, wall lizards, Canarian lizards
Granivorous open-land birds	Partridges, quail, bustards, skylark, linnet
Plant-eating bush and forest birds	Laurel pigeons, goldfinch, crossbill, thrushes
Small plant-eating shrub and open-land mammals	Hares, marmot, vole
Small plant-eating forest mammals	Red squirrel, dormouse
Large herbivores	Deer, wild boar, mouflon, chamois, ibex
Non-flying ground insectivores	Toads, lizards, skinks, shrews, hedgehogs
Flying ground insectivores	Curlew, hoopoe, pipits, chats, wheatears
" " " (cliff-nesting)	Rock thrushs, choughs, wall creeper
Hole-nesting arboreal insectivores	Roller, woodpeckers, wrynex, tits, nuthatch
Arboreal and shrub insectivores	Tree frogs, blackcup, cuckoes, shrikes, oriole
Cave dwelling bats	Horseshoe bats, mouse-eared bats
Non-cave dwelling aerial insectivores	Swifts, swallows, martins, pipistrelle, noctule
Terrestrial vertebrate predatory reptiles	Whip snakes, smooth snakes, vipers
Diurnal birds of prey	Eagles, haws, kites, harriers, kestrels, hobby
Nocturnal birds of prey	Owls
Small terrestrial carnivores	Badger, polecat, martens, genet, mongoose
Large carnivores	Brown bear, wolf, lynx
Carrion birds	Vultures, raven
Ubiquitous species	Goldfinch, raven, garden dormouse, wild boar
[Introduced species]	

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[1] Machado, A. , Hiraldo, J., de Juana, E., de Benito, J.M and J. Mayol (1984). *Classification of species on Appendices II and III of the Bern Convention. Ecological Grouping.* Council of Europe. Note prepared by the Spanish Delegation, 16 pp (not published).

Appendix E. Species endorsed for recovery action by the Council of Europe

Based on the guidelines for recovery plans for herptiles (1993) and Recommendations on threatened mammals 43(1995), birds 48(1996) and invertebrates 51 (1996) of the Standing Committee of the Bern Convention.

[ ]   No symbol indicates the necessity of a recovery plan across the whole habitat, or the range is indicated in brackets. *"Pars"* means, a significant part of the habitat.

[*]   One asterisk indicates taxa to be evaluated as candidates for recovery plans.

[**]   Two asterisks indicate secondary priority for recovery.

M A M M A L S

Insectivora
Desmana moschata
*Galemys pyrenaicus**
*Tadarida teniotis**
Rhinolophus ferrumequinum
Rhinolophus hipposideros
Rhinolophus mehleyi
all other Rhinolophidae*
Myotis emarginatus
Myotis myotis
Myotis blythii
Minipterus schreibersi (RUS)
all other Vespertilionidae*

Rodentia
Pteromys volans (EST,LAT)*
*Sciurus anomalus**
*Spermophilus citellus (C.citellus)**
*Castor fiber**
Cricetus cricetus (BG)
Cricetus cricetus (B,F,G,NL)*
Cricetulus migratorius
Cricetulus migratorius (BG,GR,ROM)*
Myomimus roachi (BG,TK)*
*Mesocricetus newtoni**
Apodemus uralensis (microps) (BG,ROM)*
Spalax graecus (RUS)
Spalax leucodon (H)
Sicista subtilis (A,BG,H.ROM)

Carnivora
Canis lupus (southern SP,N,S,Alps)
Canis lupus (CZ,D,I,P)*
Canis aureus (R,ROM)*
Alopex lagopus (N,S,SF)*
Cuon alpinus
Ursus arctos (A,F,GR,I,E)
Ursus arctos (CZ,N,PL,S)*
Mustela lutreola (BEL,F,E,ROM,RUS,EST)

*Mustela eversmanni**
Lutra lutra (LUX,B,DK,D,NL,GR-Corfu, CH,S)
*Lutra lutra (F,I,N,A)**
Gulo gulo (SF,N,S)
Vormela peregusna
Felix silvestris (B,CZ,F-Corse,D,GR-Pel & Cret., I-Sard., Sic.,LUX,PL,CH,GB)*
Lynx pardinus
Lynx lynx (A,CZ,D,F,H,I, south Balkans)
Lynx lynx (CH)*
Lynx caracal
Panthera pardus
Odobenus rosmarus (RUS)
*Odobenus rosamrus**
Monachus monachus

Artiodactyla
Capra pyrenaica pyrenaica
Ovis ammon anatolica
Bison bonasus
Rupicapra rupicapra balcanica

Cetacea
Tursiops truncatus
Delphinus delphis (Medit. and Black Seas)
Physeter catodon (Mediterranean)
Grampus griseus (Mediterranean)
Globicephala melas (Mediterranean)
Stenella coeruleoalba (Mediterranean)*
Phocoena phocoena (Black and Baltic Seas)
Ziphius cavirostris (Mediterranean)
Balaenoptera physalus (Mediterranean)

B I R D S
Macaronesian and Iberian endemics
Pyrrhula murina
Pterodroma madeira
Pterodroma feae
Columba trocaz
Columba bolli

Columba junoniae
Fringilla teydea
Chlamydotis undulata
Aquila adalberti

Waterbird species
Numenius tenuirostris
Pelecanus crispus
Phalacrocorax pigmaeus
Oxyura leucocephala
Marmaronetta angustirostris
Branta ruficollis
Anser erythropus

Non-waterbird species
Aquila heliaca
Agypius monachus
Falco naumanni
Otis tarda
Laurus audouini
Acrocephalus paludicola
Crex crex

REPTILES
Testudines
Testudo hermanni hermanni
Testudo hermanni boettgeri *
Testudo graeca graeca
*Testudo marginata**
Emys orbicularis (A,D,F,CH)
Tryonyx triunguis
Caretta caretta
Chelonia mydas

Sauria
*Phyllodactlus auropaeus**
Chamaeleo chamaeleon
Lacerta lepida (F,I)
Lacerta princeps kurdistanica
Lacerta agilis (pars)
*Lacerta monticola bonnali**
*Lacerta monticola cyreni**
*Lacerta monticola monticola**
*Lacerta clarkorum**
*Lacerta pamphyllica**
Lacerta uzelli *
Gallotia simonyi
Gallotia atlantica (pars)
Podarcis lilfordi (pars)
*Podarcis filfolensis**
Podarcis pityusensis (pars)
*Podarcis milensis**
*Podarcis wagleriana**

*Podarcis hispanica attrata**
Psammodromus hispanicus edwardsianus *
*Eremias suphani**
*Chalcides sexlineatus**
*Chalcides symonyi**

Ophidia
*Eirenis thospitis**
Eryx jaculus *
*Rhynchocalamus satunini**
*Coluber najadum**
Coluber (najadum) rubriceps *
Coluber cypriensis *
*Coluber ravergieri**
*Coluber jugularis caspius**
*Elaphe situla**
*Elaphe quatuorlineata**
Natrix tessellata (pars)
Natrix megalocephala
Natrix (natrix) cetti
Natrix (natrix) schweizeri
Vipera ursinii ursinii
Vipera (ursinii) moldavica
Vipera (ursinii) rakosiensis
Vipera (lebetina) schweizeri
Vipera kaznakovi
Vipera wagneri
*Vipera barani**
*Vipera bulgardaghica**

AMPHIBIANS
Caudata
Salamandra atra aurorae
*Salamandra (Mertensiella) luschani**
*Mertensiela caucasica**
Neurergus spec. *
Chioglossa lusitanica
Euproctus platycephalus
Triturus cristatus (pars)
*Triturus italicus**
Triturus dobrogicus *
Triturus karelinii *

Anura
Bombina bombina (pars)
*Discoglossus montalentii**
Alytes obstetricans (South Spain)*
Alytes muletensis
Pelobates fuscus insubricus
Bufo calamita (A,B,D,IRL,LUX,NL,CH,SW,GB, pars)
Bufo viridis (pars)
Hyla arborea (pars)
Rana latastei

INSECTA

Odonata
Leucorrhinia pectoralis
Ophiogomphus cecilia
Stylurus flavipes
*Coenagrion mercuriale***
*Leucorrhinia albifrons***
*Leucorrhinia caudalis***
*Oxygastra curtisii***

Coleoptera
*Cytiscus latissimus***
Graphoderus bilineatus
Osmoderma eremita
*Buprestis splendens***

Lepidoptera
*Lopinga achine***
Coenonympha hero
Coenonympha oedippus
Hypodryas maturna
Maculinea nausithous
Maculinea teleius
*Maculinea alcon***
*Maculinea arion***
*Maculinea rebeli***
Parnassius mnemosyne

CRUSTACEANS

Decapoda
Austropotamobius pallipes

MOLLUSCS

Unionoida
Margaritifera auricularia
Margaritifera margaritifera

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