Strasbourg, le 3 mars 2006 **T-PVS (2006) 2**
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CONVENTION RELATIVE A LA CONSERVATION DE LA VIE SAUVAGE
ET DU MILIEU NATUREL DE L'EUROPE

## Groupe de spécialistes
## pour une Stratégie européenne sur les invertébrés

Strasbourg, le 10 février 2006

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# RAPPORT

*Document*
*élaboré par*
*la Direction de la Culture et du Patrimoine culturel et naturel*

Le Comité permanent est invité à prendre acte du présent rapport qui résume les progrès réalisés dans l'élaboration, dans le cadre de la Convention de Berne, d'une Stratégie européenne sur la conservation des invertébrés.

## Contexte

A sa 23e réunion, en novembre 2003, le Comité permanent de la Convention de Berne a décidé, sur le conseil de son Groupe d'experts sur la conservation des invertébrés, d'inscrire à son programme d'activités pour 2004 et 2005 l'élaboration d'une Stratégie européenne sur la conservation des invertébrés.

En 2004, M. John Haslett, consultant, a élaboré un document fournissant des "éléments pour une Stratégie européenne de conservation des invertébrés (à l'exclusion des espèces marines)". Ce rapport analyse plusieurs points qui pourraient être traités dans le cadre d'une telle stratégie et soulève certaines questions sur son contenu et sur sa portée. Le Secrétariat a décidé de faire appel à un groupe restreint de spécialistes en la matière, qui s'est réuni les 19-20 mai 2005 à Strasbourg pour examiner le projet du consultant ainsi que la portée, la longueur et la nature de la Stratégie.

A partir de ces discussions, le consultant a élaboré en janvier 2006 un projet de "Stratégie européenne de conservation des invertébrés (à l'exclusion des espèces marines)" qui a été diffusé auprès des membres du Groupe de spécialistes en vue de la réunion.

## 1. Ouverture de la réunion par le Président du Groupe de spécialistes

Le Groupe de spécialistes (liste à l'annexe 1) s'est réuni le 10 février 2006 à Strasbourg.

M. Yves Gonseth (Suisse), Président du Groupe d'experts sur la conservation des invertébrés, souhaite la bienvenue aux participants, souligne l'importance de cette activité pour la promotion des initiatives de conservation des invertébrés en Europe et félicite le consultant pour le document établi.

## 2. Adoption du projet d'ordre du jour

L'ordre du jour, tel qu'il figure à l'annexe 2, est adopté.

## 3. Introduction par le Secrétariat

Le Secrétariat expose les changements intervenus au sein de la Division du Patrimoine naturel et salue les progrès réalisés dans l'élaboration d'une stratégie destinée à aider les gouvernements à préciser leurs priorités en matière de conservation des invertébrés.

## 4. Présentation du projet de document par le consultant

Le consultant, M. John Haslett, présente le projet de "Stratégie européenne de conservation des invertébrés (à l'exclusion des espèces marines)" (annexe 3). Il explique les principaux changements apportés au document depuis la version examinée en mai 2005 et soumet diverses questions aux membres du Groupe de spécialistes afin de d'orienter les discussions.

## 5. Examen des diverses questions soulevées

Toute une journée est consacrée à l'examen des différents thèmes/questions soulevés dans le document présenté à l'annexe 3. Le Groupe fournit en particulier un retour d'informations au consultant sur divers points, et notamment la structure du document ainsi que (i) son titre; (ii) la perspective et les buts poursuivis; (iii) les objectifs; (iv) les principales actions préconisées; (v) les encadrés; et (vi) les annexes. M. Haslett interroge également les membres du Groupe pour savoir s'il manque quelque chose d'important dans le projet de texte; ce qu'il conviendrait, le cas échéant, d'en retirer; et à quel point il convient de le détailler - en particulier s'agissant des principales actions ou recommandations. Des contributions complémentaires relatives à la version révisée du projet de Stratégie seront envoyées au consultant au début du mois d'avril 2006 comme suit : eau douce (M. Y. Gonseth), politique agricole suisse (M. Y. Gonseth), utilisation durable, et invertébrés des montagnes, des îles et des écosystèmes méditerranéens (M. A. Legakis), nombre de nouvelles espèces (Mme M. Ramos), et la sylviculture (M. M. Meyer).

Le Groupe discute également de la publication de la Stratégie finalisée et adoptée, et décide de chercher des images et illustrations adaptées pour les différents chapitres. Il évoque aussi la possibilité de recourir à des conférences ou réunions scientifiques en 2007 pour présenter la Stratégie.

## 6. Prochaines étapes

Le consultant préparera une version révisée du projet de Stratégie qui sera communiquée aux gouvernements et examinée par le Groupe d'experts en juin 2006. Un projet finalisé sera soumis au Comité permanent en vue de son éventuelle adoption en novembre 2006.

## Annexe 1

## LISTE DES PARTICIPANTS

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**Annexe 2**

**Groupe de Spécialistes**
**pour la Stratégie européenne sur les Invertébrés**

Strasbourg, 10 février 2006

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# ORDRE DU JOUR

1. Ouverture de la réunion par le Président du Groupe d'experts, M. Yves Gonseth

2.. Adoption de l'ordre du jour

3. Introduction par le Secrétariat

4. Présentation des documents de travail par M. John Haslett

5. Discussion des différents points soulevés

6. Prochaines étapes

**Annexe 3**

Strasbourg, 9 January 2006 **T-PVS/Inf (2006) 1**
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CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

Standing Committee

26th meeting
Strasbourg, 27-30 November 2006

# 2nd DRAFT

# EUROPEAN STRATEGY FOR THE CONSERVATION OF INVERTEBRATE ANIMALS

# (EXCLUDING MARINE SPECIES)

Document prepared by
*MR JOHN R. HASLETT*

***This document brings together the problems and requirements of invertebrate conservation across Europe. It is the work of a single person, commissioned by the Council of Europe, in collaboration with a small discussion group of experts, also selected by the Council of Europe. The document in its present form is merely a draft, and is not to be taken in any way as a formal Strategy. This version is still incomplete and will be supplemented and revised according to the results of further discussions by the small group of experts. The group is scheduled to meet at the Council of Europe in Strasbourg in February 2006.***

## CONTENTS

VISION

A world in which the full spectrum of invertebrate animals is valued and protected, in parallel with all other groups of organisms, now and in the future.

GOAL

To halt the loss of invertebrate animal diversity in Europe

OBJECTIVES

[order of listing? additions?

- raise awareness and alter human attitudes and behaviour towards the importance of conserving invertebrate animals
- promote integrated management of landscape mosaics at the relevant scales to be sustainable for invertebrates
- strengthen European and National/sub-National invertebrate conservation policy
- identify and prioritise key actions to be implemented at different political and geographical levels
- promote accessibility and efficient flow and exchange of information
- promote inclusion of a fully representative variety of invertebrate species in conservation and environmental management decisions, including integration of invertebrate conservation into existing and future conservation strategies involving other groups of organisms.
- build scientific capacity for the conservation of invertebrates and identify and prioritise areas of urgent further research.

# INTRODUCTION

## Why bother to conserve insects, spiders, snails and other creepy-crawlies?

*´So important are insects and other land-dwelling arthropods that if all were to disappear, humanity probably could not last more than a few months. Most of the amphibians, reptiles, birds, and mammals would crash to extinction the same time. Next would go the bulk of the flowering plants and with them the physical structure of most forests and other terrestrial habitats of the world`*

(E.O. Wilson, 1992).

Whether or not one agrees with the time scale, or with the exact order of events, the message in the above quote from one of the world´s most renowned biologists is as poignant as it is true.

There are vast numbers of species of invertebrate animals, so many that they make up the greater part of the world`s entire biodiversity. Insects alone are estimated to be about 65% of all species of organisms on the planet, including plants and micro-organisms (eg, Speight et al, 1999). Not only are invertebrates more numerically diverse than other groups of organisms, they also dominate nearly every kind of habitat that the world has to offer. But perhaps most importantly, invertebrates perform a very wide range of essential *functional* roles in the world`s ecosystems. From the tropics to arctic and alpine, from terrestrial to aquatic, there are massive numbers of invertebrate herbivores, predators, decomposers, parasites, pollinators, seed dispersers and more. Equally, invertebrate animals are themselves the food necessary to support organisms at other levels in the food web (even including carnivorous plants!)

Thus the invertebrates are the motor that drives ecosystem function at all scales of definition, from microsystem to worldwide This means that despite, or rather *because of* the great abundance of invertebrate animals, it is essential they be conserved!

Invertebrates also provide a richness of medical and technical resources. From medicinal leeches to wound-cleaning insect larvae, from forensic entomology to models for robotics or molecular structures in materials science, the positive commercial potential of invertebrate animals is only beginning to be exploited. Also, there are the delights of such things as eating snails with garlic, or wearing a necklace of pearls from fresh-water pearl mussels. But such commercial exploitation of species creates its own sets of problems, just as with plants, and requires tight control to ensure sustainable use.

In the public view there appears to be no real need to conserve most invertebrate species. The general attitude towards these animals remains largely negative – invertebrates tend to be closely associated with pest species that bite, sting, spread disease and/or cause illness or eat our crops and food products (eg Loxdale, 2004). On top of this, the aesthetic appeal of most invertebrates is at best not appreciated, and often distinctly lacking (Samways, 2005).

It is perhaps not so surprising then, that in some European countries, governmental emphasis has tended to have been placed upon conserving human cultural heritage using the values of art and architecture, rather than on nature protection in general or the protection of invertebrate animals in particular (Balletto & Casale, 1991).

Of course there are exceptions to this negative way of thinking about invertebrates. For example, adult butterflies and dragonflies are widely accepted as beautiful animals that help to make nature enjoyable and are therefore worthy of protection. These and similarly regarded invertebrates have achieved the higher status of ´honorary birds` by being so accepted in public and political conservation circles.

## Present threats and risks to European invertebrates

Levels of knowledge of the invertebrate fauna and its conservation status vary considerably between states, but large numbers of invertebrate species are under severe threat of extinction in Europe, or are already extinct. The main factors responsible and/or creating high potential future risk may be summarised as:

- Habitat destruction and fragmentation

- Land use changes in agriculture, forestry and the construction industry
- Loss of complex habitat mosaic structure across different spatial scales
- Drainage of wetlands
- Direct impacts of economic activities
- Impacts of invasive plant and animal species, native and alien
- Negative human attitudes to most invertebrate animals.
- Light pollution (for nocturnal species)
- Wind turbines (for airborne species)
- Climate change (may contribute to, or otherwise affect each of the above)

All of these threats are the same as, or directly involve, threats to plants, birds and other organisms, but the specific needs for invertebrate conservation management have been largely neglected. Europe´s invertebrate fauna continues to decline and the scale of the problem is great.

Also, human -induced climate change is already happening, and the implications for all organisms on the planet are immense. The earth is already about $0.6^{o}$ C warmer than it was one hundred years ago. Emissions of greenhouse gases are exceeding levels which can be removed by natural systems. Furthermore, these systems are already under direct threat from human activity. For many invertebrates their 'climate space' will be altered (either directly or via habitat/vegetation changes) and policies and management practices must help enable their natural migration and adaptation to these changes. [from Plant Strategy- here or in climate change section?]

## Invertebrate – plant interactions

After the invertebrates, the plant kingdom is the second biggest overall contributer to global (and European) species diversity. The two groups have existed and developed together through a very long period of evolutionary time. A complex variety of relationships and interdependencies has developed that make invertebrates and plants functionally inseparable. Invertebrate animals eat and live on every conceivable part of a plant, living or dead, while the plants rely heavily on the invertebrates for their pollination and other aspects of their reproduction, and for recycling nutrients in the soil (Wilson, 1992).

Many invertebrates also have complicated life cycles, with adult and larval stages. These different stages often have very different demands for plant (and other) resources, so that the same species may occupy different niches at different times and may live in completely different habitats and require the presence of different plants or vegetation types. All are necessary for the survival of the species.

The spectrum of close associations between invertebrates and plants creates a `chicken-and-egg´ situation that is particularly relevant to the conservation of both, with each type of organism community relying heavily upon the continued well-being of the other. This means that by definition, invertebrate and plant conservation strategies must also be closely inter-related in their design and implementation. Also, many of the major threats to invertebrates are the same, or similar, to those of plants. Thus a co-ordinated approach to invertebrate and plant conservation strategies is essential for the well-being of both.

## The species-habitat dilemma

In the early days of conservation biology, emphasis was placed primarily upon protecting particular species that were recognised to be somehow ´rare`, mainly flowers or birds or furry animals. Protecting nature was equated with protecting beautiful and aesthetically appealing species. Then it was recognised that species are becoming extinct because their habitats are being destroyed. Now, the dilemma as to whether to use limited and usually inadequate human and financial resources to pursue the conservation of particular species or whether to invest in the management and protection of habitats that are of notable biological value remains a critical issue in practical conservation strategy. However, it is clear that in the end, both directions are essential for the protection of biological diversity (Haslett, 2004). Indeed, it may be most useful to regard species and habitat protection as extremes of a continuous spectrum of valid conservation strategies, relevant to most organisms, but depending upon particular circumstances.

The importance of integrating species and habitat conservation is now beginning to be fully appreciated at the European level through the acknowledgement of both within the Habitats Directive of the EU and in the approaches adopted by the Council of Europe. Such integration is just as essential for invertebrates as for other groups of organisms and this is appropriately reflected in the European Strategy for invertebrate conservation.

## Rationale for a European Strategy on the Conservation of Invertebrates

European ecosystems depend heavily upon the high diversity of invertebrate animals for their function and health. Human well-being is thus directly affected. The many and varied relationships between invertebrates and other organisms, particularly plants, are of central significance. Yet this pivotal position of the invertebrates remains, even now, largely ignored in Europe

Maintenance of invertebrate biodiversity in Europe lags far behind the conservation of other groups of organisms (eg plants, birds, mammals), for which clear European strategies have now been developed and are being implemented at various legal and technical levels. Whilst present public perception of most invertebrates is clearly negative, this can not postpone decisive and balanced action for invertebrate conservation policy and practice.

Loss of invertebrate biodiversity could already have been considerably reduced if the functional importance of these animals had been highlighted and their conservation integrated within existing plant and bird protection initiatives rather than assuming that strategies of ´umbrella protection` would suffice for all organisms. Wider appreciation of the ubiquitous functional roles of invertebrates and an awareness of the importance of different spatial scales are paramount.

Although the necessity of a pan-European approach to invertebrate conservation has long been recognised in scientific circles and by some European institutions including the Council of Europe, efforts towards conservation have been largely superficial and uncoordinated

The risks associated with inaction - of allowing invertebrate biodiversity to continue to decrease – are immense. Without co-ordinated new effort within and between states and in different sectors, not only will we lose a significant part of our natural heritage, but we are in danger of losing many of the important services that ecosystems provide for our normal well-being. Also, we risk the loss of resources directly provided by invertebrate animals that have not yet been fully appreciated and exploited, such as food and medicinal resources, as clearly highlighted at the European level as long ago as 1986, in the Council of Europe´s Charter on Invertebrates (Pavan, 1986).

In summary, invertebrates need to be conserved at European and global levels because they:

- Are key components of, and perform essential functions in just about every ecosystem
- Contribute much more to biodiversity than any other group of organisms on our planet
- Dominate in nearly every conceivable habitat, but are at the same time extremely vulnerable
- Are the basic food resource, directly or indirectly, for other organisms higher in the food web
- Provide a valuable and still underestimated resource for commercial use in medicine, technology, food and other services

Have aesthetic value that remains often unappreciated and contributes significantly to the beauty and enjoyment of nature

## Scope

### *Taxonomic limitations*

Issues of conserving biodiversity among very small organisms such as protozoa, many nematode worms and some other lower phyla are not considered in the Strategy because their requirements and threats are unique, or, more commonly, completely unknown.

*Geographic limitations*

Organism distributions and ecosystem functions do not abide by political boundaries. Nevertheless, such boundaries continue to change, causing Europe to expand considerably. This requires that a European Strategy be flexible enough to take account of presently planned and future alterations to the geographical definition of Europe and its constituent States. Thus the Strategy is mainly intended to address invertebrate conservation problems in an expanding Europe, but it also applies to African states that are Parties to the Bern Convention.

The strategy is limited to the consideration of terrestrial and freshwater invertebrate species. Invertebrates are also of extremely high significance in marine systems but the ecological requirements of marine species and the threats to their extinction in Europe differ considerably from those inhabiting other types of environment.

*The pan-European perspective*

Europe differs from other regions of the world in the pivotal role played by the European Union (EU). Uniquely, underlying policy on the environment is developed at EU rather than national level. Thus the invertebrate strategy must fit within the frameworks of existing European conservation policy, including the global Convention on Biological Diversity (CBD) and those of the European Union and the Council of Europe.

Many of the basic demands and requirements of the European Invertebrate Conservation Strategy are very similar to those identified and now in place for practical plant conservation in Europe. Given the close functional associations between plants and invertebrates throughout European ecosystems, the Strategy for invertebrates is designed to be integrative with the European Plant Conservation Strategy. Thus many of the objectives and other aspects of the two initiatives are similar.This serves to promote scientific coordination between the strategies and should also ease practical implementation. However, it must be stressed that the demands of invertebrate conservation are unique, and often differ significantly from those of plant protection, or protection of birds and other large animals.

## Who is the Strategy for?

The Strategy is targeted specifically at governments of all European states, but also at all decision-makers, land managers, scientists and teachers that have potential influence on invertebrate conservation. It is a comprehensive document addressed to nature conservation agencies and all other sectoral agencies with responsibility for activities relevant to invertebrate conservation and management. It is recognised that some aspects of implementation will be delivered through existing plant, animal and other agencies that have long-standing expertise in particular areas (e.g. Planta Europa/Plantlife; Birdlife).

The Strategy is also addressed to the Bern Convention Secretariat and strongly supports closer and sustained co-ordination and co-operation with relevant European and international organisations.

The Strategy further seeks to engage stakeholders involved in the movement, use and control of potentially invasive alien species (industry and trade, transporters, retailers, resource managers, the public etc.) and to build on the expertise and commitment of competent non-governmental organisations and research institutes. Many of the proposed key actions call for joint or complementary initiatives by private and public stakeholders.

## INVENTORISING, MAPPING AND UNDERSTANDING INVERTEBRATE DIVERSITY

If the decline of invertebrate diversity is to be halted, a clear understanding of the European fauna is needed. In an ideal world, this would include full listing and assessment of all invertebrate species, their abundances, and monitoring change in their distributions and status. Realistically, this will only be possible for a selected sub-set of the fauna under the present (urgent) time scales. There are simply too many species to deal with. In most European countries, we don`t even know how many species of the different groups of invertebrates exist! The lack of information is relevant to rare and threatened species but is equally applicable to common and widespread invertebrates. To improve the levels of understanding of either it will be essential to continue to employ both species and habitat oriented

approaches. [add from Samways Chapter 9?]

However, continued use, promotion and expansion of red lists of invertebrates remain an essential ingredient of invertebrate conservation effort. It is essential that such effort should prioritise new groups of invertebrates for inclusion on future red lists when resources permit.

### Recovering threatened species and maintaining red lists

The major focus of species conservation effort remains the documentation of rare species threatened with extinction: those restricted in range or numbers. Nearly all European countries now have national lists of at least some threatened invertebrates, but these remain largely confined to some of the more popular groups and are often badly in need of revision. Definition and application of criteria to estimate levels of threat to invertebrates remains problematical (see Box XX).

At the European level, small numbers of invertebrate species are listed in the Appendices of the Bern Convention of the Council of Europe (the Bern Convention Invertebrates, BCI´s) and in the Annexes of the Habitats Directive of the EU. These two red lists are broadly similar, and a data sheet has been compiled for each species, allowing them to be usefully employed as tools for invertebrate conservation. However, the lists remain unrepresentative of invertebrate biodiversity in Europe in terms of both the selection and number of species included.

Insert BOX Criteria to estimate levels of threat to invertebrate species

KEY ACTIONS

Advance progress in creating European red lists of invertebrates by:

- promoting a European synthesis of existing red lists and the (regular) updating and further elaboration of national and sub-national lists of threatened invertebrates.
- gaining information of European status of species within each state in order to determine international responsibilities to take action under BAP.
- prioritising invertebrate groups for action on red listing and collate information available (data sheets)
- updating information and including further species in the Bern Convention Invertebrates (BCI´s)species accounts already published, and ensuring that the information is integrated with EU initiatives such as the Habitats Directive
- identifying species or groups of species that are of high genetic diversity value

Increase awareness of protected area managers that they are custodians of populations of rare and declining invertebrate species, even if they may not realise it.

### Widespread species

It is now recognised that the focus on our rarest species reveals only part of the biodiversity decline. While the rescue of known rare and threatened invertebrate species is urgent, an equally or perhaps more serious long term problem is the reduction in abundance and range of many of the more numerous and widespread species. This is as much an expression of overall biodiversity loss as the increasing numbers of threatened species. Threat to widespread species is closely tied to habitat loss, and is likely to be most acute among those species that are associated with specialised habitats or plant species that require traditional management, or that are being destroyed by widespread factors (eg drainage of wetlands). But even present ´pest` species of invertebrates are at risk in agricultural habitats with the intensive use of pesticides and insufficient or wrongly managed set-aside land (see Agriculture and Forestry section of this document). Such losses will be unlikely to be detected in red data books, but may appear in changes in distributions of the species if monitored.

KEY ACTIONS

Use existing mechanisms to promote the importance of conservation effort for widespread species.

Establish a pan-European monitoring programme on just a few (about 10) widespread invertebrate species. These species should be associated with specific habitat types (wetlands, dead wood, agriculture abandonment, etc).

Actively support initiatives directed at farmers, foresters and gardeners to use less pesticides and herbicides and add invertebrates to the botanical arguments to reduce use of herbicides

## PREVENTING HABITAT DESTRUCTION AND ENSURING APPROPRIATE MANAGEMENT

Habitat destruction is undoubtedly the greatest threat to invertebrate animals in Europe and indeed worldwide. Direct loss of habitat, habitat fragmentation, changes in land use and/or management are all detrimental to invertebrate survival and are all well known problems in conservation biology generally.

The idea of heterogeneity over a wide range of spatial (and temporal) scales is the essence of the habitat concept in its modern form. Different organisms perceive and exploit their environment at different scales and it is essential that this be taken into account in conservation management.

### Habitat mosaics

When we think of a mosaic of different habitat patches at the scale of looking out of an aeroplane window – the eagle`s eye view of a woodland, a meadow, a lake – this is very different to the habitat mosaic relevant to, say, a beetle that exists within a few square metres, but which experiences equally heterogeneous patches of terrain at that scale (eg Haslett and Traugott, 2000). Within any such habitat mosaics, a variety of parameters become important to conservation, including the shape, size, content and edge complexity of the individual patches. All of these are relevant to how the different plants and animals exist and interact within the mosaics (eg, Haslett, 1994; Wiens, 1995). Recent technical advances in geographical information systems and remote sensing techniques make the practicalities of understanding and managing habitat mosaic dynamics much easier.

Together, all this means that a habitat is really a very complicated entity.

For invertebrates, there is a particularly important role of spatial scale in their conservation, because large numbers of species have a small body size, but are also extremely mobile (flying insects, for example). This means that they are required to use a wide range of scales in their daily existence. For example, a bee or a fly may crawl around on a single flower or leaf, or move between plants, or fly kilometres between habitats in a single day. Freshwater habitats present their own suite of problems, both for invertebrates that are entirely aquatic and for those that spend only part of their life cycle in water (see Box XX).***Umbrella or ´blanket` management***

Insert BOX Freshwater habitats

One of the main problems with present habitat conservation *per se* is the temptation to adopt a ‘blanket`or ´umbrella` protection approach in which a particular habitat, or a group of habitats within an area, is managed at large, ‘human’ scales in the expectation that this will automatically protect everything under the umbrella. However, the large scale is inappropriate for the majority of the invertebrate species present and for the functioning of the system. Successful management also requires maintenance of intact mosaics of microhabitat elements

### *Important areas for invertebrate protection*

In recent years there has been a move to define and formally establish areas of habitat, of variable size, that are recognised to be of priority importance for specific groups of organisms at the European level, irrespective of any formal protection status. Programmes for identifying and managing Important Bird Areas, Important Plant Areas and Prime Butterfly Areas across Europe exist and flourish. All such initiatives aim to conserve their own particular aspects of biodiversity, and are beginning to achieve this aim. All also benefit from significant public interest in the groups of

organisms concerned, which lends considerable backing and provides a strong lobby in political circles.

Invertebrates are an important cross-cutting issue in this set of initiatives. They are important in the identification and management of important areas of *any* type of organism because of their dominance in both ecosystem function and their contribution to species diversity.

Thus it is essential to determine the extent to which plant areas, bird areas and now also butterfly areas (Van Swaay & Warren, 2003) overlap with the geographical areas and management needs of invertebrate habitats/sites in general. There are also many situations in which areas important for invertebrates may be unique, such as dead wood, exposed riverine sediments, or soft rock cliff coasts (see Box XX). Equally, it is essential to identify ´hotspots` of invertebrate biodiversity in Europe (BOX XX)

This integrative approach to invertebrate habitat conservation will require international manpower and financial backing, but would greatly save on the ´doubling up` of uncoordinated conservation effort between organism groups. It will require that workers ´on the ground` as well as policy makers recognise such overlapping interests and act upon the implications for practical management.

KEY ACTIONS

Promote enhancement of existing important area schemes (birds and plants) by taking more notice of invertebrates and their functional roles in different habitats and ecosystems

Promote the conservation of microhabitats important for invertebrates

Promote identification of important invertebrate sites and hotspots in Europe.

Evaluate and build upon the existing framework of Prime Butterfly Areas in Europe to maximise their relevance to the protection of other invertebrate groups

Are there other areas or types of habitat that are of particular importance to invertebrates? Are these being reduced and if so how fast and why?]

Soft rock cliffs: UK with most European maritime. ? NW France, Denmark, parts of Baltic within temporate zone. UK major concentation of RDB & nationally scarce spp, many of which have undergone major decline inland. Hardly any plant or bird interest. Sea defences, rising sea level, development too close to eroding cliff edges, recreational intestest at stake (caravan sites, coastal footpaths, golf course at risk of being reduced to 16 holes!), underground water abstraction, etc.

Flowing water. Only recently have we got SSSIs in UK, and from those were selected SACs. However, selection based on aquatic flora criteria. Some of the most important UK rivers for inverts, especially riparian ones, did not even get a look-in. Exposed riverine sediment is one of the key habitats but in fact there is a whole mosaic of river bed and river bank niches at issue. Many lowland rivers have been deepened or canalised for flood control (often simply made matters worse!). Even Feshie Fan (Central Highlands) was channelled (SNH buckled to pressure) yet was claimed by some leading British geographers to be the largest intact river confluence fan in Europe (Europe has larger ones but it was claimed all were canalised). Removal of fallen wood into streams and rivers is generally removedso that the specialised fauna is rare (hence Lipsothrix craneflies on BAP as flag for rest of fauna).

Underground aquifers. There is now huge pressure to maximise use of all water resources, and the consequences for government policy towards building millions of new homes in water deficient areas is extremely worrisome. Many wetlands have been sucked dry by bore hole abstraction; theoretically the most vulnerable SSSIs have had some reprieve but there are prime cases where it is too late for the fauna EG the best active tufa formation in Norfolk could have been walked over in carpet slippers – the special fauna was absent. Buglife is highlighting the absence of invert

survey/knowledge of many small but potentially important sites which may still be refuges. Phase 1 survey (presence or absence of habitat) or vegetation evaluation re SSSI status does not necessarilly identify the sites containing highly significant ivert fauna (flora and inverts may give very different vaules).

Dung fauna. Huge problem with avermectins (esp. cattle & horses). Dung from improved grassland is a slurp compared with rough grazing. Up-sets to cattle farming (BSE etc) have broken continuity of niche over large areas and many farmers have/are pulling out of stock farming. Site fragmentation/breakdown of metapopulation structure. Even on many NNRs, NRs there has been major disruption/ceesation of suitable stock grazing.

Insert BOX Invertebrate hotspots

***Protected Areas - policy and networks***

Every country in Europe has a system of protected areas, supported by agreed international frameworks such as the Ramsar Convention and the Habitats and Species Directive (see Appendix l). Yet the geographical distribution and biological representation are uneven. IUCN categorises protected areas by management category, with six categories defined with increasing levels of intervention. Within Europe, IUCN has also identified a strong marketing approach and clear audits of management efficiency as two important ingredients for improving conservation in protected areas

***Networks and corridors for Protected Areas***

Conservation areas need to form a vast interconnected network across Europe, rather than be thought of in isolation. This requires adequate government policies on protected areas. The initiatives of Natura 2000, The Emerald Network, World Heritage Sites, Ramsar Sites and designations of protected areas that are not legally binding are doing much to define the size and extent of the network, which should ideally be connected to each other through measures such as linking corridors and 'stepping stones' between core areas. Habitat restoration may be necessary in key areas to achieve this, and it will help facilitate the spread of invertebrates and other organisms in response to climate change.. However, for invertebrates, there is concern that the spatial and temporal scales appropriate to the animals impose restrictions to corridor efficiency; promotion of directional movement of individuals may be much less than expected (eg Haslett and Traugott, 2000).

In Europe the connectivity approach has emerged in the concept of the Pan-European Ecological Network (PEEN), part of PEBLDS. Ministers from 54 countries in the UN-ECE region have endorsed the proposal to establish PEEN by 2005 [CHECK THIS]. Realisation of the Natura 2000 network and the Emerald Network will help greatly in the establishment of PEEN.

KEY ACTIONS

Promote the establishment of small scale protected area schemes to aid conservation of the many rare and threatened invertebrates and invertebrate habitats are confined to extremely small areas.

Improve understanding and improve the efficiency of ecological corridors for invertebrates across Europe`s protected areas..

## INDICATORS AND MONITORING

Which areas of Europe, large or small, are important for the protection of invertebrates, and what should be the criteria for such decisions? There are simply too many invertebrate species to attempt to make area appraisals taxonomically universal, so indicator groups must be sought, tested and engaged.[to be modified incorporating Samways texts]

It is all too tempting to ´decide` that a particular taxonomic group or an accepted rare or endangered group of species should be used as overall indicators, and to advertise them as such. But there is a range of biological, practical and socio/political factors that make selection of indicator groups more complicated. Although public acceptance, rarity and even ease of recognition (identification) are all very important, full representation of the spectrum of ecological functional

roles is essential. Thus it is necessary to identify groups of invertebrates that can do everything, from eat meat to be vegetarian to get rid of the waste!

There is also the question of choosing the right selection of species for different habitats. BAP Priority Habitats need a list of not too rare inverts in order to monitor whether maintenance/enhancement/restoration has been successful. If species used are too rare few sites have them. [add text about surrogate species from Samways Chapter 8?]

KEY ACTION

Identify and establish a palette of ´indicator groups` of invertebrates that reflect the biodiversity and the full range of ecological functions of the existing faunas of different habitat types. This to supplement existing ´rare` species indicators already in use.

Test the efficacy of all types of indicator groups for different habitat types and situations

Ensure that invertebrate indicator groups are employed and correctly engaged in biodiversity and habitat conservation issues throughout Europe.

Undertake focussed research to establish the degree of correlation between invertebrate protection using invertebrate indicator groups and established important area schemes for other organisms.

**Syrph-the-net example of indicator group**

One way forward here may to be to develop and apply the use of known species distributions, biologies and habitat associations, made available on computer, as recently documented for European hoverflies (Diptera: Syrphidae) (Speight & Castella, 2001). Expansion of this, or development of similar methodologies would provide a sound basis for selection of invertebrate indicator groups for biodiversity value areas.] . Syrphids happen to be a particularly acceptable group, being both attractive and with a particularly extensive raange of larval biologies and habitats. In fact the main emphasis of Syrphus-the-net is to act as a prdedictive model to judge intactness of fauna for the habitats and geographic area concerned. Thus the concept allows not just assessment of faunal status, but also status of habitat. As such it permits evaluation of present site quality and the basis for montoring future site quality, a valuable monitoring tool whether assessing the response to site management or moitoring environmental quality more generally]

### *Monitoring*

Once indicator groups have been established (including red list species), monitoring is essential to recognise and understand changes in invertebrate diversity. In order to promote and facilitate collaboration in monitoring and use of indicators for reporting on Europe's biodiversity, the European Biodiversity Monitoring and Indicator Framework (EBMI-F) has been developed within the framework of PEBLDS implementation. A proposal for implementing the EBMI-F will be discussed by the PEBLDS Bureau at CBD COP 6.[What is the updated situation here?]

Changes in the threat status of a species can only be efficiently assessed by monitoring changes in its numbers and in distribution over time. This is lacking at the international level for most invertebrate groups, and although a few European countries have good monitoring schemes, most do not.

KEY ACTIONS

Ensure that the invertebrate species on international red lists such as the Bern Convention and the EU Habitats Directive are the subjects of efficient, co-ordinated and standardised monitoring across Europe

Set up standardised monitoring schemes for selected widespread species across Europe (see sectionXX).

Review availability of computer databases of species distributions in general at national and international scales, and establish a means of integrating the information.

## INVASIVE SPECIES

Invasive alien species (IAS) are those species that have been introduced outside their normal current or past range, and whose introduction and spread cause harm to human health, the economy, and/or the environment. IAS may have been introduced accidentally or intentionally, and they may be plants, animals (including invertebrates), fungi, bacteria, blue-green algae, or viruses. They pose strong threats to invertebrate and plant biodiversity, and to the habitats upon which we and all other species on the planet depend.

The Global Invasive Species Programme (GISP) of the CBD suggests measures are needed to predict, prevent and control problem species. At the European level, through the Bern Convention the Council of Europe has developed a European Strategy on Invasive Species that is within the framework of the CBD (Genovesi and Shine, 2004)

[Do this as BOX?- include objectives of European IAS Strat?

Improving understanding and awareness by all sectors of society

Developing adequate risk assessments of species and their pathways

Devising robust codes of conduct

Providing appropriate legal and institutional mechanisms]

IUCN has stated a prime guiding principle: that the *prevention of introduction* of the invasive species ´is the cheapest, most preferred option and should be given highest priority`.

KEY ACTION

Provide active support for the European Strategy on Invasive Alien Species on all issues directly concerning invertebrates. This will involve identifying how invertebrates are affected by invasive species of any type and how invertebrates themselves contribute to the problem.

[supplement from Samways, Chapter 6?]

## EFFECTS OF AGRICULTURE, FORESTRY AND INDUSTRY

### Agriculture

Agriculture has a massive effect on invertebrates and their habitats. Farming accounts for 60% of the land surface of the European Union and of Central and Eastern Europe (Planta Europa, 2002), though the proportion is much less in Scandinavia and northern Russia where forestry predominates. Modern farming practices have proved deeply harmful to nature and the landscape in general, and particularly to invertebrate diversity. To raise output, numerous rare habitats have been destroyed, for example by drainage of wetlands and irrigation of drylands. The effects of intensive use of pesticides, fertilizers and herbicides damage farms and affect neighbouring land.

Insert BOX Pesticides [text Samways]

Some farmland is of intrinsic conservation value as its flora, fauna and landscape depends on the continuation of low intensity, often traditional farming practices (eg mountain agroecosystems). Abandonment of this kind of extensive farming is perhaps one of the greatest causes of loss of hitherto common invertebrate animals and plants in Europe. It often means the landscape undergoes detrimental successional change towards woodland because of the lack of traditional management. At the other extreme, intensification of farming practices simply exterminates biodiversity and turns such areas into ´green desert`. Designation and management of set-aside land could do much to aid invertebrate conservation in such circumstances, but the management must be realistic and appropriate. Set-aside is only useful if there is continuity of fallow habitat on a farm/small district – it is useless if the areas are ephemeral, determined by policy (now you see it, now you don´t). That it is possible to grow certain (subsidised) crops on set-aside negates the wildlife aspect. Also, set-aside

must not be sprayed with herbicide so that is becomes a brown sterile waste. Continuity of habitat availability is required, and the field edges concept is one of the better options.

## Agricultural policy of the European Union

The Common Agricultural Policy (CAP) of the European Union is of decisive importance within the EU and increasingly in the accession states. EU policy also has a great effect on non-EU states through its effect on farm prices and through its assistance programmes.

The view that farming and nature conservation can be compatible is not being put across in many places. Farmers often resent being told by the authorities what they should do on their own land, and their short times for relaxation are often used up by filling in forms. The payment of subsidies to farmers is often not enough to curb this resentment.

Now, the CAP is under reform, and it appears that some money is being removed from subsidies. It is imperative that this money should be used for conservation purposes in agroecosystems. [This is being done – find sources] Financial support for set-aside land must be one of the top priorities.

KEY ACTIONS

Promote integrated pest management and organic farming methods to reduce use of pesticides by farmers and gardeners.

Provide data on the decline of invertebrate species in farmland.

Actively support the conservation networks lobbying for agricultural change?

Support the work of relevant agencies (eg farming and wildlife advisory groups) to help them reduce the damage to invertebrate communities on agricultural land?

Engage the puplic and organisations to apply political pressure to ensure that money removed from subsidies be used by the EU to support set-aside conservation land.

Take appropriate action to improve the temporal stability of national and European policy regarding the designation and management of set-aside land

## Forestry

About 46% of Europe is forested (Planta Europa, 2002) but the proportion of forested land varies greatly from one country to another - from about 1% closed forest in Iceland to 60% in Finland. The extent of forest in Europe is increasing as marginal land is abandoned and reverts to scrub and woodland. Moreover, there is now a great trend to plant trees (often non-native or otherwise inappropriate species) rather than let trees regenerate naturally in the landscape.

Much of the forest land is intensively managed, again often for non-native and/or coniferous species in plantations, and the homogenous crop of trees that results is of little biodiversity value. Lack of rotting dead wood in the forest removes the habitat for the whole spectrum of saproxylic invertebrates, many of which are rare and which maintain the essential ecosystem function of recycling (Speight, 1989). Lack of even small patches of open habitats also removes the heterogeneity of the habitat mosaic necessary for the survival of many invertebrate species, particularly those that have complex life cycles and occupy a number of different ´partial niches`. Out of this vast area of forest, only small isolated fragments of truly natural forest survive. These are of the greatest value for invertebrates, especially for the saproxylic species (see Box XX).

Insert BOX Saproxylic invertebrates

Forest management differs greatly across Europe. In the Atlantic seaboard countries with little remaining forest, afforestation on moorlands, heathlands, raised bogs and other valuable habitats has been a major threat to biodiversity. In Scandinavia and France, most natural and semi-natural woodlands have been converted to more intensive production forests. In the Mediterranean region, forest fires and grazing continue to devastate forests. In Central and Eastern Europe, forests have suffered particularly from air pollution, as well as from conversion to monocultures, although there are also long-standing traditions of ecologically beneficial forest management.

Presently, intergovernmental commitments and processes on forests, such as the Ministerial Conference on the Protection of Forests in Europe and its associated Pan-European Work Programme take little or no account of the requirements of invertebrate conservation.

KEY ACTIONS

Encourage NGOs to ensure that afforestation does not occur on land of high value for invertebrates and that foresters adopt more multiple use policies in all forestry operations while remembering that invertebrate requirements may not always co-incide with those of other organisms).

Promote more sustainable forestry practices by joining forces with others who have the same message.

Adapt policies in Mediterranean forests to the fact that fires will occur.

Take initiatives to direct attention to the importance of saproxylic invertebrates in the forestry agenda by highlighting the Council of Europe´s report (Speight, 1989).

**Town and country planning**

Land-use planning is particularly important in Europe because of the great pressures on the land for agriculture, industry and other uses. Some countries have strong traditions of planning, resulting in a firm delineation between town and country, whereas others have a relaxed approach, often with devastating visual and ecological effect. Even where countries have effective land-use planning systems in place, implementation can be difficult and is often jeopardized by strong political and other pressures.

In towns and cities, the planning framework can encourage an invertebrate-rich environment by emphasizing the need for human settlements to be part of the balance of nature.

For nocturnal invertebrates, particularly night-flying insects, there is a new and important threat from the increasing levels of lighting in towns and also in the countryside. This is becoming particularly significant in cases of advertising or commercial light shows that take place in otherwise near natural areas.

KEY ACTIONS

Influence planning processes by ensuring that the appropriate agencies aid interpretation of legislation and influence wording of ministry guidelines.

Support and use existing mechanisms for highlighting red listed species to ensure that key invertebrate sites are safeguarded from damaging planning decisions

Draw attention to the problems of light pollution by undertaking appropriate case studies and engaging astromoners as an ally.

Halt the threats resulting from the development of ski facilities in European mountains including the Mediterranean countries using .government tourism ministries and tour companies to alter public perception and exert pressure. Establish firm EU guidelines.

**Industry**

Industry has two main impacts on invertebrate diversity and abundance: damage from pollution, (which may also induce melanism in some species) and direct physical damage to the landscape by using space for buildings or for mining and other extractive industries.

Invertebrates may be directly poisoned by industrial pollutants or, more commonly in terrestrial environments, affected by the ill health of the vegetation. The European Commission's annual 2000 report on Europe's trees concluded that only a third of Europe's trees are healthy. It found an improvement in western and central countries but a deterioration in the Mediterranean region, where defoliation of nearly all tree species has increased considerably. Pollution is the cause. There are clear implications for invertebrates that rely on the trees for food or living space.

Protected areas and important invertebrate sites may coincide with areas that could be used for mining and other extractive industries. Modern Europe has an insatiable appetite for aggregate for

roads and limestone for concrete and cement. This is especially true at present in southern Europe, where large areas of the landscape are scarred by mining operations. Inevitably some of the limestone hillsides being removed had rich invertebrate biodiversity. Substrates rich in minerals are naturally attractive to the mining industry but usually support a unique and endemic fauna and flora.

KEY ACTIONS

[Need help here - is there anything we can do more than react to individual proposals from industrial firms?]

**Transport** [combine with industry above?]

Transport, especially road transport, has an increasing impact on natural habitats. Many of the most contentious issues in conservation over the last decades have been over road schemes, which, by avoiding towns and villages, all too often interfere with more natural areas. Increasingly, too, the new high-speed railways are devastating to landscapes because of their need for new track alignments that are level and straight. Often, the damage done to natural sites, and especially protected areas, is ignored or under-estimated in the planning of transport infrastructure.

KEY ACTIONS

Obtain further facts on the threats posed by transport by undertaking a case study involving key invertebrate sites, and use the information obtained as the basis for further lobbying.

Undertake studies to determine how significant is the cull of flying insects that occurs as a result of collisions with car windscreens and radiator grills etc in areas of known importance to invertebrate conservation.

**Energy**

Wind farms ?[*Antennae* article Jan.05, and COE birds Nat & environ. No. 139]

## SUSTAINABLE USE AND DEVELOPMENT

[Need help to expand this, or lose the section and integrate into other parts of text? The subject was not specifically discussed at the last meeting]

Sustainable use of biodiversity is one of the three major objectives of the CBD, but has received less attention in Europe than in many other regions where people are more dependent upon wild species for their livelihoods.

Nevertheless, in Europe wild invertebrates with commercial value are collected, for example snails and crayfish for food, fresh-water pearl mussels and butterflies for decoration.

KEY ACTIONS

Develop national programmes to monitor and where necessary regulate the collection and trade in wild-collected invertebrate animals with the objective of achieving sustainability

## SCIENTIFIC CAPACITY BUILDING

There are still large gaps in our knowledge of the taxonomy of European invertebrates, their biology, their habitat requirements, distributions and their population dynamics. This causes an array of important practical problems in creating and executing a conservation strategy for particular invertebrate species, or for invertebrate habitats.

Scientific capacity to adderss these difficulties is uneven in invertebrate zoology across Europe. The former communist countries often had large biological infrastructures and supported traditional zoology, but these departments are now deeply weakened by lack of resources and funds. Throughout Europe, few universities now have zoology departments, which have been replaced by institutes focussed on biotechnology or molecular biology. This is strongly detrimental to biodiversity conservation as the expertise to identify and classify animals (and plants) is disappearing at precisely the time that governments are waking up to the vital importance of biodiversity protection, which all acknowledge cannot be delivered without that expertise. Despite an acute awareness of the problem

within relevant scientific circles, little is done. And in the absence of a strong framework for invertebrate taxonomy, taxonomic approaches from one country to another are diverging, making the essential continent-wide synthesis more rather than less difficult (see Box XX).

Recently, a strong case has been made for ensuring that conservation decisions are ´evidence based`, in other words, that conservation management decisions should be made on the basis of scientific evidence, rather than on feelings or previous experience of experts (Sutherland et al, 2004). This idea promotes the exchange of known information between workers, and exposes the difficulties of computer database incompatibilities!

Insert BOX Invertebrate taxonomy in conservation

Invertebrate conservation requires people with a wide range of skills. Above all, it needs practitioners - people who will actually go out and achieve invertebrate conservation, rather than just advise or assist in it.

There are relatively few institutions created specifically for invertebrate conservation. However, many conservation agencies include staff zoologists and/or zoological teams, who are charged with providing an invertebrate input into conservation activity. This has the advantage of integrating invertebrate conservation with other functions but the disadvantage that invertebrates rarely, if ever, receive the attention they need.

Invertebrate conservation lacks the high profile and better political awareness of more prominent organisms and/or parts of the environmental agenda so is without realistic levels of funding. Lack of funding has been particularly acute in developing international cooperation for invertebrate conservation.

Invertebrate conservation will only succeed if new and enlarged sources of funding are found. These will have to come in two ways. First, from increased funding by existing donors and supporters, such as the funding provided by government to its conservation agencies. Political will, fuelled by public attitudes, is the main driving force here. Second, funding will also have to come from new and innovative mechanisms, such as trust funds, charitable events, sale of produce etc. In doing this successfully a high public profile is greatly desirable. Awareness about the needs of invertebrate conservation is the crucial driving force.

However, all arguments for more science to underpin invertebrate conservation should make the point that most of the key actions needed for invertebrate conservation do not depend on more science being undertaken. And the precautionary principle can also be invoked.

## KEY ACTIONS

Undertake field work and other research necessary to improve the conservation status of invertebrates in Europe by:

Improving efficiency of field surveys.

Undertaking inventories of Natura 200 and Emerald Network sites.

Selecting permanent sites for long term monitoring

Obtaining and collating autecological, behavioural and other biological information on known rare or threatened species

Obtaining and collating new taxonomical information

Strengthening the taxonomic work force

Select an NGO for invertebrate conservation in each country as a cost-effective mechanism to deliver government-funded conservation work and/or as a campaigning force.

Increase expertise and involvement of official conservation agencies in each country to make sure invertebrates receive the attention they deserve. This should include proper training within ´all purpose` agencies for the many staff making decisions that affect what happens on the ground.

Determine the level of invertebrate conservation expertise across the region, as a sort of capacity audit.

Make efforts to initiate a revival of invertebrate taxonomy to make the subject more attractive again, to both students wishing to make it a career, and to funding agencies.

Identify and implement a standardised approach to invertebrate taxonomy across Europe.

Persuade international funding bodies to look upon the needs of invertebrate conservation more favourably.

## EDUCATION AND PUBLIC AWARENESS

[insert Samways aesthetic?]

Given the fundamental importance of invertebrates, the need for invertebrate conservation is little appreciated. A targeted programme of awareness and education is necessary to highlight the importance and plight of invertebrates and in turn to try to change human attitudes and behaviour.

While all major international treaties, as well as national and regional conservation strategies, nowadays rightly stress the general importance of environmental education in order to foster and promote environmentally responsible citizenship, more attention needs to be given to the specific importance of invertebrates and the issues that affect them.

Awareness essentially brings the issues relating to invertebrate diversity to the attention of key groups who have the power to influence outcomes. Education is a set of processes that can inform, motivate and empower people to support invertebrate conservation by making lifestyle changes and also through promoting change in the way that institutions, businesses and governments operate.

Awareness alone is not enough. It will only lead to conservation if interest is translated into action. Educational programmes are therefore necessary to influence the formal curricula of schools and universities, and also the work of national parks and other protected areas, museums.

Environmental education is a relatively new discipline, but it is growing in importance as people realize the seriousness of biodiversity loss. The imperative of education is stressed in all major international conservation strategies, including the CBD and Agenda 21

Ideally, a communication, education and public awareness strategy should be developed for many of the Key Actions in the European Invertebrate Conservation Strategy, as awareness raising is a cross cutting issue. However, it is clear that more funding will be needed to increase the capacity of institutions to implement this important work.

### KEY ACTIONS

Achieve public acceptance of the importance of invertebrate animals to the well-being of the world and ourselves by:

Drawing public attention to the functional importance of widespread invertebrate species, and that even these are also at long term risk of becoming threatened.

Providing guidelines to influence the curricula of what is being taught in schools.

Making creepy-crawlies more interesting on television and in magazines by accentuating their functional roles and their importance to our own quality of life.

Involving the arts, and people so inclined, such as poets, writers, artists, to help make the case for invertebrates?]

Support education and awareness programmes in zoological institutions on invertebrate conservation issues (e.g. the programmes of natural history museums).

Provide advice and encourage direct liaison with land managers to help reduce damage to invertebrates (e.g. by minimising the use of pesticides and using integrated control methods.

Support initiatives to encourage the public to appreciate the diversity of invertebrates and understand the environmeental cost of "suburbanising" the countryside

Emphasise the importance of local patterns of genetic variation for invertebrate conservation and landscape and habitat restoration.

## COOPERATION AND IMPLEMENTATION

In an increasingly interdependent world and in a region where more and more nations are conceding their sovereignty to agreeing action in a multilateral framework, whether it be the European Union, the Council of Europe or the CBD process, international cooperation is of central and growing importance.

Zoology has always been an international science, but cooperation on animal conservation, especially of invertebrate animals and their habitats is relatively new. Yet at both governmental and non-governmental level, international cooperation has become ever more complex, in part due to the complexity of the various policy initiatives and in part due to a splintering of organizations into smaller components. A process of integration is needed, to harmonize disparate policy instruments that have similar goals and to bring together as partners organizations that have common goals.

### The role of the Council of Europe

The Council of Europe, through the Bern Convention, is very well placed to promote national and European co-operation on invertebrate conservation issues. It provides a regional framework for implementation of the CBD in Europe and brings together European states, NGOs and others specialised in biodiversity conservation. It has given particular attention to biotic invasions over the last XX years and adopted a wide range of policy and technical recommendations.

KEY ACTIONS

It is suggested that the Council of Europe should:

Continue with Bern Convention engagement with invertebrate conservation issues by facilitating national implementation of this Strategy and strengthening co-operation with relevant regional and global institutions.

Continue and support the work of the Convention's Group of Experts on the Conservation of Invertebrates.

Work with key regional and global institutions (e.g. European Commission, IUCN, Planta Europa, Birdlife International) to promote the further development of effective invertebrate conservation measures for Europe and the Mediterranean Region.

Contribute at the European level to developing a common interpretation of terms and concepts.

Monitor the implementation of this Strategy and report to the Standing Committee on the possible need for further actions in the future.

Insert BOX Possible Activities of the Bern Convention Group of Experts on Invertebrates

## CLIMATE CHANGE

Climate change is a reality. Plants and photosynthesis are directly affected by the increase in carbon dioxide concentration in the atmosphere, which also directly affects all invertebrates associated with the vegetation. Clmate change also has important direct effects on the sets of abiotic conditions that organisms experience in any particular place: climate or microclimate as relevant at any particular spatial scale.

Much has been written about biodiversity and climate change in the scientific literature. One major fact comes forward in relation to invertebrates: individuals are mobile, albeit at different speeds and over different ranges. This means that in situations of change, it is not so much the mathematical average of the change that is important, but more the variance of that average – the likelihood of an extreme situation. Invertebrate populations may be wiped out by exposure to an extremely cold winter, hot summer, unexpectedly long period of drought or of flood much more than geographical averages. The degree of mobility of the organisms is an index of their chance of actively escaping the climatic event, a situation very different from most plants, that can only stay rooted and weather the storm, or send propagules for the next generation.

Climate change may affect invertebrate/plant interactions by separating them in space or time. Plants respond less rapidly to climate and most other environmental change than invertebrates. Seed bank, vegetative rootstock etc means that annual reproduction is not essential. There will be segregation of plants from pollinators, and the loss of phytophagous species and related guilds of invertebrates. Already, too often the invert fauna is impoverished because of incompatible vegetation management, and climatic change risks further improverishment in many districts of Europe.

It is already clear that many invert species are rapidly changing their range, but man-made habitat fragmentation and isolation mean that many species are no longer able to move with the climate The solution must be sought at a landscape scale to ensure that there are enough corridors and stepping stones as possible. Regionally or locally significant sites may be paramount as part of the European Strategy.]

The Kyoto agreement is only one of a number of political instruments that has focussed recent attention on climatic change from human influences, and the subject is now high on the political agenda. The repercussions go well beyond invertebrate conservation.

**BOXES**

[Most Boxes are still empty of text – need some discussion at the February meeting before filling them! What topics for boxes are still missing?]

## BOX Criteria to estimate levels of threat to invertebrate species

Decline often goes undetected in the general absence of monitoring invertebrate numbers. Both Red Data Book and Biodiversity Action Plan criteria include rate of decline, a qualification for action in order to prevent a high rate of decline deteriorating to critical levels of viability, including viability in maintaining range. This criterion is applied to well studied groups such as birds and higher plants where national and European status is well ascertained. There must be many invertebrates equally deserving of action but the data is lacking. Hence the precautionary principle should operate where there is good cause to conclude that equivalent decline in habitat, combined with representative local information on consequences for population viability.

IUCN criteria

To focus conservation effort on particular species requires that those species are somehow known to be under threat of extinction at some spatial scale of interest, (eg locally, nationally, globally). The species are usually thought of as being somehow ´rare`. The important initiative of IUCN to define criteria in a quantitative manner that should allow species to be assigned to a category of threat has been generally accepted as a global standard. Unfortunately, there are major problems in applying these IUCN criteria to many groups of the invertebrates. The main reason is a significant lack of relevant information to allow the criteria to be applied (´Data Deficient`). Despite this great difficulty, use of the IUCN criteria in assessing threat to invertebrate species is required by both the EU and the Council of Europe. Some valiant attempts have been made to apply modified versions of the IUCN criteria to whole groups of invertebrates (eg European butterflies: Van Swaay & Warren, 1999). Although such work makes major advances, there is still the inherent problem of forcing quantitative analysis upon mainly qualitative/subjective information.

## BOX Habitat mosaics

When we think of a mosaic of different habitat patches at the scale of looking out of an aeroplane window – the eagle`s eye view of a woodland, a meadow, a lake – this is very different to the habitat mosaic relevant to, say, a beetle that exists within a few square metres, but which experiences equally heterogeneous patches of terrain at that scale (eg Haslett and Traugott, 2000). Within any such habitat mosaics, a variety of parameters become important to conservation, including the shape, size, content and edge complexity of the individual patches. All of these are relevant to how the different plants and animals exist and interact within the mosaics (eg, Haslett, 1994; Wiens, 1995). Recent technical advances in geographical information systems and remote sensing techniques make the practicalities of understanding and managing habitat mosaic dynamics much easier.

Together, all this means that a habitat is really a very complicated entity, but management of habitats remains large scale and over-simplified.

## BOX Freshwater Habitats

## BOX Examples of overlooked habitats important for invertebrate biodiversity conservation

Soft rock cliffs: UK with most European maritime. ? NW France, Denmark, parts of Baltic within temporate zone. UK major concentation of RDB & nationally scarce spp, many of which have undergone major decline inland. Hardly any plant or bird interest. Sea defences, rising sea level, development too close to eroding cliff edges, recreational intestest at stake (caravan sites, coastal footpaths, golf course at risk of being reduced to 16 holes!), underground water abstraction, etc.

Flowing water. Exposed riverine sediment is one of the key habitats but in fact there is a whole mosaic of river bed and river bank niches at issue. Many lowland rivers have been deepened or canalised for flood control (often simply made matters worse

Removal of fallen wood into streams and rivers is generally so that the specialised fauna is rare (hence *Lipsothrix* craneflies on BAP as flag for rest of fauna).

Caves

Underground aquifers. There is now huge pressure to maximise use of all water resources, and the consequences for government policy towards building millions of new homes in water deficient areas is extremely worrisome. Many wetlands have been sucked dry by bore hole abstraction; theoretically the most vulnerable SSSIs have had some reprieve but there are prime cases where it is too late for the fauna EG the best active tufa formation in Norfolk could have been walked over in carpet slippers – the special fauna was absent

Dung fauna. Huge problem with avermectins (esp. cattle & horses). Dung from improved grassland is a slurp compared with rough grazing. Up-sets to cattle farming (BSE etc) have broken continuity of niche over large areas and many farmers have/are pulling out of stock farming. Site fragmentation/breakdown of metapopulation structure. Even on many NNRs, NRs there has been major disruption/ceesation of suitable stock grazing

**BOX Invertebrate hotspots**

**BOX Syrph-the-net: A prime example of an indicator group and its usage**

One way forward here may to be to develop and apply the use of known species distributions, biologies and habitat associations, made available on computer, as recently documented for European hoverflies (Diptera: Syrphidae) (Speight & Castella, 2001). Expansion of this, or development of similar methodologies would provide a sound basis for selection of invertebrate indicator groups for biodiversity value areas.

Syrphids happen to be a particularly acceptable group, being both attractive and with a particularly extensive range of larval biologies and habitats. In fact the main emphasis of Syrph-the-net is to act as a prdedictive model to judge intactness of fauna for the habitats and geographic area concerned. Thus the concept allows not just assessment of faunal status, but also status of habitat. As such it permits evaluation of present site quality and the basis for monitoring future site quality, a valuable monitoring tool whether assessing the response to site management or monitoring environmental quality more generally

**BOX Invasive species**

**BOX Pesticides**

**BOX Saproxylic invertebrates**

**BOX Invertebrate taxonomy in conservation**

The problems of identifying invertebrate species are very familiar to all workers in the field. Without a high level of specialist knowledge it is often impossible to know which species are present in an area, or how common or rare they are. Species new to science continue to be described frequently. Even apparently ´well known` groups such as butterflies suffer from the problem of requiring expert opinion for the correct identification of certain ´problem` groups of species. Of course, this is not a difficulty unique to the invertebrates, but it is significantly more widespread and intense in many invertebrate animal orders and families than for other organisms. Unfortunately, such experts are themselves now a very `rare species´ and the threats to taxonomist extinction are severe and increasing. It is of utmost importance to invertebrate conservation in Europe that sufficient numbers of competent taxonomic experts continue to be trained and provided with places of employment at high scientific levels. The work of these experts underpins the entire invertebrate conservation effort. Knowledge of which species are present is prerequisite to their protection!

The biggest problem is in countries that lack a workforce of hobby invertebrate zoologists and/or where most professionals are economically employed. Some temperate and northern European countries have more than anywhere else in the world but there is still a problem with co-ordination.

Present governmental policy throughout Europe does not appear to regard invertebrate species identification as a valid enterprise in modern biodiversity conservation. There is little or no support for the future career of an invertebrate expert who can identify species efficiently in the field or back in the laboratory

**BOX Possible Activities of the Bern Convention Group of Experts on Invertebrates**

Support the Bern Convention Secretariat in reviewing the implementation of this Strategy.

Contribute to the development of technical codes of practice to halt the loss of European invertebrate biodiversity, working with relevant sectors and organisations.

Organise seminars on specific invertebrate conservation issues, taking account of the need for capacity-building in some Parties and sub-regions.

Provide technical assistance on methodology for ´invertebrate conservation.

Help to facilitate exchange of information at national to European levels.

Continue the co-operation with and support the work of the relevant European sections of the IUCN and other such institutions.

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APPENDIX 1. EXISTING POLICY AND LEGISLATIVE FRAMEWORK FOR INVERTEBRATE CONSERVATION
[based on Plant Strategy text]

**Global**

The Convention on Biological Diversity (CBD) 1992

Includes diversity within species, between species and of ecosystems. The objectives of the CBD include the conservation of biodiversity, the sustainable use of its components and the sharing of benefits arising the use of genetic resources. Web site:

The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) 1973

Aims to prevent commercial trade in species in danger of extinction. Species covered are listed in three appendices, each of which has a different level of trade restriction

http://www.cites.org/

The World Heritage Convention 1972

Allows ites of outstanding cultural and/or natural value to be designated as World Heritage Sites and promotes international co-operation for safeguarding these areas.

http://www.unesco.org/

The Convention on Wetlands of International Importance (Ramsar Convention) 1971

An intergovernmental treaty which provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. Under the Convention, wetlands of international importance are designated as Ramsar sites and the sustainable use of wetlands is promoted. The Ramsar convention provides a tool to help the protection of wetland habitats and their fauna and flora.

http://www.ramsar.org/

UNESCO Man and the Biosphere programme (MAB) 1970s

Biosphere reserves are designated as representative international examples of habitats and ecosystems where practical management and research can be undertaken, with a focus on information exchange between all stakeholders.

http://www.unesco.org//mab

(GISP)

**European**

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1982

Requires member states of the Council of Europe to ensure the conservation of wild fauna and flora species and their habitats. Special attention is given to endangered and vulnerable species listed in Appendices. Invertebrate species are currently badly under-represented in these Appendices.

The Emerald Network

Designates Areas of Special Conservation Interest (ASCIs). These are sites in Council of Europe countries that contain species and/or habitats of European importance. ASCIs are designated as a result of the Bern Convention Resolution I (1989) and Recommendations 14,

15 and 16. The Emerald Network in Council of Europe countries assists preparation to comply with the EU Habitats Directive (see below).

The Habitats and Species Directive (EC Directive 92/43/EEC on the conservation of natural habitats of wild fauna and flora)

A legislative instrument with a present main focus of the requirement of member states of the EU to set up a coherent ecological network of Special Areas of Conservation (SACs) that will, with the Special Protection Areas (SPAs) designated under the Birds Directive, become the NATURA 2000 network. SAC selection is based on the presence of species and habitats of European importance that are listed in the Directive´s annexes. Annex I lists the habitat types and Annex II? lists the animal and plant species that qualify sites for SAC designation. The list of invertebrate species included is closely similar to that of the Bern Convention, and is similarly not representative. SACs are required to be adequately protected and managed to maintain and improve their nature conservation value. The Directive also makes provision for the protection of listed species outside of the designated SACs.

The Pan-European Biodiversity and Landscape Diversity Strategy (PEBLDS) 1995

Provides a framework for strengthening and building upon existing initiatives and programmes, drawn up as a Pan-European response to the CBD.

http://www.nature.coe.int

A Pan-European Ecological Network (PEEN) has been established under PEBLDS and consists of core conservation areas, ecological corridors, buffer zones and restoration areas.

The European Community Biodiversity Strategy 2001

Provides the framework for developing EU policies and instruments to comply with the CBD. The Strategy aims to anticipate, prevent and attack the causes of reduction or loss of biodiversity at their source, and eight policy areas have objectives on how this can be achieved. EC Biodiversity Action Plans (BAPs) have been developed for four sectoral policies: Conservation of Natural Resources, Agriculture, Fisheries and Development and Economic Co-operation.

http://biodiversity-chm.eea.eu.int

**National Initiatives**

National Strategies and Biodiversity Action Plans (NSBAP)

Have been, or are currently being developed by each contracting party to the CBD and provide a framework for action to deliver national commitments to conserving and promoting sustainable use.

See National Government Environment Department websites.

## ACRONYMS

| | |
|---|---|
| BAP | Biodiversity Action Plan |
| BC | Bern Convention |
| CBD | Convention on Biological Diversity |
| COE | Council of Europe |
| EPCS | European Plant Conservation Strategy |
| EU | European Union |
| GISP | Global Invasive Species Programme |
| IUCN | International Union for Conservation of Natural Resources (The World Conservation Union) |
| PEBLDS | Pan European Biological and Landscape Diversity Strategy |
| UN-ECE | United Nations Economic Commission for Europe |