

FALLING THROUGH THE CRACKS: ARE EUROPEAN DIRECTIVES AND INTERNATIONAL CONVENTIONS THE PANACEA FOR FRESHWATER NATURE CONSERVATION?

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Introduction

In a paper on the role of legislation in protecting and improving the quality of British fresh waters, Howell & Mackay (1997) concluded that, to be effective, legislation requires a blend of three aspects – ‘enforcement’, ‘inducement’ and ‘agreement’ – with strategic and operational decisions made in line with the principles of integrated catchment management. They considered that European legislation – specifically the Habitats Directive – could be a powerful tool in freshwater conservation through its requirement to provide good quality habitat for listed species.

Of course, there are many ways of practising freshwater nature conservation: from strict legislative protection of individual species considered rare or threatened to protecting whole lakes or long stretches of rivers; from practical conservation management at a local scale to integrated catchment management at the river basin scale; and from the encouragement of better habitat management through codes of good practice to statutory control of pollution or abstraction. Whatever the mechanism, an essential pre-requisite is a way of choosing where to put the effort, especially when resources for nature conservation are severely limited.

The aim of this article is to review the contribution from four specific international measures to the task of assigning priorities for conservation. The 1990s saw the introduction of two European directives (the Habitats Directive (HD) and the Water Framework Directive (WFD)) and one international convention (the Biodiversity Convention (CBD)) each with the potential for influencing, to a greater or lesser extent, the conservation of freshwater habitats and species. This article also discusses a much older convention – the Ramsar Convention – adopted in 1971 specifically to help tackle the conservation and management of wetlands and aquatic ecosystems.

Although we have focused mainly on the UK, the subject is relevant to other parts of Europe and beyond. We have not set out to make definitive judgements on the overall effectiveness of these four statutory instruments, nor to discuss the fundamental question of whether or not the designation of special sites or areas (e.g. Special Areas of Conservation – SACs, Sites

of Special Scientific Interest – SSSIs, Ramsar sites) is an effective conservation tool, nor yet to examine in detail the way that directives and conventions are implemented. Instead, the article explores the degree to which these measures help in identifying the most important fresh waters for conservation, and asks whether or not they present the right conservation message to a wide audience. As significant amounts of time and money are now being invested across Europe in their implementation, we suggest that this review is timely.

The context: conventions and directives

The purpose of this section is to provide a brief overview of the EC directives and international conventions discussed later, especially for readers whose work centres on ecology rather than on aquatic management and environmental regulation. More detailed information can be found in the directives and conventions themselves and in a wide range of internet web-sites (e.g. the Ramsar Convention web-site: www.ramsar.org).

EC Habitats Directive

The Habitats Directive (HD, European Commission 1992) was adopted in May 1992 with its aim ‘to contribute towards ensuring bio-diversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies’ (Article 2). One of the principal means of achieving that aim is by establishing a coherent European network of protected areas, designed to maintain the distribution and abundance of threatened species and habitats. This network (Natura 2000) will comprise Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), the latter designated under the EC Birds Directive.

The HD contains six annexes. Annex I lists ‘natural habitat types of Community interest whose conservation requires the designation of Special Areas of Conservation’, while Annex II is an equivalent version for animal and plant species. Annex III provides criteria for selecting sites for designation as SACs; these include (for habitats) the area of the site covered by the natural habitat type, and (for species) the size and density of the population present on the site. The remaining three annexes are concerned with species protection and with species exploitation.

EC Water Framework Directive

The Water Framework Directive (WFD, European Commission 2000) was adopted in December 2000. Article 1 summarises the main aims of the Directive:

- to prevent further deterioration of aquatic ecosystems and to protect and enhance their status (including wetlands directly depending on aquatic ecosystems)
- to promote sustainable water use
- to reduce pollution to groundwater and to surface water
- to contribute to mitigating the effects of floods and droughts.

The WFD covers all inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters, and groundwater. At the heart of the Directive is a requirement to produce river basin management plans, to monitor the status of water bodies, and to put in place 'programmes of measures' to ensure that the environmental objectives in Article 4 of the directive are met. These objectives include achieving 'good surface water status' by 2015, preventing deterioration, reducing pollution from 'priority substances' and complying with the standards and objectives set for European 'protected areas' (e.g. SACs, nitrate vulnerable zones).

Surface water status (classified into five levels from 'high' to 'bad') comprises 'chemical status' and 'ecological status', the latter defined according to the quality of 'biological elements' such as macrophytes, benthic invertebrates and fish. Ecological status also takes account of 'physico-chemical quality elements' (e.g. nutrient concentrations and pH) and 'hydromorphological quality elements' (e.g. substrate composition and riparian structure).

The WFD contains 10 annexes, of which Annex V comprises 40 % of the Directive's text. This annex covers many of the technical aspects, including broad definitions of ecological status and instructions on monitoring procedures and standards.

Ramsar Convention

The 'Convention on Wetlands of International Importance, especially as Waterfowl Habitat' was signed in Ramsar, Iran, in 1971, but did not come into force until 1976. The Ramsar Convention was the first of the modern global intergovernmental treaties on conservation and the wise use of natural resources, with the objective 'to stem the progressive encroachment on and loss of wetlands now and in the future'. Its definition of 'wetlands' is all-embracing, covering habitats as diverse as mangrove swamps, coastal beaches and tropical river systems. A recent amendment to the Ramsar criteria goes even further by defining coral reefs as wetlands.

Its original emphasis, as its full name suggests, was on waterbirds, but it has now broadened to cover other aspects of wetland conservation in recognition of the importance of wetland ecosystems for biodiversity and for human well-being. The convention seeks to promote special protection for wetlands included in the List of Wetlands of International Importance

('the List'). The text of the Convention (Article 2.2) states that 'Wetlands should be selected for the List on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology', and indicates that 'in the first instance, wetlands of international importance to waterfowl at any season should be included'.

The latest version of the guidance for selecting sites (May 1999) contains general criteria for wetland habitats and species, together with specific criteria for waterbirds and fish. As of 1 June 2005 the Convention had 145 Contracting Parties, with 1430 wetlands designated for inclusion in the List, covering approximately 125 million hectares.

Convention on Biological Diversity

The text of the Convention on Biological Diversity (CBD – also referred to as the 'Biodiversity Convention' or the 'Rio Convention') was negotiated by an Intergovernmental Negotiating Committee under the auspices of the United Nations Environment Programme (UNEP). In June 1992 the Convention was signed by 157 governments at the 'Earth Summit' in Rio de Janeiro. By June 2005, 188 countries had ratified the agreement.

Article 1 describes the objectives of the Convention as 'the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources....'. The term 'biological diversity' is defined as 'the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems'. The Convention is legally binding; countries that sign it are obliged to implement its provisions by developing national strategies for the conservation and sustainable use of biological diversity, promoting public education and awareness, carrying out *in situ* conservation, and setting up programmes of research, technology and training.

The UK's commitments to the CBD led to the publication in 1994 of the UK Biodiversity Action Plan (BAP). A year later the UK Biodiversity Steering Group published a report setting out a list of 37 'broad habitat types' covering the whole of the UK, including two for fresh waters – 'Standing open water and canals' and 'Rivers and streams'. Within these broad habitat types, more specific work can be carried out on 'priority habitats' and 'priority species' (four and 75, respectively, for fresh water), through Habitat Action Plans (HAPs) and Species Action Plans (SAPs). All plans contain specific targets for maintaining or restoring habitats or species populations, with responsibility for each agreed by one or more organisations.

Selecting important fresh waters for conservation: the relevance of EC directives and international conventions

Freshwater habitats

Given the importance afforded to these directives and conventions, both nationally and internationally, what contribution have they made to identifying rivers and lakes worthy of conservation?

The WFD is the most comprehensive legislation ever enacted in Europe to address the integrity of freshwater ecosystems. While the concept of 'ecological status' is not synonymous with 'nature conservation value', the Directive does have much to contribute to the field of aquatic conservation. The WFD is far-reaching geographically (the whole of the UK and the EU); it covers all surface waters; it requires 'programmes of measures' within 'river basin management plans' to bring water bodies up to good status; and it embraces a much wider ecosystem perspective than previous legislation in terms of spatial coverage (river basins), habitat attributes (morphology, hydrology, water quality, riparian zones) and biological communities (macrophytes, phytobenthos, phytoplankton, benthic invertebrates, fish).

The extent to which rivers and lakes identified as water bodies in the UK (and the rest of the EU) meet the target of 'good ecological status' will only become clear as comprehensive monitoring schemes are put in place, yet listing water bodies at good ecological status will not be sufficient to distinguish one from another in terms of their conservation value. Good ecological status is essentially a measure of 'departure from naturalness', because each of the biological elements and chemical attributes are assessed in terms of how close they are to an expected 'reference condition'. Although 'naturalness' is often considered the most important criterion for nature conservation assessment (Boon et al. 1997, 2002; Boon 2000; Dunn 2004), freshwater conservation value is frequently assessed using a range of other criteria such as 'diversity', 'typicality' (or 'representativeness') and 'rarity' (Ratcliffe 1977).

In contrast to the WFD, nature conservation is an explicit focus of the Habitats Directive, the Biodiversity Convention and the Ramsar Convention. Yet their contribution to creating comprehensive lists of rivers and lakes important for nature conservation is hampered by the restrictions imposed in their annexes. The HD is considerably more useful for identifying important lakes for conservation than it is for rivers, at least in the UK. For lakes, Annex I lists a range of discrete types spread through a trophic spectrum from naturally eutrophic to oligotrophic or dystrophic (Table 1). This has helped the UK conservation agencies select as SACs high quality examples that represent most of the 10 lake types used in their assessment and classification procedures (Palmer et al. 1992; Duigan et al.

Table 1. Freshwater habitat types occurring in the UK and listed in Annex I of the Habitats Directive. The number of SACs selected for these as 'primary' or 'qualifying' features is also given. Data source: www.jncc.gov.uk.

Habitat code	Habitat description	Primary feature	Qualifying feature	Total no. of SACs
H3110	Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>)	4	0	4
H3130	Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i>	27	18	45
H3140	Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.	14	1	15
H3150	Natural eutrophic lakes with <i>Magnopotamion</i> or <i>Hydrocharition</i> -type vegetation	14	2	16
H3160	Natural dystrophic lakes and ponds	14	8	22
H3170	Mediterranean temporary ponds	1	0	1
H3180	Turloughs	2	0	2
H3260	Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation	12	8	20

in press). Even though the Annex I habitat descriptions are generally more qualified and less generic than broad descriptions such as 'oligotrophic', it is likely that well over 50 % of the area of standing water in the UK is covered by the HD, although by far the majority (ca. 1500 km² out of the total for the UK of 2400 km²) is included under the category 'Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*' (Palmer & Roy 2001; Jackson & McLeod 2002).

For rivers, on the other hand, only one of the eight Annex I habitat types (H3260: 'Rivers with *Ranunculus*') occurs in the UK (Table 1). Inevitably, this has limited both the overall proportion of riverine habitat designated as SACs and the degree to which SACs are able to represent the 10 'River Community Types' used by the conservation agencies when selecting rivers as 'Sites of Special Scientific Interest' (Boon 1991; JNCC 1995; Holmes et al. 1999). In Scotland this is especially marked, where only one river – the Tweed – has been selected as an SAC for the presence of an

Annex I habitat. Although there are no comprehensive data available for the extent of this habitat type in the UK, it has been estimated that in England and Wales it amounts to about 2500 km of river, less than 2 % of the total river length. Equivalent figures for Scotland and Northern Ireland are not available, but are likely to be even lower (www.jncc.gov.uk).

Despite its comprehensive definition of the term 'wetland', the Ramsar Convention has been used comparatively rarely to identify important open waters (rivers and lakes) and designate them as Ramsar sites. Instead, most sites are predominantly mosaics of 'true' wetland habitats (i.e. periodically inundated wet lands), or they represent important transitions from open water to terrestrial habitats. A review of the summary descriptions for the Ramsar sites in five EU states (UK, France, Germany, Sweden and Greece) illustrates this point clearly (Table 2). More than 60 % comprise three or more distinct wetland habitat types, such as wet grassland, wet heath, wet woodland, mudflats, seagrass beds, and oxbow lakes. In the UK, the present suite of 144 Ramsar sites includes only a small number of lakes (e.g. Cairngorms Lochs, northern Scotland; Llyn Idwal, north Wales); and even fewer rivers (e.g. small sections of the River Avon, southern England, and the River Spey, northern Scotland).

The Habitat Action Plans (HAPs), formulated as part of the UK response to the CBD, are equally limiting in highlighting the most important rivers and lakes for conservation. The four priority freshwater habitats for which action plans have been drawn up are 'Mesotrophic standing waters', 'Eutrophic standing waters', 'Aquifer-fed naturally fluctuating water bodies' and 'Chalk rivers'. This means, for example, that there can be no river HAPs at all in Scotland, Wales or Northern Ireland owing to the south-easterly distribution of chalk in the UK. A recent proposal developed in Scotland for a HAP to cover dynamic gravel-bed rivers (typically associated with more northerly, upland areas) has not yet been adopted by national BAP steering groups.

Table 2. The percentage of Ramsar sites in five European countries containing 1 to ≥ 6 distinct wetland habitat types. Data source: www.ramsar.org.

¹ Estimates could not be made from the summary descriptions of four of the 144 Ramsar sites in the UK.

	n	1	2	3	4	5	≥ 6
UK	140 ¹	14	25	19	21	11	10
France	19	5	27	27	15	21	5
Germany	31	16	35	16	26	7	0
Sweden	51	10	35	37	14	2	2
Greece	10	0	10	20	10	40	20
TOTAL	251	12	28	23	19	11	7

Table 3. Species occurring in rivers and lakes in the UK and listed in Annex II of the Habitats Directive. The number of SACs selected for these as 'primary' or 'qualifying' features is also given. Data source: www.jncc.gov.uk.

Species code	Species	Common name	Primary feature	Qualifying feature	Total no. of SACs
S1029	Freshwater pearl mussel	<i>Margaritifera margaritifera</i>	19	7	26
S1044	Southern damselfly	<i>Coenagrion mercuriale</i>	8	2	10
S1092	White-clawed crayfish	<i>Austropotamobius pallipes</i>	8	2	10
S1095	Sea lamprey	<i>Petromyzon marinus</i>	8	11	19
S1096	Brook lamprey	<i>Lampetra planeri</i>	9	8	17
S1099	River lamprey	<i>Lampetra fluviatilis</i>	10	7	17
S1102	Allis shad	<i>Alosa alosa</i>	0	6	6
S1103	Twaite shad	<i>Alosa fallax</i>	4	1	5
S1106	Atlantic salmon	<i>Salmo salar</i>	18	13	31
S1149	Spined loach	<i>Cobitis taenia</i>	4	1	5
S1163	Bullhead	<i>Cottus gobio</i>	11	6	17
S1355	Otter	<i>Lutra lutra</i>	22	49	71
S1831	Floating water-plantain	<i>Luronium natans</i>	12	1	13
S1833	Slender naiad	<i>Najas flexilis</i>	4	1	5

Freshwater species

Under the HD, SACs may also be selected if they contain important populations of species listed in Annex II; for rivers and lakes these are principally the species shown in Table 3. The list for the UK comprises two plant species, three invertebrates, eight fish and one mammal. Although some of these species (e.g. freshwater pearl mussel) are threatened at a UK as well as a European level, others are not. For example, bullhead is listed in 186 of the 351 datasets in the *Database and Atlas of Freshwater Fishes* (Davies 2002) and occurs in some rivers in very high numbers, prompting the suggestion that in the UK it should be exempt from the requirements of the HD (Carter et al. 2004).

Table 4. The percentage of Ramsar sites in five European countries for which the summary site descriptions indicate broad taxonomic importance. Data source: www.ramsar.org.

	Birds	Plants and/or invertebrates	Fish
UK	78	49	1
France	95	58	5
Germany	100	35	13
Sweden	86	14	25
Greece	100	30	50

The opportunity for designating SACs for Annex II species can, theoretically, extend the list of rivers and lakes identified as important for Annex I habitats. In practice, however, only about a third of the 170 SACs in the UK containing Annex I and/or Annex II freshwater features have been selected for individual species. Most sites have been chosen because they contain multiple HD features, in some cases (such as the River Usk, Wales) as many as nine, thereby limiting the number of SACs that could be added to the list of sites already selected using habitat criteria.

The practice of focusing on a few threatened species applies equally to the Species Action Plans (SAPs) prepared in the UK under its Biodiversity Action Plan. These are linked to the four freshwater HAPs, with plans developed for 21 plant species (e.g. *Chara canescens*) and 16 invertebrates (e.g. *Hirudo medicinalis*), as well as for two amphibians, two fish, and five mammals. A few of them are HD Annex II species, but most are not. Thus, while action plans are not directly related to site designation, they provide an opportunity for emphasising the conservation importance of named rivers and lakes that support BAP priority species.

Ramsar sites selected for their species assemblages are still dominated by bird interests, despite the broad objectives of the Convention and its more recent expansion to include specific criteria for fish. On average, birds contributed to the reason for designation in more than 90 % of the site descriptions in the five European countries listed in Table 4. However, 40 % of site descriptions across the five countries also mention plants and invertebrates as important features, and there are occasional references to other species, such as otter.

Limitations and risks

In this article we have demonstrated that the diversity of fresh waters in the UK (especially for running waters) is not adequately represented in the

suites of protected areas selected using European or international mechanisms. National legislation requires the designation of Sites of Special Scientific Interest (SSSIs) in Great Britain (and Areas of Special Scientific Interest (ASSIs) in Northern Ireland). The guidelines for freshwater SSSI selection (JNCC 1995) are less restrictive than those for SACs, for example; however, they have not been applied evenly across Britain as a whole, mainly as a result of different policy stances taken by the three statutory conservation agencies: English Nature, Scottish Natural Heritage, and the Countryside Council for Wales. This has led, for instance, to SSSIs in England covering river habitats far more comprehensively than in Scotland.

It is inevitable that the value of many fresh waters will be largely neglected if they have no formal recognition through conservation designations, and there are insufficient resources to adopt more comprehensive freshwater conservation programmes. Two examples from northern Scotland illustrate this point.

The Findhorn is a large salmon river, rising at 900 m in the Monadhliath Mountains and flowing to the north east into Findhorn Bay. The river is a high-energy system with an actively migrating channel in places. The upper reaches in particular are near-natural, and this, together with generally low levels of impact, diverse substrate types, and features of interest such as wooded islands and gorges, makes the Findhorn an important river for conservation. Shildaig Lochs are a group of four lakes



The River Findhorn.

in the remote highlands of Wester Ross. These waters contain important examples of ancient brown trout populations.

The importance for conservation of both the Findhorn and Shieldaig Lochs is not recognised by designation as neither meets the criteria for SAC status, and neither has been selected as an SSSI. Because their ecological status is likely to be 'good' or 'high', classification under the WFD provides no way of highlighting their distinctiveness alongside other similar waters at good or high status. Neither has been selected as a Ramsar site or lies within the scope of the Biodiversity Action Plan. These waters, like many others, fall through the cracks. There is no statutory impetus for monitoring their conservation interest, and when threatened with catchment development proposals there are no designations to support the case for opposing them. Conservation evaluation needs to throw its net far wider. That was the rationale behind the development in the UK of the System for Evaluating Rivers for Conservation (SERCON: Boon et al. 1997, 2002), in which rivers could be assessed comprehensively across the full spectrum of quality from totally degraded to near-natural. Irrespective of whether a river is an SSSI or an SAC, its value for nature conservation can be defined and compared with others using a standard protocol. A similar but more limited approach is now being developed for lakes (Palmer, in preparation).

Environmental directives and conventions fulfil a further role: they serve to inform and educate society about the value of nature and the importance of the wise management of natural resources. The Habitats Directive, and the Ramsar and Biodiversity Conventions have all made valuable contributions to freshwater nature conservation, yet they run the risk of proclaiming, if not the wrong message, at least an incomplete one. Where emphasis is placed on the rare and threatened, the commonplace is undervalued. Where the focus is on protected 'sites' for conservation, the 'wider countryside' of which those sites are an integral part, may be neglected. In the UK, the Nature Conservancy Council (NCC), set up by government in 1973 had begun, by its 11th annual report (NCC 1985), to include specific reference to the wider countryside. The successor bodies to the NCC – English Nature (EN), Scottish Natural Heritage (SNH), and the Countryside Council for Wales (CCW) – embraced this view of conservation and worked to extend it. Statements such as 'We want to maintain healthy ecosystems, not botanical or zoological parks' (EN 1997), the lack of a specific reference to site-based conservation in SNH's six 'main aims' (www.snh.org.uk) and the inclusion of only one in CCW's 11 examples of its work (www.ccw.gov.uk), re-affirms the intention of these bodies to focus attention more widely than statutory nature conservation sites.

Nevertheless, in practice EN, SNH and CCW require significant amounts of money to fulfil their statutory duties with respect to protected areas. For example, the projected expenditure on this work by SNH for 2003/04 is £13.18 million – approximately 25% of its total budget of £55.88 million (SNH 2003). The costs of implementing the HD are extremely difficult to estimate, either in total or specifically for freshwater habitats and species. An approximate estimate by Defra (2001) indicated that the overall cost between 1994 and 2000, including aspects such as research and survey, site management and monitoring, amounted to £85 million. Equally difficult is any realistic assessment of the costs of implementing the WFD. Although the bulk of the expense will be borne by the environment agencies in the UK, the conservation agencies and other bodies also have duties to contribute to WFD implementation.

Whatever the detail in the balance sheets, the price tags on these directives are not insignificant. The message is clear: while European directives and international conventions, with their networks of special sites, action plans and lists of protected species, will continue to play an important part in the freshwater conservation framework, they cannot be expected to do everything. Broader and more imaginative strategies for evaluation, catchment management, statutory protection, and public education are needed throughout Europe if the conservation of rivers and lakes is to be addressed comprehensively and effectively.

Acknowledgements

We wish to thank David Withrington (English Nature) for his helpful comments on an earlier draft of this article.

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