

River habitat features in different landscape settings: observations from several European countries

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Abstract

There is a broad similarity of landscape settings and riverine features in European countries, with differences largely determined by scale and biogeographical factors.

Keywords: river habitats; landscape features; Europe

Introduction

The physical character of rivers and streams across the UK has been assessed using River Habitat Survey (RHS) (Raven *et al.*, 1998a). The occurrence of various riverine features associated with different landscape management types can be quantified and used as a basis for assessing habitat quality and modification (Raven *et al.*, 1998b). This in turn can be linked to biological measures of water quality (Holmes *et al.*, 1998) and also used as the basis for deriving physical quality objectives for rivers (Walker *et al.*, 2002).

Methods

Since 1994 RHS has been carried out at more than 17,000 sites (500m river-lengths) in the UK and 2 million data entries made on the RHS database. RHS has also been tested on small rivers in several other European countries (Raven *et al.*, 2002) and has been used as part of the EU-funded STAR project, which includes surveys of different biological and morphological features of rivers (www.eu-star.at). Figure 1 shows the distribution of these sites across Europe.

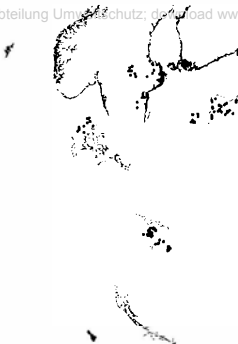


Fig. 1: The distribution of RHS sites on mainland Europe surveyed for the STAR project.

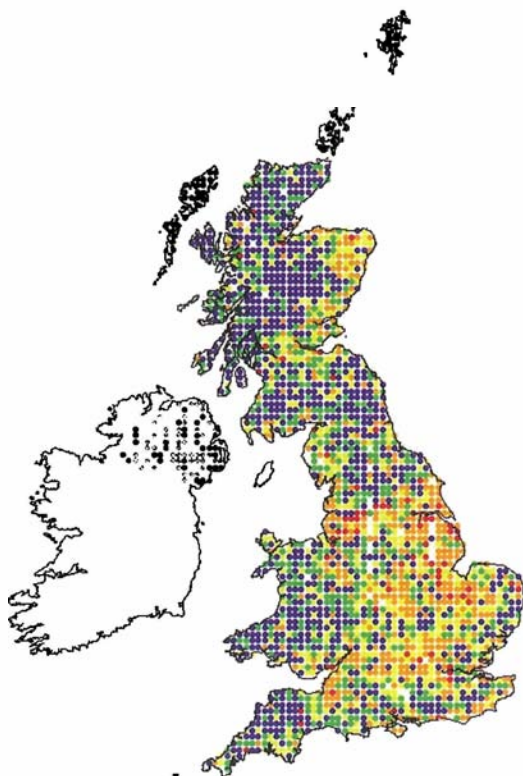


Fig. 2: Habitat modification of rivers in Great Britain. Blue: semi-natural; green: largely unmodified; yellow: obviously modified; Orange: significantly modified; red: severely modified.

Tab. 1: Landscape and riverine features of different valley forms in the UK. Percentage of sites where feature occurs extensively (>33% of 500m channel-length). * Data for shingle bars, woody debris and tree roots indicates presence within site. 1996 data.

	Predominant valley form			
1.1 Land Use	Deep Vee	Bowl	Shallow Vee	Floodplain
Woodland	48	27	22	16
Wetland	4	4	4	4
Pasture	23	47	55	61
Arable fields	2	8	25	36
Towns	9	6	9	19
1.2 Modification				
Reprofiled Banks	5	14	30	44
Protected banks	5	8	7	8
Embankments	0	3	4	12
Impounded water	1	2	2	6
1.3 Features				
Bankside trees	62	39	30	28
Shingle bars*	89	83	69	54
Woody debris*	58	46	46	33

Number of sites	331	339	635	779
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Table 2: A list of the main differences between UK and mainland rivers surveyed using RHS.

1.1.1.1 Mainland European characteristics compared with UK rivers	
Upland	Lowland
Higher altitudes	Sandy substratum
Greater valley relief	Distinct riparian woodland and scrub
Steeper slopes	Complex bank structures
Greater stream energy	Multiple channels
More stream mobility	More extensive wetland floodplain features
Greater sediment loads	Seasonal flows
Snowmelt hydrological regimes	Much larger rivers

We can broadly classify river landscapes according to valley shape. Using a simple classification, a broad picture of landscape, river features and channel modifications in the UK can be built up (Table 1).

The impact of land management and river channel works in Great Britain can be seen by the pattern of habitat modification categories (Figure 2). As a result only 2% of 17,000 RHS sites in the UK can be considered in pristine condition. A similar picture is reflected for rivers in several European countries.

The UK has a relatively modest range of rivers in terms of altitude, length, size, discharge volume and riparian habitat. RHS sites in the UK can be plotted using a Principal Components Analysis approach (Jeffers, 1998). If European RHS sites are superimposed it clearly shows the greater energy of alpine rivers which occur beyond the range of UK sites in terms of altitude and slope.

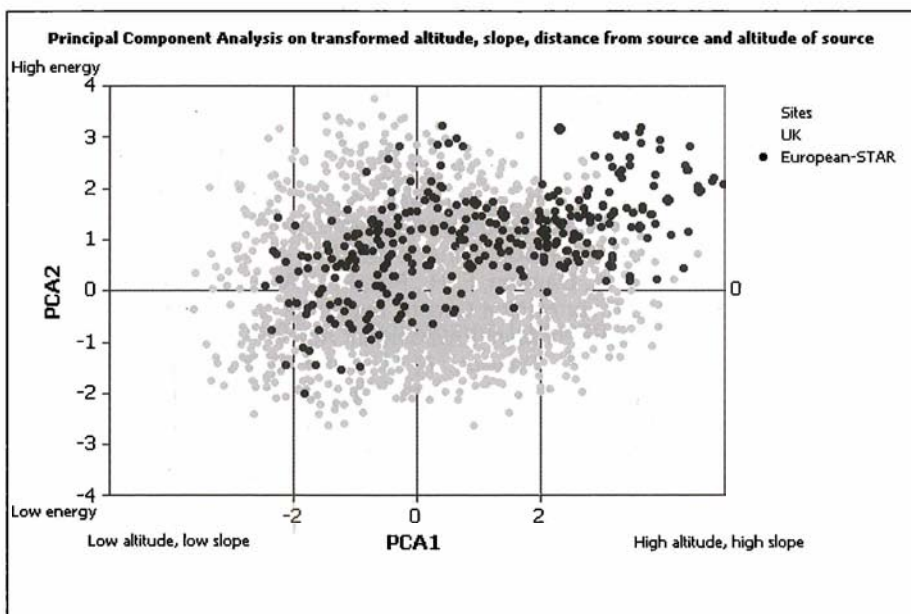


Fig. 3: Principal Components Analysis plot of UK (grey) and mainland European (black) RHS sites.

Discussion

The similarity of river landscapes and habitat features across Europe is striking, with differences largely a reflection of scale. Nevertheless there are subtle differences caused by biogeography, altitude, geology, valley relief, hydrological regime, climate and land management (Table 2). These

differences have implications for sampling strategy, survey methods, and the interpretation of results of river habitat assessment.

This means that morphological assessment and classification methods for rivers as required by the Water Framework Directive need to be broadly consistent and based on core features, but refined to take account of local characteristics and management practices.

It also means that the conservation of rivers can be based on broadly similar principles, such as the degree of ecosystem functioning. But regional or local characteristics will determine the intrinsic value of river reaches and consequently the rationale for protecting the very best examples and restoring those which have been modified in the past (Boon, 1992; Boon *et al.*, 1998).

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