NICK HANLEY, ROBERT E. WRIGHT, BEGONA ALVAREZ-FARIZO

ESTIMATING THE ECONOMIC VALUE OF IMPROVEMENTS IN RIVER ECOLOGY USING CHOICE EXPERIMENTS: AN APPLICATION TO THE WATER FRAMEWORK DIRECTIVE*

1. INTRODUCTION

The Water Framework Directive (2000/60) will bring about major changes in the regulation and management of Europe's water resources. Major changes include:

- a requirement for the preparation of integrated catchment management plans, with remits extending over point and non-point pollution, water abstraction and land use;
- the introduction of an EU-wide target of 'good ecological status' for all surface water and groundwater, except where exemptions for 'heavily-modified' water bodies are granted;
- the introduction of full social cost pricing for water use; and
- the incorporation of estimates of economic costs and benefits in catchment management plans.

How exactly regulators will interpret 'good ecological status' is at present not finalised. However, it is clear that it represents a wider set of parameters than the chemical and biological measures of water quality that have previously dominated EU water quality regulation, such as Biological Oxygen Demand or Ammonia (NH_3) levels. In this paper, we use three indicators of ecological status which ordinary people see as important, but which are also consistent with regulator's expectations about the scientific interpretation of this concept. We take ecological status to be determined by three broad factors: healthy wildlife and plant populations; absence of litter/debris in the river; and river banks in good condition with only natural levels of erosion. Recent assessments for UK waterbodies indicate that a significant fraction of rivers, lochs (lakes), estuaries and coastal waters will require improvements if they are to meet 'good ecological status' (DETR, 1999; Scottish Executive, 2002).

One main focus in this paper is therefore on the values people place on improvements in these three indicators, and thus on the non-market economic benefits of moves towards good ecological status. Whilst benefit estimates do exist for implementation of the Water Framework Directive (WFD), these are at present highly

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incomplete (WRc, 1999; Scottish Executive, 2002). However, we are also interested in the practicalities of environmental management using environmental valuation. Valuation exercises are expensive and time consuming, and regulators are very unlikely to have the time or money to commission original valuation studies for every catchment. Benefits transfer, the process of taking estimates from one context and adjusting and then applying them to another, is therefore likely to be important. Accordingly, we conduct a benefits transfer test across two similar rivers, to see what errors are likely to be experienced if benefits transfer procedures are used as part of implementing the WFD.

In what follows, Section 2 briefly describes the Choice Experiment method of environmental valuation and outlines some current issues in benefits transfer. Section 3 describes the case study rivers and survey design. Section 4 presents results, whilst Section 5 concludes.

2. METHODOLOGICAL APPROACH

2.1. Choice Experiments

The methodology we use to estimate the value of improvements in river ecology is Choice Experiments. Choice experiments (CE) are becoming a popular means of environmental valuation (Hanley, Mourato and Wright, 2001; Bennett and Blamey, 2001). Choice experiments are one example of the stated preference approach to environmental valuation, since they involve eliciting responses from individuals in constructed, hypothetical markets, rather than the study of actual behavior. The Choice Experiment technique is based on random utility theory and the characteristics theory of value: environmental goods are valued in terms of their attributes, by applying probabilistic models to choices between different bundles of attributes. By making one of these attributes a price or cost term, marginal utility estimates can be converted into willingness-to-pay estimates for changes in attribute levels, and welfare estimates obtained for combinations of attribute changes. The decision to use a CE approach here was driven by the desire to estimate values for different component parts, or aspects, of water quality, as interpreted by the WFD. These component parts constitute the attributes in the CE design detailed below.

2.2. Previous Studies of River Ecology Changes using Choice Experiments

Several authors have previously used CE to estimate the value of improvements in river quality. Adamowicz, Louviere and Williams (1994) studied people involved in water-based recreation in Alberta. They recruited a sample of 1,232 members of the general public, from which a 45% response rate was achieved. The attributes used were landscape terrain, fish size, catch rate, water quality, facilities (e.g. campsite), distance from home and fish species present. The authors found significant effects on utility from changes in fish size, catch rate, water quality and distance from home.

Burton et al. (2000) studied public preferences for catchment management plans in the Moore Catchment, Australia. This area is subject to problems of salinity,