Estimating potential impacts of a change in river quality on the tourism value of Kruger National Park: An application of travel cost, contingent and conjoint valuation methods

Jane Turpie[1]* and Alison Joubert[2]
[1]*Percy FitzPatrick Institute, University of Cape Town, Rondebosch 7701, South Africa*
[2]*Dept of Statistical Sciences, University of Cape Town, Rondebosch 7701, South Africa*

Abstract

Development and resource allocation decision processes are increasingly under pressure to take environmental values into account in order to reach optimal economic outcomes. In South Africa new techniques will be needed to incorporate environmental values into environmental impact assessment and in the allocation of water resources under the new National Water Act (1998), both of which require the comparison of alternative scenarios with varying impacts on the environment. This study on the tourism value of rivers in the Crocodile Catchment is the first case study to develop methods for incorporating the economic values of the goods and services provided by functioning aquatic ecosystems into such decision processes. Rivers within the Kruger National Park (KNP) will be affected by water usage in the portions of their catchment areas upstream of the park boundary. The current tourism value of these rivers was considered in terms of revenues to KNP (visitors' on-site expenditure), contribution to the economy (visitors' on-site and off-site expenditure) and recreational value, including consumers' surplus. The effect of a change in river quality was determined using a joint contingent valuation - conjoint valuation approach, whereby respondents rated four different scenarios, each containing four attributes at four different levels. It was estimated that the current value of KNP tourism is about R136 m. in terms of on-site expenditure, R267 m. in terms of economic impact, or all expenditure related to visiting the park, and R1 bn. in terms of consumers' surplus. The latter two values can be added to calculate total recreational value. Four methods were used to isolate the value of rivers from the total tourism value stated above, and all yielded similar values of about 30% of the total. This implies that about 30% of tourism business would be lost if rivers were totally degraded. Thus, rivers within the Crocodile Catchment, which takes 22% of KNP visitor-nights, contribute R9 m. to KNP revenues and have a total annual recreational use value of about R85 m., including off-site expenditure and consumers' surplus. The conjoint analysis generated an equation which is able to predict the change in trip expenditure, or total KNP revenue, associated with changes in levels of any of the four attributes considered. Appearance of the riverscape has the greatest influence on recreational use value, followed by waterbird diversity, aquatic megafauna and riparian tree density. Such models can be used in water allocation decision processes when attribute levels associated with alternative management scenarios are predicted by aquatic ecologists.

Introduction

Development and resource allocation decisions are usually based on the rationale of maximising economic benefits. Most development carries some degree of impact on the environment, a problem which has been addressed in the past mainly through efforts at damage mitigation, but the economic implications of environmental impacts have largely been ignored in decision-making processes. However, with the valuation of environment and biodiversity becoming a growing international field, there is now increasingly a move in the international arena to consider the full costs and benefits of actions in decision processes, as new understanding suggests that many past decisions have been suboptimal.

In South Africa, it is now starting to be recognised that inclusion of environmental economics is important in environmental impact assessment (CSIR, 2000) and in the application of the new National Water Act (Act 36; RSA 1998; Turpie et al., 2000), in which the environment is recognised as a legitimate water user.

Under the National Water Act, allowance is made for the allocation of an ecological reserve (the quantity and quality of water required by ecosystems to maintain a certain level of functioning), as well as a reserve for basic human needs. Water resources (river reaches, wetlands etc.) will be classified into management classes which will determine their future state of health (ranging from relatively pristine to 'hard-working'). This, in turn, will determine how much water can be allocated to development and how much is retained in aquatic systems as an ecological reserve. The process of definition of management class and reserve has been termed resource-directed measures (RDM). In this process, the management class - or society's desired future health state of the ecosystem - will be decided on the basis of ecological status and health, basic human needs, and economic and social considerations. The framework and methodology for incorporation of socio-economic considerations in the decision process is still under development, but will involve a catchment-level analysis of the implications of retaining alternative levels of quantity or quality of water in the ecosystem (Turpie et al., 2000). This decision process will rely on capacity to predict both the ecological and economic impacts of different scenarios of catchment management.

Whereas the field of environmental valuation has progressed significantly during the past two decades, methods for predicting changes in value due to changes in environmental quality are less

* To whom all correspondence should be addressed.
☎(021) 650-3290; fax (021) 650-3295; e-mail: jturpie@botzoo.uct.co.za
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