

Estimating benefits of nature conservation: ecosystem service valuation in Krka National Park (Croatia)

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Introduction

Protected areas (PAs) are cornerstones of all national and international conservation strategies to preserve species diversity and ecosystem function and, therefore, ensure continuation of ecosystem services (ES). The protection includes additional regulation and control of human activities. The restrictions are mostly placed on provisional services (agriculture, farming, logging, hunting, mining, etc.). Due to these restrictions, locals may perceive income loss and oppose the PA. Revenues and non-monetary benefits from cultural ES - such as nature-based tourism - may be greater than the value of provisional services, but the local population will feel compensated only if aware of the revenues. Increasing awareness of ES-based benefits of PAs can, therefore, help PA managers foster good will towards the PA among the local populations. In addition to monetary benefits resulting from ES that are of primary interest to the local and regional population, PAs offer non-monetary values of cultural ES that are of primary interest to tourists. The interests of tourists are important because only their satisfaction guarantees positive advertising and, therefore, continuation of the tourism revenues.

In this study, we estimate the benefits of ES in Krka National Park (Croatia) - to the local population and to the Park visitors. We develop new methodology to estimate indirect monetary benefits of nature-based tourism to local population (i.e. local economy), and non-monetary benefits of nature-based tourism to Park visitors. Additionally, using existing approaches (CICES), we estimate monetary benefits of provisional and regulating ecosystem services (ES), and direct monetary benefits of nature-based tourism (cultural ES).

Methods

Provisional and regulating ES were classified by CICES and valued by direct or indirect market evaluation method (market price, secondary production value, value of avoided damage and/or replacement cost, conditional value, and conditional choice). Direct monetary benefit of nature-based tourism (cultural ES) was also calculated following CICES classification as net income attained by visitor's payment of administrative fees (such as tickets) and other services in the Park.

Indirect monetary benefit of nature-based tourism was estimated as revenue based on the length of stay of Park visitors in the region and average visitor expenditure. Visitors were asked for the role (importance) of the Park in the decision to vis-

it the region. The importance of the Park was then used as a scaling factor for the length of stay and, consequently, total expenditure in the region.

Non-monetary benefits of nature-based tourism were established by investigating personal benefit attainment (PBA) experienced by visitors through interactions with nature on physical, intellectual or spiritual level. Research was conducted by designing and administering a questionnaire to a random sample of visitors at exit.

Results and discussion

Total monetary benefits of provisional and regulating ES has been evaluated as 15.97 million euros/year. However only 14 out of 20 services have been evaluated. Since maintaining nursery populations and habitats (class P15) have not been evaluated, but have a potentially extremely high value, the actual monetary value of provisional and regulating services is certainly much higher.

Direct monetary value of nature-based tourism (cultural ES) has been estimated at 9.83 million euros/year, yielding the total sum of ES classified by CICES of 25.8 million euros/year. Services related closely to the protection (filtration of water, filtration of air, erosion control, genetic materials, nature-based tourism) account for 43% of the value, even though the potentially largest class (P15) could not be calculated. Economic activities (cultivated crops, reared animals, honey production, water based energy) account for 30% of the total value.

Total indirect monetary benefits of nature-based tourism in the Park are nearly 164.96 million euros/year. The visitors who are staying in Sibenik-Knin County rate the role of the Park significantly higher compared to visitors staying in more distant counties, while the visitors staying in the bigger cities evaluate the role of the Park significantly higher than visitors from small coastal towns. However, the visi-

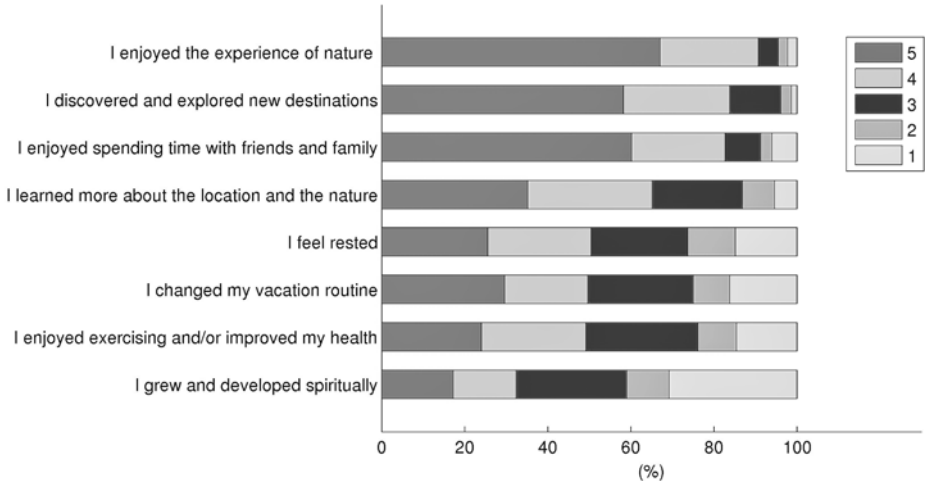


Figure 1. Personal benefit attainment (PBA) was assessed via 8 categories. Visitors graded the agreement with the statements connected to the 8 categories on a five point Likert scale: 1- completely disagree, 2-somewhat disagree, 3-neutral, 4-somewhat agree, 5-completely agree

tors who evaluate the role of the Park with higher grades stay in the region for shorter period of time.

Non-monetary benefits of nature-based tourism to Park visitors excel in sensory stimulation by beauty of nature (grade: 4.51 on a 1-5 scale), closely followed by new experience, and social engagement (Figure 1). Averaged grades of PBA categories are in the range 2.78-4.51. Visitors seldom attain spiritual and meditative experience in the Park, probably due to high number of other visitors (very crowded area).

Conclusion

Estimated direct and indirect monetary benefits of nature-based tourism (cultural ES) are considerable (sum: 174.79 million euros/year), ensuring substantial incomes to local population due to the existence of PA.

Non-monetary benefits of nature-based tourism to Park visitors add to importance of cultural ES as well - at least 82% of the visitors had grades greater than 4 in three categories of PBA they rated the highest. These findings give great leverage to PA managers when negotiating with local stakeholders. Further research is needed to i) verify the findings independently, ii) test the methodology on other types of PA, particularly marine PA, and iii) to expand methods to incorporate seasonal variability such as daily expenditure per tourist, and duration of stay.

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