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A Proposal for the Economic Valuation of Satkosia Wildlife Sanctuary, Odisha

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ABSTRACT

In the paradigm of Economics, goods and services are divided into four broad categories: public goods, private goods, common property resources and club goods. Environmental goods belong to the category of common property resources, which are non-excludable but rival in nature. Given this unique nature of environmental goods and the fact that environmental goods possess both use and non-use values, the markets for these goods are usually imperfect. And so, the valuation of environmental assets is a rather complicated process in the ordinary market set-up that leads to determination of equilibrium price for other goods and services. The valuation of environmental assets depends on indirect valuation methods, via the markets for other related marketable goods and services or creation of hypothetical markets. The proposed study is to make an attempt for the use of the travel cost method (TCM) and the contingent valuation method (CVM) towards assessing the total value of the Satkosia Wildlife Sanctuary located in Odisha. A research in this direction could help identify deviations between actual pricing levels and mechanisms currently under practice and those that may be more appropriate, and thus aid in policy decisions with regard to the economic value of the environmental assets of the state.

Keywords: Environmental Valuation, Travel cost Method, Use value

JEL Classification Codes: Q 50, Q 51, Q 59

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I. INTRODUCTION

Elements in our physical and biological environment such as air, water, soil, flora and fauna are the sources of valuable goods which offer a flow of services to mankind throughout their lifespan. Of course mankind gets all its direct economic benefits from the consumption of goods and services that are available in the market, but the origin of all these marketable goods and services is the nature and for these environmental amenities no payments are made. The natural resources

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help us to form our surrounding environment and also support both human and wildlife. Due to the unlimited desire of humans to attain higher and higher levels of economic growth, multiplied with the increasing growth rate of population, these resources are often extracted at a much faster rate than the rate of their regeneration (Mohanty, 2014). One of the best possible ways to conserve environmental resources is through formation of natural parks, biosphere reserves, wildlife sanctuaries, etc. Today it has become very important to maintain sync between quantitative material transaction as a symbol of economic growth and the prevention of environmental degradation at each step of human action. This requires a proper economic evaluation of environmental assets.

However, the question arises how the value of these non-marketed goods and services can be estimated. Several environmental economists have developed various techniques to measure the total economic value of environmental assets in the past years. The total economic value of an environmental good like a wildlife reserve could be classified under two broad heads: use value and non-use value. The use value could further be analyzed as non-extractive (that is, for purposes of recreation, education, etc.) and extractive (for example, consumption of forest products, medicines, etc.). The non-use value includes several sub-categories like existence value (the welfare obtained from just knowing the fact that an environmental resource exists), option value (the benefit derived from the assurance that one could enjoy the particular environmental resource at a certain point in future even if it is not being used at the present moment), bequest value (the willingness to conserve a resource not necessarily for oneself but for future generations), sympathy value (the desire for an environmental resource not for oneself or one's future generations but for the various other species around).

The Satkosia Wildlife Sanctuary houses several indigenous flora and fauna, and attracts tourists from around the country throughout the year and mostly during the winter months. The regions surrounding the sanctuary are also inhabited by several tribal populations. The current study proposes to undertake an evaluation of the economic value of the Satkosia Wildlife Sanctuary.

II. REVIEW OF LITERATURE

The literature reviewed for the study as yet includes few journal articles and books on the fundamentals of valuation techniques for environmental goods. Cropper and Oates (1992) innumerate the use of few indirect methods of valuation of environment among the studies dealing with development of environmental economics, the most prominent being the willingness to pay for a change in environmental quality. They conclude that while these techniques of assessment may not be perfectly accurate, still they could help substantiate policy formulations (Cropper & Oates, 1992). Griffin, Briscoe, Singh, Ramasubban and Bhatia (1995) have made a study on the willingness to pay for piped water supply to households, of the same set of respondents in two phases (1988 and 1991) and also few additional respondents in the second phase, from the rural areas of the northern part of Kerala, as a part of a World Bank multi-country study on willingness to pay for water in rural areas of developing countries. They reflect that the people who are getting the facilities of the environmental good have less WTP for its conservation, while the people who are eliminated to use the environmental good have higher

WTP (Griffin, Briscoe, Singh, Ramasubban & Bhatia, 1995). The hedonic pricing approach has been explored by Jogasankar Mahaprasasta (2010) in context of Odisha in his study on the economic implications of urban drainage system based in the city of Cuttack. Chaudhry, Sharma, Singh and Bansal (2013) also make use of hedonic pricing approach to determine the appropriate market price of residential areas near Sukhna Lake and state that there exists ample scope for enhancing tax collection on residential plots in areas surrounding the lake (Chaudhry, Sharma, Singh & Bansal, 2013). An attempt towards valuation of Kaziranga National Park using contingent valuation method by Anuradha Singha (Singha, 2011) and valuation of environmental quality of Boroda city and its economic dynamics using hedonic pricing approach by Sanchita Talukdar (Talukdar, 2007) are other similar works in the Indian context.

III. RESEARCH GAP AND MOTIVATION

While the direct use value of environmental assets is tangible and does enter the process of market transactions, the indirect use value and non-use values which though are very significant, often remain veiled. As a result, the total value of environmental assets often remains underestimated. Since the true value of environmental assets often remains unrealized, it makes them vulnerable to exploitation and subsequent destruction. The rapid growth of population and pace of urbanization in the past two decades has begun to put severe pressure on environmental resources, which are likely to perish if urgent and adequate steps are not taken to conserve them. However, for implementation of appropriate policies to combat degradation, valuation of environmental amenities is necessary.

By virtue of its geographical location, the state of Odisha is adorned with coastal plains, plateaus and highlands alike, which have not only provided it with a rich endowment of biodiversity but also with immense tourism potential. With about 69 per cent of its population residing in rural areas and about 23 per cent of its total population constituted by tribal communities (third largest tribal population in the country), a large chunk of the population of the state depends significantly on environmental assets like forests directly and derives even direct use value from it informally which goes unaccounted for to a large extent. However, studies on valuation of environmental assets and recreational sites in context of Odisha are extremely scant and are scarce even in the Indian context. Though not similar in approach, but related studies in this regard among reviewed literature are mostly concerned with assessment of environmental impacts of infrastructure projects through hedonic pricing method. A few attempts have been made for estimation of value through the contingent valuation method but hardly any for assessment of value of an environmental or recreational site through a revealed preference method like travel cost method. The choice of the study area for the present study is based on the several recent cases of human-wildlife conflict in and around it, the active pursuit of nature camps, and the shifting of human habitations due to introduction of new animals/species.

IV. RESEARCH OBJECTIVES

- To explore the trend of fund allocation, utilization, revenue generation, expenditure and the gaps between the same over the last two decades as a reflection of the conservation practices of the resource

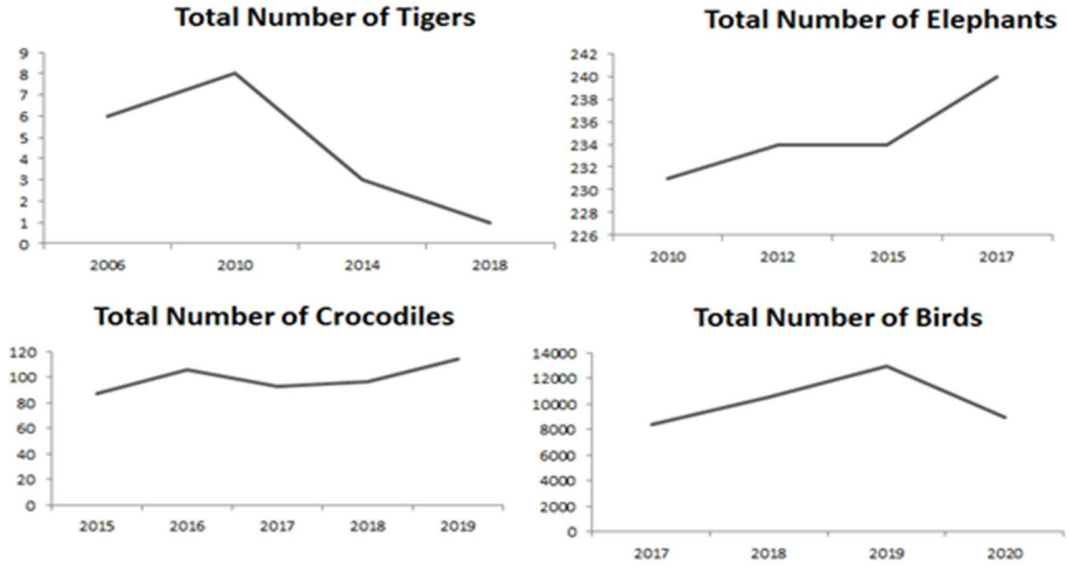
- To identify and categorize the use values and non-use values of the Satakosia Wildlife sanctuary
- To estimate an appropriate price for the use value of the reserve
- To estimate an appropriate price for the non-use value of the reserve
- To examine how the non-use value placed varies across different income groups, age groups, social groups, gender, educational levels, household size and with distance from the site

V. METHODOLOGY

Overview of the Study Area

The Satkosia Wildlife Sanctuary spans over the districts of Angul, Dhenkanal, Cuttack, Boudh and Nayagarh and covers a total area of 1136.7 square kilometers with 523.61 square kilometers being the core area. It lies on the banks of river Mahanadi along a 22 kilometers long gorge in the mountains of the Eastern Ghats. Situated at the confluence of two bio-geographic divisions of the country, namely the Deccan Plateau and the Eastern Ghats, the sanctuary is a rich biodiversity hub.

Figure-1: Trend of Population of Various Species



Source: Authors' compilation from (Forest and Environment Department, 2020; National Tiger Conservation Authority & Wildlife Institute of India, 2015; 2020)

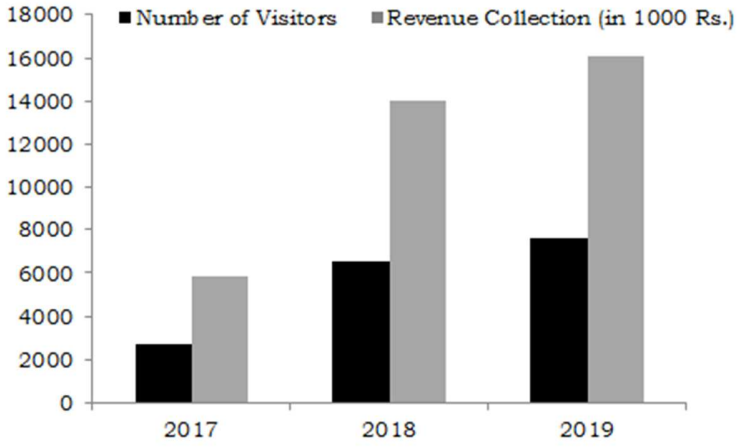
The sanctuary is classified under three major administrative divisions: the Satkosia Tiger Reserve, the Satkosia Gorge Sanctuary and the Baisipalli Sanctuary (Forest and Environment Department, 2020).

There were about 136 villages located inside the sanctuary in 2017 at the time of decision regarding expansion of the area of the sanctuary vide an official

notification in 2018, many of which were under consideration for relocation. The sanctuary reported 879 and 1054 cases of human-wildlife conflicts in 2018 and 2019 respectively, which include crop depredation, cattle kill, human injury and human kill (Forest and Environment Department, 2020).

Figure-1 shows the trend of population of various species in the sanctuary as per their censuses and Figure-2 shows the annual footfall of tourists and the revenue generation.

Figure-2: Annual Footfall of Visitors and Revenue Collection (in 1000 Rs.)



Source: Authors' compilation from (Forest and Environment Department, 2020)

Analytical Tools and Methods of Analysis

Objective 1

The first objective shall be based on secondary data which shall be collected from the Office of the Divisional Forest Officer, Satkosia Wildlife Division, Angul; Office of the Divisional Forest Officer, Mahanadi Wildlife Division, Nayagarh; and the official website of the Satkosia Tiger Reserve. Data on the annual fund allocation, utilization, revenue generation, expenditure, tourist footfall, human-wildlife conflicts, relocation of villages, etc. shall be collected and analyzed with the help of descriptive statistical tools.

Objective 2

The second objective is very crucial for carrying out the subsequent objectives. A typical wildlife sanctuary may have the use and non-use values as depicted in Table-1. However, a comprehensive listing of the use and non-use values can be made through a pilot survey of possible stakeholders before carrying out the actual research. Table-2 presents the sample size for the pilot survey before the actual research can be undertaken. A suitable representative sample can be decided after the pilot survey and a final list of use and non-use values can be prepared after the survey.

Objective 3

The third objective shall be based on primary data. A sample size (n_i) which is a specific percentage of the total population (N_i) of each stakeholder type (i) shall be finalized. For each group of stakeholders identified, there shall be a controlled group that may comprise one third of n_i. Thus, proportional random sampling shall be adopted during the period of survey for picking up the sampling units. The survey shall be undertaken multiple times in the span of a year as per requirement. The respondents shall be surveyed with the help of a structured questionnaire. The questionnaire shall have three parts: socio-economic profile, travel cost and contingent valuation. The part on socio-economic profile shall consist of questions on the age, sex, social group, income, level of education, household size, occupation, etc. of the respondents. The part on travel cost shall include questions on transportation cost, cost of food and drinks, parking fee, the amount of time the respondents have planned to spend at the site, the opportunity cost of their time (what they would have done instead of visiting the site, if they have visited on a holiday or on a working day taking leave), distance of their residence from the site, any alternative site they would have preferred to visit instead, number of visits they would like to make at current price, number of visits they would make if there was no cost involved, the purpose of the visit, if the visit was an independent plan or as a subsidiary to some other plan, etc. The part on contingent valuation shall have questions on the improvements on site or facilities desired by the respondents, their willingness to pay for the same, their preferred vehicle of payment, their willingness to accept compensation instead so as to bear with any damage to the site, their preferred vehicle of compensation, etc.

Thereafter, the travel cost for each respondent from each stakeholder group shall be calculated and the cost at which the number of visits falls to zero shall be obtained so as to reach at the consumer surplus. The average consumer surplus for each stakeholder group shall be calculated based on the sample, which shall then be multiplied with the total population of the group (that is, the total number of visitors from those groups for that year or the average number of visitors from each of those groups over a period of time) to find the total consumer surplus for each stakeholder group, and finally summed up to represent the use value of the sanctuary.

Objective 4

Primary data shall be used for this objective. The respondents for this study shall include the respondents in Objective 3, both from the observational and controlled group. The average willingness to pay shall be calculated, which then shall be multiplied with the sum of total populations of all stakeholder types to represent the non-use value.

Objective 5

This objective shall make use of secondary data and regression analysis together with descriptive statistics to examine how the non-use value placed on the

sanctuary varies with and across income groups, age groups, social groups, gender, educational levels, household size and with distance from the site. Specific models can be constructed after we have adequate information after the pilot survey.

Table-1 and table-2 provides more details on the use non-use values, stakeholders and the proposed sampling of the study.

Figure-3: Layout map of Satakosia Wildlife Sanctuary

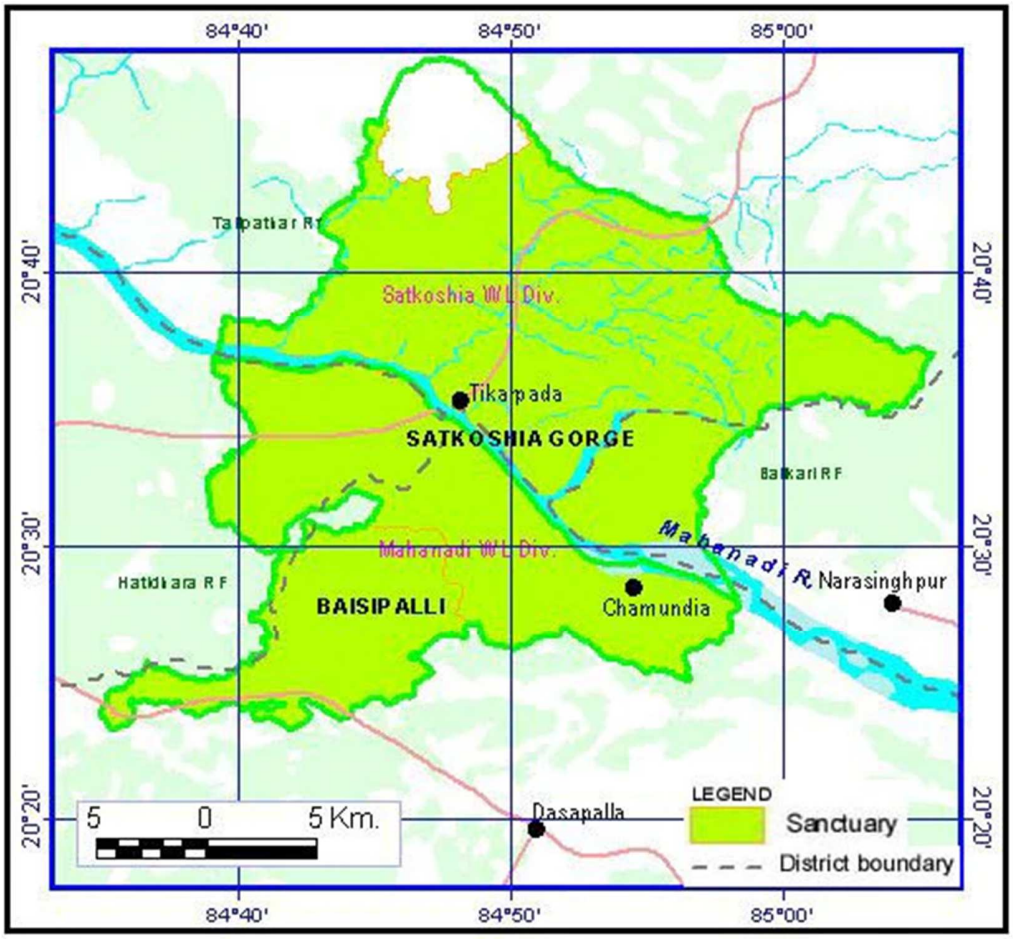


Table-1: Typical Use and Non-use Values of a wildlife Sanctuary

Use Values			
Direct use	**Tentative stakeholders**	**Indirect use**	**Tentative stakeholders**
Commercial and recreational extraction activities such as fishing, hunting, gathering	Local hunter-gatherers who draw a living from the minor forest produce and other resources	Nutrient retention and cycling	Farmers having operational holding inside and in close vicinity of the sanctuary
Aquaculture	Local fisherfolk using the water bodies inside the sanctuary for growing aquatic resources commercially	Flood control	Villagers in the downstream of the rivers immediately outside the sanctuary area
Transportation	Boat operators	Storm protection	Villagers residing within the sanctuary area
Wild resources	Local healers and forest produce vendors	Habitat function	Villagers residing within the sanctuary area
Potable water	Villagers residing inside the perimeter of the sanctuary	River bank stabilization	Villagers residing within the sanctuary area
Recreation	Tourists, tourism service providers	XXX	XXX
Genetic material, Scientific and educational opportunities	Research centres, educational institutions undertaking research and educational activities in the sanctuary	XXX	XXX
Non-use Values			
Existence, Option and Bequest Values		**Tentative stakeholders**	
Cultural heritage		Educated people residing both inside and outside the sanctuary area	
Resources for future generations		Educated people residing outside the sanctuary area	
Existence of charismatic species		Formal and informal academicians from Odisha	
Existence of wild places		People of Odisha	
XXX		XXX	
XXX		XXX	
XXX		XXX	

Source: NRC, 2005

Table-2: Proposed Sample Size for the Pilot Survey

Stakeholder type	**Sample size for the pilot survey**	**Type of information needed**
Local hunter-gatherers who draw a living from the minor forest produce and other resources	5	Direct use value
local fisherfolk using the water bodies inside the sanctuary for growing aquatic resources commercially	5	Direct use value
Boat operators	5	Direct use value
Local healers and forest produce vendors	5	Direct use value
Villagers residing inside the perimeter of the sanctuary	5	Direct use value
Tourists, tourism service providers	5	Direct use value
Research centres, educational institutions undertaking research and educational activities in the sanctuary	5	Direct use value
Farmers having operational holding inside and in close vicinity of the sanctuary	10	Indirect Use value
Villagers in the downstream of the rivers immediately outside the sanctuary area	10	Indirect Use value
Villagers residing within the sanctuary area	10	Indirect Use value
Educated people residing outside the sanctuary area	10	Non-Use value
Educated people residing inside the sanctuary area	5	Non-Use value
Formal and informal academicians from Odisha	5	Non-Use value
Common People of Odisha (only educated people to be contacted at the pilot stage)	10	Non-Use value

Note: Convenience sampling method to be followed at this stage
Source: Compiled by the authors

VI. RELEVANCE OF THE STUDY

The findings of the study could bring into light the level of synchronization that exists between the price being charged and the total value of the site as held among the public – whether the price being charged is an underestimation of the value of the site or an overestimation. This could help in formulating a more appropriate price policy for the site and more efficient revenue generation, better conservation of the natural resource, enhanced tourism potential and improved living conditions of local communities.

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