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Existence Value of Wildlife Species: Methodological Review

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Abstract

The loss of biodiversity poses a serious threat for the sustainability of the planet, with nations like India experiencing sharp drops in biodiversity notwithstanding their abundant natural resources. The 75th UN biodiversity summit brought India's critical need for strong measures to protect its biodiversity front and centre in conservation debates. In support of the whole economic value strategy, this research highlights the significance of abandonment values—in particular, existence worth—in the valuation for biodiversity. Policymakers must take existence value—which is based on cultural, spiritual, and ethical significance—into account when determining the intrinsic worth of species of wildlife. This paper examines methods for calculating existence values, including choice experiments, contingency appraisal, as well as bio-economic designs, based on research connecting altruism & existence ideals. The research makes the case that these approaches offer crucial insights for guiding conservation policies, even though it acknowledges their limits. Policymakers can ensure the maintenance of biodiversity for future generations as well as present by creating broader and effective conservation programmes by incorporating existence values into policy frameworks.

Keywords- Biodiversity conservation, Policy frameworks, Existence value, Conservation strategies

1. Introduction

Unsustainable development practices, climate change, outbreak of diseases, the world has experienced all. Every country is in the midst of the race to economic development by turning a blind eye towards environment and biodiversity. At the 75th UN 'biodiversity summit' India made the following statement- "With only 2.5% of the world's landmass, we have 8% of the world's recorded biodiversity,"; the biodiversity of the country is facing a consistent decline. According to a report by Centre for Science and Environment, India has lost ninety percent of its four biodiversity hotspots and twenty-five species in these hotspots have been extinct. Hence it is essential to prepare appropriate policies for conservation of the wildlife species. Total economic value approach which is used in case of non-market environmental goods should be used; this approach overcome the market and policy failure and provided a stronger argument to the policy makers for protecting the environmental good/species (Markandya 2004). Total economic value is divided into use value or the consumptive value and non-use value or non-consumptive value (Markandya 2004). In the case of wildlife species, non-consumptive value plays an important role than the use value (Lopes and Atallah 2020). Among the non-use values, existence value plays an important role, existence value being

the value derived from mere existence of the resources (Asafu and Adjaye 2000). Existence value was first estimated and incorporated in the total economic value by Krutilla (1967); it comprises of the cultural value, spiritual value and ethical value; it is an intrinsic value. Studies have shown a connection between "Altruism" and the idea of existence values, people value environmental good because of its use-value for future generations. They also care about the environment and want to preserve resources for their future families. However, some people are driven by an innate desire to preserve resources and species out of kindness and love for them. Boyle and Bishop (1987) stated that one of the factors driving existence value, in addition to altruistic conduct, is indirect use-value. Existence value is individual centric, it depends on what value and individual will place on environmental good/species, hence it should be estimated with caution. There are different methodologies that can be used to estimate the existence value; contingent valuation method and choice experiment are the most popular ones and widely used across the literature. There can be a case of non-reporting and hypothetical bias in case of contingent valuation technique but this limitation is overcome by choice experiment (Cerda et al. 2012). Another method of estimating the existence value is through bio-economic models/economic ecological functions, these models overcome the limitations of contingent valuation methods and choice experiment. Existence value derived from these techniques can then be used by policymakers to prepare effective management and conservation plans for protecting the wildlife species.

2. Valuing the Wildlife Species

A recent report by World Wildlife Fund (2018) stated there has been an alarming decline of 69% in the number of wildlife species- birds, mammals, fish, reptiles etc. since 1970. Animal species are under the risk of extinction due to poaching activities for production of goods, depletion of the forest cover and overharvesting (Ando and Langap 2018). These animal species provide multiple values-recreational, cultural, and intrinsic values ('non-consumptive use value') to the people (Ando and Langap 2018). They also provide various ecosystem services like maintaining the balance in the ecosystem, provisioning services, carbon sequestration, etc. (Lopes and Atallah 2020). Lopes and Atallah (2020) also highlighted the importance of existence value provided by the wildlife species; it is difficult to compute, yet if omitted from the benefit-cost analysis would lead to underestimation of the final economic value. Services provided by these species are non-marketable and hence are valued using 'Total Economic Value' approach of non-market valuation. Marshall (1979) defined the economic value as- "that which a person would be just willing to pay for any satisfaction rather than go without it". This approach aids in creating a stronger argument for protecting these species and overcomes the market and policy failure (Markandya 2014). Markandya (2014) categorized the economic value into use & non-use value, use-value is also known as the consumptive value, it is the value received through direct consumption. Non-use value, however, is the non-consumptive value, comprising option value, bequest value and existence value. Option value is measured as the willingness to pay for preserving the resources for future consumption, bequest value is defined as the value that present generation received by ensuring that the resources are available for future generation and finally the existence value is the value derived from mere existence of the resources (Asafu and Adjaye 2000). While estimating the total economic value of animal species; the component of non-use value is imperative and has higher value than the use-value, yet very few studies have been conducted to measure their non-value (Bulte and Van Kooten 1999).

3. Non-Use Value: Existence Value

Existence Value is defined as the utility that the individual gains from the knowledge of mere existence of the environmental good/ species, even when there is no current/possibility of future consumption (Amirnejad et. al. 2005). It is the amount that people are willing to pay to safeguard the resources and species that have a higher non-use value (Amirnejad et. al. 2005). Krutilla (1967) is the first study that considered the existence value in the calculation of benefits, following argument was stated by the researcher- "When the existence of a grand scenic wonder or a unique and fragile ecosystem is involved, its preservation and continued availability are a significant part of the real income

of many individuals ". Existence value pertaining to the wildlife species accounts for the cultural values that people associate with them, the ethical values and spiritual values (Lopes and Atallah 2020). Estimation of existence value is difficult as it depends on the perception of the people, since it is individual centric, including this value could also lead to errors in the estimation of the final economic value. Calculation of non-use value of wildlife species is mostly done for preparing the conservation policies, many studies are conducted that estimate the non-use value with respect to recreational value, since it is much easier to capture (lockwood 1997). It is argued that tribal/local communities living near the forest area are much more aware about the presence and importance of wildlife species and hence their views must also be taken into consideration while deriving the existence value (Ando and Langpap 2018). There are studies which link 'Altruism' with the concept of existence value (Boyle 1985 & Randall and Stoll 1983); where people value the environmental good because of its use-value for future generation, they care about the environment and have desire to preserve the resources for their family members in future and some of them are motivated by their innate desire to conserve the resources and species because of their generosity and love for their existence. Boyle and Bishop (1987) in their study added that apart from the altruistic behavior, indirect use-value is also considered as of the drivers of existence value.

4. Is Existence, a value?

There is an ongoing debate across the literature regarding the inclusion and exclusion of the existence value. Rosenthal and Nelson (1992) argued that the definition of existence value is very general and subjective, it considers all the thing as important which are given due importance by the people without any other rationale, the final decision is Soley based on individual's prefernce. Milgrom (1993) in his study about the existence value states that it is influenced by people's opinion and can be inaccurate due to lack of knowledge and hence a more efficient indicator should be used in the cost-benefit analysis while arriving at the final policy decision. Milgrom (1993) concluded the debate about existence value in his study by stating that if certain conditions are met, only under successful fulfillment of those conditions one should include the existence value. People should have gained sufficient experience before making the choice, their choices should be motivated by their economic benefit and not just due to altruistic behavior and lastly the data collected though the survey should be validated (Boudreaux 1999). Although the debate about the existence value is still going on, but with the recent developments, there have been various multidisciplinary studies that have justified the usage of existence value and considered it as an important component of in the total economic value calculation (Zabel et al. 2011). A recent study by lopes and Atallah (2020) included the existence value of tigers, considering the religious sentiments of the local communities towards these species and it successfully derived three policy scenario's which aided in understanding the appropriate and effective conservation policy for that region.

5. Techniques Used

S.No.	Name	Description	Author & Date
1	Contingent Valuation Method (CVM)	It measures non-use value; it measures the utility that the consumer attaches to the environmental good/species in momentary terms by willingness to accept/pay tool (Quiggin 1998)	Bulte and Koolten (1998), Steven et al. (1991), Quiggin (1998)
2.	Choice Experiment (CE)	Bateman et al. (2002) models choice experiment based on the concept of random utility theory; economic valuation is done based on the choice made by the respondents based on the attributes	Bateman et al. (2002), Cerda et al. (2012), Cerda and Losada (2013), Jacobsen et al. (2008)

		assigned to the environmental good/species.	
3.	Existence Value Framework: Ecological Economic Model	Existence value framework maximizes the incremental social benefit of a resource's existence value and the net benefits of extracting it for personal consumption subject to the resource stock function (Clarks et al. 2010)	Clarks et al. (2010) Lopes and Atallah (2020)
4.	Bergson-Tintner Samuelson Ethical Function	In this model the respondents make two distinct valuations, one based on the traditional consumer utility and satisfaction theory and the other based on morality and ethics in the political scenario (Kohn 1993).	Kohn (1993), Samuelson (1954)

5.1 Detailed description of the Methodologies

i. Contingent Valuation Method

In the contingent valuation method, utility of an individual is described as the sum of the utility derived from the consumption of goods and services and the existence value derived from the environment, it is also assumed that the monetary loss that the consumer faces and the loss suffered due to the environment goods that are not marketable; consumer is indifferent among these two losses (Quiggin 1998). Any new policy related to protection of wildlife will do a cost-benefit analysis before implementation, contingent valuation technique would help to estimate the benefit component by conducting a survey and getting information on individual's maximum willingness to pay and thus helping in arriving at the outcome which is pareto-improvement (Quiggin 1998). Hypothetical bias is one of the major limitations that occur, the bias arises when there is a difference in the actual response of the individual and the response given by him/her during the survey. Duffield and Patterson (1991) through their study found that the actual donations received to support the wildlife was different and lower than what people had quoted that they would pay during the survey. Whereas there have been studies that didn't encounter this bias and the results of the survey and post-survey were pretty close (Bishop and Heberlein 1979). Another problem with contingent valuation techniques is the non-reporting bias; there can be cases where the respondents didn't give any response, this chances of happening this is more in the case of mail and telephonic surveys than in-person (Loomis 1987). Since it is a stated preference technique, hence it is difficult to ascertain the validity of the responses, whether they are due to the existence value of the animal species or due to other factors. It has been observed that contingent valuation method is successful when respondents are aware about the goods/species they are being asked to value, in the case of animal species it is not very difficult unless there is some rare and endangered species, hence contingent valuation technique works well for the valuation of wildlife species (Steven et al. 1991). One of the major concerns while valuing the wildlife species is the ethical concern, Steven et al (1991) in his paper he stated that the animals are living beings and have the right to live irrespective of the value placed by human being on their existence. Researchers in favor of the contingent valuation techniques state that the problems that occur due to the occurrence of various biases can be overcome by improving the technique and it is not indeed due to inclusion of existence value but because of the shortcoming in the technique (Quiggin 1998). In case of contingent valuation method, it is also necessary to see who the respondents are, in the studies involving valuation of wildlife species, it is imperative to consider the local communities also as the respondents and not just the tourists, as these people live closely near them and have much wider knowledge about the importance of the species.

ii. Choice Experiment

Choice Experiment is an extended version of contingent valuation method, it caters to the limitations of contingent valuation method. Choice Experiment provides different attributes to the good/service and hence helps the respondents to provide a final value based on the attributes, this helps the researcher to identify and rank the attributes based on their importance (Cerda et al. 2012). For designing the choice experiment, a focus group discussion is conducted first in order to identify and decide various attributes and levels for the environmental good/species that needs to be valued, a pilot study needs to be conducted prior to the final survey in order to check the efficacy of the questionnaire (Claudia and Losada 2013). It has been found that when estimating the total economic value of the animal species, it is difficult to distinguish and separate the use and non-use values (Richardson and Loomis 2009). However, Cerda et al. (2012); conducted a choice experiment to estimate the existence value of moss species in Chile, they were successfully able to prepare the attributes such that the different values were captured; attribute - 'probability of extinction of an endemic moss' was used with levels indicating lower and higher probability. While designing the choice experiment for existence value it is important design attributes such that they do not take the ethical and moral considerations but instead should focus on the intrinsic value of existence. Lienhoop and Fishcer (2009) in their study listed down various advantages of using choice experiment over contingent valuation method; it stated that CE method offers a broader scope for including multiple attributes and thus helping in a detailed valuation exercise, CE technique provide much more realistic outcome as it avoids direct willingness to pay questions and instead give multiple choices sets to the people to select from and lastly the choice experiment helps in identifying the lexicographic preferences. Measuring the existence value is necessary as even though the use-value is having a direct impact on the individual but in the case of animal species, non-use value is more important; among the non-use values, existence value is much more important compared to others in case of wildlife species as they are irreplaceable and unique (Madariaga and McConell 1987). In order to make and implement and effective policy, it is necessary to estimate the economic value of multiple animal species and not just one species and therefore Choice experiment is a useful technique as it aids in estimating the value together for multiple species effectively (Claudia and Losada 2013). For preparing policies for conservation of wildlife species and their management, it is essential to gain knowledge on the preferences of individuals in detail regarding different attributes associated with the environmental good/species, which can be effectively done using choice experiment (Hanley et al. 2003).

iii. Existence Value Framework: Ecological Economic Model

Lopes and Atallah (2020) used the Existence value framework in their study to estimate the existence value (spiritual) of Tigers. Existence value framework maximizes the incremental social benefit of a resource's existence value and the net benefits of extracting it for personal consumption subject to the resource stock function; this framework was first used by Clarks et al. (2010). The first step is to define the objective function, Lopes and Atallah (2020) used the methodology of Clarks et al. (2010) and prepared the analysis in the context of tribal communities living near the tiger reserve, to estimate their existence value; this study was also first of its kind to estimate a specific existence value-spiritual value. Objective function comprises of two things; first is the existence value derived by the tribal communities and second is the net benefit gained from the extraction of the resource stock. This objective function is maximized subject to the discounted resource stock function. Loopes and Atallah (2020) in their study used the ecological economic model by the adding three different policy scenarios related to conservation of tigers by introducing a penalty for poaching and by giving access rights to the tribal communities. The bioeconomic model used in Loopes and Atallah (2020) also helped in estimating the marginal existence value of existence and how this value changes with the change in the population. Most of the studies related to the estimation of total economic value use the survey-based techniques like contingent valuation method and choice experiment; bioeconomic model used by Loopes and Atallah (2020) fills the gap in the literature and aids in estimation of nonlinear existence value function and also is one of the kind studies that helps in measuring the spiritual value derived by the tribal communities from the animal species. Existence value derived in the study is imperative in the effective policy making and effective allocation of resources; the model developed in the study is a general model and thus can be extended further in future by researchers to estimate the existence value of a single or multiple species, especially endangered species.

iv). Bergson-Tintner-Samuelson Ethical Function

Berson Tintner Samuelson (BTS) Ethical Function combines the consumer choice theory and hypothetical scenario of the political decisions. The model is vividly described by Kohn (1993) in his paper in the context of measurement of the existence value of the wildlife species. The first step is to state the utility function, the utility function comprises of the utility that the individual is deriving from the consumption of two goods- x and y and from the visit to a natural habitat of land while interacting with the animal species (Samuelson 1954). The second step is the 'ethical function'; the ethical function comprises of two elements, first is the utility that was calculated earlier and the second component is the 'cardinal indicator' which shows the survival probability of animal species, the model developed here is deterministic and the component of irreversibility is not considered (Kohn 1993). Optimal solution from this model is derived by estimating the marginal conditions by maximizing the ethical and economic objectives (Kohn 1993). Ethical welfare mentioned in this model increases with the increase when there is an incremental increase in the unit of land that is preserved for wildlife species. The paper also describes the usage and application of Bergson-Tintner-Samuelson model; the valuation is done in two steps, the first step helps to estimate the amount that the government authorities should pay the local communities for preserving the land for natural habitat and wildlife species, this would help in deciding the acres of land that has to be marked as protected (Kohn 1993). The second valuation exercise described by Kohn (1993) would then help to estimate the amount the communities are willing to pay in order to visit the natural landscapes and for observing the animal species. The dual approach described in the paper is considered to be effective as it overcomes the limitations of the survey-based techniques of contingent valuation and choice experiment; although the method should be carefully used as it requires that the respondents should have adequate information on the policies and actions of the government in managing the resource/species and about the animal species in general (Kohn 1993).

6. Discussion on the Policies

The concept of total economic value was proposed to estimate the non-market values of the environmental goods so that they could be expressed in quantitative format in monetary terms to provide a stronger argument in front of the policy makers to protect and conserve them (Markandya 2004). When valuing the animal species, non-use value becomes more important and in non-use value, existence value is considered as an imperative value for the animal species (Loopes and Atallah 2020). Existence value of wildlife species derived by using the above discussed methodologies will help to determine the benefits derived from the wildlife species and thus would be essential in conducting an accurate cost-benefit analysis before undertaking any decision related to conservation and protection. Policymakers could use the estimates of existence value calculated for making decisions regarding the allocation of resources and for effective conservation policies, it could help them to identify the species that need immediate attention and the valuation exercise would also aid in the estimating the returns that the investment would generate in future (Polasky et al. 2011). Policies concerning the wildlife species like identifying and demarcation of protected land/water resource, rights to the local communities in accessing the natural habitat in the presence of the animal species and penalties on poaching the animal species for commercial purposes can be prepared using the above discussed methodologies by incorporating the existence value.

7. Future Scope

The current literature contains many studies related to total economic value and valuation techniques but very limited studies are conducted on estimating the non-use value, more specifically the existence value. Existence value being an intrinsic value is difficult to estimate, therefore more interdisciplinary research with other domains like psychology, sociology, etc. is needed to properly identify, understand and estimate the existence value. Contingent valuation method and choice experiment are widely described in the literature, yet they have their own limitation; studies related to bioeconomic model/ecological economic models are very few. Bioeconomic models have proven to give me more accurate estimates than CVM hence more research is needed to explore the methodologies related to bioeconomic

models. Lastly, most of the studies estimating the existence value of wildlife species have taken the target population as tourists visiting that natural habitat and less focus is on the local communities who have much more knowledge and information about the importance of the animal species living there. Hence more research should be conducted in future to estimate the existence value of the animal species by taking the local communities also in consideration.

8. Conclusion

Total Economic Value approach is used to estimate the value of non-marketable goods especially environmental goods/services It divided the economic value in use and non-use value. Use-value is also known as the consumptive value that is the direct benefit derived from consumption, non-use value is the intrinsic value of the good, also known as the non-consumptive value. While estimating the value of wildlife species, non-use value is more imperative and hence should be estimated and included in the final total economic value of the species to arrive at the correct estimation. Existence value is one of the most essential non-use values, existence value implies the value that the individual derives merely by knowing that the good/species exists. Although there is still an ongoing debate regarding the inclusion of existence value in the final economic value as it is individual centric and could lead to overestimation of the economic value due to limited knowledge about the species. It is difficult to separate the altruism component from the existence value, an individual could also place a higher existence value because of their own moral or ethical considerations. There are various techniques that are used to estimate the existence value, one of the most popular techniques is the stated preference technique that is used across the literature. In stated preference technique that respondents are directly asked about their choices and willingness to pay/accept for conserving the environmental good/species. Contingent valuation technique and choice experiment are the two methods that are used to estimate the existence value of the wildlife species. Contingent valuation method is helpful in case of estimating the existence value of wildlife species as the respondents have full knowledge about the species. Contingent valuation method is common and widely used yet suffers from limitations and biases; non-response bias, design bias, hypothetical bias etc. Choice experiment is an extended version of contingent valuation method, it overcomes the limitation of contingent valuation. By using choice experiment, researcher can rank the attributes of the species in the order of preference and thus this can help in making effective target-based policies. Choice experiment also helps in distinguishing the altruism, bequest and existence value through the presence of multiple attributes. Through choice experiment on can even estimate the value of multiple species. Bioeconomic models/ Ecological economic functions are another set of tools that are used to estimate the existence value of the species. These models construct an optimization problem and maximize the utility that the individual derives subject to resource constraints. These models are an alternative to stated preference techniques and in some situations give more efficient results than stated preference techniques.

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