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Critical analysis of existing economic tools available for assessing river water quality
by Sudevi Basu and Lokesh K

Summary

This analysis looks at the approaches of measuring the environmental benefits and there methodologies that are available for the evaluation of the effects of environmental changes on river quality. The methodologies used lead onto show how evaluations of these methods lead to have an input on economic policy for creating more efficient water quality management. The economic tools used to assess river quality were evaluated independent of each other and were not compared against each other's results. At the beginning of the paper the author's give an introduction to river systems and talk about how important they are, they form the basis of human livelihoods and also culturally they are extremely important, they bring life and death, civilization and devastation, opportunity and risk. How important they are for irrigation systems, cheap transportation and electricity but due to economic development, population growths have resulted in continuing environmental degradation. Industrialization, urbanization and intense effects on agriculture have resulted in water quality deterioration and river systems have now become vulnerable to serious pollution.

The paper gives us an introduction to the effects of economic development and population growth on the environment and it's river systems, talking about its impacts on the present and future populations and what we need to do to conserve and protect river systems. The authors talk about there aims and objectives which are to conduct an in depth review of various economic tools and techniques for assessing river water quality. They also aim to explain the limitations of these techniques and describe the need for economically calculating various pollution control measures to prevent pollution and improve water quality in rivers. Methodologies have been introduced in the U.S and around the world to monitor water quality in rivers, which have benefitted in many ways. The aim of this journal was to conduct an in depth review of various economic tools and techniques for assessing river quality, there limitations and to overall describe the need for these techniques in order to prevent pollution and improve water quality in rivers. Different methods used include the,

- Physical Linkage Method
- Damage Function Method

Direct Methods such as,

- Contingent Valuation Method
- Choice Experiment Method

Indirect Methods such as,

- Averting Expenditure Method
- Travel Cost Method
- Hedonic Pricing
- Cost of Illness Method

Through all of these methods a results and discussion topic is given where the results of these methods were collected and reviewed in order to understand the gaps and limitations of various methods. The discussion here is to give an analysis of these methods in order to get to the main topic of proper management of water bodies to maintain their purity and sanctity. The paper concludes with a review saying that they are giving a step forward in understanding the principles of environment economics by quantifying the impacts of pollution in rivers and studying the implications of various pollution prevention projects undertaken by the government, industries and private organizations to improve the quality of water in rivers.

Critical Analysis

The review I will be doing a critical analysis of is titled *Critical analysis of existing economic tools available for accessing river water quality* written by Sudevi Basu and Lokesh K. The topic of the text discusses the different methods used to assess river quality there advantages and disadvantages and how they are providing a positive impact on finding better ways to analyze river water quality. The main aim of the text is to provide the reader with an understanding of river water its effects on the population and how it's quality is important to protect and how through using these various methodologies is important in order to preserve river water quality for future generations. I will be breaking this critical analysis into the paper's main headings and critically analyzing each heading.

Introduction

The Introduction talks about how rivers are one of the most important natural resources, river water quality is important for human livelihoods, human development through irrigation systems, potable water, electricity, etc. However due to economic development, population growth, intensification of agriculture, industrialization and increasing urbanization has led to the devastation of river systems all over the world and water quality deterioration. The authors then go onto discuss how methods to evaluate environmental impacts has gone from being mainly a U.S activity in the 1960's and 70's to becoming also a very important field in Europe and also in developing countries in Asia, Latin America and Africa. Through research I have found that this is in fact true, in 1972 the EEC met in Paris to discuss Europe's Environmental Policy, where an action programme was drawn up for environmental protection, which was adopted in July 1973. This was the beginning of the EU's policy and throughout the 1980's more acts came into pass to increase the EU's protection or its river systems such as the Water Framework Directive, which aims for all EU member states to achieve good quality water by 2015. The introduction also talks about different measures taken by the World Health Organization (WHO) , such as the cost benefit analysis (CBA) scheme on water, sanitation hygiene and health which focuses on the development of methods at a country level to assist in finding the best cost effectiveness and benefit-cost methods on water, sanitation, hygiene and health. This part of the introduction is important there are a lot of strengths here as it provides the reader with an understanding of all the different methods being taken around the world in order to improve water quality, also the

introduction provide us with an idea of the impact of water pollution on human development.

Aim and objectives

One of the key points of the paper is to explain to the reader the aims and objectives, which are to conduct an in depth review of the different methods used for assessing river water quality, to explain their limitations and describe the different measures to take in order to prevent pollution in rivers. I think the aims and objectives in this analysis of river water quality are a strong asset to the paper, giving us an idea of what the paper intends to provide the reader with, they split the journal up into three criteria, conduct a review, explain the limitations and describe future actions to prevent pollution in water which I think allows us to easily understand the aims and objectives of the journal.

Existing Economic Methods

The main section of the paper consists of the authors explaining the different economic methods used for valuing river water quality for pollution control. They talk about the two different types of methods the Physical Linkage Method and the Behavioural Linkage Method. Both methods are described to us to allow us to gain an understanding to why they are used , there effects and if each method has a positive impact in terms of cost benefit and cost effectiveness to allow it to be constantly used in future tests of river water quality. I feel as a reader I would rather the authors explain to us why each method is important in terms of measuring river water quality and each methods effect on human livelihoods rather than talking about how each method is used to analyze if a person was willing to pay in order to increase river water quality. Each method is described in terms of looking at how benefits of a policy lead to damage reduction, the damage reduction method is used to capture the relationship between a contaminant and any associated damages and how damages decrease in river systems through policy induced system of decreasing contaminant. There are strong points made here to illustrate to us that through a policy induced system river systems will have less contaminant. Also through direct methods they can evaluate the economic benefits of using policies and whether the benefits of a proposed project outweigh the costs. They discuss the Contingent valuation method which is way of evaluating if methods results are better than the cost of the method, and if the population is willing to pay a tax in order to decrease the contaminant in rivers and increase river water quality. The results of the surveys showed that people were willing to pay the tax and I think this is an important factor in portraying to the reader the main aim of the authors is to explain that through these methods direct methods they are evaluating that the population is prepared to pay to see an improvement in river water quality. This is important in terms of it gives us an understanding of how people see river water quality as an extremely important asset to their daily lives. We see this again in the choice experiment method the authors discuss the results of studies carried out, one in where a sewage treatment plant is planned to be built on the banks of the River Ganga in India. We see that according to the study if each household were to pay 8.36 a month it would lead amounts of

3,304,441 per annum. These studies I think are important for us to understand the topic and aim of the paper, the authors back up their points with results of studies taken, this reinforces their arguments and allows us to gain an understanding of their point that people are willing to pay and want to see improvements in river water quality. We also read about the limitations of choice experiment in which it is stated that the problem is using CE are often the complex nature of statistical/experimental design and the selection of appropriate attributes and levels. I feel that maybe the authors should go into a bit more detail of the limitations of using this method and feel this is a weakness to the paper in terms of that through reading through each method we see mainly advantages and less disadvantages to each method, this however I feel is a minor weakness. The use of indirect methods is discussed in which water resources are valuated in terms of consumer behavior. The Averting Expenditure Method is used to indirectly see whether a consumer is willing to pay for non-marketed commodities like clean water and how people respond to the degradation of water quality sometimes in ways of avoiding it. Also the Travel Cost approach in which they discuss how water bodies for boating, fishing, watching birds and the cost of those trips to infer peoples willingness to pay for access to the sites. They talk about how researchers have employed travel cost method to measure the welfare effects to changes in river water quality. I think this is an important point as the authors are now talking about the fact that due to boat trips whether it be leisure or fishing these trips are effecting river water quality and they are analyzing these facts and portraying them to us in the travel cost method. The Hedonic pricing method I feel is a weak point in terms of the paper mainly consists of methods available for assessing river water quality, I think the hedonic pricing method mainly focuses on house prices and how they reflect the value of local resources like water quality. I don't this method reflects what the paper is about, I understand the point the authors are making but feel as though they need to reinforce this point more, back up what they are saying, maybe how people who live closer to water are willing to pay to see rather than people who love further away, I don't see their point of how property value increasing relates to river water quality. I think one of the most important methods and points to the paper is the Cost of Illness method which says that people should be willing to pay to increase river water quality as much as the value of the income they would lose by dying prematurely due to the effects of bad water quality. I think this point finishes the list of methods off perfectly and ends with the fact that people should be willing to pay as much as they would lose if they died due to the effects of bad water quality.

Conclusion

For my conclusion I will be critically analyzing the last two headings of the paper which are the results and discussion and the conclusion. The results and discussion main point is that the need of the hour is proper management of water bodies to maintain their purity and sanctity which I feel is a good way to finish the paper because when we think of water we think of good clean quality and if we're assessing river water the main reason is to make sure that it is clean and not contaminated. They conclude with assessing the results of each method and find that each method was mainly assessed independent of each other, this

can be seen as a weakness to the overall aim of the paper in terms of the results can nearly be seen as inconclusive as there are still a lot of holes left in the assessment of each method and how they have an impact on river water quality. I agree with the conclusion that the paper is certainly a step forward in understanding the impacts of pollution on rivers and by studying the implications of pollution prevention methods we can aim to improve the quality of water in rivers all over the world.