Государственное и муниципальное управление. Ученые записки. 2024. № 4. С. 115–123
State and Municipal Management. Scholar Notes. 2024;(4):115–123
Problems of Economics
Original article

Ecological-economic assessment of Chinese territories' environmental quality on the nature's total economic value conceptual basis

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Abstract. Environmental quality (EQ), its adequate ecological-economic assessment forms the foundation for increasing the sustainability, first of all, ecological, of socio-economic development trends of modern spatial-economic systems. *The purpose* of the study is to develop a conceptual model of ecological-economic assessment of environmental quality of China's territories on the theoretical basis of the Total Economic Value of Nature (TEV) and to justify its applicability in the development of public policy measures aimed at achieving the goals of sustainable development 2030. The focus of the *research methodology* is bibliometric methods, in particular meta-analysis and bibliometric mapping, which allow a comprehensive and critical analysis of the advantages and disadvantages of current methodological tools, as well as a detailed analysis of actual problems hindering the environmentally sustainable development of China's territorial systems. The *scientific novelty* of the research results consists in revealing the limitations / one-sidedness of the methods of ecological-economic assessment of EQ used in Chinese practice, as well as in creating a conceptual model based on TEV and integrated with the concept of sustainable development, allowing for a comprehensive assessment of environmental values in various aspects. The significance of the *results* of the study lies in the development of specific methodologies for assessing the multifaceted values of EQ in the substantiation of directions for improving the methodological tools used in environmental-economic assessment. The study aims to develop a comprehensive understanding of the environmental-economic value of environmental quality, to identify tools that can effectively assess TEV, and provide theoretical support for the formation of sustainable environmental policies in China using the proposed conceptual model.

***Keywords*:** ecological-economic assessment, environmental quality, territorial sustainable development, concept of the total economic value of nature

Acknowledgments: The research was carried out in Southern federal university within the framework of the RNF project No. 24-28-01624.

For citation: Yinan Dong, Lazareva E. I. Ecological-economic assessment of Chinese territories' environmental quality on the nature's total economic value conceptual basis. *State and Municipal Management. Scholar Notes.* 2024;(4):115–123. https://doi.org/10.22394/2079-1690-2024-1-4-115-123. EDN FMLFKY

Проблемы экономики

Научная статья
УДК 338.23
https://doi.org/10.22394/2079-1690-2024-1-4-115-123 EDN FMLFKY

Эколого-экономическая оценка качества окружающей среды территорий Китая на концептуальной базе совокупной экономической ценности природы

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Аннотация. Качество окружающей среды (далее – КОС), его адекватная эколого-экономическая оценка формируют фундамент повышения устойчивости, прежде всего, экологической, трендов социально-экономического развития современных пространственно-экономических систем.

Цель исследования – разработка концептуальной модели эколого-экономической оценки качества окружающей среды территорий Китая на теоретической базе совокупной экономической ценности природы (Total Economic Value, TEV) и обоснование ее применимости в выработке мер государственной политики, ориентированных на достижение целей устойчивого развития 2030. Фокусом *методологии и*сследования выступают библиометрические методы, в частности мета-анализ и библиометрическое картирование, позволяющие комплексно и критически проанализировать достоинства и недостатки актуальных методологических инструментов, а также детальная аналитика текущих проблем, препятствующих экологически устойчивому развитию территориальных систем Китая.
Научная новизна результатов исследования состоит в выявлении ограниченности / односторонности применяемых в китайской практике методов эколого-экономической оценки КОС, в создании концептуальной модели, основанной на TEV и интегрированной с концепцией устойчивого развития, позволяющей проводить всестороннюю оценку экологических ценностей в различных аспектах. *Значимость результатов* исследования заключается в разработке конкретных методик для оценки многогранных ценностей КОС, в обосновании направлений совершенствования методологических инструментов, используемых в эколого-экономическом оценивании. Исследование направлено на разработку всестороннего понимания эколого-экономической ценности качества окружающей среды, выявление инструментов, способных эффективно оценивать его TEV, и предоставление теоретической поддержки для формирования устойчивых экологических политик в Китае с использованием предложенной концептуальной модели.

***Ключевые слова*:** эколого-экономическая оценка, качество окружающей среды, устойчивое развитие территории, концепция совокупной экономической ценности природы

Благодарности: исследование выполнено в Южном федеральном университете в рамках проекта РНФ № 24-28-01624.

Для цитирования: Инань Дун, Лазарева Е. И. Эколого-экономическая оценка качества окружающей среды территорий Китая на концептуальной базе совокупной экономической ценности природы // Государственное и муниципальное управление. Ученые записки. 2024. № 4. С. 115–123. https://doi.org/10.22394/2079-1690-2024-1-4-115-123. EDN FMLFKY

Introduction

The environmental quality in China has become a critical concern as the country continues to experience rapid economic growth. Severe environmental challenges, including significant air and water pollution, soil degradation, and loss of biodiversity, pose substantial risks to public health and economic stability. In northern regions, air pollution is particularly severe [1, 2], while water pollution from industrial waste, agricultural runoff, and insufficient wastewater treatment threatens both drinking water safety and aquatic ecosystems [3].

To address these challenges, it is essential to adopt comprehensive assessment methods that capture the full economic value of environmental quality. The concept of Total Economic Value (TEV) provides a robust framework for this purpose. TEV encompasses all forms of economic value derived from the environment, including direct market transactions, ecosystem services that support economic activities, and non-use values that contribute to social well-being [4, 5]. By incorporating TEV into environmental-economic assessments, a more accurate understanding of the true economic value of natural resources and ecosystem services can be achieved, thereby informing more effective and sustainable environmental policies [6, 7].

In the sphere of public policy, financial frameworks and incentives, especially those directed to implementing sustainable behavior have a general coverage. In particular, financial programs assisting with the purchase of electric vehicles can influence how people behave, thus increasing the rate at which clean energy technologies are adopted and consequently reduce environmental pollution levels. Applying a conceptual framework based on TEV in environmental economic assessments can revolutionize such assessments by embedding the different values of natural resources and the services of the ecosystem. Such an integrated methodology can assist in attaining a quest for an even better approach to environmentally sound practices management and ultimately, targeted sustainable development goals.

This study proposes a new conceptual model based on TEV to improve the comprehensiveness and accuracy of China's environmental economic assessment, thereby enhancing the effectiveness and sustainability

of environmental policies. The model incorporates the core principles of sustainable development, emphasizes the necessity of balancing economic growth and environmental protection, and comprehensively evaluates all aspects of environmental value. Through conceptual analysis and bibliometric methods, this study constructs a comprehensive environmental economic assessment framework that not only deepens the understanding of environmental quality but also supports the formulation of sustainable environmental policies in China.

In addition, the model provides an improvement in assessment accuracy through a comprehensive review of existing literature and methods, and deeply explores how policy measures affect consumer behavior and environmental outcomes. Combining TEV with policy effect analysis, the model can more clearly reveal the economic value of natural resources and ecosystem services, providing support for the formulation of robust policy decisions. With this approach, this study not only promotes the coordination between environmental and economic policies, but also provides a scientific basis for achieving environmental sustainability. Ultimately, the model provides a solid theoretical and practical basis for policy formulation for China to play a leading role in the global sustainable development agenda.

Methodology of China's territories EQ ecological-economic assessment

Ecological-economic assessment methods have significant limitations and challenges in capturing the complex dynamics of environmental quality, especially in the context of diverse and rapidly changing environmental conditions in China. Traditional assessment tools often rely on a single perspective and a single assessment method, which cannot fully understand the environmental impacts and their economic implications.

Early ecological economic valuation methods focused primarily on direct use values, such as market transactions associated with natural resource extraction and production [8]. These methods, which include market pricing [9] and cost-benefit analysis [10], are well suited to quantifying tangible economic activities. However, these methods are insufficient to capture indirect use values and non-use values, which are essential for a comprehensive understanding of environmental quality. Ecosystem services such as air and water purification and biodiversity support are often underestimated or neglected in these assessments.

The concept of TEV encompasses all forms of value provided by the environment, including direct use values, indirect use values and non-use values. This framework provides a more comprehensive assessment of environmental resources by considering the full range of benefits they provide to society. Studies by Nijkamp, P., Vindigni, G., Nunes et al [11] and Plottu, E., Plottu, B. [12] laid the groundwork for the inclusion of TEV in ecological-economic valuation by emphasizing the need to consider the full range of values associated with natural resources.

The application of TEV in environmental policy has been explored in various contexts, demonstrating its potential to inform more sustainable decision-making. For instance, studies assessing the value of wetland ecosystem services [13], forests [14], and coastal areas [15] have shown that TEV can provide a solid foundation for evaluating the economic impacts of environmental conservation and degradation. These studies highlight the importance of including non-market values in policy frameworks to ensure the efficient management of environmental quality.

Although the TEV framework has significant advantages in eco-economic assessment, there are still challenges in its implementation, especially in quantifying non-use values. This often requires reliance on stated preference methods such as contingent valuation and choice experiments. This paper proposes a TEV-based conceptual model that integrates these methods and aims to provide a comprehensive environmental economic assessment perspective, fill the gaps in the literature, and provide a solid analytical framework for environmental quality assessment and policy decision-making.

Results of the research

The core result of this study is to construct a comprehensive eco-economic assessment conceptual model, which integrates use value and non-use value under the framework of TEV to achieve a comprehensive evaluation of EQ. The model covers a variety of TEV assessment methods, aiming to provide a systematic assessment of the multi-dimensional value of environmental quality.

Use values derive from the direct or indirect utilization of environmental resources and are assessed using methods such as the hedonic pricing method [16]. This approach evaluates the economic value of environmental attributes by examining how these attributes influence market prices, especially real estate prices.

For instance, the hedonic pricing method can quantify the impact of air quality on property values [17], thereby providing tangible measures of the economic benefits associated with environmental improvements.

Non-use values, including the intrinsic worth people assign to environmental resources irrespective of their actual use, are estimated using stated preference methods [18]. Such as, contingent valuation method, choice experiment. These methods involve surveying individuals to understand their willingness to pay/accept for the preservation or enhancement of environmental resources, thereby capturing values related to existence [19] and heritage [20].

The model provides a comprehensive perspective on the economic value of environmental quality by integrating use value and non-use value into the TEV framework. It not only quantifies the direct economic benefits of environmental resources, but also incorporates the value of social and ecological aspects that are often overlooked in traditional assessments. By integrating a variety of assessment methods, the model can provide a more comprehensive and accurate estimate of environmental value, thereby supporting the formulation of more informed and sustainable decisions.

To incorporate the influence of government policy, this model includes a policy impact component. For example, consumers' willingness to accept government subsidies for electric vehicles are used to assess the economic value of such policies in promoting environmental sustainability (fig. 1) [21]. Figure 1 shows that the core of the model revolves around the concept of «Environmental sustainability», which is interconnected with social and economic sustainability.

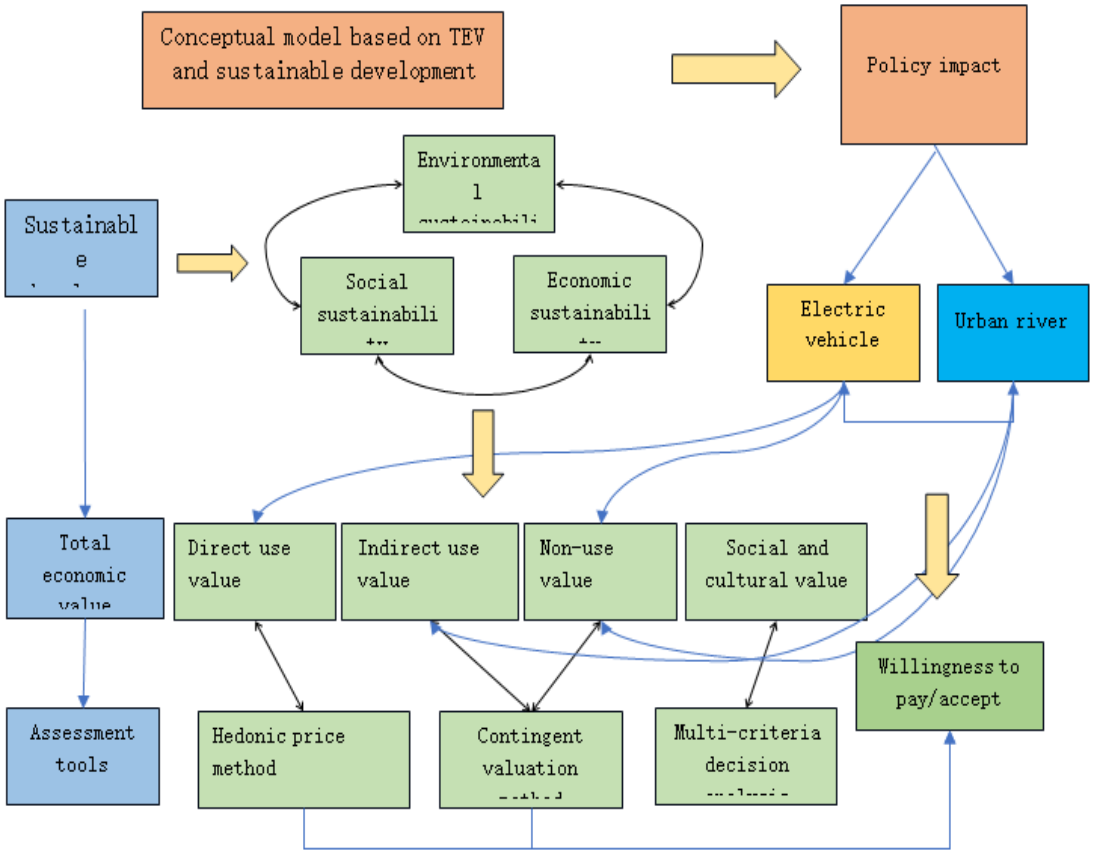

Fig. 1. Conceptual model integrating EQ TEV and policy measures to achieve the Sustainable Development Goals[1]

Рис. 1. Концептуальная модель, интегрирующая КОС TEV и меры политики по достижению целей устойчивого развития

[1] Составлен авторами.

Together, these three parts embody the core concept of sustainable development, which is to find a balance between protecting the environment, enhancing social well-being and promoting economic growth. The "Sustainable Development" part is used to measure the overall economic value of environmental quality, which includes direct use value, indirect use value, non-use value and social and cultural value. The "Evaluation Tools" section at the bottom of the model details how to calculate these values. The model also includes two real-world cases: "Electric Vehicles" and "Urban Rivers", which show how to evaluate the economic effects of transportation and water management policies. Finally, the "Willingness to Pay/Accept" section emphasizes the importance of considering public opinion when choosing an evaluation method. In short, this model helps to comprehensively evaluate the economic impact of environmental policies and ensure that public opinion is taken into account during the evaluation process.

Based on the conceptual framework of TEV, a comprehensive review of environmental economic value assessment methods is conducted, which helps to understand environmental value more comprehensively. Although people are paying more and more attention to the non-use value of environmental resources, current research has not fully assessed the total value of environmental resources.

In order to improve and verify this conceptual model, a bibliometric method was used to systematically analyze the relevant literature in the Web of Science database. Through this method, problems in the assessment method can be identified and suggestions for improvement can be made. Such analysis ensures that the model can adapt to China's changing environmental conditions and maintain its effectiveness and practicality.

Figure 2 shows the main topics studied using the hedonic price method in China. These topics are divided into four categories: niche topics, emerging or declining topics, automotive topics, and basic topics. This topic map shows the importance, maturity, and development trend of these topics in the research field. Niche topics are closely connected internally, but have fewer connections with other fields, indicating that these fields still have a lot of room for development. Emerging or declining topics are currently less studied, but may have development potential in the future. The automotive topic is a hot area in current research. Although the basic topics are important, the current research is not in-depth enough.

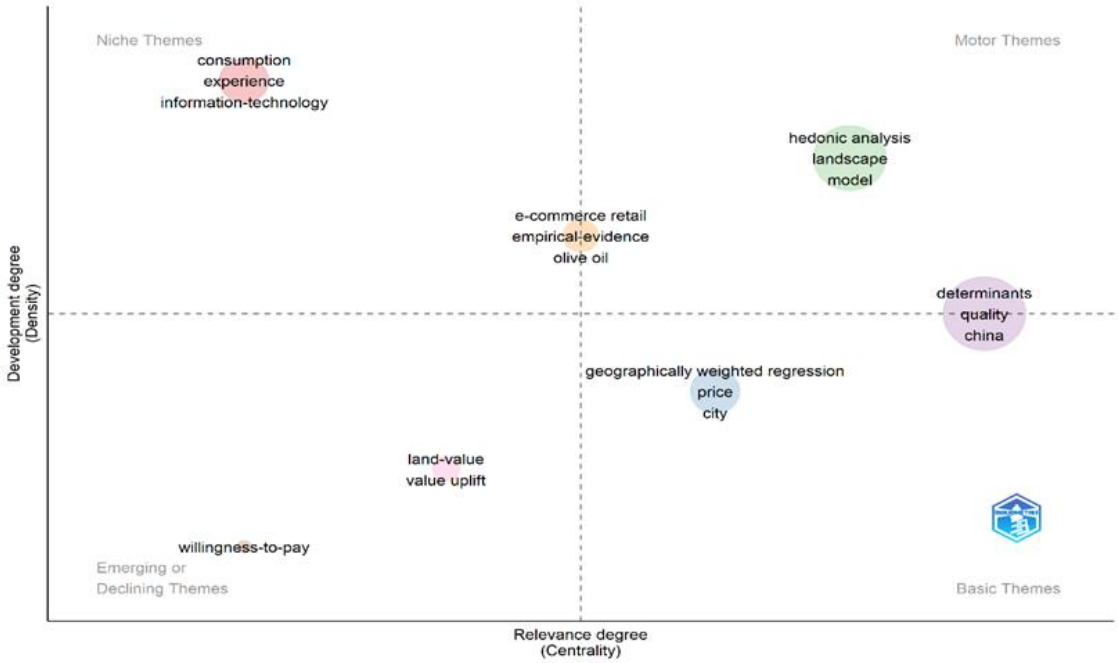

Fig. 2. Thematic map of the hedonic price method research[1]

Рис. 2. Тематическая карта исследований по методике гедонистических цен

[1] Составлен авторами.

Figure 3 shows the main themes of research on China's contingent valuation methods, which are divided into four parts. Niche themes are closely related but not connected to other fields, like isolated islands. Some emerging or fading themes have not yet formed a complete research system, but they have great research potential. The motor theme is particularly important in China's contingent valuation research and is the mainstream of current research, focusing on applications such as ecological restoration. Although the basic themes are important, they are not mature enough and the research results are not complete, which means that these areas may become the focus of research in the future.

The use of the TEV framework allows us to have a more comprehensive understanding of the economic value of China's environmental quality. Unlike traditional valuation tools that only focus on direct use value, the TEV framework considers multiple aspects of environmental value, including indirect value and non-use value. This comprehensive approach highlights the huge economic benefits of TEV valuation, which are often overlooked in traditional analysis. Figures 2 and 3 show the research focus of the hedonic price method and the contingent valuation method, respectively, and reveal the current status and shortcomings of environmental economic valuation by identifying different research themes. This emphasizes the importance of adopting a more comprehensive and inclusive valuation framework proposed by the TEV conceptual model.

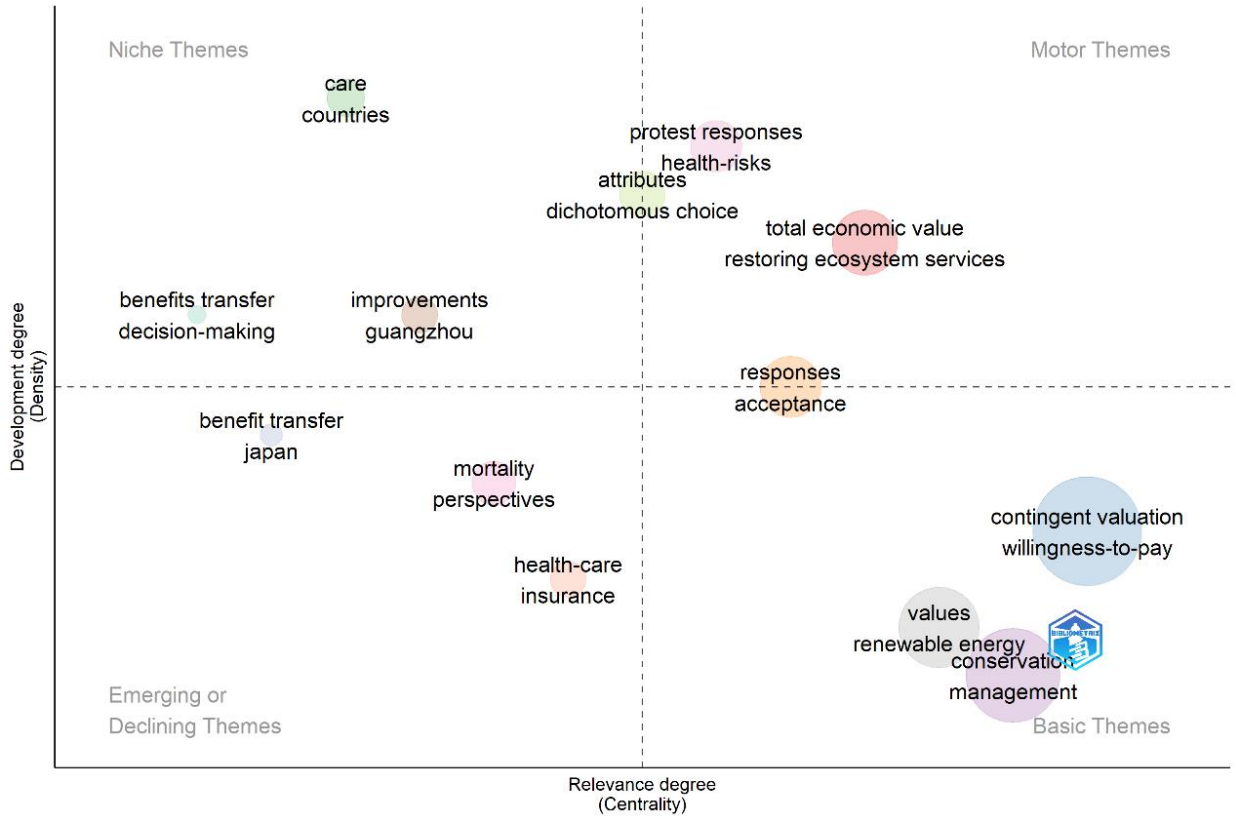

Fig. 3. Thematic Map of Research on Contingent Valuation Methods[1]

Рис. 3. Тематическая карта исследований методом условной оценки

[1] Составлен авторами.

Discussion

Incorporating policy impacts into a conceptual model based on TEV helps to capture the economic value of environmental quality in China in greater depth. By analyzing how public behavior responds to government policies, the model is able to more accurately assess the economic benefits of environmental quality improvement. This holistic approach ensures that policy decisions are based on an in-depth understanding of the direct and indirect economic impacts of environmental quality.

Government subsidies and incentives are critical to promoting sustainable behavior. For example, subsidies for electric vehicles can reduce the cost of purchasing and using electric vehicles, which is a great incentive for consumers. Such policies not only reduce air pollution because there are fewer gasoline cars on the road, but also promote technological innovation in the automotive industry. The TEV framework helps us calculate the economic benefits of these subsidies, including not only the value that can be seen in the market, but also those that are not easy to see directly, such as improved public health and reduced greenhouse gas emissions. This TEV-based model also emphasizes the importance of environmental protection activities. Policies aimed at reducing pollution, improving wastewater treatment, and promoting sustainable practices can greatly improve environmental quality. By incorporating TEV into the evaluation of these activities, decision makers can more clearly see the pros and cons and interactions between economic development and environmental protection.

Raising public awareness of the economic value of natural resources and the determination to participate in natural resource management is essential for the formulation of successful environmental policies. Through ecological value education, people can recognize the comprehensive benefits of a healthy ecosystem, such as providing recreational opportunities and protecting species diversity. By making the benefits of environmental protection concrete, people's understanding and support for the environment can be enhanced.

The adoption of ecological values will not only have an integrated design in policy making, but will also increase the gross national product and quality of life. By incorporating ecological values into the national economic evaluation system, we can ensure that we know why humans should survive in the process of population growth and wealth pursuit, and we can also make humans have a better quality of life and happiness.

Future research should focus on improving TEV-based valuation methods for a wider range of environmental problems, which will include the specification of non-market valuations in standard TEV methods, improvements in the integration of spatiotemporal data, and the resolution of uncertainty in the valuation of ecosystem services. Valuable information about its practical utility and effectiveness can be obtained through a series of empirical studies applying the TEV framework. Interdisciplinary collaboration is essential to advance environmental economic valuation research. Integrated perspectives from ecology, economics, and social sciences will make valuation methods more robust and will effectively support more comprehensive and more effective approaches to environmental policy problems.

Conclusion

Air pollution, water pollution, and soil degradation within China reflect the urgency of strengthening assessment tools that can broadly capture the multidimensionality of environmental quality. This study provides a key link in the development of a flexible conceptual framework for systematic ecological and economic assessments to mitigate such challenges.

The total economic value-based approach described in this paper will provide a complete framework for conducting ecological and economic assessments, which in turn will inform sustainable development policies, aiming to improve the effectiveness of environmental policies by addressing the limitations of existing policies. It is also important to address the shortcomings of current methodological tools so that the proposed model can cover environmental quality, economic assessment of environmental resources, and sustainable development, thereby providing a clearer and more complete view of environmental quality within its territory and helping to formulate more informed and effective actions. The framework comprehensively and flexibly strengthens the capacity for sustainable development planning and policy making.

**Список источников /
References**

1. Wang, K. *The effect of environmental regulation on air quality: A study of new ambient air quality standards in China* / K. Wang, H. Yin, Y. Chen. J. Cleaner Prod. 2019; 215: 268-279 – DOI 10.1016/j.jclepro.2019.01.061.

2. Libin N., Lazareva E. I. The Strategy of Environmental Protection of Chinese Regions in the Context of Achieving Sustainable Development Goals. Вестник высших учебных заведений. Северо-Кавказский регион. Общественные науки. 2022; 2 (214): 112-119. [*Bulletin of hgher education institutes. Northern-Caucasus region. Social sciences*. 2022; 2(214):112-119]

3. Zhou, Y. et al. Improving water quality in China: Environmental investment pays dividends. *Water Resources.* 2017;(118):152–159. DOI 10.1016/j.watres.2017.04.035

4. Loomisa J. et al. Measuring the total economic value of restoring ecosystem services in an impaired river basin: results from a contingent valuation survey. *Economics of Water Resources*. 2004. Routledge.

5. Lazareva E., Karaycheva O. Natural Capital from the «Green» Economy of Sustainable Innovation Development Perspective Managing Identification: an Instrumental View. *SGEM 2018 Conference proceedings.* 2018: 693-700. DOI: 10.5593/sgemsocial2018/1.3/S04.085.

6. Лазарева Е. И., Анопченко Т. Ю. Эконометрическая оценка инвестиционной привлекательности как основа формирования кластерной инвестиционной стратегии региона. Вестник Самарского государственного экономического университета. 2016;5(139):21–26. [Lazareva E. I., Anopchenko T. Yu. Econometric assessment of investment attractiveness as the basis for the formation of a cluster investment strategy in the region. *Bulletin of the Samara State University of Economics.* 2016;5(139):21–26 (In Russ.)].

7. Lazareva E., Anopchenko T., Murzin A. Human Capital in the System of Urban Territory Sustainable Development Management. *Green Technologies and Infrastructure to Enhance Urban Ecosystem Services: Proceedings of the Smart and Sustainable Cities Conference 2018.* Cham, 2020: 269-277.

8. Kadekodi G.K. Valuation of natural resources: What have we learnt from Indian experience? *Indian Journal of Agricultural Economics*. 2001; 56: 285-312.

9. Haab T. C., McConnell K. E. *Valuing environmental and natural resources: the econometrics of non-market valuation.* 2002. Edward Elgar Publishing.

10. Kuosmanen T., Kortelainen M. Valuing environmental factors in cost-benefit analysis using data envelopment analysis. *Ecolog. Econ.* 2007;(62): 56-65. DOI 10.1016/j.ecolecon.2007.01.004.

11. Nijkamp P., Vindign, G., Nunes, P.A.L.D. Economic valuation of biodiversity: A comparative study. *Ecolog. Econ.* 2008;(67):217–231. DOI 10.1016/j.ecolecon.2008.03.003.

12. Plottu E., Plottu B. The concept of Total Economic Value of environment: A reconsideration within a hierarchical rationality. *Ecolog. Econ.* 2007;(61):52-61 2007. DOI 10.1016/j.ecolecon.2006.09.027.

13. Aryal K. et al. Perceived importance and economic valuation of ecosystem services in Ghodaghodi wetland of Nepal. *Land Use Policy.* 2021;(106):105450. DOI 10.1016/j.landusepol.2021.105450.

14. Taye F.A. et al. The economic values of global forest ecosystem services: A meta-analysis. *Ecolog. Econ.* 2021;(189): 107145. DOI 10.1016/j.ecolecon.2021.107145.

15. Su C.-W., Song Y., Umar M. Financial aspects of marine economic growth: From the perspective of coastal provinces and regions in China. *Ocean Coast. Manage.* 2021; 204: 105550. DOI 10.1016/j.ocecoaman.2021.105550.

16. Rosen S.: Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *J. Polit. Economy.* 1974;(82):34-55. DOI 10.1086/260169.

17. Dong Y. Valuing the Ecological Quality of the Urban Environment Using Hedonic Pricing Method. Государственное и муниципальное управление. Ученые записки. [*State and Municipal Management. Scholar Notes].* 2022;(2):272–280.

18. Kroes E. P., Sheldon R. J. Stated Preference Methods: An Introduction. *Journal of Transport Economics and Policy.* 1988;(22):11-25.

19. Amirnejad H. et al. Estimating the existence value of north forests of Iran by using a contingent valuation method. *Ecolog. Econ.* 2006;(58):665–675. DOI: 10.1016/j.ecolecon.2005.08.015.

20. Jin M. et al. Estimating the Preservation Value of World Heritage Site Using Contingent Valuation Method: The Case of the Li River, China. *Sustainability.* 2019;(11):1100 DOI: 10.3390/su11041100.

21. Dong Y. Analysis of Consumers' Willingness to Accept of Government Subsidies for Electric Vehicles. Transp. Res. Procedia. 2022;(61):90–97. DOI: 10.1016/j.trpro.2022.01.016.

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Вклад авторов: все авторы сделали эквивалентный вклад в подготовку публикации. Авторы заявляют об отсутствии конфликта интересов.
Contribution of the authors: the authors contributed equally to this article. The authors declare no conflicts of interests.

Статья поступила в редакцию 22.10.2024; одобрена после рецензирования 25.11.2024; принята к публикации 26.11.2024.
The article was submitted 22.10.2024; approved after reviewing 25.11.2024; accepted for publication 26.11.2024.