

Stakeholder Participation for Nature-Based Solutions: Inspiration for Rural Area's Sustainability in China

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Abstract: Due to the current pressure of rural modernization and industrialization, rural areas are facing social and environmental challenges such as a lack of cultural identity, low democratic participation, and the destruction of landscape ecology, especially in China, a large and representative developing country. The nature-based solutions (NbS) approach states that achieving the multiple benefits of nature for health and well-being requires wider stakeholder collaboration and integration of nature into the policies. Although many scholars have argued that NbS have a significant positive contribution to sustainability in rural areas, there is still a lack of clear pathways for NbS to guide farmer participation and address environmental issues. This paper first summarizes the theoretical research and practical experience of stakeholder participation for NbS through a systematic review. The literature analysis is mainly conducted from five perspectives: policies, benefits, challenges, methods, and frameworks. Combined with the “farmers as the main body” principle of China’s rural revitalization strategy, this study proposes to (1) stimulate farmers’ awareness of environmental protection; (2) enhance farmers’ participation and sense of ownership; (3) enhance farmers’ ability to take action to improve the ecological environment; and (4) integrate eco-design into their lives, make environmental protection education deeply rooted in people’s hearts, and cultivate green farmers.

Keywords: nature-based solutions; stakeholder participation; ecosystem; rural area sustainability; rural spatial regeneration; ecological civilization; China



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1. Introduction

With rapid socioeconomic development and climate change, rural areas face a series of challenges such as excessive consumption of resources, serious environmental pollution, and accelerated degradation of ecosystems, etc. The sustainability of rural areas has become a recognized global problem [1], especially with respect to the dramatic changes in the rural ecology of China and other developing countries [2]. Humankind urgently needs a nature-based and ecosystem approach with which to address the global challenges linked to climate change, sustainable energy, food security, and economic and social development [3]. In recent years, Nature-based Solutions (NbS) have become a mainstream approach to addressing the challenges, leading to synergistic environmental, social, and economic benefits [4]. NbS advocate that humans are part of nature and not separate from nature [5]. Moreover, the application of NbS can contribute to region resilience and ecosystem restoration [6].

NbS encourage policy-makers and decision-makers to think more scientifically and adopt co-designed and co-developed solutions to enhance sustainability [7]. Public support is critical to the effective implementation of responses to environmental problems [8]. With the increasing use of NbS, co-designing and implementing NbS have already been undertaken, and several reviews have summarized and classified barriers, mainly in urban settings [9,10], such as Frantzsakaki [11], who summarizes seven lessons for cities implementing NbS through a cross-case comparative analysis. However, NbS is still a

new concept, with both opportunities and challenges [12]. There are still few publications on the collaborative planning, stakeholder perceptions, and co-implementation of NbS in rural areas [9].

In the world's largest developing country, China, due to the rapid urbanization and industrialization of the countryside [13], environmental problems, such as air pollution, food safety, water pollution, and ecosystem degradation [14], have seriously affected the quality of life and happiness of farmers; thus, ecological problems have become an urgent challenge for China's rural construction [15]. Moreover, rural construction work mostly relies heavily on the "government leading type" [16], which causes farmers to be ignored and seriously affects their motivation, interaction, and creativity [17]. Furthermore, due to the pursuit of modern style construction, the unique, humanistic characteristics and spatial qualities of rural areas have been destroyed [18]. Meanwhile, in developing countries such as China, farmers' lack of education and low awareness of environmental protection [19], as well as the limited technical skills of grassroots organizers, also greatly constrain farmers' ability to participation [20]. In summary, these are the reasons why this study chose China as the main topic.

Nature-based solutions (NbS) are based on the principle of "seeking reciprocity between humans and ecosystems" [7], which is consistent with China's ecological civilization goals, such as "clear waters and lush mountains are invaluable assets" and "mountains, water, forests, fields, lakes, grasses, and sands are a community of life" [21]. Meanwhile, the Chinese government has come out with many environmental policies, such as the following: the "Leading Rural Revitalization with Green Development", which points out that a good ecological environment is the greatest advantage and valuable asset of the countryside [22]; the "Building a Beautiful Countryside with Good Ecology and Livability", which emphasizes that the majority of farmers should gain a sense of happiness in the revitalization of the countryside [23]; and "China's 14th Five-Year Plan", which proposes to promote green development and the harmonious coexistence of humans and nature [24]. In 2019, at the UN Climate Action Summit, China and New Zealand co-lead the advancement of NbS as the main tool for achieving global sustainable development [25]. In 2021, the Ministry of Natural Resources of China and IUCN published the "IUCN Global Standard for Nature-based Solutions (Chinese Language)". Kongjian Yu's team "Wang Shan Life" project in Xunjiansi village was included with the "Typical Case of Nature-based Solutions in Practice in China". Luo [26] proposed to combine the idea of ecological civilization with NbS and to build a beautiful countryside in which "people and nature live in harmony".

In conclusion, although NbS have gained a broad consensus among researchers and policy-makers around the worldwide; nevertheless, the role and potential of NbS to address the many factors and mechanisms involved with rural sustainable development processes remains to be further researched and defined. Moreover, NbS is still at the beginning stage in China; China's ongoing process of developing "Ecological Civilization" and "Beautiful Countryside Construction" urgently requires the implementation of NbS. Thus, it is the complexity that makes China a typical research subject for analyzing NbS with respect to rural environmental sustainability issues. At present, research about stakeholder participation in NbS is mainly focused on urban areas in Europe, which have accumulated rich experiences and reference cases.

This research will be guided by a systematic review, with a literature analysis focusing on the five aspects of policies, benefits, challenges, methods, and frameworks to explore the theoretical and practical experiences related to these five aspects in the process of stakeholder participation in NbS and to summarize the advantages and disadvantages of these five aspects and their impact on NbS in terms of how to incorporate the relationships between these five aspects; then, we explore stakeholder participation in the implementation of NbS with a view to contributing to the field in future academic discussions, as well as helping to understand and popularize NbS and public participation. Based on this, we will continue to think about the implications for sustainable development for rural areas in China and to contribute to the research on the NbS response to sustainability in rural areas.

2. Methods

The data used in this study were from Scopus data and CNKI, with a data collection time from 2012 to 2022. Compared with other search databases, Scopus has the advantages of higher search efficiency and wider coverage, while CNKI is the most important and commonly used database in China. We used VOSviewer to generate co-occurrence network analysis graphs between keywords for this literature review to help with the later literature analysis and summary. Meanwhile, we also used the preferred reporting items for systematic reviews (PRISMA) methodology as a guideline to ensure the accuracy and observability of the search.

2.1. Research Aims and Search Standard

At first, we undertook this systematic literature review (SLR) to explore stakeholder participation for NbS, aiming to accomplish the following:

1. To construct a systematic analysis of relevant theories and experiences of NbS in different application areas;
2. To gain an in-depth understanding of the conditions and motivations for stakeholder participation for NbS, as well as the advantages and barriers;
3. To explore the implications of stakeholder participation for NbS for sustainable rural development.

Meanwhile, in order to ensure the representativeness and readability of publications, this research specially formulated search criteria as follows:

1. Because NbS is a general term covering various related terms, the literature search should also cover five categories, namely, “ecosystem restoration”, “ecosystem protection”, “ecosystem management”, “specific problem solving”, and “infrastructure construction” and corresponding keywords;
2. We searched with a combination of “stakeholder” or “public” or “resident” or “community” in combination with “participation” or “engagement” or “co-creation” or “co-design” to cover the research topic and avoid confusion caused by overlapping terms omission;
3. Eliminate publications that are less relevant from the research database.

2.2. Literature Search and Identification

In SCOPUS, with the combination of the TITLE-ABST-KEY “nature-based solutions”, TITLE-ABST-KEY (“stakeholder” or “public” or “resident” or “community”), and TITLE-ABST-KEY (“participation” or “engagement” or “co-creation” or “co-design”), the retrieval returned 202 documents, and there are 77 Chinese papers on CNKI with the above topics. Additionally, literature review articles dealing with the topic of NbS but not addressing the issue of stakeholder participation were not included in this systematic review. We used VOSviewer (2020) to generate keyword co-occurrence network analysis graphs in order to analyze the relationships visually between keywords (Figure 1).

Meanwhile, we also endeavored to highlight the main contribution of the current work. We use a combination of the TITLE-ABST-KEY “nature-based solutions” and TITLE-ABST-KEY (“ecosystem restoration” or “ecosystem protection”, or “ecosystem management” or “specific problem solving” or “infrastructure construction”), which has retrieval returned 111 documents (Figure 2).

A total of 390 papers related to NbS were collected in this research. We aim to focus on academic articles and reviews, considering the high quality ensured by the peer-review process. A total of 49 records were excluded by source and document type, such as conference, note, book, letter, etc. Then, we further screened the articles by reading the subject area and theme. We excluded 67 records relevant to topics in microbial science, medicine, physics, chemistry, mathematics, business management, etc., wherein “nature” “based” “solutions” appear in different parts of the article. The data collection process is shown in the PRISMA flow chart (Figure 3).

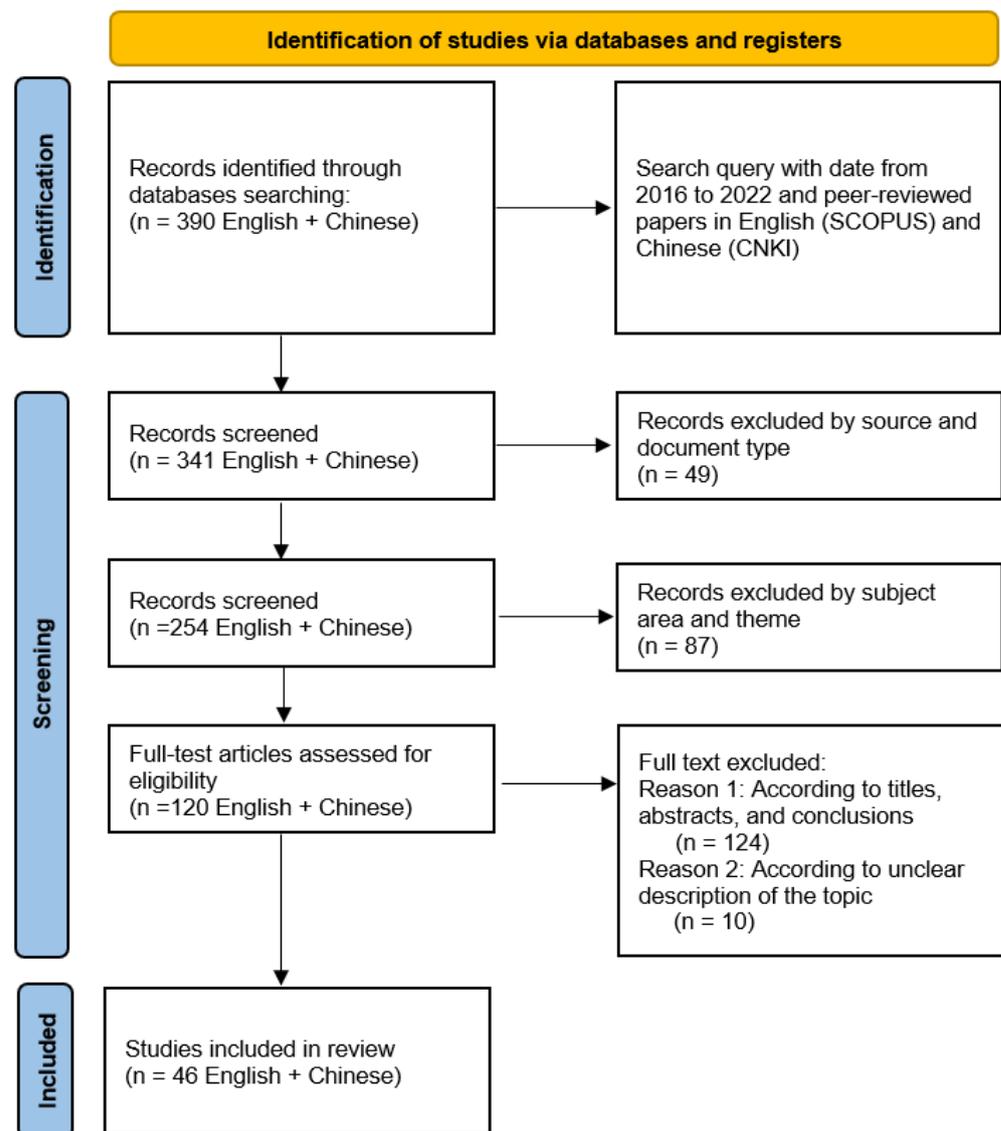


Figure 3. Data collection process.

2.3. Screening and Evaluation

We screened papers based on clear inclusion and exclusion criteria. Regarding the inclusion criteria, the content of public or stakeholder participation for NbS should be clearly stated in the article. Regarding the exclusion criteria, first, by reading the abstracts, we excluded 124 papers that did not provide the basis for public participation and did not meet the requirements; then, by carefully reading the full text of the articles, we again excluded 10 papers with unclear descriptions of the participation process, and those which did not analyze the conditions, motivations, advantages and obstacles of stakeholder participation for NbS. A total of 120 papers were selected. Finally, we carefully selected the most representative 46 papers by manually reading and analyzing the full text in detail, excluding 74 papers that were not in-depth studies or specific in the presentation of stakeholder participation for NbS (policies, benefits, challenges, methods, frameworks).

3. Results

3.1. General Results for NbS Research Perspectives and Progress

The literature review concludes that the existing research process on NbS mainly considers five aspects: policies, benefits, challenges, methods, and frameworks. The study found that NbS research is relatively abundant in the introduction and publicity of policies,

but there is still a lack of in-depth research, such as studies on how to mobilize the public's participation motivation, how to solve future challenges, specific implementation methods, supervision, management frameworks for sustainable development, and replication exploration. It is a meaningful and necessary research direction by which to promote the implementation and development of the policy, encourage indigenous and interdisciplinary professionals to participate in the collaboration, and overcome the challenges in order to systematically study and summarize the implementation pathways of NbS for rural sustainability.

In order to present the characteristics of different research levels more intuitively, we have summarized the specific relevant typical content and references of the five aspects of policies, benefits, challenges, methods, and frameworks.

3.2. Policies of Participation for NbS

3.2.1. Definitions of NbS

NbS are increasingly being referred to in academic research and in the future planning of government policy [27,28]. NbS is not a new concept; it is a broad umbrella term that covers already relevant approaches [28]; for example, there are five main categories: ecosystem restoration, ecosystem conservation, ecosystem management, solving specific problems, and infrastructure [29].

In the late 2000s, NbS were first introduced by the World Bank and the International Union for Conservation of Nature to enhance the global response with respect to biodiversity conservation and climate change programmes [30]. Moreover, NbS has become an important part of the EU's research and innovation agenda; in 2015, the European Commission implemented this concept into "Horizon 2020" [31].

The definition of "Nature-based Solutions (NbS)" has evolved over the years, mainly shaped by IUCN and the EU Commission. NbS was first defined by the IUCN, who described NbS as: "Actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges (e.g., climate change, food and water security or natural disasters) effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits" [32]. The definition from the IUCN is more focused on the natural aspects, considering "the potential power of nature and the solutions it can provide to global challenges in fields such as climate change, food security, social and economic development. Healthy, diverse and well managed ecosystems lay the foundation for practical solutions to global problems" [33].

The earliest EU Commission defined NbS as "NbS are actions which are inspired by, supported by or copied from nature". Recently, the EU Commission defined NbS as "Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social, and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions." [34]. The European Commission's definition is more focused on the economic benefits of NbS and the potential to produce more opportunities for employment, emphasizing that "NbS harness the power and sophistication of nature to turn environmental, social and economic challenges into innovation opportunities" [34] (Table 1).

3.2.2. Potentials

Based on the overall goal of addressing global social challenges and achieving comprehensive sustainable development goals, NbS have the potential to make an important contribution to the achievement of the goals of the 2030 Agenda for Sustainable Development [35]. The 2030 Agenda for Sustainable Development and the New Urban Agenda were adopted at the UN HABITAT III conference call for sustainable solutions to societal challenges, supported by EU Commission research and innovation policies for nature-based solutions [36]. From there, NbS have been increasingly emphasized as actions to protect, sustainably man-

age, and restore natural or improved ecosystems, and actions to address societal challenges while improving human health and well-being and enhancing biodiversity.

Table 1. Definitions of NbS.

		Definitions of NbS	Authors
IUCN	Actions	Protect and sustainably manage and restore natural, modified ecosystems	[32]
	Address societal challenges	Climate change, food and water security, or natural disasters	
	Provide benefits	Human well-being and biodiversity benefits	
	Emphasis	The potential power of nature	
EC	Origan	Inspired and supported by nature	[34]
	Provide benefits	Cost-effective, simultaneously provide environmental, social, and economic benefits and help build resilience	

In recent years, the relationship between NbS and community resilience and the potential of NbS for cross-disciplinary public co-creation have been increasing [11]. Moreover, the EU Commission is exploring innovative science policy mechanisms that promote social participation [35]. Moreover, the EU’s research and innovation (R&I) program has fostered interdisciplinary R&I and stakeholder communities with the goal to build a public platform for the exchange of knowledge and practical experience [35]. With the implementation of R&I projects, NbS is expected to become a mainstream measure at the planning and environmental management policy level in the future, but there are still many processes to be conducted [37].

3.2.3. Participation for NbS

The topic of participation in environmental planning has been actively discussed in academic contexts. Refs. [32,36] pointed that people have great potential and play an important role in the protection and management of natural ecosystems. In the Global Standard for NbS, the IUCN has proposed eight principles for NbS implementation, the fourth clearly states “fairness, transparency and broad participation” [29]. The European Commission’s (2021) handbook for practitioners evaluating the impact of NbS contains a specific explanation for “participatory planning and governance” among the 12 social challenges [31]. The European Commission proposes to enhance support for the social, political, and financial aspects of NbS, to advocate for participatory planning and the governance of NbS, and to emphasize the necessity of innovation and continuous learning, interdisciplinary collaboration, and citizen participation [31,37].

Moreover, NbS in different parts of the world mainly use bottom-up models to address environmental challenges at different scales, while ensuring that citizens and their communities achieve equity and sustainability in the planning and design processes [5]. It is imperative that planners adopt an open approach that encourages actors from different sectors to collaboratively govern NbS to ensure inclusivity, livability, and resilience [11]. For example, Think Nature (Call no. H2020-SC5-2016-OneStageB; 2016–2019) is funded by the H2020 research program, with the main objective to develop a multi-stakeholder communication platform that gathers multi-disciplinary scientific expertise, policy, business, and society, as well as citizens, to support the understanding and promotion of NbS at a local, regional, EU and international level [3]; thus, urban areas have comprised mainstream NbS research. Meanwhile, the effects and promotion about NbS in rural landscapes are also gradually being placed on the agenda [10].

3.3. Benefits of Participation for NbS

The benefits of stakeholder participation for NbS have long been the topic of discussion by scholars. Here, we summarize the experiences from five perspectives.

(a) Environmental benefits: stakeholder participation for NbS can promote the assessment of environmental risks and help restore and protect ecosystems [29,38–40]. (b) Economic benefits: stakeholder participation for NbS can enhance economy, stimulate a green economy, and provide green jobs [4,11,27,41]. (c) Social benefits: increasing stakeholder participation for NbS can contribute to citizen autonomy, such as by improving health and well-being, enhancing community cohesion, and strengthening cultural and spiritual values [42,43]. (d) Policy benefits: Involving stakeholder participation can help improve their understanding and trust of the decision-making process [44] so that they can offer constructive ideas and suggestions that will ultimately improve the planning and promote the implementation of the decision [41]. Moreover, stakeholder participation in interdisciplinary governance processes can enhance fairness and acceptance, which strengthens the legitimacy and democracy of the process, as well as, ultimately, sustainability [41]. (e) Citizens' benefits: Participation ensures a sense of citizen ownership of the project planning process and results [45,46]. In addition, participation can raise the ecological awareness of citizens. Some people may be motivated to participate in NbS for ethical and moral reasons, such as a sense of responsibility to protect and conserve the natural world for future generations.

Overall, stakeholder participation for NbS can help address a range of environmental challenges while providing a variety of benefits to individuals, communities, and ecosystems from practical economic benefits to more abstract ethical and moral considerations. Table 2 summarizes these benefits.

Table 2. Benefits of stakeholder participation for NbS.

Benefits	Factors	Authors
Environmental benefits	Help restore and protect ecosystems	[29,38–40]
Economic benefits	Stimulate a green economy and provide green jobs	[4,11,27,36,41]
Social benefits	Improving health and well-being, enhancing community cohesion, strengthening cultural and spiritual values	[11,29,42,43]
policy benefits	Improve citizens understanding and trust of the decision-making	[11,44]
citizens benefits	Strengthens the legitimacy and democracy	[45,46]

3.4. Challenges and Barriers of Participation for NBS

However, NbS remains an ambiguous category that lacks operational rigor [41]. When stakeholders, such as experts, academics, government managers, and indigenous people from different fields, give solutions to the same problem, disagreements often arise [47,48]. Discussing the difficulties and barriers faced by stakeholder participation for NbS is a key topic, and research scholars have studied and discussed it from different backgrounds and perspectives. Here, we explain it from two perspectives: local government institutions and stakeholders. Among them, the lack of ecological awareness, as well as professional knowledge and skills, funding, and policy support are the most discussed. According to research, due to different societies and times, young people are more willing to participate in public activities than old people [49]. At the same time, there are also significant differences in citizens' cognition due to economic and material levels. In areas with relatively backward economic levels, people's awareness of the ecological environment is weak and their participation is low [50]. Meanwhile, the research found that active citizens, to a large extent, come from people with higher levels of education, and who are more likely to accept and understand spatial participation in action [43]. People with similar values, beliefs, and interests are more likely to facilitate the feasibility and effectiveness of stakeholder participation [51].

When the cost of maintaining public space is reduced by government funding, the expected effect of participation is greatly diminished [52]. The participation process of stakeholders, such as government officers, designers, community leaders and local residents, needs regular coordination, maintenance, and supervision [50]. The lack of knowledge interaction among stakeholders presents further challenges in addressing sustainability issues in public spaces [48]. Research shows that traditional stakeholder participation is common in NbS models but less common in the form of deeper participation, where the stakeholder is empowered to lead [5]. For example, some forms of symbolism impose invisible restrictions on the structures of participation, leading to the exploitation and alienation of citizens' benefits [39]. In conclusion, it is necessary to appeal for more engaging program designs and funding schemes, inspiring confidence among participants, building bridges of trust, and increasing opportunities for stakeholder participation [53]. On the other hand, providing citizens with power, adequate funding, and a platform with the potential for development will greatly increase creativity and the motivation to participate [39]. Other challenges, such as lack of motivation, cohesion, maintenance, and regulation, are also worthy of attention in helping us understand the challenges of stakeholder participation for NbS (Table 3).

Table 3. Challenges and barriers of participation for NBS.

Aspects	Challenges and Barriers	Factors	Authors
Local government institutions	Outdated technology	Lack of professional technical guidance support	[28,36,39,41,47]
	Lack of support from resources	Shortage of policy, funding, and manpower	[5,11,28,29,39,48,50,52–54]
	Lack of maintenance and regulation	Lack of supporting and mature working conditions and operating structure	[41,48,50,55]
Stakeholder	Cognitive gaps	Low levels of ecological awareness among the underclass because of different education, income, age, etc.	[11,28,39,41,43,47,48,50,51,53,56,57]
	Lack of motivation	Awareness of public participation and not actively making changes	[11,28,48,50,58]
	Unsatisfactory results	Disappointed that participation fails to truly influence decision-making	[11,28,39,48,53,56,59]
	Lack of cohesion	Mutual divergence of benefits caused by different personal preferences, experiences, and habits	[28,29,39,41]

3.5. Methods/Tools of Participation for NBS

The process of stakeholder participation has traditionally used survey methods (e.g., field studies, interviews, meetings, and questionnaires) for information gathering. Moreover, role-playing and games are used to increase interest and awareness with respect to stakeholder participation. The advantage of these activities is that they will clearly enhance the openness and transparency of democracy; the disadvantage is that citizens have less initiative in participating at the early and later stages of developing or evaluating solutions, wherein they would be involved in the decision-making process in a meaningful capacity [37].

An increasing number of projects are addressing sustainability challenge problems such as mobility, air quality, and spatial regeneration via the co-design/creation of platforms [60]. The co-production strategies denote a process that involves citizens as professionals, i.e., on the same footing as planners, politicians, experts, institutional and private sector stakeholders, to making decisions together [43,61]. Torfing [62] even suggested that the public sector has been transformed from a policy maker and implementer to an arena of co-design/creation, as co-design/creation emphasizes the opening of government institutions to accept the needs and preferences of citizens, thus enhancing their trust of the public sector [63]. According to [11], co-design/creation with stakeholders will lead to a positive effect for the development of NbS design strategy.

In recent years, “urban living labs” have become a popular development approach aimed at promoting experimentation and innovation through stakeholder participation in enhancing sustainable urban transformation [64]. Living labs offers a flexible governance approach that coordinates collaboration among stakeholders (including companies, research teams, public sector representatives, and citizens) to provide the suitable environment for co-creation [65]. Moreover, programs such as Horizon 2020 promote the use of Living Labs in the NbS field and may help to systematize and build bottom-up processes [9]. Remme [37] concluded that with the support of NbS, the Living Lab will hopefully create a platform for equal exchange in rural areas to enhance trust and understanding with respect to stakeholder’s co-creation.

With the rapid development of the Internet, more and more citizens are participating in political life through digital tools, for example, through the Public Participation Geographic Information System (PPGIS) [66,67], Virtual tools [68], Geo-questionnaires [69], 3D visualization [70], and social media [71,72]. Digital tools can be a tool for both engagement and the promoting of new perceptions of the natural environment, which can lead to increased citizen support for nature policy. For example, technological innovations such as webcams and drones offer a wide range of new possibilities for people to experience nature, alongside some virtual reality games, which stimulate many stakeholders to participate [73]. Moreover, social media serves as a tool and platform for stakeholders to share opinions, experiences, and perspectives (e.g., blogs, tweets, or shakes, etc.), coordinating relationships and making interactions more accessible. Therefore, digital tools will become the tools with the potential to develop collaboration and interaction between NbS stakeholders.

Within natural resource management and policy, social learning is increasingly becoming a normative goal [55]. Social learning emphasizes stakeholder participation and collaboration. According to [74], Learning Alliances (LA) can achieve effective participation through social learning and jointly promote change in order to provide multi-benefit solutions to environmental problems. For example, Benson et al. [75] analyzed the stakeholder participation process in UK flood risk management through the lens of “individual-community interaction” and evaluated whether it contributes to increased stakeholder participation through social learning (Table 4).

Other scholars have adopted the citizen science method; for example, Cárdenas et al. [76], through citizen science, used survey data from 1955 participants from 17 cities around the world to explore the relationship between participants’ behavior in engaging with NbS and their perceptions of, and motivations with respect to, sustainability.

Table 4. Methods/tools of participation for NBS.

Methods/Tools	Factors	Authors
Traditional Survey Methods	Field studies	[36,37,55,67,75,77,78]
	Interviews	
	Meetings	
	Questionnaires	
Co-design/creation		[43,60–62]
Living Labs		[11,37,46,63–65]
Digital tools	PPGIS	[66,67]
	Virtual tools	[68,73]
	Geo-questionnaires	[69]
	Social media	[71,72]
	3D visualization	[70,79]
Social learning	Learning Alliances (LA)	[74,75]
	Citizen science	[76]

3.6. The Frameworks of Participation in NbS

The study of the framework involved in NbS has been a hot topic. Scholars have given different perspectives on the key elements of participation for NbS frameworks, such as time nodes, interaction mechanisms, and actor power.

Some of the key questions in the process of stakeholder participation in collaborative governance center on at which stage of the process they should start participation and the extent of their influence on the decision-making process. The controversy regarding the participation in the interaction management process in NbS focuses on the form in which different participants interact. Through literature research, we summarize the following four types: top-down, bottom-up, combining top and bottom, and cross-sector collaboration.

In the top-down policy making process, the government plays an important role, and there is an administrative and command relationship between the top and the bottom, with the top being responsible for decision making and the bottom responsible for policy implementation, which is itself conducive to policy implementation. However, this model also shows strong drawbacks: (1) emphasizing the central role of the government in the policy implementation process, it is easy to ignore the role of primary policy implementers and target groups; (2) it is difficult to determine the causal link between policy actions and the subsequent results by starting from the goals of policy-makers only. As described by Buijs et al. [43], top-down projects have some benefits in the initial stage based on government funding and technical staff support, but it is difficult for citizens to truly participate due to the low participation and weak self-organization capacity at the bottom.

The bottom-up model, which emphasizes empowering bottom organizations and citizens to make decisions on their own, is conducive to promoting communication and exchange between citizens and non-government actors, but it tends to create an imbalance that reinforces the bottom but neglects the center [59].

The “combining top and bottom” approach refers to the combination of top-down and bottom-up approaches to form an organic whole. This approach brings out the exploratory spirit of the bottom while relying on powerful support from the top to quickly disseminate successful experiences from the bottom.

Cross-sectoral collaboration: Scholars see promise in a “public participation” approach, which improves stakeholder communication through the intervention of expert mediators [80]. This approach uses new forms of communication, such as art, performance, or new media, to facilitate collaboration among stakeholders. For example, the International Society of Arboriculture uses community education to bridge the gap between different stakeholders by creating a collaborative platform between experts and clients to jointly facilitate effective knowledge transfer between them and thus improve collaborative relationships [81].

One of the key questions about the process of engaging in NbS collaborative governance is the question of the best time for participants to participate. Newig et al. [47] believes that when stakeholders show a strong tendency to participate, the role of participants can be maximized, at the same time helping to enhance awareness of environmental issues. De Leiuen & Arthure [82] ranks the degree of community involvement from low to high as inform, consult, involve, collaborate, and empower. Li, J et al. [83] also suggested that citizens’ participation should not only be between informing and consulting; citizens should be encouraged to participate in the whole cycle process; i.e., we should fully consider the interests of residents and incorporate them into the decision-making process so that the project can achieve better results.

Another key issue is the power and status of citizens in the participation process. Li, J et al. [83] found that residents are willing to participate; however, because they lack confidence in whether their voices will be accepted, they only participate symbolically in the participation process.

4. Discussion

4.1. Relationship between Policies, Benefits, Challenges, Methods, and Frameworks for NbS

Although most scholars have discussed the five aspects of stakeholder participation for NbS, in actual case practice, the vast majority of existing research may have considered only one to three of the following aspects: policies, benefits, challenges, methods, and frameworks. Because each aspect is not only an important part of NbS practice and research but also interdependent with the others, it is possible to understand stakeholder participation for NbS as a whole in terms of these five aspects. We contend that the implementation of a framework for stakeholder participation for NbS should be jointly determined by policies, benefits, challenges, and methods. The intensification of social conflicts has aroused the attention of policies; then, the issuance of policies affects the development of the interests of all parties. In the process of promoting the development of new policies, we will face many challenges. Different application frameworks are produced under the multiple cooperation of methods; meanwhile, the frameworks are supported and promoted by policies, and the frameworks will also be ultimately maintained and guaranteed, and benefits will be supervised. How to combine the relationship between these five factors and think about the implementation methods for stakeholder participation for NbS are among the important development trends in the future.

Existing stakeholder participation for NbS practice and research often directly connects policies and frameworks and lacks collaborative thinking on the five. Only a few studies have adopted multiple perspectives; for example, Raymond [4] developed an overall framework with a seven-stage process for implementing co-benefit assessments of NbS in urban areas, including the following: “(1) identification of problems or opportunities, (2) selection and evaluation of NbS and related actions, (3) design NbS implementation processes, (4) implement NbS, (5) frequently engage stakeholders and communicate co-benefits, (6) transfer or upscale NbS, (7) monitor and evaluate co-benefits across all stages.” Based on these seven stages, Frantzeskaki [11] gives seven overarching lessons on how to planning NbS in cities: “(1) NbS should attract citizens aesthetically, (2) NbS can bring public Spatial regeneration, (3) experimenting with NbS requires confidence in local government and experimentation process itself, (4) co-creating NbS requires diversity and learning from social innovation, (5) NbS requires collaborative governance, (6) NbS is inclusive and adaptable to multiple species regions, (7) designing NbS for long-term learning and replication.”

In addition, reviewing the overall research, policy-makers are still included among decision-makers, and research on the perspective of participation of local indigenous people still needs to be explored and practiced.

4.2. NbS Inspiration for Sustainable Development for Rural Areas in China

NbS emphasize the integration of protection and restoration and promote the sustainable management of ecosystems and the harmonious coexistence of humans and nature. It is highly compatible with China’s philosophy of promoting an ecological civilization [84]. Therefore, NbS are applicable to China’s land management, as well as the protection and restoration of ecosystems such as forests, wetlands and farmlands, rural constructions, and urban and rural human settlement renewal.

At the same time, NbS emphasizes the fair and equitable generation of social benefits, the improvement of transparency, and the promotion of broad participation. In order to transform the general concept of NbS into an operable practical strategy, we attempted to propose a potential use of “ecological civilization-rural revitalization-farmer as the main body-expected benefits-comprehensive challenges-implementation methods and tools-operational framework and management standards” based on the synergy of five aspects, namely, policies, benefits, challenges, methods, and frameworks, in order to implement the localized application of NbS for sustainable development in rural areas of China.

Combined with the needs of China’s rural revitalization strategy, we suggest that future Chinese rural NbS policies can be based on ecological civilization, rural revitalization, and the farmer as the main body. China’s sustainable development policy emphasizes

the coordinated development of the economy, society, and environment, and focuses on protecting ecological environment and promoting social equity and economic development, which profoundly responds to the concept of “clear waters and lush mountains can become invaluable assets” in China’s ecological civilization [83]. Meanwhile, it also responds to the ecological civilization ideology that emphasizes “respect nature, follow nature, protect nature” to achieve “harmonious coexistence between human and nature” to establish a more reasonable ecological environment for human settlement and to make nature and human beings integrate organically to achieve mutual benefit [26]. Ecological civilization is not only the inherent requirement of rural revitalization; it is also the future direction of implementing rural revitalization [25]. Rural revitalization, oriented by ecological civilization, emphasizes building a new model of economic development with green, cyclic, and low-carbon development concepts, leading to new industrialization, new urbanization, and agricultural modernization, as well as promoting rural economic and social development toward well-being and healthy life [85]. The fundamental aim of rural revitalization is to improve the quality of life of the farmer; therefore, the rural revitalization strategy must be implemented with the farmer as the main body, giving full play to the main role of the local farmer and the spirit of innovation, continuously liberating and developing rural social productive forces, as well as stimulating the vitality of rural development [86]. In conclusion, there is a positive relationship between “ecological civilization, rural revitalization and farmers as the main body”, and they are interdependent with each other.

However, policy implementation should first determine the target and scope of its use; otherwise, it will not be possible to achieve the policy objectives. Considering that the aspect of expected benefits is a difficult part of future NbS implementation, we suggest to strengthen both the farmer as the main body and stakeholder participation in order to build a platform in which stakeholders such as policy-makers, interdisciplinary professionals, planners, researchers, village committee leaders, and farmers can work together, and to clarify the action to be implemented according to different tasks’ needs to achieve common benefits, construction, governance, and sharing. The establishment of an interdisciplinary cooperation platform with the farmer as the main body and stakeholders will help to mobilize the enthusiasm, initiative, and creativity of farmers in participating in the construction of villages, as well as to explore regional characteristics and realize localized planning; on the other hand, it will help to convey the needs of stakeholders across all aspects, and in the process of implementation, it will help to bring into play the specialties of various professions and meet comprehensive challenges.

China is characterized by uneven economic development and significant regional differences, especially in rural areas. Therefore, the implementation methods and tools should follow the characteristics of different regions and the needs of different objects and subjects. Finally, the characteristics of different disciplines and industries in different regions should be integrated to develop a distinguished NbS operational framework and management standards, to rely on classified implementation monitoring, to guarantee the stability of policy implementation, and to achieve sustainable development for rural areas.

5. Conclusions

As a holistic and leading concept, NbS has become progressively more diversified and systematic as a starting point in the process of continuously responding to the global demand for sustainable development [1]. Based on stakeholder participation for NbS project collaboration being increasingly recognized as a promising approach, this study first reviews the current findings and outlines stakeholder participation for NbS from five perspectives: policies, benefits, challenges, methods, and frameworks. Although there is a rich amount of corresponding research results, the various research perspectives are scattered; in particular, there is a lack of research on indigenous participation perspectives, which has not yet developed a systematic way of thinking. Second, the value of the review section of this research is to theoretically advocate for the systematic analysis of stakeholder participation for NbS from the five perspectives above, and then to support its application.

Third, by summarizing and clarifying the research perspectives of stakeholder participation for NbS from the perspectives of policies, benefits, challenges, methods, and frameworks, we prevent the comprehensive conceptual scope from blurring the entry point needed for NbS implementation; thus, we expect to solve the current problem of lacking clear paths for stakeholder participation for NbS.

China is a large agricultural country, and the rural area plays an extremely important role in China. Moreover, the majority of China's population are still farmers. Based on the principle of "farmer as the main body" in China's rural revitalization strategy, this study puts forward four suggestions for farmers' participation in the rural spatial regeneration of NbS: (1) to stimulate farmers' awareness of environmental protection; (2) to enhance farmers' participation and sense of ownership; (3) to enhance farmers' ability to take action to improve the eco-environment; (4) to integrate eco-design into their lives, make environmental protection education deeply rooted in people's hearts, and cultivate green farmers. In addition, in order to explore the value of farmers' participation in the rural spatial regeneration of NbS, we still need to think about the following two questions: (1) How do we protect and inherit local cultural characteristics and enhance farmers' sense of honor and belonging? (2) How do we promote the rural economy and farmers' employment through ecological compensation, green finance, cultural creation, ESG (environmental, social, and corporate governance), and other market-oriented operations? By facing up to and exploring these practical problems, the role of NbS in the sustainable development for rural areas in China will become increasingly prominent; then, the balance between economic development and environmental protection will be solved; thus, China's concept of the ecological civilization as when "clear waters and lush mountains can become invaluable assets" will be realized.

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