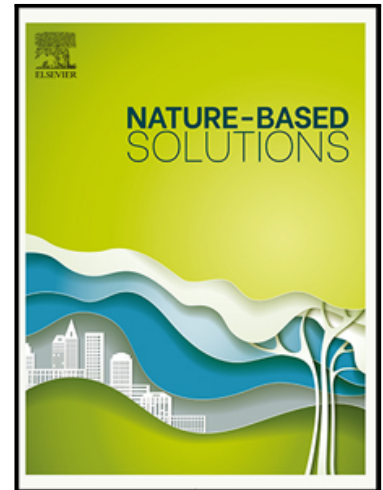


Journal Pre-proof

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PII: S2772-4115(24)00074-0
DOI: <https://doi.org/10.1016/j.nbsj.2024.100183>
Reference: NBSJ 100183



To appear in: *Nature-Based Solutions*

Received date: 21 March 2024
Revised date: 2 September 2024
Accepted date: 12 September 2024

Please cite this article as: Richard Hardiman , Anders Branth Pedersen , Anne Jensen , Kelly Guyu Dai , Carolyn Petersen , Public Participation and NGO activity in Nature-Based Solutions in Urban areas of China, *Nature-Based Solutions* (2024), doi: <https://doi.org/10.1016/j.nbsj.2024.100183>

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Public Participation and NGO activity in Nature-Based Solutions in Urban areas of China

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Keywords: China, Nature-Based Solutions, governance, public participation, NGOs, barriers, enablers.

Nature Based Solutions (journal homepage: www.elsevier.com/locate/nbsj)

Abstract

This paper analyses the degree and types of public participation in Nature-Based Solutions (NBS) projects in China. The paper is based upon the premise that NBS affect multiple aspects of the city as a place for the daily lives and activities of citizens and that NBS implementation can benefit from citizen and stakeholder involvement. NBS thus offer a platform for stimulating engagement between the local government and the public. Case studies are examined through a literature review, site visits, and interviews with researchers, local officials and NGOs in China. The paper indicates that there has been significant progress since the 1990s in formal requirements of public participation through Chinese legislation promoting the inclusiveness of the public in environmental and NBS decision-making, and acknowledgment of the importance of NGOs, however actual implementation of soliciting public opinion and involvement in NBS project design has been more limited. The case studies suggest that the level of involvement of the public in NBS activities and decision-making is the reciprocal of the size of the project, where there is a high-level of involvement in the smaller local projects, but minimal involvement in larger-scale NBS projects.

We find that Public Private Partnerships (PPPs) have a significant potential to help finance NBS projects providing the project can forecast low risk and positive revenue for investors, therefore this model would merit further exploration. However, PPPs may also involve limited public participation by citizens and stakeholders beyond private companies and may therefore require targeted efforts to address local communities' needs and interests. Local people are the most important (and willing) actors and opinionators in projects that directly affect their lives, livelihoods and well-being. The findings highlight the important role of NGOs in promoting and facilitating public participation, and accompanying co-benefits, in several of the Chinese case studies. Our study also suggests that symbiosis between local governments and the citizens could be invoked by local community-based organisations (e.g. Community Resident Committees or similar) that can act as a liaison point and catalyst to public participation in NBS projects, although significant training would also be required.

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1 Introduction

This paper investigates public participation in Nature-Based Solutions (NBS) case studies in China. The case studies were examined through conducting a literature review, site visits, and interviews with researchers, local officials and NGOs in China. The paper is based upon the premise that NBS affect multiple aspects of urban living and activities of citizens, while its implementation can benefit from citizens and stakeholder actions and opinion.

Public participation is a key aspect of governance in environmental decision-making and was stimulated by the UN's Agenda 21 charter adopted at the UN Rio Summit in 1992 concerning the central question: how civil society and the public at large work together with local governments [1]. Public participation in environmental decision-making has become an indelible feature of many environmental regulatory systems world-wide over the past few decades. Individuals and organisations affected by urban development, pollution licences, land use plans and other types of regulatory processes have increasingly demanded greater consultation, and more transparent and accountable decisions [2].

Since the concept of NBS was introduced by the World Bank and IUCN in 2008 [3], it has taken root amongst researchers and practitioners as a means of societal inclusiveness in environmental decision-making and is defined by the IUCN [4] as 'actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits, with common societal challenges cited as being climate change, food security, disaster risks, water security, social and economic development as well as human health'. The emphasis on societal challenges, human well-being and human health brings public participation into the arena as a central component in the governance of NBS.

Governance of NBS take various forms, and an increasing body of knowledge identifies governance aspects to be a crucial element in successful NBS implementation [5], and to maximising the co-benefits offered by NBS [6] [7]. In a study of 56 NBS cases across Europe, Egusquiza, A. [8], identifies five main clusters of NBS governance models:

- (i) National/regional Public Administration: hierarchical governance structures and centralised government control of NBS.
- (ii) New Public Management: 'public-private partnerships' and the corresponding 'hollowing-out' of government services.
- (iii) Private-private partnerships: this would include sole governance of the NBS by private sector or community organisations, joint community-private sector co-governance, sustainable Local Enterprise Networks, etc.
- (iv) Societal resilience: this is characterised by a high level of community leadership and low-level role played by governments.
- (v) Network Governance: recognises the necessity to engage many different actors in service delivery and the complexity involved in managing such networks effectively.

These five categories of government-citizen/civil society interaction (or lack of) are a central theme based upon case studies undertaken in Europe. However, the question arises whether the same

categories can be applied to the level of involvement of civil society and public participation in NBS decision-making in China. This forms the backbone to our research, in the determination of which individuals/groups are included as non-governmental or private actors in NBS governance arrangements links governance to participatory literature.

The hierarchy of governance presented by A. Egusquiza et al. [9] draws on the model of public participation created by S.R. Arnstein [10] who represented citizen participation as a ladder with three main categories (and eight sub-categories) comprising, in order of increasing participation: 'non-participation' (manipulation and therapy), 'degrees of tokenism' (informing, consultation and placation) and 'citizen power' (partnership, delegated power and citizen control). A. Egusquiza et al. [9] highlight the intensity of participation to be influenced by factors such as the range of actors included in decision-making, the intensity and direction of information flows and the level of influence in the decisions made (see also M. Lauria and C.S Slotterback [11] for further elaboration of Arnstein's model and analysis). The five NBS governance clusters differ in their levels of participation, the range of types of stakeholders involved and the intensity of involvement, with societal resilience and network governance models likely to involve the greatest level of participation (including range of stakeholders and intensity of involvement) and hierarchical/centralised national/regional public administration the least.

The multi-functional and multi-beneficiary character of NBS governance when it includes public participation can bring communities, citizens and stakeholders, and local government together. However, particular processes of implementation of NBS governance policies and projects are crucial to support public participation, empowerment and innovation, affecting outcomes and results. Moreover, public participation can aid the development of alternative urban management capacity, encourage innovative engagement between the local government and citizens, and prompt other collaborative approaches previously unrealised at local government level [12]. At the same time, the need to account for local conditions, including screening and design of social and institutional conditions to enhance the governance in ecosystem-based management systems to achieve societal goals, has been noted (e.g. by Gerjan, P. et al.) [13].

Given the right conditions, NBS are widely recognized as cost-effective responses to climate change and environmental degradation that also provide numerous co-benefits (see e.g. Raymond, C.M. et al.) [14]. However, despite significant policy attention, NBS plans often fail to materialize due to public budget shortfalls. Alongside traditional public finance, the international debate increasingly urges the mobilization of private capital for NBS through alternative financing techniques (see e.g. Brears, R.C.) [15].

Public-Private Partnership (PPP) is an option for financing NBS projects when public funds are lacking. Den Heijer, C. and Coppens, T. [16] note that there is increasing pressure to utilize private capital for NBS to address shortfalls of public financing. However, Koppenjan, J.F.M. [17] highlights that whilst this may first seem attractive, it is not without challenges and can create tensions between the local authorities and the private sector. Van Ham and Klimmek [18], on the other hand, note several instances where PPPs have been successful and where this has led to citizens and local businesses having a common interest in maintaining and improving parks, protected areas, urban forests, clean watersheds and liveable cities.

In a study of selected NBS case studies in Europe, key factors central to achieving desired impact in the rehabilitation of damaged urban ecosystems were found to include collaborative decision-

making (involving public participation), creation of visions, feasible strategies, spatial scenarios, and guidance tools to enable adaptive governance[19]. Banzhaf, E. et al. [5] coined the terms 'peopleshed', 'natureshed', 'airshed' and 'watershed' to demonstrate interdependence of factors in NBS governance, applied to case studies in both Europe and China, emphasizing the need for interaction between NBS and society. However, it is not clear whether or to what degree public participation can impact on environmental decision making, sustainability or social inclusiveness, particularly in instances of NBS. Cooke and Kothari [20] present a somewhat critical view of public participation and the naivety of practitioners and consultants against the reality of socio-political power struggles. Kiss et al. [21] on the other hand, considering 58 case studies on NBS in Europe, suggest that public participation has generated a positive impact on social cohesiveness and environmental understanding amongst the public, but there is little evidence of its influence in environmental decision-making or the sustainability context of NBS projects. The question then arises whether public participation in NBS decision-making is necessary and whether it leads to better results or decisions. Newig et. al. [22], using multi-level modelling to test the links between participation and environmental outcomes for 305 NBS case studies across 22 Western democracies, concluded that public participation can be effective in environmental decision making and sustainability under certain conditions. They found that power delegation (the extent to which participants can shape decisions) associated with environmental stance was shown to be the most stable predictor of strong environmental outputs. On the other hand, communication intensity only predicted the conservation-related standard of outputs, but not the environmental health-related standard of outputs.

Whereas public participation in NBS in Europe is relatively well-documented, in China this is less the case. In earlier studies, M. Alberton [23] concluded that most environmental case studies in China are concerned Environmental Impact Assessment. Today, there are examples of studies on public participation in NBS, however, there is a need to consolidate such examples to analyse the types of existing Chinese NBS public participation, and the core factors that affect such participation. NBS (*Ene Be Ese* in Chinese) is still an emerging concept in China [24] and is more commonly understood to be equivalent to the more recognised concept of 'Ecological Civilisation'. It was formally recognised by the Chinese government at the UN Climate Action Summit in September 2019 [25] and officially introduced into China's nomenclature in 2020. Notably IUCN and China Land Consolidation and Rehabilitation Bureau (under Ministry of Natural Resources) jointly described 10 NBS case studies in 2023 under the 'Mountain-Water programme', as part of China's nation-wide ecological restoration programme [26]. In July 2023 President Xi Jinping and the Premier of the State Council addressed this programme as 'a natural restoration solution' in a national ecological-environmental conservation conference [27].

This said, NBS has been employed in China long before the concept was conceived. There are ample examples of NBS used in China, and where nature-based measures have been used to mitigate climate change, rehabilitate the environment, and improve urban-social settings and that have been incorporated in the government's 5-year plans since 1981-1985 [28]. Notably the Grain for Green programme (1999-2007) aimed to increase tree coverage and carbon sequestration, whilst reducing unsustainable agricultural practices on slope land above 25% [29]. Similarly, the on-going Three Norths Programme sets to curb desertification and encroachment of desert areas on settlements, urban areas and infrastructure [30].

Despite the fact that China now widely recognizes the importance of NBS and the literature generally calls for a comprehensive approach to coordinating different policies, regulations, and financing related to NBS actions [31] [32], it is unclear whether China's governmental system fully embraces the incorporation of civil society and the public at large in NBS interventions. In this respect studies concerning civil society and public participation in NBS in China have been limited [33] [34]. Utilizing several case studies and a literature review, this paper therefore sets out to investigate the degree and types of public participation in NBS intervention projects in China.

The real question is whether public participation matters in China. Chinese government regulations have encouraged involvement of civil society in environmental decision-making as early as the 1990's, in which some normative documents stipulated the need to consider public opinion such as 'the decision of the State Council on several issues concerning environmental protection', 'the Law of the People's Republic of China on prevention and control of water pollution', 'the Law of the People's Republic of China on prevention and control from environmental noise' and 'Regulations on the administration of construction projects environmental protection'. However, a specific legal requirement to consider public opinion in environmental decision-making was not brought into Chinese policy until 2003 under the Revised Environmental Impact Assessment Law [35]. The law clearly requires seeking public opinion before any project affecting the environment is undertaken [36]. However, the manner that this public opinion is to be sought is unclear. Moreover, it is the responsibility of the companies carrying out project design and planning to gather this information and therefore implies non-impartiality.

Inclusion of public opinion is also incorporated in Article 26 of the 2007 Urban and Rural Planning Law [37], formulated by the Ministry of Housing Urban and Rural Development, which is the main body responsible for implementing NBS in urban areas. The legislation states the requirement for soliciting opinions from the public in urban planning, but it does not require public participation directly in decision-making. The hinge point of change took place with the Revised Environmental Protection Law of 2015. This law, which took four readings and heavy intra-governmental debate before it was passed, has a designated Chapter 5 on Information Disclosure and Public Engagement incorporating a public right to environmental justice, information and participation in environmental decision-making. Moreover, it provides legislation, allowing registered NGOs and the public to pursue Environmental Public Interest Litigation [38]. This chapter bears similarity to the three pillars of the Aarhus Convention [39], even though China is not a signatory to this convention. Promotion of public participation within this law was to allow inclusiveness in environmental decision-making. This could be in response to increasing number of public protests concerning the environment taking place in China since the 1990s, although a distinct link between protest and advocacy cannot be confirmed [40] [41]. It would seem that inclusion of public participation in environmental policy was an approach to open alternative channels for public expression and influence upon environmental decision-making and in order to invite a positive interaction between government and citizens/civil society at a local level in China.

The encouragement of public participation in environmental decision-making also appears in the 2019 publication by the Chinese Ministry of Housing and Rural Development of national standards for urban planning for urban environmental projects, sponge city projects and other environmental interventions [42]. Furthermore, in June 2023 the Ministry of Ecology and Environment published 'ten principles of conduct for citizen ecological-environmental behaviour

[43]. The publication however does not promote public participation in NBS projects but rather presents a code of conduct that citizens should follow with regard to the environment.

Whilst China's environmental policy has endorsed public participation as a political principle and even demands public opinion in environmental decision-making, a number of studies demonstrate a lack of public participation and imply that the interpretation and application of these laws are subject to the local governments' interest in delivery of these policies, and may either be carried out in a perfunctory manner, or with a genuine willingness to understand public needs. Recent examples of public controversy of environmental project decision-making suggest that there is still a learning curve on the part of local governments to take public concerns into account [44] [45]. X. Zhu and K.J. Wu [38] identify that the main challenge is less in policy design and more in policy implementation. W. Dang [46], comparing China with Italy and the Netherlands suggests that public participation in China is affected more by its hierarchical structure, which, in turn, implies embedded traditions of Confucianism. Li, W. et al [47] attribute this to historical and cultural differences, where the democratization in China is slow and public participation in environmental protection is rare. Although X. Wang, X. and Y. Zhang [44] conclude that there is presently a shift from a more hierarchical/paternalistic structural approach based upon Confucian principles, toward a more participatory approach. This suggests that decision-making processes of government organs, particularly at the local level, are increasingly open to the public to avoid imbalances in policymaking, resolve social tensions, and to improve the quality of administrative decision-making. This is supported by Chen J. et al [48] who found that approximately one-third of county governments respond to citizen demands expressed online due to fear of collective action and threats of taking their case to upper levels of government. Nevertheless, evidence is accumulating that public participation in NBS projects in China is increasing (NBS project design consultant, personal communication, 2022). This could imply that whereas previously public participation had been a formal requirement in government policy and was often carried out in a perfunctory manner [23], local governments have increasingly come to the realisation that it is important to consult the public, not only for the purpose of obtaining an additional dimension to NBS project design, but also in order to increase the social acceptability of NBS projects.

A key element to public participation is the transparency and provision of governmental information. Both J. Li, and S. Chen [49] and L. Zhang et al [50] suggest that, with the legislation of the Environmental Protection Law of 2015, there is an improvement in the transparency of environmental information provided to citizens. However, limited provision of information has also been noted, particularly at the grassroots and local level, a result of which the public are unable to fully grasp the details of an environmental intervention [38]. These challenges have partly been taken up by NGOs such as the Ma Jun's Institute of Public and Environmental Affairs [51], which translates publicly available environmental data into a user-friendly format.

Unless detailed and understandable information of an environmental project is provided to the public, the public are likely to be less able to make in-depth comments, queries or other types of interaction regarding the project, thereby hampering public participation. The question therefore arises as to whether local governments are genuinely interested in public opinion or whether public participation in many cases in China is carried out in a form of tokenism (Arnold 1969) in fulfilment of regulations.

Discussion and debate in the design of NBS projects often takes place within the confines of government bureaux and private contractors. Citizens are rarely consulted in these processes and

Chen, M., et al. [52] indicate that there are very few NGOs in China that play a positive role in promoting and guiding public participation. However, Peel, J. [53], suggests that increasingly public voice in sovereign states is becoming more effective in protecting both the global and national environment. In a study of air pollution in China, Li, L. et al. [54] noted that only when government policies, public and enterprise participation are jointly involved can air pollutant emissions be effectively controlled and SDGs be ultimately achieved. The EU Horizon 2020-funded Clearing House research project reported that the government is often regarded as the main actor, and the citizen as the recipient in urban forest NBS co-design projects processes [55]. Common feedback from the government is, “we need to communicate more solid ideas to the public to avoid unnecessary arguments,” and the typical response of residents is “Future planning is the government’s job. My opinions seldom count, so I never think about this” [56]. There may be numerous reasons for this, but it suggests that there is an overall gap in communication between the government and the public. In a study of governance of the Beijing Urban Forestry Programme (2012-2015) most forms of civil society and citizen involvement were neglected both in the planning process of the project and in the implementation of the plan; rather, there was a public-private partnership between the local government and contractors [57]. The only form of public participation evident in the Beijing Urban Forestry Project concerned the farmers from whom the land was rented for afforestation and who were employed as forest workers for planting and maintenance [58].

Guo, J. and Bai, J. [59], found that in cases examined the reason for lack of public interest in participating in NBS decision making is because it has no executive power and therefore takes a passive stance, and depends upon the government with regard to environmental issues. It is suggested that public participation in environmental governance can be enhanced through better public-government interaction and by provision of information to increase environmental awareness. Although Tan, Y. [60] finds that improved governance does not necessarily translate into stronger accountability.

It would appear from the above finding that there is some ambivalence as to the implementation of public participation in environmental and NBS decision-making in China and that certain factors must be in place for it to be effective, including an open-minded local government, free flow of information and a high level of environmental awareness and willingness to participate amongst the populace or at least, the local affected population. In a less ideal situation, the free flow of information can still increase environmental awareness and lead to cohesiveness of public groups.

2 Methodology

To determine core factors that affect public participation in cases of NBS in China, we applied a literature search, a review of case studies cited in literature, online interviews, and site visits to case studies.

A review of academic literature was conducted on Jstor and Google Scholar for publications between 2001-2022 using the search string: China *and* Case Studies *and* Nature based solution *and* public participation *and* Urban. Using Jstor this yielded 2,932 results and using Google scholar yielded 17,500 results. These results were filtered accordingly to relevance yielding 109 papers, all of which were subjected to qualitative analysis. In addition, between August and September 2022 online and face to face interviews were conducted with local NGOs, academic researchers (ACAD) and government officials (GOV) in three cities with references indicated in brackets: Beijing, (BJ-NGO) Shanghai (SH-NGO) and (SH-GOV) Ningbo (NB-ACAD) and site visits (SV) took place to selected NBS projects in Beijing, Ningbo, Guiyang and Shanghai. A site map is shown below (Fig.1) showing that most of the case studies were located in the Eastern part of China which is more developed than in the West.



Figure 1: Location map of case studies

For the purpose of this paper six case studies were selected on the basis that they fitted, as much as is possible, the range of five main clusters of NBS governance models identified by Egusquiza, A. [8], and also represent different and diverse situations in China. Whilst it cannot be said to represent public participation in NBS projects in China as a whole, they provide further insight to factors affecting public participation in NBS projects.

The investigations of the case studies were in the form of a literature review, on-line interviews (during the Covid lockdowns), face-to-face interviews and site visits. A map identifying the type of governance model in accord with Egusquiza, A. [8], location and summary of the interactions for each case study is listed below (Table 1).

Table 1. Summary of methodology of case studies examined

Case Study	Literature Review	Online interview	Face-to-face interview	Site Visit
Beijing Olympic Forest Park	√	√		√
Lihu Lake rehabilitation project	√			
Poyang Lake rehabilitation project	√			
Ningbo Sponge City Project	√	√	√	√
Guiyang Public Environmental Education Centre	√		√	√
Shanghai Community Habitat Garden	√	√		√

3 Findings on public participation in Chinese governance of NBS projects

Lihu Lake, Wuxi, Jiangsu Province

The NBS project to rehabilitate the polluted Li Hu Lake near Wuxi, Jiangsu Province has been ongoing since 2005 with the Lihu Lake Protection Plan (2005-2020). Apart from the resolve to decrease the pollution of the lake, a key motivation was to increase real estate value and tourism of the area. The project resulted in a pleasant lake environment and open green spaces which gave rise to increased tourist attractions, cultural exhibitions, artistic performances and sports [61]. However, the process of decision-making for rehabilitation *per se* was a public-private partnership between the local government and real estate companies and did not involve civil society or local citizens. The local residents were informed of the plan through dissemination of scientific and public information, and they were incorporated into the plan when needed resulting in various benefits such as sports activities, arts and eco-tourism. However, they were not given the option to object to or participate in the decision-making process even though it resulted in substantial demolition and relocation of residencies. A total of 5,500 farmers lost land, 1,860 homes and 289 enterprises were demolished. This said, all affected persons or enterprises received compensation, housing, jobs, and a coveted Wuxi residency status. As a result of the project, real estate value increased 70-1000% and the entire project was of zero cost to the local government. Therefore, although there was no real public participation, the case demonstrates a successful form of Private-Public-Partnership, with benefit to the local economy, local people and the ecology [61].

Poyang Lake, Jiangxi Province

Poyang Lake serves as a retention lake to absorb excess flow from the Yangtze River during the rainy season and is an important buffer to downstream flooding in times of high-water flow. The lake area expands during the rainy season and contracts during the dry season leaving dry land. Over a period of fifty years the borders of the lake have been continually encroached upon by farmers through the conversion of wetland to farmland and construction of dams, dikes, polders, and settlements, which had reduced the lake area and its capacity to absorb flood waters significantly [62]. During the 1998 Yangtze River flood this encroachment was considered one of the prime causes that resulted in 21 million square ha. of flood damage, damage to 4.97 million houses, 1,320 dead, 15 million homeless and \$23 million in economic loss [63] Shortly after the disaster, in 1998 the central government passed the “32-Characters Mandate” and provided RMB 10 billion (US\$ 1.2 billion) a year over five years to mitigate future flood risks. It included relocating towns and villages from flood-prone areas to higher ground and building new towns; returning

reclaimed farmland to lakes and preventing retention areas from being used for agricultural, commercial, or residential purposes. The Jiangxi Provincial government intended to implement the program by breaking down the dams, dikes, and polders, and converting farmland back to lake wetlands, but this was met with strong resistance by farmers whose livelihoods were affected by the plan and were against relocation and abandonment of farmland and considered the compensation offered insufficient. Social stability took priority over ecosystem restoration and the Jiangxi government rescinded its decision, indicating it contravened central government agricultural policies to increase national grain production and which took precedence over lake restoration [64]. In July 2020, floods damaged 510,700 hectares of crops, affecting 5.5 million people and a direct economic loss of 1.16 billion USD [65]. The Poyang Lake case is a microcosm of national attempts to mitigate climate change where the importance of the local economy supersedes national plans to alleviate flooding. On the one hand, the local population were effective and successful in impacting, and even changing, government decision-making, yet the resulting compliance of Jiangxi government to the voice of the farmers resulted in inordinate economic damage and loss of life. In this instance ‘public participation’ (or lobbying) by one specific group of stakeholders (i.e. farmers) had an adverse effect upon environmental decisions made, or it might demonstrate an example where insufficient attention is paid to local people’s needs (across the range of sectors) and maybe also a lack of dialogue about compensations.

Beijing Olympic Forest Park

Beijing Olympic Forest Park was part of an initiative of Beijing Municipality in preparation for the Olympic Games in 2008. It is a 680-ha man-made park designed by Sasaki USA, and Beijing Tsinghua Urban Planning and Design Institute. It includes an artificial mountain with earth from the excavations of the Olympic subway, recycled water, forest area sequestering 4,000 tonnes CO₂/year, boating lake, petting zoo, educational insect identification centre, jogging paths and recreation area. According to some sources, the park has resulted in an increase in flora, fauna and fish, although this has not been systematically monitored. No public participation or consultation took place regarding the project. Rather it was built primarily to serve the Olympic area. Li, X.P. et al. [66] observe from subsequent interviews that visitors to the park did not appreciate the natural flora and preferred cultivated lawns and flowerbeds. They ascribed it to a lack of education of the visitors interviewed although it is likely to reflect historical and cultural preferences around green spaces [67].

Shanghai Community Habitat Garden project

This project stands out from other NBS Case Studies cited in this paper because it is a grassroots microproject, which, whilst acknowledged by the local government, was implemented independently of any local government intervention and with minimal funding. The project is located in a gated compound in Changning district, Shanghai [68] [69]. The concept of a gated compound is a common feature in China’s urban landscape where each compound may cover from about 200 to 1,000 households and is operated and managed in a similar manner to condominiums in the USA (see Wu, F. and Zhang, F. for a full analysis) [70]. The project was initiated by a government-affiliated organisation – the Low Carbon Management and Development Center of Changning District - under the guidance of the US-based NGO, The Nature Conservancy, and is based on community initiatives using abandoned land available within the compound for NBS activities. These include use of native plants, elimination of invasive species, reduction of pesticides and fertilizers, and provision of habitats for urban wildlife. Sub-

projects include: a bird watching wall, flower borders, natural and artificial water sources, insect boxes, compost bins, growing vegetables, a gabion to provide suitable shelter space for various insects and a deadwood pile to be used as a habitat for animals to live, forage and hibernate, and that can also provide a foothold for amphibians to breathe and rest in water bodies [71] [72].

The Landscape Design Agency, Pandscape, started a 'Gardening Together' initiative during the COVID lockdown period in Shanghai and was an extension of other initiatives such as 'doing grocery together' to ensure continuous food supply. These self-organised groups used an online order and distribution system within communities and proved to be very efficient. Gardening Together encourages the public to start gardening practices in abandoned, privately-owned, or even green infrastructure areas lacking maintenance. Via online courses and many group knowledge-sharing events, citizens learn how to form micro-scale gardens in their residential areas, how to plan, and it is furthermore a platform to exchange ideas and information. As of 2022, 110 people have registered for this initiative, and eight group leaders have started their own 'seeding garden' [71].

The working method of public participation forms the core of the project and differs significantly from government-led projects. Volunteer groups proactively take responsibility for the operation, management, maintenance, promotion and advocacy, as well as knowledge sharing. Notably, in the evolution of the project it was initially met with scepticism and inertia within the community, and required identification of a key person through which others could be persuaded to join. These were consistently senior citizens who were engaged at the proposal stage and were dedicatedly involved in almost all procedures (Interview SH-CSO Aug 2022).

Financing the project was a challenge. The local government and The Nature Conservancy provided start-up funding to all project sites for a feasibility study, consultative process, design and construction. However, financing and personnel were not covered. Some sub-district offices provide or even guarantee the funding for daily maintenance and repair needs but depending upon the willingness and priority ranking on their checklist. As of now, there is no budget from the Changning district government. Currently an alternative, in the form of NGO, the 'Alliance of Habitat Gardens' is under development, to provide comprehensive strategic, technical and financial support (Interview SH-CSO Aug 2022).

Based upon the success of this initiative, some senior citizens continued to work together by making use of other abandoned spaces within their communities, outside of the formal project process. In one community, a 100m x 2m plot is now under collective care by a group of senior citizens from the same community; they moved pots and vegetation from their balconies to a narrow alley, creating a walkable area with a vivid green setting (Interview SH-CSO Aug 2022).

This initiative is now being scaled up. *The special ecological plan for environmental protection in Changning District* released in 2023, includes the content and design of community habitat gardens. This project demonstrates potential for developing ecological microcenters and contributing to linking ecological corridors for small animals and birds living in urban areas. It fits *the Guidelines of Shanghai spatial and urban development design 2017-2035* [72]

The project is interesting in as much that it involves intense debate and interest within the local community. Many residents were sceptical about the project at first, whilst others were enthusiastic. Debates that evolved concerned: responsibility, ownership, budget, costs, and management. Identification of a key person within the community was pivotal to drive the project and many of

the volunteers were senior citizens. The project was particularly important during the Covid lockdown period with self-organised groups working together and attending online courses being given on microscale parks and gardens. As of August 2023, based upon this model, a total of 13 new projects are established [71].

Ningbo Sponge City Project, Zhejiang Province

The Sponge city project in Ningbo is part of the national Sponge City Program (SCP) started in 2015 under the Ministry of Housing in the Urban Rural Development comprising 16 pilot cities, and a further 14 cities started in 2021. During the medium-term stage, Establishment of Sponge City standards, management systems, and monitoring and early warning systems by 2020; with greater than 20% of municipal areas able to recycle 70% of incident rainfall [73]. The stakeholders and their roles in the projects vary from one project to another. Experts for consultation and advisory purposes are involved in policymaking and sometimes are leaders in the SCP design and planning, especially concerning hydrology, urban planning, landscape design, and environmental engineering [74].

Interview with NB ACAD suggests that public participation in the Ningbo SCP was primarily through public review procedures by posting information online or using local media, allowing the public to respond. Under government regulation, implementation plans, and construction can only be passed five or ten days after completion of the public review procedure. The interviewee also noted that the local government states that it responded to all posts or questions made and some of the outcomes of public participation were to implement rain gardens, permeable pavements, and grass parking lots. Thus, for residential SCP sites, community committees are usually actively engaged in the whole process and take a coordinating role to ensure the suggestions of the public are delivered, well-considered, and preferably addressed in the early stages of planning and design. These committees engage the public through questionnaires, polls, and volunteer groups. In public areas, citizens also provide feedback and for some SCP park sites alongside rivers and lakes built on the previous environmental restoration projects, citizens are very sensitive to polluting risks and broken infrastructure. Some may even come to the management department to report issues. The public also responded to the government in submitting complaints such as leaking pipes and dumping of sewage into rivers. However, the SCP has yet to include active stakeholder engagement and is far from supporting stakeholder participation [74].

The SCP was expected to be of significant interest to investors from the real estate, insurance and, transport sectors and substantial effort was put into attracting finance for the SCP through a PPP model, but it was only of minor success mainly because return on investment was uncertain due to unclear factors such as maintenance, transborder flood management downstream, drainage infrastructure, planning and land modernization. Hence it was quite difficult to get companies and banks to contribute [73].

The Guiyang Public Environmental Education Center

The Guiyang Public Environmental Education Center [75] is an NGO located in Guizhou Province and is a particularly interesting example of a local NGO working in collaboration with Qing Zhen County Environmental Court, the local government and the public to become catalysts of change with local communities. In the case study, cooperation agreements were made with Qingzhen City government and the Guanshanhu District in Guiyang to create a local "non-confrontational environmental social governance model". This linked the municipal government

to the Environmental Protection Bureau, the NGO, local enterprises and local residents. The NGO works with the government departments to help ensure environmental compliance and provide experts to help enterprises improve environmental protection. The NGO also provides education activities in the communities, schools and villages around the enterprise, and collect the opinions and demands of residents and give feedback to the government for timely disposal. Through this approach social conflicts have been avoided allowing coordination between the government, enterprises and community residents, where NGOs act as independent third parties. The core element of the tripartite arrangement appears to be trust, and the case shows the government, the court and the local villagers as trusting the NGO to act in their mutual interests. The NGO, on the other hand, utilizes this mutual trust to stimulate an action plan to improve the local environment and thus the lives of the villagers. Using this citizen-collected information, the NGO submitted river protection proposals to the Guiyang City government and helped the government implement a protection plan of 17 river headwaters. These projects demonstrate that volunteers, and families can become *Citizen Riverkeepers* to monitor sections of the river. The website gives pride and status to the local people by naming them with the title *River Chiefs* [76]. This NGO and its efforts are particularly interesting inasmuch that it is located in one of the poorest provinces in China where environment and ecology would be expected to receive a lower priority, yet both government and people seem to consider change and environmental improvement as more important than in several other cases.

4 Discussion

There is no doubt that public participation in environmental matters and the importance of taking public opinion into account has evolved and improved over the past 50 years in Chinese law. In the original Environmental Impact Assessment Law of 1973 public opinion in environmental decision making was not mentioned [36]. The hinge point of change took place with the Revised Environmental Protection Law of 2015 where the emphasis on public participation became an important part of the law [38]. Whilst these recent laws and policies clearly specify the requirement for public participation in environmental decision-making, the implementation of these policies has been varied.

Considering the case studies mentioned in this paper we can see different levels of public participation as articulated in Arnstein's ladder [10]. More commonly 'tokenism' is employed by local governments in order to demonstrate that public participation has taken place. This was particularly noted in: hierarchical governance structures and centralised government control of NBS as noted by Egusquiza, A. [8], in the case of the Ningbo Sponge City Program and Beijing Olympic Forest Park which is considered as National/Regional Public Administration under Egusquiza's classification system (Table 2).

Table 2. Summary of types of public participation in the case studies in accord with Arnstein's ladder and fit to Egusquiza classification

Case Study	Governance models in accord with A. Egusquiza [8]	Governance models in accord with Arnstein's Ladder [10]	Summary
Beijing Olympic Forest Park	National/ Regional Public Administration	Non-participation	Government planned project with no evidence of public participation. Result: a well-structured park area with positive NBS structures
Lihu Lake rehabilitation project	Private, Private Partnership	Non-participation	No public participation. Decisions made by government and private sector with positive NBS benefits
Poyang Lake rehabilitation project	National/Regional Public Administration	Citizen Control	Citizen control resulting in reduced NBS impacting the lake's retention functions.
Ningbo Sponge City Project	National/Regional Public Administration	Tokenism	Public information systems put in place with mechanisms for the public to express opinion. It is unclear to what extent opinions were taken into consideration
Guiyang Public Environmental Education Centre	Network Governance	Citizen Control	NBS model for engaging citizens, local government, enterprises and NGOs with the NGO acting as a central coordinating function
Shanghai Community Habitat Garden	Societal Resilience	Citizen Control	Example of a replicable community initiative for developing and maintaining local NBS initiatives to the benefit of the local community

Accordingly these two macro-scale NBS projects, initiatives that have been set by the central government and fed down to the municipal and provincial governments, were extremely well planned, designed, and executed and they demonstrated consideration towards climate change, carbon sequestration, biodiversity, flora, fauna and migratory birds through reforestation, wetlands, waterways, water recycling, solar panels and park benches, etc. [67]. However, although there are examples of educational awareness raising for adults and children, there is no evidence of public input into the educational aspect of these projects, or that the design was what the public wanted, rather how the planners or local governments perceive the needs of the population. A case in hand is the subsequent survey of visitors to Beijing Olympic Forest Park, which featured re-wilding aspects in the implementation of NBS, visitors indicated preference for manicured lawns upon which they could sit and have picnics and cultivated flower beds as opposed to the 're-wilding' pro-biodiversity model used. In the report, this was attributed to the low education level of those surveyed [67] but is likely to also reflect historical and cultural preferences. Indeed, public resistance to re-wilding of parks is not only a phenomenon in China but also elsewhere. In a study

connected in the UK demonstrated the complexities of re-wilding both amongst the local government and the public, implying that in planning an open space applying NbS principals requires careful planning and inclusiveness of all stakeholders in order to ensure that an acceptable model is realised. [77]. In the case of Poyang Lake, which was of national and regional importance in terms of protection downstream areas from disastrous flooding, which also reflected a National/Regional Public Administration model in accord with Egusquiza's classification [8] interaction between the Jiangxi provincial government and the local farmers was apparently difficult and farmers and residents were unwilling to give up livelihoods, income and appropriated land for national planning without adequate compensation. Social stability was a key factor resulting in the local government rescinding on its former plan for restoration of the lake, even though the project would be beneficial both to the environment and local people to mitigate flooding. It may be said that the local population were effective in expressing their opinion however this resulted in inadequate changes to the lake's retention capacity and could have been partial result to subsequent flooding in the flood event of July 2020 [78].

The case studies of Poyang Lake suggests that implementation of government policy for environmental restoration and eco-compensation requires far more detailed interaction between government and the local public in order to facilitate a more mutual understanding of measures to be taken and to ensure acceptance of such measures by the rural population and thus successful implementation.

The case study of Lihu Lake fitting Egusquiza's classification of Public Private Partnership [8] show interesting model of PPP, where, although the local people were excluded from the planning and decision making, private real estate companies played an important role in off-setting costs for the intervention because the investment was clearly seen to be profitable for the real estate and tourism sectors. This concept could be an interesting financing model for future NBS projects where sources of finance, other than national/local governments are often problematic. The opposite is the case of Ningbo Sponge City Project where too many uncertainties and extraneous factors deterred investors and therefore attempts at setting up a PPP model were not successful. This supports the observation by Den Heijer, C. and Coppens, T. [16].

However, the two examples demonstrate interesting examples of PPP that can be an important contributor to successful NBS implementation involving collaboration between a government agency and a private-sector company. Mayor, B. et al. [7] note that this can be a vital tool, facilitating the engagement of public, private, and community stakeholders in setting out a consensual roadmap for the long-term sustainable financing of NBS. In particular, the role of real estate companies who would have a strong interest in financing the improvement of the environment in order increase real estate value. This, of course is providing that assurance and attention is paid to local needs and interests.

The successful involvement of the local population in the two Grassroots NBS projects: the Shanghai Community Habitat Garden project and the Guiyang Public Environmental Education Centre, demonstrate that the local populace in these cases are extremely motivated and willing participants in community efforts where they know that they can have an impact upon the environment and their general well-being, and they are willing actors and stakeholders in proliferation of the NBS project.

In a recent review, the EU Commission stresses ‘trust’ as important, and especially regarding government and public interaction and in the case of large-scale interventions involving local and regional governments [79]. As such, this provides an opportunity to strengthen inter-governmental and transboundary relationships and promote solidarity. Schleyer, C., et al. [80] argue that factors, such as degree of bindingness and policy obligations, impact upon multi-level governance as well as the type of interventions targeted, type of support, etc. Furthermore, in the European scenario, most initiatives that have sought to foster greater public participation and inclusion in NBS have been driven by municipal authorities, whereas other potential significant actors – local museums, cultural institutions, botanic gardens, educational bodies and so on – have not had a high profile in such initiatives [78].

It is possible that the reason the local population are not interested in participating in macro-sized government-led NBS projects in China, as observed by Wang, Z. et al. [56] and Guo, J. and Bai, J. [59], is because the public have no executive power and therefore takes a passive stance. There may be numerous reasons for this, but it suggests that there is an overall gap in communication between the government and the public that needs to be addressed to increase public participation. In both the grassroots NBS projects, NGOs are both active initiators and liaison agents between the local population and the government. It is suggested that NGOs could play a similar role in conveying public needs and opinions in larger scale NBS projects.

Similarly, the example of the Guiyang Public Environmental Educational Centre could be extended to Community Resident Committees [81] in urban areas whereby these committees become a liaison point between the government and the people in the implementation of NBS projects for conveying information, gathering opinions, and collecting data regarding NBS interventions. Thus, a symbiotic relationship could be initiated using the role of the Community Resident Committees as a catalyst and liaison point between the local government and the public. To date little research has been conducted in this regard but this could provide a significant opportunity to use the Community Resident Committee to enable public participation. At present, involvement of the Community Resident Committees in NBS design is rare, however potential for greater involvement is certainly present, although significant training of relevant personnel would be required.

It is shown that a PPP format in NBS projects can form an important contribution to financing providing that the project can demonstrate low financial risk and positive revenue for investors, although if the risk factor is unclear due to lack of information or a more detailed assessment of outcomes of the NBS intervention then investment is not likely to be forthcoming as in the case of the Ningbo Sponge City Programme.

It has not been possible to determine long-term maintenance of NBS projects in China, albeit observationally these projects appear to be maintained quite well. This said, bearing in mind that NBS is a relatively recent concept, it is too early to draw firm conclusions. One would assume there is a direct relationship between public interest/usage of NBS and maintenance. This certainly is the case of the Shanghai Community Habitat Garden project which receives no external funding and therefore maintenance is entirely dependent upon the interest and enthusiasm of the local residents and ultimately management of the project by key players. This type of response would impact ownership and therefore funding to support NBS maintenance

5 Conclusion

This paper has analysed the degree and types of public participation in selected NBS projects in China. The analysis indicates that whereas there has been significant progress through Chinese legislation promoting the inclusiveness of the public in environmental and NBS decision-making, and acknowledgment of the importance of NGOs in representing a public voice, actual implementation of public participation, including gathering public opinion and involvement in NBS project design and decision-making has been limited. The case studies suggest that the level of involvement of the public in NBS activities and decision-making is the reciprocal of the size of the project, where there has been a high-level of involvement in the smaller local projects, but minimal involvement in large scale NBS projects. Government-led and macro NBS projects have so far offered limited opportunity for public opinion to be incorporated in project design. Nonetheless, PPPs have significant potential to help finance NBS projects and off-load the financial burden on municipal governments. However, PPPs may also result in limited public participation by citizens and stakeholders beyond private companies and may therefore require targeted efforts to address local communities' needs and interests. Local people are the most important (and willing) actors and opinionators in projects that directly affect their lives, livelihoods, and well-being. The findings highlight the important role of NGOs in promoting and facilitating public participation, and accompanying co-benefits, in several of the Chinese case studies. Our study also suggests that symbiosis between local governments and the citizens could be invoked by local community-based organisations (e.g. Community Resident Committees or similar) that can act as a liaison point and catalyst to public participation in NBS projects (in some cases supported by NGOs), although significant training would be required to bring committee members to become agents of the public opinion.

Further research and exploration is required to examine further the potential of Community Resident Committees in a decision making role and maintenance role of NBS project in China. Similarly, there is need to examine the role of the private sector in financing NBS and other innovative means of financing and how this may impact the outcomes of NBS projects in China.

Funding: This research was funded by the European Commission, Horizon 2020 programme, grant number 821016, and the National Key R&D Program Intergovernmental Cooperation in International Science and Technology Innovation from Ministry of Science and Technology of China (Grant no. 2021YFE93100).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Acknowledgments: We greatly appreciate research and discussions with practitioners through the EC REGREEN Nature-based Solutions project (regreen-project.eu/) which enabled our inter- and transdisciplinary collaboration. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 821016, and the National Key R&D Program Intergovernmental Cooperation in International Science and

Technology Innovation from Ministry of Science and Technology of China (Grant no. 2021YFE93100).

Conflicts of Interest: The authors declare no conflict of interest.

Journal Pre-proof

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NBS Impacts and Implications

- **Environmental** aspects: the paper focuses on different case studies involving Nature-Based Solutions in different locations in China.
- **Economic** aspects: The paper addresses economic concerns by considering the options for public private partnerships (PPP) for financing Nature-Based Solutions in China and thereby offloading burdens placed on local governments.
- **Social** aspects: the paper addresses the degree of public participation and involvement of NGOs in various and selected projects concerning Nature-Based Solutions in China.

Journal Pre-proof

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Declaration of interests regarding the Paper: *Public Participation and NGO activity in Nature-Based Solutions in Urban areas of China*, by Richard Hardiman, Anders Branth Pedersen, Anne Jensen, Kelly Guyu Dai, Carolyn Petersen

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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