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Uniting citizen science and natural history in China

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Citizen science (CS) is an emerging field in 21st century China. Chinese CS mainly focuses on environmental and species monitoring. According to Danielle Brombal, Asian studies scholar, Chinese CS is highly instrumental and data-focused, i.e., used primarily to promote scientific research, but places little value on citizen scientists' social and emotional context. Brombal suggests a transformative change for Chinese CS, which aims for a radical change of individual cognitive and emotional attitudes, as well as collective norms. The end goal is the transition to sustainability or ecological civilisation for the entire of China. This paper discusses the potential of facilitating such transformative changes through the Natural History Revival Movement, an environmental movement in contemporary China, which proves to be consistent with Brombal's proposed transformation of Chinese CS as regards goals and approaches.

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1. Introduction

Citizen science (CS) is scientific research conducted by nonprofessional scientists/ citizens to assist their needs and concern. CS flourished in Europe and North America and then gradually became popular in Asian countries. In this century, due to the unprecedented environmental crisis, CS also found the space to take root in China.

Environmental monitoring projects are dominating Chinese CS. Air and water pollution monitoring projects have been most successful in terms of scientific impact and numbers of volunteers. The best practices included float Beijing (attach small pollution monitors to kites) [1], anti-incineration movements (citizens turn down the government's decision to build incineration plants near their communities) [2], and the black and smelly river program [3]. Citizens engaged CS on mobile apps, such as the Black and Smelly Waters app and Blue Map [4]. Public members also used social platforms to interact with environmental authorities about pollution issues [5].

Some biodiversity CS projects focus on species monitoring and habitat protection. The former projects range from general plants (China Biodiversity Observing Network [6], Kunming Botanical Garden project [7]), birds [8] (birdwatching from Shan Shui's China Nature Watch program, the China Coastal Waterbird Count [9]) to specific species such as snow leopard [10] and black-and-white snub-nosed monkey [11]. The projects in the latter category include seagrass assessment for coastal habitats in Hainan [12] and "Ant Forest" afforestation programs in Gansu and Inner Mongolia [13].

2. Current CS in China

As complements of the State's environmental monitoring system, these CS cases have improved transparency and encouraged public participation in science. Authorities seem to have started to recognise the function of CS in generating environmental data (although without a single mention of the term "CS" in official policy and regulation). They promised policy support, funding for building big data platforms, and international academic communication between the Chinese Ministry of Science and Technology and the Wilson Center in the US, to set up more CS projects [14].

2.1 Are current Chinese CS practices good enough?

Current research on Chinese CS primarily focuses on the solution and its efficiency for particular problems. Critical questions aimed at a broader discussion of CS objectives and practices, such as the development and strategy of Chinese CS, were rarely asked.

Asian studies scholar Daniele Brombal is one exception [15]. Brombal found that NGOs played a crucial role in Chinese CS. Their basic strategy is to "fight with data (rather than slogans or poems)" to gain environmental information's accuracy, availability, transparency and accountability. So, they can challenge authorities on environmental administrative decisions. However, these NGOs must frame their requests in politically and scientifically consistent ways with China's authoritarian government, which adopts a technocratic attitude to instructing policies' methodology and practice [16]. Antagonistic topics, primarily when related to social aspects, are deliberately removed from public debate under the excuse of scientific inquiry and economic development [17].

Under these circumstances, NGOs could do nothing but stick to the "fight with data" strategy. When they generate and evaluate outcomes/data from a CS project, they are forced to use scientific metrics rather than other approaches to evaluating environmental issues based on ethics and emotions. According to Brombal and other authors, CS—environmental CS in particular—needs to connect to broader social and cultural issues [18], which is also implied by the ten CS principles published by the European Citizen Science Association, which are also

available in Chinese [19]. Brombal is concerned that by focusing merely on data collection for the sake of science Chinese CS enforces the technocratic vision of progress that contributes to China's—and the World's—dramatic environmental emergency. The instrumental and contributory apporach to CS ignores more fundamental issues such as ecological awareness and participatory decision-making that is part of the democratic essence of CS.

Moreover, with an extensive focus on pollution monitoring, Chinese CS seems to lose its fostering of emotional responsiveness. The emotions citizen scientists experience would be mostly anxiety and fear for human safety, rather than pleasant and amazement from nature's wonder. In conclusion, Brombal summarised the current traits of Chinese CS as **contributory, highly data-focused, and emotion value downgraded**.

2.2 What are the solutions?

As a solution, Brombal proposes a transformative framework for Chinese CS. In this framework, CS should help citizens foster "knowledge-based ecological awareness" and encourage their "emotion responsiveness", which could much more strongly motivate citizens to engage with environmental issues. After gaining ecological awareness and emotional responsiveness, citizens would seek involvement institutionally and finally achieve a systemic change towards solid sustainability.

There are two approaches to facilitate the formation of this framework. The first one is to launch more biodiversity CS projects. The wildlife citizen scientist community and their eco-centric views have shown their potential to transform indigenous knowledge into conservation concern and action successfully [20]. Brombal mentions that Chinese birdwatchers aligned with scientists in 2015 to negotiate with the government on the decision to build the 2022 Winter Olympics alpine skiing track across the Songshan National Natural Reserve. She believes it proves how promising emotion responsiveness is in conservation behaviours was and could be in transforming Chinese CS.

The second approach is situated at the cultural level. Due to the pursuit of modernisation and insistence on Marxism politically, the cultural core in contemporary China is highly anthropocentric with a "controlling and extractive attitude towards nature" [21]. However, another kind of harmonious cultural legacy has existed in China for a long time. It originated from Daoism (e.g., govern by doing nothing that goes against nature) and is part of the Confucian tradition (e.g., harmony between man and nature). It contains philosophies of respecting more-than-human entities and restraining excessive human interference. Brombal proposed that this cultural legacy should be activated to enrich Chinese CS with diversified cognitive and emotional values, so Chinese CS would have a chance to become something more than just "sending around human sensors to collect environmental quality data".

3. The Natural History Revival Movement (NHRM)

Natural history might help transform this CS framework in the way Brombal suggests. A natural history revival movement (NHRM) has emerged in contemporary China in the past decade. As an idea and a social movement, the NHRM draws on diverse approaches in philosophy, sociology, and science. It has reached a broad audience through publications and promoting "living as a naturalist" [22].

3.1 What is NHRM?

According to the NHRM, engaging with nature and apprehending its wonder is—or should be—the essence of natural history. According to one of its leading proponents, Liu Huaijie, a professor at Peking University, the NHRM has several pillars. It encourages people to achieve familiarity with nature and build up an emotional attachment to nature by

learning to observe nature closely and remember the species name. It suggested more than one kind of scientific approach to nature and acknowledged that science would not solve all problems, especially environmental crises. Most importantly, the NHRM was striving to establish a movement through community engagement around natural history.

The NHRM wishes to build natural history societies that contribute to civic society and culture [23]. Natural history in history has proved its capability to do so. In nineteenth-century Scotland, natural history as a collective pursuit was associated with local civic culture [24]. Natural history practice, such as fieldwork undertaken by local natural history societies, was a great approach to securing natural knowledge and promoting civic identity [25]. In nineteenth-century Germany, where the political freedoms were restricted, the appearance of large numbers of civic natural history societies (such as the Isis Society in Dresden) created a communal space for "liberal political dissent" [26]. The NHRM implied the wish to duplicate this exciting social development in China.

3.2 What are the connections between CS and NHRM?

Facilitating CS through natural history is not a new idea. Natural history values emotional involvement and anthropomorphises natural objects due to moral considerations. In CS, emotional engagement, such as love of nature, vital concern over certain species & environmental issues, and satisfaction with contributing to a science project, is essential for citizen scientists' continuous participation [27]. Natural history has been disappearing in the educational system since the last century [28], but CS could help by harvesting human resources and resources to contribute to natural history knowledge building. For example, biodiversity CS platorms, such as iNaturalist, FloraIncognita, Pl@nNet and Merlin Photo ID, built broad partnerships between citizen scientists and professional researchers, just like London Natural History Museum's nature project invited citizen scientists to help museum professionals transcribe 370,000 handwritten records [29].

4. NHRM can help in enacting transformative changes in CS

We can see remarkable similarities between Brombal's suggestions and NHRM. Firstly, both value historical practices. Brombal suggested reactivating the Chinese cultural legacy with a harmonious idea of the natural world. Meanwhile, one of NHRM's goals is to revive Chinese traditional natural history known for its holism philosophy.

Secondly, both emphasise the importance of emotional value in studying nature. Brombal encouraged the development of more biodiversity CS projects because they help nurture citizens' emotional responsiveness. Liu Huajie and other proponents of NHRM argue that natural history leads to emotional embeddedness and feelings of being one with nature because it pays more attention to the wholeness of nature and human beings. By knowing and practising natural history, citizens could understand and experience civic rights and obligations and pomote more profound and long-term social change in China.

At last, both agreed that "scientific" is not the only metric revealing truth because it would encourage an anthropocentric and technocratic vision of progress. Brombal believes the sole emphasis on science would make CS deviate from its democratic essence and strengthen the Chinese technocratic science system. The proponents of NHRM are also firmly against what they see as prevailing scientism in current Chinese science and society. They promote natural history as an alternative to the current system.

The similar mindset and common pursuit mean the chance of an alliance between CS and natural history/NHRM in China. Liu Huajie once mentioned CS, acknowledging its contribution to biodiversity studies, environmental protection, and nature education [30]. It should indicate that there are conceptual and practical grounds for uniting NHRM and CS in the kind of transformative change envisaged by Brombal.

5. Conclusion

This paper acknowledges that the suggested solutions remain in an idealized sphere, and more case studies and research-based evidence are needed to back up the claims made.

In conclusion, this paper has investigated the connection between CS and the NHRM, concluding that the NHRM could significantly contribute to Brombal's idea of transformative change in Chinese CS. If, in bridging CS and the NHRM, individuals with a high-level emotional response nurtured by the NHRM would more actively engage in and experience CS, and even collaborate with professionals in designing transformative CS, then subsequently, at the social level, the public would be empowered to care for nature with action, negotiate against improper environmental policies, and seek further civil and political rights. In turn, this may facilitate the institutional formation of civil society and the acceleration of participatory governance, or even the democratisation in China.

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