



A participatory sustainability assessment for integrated watershed management in urban China



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ABSTRACT

This paper introduces a participatory framework for Sustainability Assessment (SA) for urban Integrated Watershed Management (IWM). The framework is applied to the Lihu Lake Basin (Wuxi City), where between 2002 and 2012 an IWM program was implemented, coordinating water environmental management measures with urban planning. The framework for SA introduced in this paper is based on a Multi-Criteria-Decision-Analysis (MCDA) approach integrating criteria of environmental, economic, and social sustainability. Local stakeholders were engaged in focus group discussions (FGDs) to validate and weigh criteria and attributes employed in the SA framework. Results of the model application indicate that the programme implemented in the Lihu Basin yielded positive results in enhancing environmental conditions, providing more sustainable avenues of environmental management funding, and fostering economic growth. Despite efforts put forward by local authorities, performance of social indicators was comparatively worse, due to relocation policies, increase in housing prices, and scarce public participation. Results show that decision makers pursued viability, rather than comprehensive sustainability.

1. Introduction

In the last quarter century a wide consensus has emerged over the potential of Integrated Watershed Management (IWM) in fostering sustainable urban development (Kidd, 2007; Schussel and Neto, 2015). IWM's theory and practice are informed by the concept of Integrated Territorial Management (ITM), aiming at the harmonization of environmental, economic, and social goals in the development of spatially defined areas (UN, 1992; De Quevedo, 2014). Such harmonization requires the establishment of multi-sectorial synergies and the re-scaling of policy, planning, and management functions, based on natural systems' boundaries. Water management in densely populated areas and rapidly urbanizing regions has constituted one of the main fields for experimentation in this respect (De Graaf and Van Der Brugge, 2010). In China, IWM has been subject to intense scrutiny and debate. The experience matured in the EU with the Water Framework Directive (WFD) has been a particular source of

inspiration for Chinese researchers and decision-makers, informing research and policy action (Deng et al., 2016). With particular reference to urban areas, in 2014 the National Development and Reform Commission (NDRC)¹ called for the establishment of a nationwide pilot program for 'the integration of several plans into one' (*duoguiheyi*), based on ITM principles (Tzou et al., 2017). Cities where pressing issues of water contamination and pollution intersected with rapid urbanization have been particularly active in experimenting with the harmonization of water environmental management and urban planning (Brombal and Moriggi, 2017). In their relentless growth, many Chinese cities have expanded to include areas previously destined to agriculture, severely affected by non-point sources water pollution. The economic potential for residential and recreational exploitation of areas close to rivers, lakes, and wetlands has put in place incentives to establish watershed environmental management programs, closely coordinated with urban planning. To what extent these initiatives have contributed to meet sustainability goals remains unclear. This

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¹ NDRC is the most important China's ministerial body, responsible for policy macro planning.

uncertainty is due to several factors. First, despite inter-sectorial coordination at local level, ex-post evaluation systems remain fragmented. Programs of watershed management are still evaluated vis-à-vis the achievement of goals of environmental quality and resource utilization. Second, the evaluation of progress towards urban sustainability is carried out by taking administrative entities as units for data collection and analysis. It is therefore difficult to appraise the contribution made by measures devised according to the boundaries of natural systems, as in the case of IWMs. Moreover, sustainability indicators systems used in China are known to be scarcely effective in grasping the social dimension of sustainability (Shen and Zhou, 2014). Finally, participatory processes are still in their infancy in China. On the one hand, the country has widely experimented with forms of public participation within environmental and urban planning processes (Yang, 2008). On the other hand, such processes have been frustrated by the peculiarity of China's political system and by the "expert cult" (*zhuanjia chongbai*) phenomenon, causing a gross underestimation among decision-makers of the public's capacity to contribute to decisions whose outcomes affecting their lives (Tang et al., 2008; Jacka, 2009; Zhang and Barr, 2013). This ambivalence has jeopardized the possibility to establish meaningful participatory processes aimed at defining the criteria for evaluation of public projects, programs, plans, and policies (Brombal et al., 2017). Our work seeks to contribute to addressing these gaps, by developing a participatory ex-post Sustainability Assessment (SA) framework applicable to IWM programs tied to urban planning. The framework is used to appraise the case of the Lihu Lake Basin (Wuxi City), where between 2002 and 2012 a government-led program was carried out to reduce water environmental pollution. The program was informed by an integrated territorial planning approach, combining water environmental management, functional rezoning, and urban renewal. The paper is divided in five parts. We first introduce our case study and the criteria used in its selection (paragraph 2). The following paragraph presents the methodology used in developing our Sustainability Assessment (SA) and the participatory practices used to engage local stakeholders² (paragraph 3). In the fourth paragraph, we introduce the results of the model application to the Lihu lake basin. We then move to the discussion of our findings, against the background of China's integrated territorial management in urban areas (paragraph 5). The conclusive paragraph introduces the implications of our work for research, policy, and practice.

2. Case introduction

The case discussed in this paper was selected based on its ability to epitomize current trends and future developments in the integration of China's watershed management and urban planning. Five prerequisites were set forth to guide the selection of the case study:

- (a) **Time:** the case deals with processes of integration of environmental management and urban planning that have been already implemented, therefore allowing for an ex-post analysis.
- (b) **Location and spatial scale:** the case is located in a urban and/or peri-urban area and is characterized by a clearly identifiable spatial scale.
- (c) **Relevance:** the case is considered a best practice by the domestic community of practitioners and decision-makers.
- (d) **Accessibility and availability of data.**
- (e) Willingness of local stakeholders to take part in participatory practices

The triangulation of scientific literature, media reports, and materials collected through key-informants interviews and participant

² We endorse the definition of stakeholders provided by the World Bank, as follows: "A stakeholder is any entity with a declared or conceivable interest or stake in a policy concern [. . .] [Stakeholders] can be individuals, organisations, or unorganised groups." Cfr. <http://www1.worldbank.org/publicsector/anticorrupt/PoliticalEconomy/stakeholderanalysis.htm>.

observation concurred in indicating in Lihu—also called Wulihu—a case suitable for our analysis.³ Lihu Lake Basin is located in Wuxi, a middle-sized city of Eastern China's Jiangsu province. The basin measures 35 km² and is home to roughly 600,000 people⁴ (Survey Office of the State Statistics Bureau, 2012). Like the nearby Taihu lake, in the mid-1990s Lihu started being affected by severe eutrophication, caused by non-point source pollution from agriculture and fish farming (Ma, 2007; Xia et al., 2014). The environmental crisis in Lihu triggered a radical rethinking of both the basin's function and its management structure, involving local authorities, environmental experts, and urban planners. Change was favored by the transformation of city's economic fabric, due to the growing importance of real estate sector and of the tertiary industry. The 2001 Wuxi city master plan designated the basin as a key spot for recreation, tourism, and real estate development (Brombal and Moriggi, 2017). In 2002, the city government launched the "Lihu Comprehensive Remediation project" to address environmental issues affecting the lake. The project was devised in coordination with the change in the basin's functions called for in the master plan. It included six main components: (1) construction of sewages; (2) hydraulic works regulating the inflow from and outflow to Taihu lake; (3) dredging of lake sediments; (4) wetlands ecological restoration; (5) reconversion to water of areas that had been previously reclaimed for agriculture; and (6) functional rezoning of the basin, converting most of it from agricultural to recreational purposes (Xia et al., 2014). Fig. 1 shows an aerial image of the basin before and after the implementation of water management measures.

The transition towards an integrated watershed management model was formalized in 2005, with the enactment of the "Lihu Lake Protection Plan". The plan explicitly framed the development of the basin management system in terms of comprehensive sustainability, prioritizing the achievement of environmental quality as a prerequisite for economic growth. Moreover, the plan called for the establishment of an inter-sectorial and inter-scalar administrative body, in charge for the overall management of the basin. This body was introduced in 2008 by merging staff from several government departments, and eventually evolved into a public-private partnership in 2012–13 (Brombal and Moriggi 2017). In the ten years elapsed from the launch of the remediation plan and the reform of management institutions, extensive urban renewal took place in the basin. Two key projects in this respect were the establishment of the Lihu lake Scenic Area and the construction of Lihu New Town (*Lihu xincheng*), which according to official claims embodies the harmony between human and nature (Wuxi City, 2008). Also as a result of these projects, during the 11th Five-Year Plan (2006–10) Wuxi established itself as one of the models for sustainable urbanization in China (Wu and Li, 2014; Brombal and Moriggi, 2017). In 2011, the city's experience was included in among Asia's best practices for urban development endorsed by the United Nations Environmental Programme (UNEP, 2011). Given the incremental nature of China's policy processes, whereby successful pilots are replicated locally or scaled up to inform national policies, the appraisal Lihu's experience can therefore provide an insight over future development of IWM in China, and its integration with urban planning.

3. Methodology

3.1. Theoretical and analytical background

The notion that the pursuit of sustainable development requires

³ Another case was identified which complied with most of prerequisites, that of the Qionghai lake basin, located in the Liangshan Yi Ethnic Autonomous Prefecture (Sichuan Province). However, due to limited access to data and local stakeholders, the research team had to drop the case entirely. For an overview of the Qionghai case, see Chen and Wang (2003).

⁴ This number have been estimated based on the number of residents in the Binhu district, Taihu subdistrict, and Xuelang subdistrict.

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