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Situating Adaptive Environmental Governance

Non-governmental Actors in the Protection of Nanjing's Qinhuai River

By

Matthew Gaudreau

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School of International Development and Global Studies

Faculty of Social Sciences

University of Ottawa

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Abstract

Studies of adaptive governance in social-ecological systems have identified common features that assist social actors in responding to environmental pressures. Among these features, multiple sources of ecological knowledge, trust, and networks between actors have been highlighted as properties that contribute to successful governance arrangements. However, studies in adaptive governance have also been critiqued using a political ecology approach. This is due to their under-theorization of political elements that can constrain or promote the formation of the features of adaptive governance. In particular, power dynamics between actors and the subsequent privileging of one source of knowledge over another might have an effect on governance arrangements.

In China, environmental degradation is a serious issue. The Qinhuai River, located in the city of Nanjing, has experienced significant ecological decline over the last 30 years as urbanization pressures on the system increased. Over the same period, China has undergone changes in state-society relations, including allowing the formation of NGOs. Since the turn of the millennium, several NGOs have begun working on issues related to the Qinhuai River, including raising awareness and producing information on the environment.

This study examines the features of adaptive governance in a critical light by situating them in the local political context of China. The relationship between NGOs, fishers who use the Qinhuai River and government are examined using Social Network Analysis and semi-structured interviews in order to understand the production of information, networking and trust between these actors. It is shown that the existing arrangements to include NGOs and fishers in the river's governance activities are guided by a corporatist system of state-sanctioned representation. This is not conducive to adaptive governance arrangements, despite the increasing existence of ENGO networks and new sources of knowledge over the last decade. It is thus important that studies of adaptive governance take steps to contextualize their findings within the local political climate.

Résumé

Les études en matière de gouvernance adaptative des systèmes socio-écologiques ont permis d'identifier des caractéristiques communes qui permettent aux acteurs sociaux de répondre aux défis environnementaux. Parmi ces dernières, de multiples sources de connaissances écologiques, la confiance et des réseaux entre les acteurs ont été mis en évidence comme étant des éléments qui contribuent au succès des modalités de gouvernance. Cependant, les études traitant de la gouvernance adaptative ont également été critiquées par le biais de l'écologie politique en raison de leur sous-théorisation des dynamiques de pouvoir entre les acteurs et du fait qu'elles favorisent une source de connaissance ou une vision de l'avenir plutôt qu'un autre.

En Chine, la dégradation environnementale est un problème important. À ce titre, alors que les pressions d'urbanisation se font de plus en plus sentir sur le système local, la qualité écologique de la rivière Qinhuai, située à Nanjing, a diminué au cours des 30 dernières années. Durant la même période, la Chine a connu plusieurs changements dans ses relations État-société, en permettant notamment la formation d'ONG. Depuis le début des années 2000, plusieurs ONG ont commencé à travailler sur les problématiques liées à la rivière Qinhuai, incluant entre autre la sensibilisation et la production d'informations sur l'environnement local.

Cette étude examine les caractéristiques de la gouvernance adaptative d'une manière critique en les situant dans le contexte politique local de la Chine. Les relations entre les ONG, les pêcheurs qui utilisent cette rivière et le gouvernement sont ensuite étudiées à travers une analyse des réseaux sociaux et d'entretiens semi-dirigés avec différent acteurs, ceci afin de comprendre la production d'informations, le réseautage et le niveau de confiance entre ces acteurs. On constate que la participation des ONG et des pêcheurs la gouvernance de la rivière est encadrée par un système corporatiste de représentation sanctionné par l'État. Ceci n'est pas favorable à des modalités de gouvernance adaptative, et ce, malgré la croissance, depuis les dernières décennies, de nouvelles sources de connaissances. Il est donc important que les études sur la gouvernance adaptative prennent des dispositions afin de contextualiser leurs conclusions dans l'environnement politique local.

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List of Acronyms

ADB	Asian Development Bank
CCP	Chinese Communist Party
ENGO	Environmental Non-Governmental Organization
EPB	Environmental Protection Bureau
GONGO	Government Organized Non-Governmental Organization
NGO	Non-Governmental Organization
QEIP	Qinhuai River Environmental Improvement Project
SNA	Social Network Analysis
SEPA	State Environmental Protection Administration

Note on Use of Chinese Characters and Pinyin

Chinese concepts and keywords in this text are, unconventionally, written in both *pinyin* with "tone" markers and Chinese characters in the first instance they are introduced, for example: (*pīnyīn*, 拼音). This is to assist readers with basic knowledge of Chinese to expand vocabulary, which includes knowledge of both tones and characters. Character inclusion also assists Chinese readers not familiar with English translations of Chinese concepts. The names of people and cities are kept in roman letters, as they are more commonly used and understood across languages.

Chapter 1: Context and Research Problem

China has experienced rapid economic and urban expansion over the last 30 years, averaging over 10% annual growth in GDP (World Bank 2013). However, this growth has come at the cost of environmental degradation, in the form of air pollution, water pollution, soil degradation, and the creation of urban heat islands, among others (Liu 2009; Economy 2010; Li et al. 2010). Though the environment is increasingly accepted as an issue, it remains in constant tension with the priority given to economic growth (Tilt 2007; Ho 2008a). The role of social actors in responding to environmental pressures, through creating and sharing knowledge, and successfully contributing to policy discussion, is central to creating governance arrangements that can successfully deal with environmental change (Folke et al. 2005). However, these various sources of knowledge are subject to unequal power relations (Armitage 2008).

1.1 Context

Humans and the natural environment are constantly interacting, even in cities (Alberti 2005; Grimm et al. 2008). Though this statement may seem simple, the nature of these interactions and the way that these interactions are perceived and studied is in fact complex, as are their implications (Liu et al. 2007). With the rise of urbanization, there are countless effects of urban expansion on existing ecological systems, and likewise on social systems; biodiversity loss, air pollution, water pollution, and health impacts can all be linked to urbanization (Duh et al. 2008).

As a result of changing urban environments, the accompanying degradation has often been met by both governmental and non-governmental actors who respond to events by changing the way development is governed in order to mitigate degradation (Ernstson et al. 2008; Hordjik and Baud 2011). In doing so, the goal of such responses is to improve the ability to deal with

environmental shocks in order to stay within the bounds of a desirable state, thereby increasing a system's "resilience" (Walker et al. 2006). Studies have been completed in both rural and urban areas across the world to better understand the way that linked social-ecological systems interact and the different ways that social actors are able to intervene to promote sustainable practices (Berkes et al. 1998; Berkes et al. 2003; Ernstson et al. 2008; Otto-Zimmerman 2011; Colding 2012). Academically, adaptive governance frameworks have attempted to formalize the role of these various social actors in creating governance arrangements to better manage social-ecological systems in order to make the system more resilient to social-ecological degradation (Folke et al. 2005; Boyd and Folke 2012).

China currently has 16 of the 20 most polluted cities in the world (Economy 2007), 70% of the country's waterways are severely polluted (OECD 2006), municipal waste has more than doubled since 1990 (OECD 2010), and sulphur dioxide and nitrogen oxides emissions are the largest in the world (Zhao 2006). These statistics are coupled with the fact that development plans include the continuation of urbanization, a trend that has seen an *increase* of over 370 million people living in cities across the country between 1980 and 2005 (UNDES 2011). This urbanization process contributes to the ecological stresses listed above, changing the composition of ecological systems through human interaction (Duh et al. 2008; Ernstson et al. 2010a). Like elsewhere in the world, this degradation has been met by responses both inside and outside of government (Ho 2008). Environmental Non-Governmental Organizations (ENGOs) have steadily increased in number since the mid-1990s, and demonstrations regarding concern over environmental degradation and pollution have also been consistently observed (Shi and Zhang 2006; Li et al. 2012).

One city that has experienced attempts at non-governmental engagement in environmental governance is Nanjing, which is often considered one of China's "greenest" cities (Jones 2010). In

addition to having a relatively active citizenship, Nanjing is also the site of an urban river that has experienced steady degradation over the last 40 years (ADB 2006; Xu 2009). The Qinhuai River (*Qínhuái hé*, 秦淮河), which runs through the city and joins the Yangtze River (*Chángjiāng*, 长江), has been negatively affected by Nanjing's urbanization and industrialization, and has also been the target of both governmental and non-governmental revitalization campaigns[1]. However, despite the attention it has received over the last decades, the ecological indicators of the river have improved very little (Xu 2009; ADB 2012).

1.2 Problem Statement

Literature in social-ecological systems has been fruitful in identifying institutional arrangements through which multiple actors in a system are able to adapt to ecological signals in order to increase resilience to change. However, the use of theory from social science to understand the barrier to and pitfalls of adapting institutions to improve governance systems has remained weak (Armitage 2008; Cote and Nightingale 2012). This research seeks to engage three areas of theory through an empirical case study: 1) resilience and adaptive governance of social-ecological systems, 2) political ecology and 3) China specific investigation of state-society relations. In doing so it will seek to explore the importance of acknowledging existing social theory in the context of social-ecological research, particularly in the context of urban areas and countries with *non-democratic* political systems.

In the context of the Qinhuai River, with similarities to other environmental issues in China, the inclusion of social theory becomes extremely important in understanding how adaptive governance regimes are able to come about, or are constrained. Though many areas across the

[1] These revitalization efforts have included large scale waste-management projects beginning in the 1980s, to

globe experience environmental degradation due to urbanization and industrialization, which can at times be managed at the local level, it is not assured that local reactions are able to adapt to create more sustainable forms of living. Following the propositions of Armitage (2008) and Cote and Nightingale (2012), this research will engage in the following problems: Which sources of knowledge are privileged in addressing environmental management? What information is available to inform environmental governance? How do political structures and existing institutional arrangements influence non-governmental responses to crisis? These issues are at the heart of this thesis, and must be more closely examined and incorporated into social-ecological systems theory.

1.3 Thesis Structure

As laid out in this first chapter, this thesis will address the interface between varying knowledge sources among social actors, and the opportunity for input into policy discussion. This will specifically be done in the context of social responses to the degradation of Nanjing's Qinhuai River. As an interdisciplinary study, Chapter 2 and 3 will review previously unrelated literatures and theoretical discussions. In Chapter 2 this will include findings of studies on urbanization and the environment, examining these issues through the rich body of literature related to adaptive environmental governance and the political ecology critique. Chapter 3 will cover both the theoretical and empirical study of urban governance arrangements and state-civil society relations in China during the post-1979 (and particularly post-1994) period.

Chapter 4 will introduce the research questions arrived at through the literature review. It introduces a conceptual framework for the study and reviews the use of Social Network Analysis, followed by a discussion of the methodological approach taken and an overview of the Qinhuai River case study. Chapter 5 proceeds to a presentation of the data collected. This chapter is divided

into two principal sections in order to assess the data regarding generation of ecological knowledge in civil society and the networking undertaken to share said knowledge. Chapter 6 will focus on a discussion and analysis of the results from Chapter 5, examining the process of knowledge creation and sharing among ENGOs and fishers and placing this in the larger context of the literature review.

Finally, Chapter 7 will provide a summary of the study and its findings, presenting conclusions arrived at through this research and direction for future engagements. In addition, limitations of the study will be addressed.

Chapter 2: Social-Ecological Systems, Adaptive Governance and Political Ecology

2.1 Urbanization and the Environment

For the first time in history, over 50% of humans live in cities, transforming landscapes and putting pressure on both ecologies and human health (Schell et al. 1993; UN Habitat 2012). Urbanization has been linked to significant environmental changes, such as land use change, creation of urban heat islands, water pollution, air pollution, and biodiversity loss (Alberti 2005; Grimm et al. 2008). These, among others, have a variety of impacts on ecological systems in the urban setting and add significant pressure on the environment given the magnitude of urbanization, particularly in countries such as China (Grimm et al. 2008).

Building on this, Liu et al. (2007: 1513) indicate, that "ecological and socioeconomic patterns and processes in urban coupled systems are different from those in rural areas. They are mediated by factors such as the urban form, built infrastructure, and location and consumption preferences of heterogeneous households and businesses" (pg. 1513). For example changes in land cover can lead to increased water pollution through runoff from paved surfaces into soils, untreated sewers, and aquatic systems (Pauleit et al. 2005; Shao et al. 2006). Similarly, large expanses of paved land overtake the area in which many plants and animals live, and disrupt processes of pollination (Colding 2007). Further, the absence of adequate infrastructure to treat wastewater, in addition to individual habits of water consumption, leads to increased pressure on local aquatic systems (Wu et al. 1999).

Though highly industrialized countries are also at risk, the problem is especially severe for developing countries, as the expansion of urban infrastructure is often not able to keep pace with the rapid urban-rural migration that has occurred over the last half century (Shell et al. 1993; Wu et

al. 1999; Medina 2010; UN Habitat 2012). The new concentration of people has resulted in the creation of solid waste, energy use, industrial byproducts, carbon dioxide and sulphur dioxide emissions, and untreated water (OECD 2006; Xu 2007; Zhao 2009).

Inherent in these changes is the relationship between developing socio-economic systems created to manage urban life, and ecological systems which provide ecological functions necessary to sustain human life (Ernstson et al. 2010a). It is at the confluence of these pressures and the ability for social actors to react to these changes that we arrive at a discussion of a prominent framework that seeks to address this type of change both in rural, resource based communities, as well as in urban settings.

2.2 Social-Ecological Systems, Adaptive Governance and Political Ecology

2.2.1 Social-Ecological Systems

Adaptive governance frameworks are tied to the concept of social-ecological systems and the resilience approach. The concept of social-ecological systems has been developed since the 1990s (Berkes et al. 1998), with the goal of putting forward a conceptual understanding that human systems (social/economic/political systems) and ecological systems (where humans are often treated as exogenous) are integrated (Adger 2000), and together they "behave differently than their separate parts" (Alberti and Marzluff 2004: 242). This vision was formulated in reaction to resource management strategies which have traditionally been based on a "utilitarian and exploitative worldview which assumes that humans have dominion over nature" (Berkes et al. 1998: 1). Thus, social-ecological systems thinking has sought to "stress that the delineation between social and ecological systems is artificial and arbitrary," and that it is indeed harmful to examine one aspect without the other (Folke et al. 2005: 443).

This can be equally applied to the urban setting which also depends on ecological functions in order for human life to be sustained (Armitage et al. 2009; Ernstson et al. 2010a). This is particularly important due to the rise of urbanity throughout the world and the consequences described above (Hordijk and Baud 2011). A literature that exists on the ecological functions of urban areas (cf. Grimm et al. 2000); however the integration of humans into the analysis of urban social-ecological systems is a more recent development (Alberti 2003; Ernstson et al. 2008).

In the last decade there have been multiple studies examining the interaction between people and the environment in urban settings, for example in the creation or preservation of urban parks (Ernstson et al. 2008; Belaire et al. 2011) and the effect of urban design on wildlife in the city (Jim and Chen 2003; Elmqvist et al. 2004; Lundberg et al. 2008). These studies contribute to an understanding of urban spaces as being simultaneously influenced by processes that are both social and ecological. With the addition of the larger scale effects of climate change, it is evident that even the urban system is social-ecological in nature, though may be considered a "human dominated" social-ecological system (Ernstson et al. 2010a).

2.2.2 Resilience in Social-Ecological Systems

Central to the development of social-ecological systems thinking are the resilience approach, and adaptive governance as a framework to increase resilience. Resilience has been used in both ecological and social analysis, but has more recently been adopted as a way of understand change in integrated social-ecological systems (Holling 1973; Gunderson 2003; Folke et al. 2006). A social-ecological system is resilient to the extent that it can "absorb recurrent natural and human perturbations and continue to regenerate without slowly or even unexpectedly flipping into less desirable states" (Folke et al. 2005: 483). Maintaining a system that is resilient to these

perturbations (maintaining the desirable properties that facilitate both human and non-human life within a given regime) is essential for sustainable social-ecological survival (Berkes et al. 1998; Norberg et al. 2008).

While the concept of resilience was initially intended to describe ecological systems, more recently, social systems have been integrated into its conceptualization. Adger (2000) notes that the concept of ecological resilience has often been directly transferred to that of social resilience, arguing that this is not an appropriate way to understand social system functioning. Instead, social resilience can be conceptualized as an institutionally determined property, where institutions are defined as the "rules and norms that govern society, as well as the more usual notion of formal institutions with memberships, constituencies and stakeholders," and is observed through "examining positive and negative aspects of social exclusion, marginalization and social capital" (Adger 2000: 348 and 352). Operationalized through institutional structure and social relationships, social resilience can "be defined as the ability of communities to withstand shocks to their social infrastructure" including environmental, social and political changes (Adger 2000: 361).

Folke et al. (2005) build on this definition, indicating that a social-ecological system experiencing an undesirable environmental shift is considered resilient if the social system is able to re-organize and adapt in a manner that restores the ecological conditions. This adaptation for the purpose of increasing resilience has been explored under several different but related conceptualizations, including adaptive capacity, adaptive co-management, and adaptive governance (Armitage 2008). All share a base in highlighting the importance of social flexibility in order to identify and address ecological shifts in a comprehensive fashion. Where adaptive capacity refers simply to the social space and social capital available to carry out different forms of adaptation, adaptive governance is focused on the varying arrangements under which adaptive

capacity can be utilized and institutionalized, and adaptive management is “the operationalization of” these arrangements, including monitoring of feedback (Folke et al. 2005: 444).

2.2.3 Adaptive Governance

Adaptive governance is a framework for increasing resilience through changing social institutions that are currently in an unsustainable path dependence, which decreases resilience (Ernstson et al. 2010a). As discussed by Marschke and Berkes (2005), the concept of “unsustainability” is a desirable tool in identifying a starting point for what “sustainability” looks like. The process of sustainability management therefore involves identifying unsustainable practices and devising governance arrangements that have the ability to address and improve these practices. In this sense, the role of the adaptive governance framework is to analyze the ability of systems to not only identify sustainability, but to identify unsustainability from multiple scales and perspectives, and act upon findings through a flexible governance arrangement linking government and civil society (Marschke and Berkes 2005; Stockholm Resilience Centre 2011). This is particularly an issue in urban settings, which are the site of numerous unsustainable practices (Alberti 2005; Grimm et al. 2008; Ernstson et al. 2010a; Hordijk and Baud 2011).

The idea of flexible governance arrangements has been central to this thinking, where it is conceptualized as “creating the conditions for ordered rule and collective action or institutions of social coordination” and establishing “the structures and processes by which people in societies make decisions and share power” (Folke et al. 2005: 444). These decision making structures have been specified by Armitage et al. (2009: 96) as, “the public and private interactions undertaken to address challenges and create opportunities within society,” which lead to, “the development and application of the principles, rules, norms, and enabling institutions that guide public and private

interactions". Thus adaptive governance research has sought to identify the conditions under which public and private social actors are able to coordinate in order to develop institutions that encourage the address of unsustainable practices.

Similarly, Bodin and Prell (2011) expand on the implications for ecological systems, noting that environmental problems do not fit nicely into "human-made jurisdictions", and therefore require conceptions of governance that go beyond government to multiple actors. Because this conception of 'governance' has focused on state-civil society partnerships and the sharing of knowledge, the actual structure, substance, and process of these relationships are of utmost importance in understanding how exchanges and partnerships take place (Bodin and Crona 2009).

The sharing of different forms of, and actions based upon, knowledge has become central to adaptive governance (Folke et al. 2005). Because of this, a particular issue that the literature has engaged in, in terms of participation and partnership in governance, is the use of local social and ecological knowledge/memory (Berkes et al. 2003; Ernstson et al. 2008; Raymond et al. 2010). This complex issue brings to the fore topics such as local experiential knowledge, diversity of viewpoints and the knowledge/function retained in them, as well as the relationship between formal scientific knowledge and alternative forms of understanding (Raymond et al. 2010). As indicated by Folke et al. (2003: 371), "only a fraction of the dynamics in ecosystems is likely to have been the subject of careful observations within the framework of formal science. A large proportion would be part of the experience of the people living, observing, and using the systems in a variety of contexts". Because of this epistemological standpoint, studies in social-ecological systems have been able to draw upon a wider range of knowledge forms, allowing for scientific knowledge to be paired with information built over time through experiential learning in communities (Folke et al. 2003). However, in taking into account the potential value of local knowledge and the memory that exists

in social-ecological systems, the power relationship between different knowledge forms have also received attention (Cote and Nightingale 2012).

Multiple case studies have been undertaken in both rural and urban settings exploring various social-ecological arrangements, and the development of these arrangements, that have achieved reductions in unsustainability and mitigated environmental pressures. In the rural setting, governance arrangements have often been examined using co-management as a governance practice between multiple users of a single resource. For example, Seixas and Berkes (2003) and Van Tuyen et al. (2010) both examined lagoon fisheries in Brazil and Vietnam, respectively. Focusing on multiple users of aquatic life in the lagoons, the studies examined ways in which users have been able to respond to resource degradation through co-management practices and the creation of new institutions. In both cases, it is observed that the formation of associations to create and enforce rules of use achieved some success, while also noting the constraints imposed through local power dynamics and government orientation.

In the urban setting, Ernstson et al. (2008) examine the pressures facing a national park in Stockholm, and point to the importance of network structure between civil society actors including user groups and NGOs, and their connections to political figures. They draw on social movement literature and social network analysis to find the opportunities and constraints for adaptation due to the way that structures (at least in the short term) determine the way that information is exchanged among actors. Similarly, Hahn et al. (2008) examine a separate national park in Sweden and the process of adapting governance structure to ecosystem change, and like Ernstson et al. (2008), find that "social memory" plays an important role in the processes. However, a key difference between the two cases is that Ernstson et al. (2008) take a critical approach, finding that

responses between actors in the network are subject to power relationships, which implies that the social memory and local knowledge which gets used is that of the dominant actors in the network.

A review by Armitage (2008) of key literature on frameworks including adaptive governance shows that some of the key aspects of institutional design in the context of successful adaptive resource governance include: 1) trust (between governance actors), 2) the sharing and use of multiple sources of knowledge, and 3) networks across scales, which contribute to institutional learning and adaptation. These properties are interrelated in that they contribute to broadly form the social structure of a regime that has the ability to sense and deal with change in a complex social-ecological system. In essence these points describe a collaborative relationship where actors from both government and civil society are engaged with each other in a mutually reinforcing relationship from the very local to the international. These actors exchange knowledge and learn from experience in order to adapt governance arrangements to address unsustainability in the system. Adaptive governance, therefore, goes beyond assessing simple 'participation' by addressing the importance of generating multiple points of environmental knowledge, sharing them through social networks, and *using* various knowledge forms in order to evaluate policy directions (Folke et al. 2005; Armitage 2008; Bodin and Prell 2011).

2.2.4 Political Ecology and Adaptive Governance

The literature on social-ecological resilience and adaptive governance has also been the target of criticism pointed at the relatively weak conception of social forces and social variation (Armitage 2008; Cote and Nightingale 2012). In particular, political forces are just beginning to receive more attention in terms of their implications for adaptive governance (Armitage 2008). For example, it is seen in the case studies mentioned above, that political variables such as political structures and

power relations come into play in affecting the way that social actors are able to respond to ecological disturbances (Ernstson et al. 2008; Van Tuyen et al. 2010). Common factors have indeed been isolated, pointing to certain desirable attributes that lead to successful adaptive responses to pressures in social-ecological systems (ex. trust, knowledge sharing, and networks, as stated above) (Folke et al. 2005). However, these attributes are embedded in social structures and the process undertaken by social actors to replicate these successful adaptive systems are subject to an unequal distribution of power, which affects outcomes (Armitage 2008).

Political ecology is a perspective that has an underlying theoretical basis in critical political economy, focusing on the effects of political economic pressures on human-ecological processes (Robbins 2004). Though it developed during the 1970s, Blaikie's (1985) work on the political economy of soil erosion in developing countries is seminal. Blaikie (1985) lays the foundation for integrating natural and social sciences, demonstrating that issues of environmental degradation are not simply technical issues, but can be imbued with social processes that occur both within and across specific spaces. Issues of power distribution are therefore addressed with respect to the way that different knowledge forms (as described above) and diverging interest groups are navigated in human-environment relationships (Armitage 2008).

In this context, "power" can be defined as the "ability to influence decision making" (Ernstson et al. 2008). Where this definition highlights a specific actor's ability to influence others, it extends to a definition of "power relations", which refers to the relative ability between multiple actors to influence decision making. However, as indicated by Cote and Nightingale (2012) and the political ecology critique, this conceptualization goes beyond an understanding of actors gaining their influence purely through their relationship to one another. Instead, actors are understood to also be operating under the constraints of larger social and political structures.

Political ecology, which has been varied in its content, has coalesced to form a prism through which to view human-environment issues, resting on this set of assumptions: i) ecological change and knowledge regarding ecological change is often politically produced and comes with unequal costs and benefits, ii) this reinforces existing inequalities and therefore affects power relationships (Bryant and Bailey 1997; Robbins 2004). Armitage (2008) uses a literature review to draw out complementarities between the resilience perspective, common property theory, and political ecology. He discusses the factors mentioned above (trust between actors, multiple sources of knowledge, networks across scales), and points to the fact that these desirable social properties are not always present, and can not necessarily be fostered in every context. Similarly, Cote and Nightingale (2012) argue that power relations are situated in social-ecological context, making political processes additional drivers of social-ecological outcomes.

Adding such a perspective to issues of resilience in social-ecological systems addresses the *prescriptive* nature of the adaptive governance arrangements. Prescribing principles of institutional flexibility and diversity often ignores the danger of susceptibility to power relations both in whose arrangement gets followed (Armitage 2008), and which social-ecological state is desirable and for whom (Cote and Nightingale 2012). As such, in the creation of any governance arrangement it is important to discover which arrangement is followed, who contributes (or does not contribute) to its operation, and who benefits (or does not benefit) from it (Armitage 2008). However, Cote and Nightingale (2012) argue that it is important to "situate" the social-ecological system in context, using social theory to draw out issues of power present in governance arrangements. This goes beyond focusing solely on institutions and "getting the rules right" as is focused upon by Adger (2000; 2005) (Cote and Nightingale 2012).

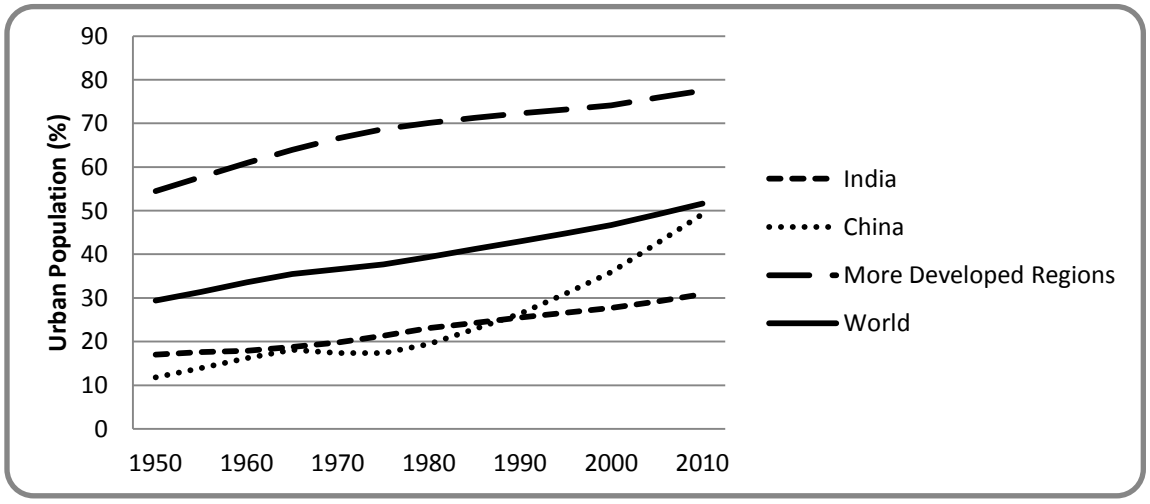
These criticisms are particularly helpful in that they demand the deepening of interdisciplinarity with regard to engaging social science theory in order to contextualize the larger power structures that exist in the context of social-ecological systems. This adds social and political limits to the ability to, and constraints to the desirability of, adapting governance structures. These criticisms are particularly pertinent when dealing with non-democratic countries such as China, host to a one-party political system and a nascent civil society, which been referred to as “semi-authoritarian” (Ho and Edmonds 2008).

Chapter 3: Urban Governance, Power Relations, and Social Networks in China

3.1 The Context of China

Since 2010, China has passed two milestones in terms of its urban expansion: for the first time it exceeded the world average urbanization level of 52% (UNDES 2011), and for the first time its population became more urban than rural (Xinhua 2012). This level of urbanization was reached with unprecedented speed, as in 1980 less than 20% of the country lived in urban areas (UNDES 2011). To put this in perspective, the world's second most populated country, India, had 23.1% of its population living in cities in 1980, and only increased to 30.9% in 2010. Figure 3.1 illustrates this phenomenon and also offers a comparative perspective with world trends in urbanization. China's growth since 1980 has been extraordinary.

Figure 3.1: Urban Population Change in a Comparative Perspective



Source: UNDES 2011[2]

[2] The UNDES term "More Developed Regions" consists of the countries of Europe in addition to Northern America, Australia, New Zealand, and Japan.

Due to the rapid pace of urbanization, infrastructure was not adequately planned for and has often not been able to keep pace with the amount of waste created in cities (ADB 2006). This, along with accumulating industrial pollutants arising through growth in industrial output, has contributed to severe problems in water systems throughout the country (Economy 2010; Cole et al. 2011). Though industrially sourced chemical oxygen demand decreased in the early 2000s (Shi and Zhang 2006), urban sewage has increased and is now the principal contributor to chemical oxygen demand (Lin and Swanson 2009). In addition, the increasing diffusion of automobiles throughout the country is contributing to air pollution, with paved surfaces leading to heavy metal run-off into bodies of water (Shao et al. 2006). Because of these urbanization/industrialization associated problems, environmental governance in the country is an issue of pivotal importance.

3.2 Urban Governance Structures

The bureaucratic structures of government in urban China are important in understanding the institutional structure providing official inroads to government, the offices through which government participates in overall urban governance, and the way in which government influences organization of social life in urban China (cf. Ma 2005; Enserink and Keppenjan 2007; Lee 2007; Shieh and Friedman 2008). Post-1979 China has experienced a restructuring of urban administration characterized by decentralization from the central government (Ma 2005), along with a relative retraction of the state from the lives of individuals, particularly in the form of social welfare (Shieh and Friedman 2008; Schwartz and Shieh 2009).

Since the Chinese Communist Party (CCP) came to power in 1949, cities in China have received some of their lasting institutional and bureaucratic structures, which helped to create political structures in the urban setting. Three of the most important bureaucratic systems that

create the institutional arrangements governing cities in China are the *dānwèi* (单位) system, street offices (*jiēdào bànshì chù*, 街道办事处) and residents' committees (*jūmín wěiyuánhuì*, 居民委员).

The *danwei* which loosely translates to "unit" or 'work unit', has historically been the most important link between people and the state, providing employment, housing, comprehensive social services, and facilitating mass mobilization campaigns of the CCP (Dittmer and Xiaobo 1996). Bray (2005) argues that the *danwei* became more than simply an administrative unit, and instead emerged as a system which controlled urban space with the effect of producing and reproducing collective subjectivities of its members – or a collective identity that has been situated as a result of power relationships. The *danwei* thus provided a system of governance that allowed for variation between each individual work unit's activities, but reinforced larger power relationships with the CCP (Bray 2005). As Heberer and Göbel (2011) reiterate, this system laid the institutional foundations that governed urban life in China through daily routines that involved a series of production goals within the work unit, slogans and educational mottos, and spatial control in terms of residency and relationships. Indeed, between 1957 and the early 1990s, over 90% of the population belonged to a *danwei* (Bray 2005).

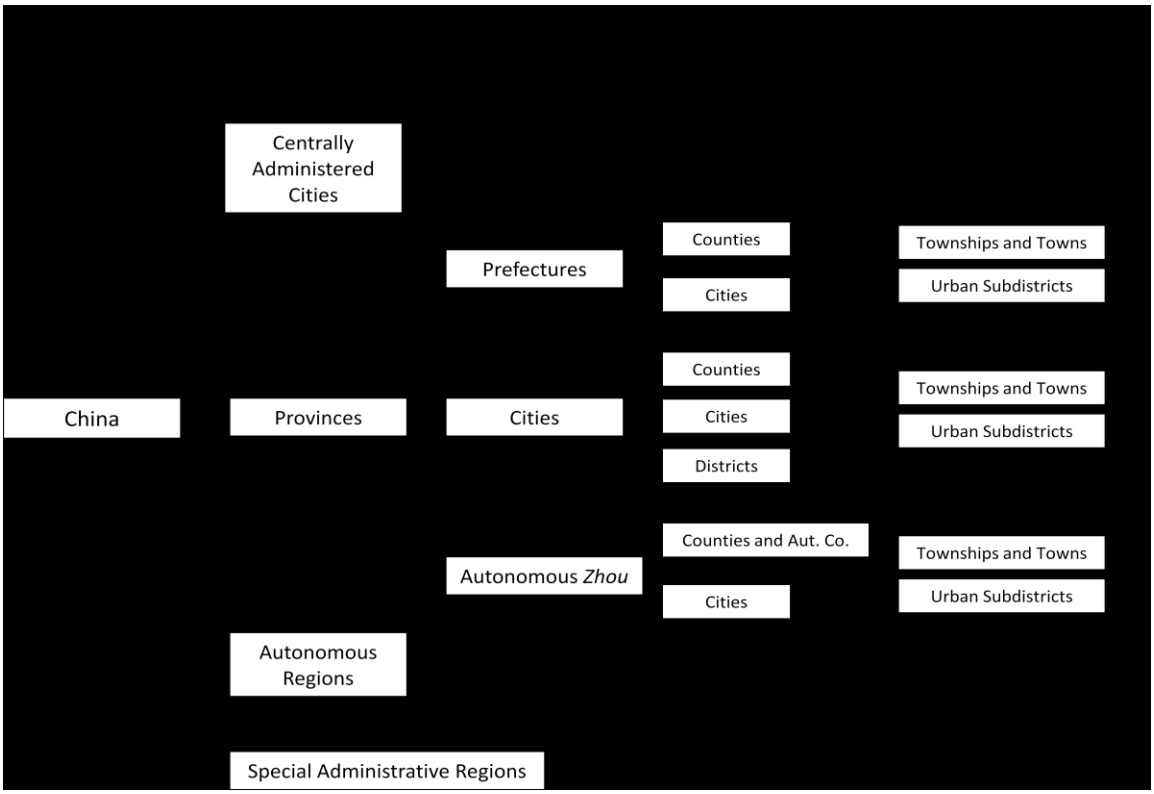
However, since China's Reform and Opening Up period (gǎigé kāifàng, 改革开放) in 1979, the ability of the state to continue providing the social service functions offered by the *danwei* has declined (Lee 2007). This is particularly the case since the 1990s when state owned enterprises across the country began closing as a result of reductions in government subsidy (Lee 2007); with the closure or downsizing of these enterprises and in the absence of government support, *danweis* were no longer able to continue either their social service or political roles (Bray 2005). As a result, it has been argued that the more recent government policy of "community building" (shèqū jiànshè, 社区建设) has been developed in order to fill the social and ideological vacuum left by the

dismantling of the *danwei* (Shieh and Friedmann 2008; Heberer and Göbel 2011; Boland and Zhu 2012).

The push toward community building involved the reorganization of two urban administrative units also developed in the 1950s in order to develop a new urban governance structure: the street office and the residents' committee (Bray 2005). Both were created with the role of providing social services for the minority of the population not affiliated with a *danwei*, along with playing the political mobilization role, where the street office is the lowest level of government (below urban districts) and the residents' committee is a sub-government organization which assists the street office in carrying out these tasks (Shieh and Friedmann 2008). Heberer and Göbel (2011) found that these two administrative organizations have been redesigned since the 1980s, including giving residents' committees responsibility for state duties, which has re-asserted party presence at the local level. However, despite this reassertion of reformulated state presence in the lives of urban residents in the wake of *danwei* dismantling, it is clear that opportunities for actors outside or on the periphery of state structure are arising, including NGOs, homeowners committees and other associations (Shieh and Friedman 2008; Haberer and Göbel 2011; Boland and Zhu 2012).

Before examining these new actors, it is useful to understand how this local level governance dynamic of street offices and residents' committees fit into the larger structure of government in China's cities. The administrative structure at different scales is displayed in Figure 3.2. This is taken from Ma (2005) and based on modified administrative diagrams from the Ministry of Civil Affairs, which oversees residents' committees as well as all social group registration and monitoring.

Figure 3.2: China's Spatial Administration System



Adapted from: Ma (2005)

Figure 3.2 shows the four sub-national administrative categories, which in practice exist within designated geographic boundaries. These are special administrative regions (Hong Kong and Macau), Centrally Administered Cities (ex. Beijing, Shanghai) which hold the same administrative rank as provinces, Autonomous Regions (ex. Tibet, Xinjiang) which have special designations based on ethnic minority makeup, and Provinces. The administrative structure in the cities of Chinese Provinces follows directly down from the diagram, where cities are broken down into a mix of further cities, townships and districts. Moving into a closer look at the governance structure introduced in Figure 3.2, Figure 3.3 pays further attention to the structure through which government policy at each level is devised and handed down (Shieh and Freedman 2008).

Figure 3.3 China's State Administrative Structure

Adapted from: Shieh and Friedmann (2008)

Where Figure 3.2 indicates "China" as the central government level, Figure 3.3 more clearly depicts the state structure through which policy is implemented, beginning with ministries of the state council and moving down to the Provincial and Municipal (city level) People's Governments. Within cities, the structures break down further to multiple districts and multiple street offices within each district. At the very lowest level, and not part of the state organ is the *shequ*, which in its administrative functional unit is made up of Residents' committees. For example, Nanjing's Municipal Civil Affairs Bureau holds direct links to the policy of provincial Civil Affairs Department and national Ministry of Civil Affairs, with registration of social organizations and guidelines community construction as a priority (Nanjing Municipal Civil Affairs Bureau 2013).

As such, the newly evolving role of the street offices and residents' committees in community construction is nested at the local scale in a larger structure of government institutions

(both in the sense of rules and organizations) (Heberer and Göbel 2011). Through China's Ministry of Civil Affairs at the central government level, both provincial civil affairs departments and municipal level civil affairs bureaus translate policy and pass it down to the district level, which would supervise street office engagement of "grassroots" residents' committees (Yan and Gao 2007).

While this model appears linear and top-down, this is no longer completely the case in contemporary China, as many scholars have discussed at length (Lieberthal 1992; Heberer and Göbel 2011; Boland and Zhu 2012). As mentioned above, at the level of the *shequ*, pre-existing institutions have been brought back to fill the institutional gap left by the decline of the *danwei* both in terms of fulfilling social services and in connecting the CCP to urban residents (Bray 2005; Heberer and Göbel 2011). Despite the institutional reconfigurations of street offices and residents' committees, the effectiveness of this social transition has been questionable in terms of its success in replacing the *danwei*, as found by Heberer and Göbel's (2011) study revealing low levels of resident engagement and knowledge about residents' committee activities. Similarly, Shieh and Friedmann (2008) find a gap between the intent of *shequ* governance arrangements and the reality that some residents are wary of relinquishing newfound independence.

In an extension of community building activities, Boland and Zhu (2012) have studied the interaction between top-down policy initiatives and community uptake at the level of the *shequ* in terms of environmental issues. They examined the "green community building" initiative (*lǜsè shèqū Jiànshè*, 绿色社区建设) in Guangzhou and Nanjing, and found that between street office and residents' committee mobilization. They found that some agency existed in terms of interpreting and focusing on issues of importance to the community, but that knowledge of these activities remains minimal (Boland and Zhu 2012).

At this juncture, it is important to recognize that while one of the many responsibilities of residents' committees is local environment and hygiene (Heberer and Göbel 2011; Boland and Zhu 2012), there are parallel institutions that deal with environmental issues in urban areas. Both government departments following the administrative scales laid out in Figure 3.3, as well as Environmental Non-Governmental Organizations which began developing in the 1990s, are playing important roles in governance activities in terms of environmental issues in urban areas.

3.3 Government and Environment in China

The existence of critical environmental problems in China has been an issue of increasing attention both within the country and internationally, and at the local level is directly related to governance structures. As China is primarily a one party state, its governance strategy toward environmental issues has historically been top-down. As noted by Shapiro (2001), environmental governance under Mao was characterized by a motto of 'humanity must conquer nature' or 'humanity must defeat heaven' (*Rén dìng shèng tiān*, 人定胜天). Though governmental institutions and legislation began to be formed beforehand, it was only in 1984 that environmental protection was first implemented through a "basic national policy" by the central government (Xia et al. 2010). The first formal legislation was subsequently passed in 1989, and led to the implementation of more comprehensive environmental laws (Shi and Zhang 2006). The State Environmental Protection Administration (SEPA), previously an organization at the sub-ministerial level, was promoted to "ministerial rank" in 1998, and eventually upgraded fully to Ministry of the Environmental Protection in 2008 (Economy 2010). The organizational structure now has thousands of offices that can be translated onto Figure 3.3, reaching from the central level of the Ministry of Environmental Protection, to the Provincial Environmental Protection Department, and Municipal and

District/County Environmental Protection Bureaus (EPB) (Shi and Zhang 2006; Economy 2010). Thus, there has been steady progression in the terms of the institutional importance ascribed to environmental protection at the level of government.

Environmental sustainability has been gradually incorporated into overall development planning, with its inclusion in the 10th five year plan in 2002, and emphasizing "harmony between man and nature" (*Tiān rén héyī*, 天人合一) in the country's Program of Action for Sustainable development in 2003 (Cao 2009). Along with promoting ministry status to the environmental protection agency, 'slower' GDP growth has been targeted in the newest, 12th, five year plan (to 2015). At the local scale, however, severe issues still remain and regulation standards are often not met, particularly in relation to air and water quality (Tilt 2007; Wang 2011).

The central government has also begun modest development of an institutional framework to involve civil society 'participation'/'consultation' in environmental governance. This has primarily occurred through three mechanisms, the Environmental Impact Assessment (EIA) law of 2003 (Li et al. 2012), the creation of telephone "hotlines" to report environmental issues to municipal EPBs (Warwick and Ortolano 2007), and the Open Government Initiative (Zhang et al. 2010). The EIA law has required stakeholders to be consulted regarding the evaluation of consequences related to development projects, and though its application has not been even, the law has served as a channel through which citizens have been able to appeal for the delay of large-scale projects (Li et al. 2012; Mertha 2009). At a more decentralized level, in 2001 several major cities (including Beijing, Shanghai and Nanjing) opened environmental "hotlines" where the public is able to telephone and report environmental hazards, to debatable success (Warwick and Ortalano 2007). A more recent initiative is the Environmental Information Disclosure Order instigated by the Ministry of Environmental Protection, which began its trial run in 2008. This order is part of a larger Open

Government Initiative which calls on departments and bureaus under the Ministry of Environmental Protection to answer requests for information related data collected by the government. This allows interested parties a level of transparency that would provide a shared information base regarding environmental issues (Zhang et al. 2010).

Together, these three institutional changes promoted at the central government level have opened windows through which non-state actors can be engaged in governance activities, whether through reporting information to government as in the EIA requirements or environmental hotlines, or through staying informed through access to environmental information collected by the government. This is in addition to the state directed environmental projects occasionally embarked upon by residents' committees through campaigns such as green community building, as discussed in Section 3.2 (Boland and Zhu 2012). However, beyond government designated organizations and institutional frameworks, there are also non-government actors that are beginning to operate since the retraction of the state, which will be discussed below.

3.4 Emergence of Power Relations

This notion of domination of nature has been transformed since the turn of the century, with the leadership declaring that there must be harmony between man and nature (Cao 2009). Indeed, the top leadership has gone so far as to advocate the inclusion of different viewpoints in policy making through the expansion of "orderly citizen participation in order to improve the democratic system...[and] implement scientific and democratic decision-making in order to improve the [sic] information collection in decision-making..." (Chou 2009: 3; quoting Hu Jintao in 2007).

As discussed above in Section 3.2, the social and economic reforms of the 1990s, including the dismantling of the *danwei*, left a vacuum in social space once occupied by the state. While

residents committees and street offices have attempted to fill some of this gap through community building (Abrahamson 2007), new opportunities have presented themselves in which people have room to organize in a manner relatively free of the state, particularly with regard to environmental issues (Mertha 2009; Heberer and Göbel 2011). Due to the pains of state retraction, and the absence of effective government involvement in environmental issues, actors outside of government began to emerge in the 1990s. While many organizations were concerned with the rights of workers and former employees of state owned enterprises (Lee 2007), environmental organizations were also emerging. The first environmental non-government organization (ENGO) was created in 1994, and over the next decade this number multiplied to thousands of ENGOS (Shi and Zhang 2006).

As a result of this emerging urban context, the gradual involvement of actors beyond the central government level, including civil society, in influencing decision making began receiving theoretical attention from scholars engaged in the study of China's political system. Among others, there are two prominent frameworks for understanding political decision making in China: the *corporatist* framework and the *fragmented authoritarianism* model. The corporatist framework puts forward the idea that the state designates certain interest groups in the population, as well as the specific organizations that will represent that group to government (Unger and Chan 1993; Unger 2008; Hsu and Hasmath 2013). In this sense it is the state that has the power to pre-select which interest groups and which people/organizations within these groups will be granted representation. While this dual method of inclusion and control centers on state-led actions, Béja (2008) indicates that there is an issue with corporatism's validity because the Party-state has not always been able to frame the interest groups that make-up the corporatist model, a criticism echoed by Boland and Zhu (2008).

The second prominent model for conceptualizing the way that policy is formulated under China's single-party system is called "fragmented authoritarianism". Introduced in the late 1980s by social scientists specializing in the changing politics and policymaking process taking place in reform era China, fragmented authoritarianism sought to provide a way of understanding how China's post-Mao central government engaged in bargaining with its increasingly autonomous provinces, municipalities, and governmental organs in order to exercise authority (Lieberthal 1992). The model itself was focused specifically on government bureaucracy, and quickly became partially outmoded as the role of forces outside of government became more prevalent in policymaking. In particular Oksenberg (2001: 22) declared the model to be insufficient due to the creation of new intermediary institutions between China and the rest of the world, and more importantly for this work, due to the newfound existence of "legal, semi-legal and illegal organizations and associations that are arising in the social and economic space created by a market economy and the state's retreat from total control over society and culture".

Picking up from this criticism after specifically focusing on the role of environmental activists in blocking a large-scale hydropower project, Mertha (2007; 2009) introduced the concept of "fragmented authoritarianism 2.0". In this re-conceptualization of the older model, Mertha (2009) acknowledges the increasing space for non-governmental actors, extending the model to include the ability of media, NGOs, and other associations to both pressure and bargain with government actors in the policymaking process. A key finding is the importance of "policy entrepreneurs" among NGO actors that have the ability to push for alternate ideas and connect with government (Mertha 2009). This way of understanding new structural opportunities in governance arrangements which lead to the potential to influence policy can be compared to Hajer and Wagenaar's (2003: 5) networked governance understanding that "new networks erod[e] the

power of previously powerful ones". In both the case of Mertha (2007) and Hajer and Wagenaar (2003), the understanding is that the emergence of new networks and coalitions of non-state actors have the opportunity to influence the direction of policy.

The tension between corporatist efforts on behalf of the state and the reality of increasing opportunity for citizens to organize to create pressure for government action is particularly prevalent in the discussion of NGOs and ENGOs in China. NGOs focusing on a variety of issues operate on a spectrum based on their relationship to the state, from Government Organized Non-Governmental Organizations (GONGOs)[3] to illegal/unregistered community organizations (Wu 2003). Shieh (2009) argues that corporatism and civil society frameworks, such as the rule of law approach, do not capture the complexities of state-NGO relations in China. Instead he elaborates a framework that examines state-NGO interactions in terms of a process that involves negotiating space in which to operate within and beyond state regulations (Shieh 2009). Moving beyond a strict focus on NGOs, Boland and Zhu (2008) expand their analysis to include other social actors, and incorporate an analysis of power relations, which they show has an effect on the scale at which social actors can influence urban environmental governance. Namely, participation is encouraged at the local, community level, but often discouraged at higher levels within a city and province, which is a finding echoed by Hildenbrandt (2009).

On the subject of environmental activism in China, Ho and Edmonds' central observation is that the actions of activists and ENGOs in China are embedded in a "semi-authoritarian context" (Ho and Edmonds 2008: 6). In this sense, as can be inferred from Shieh's (2008) framework, ENGOs must navigate regulation and negotiation while attempting societalization, all the while dealing with

[3] GONGOs (Government organized non-governmental organizations) are organizations that are funded and set up by the government, but are ostensibly NGOs. On a spectrum of distance from government oversight, these organizations are much closer to government (Shieh 2009). They are, however, not officially government organizations.

a tremendous power asymmetry in favour of the state. Nevertheless, as Ho indicates, “the Party-state imposes formal measures of strict control, while still leaving open ample informal avenues for political action by non-governmental groups and activists” (Ho 2008b: 36). Thus, environmental activism faces “organizational constraints” while simultaneously gaining “increasing political leverage by avoiding any connotation with being a movement, by all means trying to appear small, low-key and localized, and acting as the state's partner rather than its adversary” (Ho 2008b: 21).

Examining the issue from a slightly different angle, Yang (2005) sees an established movement of loosely networked ENGOs. Like Ho, he acknowledges the constraints, but sees ENGOs moving slightly beyond them, through what he describes as “cultural translation” (Yang 2010: 119). This concept intends to grasp the way that environmental activists are able to take international concepts, local issues, and existing political language to frame their struggles (which can also constrain them). The ability to co-opt the language of the Party-state gives legitimacy to ENGOs, and makes it easier to diffuse their message to networks, echoing Béjas' (2008) view of a “rule of law” strategy, and O’Brien and Li’s (2006) “rightful resistence” viewpoint of citizen activism. In addition to cultural translation, Yang's analysis states that “[Chinese environmental NGOs] are 'segmentary,' 'polycentric,' and 'networked'. They make up a dynamic structure open to input and change, providing opportunities for innovation to creative individuals” (Yang 2010: 126). This leads Yang to state the importance of ENGOs, and that, though they may have a 'middle class bias', urban ENGOs are resourceful in that they often have access to local institutions and make “persistent efforts to put public participation at the center of their vision” (Yang 2010: 134).

In contrast to Yang (2010), Hildebrandt and Turner (2009) find that there is less actual cooperation among ENGOs, and between ENGOs and other organizations. The authors find, through survey data, that although the organizations recognized the importance of cooperation, actual

efforts were not reflected in the frequency of cooperation. They found that 25% of ENGOs cooperated once per month, while 60% cooperated once per year (Hildebrandt and Turner 2009). An explanation offered, based on interviews, is that, “the government is wary of too strong ties between groups, and if individual NGOs want to continue to engage in their own work unabated, they are best off keeping to themselves” (Hildebrandt and Turner 2009: 101). The authors conclude that despite the large representation of ENGOs in the NGO sector, their role is still very much constrained by government interests. Thus there remains debate in terms of the utility of networking and pressure to remain un-networked.

Chapter 4: Research Design and Methodology

This chapter will introduce the research question and sub-question to be addressed, in addition to a conceptual framework based on the literature review, and the overall research design employed to address the questions.

4.1 Research Questions

The research questions to be addressed in this thesis draw on the scholarly work from the interdisciplinary literature discussed in Chapter 2 and 3, focusing on the combination of environmental degradation due to urban development, reaction on the part of social actors to adapt social-ecological governance (particularly non-state actors), and the unequal ability to participate in environmental governance. In particular, the political context of China is focused on, highlighting the importance of power structures and the limits/opportunities for agency in the context of managing a social-ecological system.

Using the case study of the Qinhuai River in Nanjing, it is sought to apply and critically evaluate the adaptive governance perspective using empirical case-study data and theory developed in the China studies sub-field related with regard to civil society participation and organization. In addition, drawing on studies both in adaptive governance and in China studies, the methodological approach in this study will take on qualitative Social Network Analysis (SNA), to examine the structure of social relationships and knowledge sharing surrounding civil society participation in environmental governance. It is argued that combining context specific socio-political theory with critical perspectives of adaptive governance (through a political ecology approach) creates a fuller understanding of the situation facing governance arrangements in civil society at the city-level.

This leads to the principal question on which this research will focus:

> In light of the described features and criticisms of adaptive governance, how does local political climate affect governance arrangements among environmental actors surrounding the Qinhuai River?

This question can be broken down into sub components:

> i. Do social actors (user groups, ENGOs) generate unique ecological knowledge regarding the Qinhuai River?
> ii. What is the structure of networks between ENGOs, and to whom are they linked?
> iii. Do social actors have the opportunity to share ecological knowledge with the government?

The term "user group" draws on the Adaptive Governance literature which puts value into the idea of local or experiential knowledge from resource users (Ernstson et al. 2008). In terms of the Qinhuai River there is one particular user group that has significant interaction with the ecology that goes beyond an aesthetic relationship. These are urban fishers who engage in fishing activities in the river for a variety of reasons. Because of their unique exposure to the river ecology, this group will be focused on as civil society actors with a direct engagement with the river, who have an interest in improving its ecological functions. This will be discussed further below when addressing methodology.

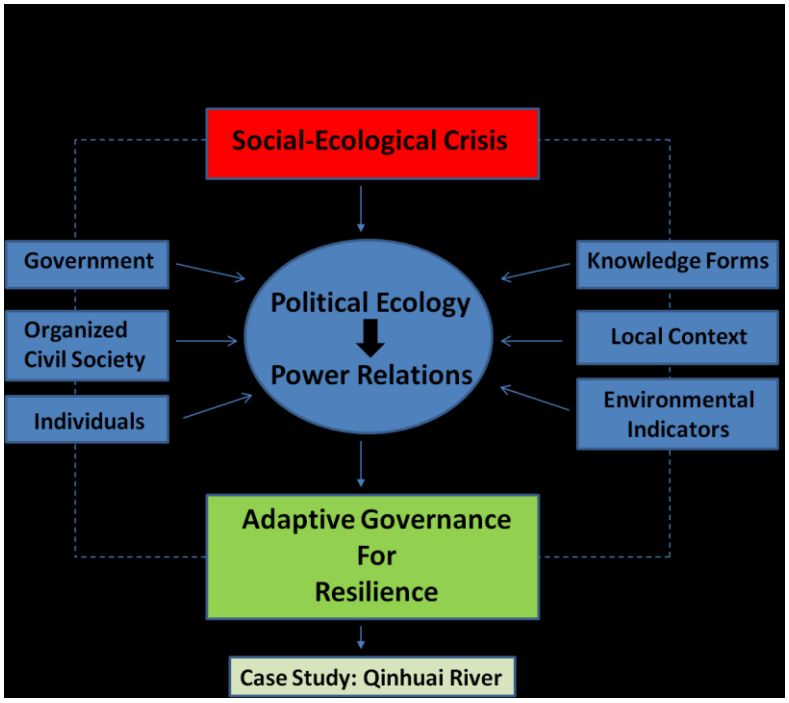
The questions are complimentary in that a full response to the central question will be guided by responses to the sub-questions. The primary research question is built on the prescriptive characteristics of adaptive governance studies and power relations critique, identified in the literature review as the sharing and use of multiple sources of knowledge, trust between governance actors, networks across scales and the effect of local political climate. To address this larger question, the sub-questions focus on these specific characteristics. The focus is on non-government actors who have a primary interest in improving the quality of the Qinhuai River. In this

sense, the research is concentrated on understanding the opportunities and constraints for operationalizing adaptive governance arrangements under non-democratic political systems, where governance is understood as sustained norm setting and institution building interactions that extend beyond government to the involvement of other actors (Armitage 2008; Bodin et al. 2011).

4.2 Conceptual Model

Based on the literature review and the formulation of the research questions, a conceptual model (Figure 4.1) has been developed to illustrate the dynamics of social-ecological system components involved in reacting to environmental degradation. This configuration puts a political ecology approach at the centre of the model, reflecting the critical stance that power relations must be negotiated in any adaptation process, particularly with respect to knowledge sharing.

Figure 4.1: Conceptual Model Guiding the Research Design



Source: Adapted loosely from Armitage (2008) and Bodin and Crona (2009)

The six components of the model are derived from the multiple areas of scholarship engaged in the literature review. The model begins with a social-ecological crisis (located at the top of the model), taking into account the dual social and ecological aspects of the system in question. The variables that are both responsible for, and can work towards solving, the crisis are featured as along the exterior of the model. Their linked nature to both crisis and potential for adaptation are demonstrated by the dotted line that connects each of these eight boxes, which also reflects the findings of adaptive governance literature indicating the interconnection between the six components in order to form more flexible and responsive governance arrangements.

Thus, these components (government, organized civil society, individuals as well as knowledge forms, local context, and ecological indicators) of the model come from literature on resilience and adaptive governance in social-ecological systems, where models often include actors from state, civil society, private sector, and natural systems (cf. Bodin and Crona 2009). A combination of characteristics is seen to be held by actors government, organizations and individuals (Gelcich et al. 2010), which give rise to addressing the environmental knowledge, local context, and ecological indicators at play in the social-ecological crisis (Folke et al. 2005). As such, in a traditional adaptive governance arrangement, these components are meant to react when faced with crisis in order to adapt and produce a more resilient governance arrangement.

However, Figure 4.1 centers on a crucial element of this study; the political ecology lens which focuses on the unequal distribution of the effects of environmental degradation and power relationships with regard to the input of knowledge to address degradation (Armitage 2008; Cote and Nightingale 2012). This central component of the model represents the inclusion of power relations which affect all other components of the model, and act as a gateway to entering more adaptive arrangements. Implicit in this configuration is the role that existing local governance

structures and political systems affect the way in which each actor in the model may act, which is drawn out of literature on urban governance and state-civil society relations in China.

As such, this conceptual model provides a generalized guide for approaching research in the adaptive governance of social-ecological systems. All of the key components that are often discussed (both social and ecological) are present, leaving room to interpret the key variables that may arise out of the system components (trust, networks, and knowledge). However, this is with the key modification that each is subject to unequal power relations both within and between components, thus problematizing the politics-neutral perspective that is often taken in analyzing movement between crisis and adaptation for resilience. In moving to the specifics of this study, the approach described by the model will be applied to the case study of the Qinhuai River.

4.3 Research Justification and Objectives

Given the brief context described above, this vein of research is highly relevant to understanding how urban citizens and environmental groups, in non-democratic contexts, are relating to each other in order to instigate better environmental practices. While government prerogative is always important, particularly in China's context, the actions of organizations and individuals have increasingly had a role in addressing specific environmental issues, and ensuring enforcement of government policy. Pursuing these questions will give insights into organizational relationships and their effectiveness in promoting changes in environmental governance, as well as the potential they present for the future governance. In addition, the investigation of the types of ongoing ecological knowledge creation surrounding the Qinhuai River, and the power relationship between these knowledge forms, will give further insight into the importance of socio-political context in the

governance arrangements of social-ecological systems and the limits imposed on the prescriptive nature of the adaptive governance.

While it is clear that the context of power relations in the study of social-ecological systems is lacking, it is also true that case studies of specific social-ecological systems in China are minimal (Van Den Hoek et al. 2012). As displayed above, studies of "civil society" and ENGOs in China are often focused strictly on the political aspects of their existence, including organizational structure and navigation of regulation, while studies of environmental degradation focus solely on ecological systems.

The closest that case studies have come to combining both has occurred in the context of the often cited example of organization surrounding the damming of the Nu River (*Nùjiāng*, 怒江).[4] This case received significant attention as it has been seen as a triumph of a network of civil society-scientist-media-bureaucratic partnerships that successfully altered development planning at the level of the provincial and central governments (Büsgen 2004; Mertha 2008; Hildebrandt and Turner 2009; McNally et al. 2009; Mertha 2009; Li et al. 2012). In essence, this group of actors was able to stop (as of time of writing) the construction of a hydroelectric dam on this largely untouched river, thereby avoiding significant ecological destruction. However, this focus is different from many other studies in adaptive governance in social-ecological systems as the intervention involved the blocking of an event rather than on dealing with ongoing pollution. In other words, it was based around the acute threat of a single project, versus dealing with the chronic issues of multiple social-ecological pressures. It is in the latter context that much more research needs to be done.

[4] The Nu River (aka the Salween River) runs from Yunnan Province of southwest China into Burma and Thailand.

4.4 Social Network Analysis

As seen in Section 3.4, the concept of networking among organizations has been central in discussion of ENGOs in China. Likewise, Chapter 2's overview of adaptive governance has also placed importance on networking between governance actors to effectively deal with environmental change. As such, the literature on social network analysis (SNA) will now be introduced in order to better situate an important component of the approach of this study.

The examination of social networks has been described as both a theory and method of analysis. However, for the purpose of this study, SNA will be understood as a perspective which will inform the methodology while acknowledging the underlying theories present in the pre-existing social network measurements (Marin and Wellman 2009). SNA comes from a structuralist paradigm that believes, "[a]ctors are described by their relations, not by their attributes […] [a]nd, the relations themselves are just as fundamental as the actors that they connect" (Hanneman and Riddle 2005: 1). While Hanneman and Riddle have an explicitly structuralist understanding of SNA, the "attributes" of social actors are not simply discounted, rather the emphasis is placed on relationships, while maintaining an understanding of the individual profiles to which they belong (Borgatti and Halgin 2011). In examining relations, however, network theorists see that, "regularities or patterns in interactions give rise to *structures*" (Wasserman and Faust 1994: 7). This brings the key assumption that the behaviour of one unit affects the behaviour of another (Wasserman and Faust 1994).

Wellman (2008: 221) summarizes the basic tenets of the social network perspective, which are broken down into three:

> 1. "'a structural intuition based on ties linking social actors'...there is no a priori assumption that the world is composed of bounded groups, and the emphasis is on

relationships between individuals, rather than on discrete individuals joined only through regression and cross-tabs."

2. "'Grounded in systematic empirical data,' rather than in deductive assertions or one-off cultural studies."

3. "'Draws heavily on graphic imagery': the familiar graphs of lines (ties) connecting points (nodes), be they persons or nation states."

(Wellman 2008, discussing tenets proposed by Linton Freeman)

While a fourth tenet is also listed, stating that mathematical models are required, Wellman disagrees, stating that "many fine ethnographic network analyses eschew such models" (Wellman 2008: 221). These tenets indicate that the method of collecting network data provides an inductive approach in that there is no predetermined network structure. However there are still predetermined methods of measurement in terms of existing theory regarding social network structures, as well as the theories related to this study regarding resilience through adaptive governance of social-ecological systems, and also in China studies. Thus, there is often engagement between inductive and deductive approaches (Marin and Wellman 2010).

Wellman (2008) also points to the graphic imagery of networks where "ties" are depicted as lines which represent relationship characteristics (ex. friendship, information exchange), and "nodes" are depicted as dots, which represent the unit of analysis, or the actor (ex. individual, organization). Together the ties and nodes from a structure based on the data retrieved, which can be measured to gain quantitative information, and described qualitatively, demonstrate an empirical structure that can be compared with existing theory.

This perspective allows for flexibility in viewing a vast array of different social phenomena. As Marin and Wellman (2010) and Borgatti and Halgin (2011) have demonstrated, SNA has vastly expanded in its application over the last twenty years. It is increasingly being used to understand

pre-existing theories by applying methods from a relational perspective, and has been used across disciplines including "anthropology, communications, computer science, education, economics, management science, medicine, political science, public health, psychology, and other disciplines" (Marin and Wellman 2010).

There has been an increasing focus on SNA as a contributing methodology to understand natural resource governance from the point of view of adaptivity, with a particular interest in the structure and content of relationships between governance actors (Ernstson et al. 2008; Bodin and Crona 2009; Bodin and Prell 2011). Tompkins and Adger (2004) were among the first to recognize the importance of social networks to adaptive management of environmental change, however, the formalization of SNA in natural resource management began with Bodin et al. (2005). In addition, as mentioned in the literature review above, the existence of social networks is consistently discussed in the context of the work of ENGOs in China (Hildebrandt and Turner 2009; Yang 2010). As such, a social network methodological approach will be employed in this study in order to collect data on the relationships between actors in order to determine which actors are working together, and which are not, and how information is shared.

4.5 Research Design

In order to discover the way that information exchange and partnerships among ENGOs, fishers, and government have taken place, a mixed methods approach was employed. In essence, there are two principal sample groups that were engaged in order to answer the research questions, ENGOs and urban fishers, each of which was asked to complete a variation of a network questionnaire in addition to an in-depth semi-structured interview. Each of the sample groups will be described in more detail below after addressing the overarching approach.

The objective of the social network questionnaire was to examine structural relationships among environmental actors regarding their possible relationship to one another, and their possible relationship to government organizations. In support of answering the principal research question, the network questions were aimed at addressing questions ii and iii. In this case, the network that was sought out was that of ENGOs in Nanjing working on issues related to the Qinhuai River. Thus a "whole network" study was undertaken, where the boundary of the network was drawn by participants' identification as an ENGO and their operations touching issues related to the Qinhuai River (including water governance and adjacent aquatic systems). The rationale, guided by the literature in adaptive governance, political ecology, and environmental governance in China, is that ENGOs are potentially important actors on the civil society side of governance arrangements and are increasingly present, though constrained, in China throughout the last 15 years.

The formal network questionnaire was delivered only to the ENGOs that were sampled (see Appendix I). The network survey listed each ENGO working on water governance in Nanjing, and asked each respondent to identify the organizations with which it: a) gives/receives historical or political information regarding the Qinhuai River, b) gives/receives ecological information regarding the Qinhuai River, and c) has partnered with on a project regarding the Qinhuai River (Ernstson et al. 2008). In addition the ENGOs were asked these questions regarding their contact with fishers and government organizations at different scales (municipal, provincial, national). Because government is the dominant governance actor in China, as established by the literature review in Section 3, connection to government organizations is used as a proxy for power within the larger political structure in the country. While this may not translate directly to an ability to influence decision makers, it does translate to the potential to influence decision makers or be directly influenced by decision makers.

Because urban fishers in Nanjing do not have any formal organization representing their collective interest, they could not be included in a formal network survey. Rather, each fisher in the sample was given the same list as the ENGOs in order to identify whether they had been engaged by (or even heard of) the ENGOs, and likewise by government or university actors (see Appendix I). This allowed for fishers, as the primary user group of the Qinhuai River, to be assessed on their participation in governance activities related to the river's ecology. In addition, fishers were asked whether they shared information with each other and with nearby residents.

A principal shortcoming of social network analysis is its tendency to focus too much on structure, and not enough on the content of relationships (Bodin and Prell 2011). In order to avoid this, and in order to gain important qualitative information regarding the attributes of each actor, additional semi-structured interviews were carried out with the key informants in each of the ENGOs (see Appendix II) and with each urban fisher sampled on the Qinhuai River (see Appendix III). These qualitative questions focused on issues that indicate the capacity of both ENGO and fishers to produce ecological knowledge regarding the Qinhuai River (addressing question i), perceptions of key players in environmental governance (addressing question ii and iii) and engagement with existing government initiated governance programs (addressing question iii). As discussed in Section 3.3, together the content of each question type described in Table 4.1 goes toward answering the sub-questions guiding this research, which together inform the primary research question. The details of questions posed during in-depth interviews will be discussed individually below.

Table 4.1: Research Design in Relation to Research Questions

Content of Interview/Survey Questions	Relationship to Research Questions
Scientific testing/observation and frequency/type of interaction with river system	Question i
Social network questions: information exchange and partnerships with other ENGOs	Question ii
Government ties and relationship to government	Questions ii and iii
Perception and use of government initiated governance programs (directed toward public)	Question ii and iii

Data was collected in Nanjing from November 2011 to January 2012, along with an in-city pre-study period during September and October 2011. Both semi-structured interviews as well as a social network questionnaire were conducted with the interviewees. Government planning surrounding the river was assessed through an extensive document review, including documents from the Nanjing Municipal Government and reports submitted to the Asian Development Bank.

Data was analyzed using a combination of SNA using UCINET 6 (Borgatti et al. 2002), and a detailed review of government, ENGO, and fishermen interviews. A basic SNA was performed using UCINET 6, and was completed using the social network questions regarding information exchange (ecological information, urban planning/political/cultural information), as well as joint projects with other organizations related to the Qinhuai River. The interviews were assessed qualitatively using a manual key word analysis to discover broad themes identified by ENGOs and fishers in their responses.

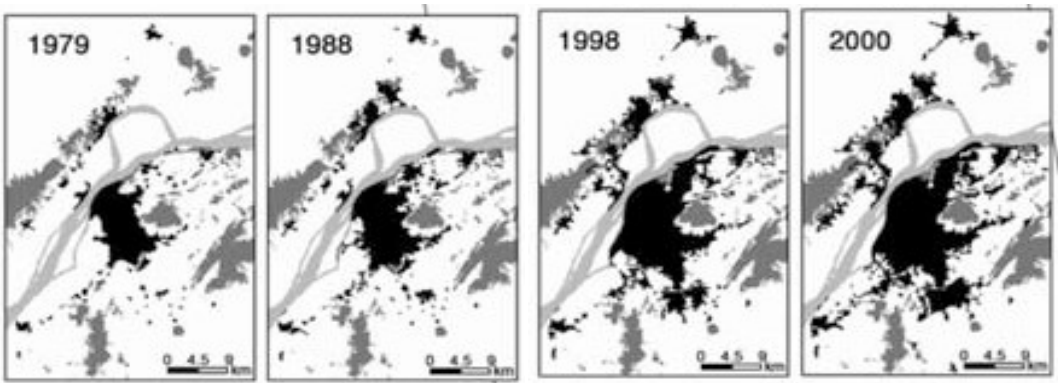
4.6 Site Selection and Case Study

The Qinhuai River was selected as a case study site for several reasons. First, the river is a heritage site with national significance. Nanjing is the capital city of Jiangsu Province, and is a historically significant city due to its role as capital city several times, most recently during the 1930s under the Republican government. Through this time, the river was a source of trade, culture and resource livelihoods. Given its social importance to the people of Nanjing, and to the people of China, the degradation it has experienced over time has been met with outcry from Nanjing's citizens and the increased focus of both government and ENGOs (Jones 2010). Given the combination of environmental degradation and social response, this makes the urban social-ecological system one that is particularly appropriate for a study of adaptive governance and power relations.

Second, the existence of the combination of government planning, ENGO activity, and urban fishers, makes the Qinhuai River a pertinent setting from the point of view of potentially collaborative or competing knowledge forms. This is to say that each group of actors has their own methods of knowledge production, and their own viewpoints when it comes to river management, thus providing a rich environment in which to examine power relations between knowledge forms. In addition, the site's location in Nanjing was ideal given previous contacts with Nanjing University and an inter-University partnership through the Ontario-Jiangsu Student Exchange program which made conducting research in Nanjing particularly feasible.

Over the last 30 years the urban area of Nanjing has increased over 360%, from 12896 ha in 1979 to 46084 ha in 2003, as depicted in Figure 4.2 (Xu 2007). Concurrently, Nanjing has experienced tremendous economic growth through the early development of an industrial base which has increasingly moved to a tertiary economy (Jim and Chen 2003; Luo et al. 2010), with GDP per capita three times as large as the national average (ADB 2012). However this rapid urban

Figure 4.2: Urban Expansion in Nanjing 1979-2000

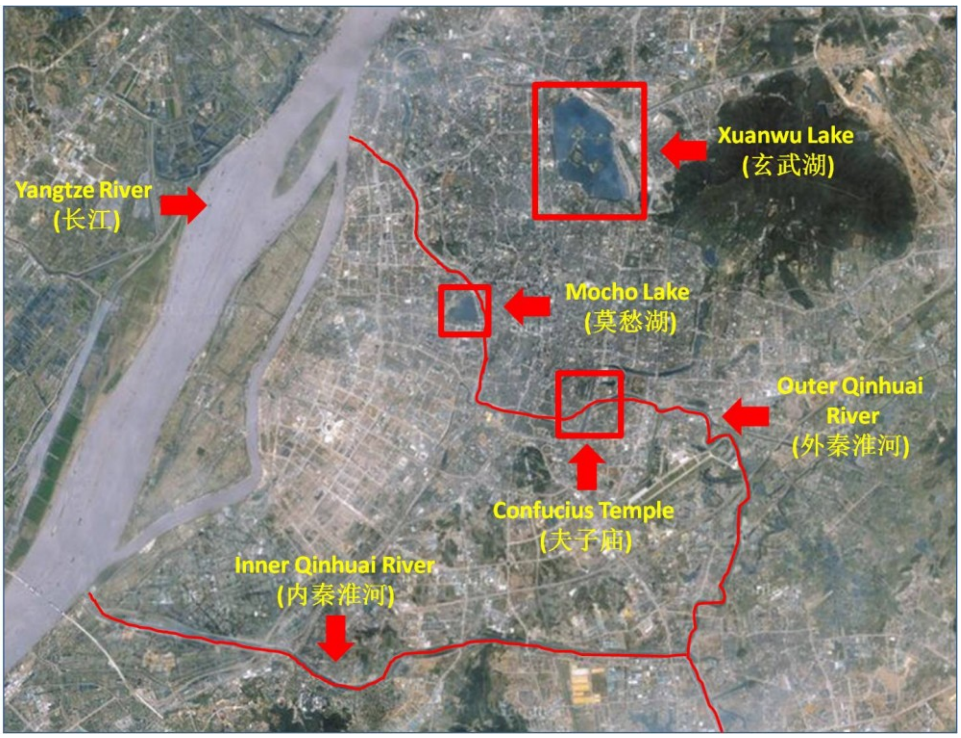


Source: Xu et al. (2007: 928)

growth has also brought about environmental degradation, particularly in terms of water quality (Zhao et al. 2006; Xu 2011; ADB 2012).

Nanjing is located in a water abundant area of the country; the city's overall water consumption is high by Chinese standards at 400L/capita/day (UN Habitat 2008). Figure 4.3 presents some of the major bodies of water in the city that form the principal components of the areas drainage system: the Qinhuai River (both inner and outer), Mochou Lake, Xuanwu Lake, and the Yangtze River (Jim and Chen 2003). As the river flows into the city, it splits into the Outer and Inner Qinhuai River, where the inner river is a man made diversion running through peri-urban areas into the Yangtze, and the historical outer Qinhuai River runs through the city before merging with the Yangtze.

Figure 4.3: The Qinhuai River and Nanjing's Principal Bodies of Water



Source: Google maps

Flowing through the city, the Inner Qinhuai River is a site of historical importance for both the city of Nanjing and the country; it has historically (and in the present) been integrated into the livelihoods of city residents. One of the most visited areas of the river is the portion that flows through the Confucius Temple (*fūzǐmiào*, 夫子庙), a popular tourist attraction filled with stores, restaurants, and a re-creation of a former temple and site for taking prestigious civil service examinations during the dynastic period. Figure 4.3 also points out two large lakes, integrated with Nanjing's overall hydraulic system, which have been turned into municipal parks (Jim and Chen 2003). In addition, it must be noted that the city is criss-crossed with many small streams and canals that have been created both recently and over hundreds of years. These rivers and canals are integrated within neighbourhoods and are connected to the Qinhuai River.

Water pollution in Nanjing became visible in the 1970s, and the situation deteriorated through the 1980s and 1990s (Xu 2009). During this time, the city's technical solutions to water issues did not make waste-water treatment a priority, instead focusing on flood control (Zhou 2008). By 2004, only 42% of Nanjing's waste-water was being treated out of a total yearly volume of 897m^3 being created, with much of this reaching Nanjing's rivers (ADB 2006). Compounding this problem is the trend that, in Nanjing, the demand for potable water (for domestic and industrial use) has risen steadily and that the discharge of wastewater is increasing rapidly, without proper infrastructure investments (ADB 2006).

The actual level of pollution found in the Qinhuai River has been severe. Table 4.2 lists the descriptive criteria for water grades in China, where in 2005 both the Inner and Outer Qinhuai River were classified beyond Grade V. Both parts of the river exceeded Grade V criteria in terms of chemical oxygen demand, 5-day biochemical oxygen demand, ammonia nitrogen, and dissolved oxygen (ADB 2006). The Inner Qinhuai River also exceeded total phosphorous levels (ADB 2006).

Table 4.2: Descriptive Water Grades in China

Grade I	**Mainly applicable to the source of water bodies and national nature preserves.**
Grade II	Mainly applicable to class A water source protection area for centralized drinking water supply, sanctuaries for rare species of fish, and spawning grounds for fish and shrimps.
Grade III	Mainly applicable to class B water source protection area for centralized drinking water supply, sanctuaries for common species of fish, and swimming zones.
Grade IV	Mainly applicable to water bodies for general industrial water supply and recreational waters in which there is not direct human contact with the water.
Grade V	Mainly applicable to water bodies for agricultural water supply and for general landscape requirements.
Grade V+	Essentially useless.

Source: World Bank (2006)

In 2004 the central government helped the Jiangsu Provincial and Nanjing Municipal Governments access an Asian Development Bank loan for the large scale Qinhuai River Environmental Improvement Project (QEIP). By 2007 the 100 million USD loan had been approved, and the project was underway. The QEIP included two new waste-water treatment plants, water replenishing to increase water flow and volume, waste and storm water division and expansion, dredging, and sludge disposal. As a result, waste-water treatment was to reach 85% (ADB 2006). The water quality goal for the both the Inner and Outer Qinhuai River was to measure within Grade IV, thereby reducing the measured pollutants by over one full grade (ADB 2006). The beginnings of this project results resulted in the city being awarded a UN Habitat certificate of merit (Jones 2010).

The goal with regard to official waste-water treatment was reached in 2010 (Jiangsu Provincial Government 2013). However in 2010 both the Inner and Outer Qinhuai River were not able to reach water quality targets, often measuring in Grade V, though sometimes reaching Grade IV (ADB 2012; Jiangsu Provincial Government 2013). Further, the river experienced its first algael bloom in 2010 (Xu et al. 2011), and mass fish die offs in 2010 and 2011 (Xinhua 2011). Throughout this time, since 2000, ENGOs have begun organizing to monitor river quality, raise awareness, and advocate for water quality improvement (Jones 2010). These ENGOs and the fishers that depend on the river's functioning will be the focus of the study to follow.

4.7 Sample Selection and Data Collection

Overall, the goal of sampling was two-fold: 1) to gather a complete set of ENGO actors in Nanjing in order to have an exhaustive perspective on the way the organizations connect and generate original ecological information, 2) to take a sample of the primary user group, urban fishers, to understand their relationship to governance practices of the river and their relationship to organizations (both

governmental and non-governmental) involved in river governance. In addition, the user group sample would provide an indication of the kind of local ecological knowledge available among urban fishers and the extent to which this knowledge has been employed by themselves and/or other actors.

4.7.1 ENGOs

Extensive pre-study was undertaken in the 7 months prior to field work, including 2 months of pre-study on-site in Nanjing. Because social network analysis was being employed, it was important to achieve a response rate near 100%, otherwise important actors in the network might have been overlooked. Thus several precautionary mechanisms were employed. The 5 months of pre-study in Ottawa included extensive searches in academic and grey literature, English language media reports, and particularly Chinese media and blog reporting based in Nanjing and nationally. This provided a preliminary list of ENGOs existing in Nanjing which had a focus on water governance, including the Qinhuai River.

Upon arrival in Nanjing, informal discussion was had with professors and students at Nanjing University regarding known actors (particularly non-governmental actors) in river governance. With the internet based pre-study findings confirmed, the list was finalized for the purpose of inclusion during semi-structured interviews. Finally, the structure of the social network questionnaire was built in a way that allowed for interviewees to add additional organizations that were not included in the list (resembling a snow ball method). This led to the inclusion of one extra ENGO (Organization E) to the list after the first interview was completed.

In total, this resulted in 6 ENGOs being successfully solicited for interviews and the social network questionnaire. This means that a census of all known ENGOs operating on issues related to

the Qinhuai River in Nanjing are included in this research.[5] Given the spectrum of ENGOs discussed in the literature review, it is possible that some unregistered community organizations exist that were not included in this group – however, if this is the case, these organizations were not known by any of the other organizations, and had no media or internet exposure. In this unlikely event, the organizations would clearly be uninvolved in exchanging information with the variety of actors interviewed for this research, many of whom have years of experience working in Nanjing.

Data was collected through the semi-structured interviews held at the headquarters or offices of key informants at organizations involved. In each case, the interview was carried out with a long-standing member of the organization in a senior role at the organization, usually President/CEO/Secretary General.[6] Interviews lasted approximately 1.5 hours and included the administering of the social network questionnaire (which took approximately 20 minutes). In addition to the social network questions described above (inquiring about exchange of information related to politics/history, ecology, and partnerships), ENGOs were asked about their engagement in scientific testing, frequency of exposure to the river, perception of water quality, perception of important governance actors (in and outside of government), and use of access to environmental information requests from government. The interview questions and the social network questionnaire can be seen in full in Appendix I and II, respectively.

[5] These ENGOs will be described in full in Chapter 5: Results and Analysis.

[6] There are two potential issues with this interview strategy: 1) gaining trust through a single interview, 2) organizational representation through a single source. In terms of trust, all ENGOs were readily willing to engage in discussion regarding their activities. Additionally, the questions asked were designed to not immediately raise contentious issues – regardless, most interviewees discussed their (sometimes critical) view of government. With regard to having only a single interviewee per organization, the pitfall of under-representing organizational networks was minimal given the small size of the organizations involved. In addition, the interviewees were all fully engaged in the organization's activities related to the Qinhuai River.

Table 4.3: List of Respondents

Source	Description of methods
Government	Literature Review (government documents)
	Key informant interview (n=1)
Environmental Non-governmental Organizations (ENGOs)	Key informant interviews (N=n=6) Network survey (N=n=6)
Urban Fishers	Key informant interviews (n=24)

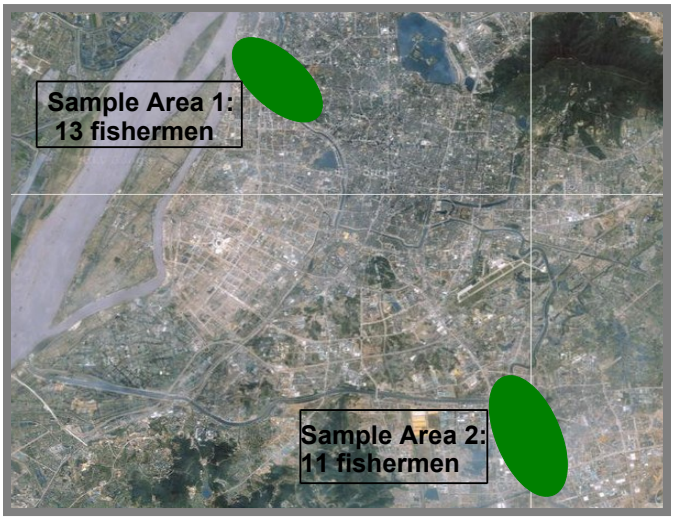
4.7.2 Urban Fishers

During the pre-study period, several possible user groups were identified, including fishers, recreational users, boaters, and nearby residents. During the two months of pre-study in Nanjing, this pool of user groups was narrowed to only urban fishers. This was partially based on time constraints due to the large population of nearby residents, and the difficulty in establishing boundaries with regards to what could be deemed a recreational user. Multiple site visits along the Qinhuai River during September and October 2011 led to the conclusion that urban fishers are indeed numerous along the Qinhuai River, particularly in the north-west and south-east sections of the river (see Figure 4.2). Indeed it was also observed that urban fishers have by far the most contact with the river, in the form of spending many hours in close proximity, using water to rinse personal effects, retrieving fish, and consuming fish. As such, this sample group served as the best opportunity to examine the potential for local ecological knowledge regarding the Qinhuai River.

A total of 24 fishers were interviewed, selected during 4 site visits totalling 22 hours along the river banks. The two sample areas were selected due to the accessibility of water given the lack of elevated cement walkways and railings. As seen in Figure 4.4 Sample Area 1 in the north-west

and Sample Area 2 in the south-east achieved 13 and 11 responses, respectively. Each area was visited twice, once each on the weekend and weekday. A total of 28 fishers were approached with 4 declining to be interviewed. Every fisher that was encountered fishing on the banks of the river was approached, thus the response rate among observed fishers was 85.7%.

Figure 4.4: Urban Fisher Sample Areas



Source: Google maps

Fishers were asked a similar core set of questions regarding exposure to governmental and non-governmental actors, but also were also asked a separate set of questions intended to get a better understanding of their potential local ecological knowledge, and the extent to which they have shared this knowledge with others. Specifically, fishers were asked their frequency of fishing, the number of years they have been fishing, perceived water quality and improvements/decline, and whether or not they eat their catch and what the quality was (see Appendix III). Those fishers that engaged in small business commercial fishing were asked about species variety and the history of

their daily catch quantities due to the larger volume of daily catch as compared to recreational or self-sustenance fishers.

To understand their engagement with governance actors, the fishers were also asked whether they were familiar with the ENGOs, government offices, and what their sources of information regarding the environmental quality of the Qinhuai River were. This also included questions regarding the use of Nanjing's environmental hotlines to report river quality.

4.7.3 District Environmental Protection Bureau Official

In order to gain perspective from the governmental viewpoint to the context of the Qinhuai River and the activities of both ENGOs and fishers, a government official from a District Environmental Protection Bureau (EPB) involved in Qinhuai River monitoring was interviewed. The questions posed were informed both by the interviews with ENGOs and fishers in order to triangulate the information gained from ENGO and fishers interviews, but modified to focus on government operations (see Appendix IV). The official came from a district level EPB in the east of the city, adjacent to the Qinhuai River. This official was interviewed for 1 hour in a coffee shop, and the single interview was analyzed by manually reviewing interview notes.

Attempts were made to contact officials at the level of Nanjing's Municipal Government however these attempts were not successful. Due to time restrictions, it was not possible to make contact with Municipal officials through alternative avenues.

Chapter 5: The Activity of Organized and Disorganized Civil Society

In this chapter the results of the engagements described in Section 4.7 will be presented. Initially, data will be put forth separately between ENGO data, fisher data, and data from the District EPB official. This will allow for a more organized examination of the responses received from each component group as they relate to organization/individual characteristics, forms of knowledge production, view on ecological crisis and responses, political contacts, and network practices.

5.1 Environmental Non-Governmental Organizations

5.1.1 ENGO Profiles

Since 2000 six organizations began working in Nanjing on objectives of dealing with water governance issues in the city, with several focusing specifically on the Qinhuai River. Table 5.1 describes each of the ENGOs in terms of their resources and characteristics, including staff members, years in operation, funding sources and relationship to government. Of the six ENGOs, five engage in projects directly related to the Qinhuai River (Organizations A, B, C, E and F). While Organization F focuses on water governance issues more broadly, and has advocated against water pollution in Nanjing, principally dealing with the Nanjing section of the Yangtze River.

The two earliest organizations to begin work on the Qinhuai River are Organization B (2000) and Organization A (2001). Organization B is predominantly made up of university students, but has grown into a full time ENGO, receiving its principal funding from an American ENGO. Because of its origins as a university student group, the ENG is able to maintain registered status through its university affiliation. Organization B began its operations by gathering the support of university professors in the city and assisting in writing an open letter to the Mayor of Nanjing declaring their

concern for the quality of the river, requesting that the government take more stringent measures to reduce pollution. The organization has since taken on yearly projects related to the river.

Table 5.1: ENGO Profiles

	Paid Staff	Volunteers	Began QHR Work	# of QHR Projects	Principal Funding	Relationship to Government
Organization A	9	more than 1000	2001	9	Local/Provincial Government, businesses	Government Organized NGO (GONGO)
Organization B	3	200	2000	11	International NGOs	Independent
Organization C	1	300	2006	8	Organization D	Independent
Organization D	5	more than 1000	2009	0 (assists on the projects of others)	International Organizations	Independent
Organization E	3	30	2008	6 (including focus on adjacent lake)	District EPB and community funding	Government Affiliated
Organization F	0	110	--	0 (focus on general water issues)	No formal funding, affiliated with a national NGO	Independent

Organization A had experience in unrelated projects in the years before it initiated Qinhuai River related projects, and began focusing on the river in 2001. Organization A is closely affiliated with the local and provincial government, receiving their funding largely from government sources, as well as businesses, and as a result, they have been able to access significant financial resources which enable them to keep nine paid staff members. In addition to their self-stated close relationship with the government, Organization A is also recognized by other ENGOs as being tied to the provincial and municipal government. Between 2001 and 2010 the organization carried out yearly projects related to the Qinhuai River, however the organization has not undertaken activities

related to the Qinhuai River after 2010 as a result of their assessment that the river quality is improving.

In 2006, after the initiation of the Nanjing Municipal Government's Qinhuai River Environmental Improvement Project, Organization C began its own work. Particularly interested by the historical and cultural significance of the Qinhuai River, and concerned by its declining environmental quality, the organization began local cultural events to promote the rehabilitation of the river and its associated canals that run through Nanjing. Organization C operates on an almost strictly voluntary basis, receiving some funding through a well established NGO in China, Organization D. In addition, Organization C's affiliation with Organization D allows it to have official registration status as a subsidiary organization.

Organization E was created in 2008 with the goal of protecting a water body, adjacent to the Qinhuai River, which was experiencing declining quality. Because the ecosystems are intertwined, the ENGO's projects are also related to both the nearby sections of the Qinhuai River and the Qinhuai River in general. The organization was created by a former government official and community member who specialized in environmental issues, and was interested in community engagement. Because the organization is focused on a more defined area and is relatively new, its resources are limited, and it has been able to operate with only modest funding from a district level Environmental Protection Bureau as well as community sources.

Finally, Organization F has been active since 2005, focusing on a variety of environmental issues, including an interest in water governance surrounding the Nanjing section of the Yangtze River – into which the Qinhuai River flows. Organization F is a "study group" related to a prominent national ENGO, and is technically unlicensed, using the term "study group" to avoid the connotation of being a formal organization. It is comprised of a network of professionals who are concerned

about environmental issues, and though they do not engage in projects related to the Qinhuai River, they have advised the government on issues related to the water governance in Nanjing.

Though these organizations share similar goals in terms of focus on water and desire to see improvements in water quality, not all organizations cooperate with each other. Each ENGO was asked about its relationship with other ENGOs, in terms of sharing ecological knowledge, political and cultural knowledge, as well as their previous and current project partnerships.

5.1.2 Generation of Ecological Information

Organization A

As the second longest running, but largest, organization with a direct project focus on the Qinhuai River, Organization A has also accumulated some ecological information with regard to the Qinhuai River. Like the previous organization, Organization A has focused its efforts in public engagement, with the ability to reach a broad range of people given its support from government. Their projects have included river walks, particularly in the early 2000s, and until 2010 the organization had frequent field visits to the river. Some field visits included water sampling however the samples were not tested, but rather forwarded to government offices for testing.

The information generated by Organization A has mostly been at the level of observing superficial water quality change. In addition, field visits included gathering debris along the water side, and as such the organization has some knowledge regarding the level of debris accumulation along the river's side. Because of the organization's connections with government, most information that they receive and act on comes directly from government offices, as indicated in the interview. This sourcing of information played a role in the organization's decision to not continue with projects related to the Qinhuai River during 2011, highlighted by the organization's

perception of improvement in river quality and therefore a much reduced need to devote organizational resources to address Qinhuai River quality.

Organization B

With over 10 years of experience in raising awareness and creating projects related to the Qinhuai River, Organization B reported a wide variety of types of engagement related to the river. Like many ENGOs in China, the foremost activity has been in raising public awareness of the state of the river and urging citizens to act responsibly towards managing pollution. For the past several years, the organization has held river walk activities with its members, passing out information brochures about the river and pollution levels.

Figure 5.1: Residential Wastewater Pipes[7]

(a) **(b)**

Source: Author

In terms of ecological information, Organization B has been conducting monthly or bimonthly water quality tests for most of the last decade. In addition to conducting the tests

[7] Figure 5.1 (a) is a picture of a wastewater pipe originating from an apartment building on the bank of the Qinhuai River, located at the split between the Qinhuai Inner and Outer Qinhuai River. Figure 5.1 (b) is a picture of a creek flowing from the Qinhuai River, with multiple wastewater pipes originating from individual houses.

themselves, the organization's members have also encouraged 'citizen scientists' to perform their own tests by providing water testing kits to encourage more active engagement in understanding river quality. Finally, Organization B has also undertaken an extensive pollution mapping project, using virtual mapping software to record pollution discharge sites throughout the Qinhuai River and adjacent streams. This mapping project is unique, and as a result, the organization has detailed information on source-sites for both legal and illegal pollution discharge, as depicted in Figure 5.1 (a) and (b). As a result of missing infrastructure, wastewater is being discharged both directly into the Qinhuai River (Figure 5.1 (a)) and into streams and canals connected to the river (Figure 5.1 (b)).

Group members spend time near the river almost every weekday in addition to performing weekend-based river walks. Because of their frequent interaction and years of campaigning, the organization created a handbook and training manual discussing general river management and ways to reduce pollution. As such, the organization is the source of a large quantity of unique environmental data, produced both through formal science and also through experiential knowledge of frequent engagement with all parts of the river and its associated lakes and canals.

Table 5.2: Ecological Information by ENGO

Organization	**Information Collected/Created**
Organization A	Local knowledge, community education
Organization B	Scientific, river management, pollution discharge locations, local knowledge
Organization C	Historic Qinhuai River, local cultural and ecological knowledge
Organization D	Participation in activities
Organization E	Scientific, community education
Organization F	General water management (not Qinhuai River Specific)

Organization C

Organization C's primary interest in the Qinhuai River is cultural due to the river's historical importance, and because of the level of degradation, the organization has become keenly interested in the river's ecological status. Because of the historical focus of their work, the organization knowledge specialization has mostly focused on community consultation with regard to the historical development of neighbourhood waterways. This includes discussion with residents during river walks (held with Organization B) regarding both the environmental quality and past condition in areas along the Qinhuai River and related canals. The organization does not conduct its own scientific tests, but does engage the knowledge of multiple other organizations – which will be presented below.

Organization E

This organization focuses primarily on water testing, species observation, and community education surrounding the Mochou Lake ecosystem which is their area of focus. In addition, they have conducted water sampling of the Qinhuai River in the stretch of river located upstream and downstream of Mochou Lake (see Figure 4.3 in Chapter 4). The respondent from Organization E indicated that they have in interest in the Qinhuai River in addition to Mochou Lake because the "systems are interrelated". As such, Organization E is developing a significant amount of unique data that can be used to measure changes in the Qinhuai River's ecology as well as the ecology of related bodies of water. Because the organization also focuses on community engagement, they are drawing on local knowledge of nearby residents to both understand changes in the neighbourhood and also to encourage better management practices among citizens.

Organizations D and F

Neither organization D nor F holds significant local knowledge specific to the Qinhuai River. This is because Organization D has only recently begun participating in the activities of others, and encouraging its members to participate. It has not devoted the time or resources necessary to collect this kind of information however it lends its support and funding to Organization C.

In the case of Organization F, it has simply not focused its project efforts on the Qinhuai River. However, this organization does hold scientific information regarding the river quality and health hazards related generally to Nanjing, including proximate areas of the Yangtze River, which is a related body of water. Its network of professionals, typically with training in a variety of sciences, do hold a reservoir of experience in terms of ability to conduct formal scientific study on both ecological systems and human health impacts, and have been solicited for comment on the river by news organizations.

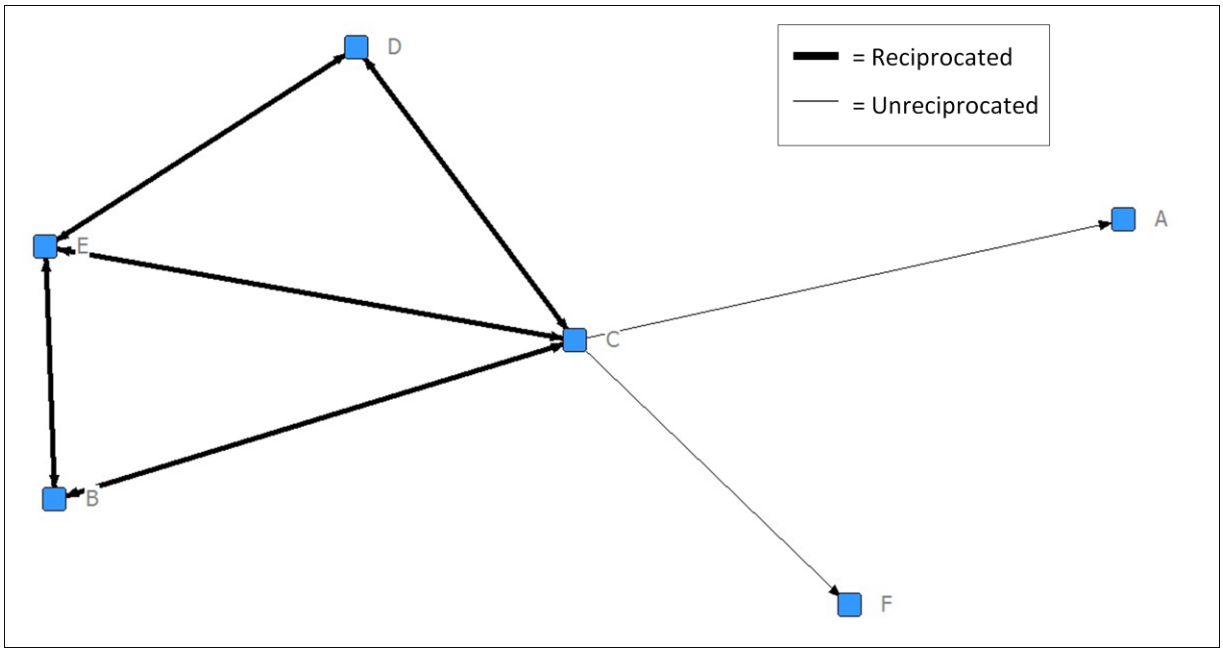
5.1.3 ENGO Information Sharing and Partnerships

Information Sharing

Following Ernstson et al. (2008), network data was gathered on informational exchanges. Each ENGO was asked with whom they share information regarding: 1) the ecology of the Qinhuai River and 2) cultural or political aspects of the river. These relational data were put into two matrices (one for each information set) which were then combined. As there was no overlap between the two types of informational relationships (which would theoretically equate to a stronger tie between organizations), the combined matrices formed a single matrix representing information sharing between the organizations.

Not every ENGO recognized each other as a partner in information exchange, which is called a non-symmetrical (or unreciprocated) relationship. In order to more clearly demonstrate mutually recognized relationships, Figure 5.2 represents reciprocal relationships with a thicker line than non-symmetrical relationships. For example, Organization C indicated exchanging information with Organization A and F, but Organization A and F do not recognize a relationship with C, and so these relationships are qualified with thinner line connection. This is further indicated by the directional arrows depicted at the end of each line.

Figure 5.2: Qinhuai River Information Sharing



This network graph shows that each of the 6 ENGOs which are (to different degrees) active in contributing to governance of the Qinhuai River are in some way connected through information sharing. In particular organizations B, C, D, and E have a series of symmetrical relationship in that they recognize each other as having shared information regarding the Qinhuai River's ecology or

culture/politics. This is an indication that the four organizations experience interaction, and are familiar with each other's work.

Two general explanations can be offered to explain the lack of reciprocation between Organization C and both Organizations A and F. The first explanation is that Organization C has received information only from less personal sources (ie. website, brochures, media commentary, attendance at an activity etc.). The second explanation is that Organization C received information, but not with enough frequency for a large organization like A to recall the exchange or ascribe any significance to it. In either case, these both indicate that the level of interaction that Organization C had with A and F is minimal, which was further confirmed by Organization C stating while filling out the form that the level of interaction with A and F was "a little bit" (*shǎo*, 少).

Beyond this, it can be emphasized that both Organizations A and F are at a distance from the information sharing network. Neither acknowledged information exchange of any kind regarding the Qinhuai River with any of the other ENGOs operating on related issues. For Organization F, which does not have Qinhuai specific projects but does work on water governance, this can easily be explained as it would be expected to be a peripheral member of the network. However, for Organization A, which has long standing engagement in these issues, the explanation is not readily accounted for, and will be addressed more fully below.

Partnerships

Focusing on formal partnerships, or sustained collaboration on projects or joint events, adds a dimension that helps to illustrate the strength of the network. This is because, unlike information exchange which is harder to measure comparatively, partnerships can be understood more concretely between actors (Ernstson et al. 2008). In the social network questionnaire, ENGOs were

asked with which organizations they held partnerships related to the Qinhuai River. Similar to the results regarding information exchange, Organizations B, C, D, and E were found to be connected, while A and F did not have any partnerships at all.

Figure 5.3: ENGO Partnerships

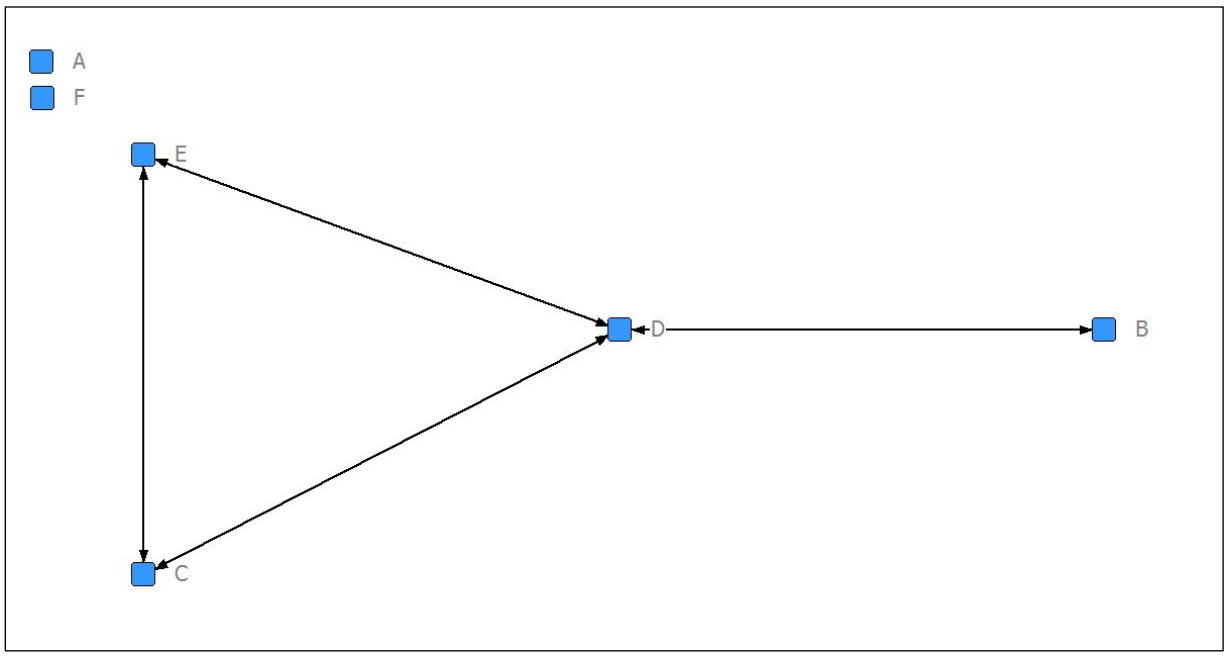


Figure 5.3 illustrates this core network in partnerships related to activities surrounding the Qinhuai River. It shows that Organization D plays a central role in that it is partnered with all three of the connected organizations, C, B and E. Both Organizations C and E each have two partnerships (with each other and Organization D), while Organization B only has one partnership (with Organization D). This is slightly different than the information exchange network, where Organization C was central to the network, and is explained by Organization D's ongoing participation in the activities of Organization B. Given Organization D's supporting role in these activities, neither organization recognized information sharing (between B and D) as ongoing.

In network terms this put Organization D in an important "bridging" role, where its relationship with Organization B brings the other organizations structurally closer to this otherwise isolated organization (isolated in terms of connections through partnership). In contrast, the partnerships between organizations C, D, and E are interconnected, which indicates that they form a more tight-knit partnership group, operating jointly on issues related to the Qinhuai River. From the perspective of adaptive governance arrangements, and the requirement of networking among actors, this type of arrangement is one that should lend itself to better coordinating activities and responding to crisis – an issue that will be examined in more detail below as the attribute data of each ENGO are added to the analysis.

Although Organization A was aware that other ENGOs are operating on issues related to the Qinhuai River, it has not formed any partnerships with these organizations because they are "not as big" and "don't have the same capacity". Meanwhile Organization F indicated that it does not wish to be more actively involved in formal Qinhuai River activities (as opposed to general water governance activities) because of a belief that not much can be done to improve its quality. The interviewee indicated that there is a common misconception among Nanjing residents and government planning that the Qinhuai River consists principally of the Confucius Temple area (see Figure 4.3 in Chapter 4), when in reality it is much larger and connected to other water bodies (a sentiment echoed by Zhou 2008). Because of this lack of government focus, it was not worthwhile for Organization F to devote its resources to this specific issue, beyond providing general commentary to news outlets.

The core network of B, C, D, and E, along with the isolation of Organizations A and F, will be further examined through combining both network types (information and partnership) to illustrate a comprehensive view of network structure.

5.1.4 Overall ENGO Networks

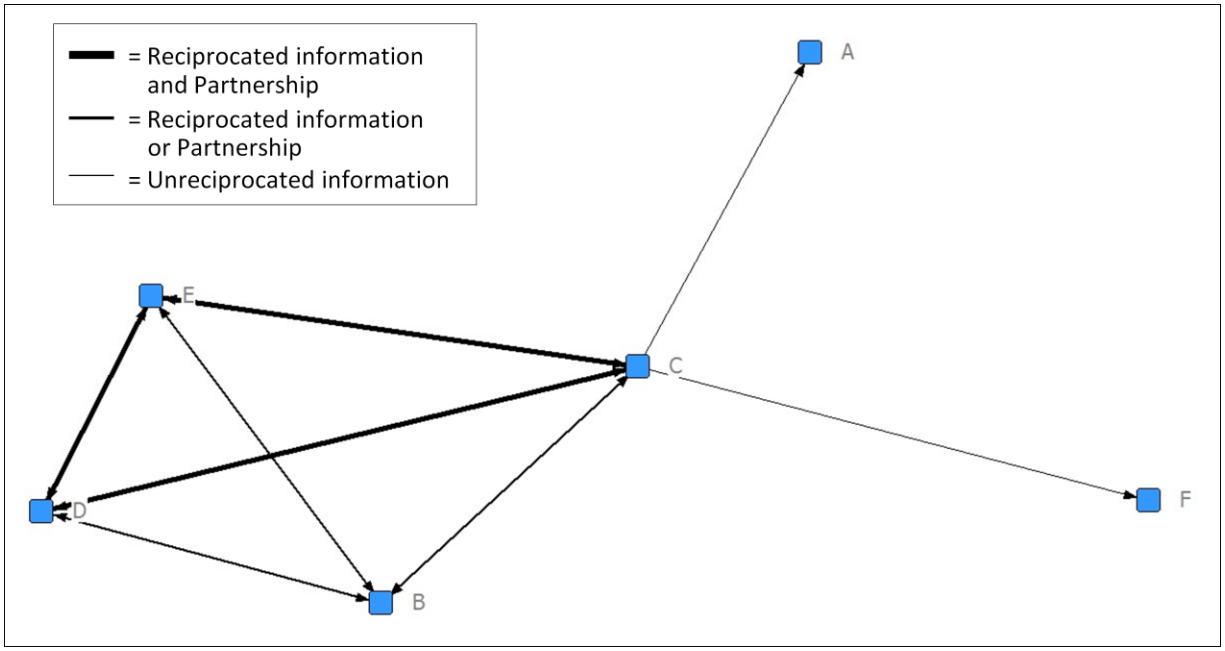
By combining both the Information and Partnership data sets, we arrive at an overall network measure. The combination of each relationship type helps to further determine the strength of ties between each actor in the network. Following Ernstson et al. (2008), the calculation with which this is done is:

$$ON = 2I + 2P$$

Where ON is Overall Network, I is Information network (where a reciprocated relationship =1 and a non-reciprocated relationship =0.5, thus equalling a measure of 2 for reciprocated relationship, or 1 for non-reciprocated), and P is Partnership network (=1 if partnership exists, all are reciprocated). As seen in Figure 5.4, the weight of the overall relationship measure is reflected in three levels of line thickness, where the most thick indicates both reciprocated information sharing and partnership, the next thickest indicates information sharing or partnership (one of the other), and the thinnest indicates non-reciprocated information sharing.

Similar to what was seen in the Information and Partnership networks, the overall network is characterized by a well related group between organizations B, C, D, and E (with particularly strong ties between C, D, E), and the outliers Organization A and F.

Figure 5.4: Overall ENGO Network



The network measure of "density" is a useful tool to indicate how integrated a network is, and as indicated by Hanneman and Riddle (2005), is measured by:

Total Number of Ties / Total Number of Possible Ties

Where a perfectly connected network would have a score of 1 and complete isolation between nodes would score 0. In the case of the overall network of ENGOs, the density measure is:

8 / 15 = 0.53

Where there are a total of 8 ties among 15 possible ties, recalling that 2 of these ties are not reciprocated (C to both A and F). This can be compared to the sub-group comprised of Organizations B, C, D, and E, which has a density measure of:

6 / 6 = 1

In social network terms, a density measure of 1 is considered a "clique". Thus it is clear that there is one highly networked group of actors, and two outliers that do not engage the networked group of

actors. While the strength of each relationship in the B, C, D, E clique varies (as shown in the overall network graph), these groups are interacting with relative frequency, including having partnerships and exchanging information.

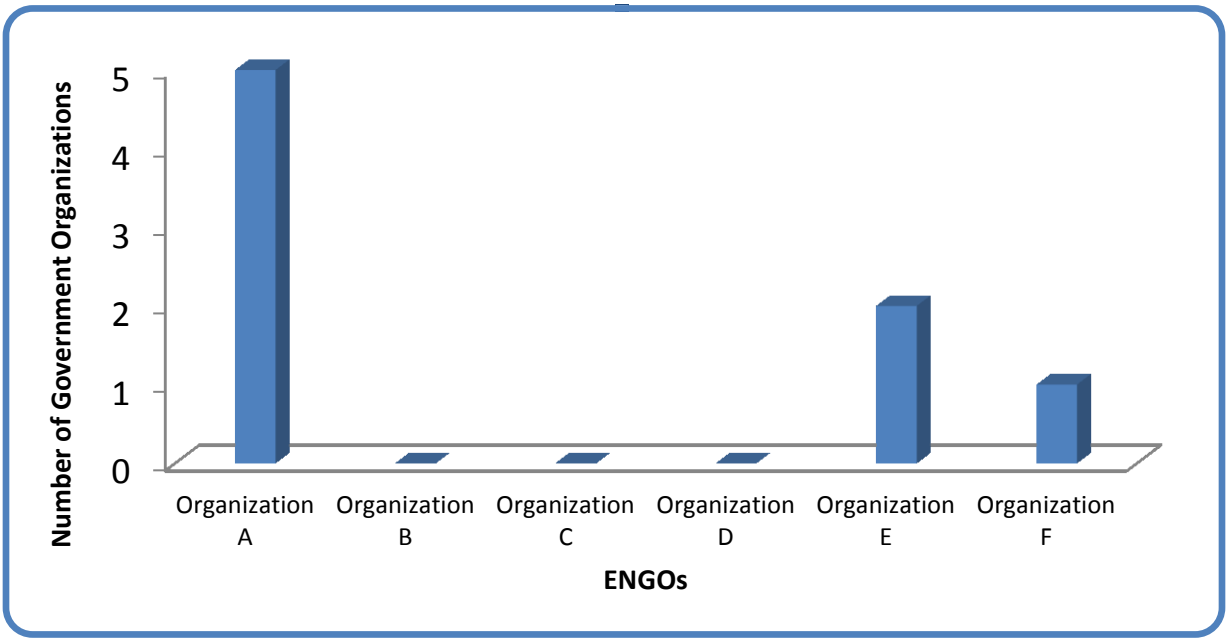
As noted in Chapter 4.4, a strictly structural perspective is flawed in the sense that it only accounts for relational variables and not for attribute based variables, which can help to address questions regarding effect on governance potential and power relationships in the network. As such, the attribute data gathered regarding contact with government actors at different scales, as well as the data collected on the generation of ecological knowledge displayed in Chapter 5.1.2 will be incorporated into further examination of the network data. This will allow for a nuanced look at the opportunities and constraints posed by the relational structure of ENGOs for transferring uniquely generated ecological information to government actors, thereby addressing the potential for this current structure to lend itself towards adaptive governance arrangements.

5.1.5 Government Contacts and Important Actors

Figure 5.5 displays the contacts between each ENGO and the various government organizations regarding the Qinhuai River, as declared by each interviewee. Contacts were determined through the Social Network Questionnaire (SNQ), which asked ENGOs the same questions they were asked about relations to other ENGOs (ecological information, culture or political information, partnerships) however this time focusing on government actors. In addition, the nature of the relationship was asked as a follow up question in order to determine the intensity of a given relationship. The data displayed in Figure 5.5 represents active contacts between each ENGO and five different government organizations: the Environmental Protection Bureau (at both the provincial and municipal level), the municipal People's Assembly (political body), the People's

Political Consultative Conference, and the Municipal Water Conservation Bureau. This represents five possible institutional connections.

Figure 5.5: Contact with Government Organizations



As observed, Organization A, which receives its principal funding from the provincial and municipal government, has by far the most significant contact with government organizations. For every government organization, Organization A indicated that each of the contacts was frequently engaged. Comparatively, Organization E, which is also affiliated with the government, but much smaller and organized at the neighbourhood level, has contacts with only two government departments in relation to the Qinhuai River (the provincial EPB and the Municipal Water Conservancy Bureau). Of these two contacts, the Provincial EPB was frequently engaged, while the Municipal Water Conservation Bureau was less so. Finally, Organization F, though not holding any specific Qinhuai River related projects, has held infrequent discussions with the Nanjing EPB on

water governance in the city more generally and thereby established contacts at the municipal level.

These government connections can be compared to the remaining three organizations, B, C, and D, who do not have any relationship with government institutions in relation to the Qinhuai River. Though these organizations operate on issues related to the Qinhuai River and are concerned with the governance of the river, they are not able to develop formal connections with government institutions. Instead, their activities are limited to sending letters, and reports of data, which do not receive answers, as indicated through interviews. This distribution of government contacts serves a key attribute in relation to the overall network data, and will be incorporated below.

5.1.6 Perception of Government Actors

In order to better understand each ENGO's perception of the importance of government actors, and also the nature of their relationship with government in general, three further questions were asked. These questions include 1) appropriate government department to contact when it comes to the Qinhuai River, 2) government cooperation with the ENGO's activities, and 3) the use and usefulness of the Government's new Environmental Disclosure Policy. These three questions help to better contextualize the usefulness of political contacts, their role in assisting each ENGO, and their ability to gain access to information from the government.

Table 5.3 highlights which government departments each ENGO considers most appropriate to contact when concerned about the Qinhuai River. All actors note the importance of the EPB in the governance of the river, along with local government, universities, and nearby companies (who may be polluting). This finding demonstrates consensus among ENGOs of the EPB's importance as an actor in environmental governance.

Table 5.3: Perception of Important Government Actors

Organization	Perception of most relevant government department related to the Qinhuai River
Organization A	EPB; District and city government
Organization B	EPB; Water Treatment Bureau
Organization C	EPB; University specialists
Organization D	EPB; nearby companies
Organization E	EPB
Organization F	EPB

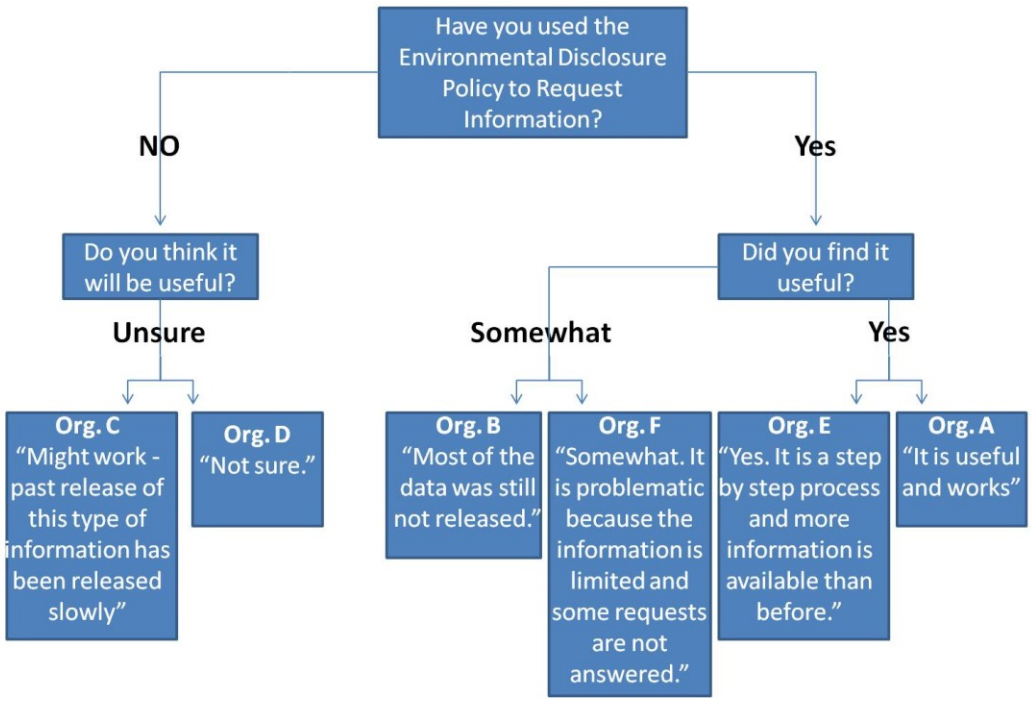
Nevertheless, despite the consensus in terms of the EPB's importance as a portal through which to make environmental complaints, there was no consensus as to government cooperation with ENGO activities (more specifically the EPB, which is how the question was interpreted by all respondents).

The two organizations that declared the most connections to government (Organizations A and E, who also receive government funding) both indicated that cooperation was very good. In fact, both stated that it was essential. Organization A indicated that "the government has done a lot to improve the [Qinhuai] River, and the environmental quality is much better", while Organization E agreed that improvements had been made and also indicated that "cooperation with the government is important in order to access data".

The other four organizations (B, C, D, and F) were less optimistic about government support of their activities. In essence, all indicated that there was support when it was beneficial to government, where Organization D said that "Government officials will sometimes come to project openings that we have put on". However, Organization B and C both articulated similar feelings, that at the municipal level government "only cooperates when our interests intersect" (Org B), and

"if the government needs help, we help them, but if we need anything, the government does not help us" (Org C). Similarly, Organization F indicated that they had been asked for advice from the EPB, but when the advice was given it was never followed.

Figure 5.6: ENGO Experience with the Environmental Disclosure Policy



This divided perception of cooperation is further elaborated in ENGO responses to the question regarding the usefulness of the new Environmental Disclosure Policy implemented at the Ministerial level of the EPB (as discussed in the literature review). The diagram in Figure 5.6 demonstrates the responses regarding the policy from each of the ENGOs.

As can be seen from the four ENGOs that have used the process so far, the results have been mixed. The two organizations with highest level of ties to government (A and E) have found that the policy has been effective in requesting information, though Organization E notes that the process is still ongoing to fully implement the policy. For Organizations B and F, however, issues were encountered in terms of the limited scope of the responses they received for their requests.

Organization B indicated that most of its requests were not answered, and Organization F stated that while some were not answered, the ones that were did not receive full disclosure.

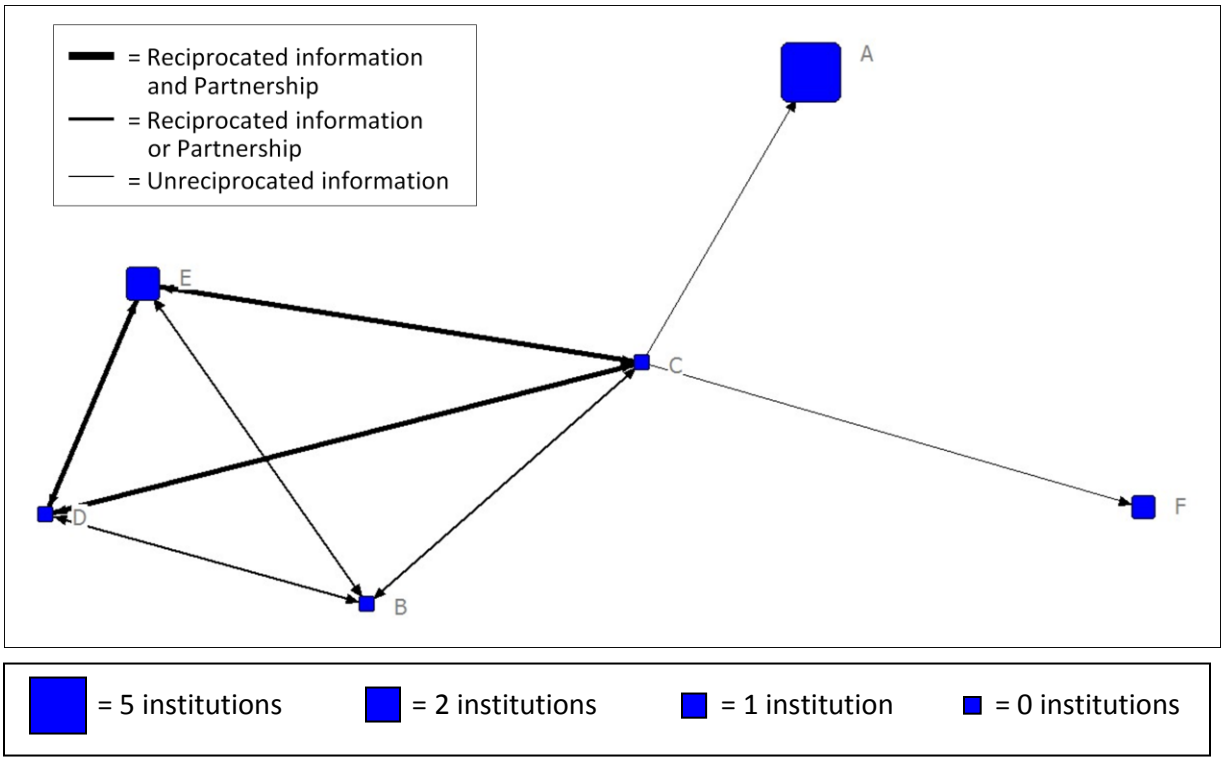
Taken together, these questions help to achieve a better understanding of the relationship between each organization and government bodies. The relational questions regarding contact with government departments established that organizations A and E had the closest connection to government in relation to the Qinhuai River, principally through the EPB, though Organization A had several other connections. These connections are further qualified through the cooperation received by each of these organizations from the government, as well as their funding sources, and their stated success in accessing information. Further, the question regarding which is the best department to contact to express concern regarding the Qinhuai River received unanimous agreement that the EPB is the most important contact, thereby justifying the importance of organization A and E's (as well as F's) connections.

5.1.7 Government Contacts and Overall Network Structure

Incorporating the data regarding connections to government displayed in Figure 5.5 into the overall ENGO network, we can see the distance between actors with varying connections to government. Figure 5.7 contains the same overall network graph however each node representing an ENGO is given a different size reflecting the number of government institutions with which it has contacts with. This clearly demonstrates that Organization A, the largest Qinhuai River ENGO actor (by project focus, staff, and volunteer size), has by far the most political connections but is also far removed from other ENGOs via network structure. This has important implications for the ability of

most ENGOs to reach government in terms of collaborating on issues related to the Qinhuai River, and will be discussed in theoretical terms below.

Figure 5.7: Political Contacts Among Overall Network



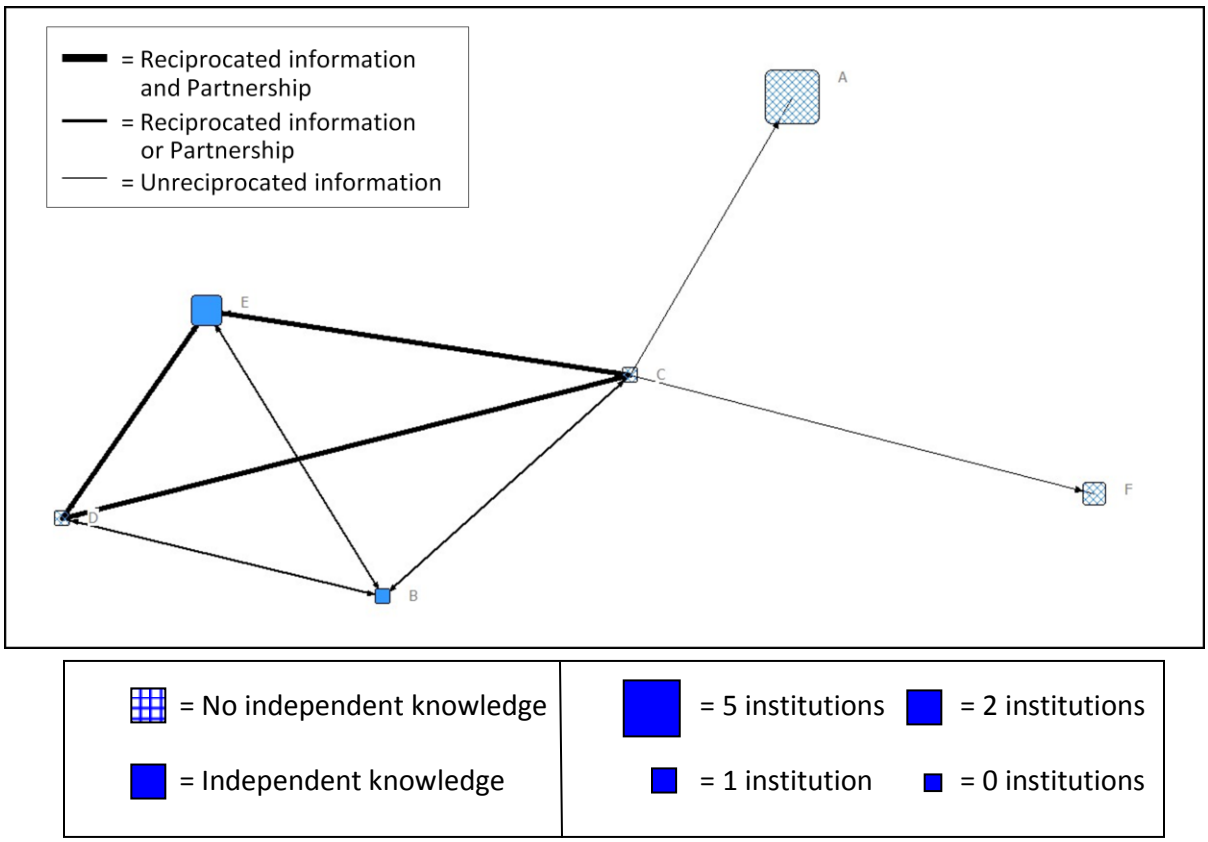
While the clique of Organizations B, C, D, and E have dense network activity, they have relatively less active contacts with government institutions on topics related to the Qinhuai River. Within this clique only Organization E holds government contacts with the Provincial EPB and the Nanjing Municipal Water Bureau, and the content of these contacts is typically related to the Mochou Lake while occasionally dealing with the Qinhuai River as well. This is similar to Organization F's connection to the Nanjing EPB which deals with water governance more generally. As such, the organization that has by far the most connections to government is Organization A which has specific focus on the river and maintains these contacts specifically regarding the river.

When the weak nature of the connection between Organization C and Organizations A and F is taken into account (Organization C had simply acquired information from these ENGOs), the clique becomes relationally isolated from the most government connected ENGO. As such, there is strong structural division between ENGOs with no government contacts and the ENGO that retains the highest number of government contacts related to the Qinhuai River. This result is even more significant when observed alongside information on which network actors produce unique formal scientific knowledge.

5.1.8 ENGOs, Ecological Information, and Government Contacts

From the point of view of information sharing abilities, an additional element of importance arises when we account for the production of individual ecological information. Recalling the information displayed in Table 5.2 on the production of ecological knowledge among ENGOs, Figure 5.8 adds this information to the graph in Figure 5.7 to create a new graph with three layers: overall network, government contacts, and conduct of independent and structured testing of environmental indicators. While all of the ENGOs (except Organization F) engaged in river walk activities and possessed some degree of local knowledge, Organizations B and E were the only ones to undertake regular scientific observation on their own. As such, nodes with a sold blue fill represent organizations that produce independent knowledge of the river's ecology, while organizations whose node is filled by a semi-transparent grid do not.

Figure 5.8: Government Contacts and ENGO Ecological Knowledge



This graph depicts where independent sources of knowledge among ENGOs are coming from, and what opportunities they have to reach each other and to reach actors with government connections in the network. The actor most connected to government in the network is far removed from independent scientific testing being undertaken by Organization B in particular (also Organization E, but most of its testing is focused on the lake system and not directly on the Qinhuai River). This separation is further strengthened by Organization B's statement that the "information sent to government has not been responded to". From the opposite view, the access to government held by Organization A is being held to itself, without taking the information produced by other organizations into account.

In relation to the key adaptive governance property of sharing multiple sources of knowledge, it is clear that there are sources of independently produced ecological knowledge among ENGOs (particularly with respect to B and E). Thus it appears that the ENGOs in Nanjing are at least beginning to provide alternative information sources with regards to the regular monitoring of environmental indicators. However, given the network data above, the ability to share this information with the most important governance actors is under question. While the clique of B, C, D, and E have the opportunity to share this independently produced information with each other as they have relatively solid relationships, its relationship to government is constrained given the lack of contacts to government institutions. As such, there is reason to believe that capacity among ENGOs to contribute to governance has greatly increased since the 1990s (multiple ENGOs now exist, environmental information is being produced, and most of the ENGOs are well networked with each other). However, the ability to act on this capacity by reaching government actors is limited among most ENGOs.

Given this disparity between contact with government and ENGOs that create independent ecological knowledge, it is useful to examine how ENGOs perceive their own importance in governance activities related to the Qinhuai River. This helps to determine whether ENGOs themselves actually believe that there are important non-governmental actors that can contribute to governance. Table 5.4 lists each ENGO with their response to the request to name the two most influential organizations besides governmental organizations.

Table 5.4: Perception of Influence Among ENGOs

Organization	Most Influential Organizations Outside of Government
Organization A	None (some exist, but not influential)
Organization B	Organization C; Organization E
Organization C	Organization A
Organization D	Organization B; Organization E
Organization E	Organization B
Organization F	None (advocacy exists, but none are influential)

When this data is compared to the overall network data with political contacts and ecological information it is seen that there are two groups of importance that have formed in terms of perception among peers. The highly networked group of organizations B, C, D, and E who all have medium to strong ties among each other in their respective and collaborative work on the Qinhuai River, are largely self referential in terms of who is most influential. Within this clique Organization B and Organization E (who both conduct scientific data collection) are cited twice as being most important, while Organization C is cited once. In addition, an outlier exists in that Organization C has pointed to Organization A as being the most important actor. This is significant as Organization C holds a unique position in the network, having contact with all actors and relationships with 4/6 ENGOs. It is possible that this position has allowed Organization C to better judge the influence of each organization in terms of access to government.

In contrast, both outlier organizations A and F indicated that they are aware that other ENGOs exist, but that they have no influence in terms of issues related to the Qinhuai River, and therefore do not name any organizations as being influential outside government. The answers to

this question help to further understand the obstacles that exist in creating a governance system in which multiple sources of knowledge are shared between actors, as there are two scales of actors: the small and networked clique, with little influence, and the larger government organized ENGO with the role of engaging the public, but not producing information outside government.

5. 2 Urban Fishers

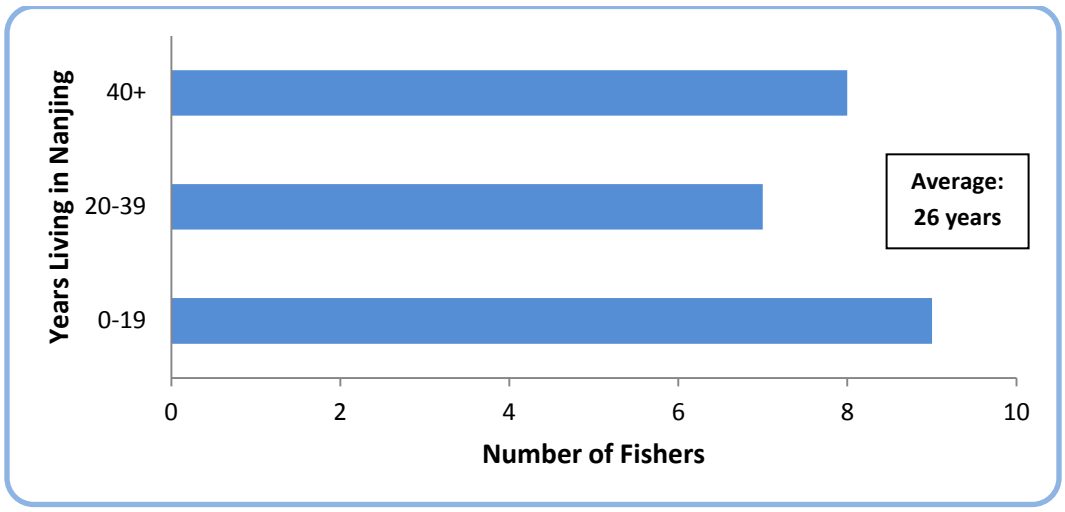
5.2.1 Urban Fishers and Local Ecological Knowledge

Fishers were interviewed individually on-site, in two general areas: in the south-east of the city where the Qinhuai River splits into the Inner and Outer Qinhuai River and in the north-west of the city where the Inner Qinhuai River joins the Yangtze River (as show in Figure 4.4 in Chapter 4.7.2). There was no significant difference between the answers provided by fishers in either section, so aggregated data is presented here.

Because fishers are the primary user group that directly depends on the ecosystem functions of the Qinhuai River, they are also an excellent candidate group to possess a wealth of local ecological knowledge. Questions were first asked to gather a profile of the respondents which will help to determine their capacity to contribute to governance activities through using their knowledge of, and relationship to, the river. As shown in Figure 5.10, each fisher was asked the length of time that they have resided in Nanjing. This question helps to understand the time frame in which typical fishers have been engaging with the Qinhuai River, and therefore the period over which they have been able to observe changes in the river. This is an indicator of the potential strength of local knowledge regarding the river's conditions, as this will depend on the length of time and degree of exposure on which the knowledge is built on (Raymond et al. 2010). The results of this question were that the average time spent in Nanjing was 26 years, within which 8 people

have spent over 40 years in the city (their whole lives) and 9 people are relatively new migrants to the city.

Figure 5.9: Years Spent in Nanjing by Fishers

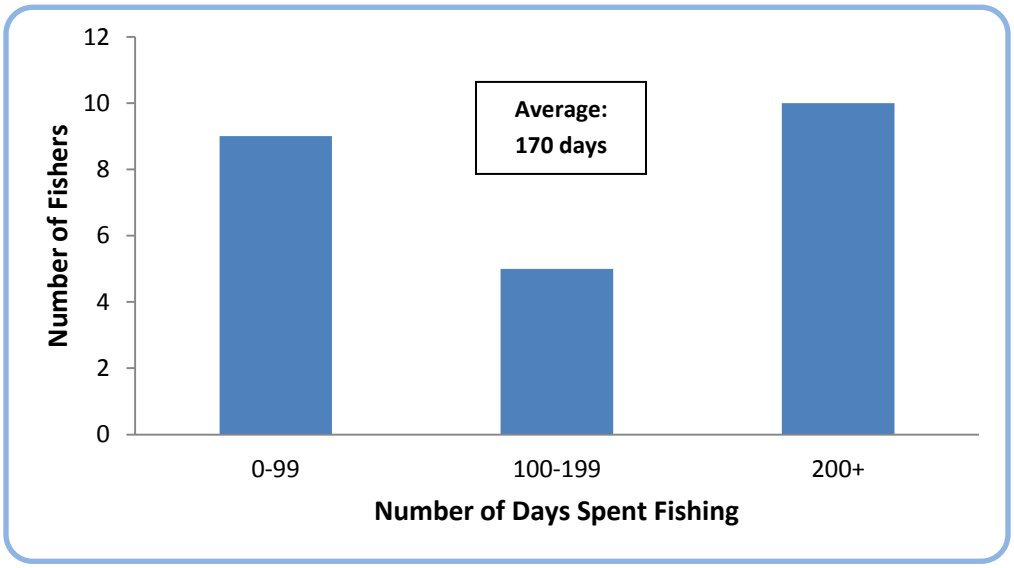


This figure indicates that there is a substantial proportion of fishers (62.5%) who have been in the city long enough to observe the changes that have come about since (or before) 1990. This is important to know, as contemporary China has experienced massive rural-urban migration, which will impact the building of place-based local knowledge. In particular, it indicates that a large portion of the sample is able to draw on long term experience dating back to years before the river's quality degraded to the level of the late 1990s.

The length of time fishers have been in Nanjing is one aspect that helps to understand the depth of local knowledge that might exist among the Qinhuai River's primary user group, however the two subsequent questions give more specific content to the type of information held by fishers. Figure 5.11 lists the approximate number of days spent fishing on the river in a given year by each person. This question helps to gauge the frequency of exposure to the river, providing an indication

of the extent to which each fisher actually engages with the ecosystem. The results show that the average number of days spent on the river is 170 per year, with 62.5% of fishers spending nearly one third of the year on the river. Thus, many of the fishers are indeed making frequent visits, and engaged in activities that have them interacting with the river's ecological functions and cosmetic appearance.

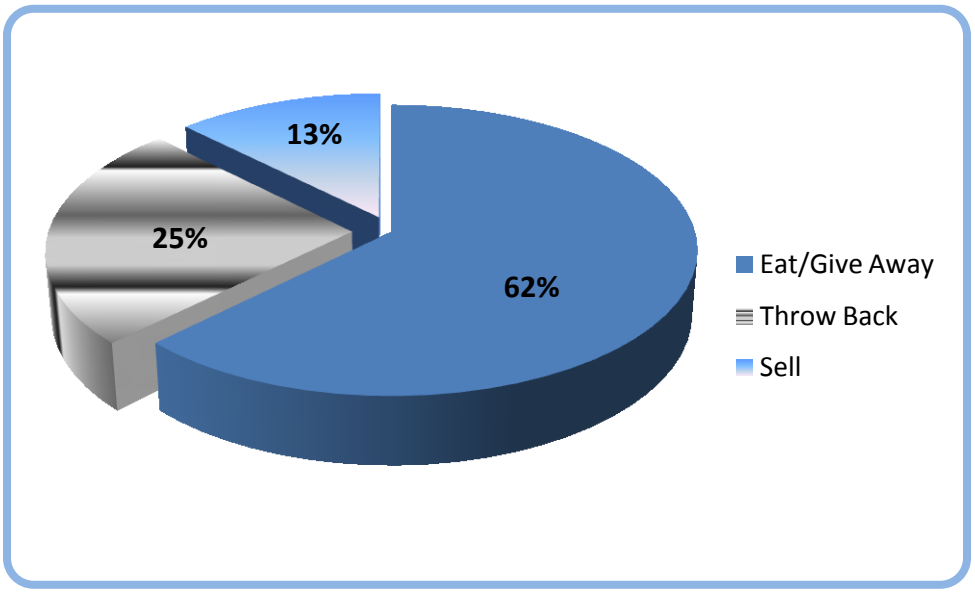
Figure 5.10: Estimated Number of Days Spent Fishing by Person



This is important to know, as local knowledge is built up through this type of frequent interaction, as it gives not only a time-span over which fishers have had the opportunity to observe change, but also the intervals of their observations. As such, the average fisher in the sample has spent a substantial amount of time in Nanjing (over 2 decades) and is frequently engaging with the Qinhuai River (170 days). This indicates that many of the fishers on the river have the potential to not only be able to reflect on their observations over time, but to be engaged in governance activities in the future. It should be noted that for most respondents, these daily intervals are only

valid over the last several years. However, as mentioned below, several small business fishers were interviewed, and possess a more stable history of interaction with the river.

Figure 5.11: Purpose of Fishing



The activities that each respondent engages in, with respect to their fishing habits, adds a qualitative dimension to understanding how closely they are interacting with the river. The majority of fishers are, at least in part, engaged in fishing activities to consume the fish they catch. In total, 75% of fishers either eat, give-away, or sell their catch from the Qinhuai River, while the remaining 25% throw back their catch. This is further indication of the kind of knowledge that may be accumulated by fishers, including the taste and availability of fish. Indeed, several of those that ate the fish they caught described the quality of fish as poor. Responses commonly indicated that the fish "smelled and "tasted of oil" as a result of the quality of the water.

In addition to fishers gaining experiential knowledge through their time on the river and handling of fish species, another aspect of information related to the river is the information on

species diversity that is held by the three small scale commercial fishers. Because the three small scale fishers in the sample have each been fishing on the river for decades, and are on the river nearly every day of the year, they hold a particularly vast and reliable reservoir of knowledge. It is reliable because their experience has been repeated daily, and attention to the detail of their catch as been crucial to their livelihood in terms of total catch, species variety, and the price paid for different species.

These three individuals all indicated that fish species, size, and abundance have declined over the last decade. Remaining are smaller species of fish such as carp, tilapia and whitefish, whereas other species existed previously. With regards to the abundance of fish, two of these individuals were willing to estimate their daily catch (both using similar fishing methods which included several rods and small nets). They both indicated that on a given day they will catch between 10-20 *jin*[8] (5-10kg), whereas a decade ago they would catch 20-40 *jin* (10-20kg). Fishers stated that it was possible for them to remain in business because of the general rise in price per fish, which made their lower yields economically bearable.

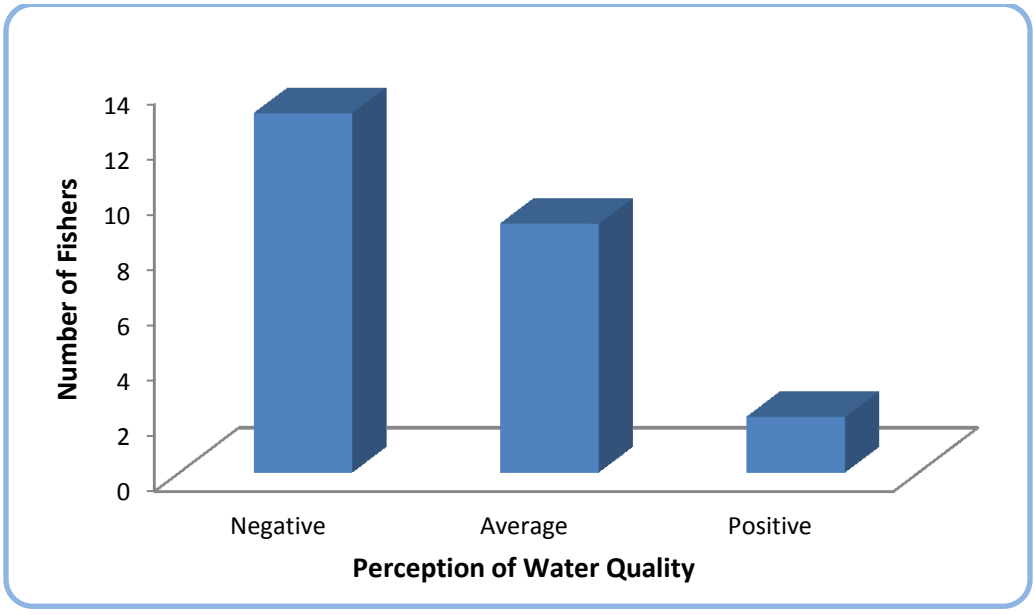
The data above regarding the extensive amount of time spent by many fishers on the Qinhuai River, both in a given year and over many years, show that many among this user group do in fact have a valuable reservoir of local knowledge. While not detailing the exact content of ecological knowledge possessed by each of the respondents, this does demonstrate that there is capacity among fishers to assist in governance activities. This knowledge is shown to exist in several forms: discussion of visible changes in the water banks and surface water debris, the existence and location of wastewater pipes and the water quality in relation to their location, accounts of species

[8] A *jin* (jīn, 斤) is traditional unit of measurement in China and is equal to 500g.

diversity, and ability to monitor visible changes at close range. In addition, their time spent on the river puts fishers in an excellent position to engage in monitoring activities in the future.

Because of this existing reservoir of knowledge, and the interest in the potential for fishers to engage in governance activities, respondents were asked about their perception of the water quality in order to assess whether fishers actually feel any need for the river quality to be improved. When asked "what do you think of the Qinhuai River's environmental quality", responses fell into three general categories, offering an overall negative, average, or positive assessment of the state of the river. In total, 13 view the river quality as overall negative, 9 average, and 2 positive. This shows that the majority (54%) of respondents do feel negatively regarding the river quality, and only 8% of respondents actually perceive the quality as being good.

Figure 5.12: Fishers' Perception of Qinhuai River's Environmental Quality

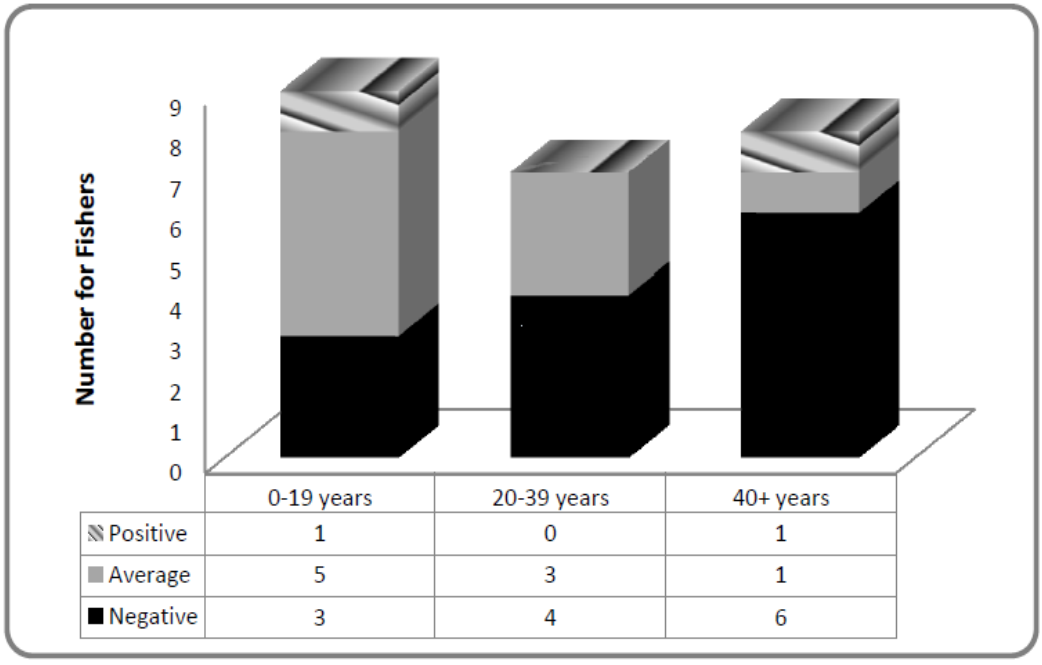


However, these assessments vary based on the number of years lived in Nanjing. Figure 5.14 offers the same assessments with a breakdown based on years spent in the city, demonstrating that

perceptions of river quality become more negative among those with longer residency in the city. Here we see that the non-negative responses (ie. average or positive) are much more prevalent among fishers that have been in Nanjing for 19 years or less (the average among this group is 4.9 years in Nanjing). In the case of fishers between 20-39 years in Nanjing, the 54% of responses are negative, and reached 75% negative among residents who had lived 40+ years in the city.

Given these figures, it is clear that the longer term residents hold more consistently negative perceptions of the river's quality. Some expressed immediate concern indicating that the quality has "deteriorated rapidly" and that "fish from the river cannot be eaten". Others indicated that it "does not meet the government's environmental standards", and that the river is "worse when the water is low" and "near wastewater pipes".

Figure 5.13: Perception of River Environmental Quality by Time in Nanjing



	0-19 years	20-39 years	40+ years
Positive	1	0	1
Average	5	3	1
Negative	3	4	6

On the other hand, the two people to describe the quality as "good" were somewhat different in their approach to the question. One individual lived in Nanjing for 2 years and spent 40 days per year on the river, and indicated that the condition was generally good, but had also noticed that conditions worsened when the water level is low. This person ate the fish he caught. However, the other individual was a resident for 60 years and spent most days on the river. He approached the question relative to his time in Nanjing, indicating that the river quality was good because "it is much better than before". This person however, indicated that he does not eat the fish he catches.

Similar to the latter individual, many fishers highlighted that there had been improvements in the water quality in the last several years. Overall, 58.3% fishers indicated that the water quality had improved to at least some degree. However, of these 14 fishers nine still indicated that the quality of the river is bad and had an overall negative view of the water quality. Beyond these 14, four fishers indicated that the water quality has actually deteriorated. As such, there is some agreement that quality has been improving, but much less optimism regarding the overall quality of the river.

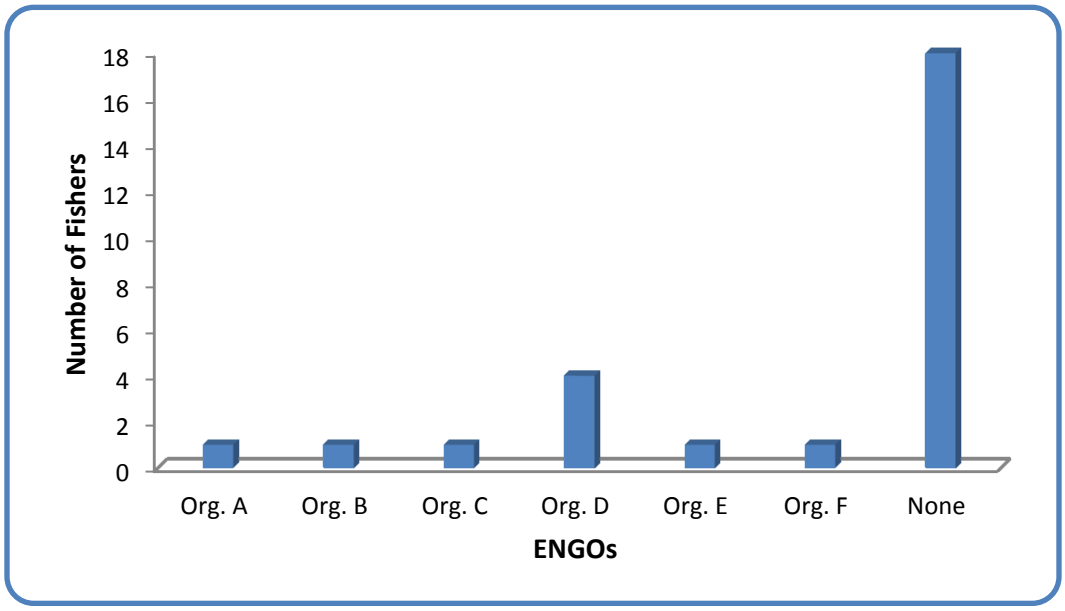
5.2.2 Perception of Governance Actors Among Fishers

Fishers were asked about their relationship to the governance actors discussed in Chapter 3. This included questions regarding participation in activities with their *danwei* or residents' committee, with ENGOS, and through government channels.

The first question regarding *danwei* and residents' committee activities received a negative response. None of the fishers had ever engaged in or heard of this type of activity related to the Qinhuai River among these local level government affiliated organizations. Fishers were then asked

whether they had any relationship with the ENGOs active with the Qinhuai River. The responses indicated that none of the fishers had any relationship or had ever spoken to any of the ENGOs. As a follow up, each was asked whether they had heard of any of the NGOs. Figure 5.15 shows the results which demonstrate that only six of the fishers could remember hearing of the existence of the ENGOs involved in the network analysis.

Figure 5.14: Awareness About ENGOs Among Fishers*



*** Note: One fisher identified organizations D, E and F, while another identified organizations C and D**

This shows that among the fishers sampled, only 25% of fishers had heard the name of at least one ENGO, indicating that there is negligible awareness of ENGO activities to improve the water quality depended upon by the user group. It should be reiterated that the majority of these fishers are on the river half of the days of the year, and have not encountered the ENGOs. Further, there was no variation in awareness based on length of time in Nanjing. Not only, then, are fishers

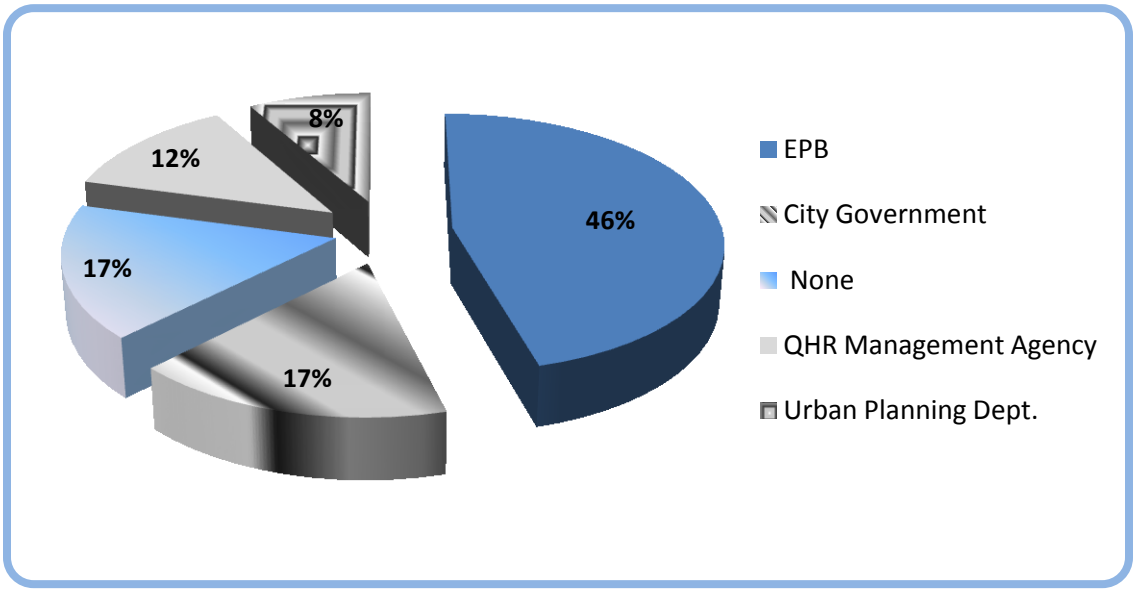
not aware of the ENGOs, their accumulated knowledge and frequent interaction with the river is not being utilized to its fullest extent.

In fact, ENGOs were also asked about their interaction with fishers, and only Organization A and C indicated that they exchanged information with fishers. Despite Organization A's large volunteer base and length of time engaging the issue, only one of the fishers was familiar with its name. This indicates that the manner in which these two ENGOs interact with fishers is likely haphazardly taking place during river-walks rather than in a sustained fashion with dedicated fishers.

Questions then focused on fishers' relationship to government channels of inclusion for local knowledge. In order to gauge the respondents' perception of important government actors, fishers were asked "Which government department would you contact if you wanted the government to be aware of environmental issues related to the Qinhuai River" and "Outside of government, please name two of the most influential organizations related to issues of the Qinhuai River" [see Appendix III].

While (as indicated by the ENGO awareness data) no respondent knew of actors outside of government that are influential on issues related to the Qinhuai River, responses related to government varied.

Figure 5.15: Who to Contact Regarding Environmental Issues



The EPB was identified as the main agency through which governmental awareness about the environmental issues could be achieved by 11 of the respondents, whereas four indicated the city government in general. Further, three people recognized that there exists a Qinhuai River Management Agency and two people recognized the city's Urban Planning Department. Finally, four people indicated, negatively, that there is no government department that can be contacted to affect any change. Thus, the respondents were much more aware of various government points of contact than non-government, though perception of most pertinent departments varied somewhat.

5.2.3 Use of Environmental Hotline

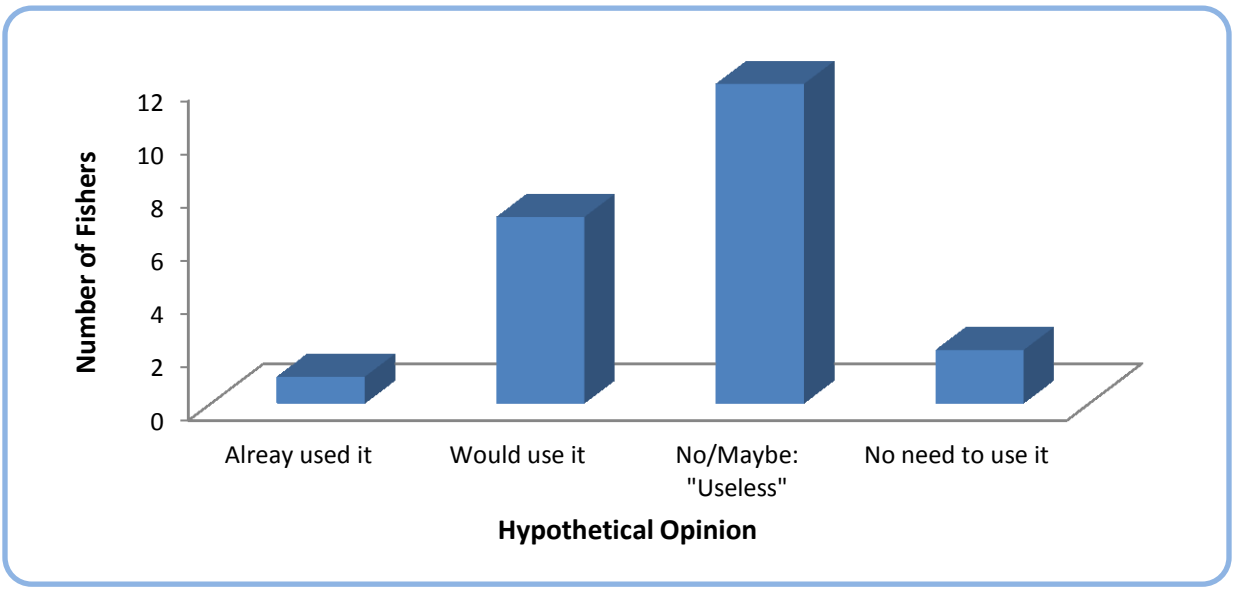
Following the literature on channels for citizen participation in environmental governance (Warwick and Ortolano 2007), fishers were asked a series of questions about the EPB's environmental hotline which was launched in 2003 in Nanjing. Questions began with the topic of awareness in order to understand it's exposure among the key user group, and were followed by the potential for the respondents to use the hotline.

In terms of awareness, few of the fishers knew that there was an environmental hotline available to report concerns. As shown in Figure 5.17, one quarter of the respondents were aware of the hotline's existence, while the remaining three quarters had never heard of this channel to reach government. Thus, though the channel exists, this primary method for citizens to reach government in order to report environmental issues is not widely recognized among a key group.

To further explore the potential for fishers to use this mechanism to contribute information, respondents were also asked whether they would use such a phone line to report pollution. While two people indicated that there would be no need to use the hotline because no particular pollution existed, seven people indicated that they would use the phone line if the occasion arose. However, the majority of fishers (12) indicated that the phone line would have no effect and was perceived as "useless" (*méi yòng*, 没用). Within this category, two fishers said that they might still call though they knew it wouldn't do anything, and the other ten indicated that this would prevent them from calling.

This level of negative response indicates a lack of trust between government and fishers on the Qinhuai River, specifically with regard to the government's ability to act on individual information in order to improve river quality. Further, because there is very little recognition that ENGOs exist in relation to the Qinhuai River, there are very few channels that fishers are aware exist to participate in governance activities in any organized form.

Figure 5.16: "Would you use the phone line"



To illustrate this, one respondent had actually called previously to report a waste water pipe emptying into the river. He indicated that he was nervous to do so and therefore used a public payphone to call the hotline. Though nearly a year had passed, the fisher indicated that the pipe was still in place. Other fishers stated that government actors are not interested in improving the river quality and the situation is very discouraging.

As such, the data related to fishers show that there exists strong potential for local capacity which can be used to assist in governance activities. Ecological knowledge exists, much of which is from long-term and repeated interaction with the river, and these characteristics can be used to assist in regular data collection and monitoring activities. However, fishers remain almost completely isolated from both ENGOs and government in terms of the way in which they have been engaged to contribute to governance activities.

5.3 EPB Official

In order to situate the role of government in Qinhuai River governance, specifically as it relates to the condition of the river and the inclusion of ENGOs and Fishers, a district EPB official was interviewed. The official was female and had been working at the district EPB for over 20 years conducting water sampling.

The district EPB at which the respondent works has been in existence since approximately 1980 and has over 40 staff members tasked with various responsibilities. Given the career of the official within the same department, the respondent was asked about the last 30 years of environmental change in the Qinhuai River. The official indicated that the 'ecology of the river is currently very fragile' given the multiple pressures it has faced in the past and still faces today. She stated that through the 1980s and 1990s the EPB saw the water quality get 'very bad and continue declining'. This was principally the result of many companies operating on the banks of the river (both factories and farming operations) which allowed chemicals to enter the river.

In the recent past, the official indicated that the river quality has 'stabilized and improved' from the level of degradation reached at the turn of the millennium. This is seen as being the result of several policies: 1) the increase in pollution standards which led to the relocation of the many polluting companies in central Nanjing to a 'different zone that has lower standards' for pollution, 2) the Qinhuai River Environmental Management plan which increased water treatment capabilities and water diversion.

However, the official also noted that problems remain. One of the main issues is 'citizen pollution' coming from illegal wastewater pipes. The official stated that these types of pipes still exist and are difficult to find because they are scattered. Despite recognizing this, it was also stated that the old Qinhuai River is free of this kind of pipe, and that this is mainly an issue for the new

Qinhuai River. This is in contrast to information provided by Organization B, which has spent many months mapping wastewater pipes on both parts of the river.

The other main issue identified by the district EPB official was that there remain many companies operating on the banks of the river, and not all of them comply to meet standards. She indicated that companies are required by law to 'treat water up to a certain level for "out" quality' however, not all companies do so. In generally the official estimated that the 'average company does comply with these standards, but that there are some that do not', which contributes to continued industrial pollution.

In terms of EPB activities, the official was asked about the bureau's capacity to monitor, and whether they engage help from ENGOs or individuals. While the District EPB does some local water monitoring, it was indicated that the Municipal EPB is more active in water monitoring activities. In general, the official indicated that although it is mandated with monitoring environmental issues in the entire district, it was 'not within [the District EPB's capacity] to be able to monitor the entire volume of polluted water'. This is in part because of the size of the river and its associated streams and canals that run through neighbourhoods in each district, but also because water issues are not the only ones that the EPB is tasked with.

Related to partnerships with ENGOs or individuals, the official stated that her particular district does not partner with any ENGOs, but that they are aware that the city has partnered with this kind of organization in the past. With regard to individuals, the official indicated that the environmental hotline was the most important tool that the bureau has to communicate with residents. She indicated that as of December 2011 the 'Municipal EPB had received thousands of calls' covering a variety of issues over the preceding year. While the city receives the call, the District EPB will do follow ups on each in order to examine the complaint – however the limited

capacity of the district EPBs to carry out the multiple duties they are tasked with means that extensive follow up for each call is unlikely.

Overall, the official indicated that there are still issues facing the Qinhuai River related to pollution, despite improvements. She stated that although the city has stated the overall quality of the river at class IV, the major contributor to the river receiving this classification is the success that has been achieved in landscape redesign along the banks of the river. This statement matches the analysis offered both by Organization F in terms of government focus on landscape over ecology, as well as the statements of several fishers who have made similar observations.

Chapter 6: Discussion and Analysis

In this section the results presented in Chapter 5 will be interpreted in terms of the research questions presented in Chapter 4.1. This will situate the results within the broader context of both a political ecology perspective of adaptive governance, and state-civil society relations in China.

6.1 Adaptive Governance in the Case of the Qinhuai River

As put forward in the literature, resilience is determined through a system's ability to maintain its functions in the face of change, and adaptive governance requires responding to disturbances and pressures in order to facilitate the maintenance of these functions (Walker et al. 2002; Armitage 2008). For adaptive governance, creating rules and norms to facilitate state-society partnerships is central to creating an atmosphere in which responses can be made meaningful, and that trust between actors, multiple sources of knowledge and networks across scales are key properties of successful adaptive governance arrangements (Folke et al. 2005). However as we have seen in the case study of Nanjing's Qinhuai River, there are important obstacles in the larger context of the political structure into which social actors are embedded which contribute to or impede governance changes, and affect the privileging of knowledge sources (Cote and Nightingale 2012).

In the case presented, both ENGOs and user groups were interviewed in order to understand how relationships between each other are structured, whether they possess knowledge or engage in activities valuable to environmental governance, and how they are related to government in terms of their knowledge and activities. The data collected has demonstrated that both ENGOs and fishers (particularly those that fish frequently on the Qinhuai River) have the potential to contribute to larger governance activities because of the knowledge possessed by both and the organization of ENGOs. Specifically, most ENGOs have been shown to have existing ability

to share this knowledge with each other, and the ability to monitor changes in the river including sources of pollution. In addition, government actors have also shown a willingness to improve river quality by undertaking large scale infrastructure projects to deal with wastewater, and opening some opportunities for non-governmental actors to engage these issues.

6.1.1 Do social actors generate unique ecological knowledge regarding the Qinhuai River?

As discussed, studies in adaptive governance point to the necessity of the key characteristic of having multiple sources of knowledge available to inform management decisions (Folke et al. 2005; Ernstson et al. 2008; Raymond et al. 2010). In the context of Nanjing's Qinhuai River, the results show that the social-ecological system in question indeed has several sources of information being produced by governance actors. Primary among them are government actors, particularly the EPB and other departments that have been closely related to redevelopment activities. As seen in reports from the Asian Development Bank, tests are carried out at 3 different locations approximately 8 times per year by in accordance with the government's redevelopment project (ADB 2012). In addition, according to the district EPB official, the government's principal sources of information are from the EPB, the Qinhuai Management Corporation and the Construction Bureau, who all conduct various forms of tests but also share the results with each other.

However, the non-state actors targeted in this study were also found to possess a variety of forms of uniquely produced information. Among ENGOs, two organizations (B and E) carry out their own independent scientific testing for water quality, with organization B carrying out tests nearly monthly at rotating river locations. In addition, Organization E has performed species counting related to the Qinhuai River surroundings and Mochou Lake.

Importantly, as residential waste is a significant contributor to continued Qinhuai River degradation (as discussed by the EPB official interviewed along with other ENGOs and fishermen), Organization B has also created and maintained a detailed digital map of pollution discharge sites. This type of information is valuable as many of the pipes are illegal and therefore not necessarily known within governmental sources of information. Finally, Organization C has focused on the cultural importance of the river, drawing on the social memory of residents and conducting historical research to understand what the quality of the river once was, and sharing this with residents of Nanjing.

On the side of fishers, though not typically acting on their knowledge, respondents were found to hold a variety of knowledge including species variety and quantity, taste, visible changes in water quality and river banks, and the location of wastewater pipes. Perhaps one of the most important contributions fishers have the capacity to make, given their frequent visits to the river, is engaging in monitoring activities. Because fishers are often aware of wastewater pipe locations and are familiar with their own local areas, they are ideally placed to observe changes.

These key findings show that environmental actors from the non-governmental sphere, both organizations and individuals, possess unique sources of knowledge. This knowledge has the potential to contribute to a more detailed understanding of environmental pressures and the Qinhuai River's ecology. In terms of the literature on adaptive governance, there is a combination of formal scientific knowledge, local ecological knowledge, and social memory at play (Ernstson et al. 2008; Raymond et al. 2010). Among these, however, there is disagreement in the interpretation of scientific evidence between the ENGO subgroup (B, C, D, and E) and Organization A (in cooperation with the

government). There is also a clear lack of sustained engagement with the local knowledge of fishers, which is reflected in the lack of trust between them and the government, and in the lack of awareness of ENGOs among fishers. Finally, the social memory being drawn on by Organization C through its activities is in competition with Municipal Government's own version of the historical importance of the Qinhuai River, which focuses largely on the beautification of the Confucius Temple area and the coastal landscape.

6.1.2 What is the structure of networks between ENGOs, and to whom are they linked?

The key finding regarding ENGOs is that among the six organizations in Nanjing working on issues related to the Qinhuai River, there is a tightly knit group of four, and two isolated organizations. This "clique" measurement (where the overall network's density is 66.7%, but the subgroup of ENGOs B, C, D, and E is 100%) is important as it relates to both the adaptive governance requirement of networking between governance actors. It is also pertinent with regard to the literature on NGOs in China which face a debate between highly networked versus constrained relationships. The division between the clique and the two relatively isolated actors brings into question the reason for this disjointedness, the effect that this has on governance relationships, and the role of power structures in the flow of information.

The tightly knit group members both share information and have created partnerships between each other, which is in contrast to the isolate organizations, who are not involved with the others' Qinhuai River activities. The explanation for Organization A and F's isolation is different in each case. Organization A feels that there is no longer a need to focus on the river because the government has done its job and the other organizations are amateurish, and Organization F feels that there is little point in creating projects because the

government's focus is off the mark in terms of what needs to be done to truly improve the rivers' ecological functioning. This divide in opinion between the isolates is indicative of a larger political ecological power relationship that runs through this network of ENGOs, which will be discussed in more detail below. It is important to recall that the level of governmental connections between these ENGOs is divided between Organization A, who is highly connected to and funded by government, Organization E and F who have more modest connections (though the content of connections is not typically focused on the Qinhuai River), and the other organizations which do not possess connections to government departments.

Among the fishers sampled, as the primary user group dependent on the Qinhuai River, connections to either ENGOs or government were practically non-existent. Only a few of the 24 fishers sampled had ever heard of the ENGOs operating in Nanjing, and none had been approached or worked with any of these organizations. Further, despite the academic research that has placed significance on the *danwei* and residents' committees in dealing with environmental issues (Heberer and Göbel 2011; Boland and Zhu 2012), none of the fishers had participated or even heard of activities surrounding issues related to the Qinhuai River. The only connection held between fishers and government is the environmental hotline to which they can report pollution or environmental concern. However, even this path is not a adequate permanent connection in its current form, as the connection is unidirectional, little known, and poorly perceived.

As such, while the ENGO subgroup is well networked with each other, each potential governance actor remains segregated from each other, between the ENGO subgroup, the

isolate ENGOs, and fishers. Thus the network structure contains a core group and isolates, with uneven links to government.

6.1.3 Is there opportunity to share ecological knowledge with the government?

Given the responses to the first two research questions, we have seen that social actors do in fact generate unique sources of ecological knowledge (both formal scientific testing and local experiential knowledge), and that this knowledge enters a network with unequal access to government.

The level of connection to government held by Organization A demonstrates that it is able to engage in collaborative activities with government institutions and transfer information. This is supported by its positive perception and successful cooperation with government. Possessing connection to all five departments indicates that it is able to reach government across scales (from municipal to provincial, including both state and political organizations). Organization A indicated that it has "a very close relationship with government" and "receives technical support" from government agencies. At the same time, it does not recognize any connection to the rest of the ENGO network.

The division between the clique and Organization A is pertinent in that it represents a break not only between the largest ENGO and the clique, but also between the strongest connection to government actors and unique knowledge source. Thus the combination of network structure, government contacts, and generation of formal ecological knowledge creates a clearer understanding of the division behind these relationships (see Figure 5.8). This combination also raises questions about the level of networking and the opportunities that exist among the set of ENGOs to relay information to government. There is at once a highly networked group with minimal

avenues to effectively reach government through established contacts, and a lone operator who possesses the largest number of contacts and does not wish to be related to the other actors in the network.

On the other side of this relationship, organizations B, C, and D do not hold governmental contacts regarding the Qinhuai River, and have a mixed perception of the government's receptiveness to their activities. While Organization D acknowledges attendance at project openings, both organizations B and C see the relationship as imbalanced, where government actors will essentially use their name when it is convenient, but provide no support when it is needed. These factors indicate very weak opportunities for each organization to share their ecological knowledge, whether it is the formal scientific testing and pollution mapping conducted by organization B or the social memory that organization C is drawing on in its cultural and historical activities.

In the context of fishers, similar institutional constraints exist in their ability to share information with government. The first obstacle is that the urban fishers of Nanjing are not organized to any degree, with relationships between each other typically limited to chatting. This is likely a result of the small scale and informal nature of the fishing that goes on. As such, within relationships among fishers, there is no continuous effort to collectively lobby government for improved policy and enforcement regarding the river. Instead, the only institutional pathway open to fishers is the environmental hotline, which is largely unknown, and problematic given a deficiency in trust among the majority of fishers toward the government. Further, the structure of a phone line arrangement is not conducive to receiving sustained information flow, follow-up or consistent monitoring activities through citizen participation.

6.2 Facing Power Relations in Adaptive Governance

The answers to these sub-questions lead to a perspective on the primary research question, "In light of the described features and criticisms of adaptive governance, how does local political climate determine governance arrangements among environmental actors surrounding the Qinhuai River?" This network structure (including the isolation of fishers from the ENGO network) combined with the distribution of government connections is not conducive for environmental actors in Nanjing to form adaptive governance arrangements. This issue is a central concern, given that the literature has typically focused on successful cases to determine criteria that contribute to adaptive governance arrangements (cf. Berkes et al. 1998; 2003). The literature has been less critical about the process taken to arrive at these governance arrangements and the mediation of power relationships that knowledge sources have gone through in arriving to that point (Armitage 2008).

Adaptive governance implicitly refers to changing social relationships, including both various governmental and non-governmental actors. However, changing relationships between actors necessitates an understanding of the larger structure of power relationships in which these actors are embedded (Cote and Nightingale 2012). While the approach taken by most adaptive governance studies has focused on case studies that help to determine desirable characteristics of relationships between actors to deal with change in social-ecological systems, it has been less interested in understanding the difficulty of fostering similar characteristics among actors that do not possess them (Cote and Nightingale 2012). In the case of Nanjing, where some of the foundational capacity seems to be forming, it needs to be better understood why adaptive governance regimes are not arising.

Studies such as Ernstson et al. (2008) have taken strides toward showing how relational structure is important for demonstrating how authorities and important actors can better

collaborate. Their conclusions, which include unequal relationships existing among the social network of a conservation movement, where user groups are highly peripheral, refocuses adaptive governance discussion toward power relationships in collaborative activities. Likewise, Adger et al. (2005: 9) explicitly engage political economy in identifying the power relationships that exist in cross-scale linkages between institutions, where powerful actors can "tilt the playing field such that information and knowledge are further skewed in their favour".

This perspective, though only just emerging over the last years, is refreshing in that it acknowledges the power dynamics that contribute to adaptive governance outcomes. However, the shortcoming, as hinted at by Cote and Nightingale (2012) is that the engagement in social science literature is still superficial. Though Adger et al. (2005) indicate that there are "micro-politics" at play in their case study of Trinidad and Tobago, and demonstrate how networking actors bypass power relations through creating links with alternate actors, they do not delve deeply into engaging micro-scale literature that elaborates the rich context of the island country. In particular they scarcely mention the cultural, historical and political aspects embedded in the context of the case study, which determine the way in which power is distributed and thus the manner in which environmental decision making is made (see Cote and Nightingale 2012). It is thus crucial to "situate" what resilience means in terms of the important drivers of social-ecological change, as these authors argue:

> Fundamentally, situating resilience requires moving away from an inference approach whereby abstract institutional criteria (such as flexibility, diversity, connectivity) are determined in advance and tested on the ground. Rather, principles of resilience must be drawn out of situated systems where sociocultural issues and social relations of power mediating environmental decision-making are observable… (Cote and Nightingale 2012: 481)

In acknowledging this critique, we must then revert back to examining the social science literature regarding state-civil society relations and environmental governance in China in order to situate the

observations made regarding the non-governmental actors in relation to environmental knowledge and the Qinhuai River.

6.3 Fragmented Environmental Knowledge and the Political Ecology of Adaptive Governance

As indicated in the literature review (Chapter 3.4), the political climate in China is one that has been described as "semi-authoritarian" (Ho and Edmonds 2008). In fact, this literature has already argued along the same lines as Cote and Nightingale, though from a separate framework, that local cultural, political, and economic context has a significant role in the way organizations (specifically ENGOs) can operate in a "social space that is enmeshed in a web of interpersonal relations and informal/formal rules between political and social actors" (Xie and Ho 2008). As such, structures that relationships give rise to between given actors in the context of environmental actors are embedded in larger power relations that constrain the way they can unfold. In China this is determined by the complex process that has been designed to increase public participation and limit access in governance activities through an organized and managed system.

This brings back the debate between the corporatist and fragmented authoritarianism heuristics regarding China's state-society relations and policy-making. There is consensus that, in China, the party-state is by far the dominant actor and that since the 1980s more opportunity has been made for actors below the level of central government and even non-governmental actors to engage in governance activity (Lieberthal 1992; Shieh and Friedmann 2008; Mertha 2009). However, the debate lays principally in how actors become participants in governance activities and to what extent they hold influence in contributing to decision making. Where some have found that non-governmental actors have the ability to influence policy as a result of networks of newly

developing organizations and specific pushes for policy change in the fragmented authoritarian model (Mertha 2008), others theorize that non-state actors are designated by and hold a representational monopoly to the state which allows them to "mediate on behalf of their constituents but only within the boundaries established by the state" (Hsu and Hasmath 2013).

In the context of Nanjing, the data shows that there are elements of both models at play. Organization A is clearly the ENGO that has been designated the dual role of representing the concerns of Nanjing's citizens regarding the Qinhuai River, but also the representing the government's viewpoint on both the river quality and the related need to improve governance measures. Meanwhile, the subgroup of organizations B, C, D, and E are akin to actors that exist under a fragmented authoritarianism framework, given their relative disconnect from government and the unwillingness (particularly of organizations B and C, who are the most active in Qinhuai River affairs) to abide by the government's viewpoint of river quality.

Building on Hsu and Hasmath (2013), the corporatist side of the state-NGO relationship is built on "tacit sanctioning", including allowing the government to establish the relationship, granting only selected organizations this mediating role, and ensuring they "abide by the rules of the state" (pg. 6). Organization A's unique portfolio of government contacts (a total of 5 institutions at different scales), its reliance on government funding, its registration status, and its location within the network, fits this criteria. Further, Organization A explicitly stated its disinterest in collaborating with other ENGOs which it deemed to be 'inexperienced'. Finally, the sanctioning criteria also fit in the sense that Organization A has suspended its activities related to the Qinhuai River, a move that comes after the government's receipt of the UN Habitat certificate of merit in 2008 for work towards the river's rehabilitation (Jones 2010).

In contrast, the organizations of the subgroup B, C, D, and E are less connected to government (with the exception of Organization E, whose focus is on a related environmental issue) and routinely point out the flaws of government policy relating to the river. Unlike Organization A, they have not received a special mediating role or financial benefit with regard to their work, and continue to hold projects and disseminate information related to the river's current quality. As a result of their relative distance from government, they are relatively free from worrying about being reprimanded. However, while this distance gives freedom to be more critical of government policy, it is inversely related to their ability to reach government to affect policy change (and therefore contribute to a larger governance effort).

From this point of view, the network structure observed between all organizations is particularly interesting. It depicts, within a single area of ENGO operation, an ongoing tension between the corporatist and fragmented authoritarian arguments playing out among organizations at the local level.

In engaging user groups, the corporatist frame is further demonstrated through the manner in which fishers are potentially engaged in governance activities. There has been no attempt for fishers to organize or be approached in a consistent manner by ENGOs or government in order to use their experience and constant interaction with the river. Rather, the method of gaining the local knowledge held by fishers (or any other individual) is through the EPB phone line. While this is certainly an improvement in providing a more immediate connection from government departments to the larger population of the city, the manner in which this channel functions is not conducive to long-term governance and monitoring. In essence, the hotline functions only as one-off reports from a multitude of sources concerned about a multitude of issues, with the same department responsible for responding to most of these (the EPB). Because of this arrangement,

and as noted by the district EPB official, the resources for follow up are strained – but control over the input channel to government is maintained.

Further, as seen through the interview data with fishers, there is both a lack of awareness necessary to even use this method of reporting, as well as a lack of trust that it will have any effect. As only 25% of the sample knew of the line's existence, this indicates that the phone line is not tenable in its current state as a long-term form of participation. Thus, among the most significant user group on the Qinhuai River, there is only a small minority that is even able to participate.

6.4 Bringing the Ecology "Back In"

As indicated at the beginning of this thesis, this research seeks to include focus on ecological variables within this framework. Given what we see about the power relationships that exist in the context of non-governmental actors engaged with the Qinhuai River, what does this say about how environmental knowledge is moving through the system?

As Blaikie (1985) points out in his study of soil erosion, the very act of choosing when to make environmental degradation a political issue is something that is subject to power relations. In the context of the Qinhuai River, the degradation was long observed and the subject of public concern during the first two decades of reform and rapid economic growth (Xu 2009; Jones 2010). However, controls on public organization prevented the formation of organized interest groups until NGO laws were loosened in the late 1990s. This was followed by ENGO and media engagement in the issue, which was quickly followed by government action in terms of infrastructure projects. The period through which revitalization projects have been on the government agenda coincided with vocal ENGO activity, including from Organization A, which we have seen is involved in a corporatist relationship with the government and therefore subject to sanction. Now that

government improvement projects have been implemented, and success declared, it is no longer an object of discussion – and has thus been dropped by Organization A despite continued concern from other NGOs.

Thus, on examining the network graph displaying independent sources of scientific knowledge being generated in the ENGO network, and also in consideration of the description of the ecological knowledge held by many fishers, the debate between corporatism and fragmented authoritarianism is in fact at the core of the power struggle between multiple sources of knowledge in the network of non-governmental actors. When observed in the context of the production of multiple sources knowledge, the existing network structure uncovers the corporatist nature of ENGOs in relation to the Qinhuai River which affects the path that ecological information is taking both among organizations, and between organizations and government departments. The alternative information sources are farther removed from government and from the most government connected (and officially sanctioned) ENGO. This translates to a visualization of the unequal positioning of environmental knowledge among ENGOs.

Further, when the sample of fishers is incorporated into this analysis, the hotline, as the sole institutional arrangement that has been put in place to allow fishers (and others) to transfer their experiential knowledge to government, is not effective. Despite its existence, the majority of fishers sampled would not use the line because they are of the belief that it would have no impact on the way government would respond to pollution in the river. Even the sole respondent who had actually used the line did so from a payphone so as not to be identified (for fear of retribution) and saw no improvement in the wastewater pipe he reported which expelled effluence into the river.

Beginning January 1st, 2012, the Municipal Environmental Protection Bureau declared that it would increase rewards given to citizens who either called, e-mailed, or wrote letters regarding

incidences of pollution (Nanjing EPB 2011). One of the specific information types sought is illegal wastewater pipes, a subject that was frequently articulated by fishermen and also by ENGOs. In total, the new program would increase previous reward amounts four-fold (Nanjing EPB 2011). However, this measure also requires that callers provide their real name and address, which is something that most fishers were very hesitant to provide. This lack of engagement with a primary user group on the part of both government and ENGOs is a weakness in terms of the knowledge and activities created through partnerships with fishers, a finding that has been noted in other cases (Ernstson et al. 2008). This is relevant to power relations related to the validity placed on one source of environmental knowledge to another, which will be discussed below.

Another key aspect in terms of bringing the issue of river governance to the fore is the way in which government has carried out rehabilitation projects and applied knowledge of the issues at hand. When asked why they had decided not to carry out projects specifically related to the Qinhuai River, Organization F indicated that its view and the view of government planners did not intersect. It was indicated that,

> 'the Qinhuai River is not seen as a river in full, from its beginning to its merging with the Yangtze. Instead, when people see the river they think only of the Confucius Temple area. It is seen only as a tourist attraction and this is where government planning has focused – on making the scenery nicer and pumping fresh water into the commercial area.'

This is a comment that was reiterated by a fisher that was interviewed, who said that the only interest in terms of redevelopment has been in the Confucius Temple area. A separate fisher mentioned that improvements have been cosmetic, where the 'scenery is improved, but the water quality remains poor'. This kind of perspective, combined with the findings of Zhou (2008), indicate that the focus of Nanjing's municipal government has been more closely focused on aesthetic development and large scale infrastructure improvements that pay particular attention to

commercial areas, which play a significant role in Nanjing's tourist economy. This has led to the opinion that less effort is spent on improving overall river ecology through smaller actions such as removing wastewater pipes.

The continued creation of ecological knowledge from Organization B and E that happens to run counter to the municipal government's image of a rehabilitated river is a source of knowledge that is not endorsed by Nanjing's government. As such, the system of corporatism under which Organization A has been designated a mediating role, not only has the effect of influencing relationships between local ENGOs, it also has the effect of controlling the distribution of non-sanctioned ecological knowledge. This contributes to allowing economically driven municipal development plans to proceed before addressing systemic pressures on river degradation.

The corporatist relationship puts a hurdle between social actors who might otherwise cooperate, and between some social actors and government. Given this insight, and following the research of Hsu and Hasmath (2013), it is shown that a key trait in China's local political climate, the corporatist relationship in local ENGOs, is also a key factor preventing the emergence of a more adaptive governance system and the sharing of multiple sources of ecological knowledge.

Chapter 7: Conclusions

7.1 Review of the Findings

This study has brought together three areas of scholarly literature, operationalizing and contrasting each in the context of a case study in order to arrive at a richer understanding of political context of social responses to environmental change. Research in adaptive governance to increase resilience has focused largely on institutions as an approach to understanding the social variables that contribute to successful responses to dealing with environmental change (Berkes et al. 2003; Folke et al. 2005; Gelcich et al. 2011).

While this area of research has been successful in hastening a shift in conceptualization of social and ecological systems as being separate, to a new conceptualization of interrelated social-ecological systems, it has been criticized as being weak in its treatment of social science theory (Armitage 2008; Cote and Nightingale 2012). Building on these critiques, this study sought to embed a political ecology approach to adaptive governance research within a specific political context, as recommended by Cote and Nightingale (2012). Thus, the extensive literature on the complex and changing institutional arrangements and power relations in urban China was reviewed. Along with the institutions of government, the institutional arrangements under which non-governmental organizations operate in the country were examined. This was situated theoretically by introducing key approaches being debated in the sub-field of Chinese political studies (principally in the English language literature, but also discussed in Chinese language literature). The principal theories included both the corporatist and fragmented authoritarianism 2.0 frameworks, which have been discussed and refined since the late 1980s (Lieberthal 1992; Dittmer and 1995; Mertha 2009; Hsu and Hasmath 2013). Through contextualizing the social variables identified for success in adaptive

governance literature as suggested by Armitage (2008) and Cote and Nightingale (2012), along with using country and sector specific literature in political studies, this study confirmed that there exist significant limitations in the prescriptive nature of adaptive governance literature.

The results showed that ecological and cultural knowledge is being created by non-government actors, at varying degrees of independence from government purview. In particular, Organization B is engaged in several unique projects that create useful scientific, managerial and experiential knowledge independent from government. Additionally, Organization E has been able to include the Qinhuai River as a peripheral issue of focus in its activities, which contribute ecological knowledge about the river. Organization C has also been active in promoting cultural values and drawing on social memory of Nanjing's residents in order to combat the river's degradation. Finally, fishers on the Qinhuai River were found to hold much potential in terms of their accumulated knowledge about the river's change over time and their potential to engage in monitoring activities given their intensive use of the river.

It was also seen that there was variation in terms of relationships between ENGOs and among ENGOs, fishers, and government. ENGOs were divided between a highly networked sub-group that shares information and partnerships related to the Qinhuai River (organizations B, C, D, and E), and two relative isolates in Organizations A and F. The sample of fishers was found to be completely isolated from ENGO activities, with very little knowledge of the ENGOs' existence. The divide in the ENGO network reflected unequal connection to government, where Organization A held connections to five government departments, far more than any other ENGO. From their side, the only connection to government held by fishers was through the environmental hotline, which was not well known and often distrusted.

These findings indicated that there is an unequal opportunity, both in quantity and quality of access to government departments. In terms of the overall network of environmental actors, there are few organizations with access to government. Further, the network location of organizations and fishers with unique environmental knowledge do not have the connections necessary to have the opportunity to relay this information effectively. For ENGOs, it is the less connected sub-group that is generating information, and for fishers the phone line offers a very limited opportunity to connect with government in a meaningful and repeated manner.

Despite the existence of these unique knowledge forms and the emergence of networks identified in the ENGO subgroup, the institutional arrangements guiding the distribution of power in civil society relations were found to impede the way that organizations and individuals were able to participate in governance activities. Drawing on both corporatist and fragmented authoritarianism 2.0, it was seen that there clearly exists a single ENGO (Organization A) that has been sanctioned to mediate between government and citizens in Nanjing – with other organizations and fishers representing the unsanctioned interests within or bordering the same interest group sector. The privileged position of this organization puts it in a position where it must navigate its project and lobbying activities carefully in order to keep its funding and connections to government (cf. Hsu and Hasmath 2013) – in recent years it has dropped its Qinhuai River related projects because there is "no need to continue" in the near future as a result of their perception of improvement in river quality, which is shared by government.

However, the power structure that was uncovered through mapping the ENGO network has larger effects on the way environmental knowledge is distributed and accessed. Organization A's privileged position with government structurally crowds out the information being produced by others. Further, the existing arrangements for fishers is ill suited to long term governance activities

as the phone line has the effect of diffusing complaints through one time calls from individuals rather than an organized monitoring effort. As such, it has been found that relationships between ENGOs and among ENGOs, fishers and government are limited and are heavily influenced by the known power structures that exist in state-society relations in China, which affect the way knowledge is distributed and which knowledge is acted upon.

7.2 Lessons and Contributions: The Qinhuai River and Adaptive Governance

As it currently exists, non-governmental actors are relegated to the periphery in governance activities related to the Qinhuai River. Though there were no ENGOs operating on these issues prior to the year 2000, there are now six in existence. This is a significant change when examined relative to the lack of opportunities for this kind of organization to exist before the mid-1990s. In addition, the creation of the environmental hotline a decade ago has opened a channel through which fishers (and other citizens of Nanjing) can report concerns to government. Nevertheless, these institutional arrangements, as described above, exist in a larger power structure that is preventing collaboration from taking place and prioritizing governmental knowledge and viewpoints of the river.

The lessons that can be drawn from this study relate to environmental governance activities in China (particularly the Qinhuai River) and also more generally to strengthening approaches in adaptive governance research. These lessons can be summarized as follows:

1) Despite the dramatic increase in non-governmental actors focused on the Qinhuai River over the last two decades, the ability of these actors to contribute to improved governance of chronic environmental pressures is limited. While the ability of non-governmental actors to produce ecological knowledge does exist, the ability to share this knowledge and create connections with government is highly uneven. This lesson is likely transferable to similar contexts in urban China,

where government reach is strong, ENGO activity is common, and where there is a multitude of chronic environmental issues being faced.

These chronic environmental issues are at the heart of much of the adaptive governance literature (aside from the literature on disaster adaptation). In the context of China, this should be contrasted with the typical cases examined by literature on non-governmental contributions to environmental governance in the country. These typically focus on cases of acute and single sourced environmental threats, such as a large scale dam project or a single polluting factory (Tilt 2007; Mertha 2008; Hildebrandt and Turner 2009). However, it is in managing chronic issues with multiple sources of pressure leading to degradation that longer term collaborative activities are called for.

In this case, it is the power relations into which network structures are embedded that make collaboration difficult to achieve. Drawing on a corporatist understanding of the government sanctioning of sector or area specific interest groups, it was seen that the unequal power distribution inherent in this system is not conducive to sharing knowledge from multiple sources. This system creates a single bridge between government and civil society, which mediates knowledge and constrains collaborative governance activities. Conversely, the fragmented authoritarianism 2.0 heuristic advanced by Mertha (2008) better explains sudden movements to form pressure that create policy shifts, and not the day-to-day reality of environmental governance in a specific social-ecological system.

As such, a lesson to be drawn is that collaborative forms of urban environmental governance related to the Qinhuai River in Nanjing (and likely to other cases in urban China) are constrained by the existence of a corporatist system which guides state-civil society relations and privileges the activities of one ENGO over others.

2) The second lesson to be learned arises from the first, and is related more generally to the approach taken by adaptive governance research. This lesson is that the study of adaptive governance benefits greatly in its explanatory power and the relevance of its policy prescriptions by incorporating political ecology and location specific theory from the social sciences into its approach. While other authors have described this process, indicating the need to understand social-ecological change in terms of power relations (Armitage 2008) and local context (Cote and Nightingale 2012), it has seldom been achieved. Situating the case study of the Qinhuai River has demonstrated why this lesson should be acknowledged and incorporated into this area of research.

The political ecology frame helps to guide research through its underlying assumption of unequal distribution of the costs and benefits of environmental change, which destabilizes the neutrality of adaptive governance principles (Cote and Nightingale 2012). Incorporating location specific scholarly work, such as China-specific studies on urban governance and state-civil society relations, gives the political and institutional context necessary to understand the constraints under which governance arrangements operate and the theoretical basis to interpret empirical findings. Thus this framework works together in allowing political ecology to frame the social-ecological system outcomes as being subject to power relations, and the context specific literature to provide the basis of understanding political dynamics shaping these relations. In doing so, this approach allows a more nuanced view of the opportunities, constraints, and pitfalls related to the principles of adaptive governance.

While the political climate in China is unique, recalling Ho and Edmonds' (2008) term of "semi-authoritarian", it is indeed precisely this point that is important. The local context in which all governance systems are situated will be to some extent unique, and in the majority of cases a developed social science literature (both domestic and international) will exist on the system of

political dynamics specific to the area. While this literature may not always be entirely applicable, it will certainly help to inform research questions and contextualize findings, and recommendations that may be made. In this study, reviewing literature on China's state-civil society relations assisted in helping to guide empirical research and interpret results regarding environmental governance arrangements.

7.3 Limitations and Future Directions

The limitations of the above study are in the limited scope that a case study can provide, and the constraint of focusing on non-government actors in the system without delving as deeply into the inner workings of government. In addition, there are complimentary focuses in political ecology that could have been pursued.

In terms of scope, the variables at play in the context of the Qinhuai River, Nanjing's urban development, and the residents of the city will not be strictly transferable to other cases in China or globally. This is to say that the findings particular to the case study cannot necessarily be generalized to all cases of environmental governance. However, given the direct applicability of scholarly work on state-civil society relations in policy making in China, the findings of this study are suggestive of the validity of these heuristics, and of the usefulness of approaching adaptive governance research with greater engagement of social science literature on location specific social and political order.

While this is a limitation, it is also an important conclusion of the study. The specific context highlighting the case of the Qinhuai River is unique to the city, and to an extent, the country. However, these kinds of specificities are not often accounted for in approaches to adaptive governance, which often hold political variables constant. Thus, while caution must be taken in

generalizing the findings of this study, this limitation is one that relates to research in adaptive governance more generally. Thus, this limitation also leads to a suggestion regarding direction for future research, which is for studies of adaptive governance in social-ecological systems to included increased detail regarding existing power relations which have the potential to guide outcomes and influence the distribution risks and benefits associated with environmental change.

The focus being limited to non-governmental actors is another limitation that must be addressed. Given the importance of governmental actors in China (along with most other countries), the focus on non-governmental actors can be perceived as missing the key player. The reason for examining non-governmental actors is that a key assumption in the conceptualization of "governance" in the adaptive governance literature is the need for combined efforts between public and private actors. However, the largely absent presence of primary data from government actors in this study leaves a gap in more detailed understanding of what internal motivations for (non-)partnership exist in the context of the Government of Nanjing. A better understanding of these internal factors specific to the case study would be beneficial, and does serve as a limitation to the study. Despite this, the focus on perceptions of non-governmental actors remains a pertinent focus given the importance of variety in forms of environmental knowledge. In addition, the existing literature on China's state-civil society relations largely helps to fill this gap by applying well known heuristics to this case.

Finally, streams of political ecology have also taken complimentary approaches to address power relations in human-environment relations. In particular, a political ecology approach focused on the production of knowledge is a potential future avenue to explore in relation to this case study. This could include an exploration of ENGO scientific methodologies in their production of independent information, compared with government methodologies. This would enable a deeper

exploration of the content of information, in addition to the relationship between values and knowledge.

The situation with the Qinhuai River, and with the governance activities of China's ENGOs, is sure to be of continuing importance in the future. The new policy on NGO registration declared in March 2013, which allows NGOs to register more easily with an eye to allowing them to fill critical social and environmental gaps, will be of particular interest. Will the rules governing ENGOs and the corporatist structures that have developed continue? Will new, independent, sources of information regarding chronic issues of degradation begin to reach government? The answer to these questions will have the potential to significantly influence the way that governance arrangements and urban development take shape in the future.

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Appendix I

Social Network Questionnaire (Chinese)

(1) 请问贵单位与下列哪些组织之间会定期交流与秦淮河**自然生态**相关的信息？如果有请您在对应的☐内划 √。如果除下列单位外还有其他单位，请您在空白处另行添加。

(2) 请问贵组织在秦淮河的**政策、城市规划以及文化价值**相关的信息方面与下列哪些部门之间有过交流合作？如果有请您在对应的□内划√。如果除以下单位外，还有其他单位，请您在空白处另行添加。

(3) 请问贵单位在秦淮河相关的活动（项目）上与下列名单中哪些组织和部门之间有密切合作？如果有请您在对应的☐内划 √。如果除以下名单外，贵单位还与其他单位有相关的合作，请您在空白处添加。

		自然生态			政策 / 城市规划 / 文化		项目
一、社会团体	(1)	提供信息	接受信息	(2)	提供信息	接受信息	(3)
垂钓者		☐	☐		☐	☐	☐
其他休闲娱乐者（如游客、居民等）		☐	☐		☐	☐	☐
Organization B		☐	☐		☐	☐	☐
Organization F		☐	☐		☐	☐	☐
Organization D		☐	☐		☐	☐	☐
Organization C		☐	☐		☐	☐	☐

Organization A	☐	☐	☐	☐	☐
Organization E	☐	☐	☐	☐	☐
公众环境研究中心 (IPE)	☐	☐	☐	☐	☐

		自然生态			政策 / 城市规划 / 文化		项目
二、研究机构	(1)	提供信息	接受信息	(2)	提供信息	接受信息	(3)
河海大学院系		☐	☐		☐	☐	☐
南京大学院系		☐	☐		☐	☐	☐
东南大学院系		☐	☐		☐	☐	☐

		自然生态			政策 / 城市规划 / 文化		项目
三、政府部门	(1)	提供信息	接受信息	(2)	提供信息	接受信息	(3)
江苏省环境保护厅		☐	☐		☐	☐	☐
南京市环保局		☐	☐		☐	☐	☐
南京市人大		☐	☐		☐	☐	☐
南京市政协		☐	☐		☐	☐	☐
南京市水利局		☐	☐		☐	☐	☐

四、其他政府部门	☐	☐	☐	☐	☐
亚洲开发银行	☐	☐	☐	☐	☐
联合国人居署	☐	☐	☐	☐	☐

		自然生态			政策 / 城市规划 / 文化		项目
其他	(1)	提供信息	接受信息	(2)	提供信息	接受信息	(3)
西祠胡同		☐	☐		☐	☐	☐
扬子晚报		☐	☐		☐	☐	☐

_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐

Social Network Questionnaire (English)

(1) With which of the following organizations does your organization regularly exchange information related to the Qinhuai River's ecosystems? If you have exchanged information please place a √ in the □. If you exchange information with an organization not listed, please add it in the blank spaces.

(2) With which of the following organizations does your organization regularly exchange information on policy, urban planning or cultural value related to the Qinhuai River? If you have exchanged information please place a √ in the □. If you exchange information with an organization not listed, please add it in the blank spaces.

(3) With which of the following organizations does your organization engage in activities (projects) related to the Qinhuai River? If you have projects or activities with any of the organizations listed, please place a √ in the □ with those. If an organization is not listed, please add it in the blank spaces.

		Ecology		Policy/Urban planning/ Cultural values		Projects
1. Social Organizations	(1)	Provide	Receive	(2)	Provide Receive	(3)
Fishermen		☐	☐	☐	☐	☐
Others leisure users (tourists and residents)		☐	☐	☐	☐	☐
Organization B		☐	☐	☐	☐	☐
Organization F		☐	☐	☐	☐	☐
Organization D		☐	☐	☐	☐	☐
Organization C		☐	☐	☐	☐	☐

Organization A	☐	☐	☐	☐	☐
Organization E	☐	☐	☐	☐	☐
Institute for Public Environmental Research	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐

	Ecology		**policy/urban planning/ Cultural values**		**Projects**
2. Research Institutions	(1) Provide	Receive	(2) Provide	Receive	(3)

Hohai University departments	☐	☐	☐	☐	☐
Nanjing University departments	☐	☐	☐	☐	☐
South-East University departments	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐

	Ecology			**policy/urban planning/ Cultural values**			**Projects**
3. Research Institutions	(1)	Provide	Receive	(2)	Provide	Receive	(3)

Jiangsu Environmental Protection Bureau	☐	☐	☐	☐	☐
Nanjing Environmental Protection Bureau	☐	☐	☐	☐	☐
Nanjing People's Congress	☐	☐	☐	☐	☐
Nanjing CPPCC	☐	☐	☐	☐	☐
Nanjing Water Conservancy Bureau	☐	☐	☐	☐	☐
4. Other government departments	☐	☐	☐	☐	☐
Asian Development Bank	☐	☐	☐	☐	☐

UN-Habitat	☐	☐	☐	☐	☐

	Ecology		**policy/urban planning/ Cultural values**		**Projects**
<u>3. Media Outlets</u>	(1) Provide	Receive	(2) Provide	Receive	(3)
Xici Hutong	☐	☐	☐	☐	☐
Yangtze Evening News	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐

Appendix II

Interview Questions for ENGOs (Chinese)

1。贵组织已经建立多少年了？_____年

2。贵组织共有_____位工作人员？；其中，全职人员_____位，志愿者____位？

4。贵组织开始关注秦淮河的环境状况有多少年了？_____年

5。在过去的十年中，贵组织策划过**几次与**秦淮河环保问题相关的活动？这些活动分别为？

6。在过去的十年中，贵组织参与过几次**其他组织**举行的与秦淮河环保问题相关的活动？这些活动分别为？

7。贵组织有否做过有关秦淮河生态环境状况的科学研究？（可多选）

A 独立开展的科学实验
B 独立开展的管理评估项目
C 野生动物群体数目的调查估算
D 无
E 其他相关研究 _____

8。贵组织每年有多少天在从事与秦淮河相关的活动上？ _____天

9。贵组织在哪些方面与秦淮河相关？（可多选）

A 钓鱼
B 游泳
C 住在附近（0.5 公里内）
E 划船
F 河边散步、运动
G 其他（请注明）：
H 没有

10。要引起政府部门对秦淮河环保问题的重视，你会首先考虑联系哪些机构部门（或个人）？

11。除了政府之外，请再列举两个在秦淮河相关问题上最有影响力的组织。

12。贵组织与哪些政府部门之间有比较良好的合作关系？

13。您认为相关政府部门会积极配合你们的活动吗？

Interview Questions for ENGOs (English)

1. When was your organization established? _____ Years

2. Your organization has _____ staff members in total. This includes _____ full time staff, and ___volunteers.

3. How many years has your organization been focusing on the environmental situation in the Qinhuai River? _____ Years

4. In the past 10 years, your organization has planned how many activities related to the Qinhuai River environmental issues? These activities were?

5. In the past decade, have other organizations held activities Qinhuai River environmental issues in collaboration with your organization? These activities were?

6. Has your organization done scientific research about the ecological and environmental conditions of the Qinhuai River? (you can state more than one)

A scientific experiments carried out by independent
B independently of management assessment project
C wildlife groups, the number of survey estimates
D No
E other research _____

7. How many days each year is your organization engaged in activities related to the Qinhuai River? _____ Days

8. Does your organization take part in any of these activities related with the Qinhuai River? (you can state more than one)

A fishing
B Swim
C Live in the vicinity (within 0.5 km)
E Boating
F Riverside walks, sports
G Other (please specify):
H None

9. To arouse the attention of the government departments of the Qinhuai River environmental issues, which department (or person) would you contact?

10. Apart from the Government, please cite two of the most influential organizations on issues related to the Qinhuai River.

11. Does your organization have a cooperative relationship with government departments?

12. Do you believe that relevant government departments actively cooperate with your activities?

Appendix III

Interview Questionnaire for Fishers (Chinese)

1、您在南京___年？

2、平时是跟____一起来秦淮河。

3、您每年约有____天会参加与秦淮河有关的活动。

4、您参加的与秦淮河的相关的活动主要包括下面哪些方面？（可多选）

A 钓鱼
B 游泳
C 临近居住（0.5 公里内）
D 划船
E 步行/锻炼至附近
F 其他（请注明）：
G 无

5、如果您钓到鱼，您是自己吃还是卖出去？卖给谁，在哪里卖？

6、您觉得秦淮河的环境怎么样？与以前相比有变化吗？您对秦淮河的环境状况关心吗？

7、你属于一个组织，工程，以改善秦淮河的质量？

8、有一个环保投诉热线， 您知道吗？ 您打过这个电话吗， 为什么？

9、为了要引起政府部门对秦淮河环保问题的重视，您会首先考虑联系哪些机构部门（或个人）？

10、除了政府部门之外，请再列举两个在秦淮河相关问题上最有影响力的组织。

Interview Questionnaire for Fishers (English)

1. You have lived in Nanjing ___ years?

2. Usually I got to the Qinhuai River with ____.

3. Every year you go to the Qinhuai River ____ days to participate in activities related to the river.

4. Which of the following activities do you mainly engage in regarding the Qinhuai River? (you can choose multiple)

A Fishing
B Swimming
C Close residence (within 0.5 kilometers)
D Boating
E Walking along/exercise nearby
F Other (Please specify) :
G None

5. If you fish, do you eat the fish you catch yourself? Do you sell them? Where do you sell them?

6. What do you think about the Qinhuai River's environment? Has it changed? (follow up) Are you concerned about the environmental quality of the river?

7. Do you belong to an organization that works to improve the quality of the river?

8. There is an environmental hotline in Nanjing, are you aware of this? Have you called this number before? If so, what was the result?

9. If you wanted to order to contact the government about Qinhuai River environmental issues, which department would you first consider to (or person)?

10. Besides government departments, list two of the most influential organizations related issues in the Qinhuai River.

Appendix IV

Interview Questionnaire for Nanjing
District Environmental Protection Bureau Official
(Chinese)

1。贵组织已经建立多少年了？_____年

2。贵组织共有_____位工作人员？；其中，全职人员_____位，志愿者____位？

3。贵组织开始关注秦淮河的环境状况有多少年了？_____年

4。在过去的十年中，贵组织策划过**几次与**秦淮河环保问题相关的活动？这些活动分别为？

5。在过去的十年中，贵组织参与过几次**其他组织**举行的与秦淮河环保问题相关的活动？这些活动分别为？

6。贵组织有否做过有关秦淮河生态环境状况的科学研究？（可多选）

A 独立开展的科学实验
B 独立开展的管理评估项目
C 野生动物群体数目的调查估算
D 无
E 其他相关研究 _____

7。贵部门认为秦淮河的生态环境状况如何？在过去三十年中，相关政策是如何随着秦淮河的生态环境状况变化而变更的？

8。市委、市政府对秦淮河的整治目标是什么？具体如何实施？

9。在秦淮河环境环保与治理事宜上，贵部门是否有相关的非政府合作伙伴？

10。除政府部门外，有哪些组织在秦淮河环境保护方面最为有力？

11。在制定秦淮河相关的政策时，南京市委、市政府主要依赖哪些方面的信息来源作为参考？政府有否采用政府部门之外的一些信息来源？（比如高等院校、非政府组织等）

Interview Questionnaire for Nanjing
District Environmental Protection Bureau Official
(English)

1. When was your organization established? _____ Years

2. Your organization has _____ staff members in total. This includes _____ full time staff, and ___volunteers.

3. How many years has your organization been focusing on the environmental situation in the Qinhuai River? _____ Years

4. In the past 10 years, your organization has planned how many activities related to the Qinhuai River environmental issues? These activities were?

5. In the past decade, have other organizations held activities Qinhuai River environmental issues in collaboration with your organization? These activities were?

6. Has your organization done scientific research about the ecological and environmental conditions of the Qinhuai River? (you can state more than one)

A Scientific experiments carried out by independent
B Independently of management assessment project
C Wildlife groups, the number of survey estimates
D No
E Other research _____

7. How does your department consider the ecological and environmental conditions of the Qinhuai River to be? In the past three decades, what are the most the relevant policies with regard to the Qinhuai River's ecological and environmental conditions, and how has the river changed?

8. What are the municipal government of the Qinhuai River remediation goals? Specifically, how have they been implemented?

9. Regarding Qinhuai River environmental governance matters, does your department have any non-governmental partners?

10. Apart from government departments, which is the most powerful organizations in the Qinhuai River Environmental Protection?

11. In the development of policies related to the Qinhuai River, what information sources does the Nanjing municipal government dependent on? Has the Government adopted some sources of information outside of the government departments? (Such as colleges and universities, non-governmental organizations, etc.)