Exploring the Role of a Bridging Organization to Operationalize Transdisciplinarity for Improved Ecosystem Management and Environmental Policy-making

A case study in the Three Rivers Source Region, Qinghai-Tibetan Plateau, China

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ABSTRACT

China is a mega-diversity country with abundant natural resources, and the richness of these resources is demonstrated to be relevant with the local people's historical interactions between biophysical and sociocultural systems. If we are to maintain biodiversity and strike a balance between human well-being and ecosystem service, it is important to incorporate the local people and their traditional knowledge for ecosystem management. By using a qualitative approach for a single case study of Shanshui Conservation Center and their strategies for environmental protection in the Three Rivers Source Region of China, this study aims to investigate how a bridging organization could enhance the participation of local people into ecosystem management, and facilitate the collaboration among key actors – science community, local community and policy-makers. Secondary data and semi-structure interview are used in this project for data collection. The results illustrate that *value gap, knowledge gap* and *implementation gap* are three factors which hinder the local people's participation into the ecological construction programs implemented by the state. Using the framework for structuring complexity in transdisciplinary researches, the findings show that as a bridging organization, Shanshui Conservation Center delivers three important functions of *mediation, translation and coordination*, in order to operationalize transdisciplinary research for improved ecosystem management and environmental decision-making.

Key Words: Tibetan Plateau, Civil society, Transdisciplinarity, Ecosystem management, Collaborative learning

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This thesis is dedicated to my father. For your endless love, trust and support!

The heaven of snow land.

The sacred mountain takes care,

The high places are our sacred landscape,

Om Ma Ni Be Mei Hong for all life forms.[1]

[1] Translated Tibetan text from base of cover art-Habitat of Tibetan Nature and Culture by Lobsang Kedrup

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List of Abbreviations

NFCP	Natural Forest Conservation Program
GTGP	Grain to Green Program
CI	Conservation International
NRM	Natural Resources Management
NDRC	National Development and Reform Commission
NGO	Non Governmental Organization

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1.INTRODUCTION

With population increase and economic growth, human activities such as land use change and industrialization have lead to an increasing deterioration of our environment. This thesis project departs from the understanding that to strike a balance between human well-being and ecosystem service, an improvement of ecosystem management is crucial for both better ecosystem use and conservation (MEA, 2005). On the other hand, this prompts the need for policy-makers to implement sound policy and conservation programs. Sound ecosystem management, however requires a thorough understanding of both the ecological and social-systems involved, concerning complexity, diversity and uncertainty in the human-environment relationship. In this vein, the Millennium Ecosystem Assessment was seen as a hallmark in providing an approach for analyzing and acting on the linkages between people and the environment. This approach recognizes that humans, with their cultural diversity, are an integral component of many ecosystems (ibid). On the other hand, the multiple actors involved and the diversity of human relations also add to the complexity of ecosystem management. Hence, there remain many challenges for involved academics, such as ecologists, economists and social scientists to collaborate and understand how human actions affect the provision of ecosystem service, and the value of those services (Daily and Matson, 2008). At the same time, and at least as demanding is the political challenge associated with acknowledging and incorporating this understanding into effective ecosystem management. This work responds to these challenges and aims to explore one way forward of how to bridge the gap between science and management.

China is a mega-diversity country harboring globally significant biodiversity. Biodiversity in China has been demonstrated to be part of complex historical interactions among biophysical and sociocultural systems (Sajise, 1995; Mittermeier and Mittermeier, 2005 ,cited in Edward and Xu, 2011). In this sense, if Chinese government is motivated to maintain biodiversity and improve ecosystem service, they need to recognize that the existence of these natural resources is related to the actions of the local people who live in and around them (Edward and Xu, 2011). Of particular importance, is to incorporate the local people and their need into conservation planning. In order to show its commitment to construct an environmental state, the government has implemented a series of large-scale ecological construction projects. In the context of Three Rivers Source region the government has offered to share the costs of these conservation programs and promised a large sum of funding into natural science research (Xin, 2008). As a return on investments in nature, there remains challenge for Chinese conservation biologists to provide meaningful research results, with information concerning human action and the local people's needs.

On the other hand, the value of these research results also depends on the policy-makers' response and their motivation to adopt these research results into

conservation programs. Connecting to this, commentators argue that the Chinese state and its science wields overwhelming authority in creating a singular environmental truth, and excludes from legitimate discourse other types of knowledge and traditional practices of natural resource use by the local people themselves (Yeh, 2009; Blaikie and Muldavin, 2004). This illuminates a key question for improved policy-making: to what extent the Chinese government values the local knowledge and is willing to incorporate the local people for improved ecosystem management.

In China, shared decision making between the state and other stakeholders is not a hallmark of the political process (Edward and Xu, 2011). Too often, government officials employ a "nationalist narrative" (Yeh, 2009) that marginalizes local people's contributions to environment and culture (Edward and Xu, 2011). In spite of these, recently Chinese conservation Non Governmental Organizations (NGOs) have gained considerable influence in dealing with environmental issues. The notion of "embedded environmentalism" has nowadays become a feature of environmental action for NGOs in China. According to Yang (2010) the notion has two dimensions, "a negotiated symbiosis with the party and state" (Ho and Edmonds, 2008:218) and informal social networks which provide channels of interaction and negotiation with state actors. For the first dimension, constrained by the existing rules of political language, NGOs in China need to deal with ambiguities in the political opportunity structure, so that they can extend existing boundaries (Yang, 2010). For the second dimension, to provide channels of interaction with the state, cultural translation is a new feature of NGOs to bridge the local people and the state (ibid). With an attempt to facilitate the communication between the policy-makers and local people, it requires NGOs to understand the source language and culture in the local context, and the ability to creatively reflect the local situation to the state (ibid). Such a translator, has become a prime mover of change (Hsing and Lee, 2010) to tackle environmental issues in China.

1.1 Problem formulation

So far, four important groups of actors in ecosystem management: local community, science community, policy makers and NGOs are singled out in the argument above. This work explores how to improve the collaboration of these multiple actors, by studying Shanshui Conservation Center and their strategies for conservation.

Shanshui Conservation Center is a local NGO in China with a strong tie to academics. Partnering with a research institute of Beijing University, they have implemented several key natural science researches (See section 6.1). Since 2007, Shanshui has involved in conservation programs in the Three Rivers Source region. Particularly, they endeavor to address the importance to incorporate the local people and their traditional knowledge for ecosystem management. Thus, I am interested in as a NGO which is committed to adopt rigorous scientific analysis to support their conservation, how they bridge the social actors of ecosystem, particularly the consideration of local

people to their research (Figure1- Bridge Route 1). Based on these research results and field demonstration, Shanshui is also engaged for policy initiative and improved environmental decision-making in China. In this respect, I am interested into how Shanshui build up the dialogue with the state and facilitate the communication between science community and policy-makers (Figure1- Bridge Route2). Lastly, the success and influence of this kind of bottom-up approach with incorporation of the local people and their traditional knowledge for conservation, also rest on the state's response and the transition of the existing rules of environmental decision-making. In this respect, I am interested in how Shanshui bridge the local community and policy-makers and facilitate the communication between these two actors (Figure1- Bridge Route3).

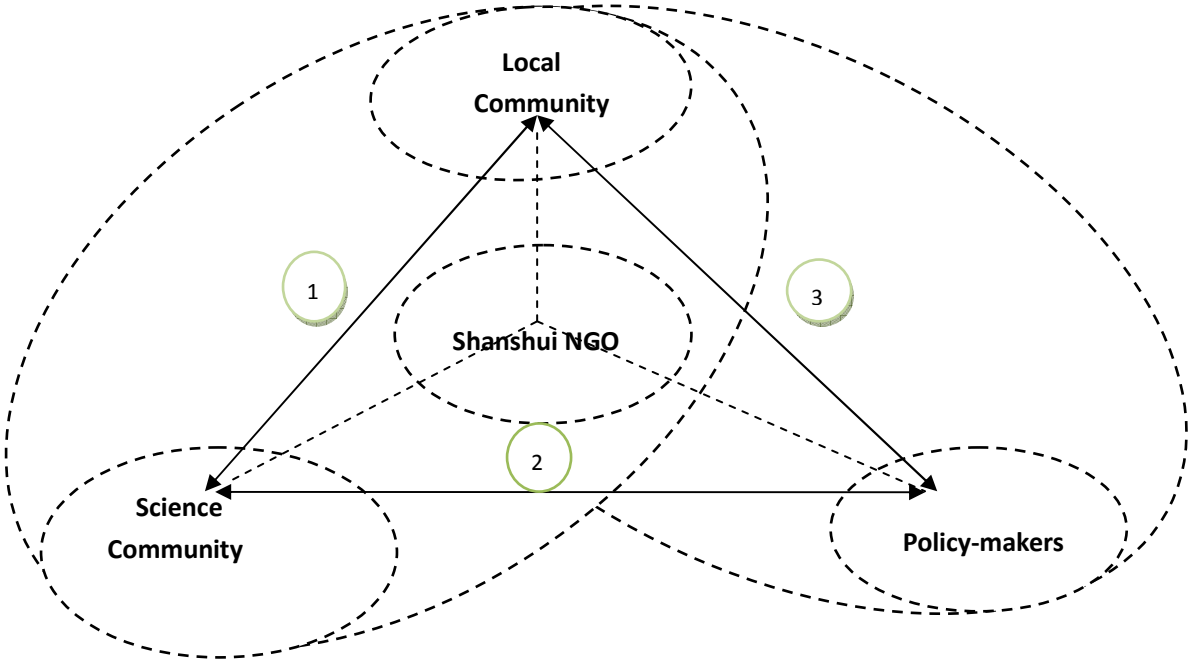

Figure 1. A conceptual illustration of the role of a bridging organization for ecosystem management

Bridge Route 1: Bridge the social actors of ecosystem management and particularly the local community and their traditional knowledge with science community

Bridge Route 2: Bridge science community with policy-makers

Bridge Route 3: Bridge the local community with policy-makers

This thesis aims to explore the role of a bridging organization to facilitate the collaboration among different actors for ecosystem management. I believe a focus on the discussion of communication and collaboration among these actors will illuminate many issues addressed by the literature on ecosystem management. Based on these considerations, this thesis proceeds to answer the following research questions.

Research questions:

1) In the context of Three Rivers Source region, how were the ecological construction programs implemented before and what are the factors lead to the deficiencies to incorporate local people for ecosystem management?
2) What strategies does Shanshui NGO adopt to address the deficiencies of those ecological construction programs? How do they communicate with policy makers and bridge the local community and the state?
3) What are the lessons to be learnt from this case study in terms of operationalizing transdisciplinary researches for ecological improvement?

2.BACKGROUND

2.1 Ecological construction and the emerging environmental state

While productive ecosystem can provide people and communities with resources and options they can use as insurance in the face of natural disasters, ecosystem degradation can exacerbate the risks and vulnerability by increasing risks of flood, drought, or disease (MEA, 2005). In this vein, the massive flooding along China's Yangtze River in 1998, and a drought in 1997 that dried up some sections of the lower reaches of the Yellow River (Yeh, 2005) acted as an alarm to the state and society at large, on the impacts of ecosystem degradation on Chinese society. To address the devastating environmental crisis and in line with the state's emerging effort to confront its huge regional impact and responsibilities (Xu *et al.*, 2005), China took two unprecedented conservation actions—the development and implementation of the Natural Forest Conservation Program (NFCP) and the Grain to Green Program (GTGP). The NFCP is essentially aimed at altering the management of state-owned forests, in many places through a complete ban on logging (Yeh, 2005). The GTGP, on the other hand, retires cultivated land on steep slopes and converts it to tree and grass-cover, depending on the nature of the original vegetation (ibid). They are said to be the largest scale environmental conservation programs in Chinese history (Figure2). Initially used in the 1950s, the term ‘‘ecological construction" is now widely employed to refer to all programs and efforts to improve the rural environment mainly in Western China (Jiang, 2006 cited in Yeh,2009), including the vast land areas of Qinghai-Tibetan Plateau. In the Qinghai-Tibetan Plateau, where the Three Rivers Source region is, located are two of the poorest western provincial-level units - Qinghai and Tibet Autonomous Region. They are usually designed as 'backward' and lagging behind technologically as well as economically (Yeh, 2009).

Figure 2. Current distribution of the Natural Forest Conservation Program and Grain to Green Program in China. Names of provinces, autonomous regions, municipalities, and the Yellow and Yangtze River are shown.
Source: Liu et al. 2007

In this vein, a view from Western China can offer an important perspective on a broader analysis of these construction programs (Yeh, 2009). While there has been an increasing interest and focus on environmental concerns related to energy consumption, air and water pollution control that primarily focus on urban areas in China, a view from the Qinghai-Tibetan Plateau is important to understand the picture of an emerging environmental state presented by Chinese government (ibid).

Though the GTGP and NFCP are both implemented in the Three Rivers Source region, in this thesis I focus on the discussion of the GTGP, as it was initiated to recover grassland and grassland management is relevant to the strategy Shanshui NGO adopts for their conservation program in the Three Rivers Source region (See section 7.2.1).

2.2 Rural reform and rangeland management in Western China

The post 1979 Rural Reform program was initiated in Chinese cropland regions, and spread to all pastoral regions in Western China by the early 1980s (Banks *et al.*, 2003). In this context, households again became the basic production unit and livestock were privatized. In the pastoral areas, the legal and regulatory framework for grassland management has been evolving since (ibid). In this vein, long-term (typically 50-year)

use rights to grassland were assigned to individual households (ibid). The grassland policy implemented in this period is based on the commons assumption[2] that overgrazing and poor management by herders are the cause of the rangeland degradation (Yeh, 2009). In this perspective, the policy-makers believe privatization of rangeland use rights can give herders the incentive to stock their grasslands within biophysical limits and convert their unproductive way of life into an efficient, market-oriented system (Banks *et al*., 2003; Yeh, 2009). Overall the rural reforms have contributed to a remarkable increase in agricultural production, at the expense of severe environmental stress including land degradation (Guo *et al.*, 2010 cited in Andersson et al.,2011). Connecting to this, the link between land degradation in western China and negative impacts on urban centers (e.g. the massive flooding happened in 1998) assumed by the government, lead to the state's increasing motivation for ecological construction in Western China, as those mentioned in Section 2.1.

Critics pointed out that rangeland privatization by reducing flexibility in a non-equilibrium ecosystem exacerbated rather than ameliorated degradation (Miller, 2000 cited in Yeh,2009). Following on this, the concept of co-management has gained increasing attention by policy-makers, which means the sharing of responsibility of natural resource management between national and local government, civic organization and local communities (Banks, 2003). Sturgeon (2005) further pointed out that under the regulations of state-allocated property rights or state claims on rural resources, accommodating local knowledge and traditional practices into natural resource management is thought to be a good thing. In a similar vein, community-based grassland management with participation of the local herders, potentially offers a viable alternative to the household ranch model that currently underpins rangeland policy in pastoral China (Banks, 2003). Nevertheless, in China's northern and western regions dominated by ethnic minorities and characterized by poor infrastructure, high dependence on agriculture and low incomes (Long *et al.*, 2010), the local people are still generally treated as passive objects in central, state-dominated activities related to natural resources management (Xu *et al*., 2005). Hence, in the next section I will present the state's 1950 project of ethnic identification, to briefly introduce how the policy and practices of minorities work affected scientific inquiry practices for rangeland management.

2.3 Reworking of ethnic minorities

During the 1950s the Chinese government launched a campaign of ethnic identification. The history of each nationality was placed into the universal framework of the Marxist-Stalinist stages of evolution in human history (Harrell, 1995). Then the plans were made to advance each group to a socialist mode of production and into

[2] Both the extent and causes of grassland degradation in China are contested, which will be further analyzed in the Chapter of results and discussion.

modern civilization (Harrell, 1995& Wu,1990, cited in Sturgeon,2005). Furthermore, Han (the biggest nationality in China) was defined as model nationality and their level of culture became the measure of progress (Harrell, 1995 cited in Sturgeon 2005). Contrasted to the 'modernity' of the Han Chinese, 'backwardness' and 'primitivity' were used to describe other ethnic minorities(Kolås, 2008).The ideological underpinning of this ethnic identification project, grants power to networks of scientific experts, specialists, and bureaucrats in environmental science, and members inside these more advanced and civilized network were considered responsible for helping their less fortunate compatriots to develop (Gladney, 2004 cited in Kolås, 2008).In line with this, science was presented as panacea by the Chinese state to solve the issue of rangeland degradation in the context of Qinghai-Tibetan Plateau (Bauer, 2005). This 'scientific logic' thus, encourages the adoption of various international scientific resource management standards and practices (Edward and Xu, 2011) into Chinese environmental management. Connecting to this, according to the *People's Republic of China Nature Reserve Ordinance,* the Three Rivers Source Nature Reserve is categorized into three zones – Core Zone, Buffer Zone and Transition Zone (RMLT, 2012). This way of demarcation for the nature reserves in China, however is based on the global design of biosphere reserve[3]. According to this demarcation, grazing is permanently banned in the Core Zone. The Tibetan Plateau, however, is a system that has evolved with grazing and removal of grazing may bring in harmful results (Xin, 2008). In this perspective, the applicability of this demarcation into China's nature reserves management, deserves a close examination before a final 'verdict' can be attempted.

3. METHODOLOGY

3.1 Ontological and Epistemological Considerations

In an attempt to create a better understanding about the human and ecological aspects of ecosystem management, it demands understanding that bridge divides between these two approaches, and so ways need to be found of helping them engage with one another (Dickens, 2003). Before presenting this overarching idea in my theoretical chapter, an overarching philosophical perspective is needed. Critical realism is an ontology, with epistemological implications, which provides me a view that the world is seen as structured, differentiated, and changing (Andersson *et al.*, 2011). If we uncover the veil of it, we find there are economic, political and cultural structures, in conjunction with their relevant mechanisms at work together, creating different events in our world (Bryman, 2008). Importantly, identification of these mechanisms offers the prospect of introducing changes that can transform the status quo (Bryman, 2008). Relative to this, ecosystem service can be mapped and observed at a physical

[3] The design and management of biosphere reserve is under the UNESCO- United Nations Educational, Scientific and Cultural Organization- Man-and-Biosphere Program.

level. Nevertheless, only explaining and understanding at levels where hidden cultural, political and economic structure for environmental decision-making analyzed, we will have better chances to change the unsustainable practice for ecosystem management (Andersson *et al.*, 2011).

3.2 Combination of a single case study design and a qualitative approach

According to Bryman (2008), combing qualitative research strategy and case study design is a typical form for research, which can be an intensive study by ethnography or qualitative interviewing of a single case.

In this research, I adopt a qualitative approach with the intention to construct a proper representation through in-depth empirical study of a single case (Ragin and Amoroso, 2011). A qualitative approach allows me to have close attention to a phenomenon in the effort to construct comprehensive understanding about it (ibid). As a qualitative researcher, I also realize that the phenomenon presented in my case, is constructed in specific context. Therefore, I provide a descriptive background information (Bryman 2008, 386) of Shanshui NGO and the setting located in the Three Rivers Source Region, in order to provide the readers with a contextual understanding of certain behaviors or actions presented in my case.

According to Bryman (2008), the rationale for selecting an exemplifying case is that it provides a suitable context for certain research questions to be answered and allows the researcher to examine key social processes. Concerning the present rate and scale of environmental change in China, the task for ecosystem management has never been greater. On the other hand, the importance of incorporating the local people and their traditional knowledge for conservation has been recognized by scholars and conservation NGOs in China (Shen *et al.*, 2012). In order to have a proper representation and deeper understanding about the importance, and way that can be found to incorporate the local people into ecosystem management, I use an in-depth study of Shanshui NGO and their strategies for conservation in the Three Rivers Source region.

3.3 Data Collection

Secondary data

Literature review is an important source of data collection in this project, which helps me to structure my idea, develop the argument and present the findings with persuasive stance on the subject (Bryman, 2008). It is also a process which helps me to gradually obtain a reflective thematization of the topic and purpose of the inquiry

from the beginning. Specifically, my literature review focused on: pastoralism and rangeland management in Western China; policies of ethnic minorities with focus on the Tibetan areas; environmental activism by NGOs in China. I also reviewed the issue of *Futures of Transdisciplinarity* published in the *Futures* journal in order to have a comprehensive understanding about this concept. Additionally, I looked into the relevant reports generated from the Sino-Canadian cooperative project[4] (See Appendix A for Project Background Information) about policy options on economic, social and ecological sustainability in the Three Rivers Source region. Moreover, two official documents about conservation planning in the Three Rivers Source region issued in 2005/2011 by the China's government are accessed, to understand the historical environmental policy development for Three Rivers Source region. Lastly, virtual document also provide important source for data collection in this project.

According to Bryman (2008), two kinds of virtual document tend to be the focus of attention: websites and Internet posting to message boards or forums. I followed the Internet posting on Shanshui's website for a certain period of time before the fieldwork, in order to get familiar with their conservation programs and relevant activities. The documents obtained include meeting minutes, newsletters, mission statement, relevant media report, updating information about the projects conducted in Three Rivers Source region. However, if I want to treat these documents as windows telling me something about organizational realities, as Bryman (2008) suggests, I had better employ other sources of data regarding that reality and the context within which these document are produced, so as to have a more comprehensive understanding about these documents. I hence look into the Sino- Canadian cooperative project on policy options in the Three Rivers Source region (See Note 3) and other relevant project (e.g. climate change, rangeland degradation) documentation from researches conducted in Three Rivers Source region. By comparing these different sources of document, I can therefore have a more comprehensive understanding about the "reality" I aim to investigate in this project.

Semi-structure interview

According to Bryman (2008), most qualitative researchers prefer a research orientation that entails as little prior positioning of viewpoints to the social world as possible, otherwise risks imposing an inappropriate frame of reference on people. In line with this, I adopt a semi-structure interview approach with the intention to enhance the opportunity of genuinely revealing the perspective of my interviewees (ibid). Instead of preparing highly specific research questions in advance and locating the meaning and narratives of the conversation to be known solely in the subjects, I see semi-structure interview a process of knowing through building up intersubjective and social conversations, involving me and my interviewees both as co-constructors

[4] The relevant reports generated from this project are synthesized into the book ***Policy Options on Sustainability in the THREE RIVERS SOURCE Region of the Qinghai-Tibetan Plateau*** (Li,2007)**,** the literature review of which is important source for data collection in this study.

of knowledge (Bryman, 2008; Kvale and Brinkmann, 2009)

According to Ragin and Amoroso (2011) , qualitative semi-structure in-depth interviews are seen as data enhancers, which allow flexibility to collect the data. On the other hand, the quality of the data produced in a qualitative interview depends on the quality of the interview skills and subject matter knowledge (Kvale and Brinkmann, 2009). For me it is a learning process to improve the skills, when conducting interviews for this project. To start with, I sent an email to the HR manager of Shanshui NGO and introduced my thesis project in order to obtain contact information of the potential interviewees. I got positive response immediately and the first interviewee was introduced over email. However, other interviewees were not found until I arrived in the field and had face-to-face interview with my first respondent. Hence, I adopted a snowball sampling method for my interviewees during the fieldwork. The potential informants were contacted by email to ask if they were willing to participate for the interview. While waiting for the response, I also needed to continually adapt myself to new situations, changing selection of interviewees and questions on the way (Rubin and Rubin, 2005 cited in Kvale & Brinkmann 2008). Altogether six interviews (see Appendix B2) were done at the end, including one with the founder of Shanshui NGO and other 3 with the employees responsible for different projects conducted in Three Rivers Source region. Apart from this, I also interviewed a researcher and journalist who participated into the *Holy Mountain and Sacred Lake* Project initiated by Shanshui NGO, to know different voices and enhance the validity of data collection. Four interviews were conducted in-person in Beijing. Two were conducted by phone. All the interviews last between 40 and 120 minutes. To conclude, my interview process and interaction with the NGO entail several layers of gatekeepers and issues of access become an ongoing feature during my fieldwork (Bryman, 2008). In spite of this, the flexible interview guide with generally open questions (See Appendix B1) prepared in advance was useful to help me collect the data in the field.

3.4 Data Analysis

I initiated the process of data analysis by using some of the sensitizing concepts drawn from the literature review. Both concept-driven and data-driven coding are used to reduce the data, when going through the interviewing material. A theoretically informed reading of interviews (Kvale and Brinkmann, 2009) is also used in order to clarify key concepts.

Apart from this, I also use the thematic analysis. According to Bryman (2008), the idea is to construct an index of central themes and subthemes, which are then represented in a matrix. Thematic analysis goes hand in hand with my theoretical reading. By moving backwards and forward between different theories and data, the central themes are identified. In spite of this, there are not clearly specified series of procedures for thematic analysis (Bryman, 2008). Ryan and Bernard (2003) provide

pointers about how to begin and to organize such an analysis. I mainly use two of their recommendations when analyzing my interviewing materials: seeking topics that recur again and again; looking for gaps of information provided by different interviewees when they discuss a same topic (ibid). For example, the constraints of participation in Chinese environmental decision-making are mentioned often by my informants. My data analysis thus proceeds to investigate what the factors are that hinders a bottom-up approach for conservation.

Lastly, by using a qualitative strategy, this research does not aim to generalize the findings to other settings. However, by specifying the supporting evidence and making the arguments explicit, I intend to achieve an analytical generalization about the role of a bridging organization for ecosystem management in the context of Three Rivers Source region.

3.5 Limitations

I gradually clarified my idea about the main purpose in this study by using of some sensitizing concepts drawn from transdisciplinarity literature, i.e. complexity, “glocal knowledge”, open systems. Moreover, I use a theoretical approach for my data analysis. Hence, I may have biased interpretation and only notice those aspects of the phenomenon that can be seen through the transdisciplinary lenses (Kvale and Brinkmann, 2009). In addition, I didn’t manage to conduct my fieldwork in the study area- the Three Rivers Source region due to some access problems. Given these considerations, having a guiding theory of transdisciplinarity from the beginning may prevent me to explore some important aspects embodied in my case.

Secondly, my conceptualization of the study topic - ecosystem management in the Three Rivers Source region is based on the perspective from Shanshui. Again due to the problem of getting access to the study area, I didn’t manage to collect data from the local people. In this sense, it may hinder my intention to have an objective and rigorous analysis of the study subject, with opinions only coming from one aspect.

4.THEORETICAL CONSIDERATION

In this chapter, I start off by presenting the concept of complexity in Natural Resource Management. This is followed by a brief discussion of the insights produced by sustainability science to deal with complexity. Then, the concept of a “bridging organization” is introduced. This chapter subsequently discusses the logic of a transdisciplinary approach to address the challenges related to complexity, and the framework for structuring complexity in transdisciplinary research is presented.

4.1 Complexity of Natural Resource Management

In an attempt to understand the challenges to implement sustainable ecosystem management, I use the idea of complexity in Natural Resource Management. However, my theoretical consideration does not address substantive questions regarding the definition and operationalization of this concept, but takes its direction as starting point, by asking what, generally speaking, "dealing with complexity" involves in Natural Resource Management, and particularly important is how this might affect research practices (Mollinga, 2010). In his study about how research on natural resource management systems can address the complexity of such system, Mollinga (2010) proposed three meanings of complexity. I adopt this idea as it is relevant to the purpose of my study. According to Mollinga (2010),

Ontological complexity refers to that Natural Resource Management systems consist of heterogeneous components (e.g. physical, technical, and human) with a diversity of relations connecting these components.

Analytical complexity refers to the complicated and difficult issues embodied in the Natural Resource Management systems, and knowledge about the behavior of Natural Resource Management systems is partial – incomplete data sets and uncertainties about the interaction and mechanism operating in the systems.

Societal complexity refers to that Natural Resource Management systems are populated, managed, and governed by different groups of people who share their different interests in Natural Resource Management.

To tackle the complexity in Natural Resource Management, sustainability science provides a vibrant arena to bring together scholarship and practice, global and local perspective from north and south, and disciplines across both the natural and social sciences (Clark and Dickson, 2003). Furthermore, in order to build more effective knowledge system to deal with the complex issues in Natural Resource Management, the insights produced by sustainability science imply that the systems and processes at the interface of research and policy should seriously invest in communication, translation and mediation (Mollinga, 2010). In these processes of communication, translation and mediation, the role of a bridging organization is critical, in a sense that they can stimulate a good dialogue and benign interactions among different actors. Benign interactions among local actors create environment for adaptive management and social learning. On the other hand, benign interaction facilitate the communication and collaboration between local actors as well as with authorities and higher level institutions (Pinkerton, 1989). Westley (1995) used the term "bridging organization" for interorganizational collaboration. According to Malayang *et al*.(2005), the initiative to a bridging organization may be bottom-up, top–down, or from research institutes/NGOs (like Shanshui).

4.2 Transdisciplinarity as an approach to tackle complexity

According to Mollinga (2010), ontological and analytical complexity of Natural Resource Management constitute the need for developing interdisciplinary approaches to research; societal complexity constitutes the logic of transdisciplinary approaches to research. As the purpose of this study is to explore the role of a bridging organization to incorporate the social actors of ecosystem, particularly the local community into conservation, I thus focus on the discussion of transdisciplinarity as an approach to tackle complexity in Natural Resource Management.

4.2.1 What is Transdisciplinarity?

In the evolving field of sustainability science an interdisciplinary account of scientific expertise is articulated. According to Lawrence (2004b), such an interdisciplinary approach of this kind can be the foundation for transdisciplinary research and professional practice. In a simpler definition, transdisciplinary research is interdisciplinary research with interest groups (so-called stakeholders) involved in all phases of the research[5] (Mollinga, 2010). Transdisciplinarity implies a fusion of disciplinary knowledge with the know-how of lay-people that creates a new hybrid, which is different from any specific constituent part (Sommerville and Rapport, 2000 cited in Lawrence,2004a). Transdisciplinary research, therefore, aims at identifying issues in problem fields with the aspiration

> ***'(a) to grasp the relevant complexity of a problem (b) to take into account the diversity of life-world and scientific perceptions of problem (c) to link abstract and case-specific knowledge, and (d) develop knowledge and practices that promote what is perceived to be the common good'***
>
> **---- Pohl and Hirsch Hadorn (2007)**

Specifically, in order to tackle the complexity of Natural Resource Management, instead of focusing on one dimension of reality in the relevant field of the specialist, researchers need a more flexible methodological practice that stems from concerted dialogue about these problems by academics, policy decision-makers, lay-people and other societal actors in the problem field (Max-Neef, 2005; Lawrence, 2004a). Relative to this, Max-Neef (2005) argued that the difficulty to bridge different researchers from various disciplines lies in the exacerbation of rational thought, which manifests itself through the predominance of reductionism and of a binary and linear logic. In a related point of view, Max-Neef (2005) argued that the Eastern culture, which is perceived by Westerners as interesting and mysterious, but seldom as competent and efficient (unless it has become Westernized), is seen as dichotomies with the West, whose culture is usually represented as advanced and logic. In a similar

[5] A web page discussing definitions of interdisciplinary, transdisciplinary, and related terms is http:// learningforsustainability.net/research/interdisciplinary.php (Accessed 19 April. 2012).

vein, local or traditional knowledge is usually seen as mysterious and sometimes irrational for the policy-makers. Thus, the different value shared by different groups of actors adds the complexity of Natural Resource Management. These complex issues prompt the researchers to adopt a transdisciplinary approach for Natural Resource Management. Particularly, it is important to activate the transformation of the research practices, institutions, education and the underlying conception of science (Pohl and Hadorn, 2007:4). The table below summarizes eight characteristics of trandisciplinarity.

Table 1. Characteristics of Transdisciplinarity

Characteristics	***Definition***
Complex Problem Solving	*Multidimensional, human and natural system interfaces, in the world and 'actual' versus 'conceptual'*
Praxis	*Theory and application interaction*
Interpenetration of epistemologies	*Dissolution of disciplinary boundaries is necessary for novelty*
Methodological pluralism	*Respond to and reflect on problems in context; no single method*
Collaborative deconstruction	*Multiple approaches deconstructing and developing one another*
Stakeholder involvement	*Involvement as a means of investing in outcomes*
Open System	*Information exchanges across boundaries*
Different (Shifting) levels of Reality	*Disunity in perspective*

Source: Lotrecchiano, 2010

4.2.2 Structuring complexity in transdisciplinary researches

To date, relevant stakeholders in civil society play a crucial role in the transition and promotion to transdisciplinary researches (Hadorn *et al.*, 2006). Furthermore, transdisciplinary researches have involved collaboration between researchers and social groups, for recurrent validation and adaptation of empirical models in concrete situations, recurrent efforts for consensus building about purposes and recurrent implementation, monitoring of effects and adaptation of transformation strategies (Krohn and Daele, 1998). In this vein, Hadorn *et al.* (2006) developed a framework for structuring complexity in transdisciplinary research (Figure3). Starting off from the empirical level, and crossing the purposive, pragmatic and normative aspects of transdisciplinary research, I argue this framework provides a practical tool to structure complexity in ecosystem management. Hence, I adopt it in this thesis project.

To start, investigations of the first process (Figure3), need to relate the analysis of systemic processes to purposes and societal practices of relevant stakeholders, on

which they depend and which they influence (Hadorn *et al*., 2006). To achieve the second process, we need to take the results of the empirical studies as well as existing practices of actors, particularly what conditions that might keep people from adopting more sustainable practices into account when designing desirable practices, which needs participatory approaches (ibid). Lastly, to achieve the third process, we have to take into account the purposes of actors related to their existing practices and the systemic conditions and processes for change (ibid). With an attempt to transform the unsustainable practice of separating the opposing poles from the many di-polar relations that characterize the behavior of natural and social life (Max-Neef, 2005) in conventional conservation efforts, we need to adopt a systemic thinking which crosses the empirical, pragmatic, normative and purposive aspects, as implied in the framework.

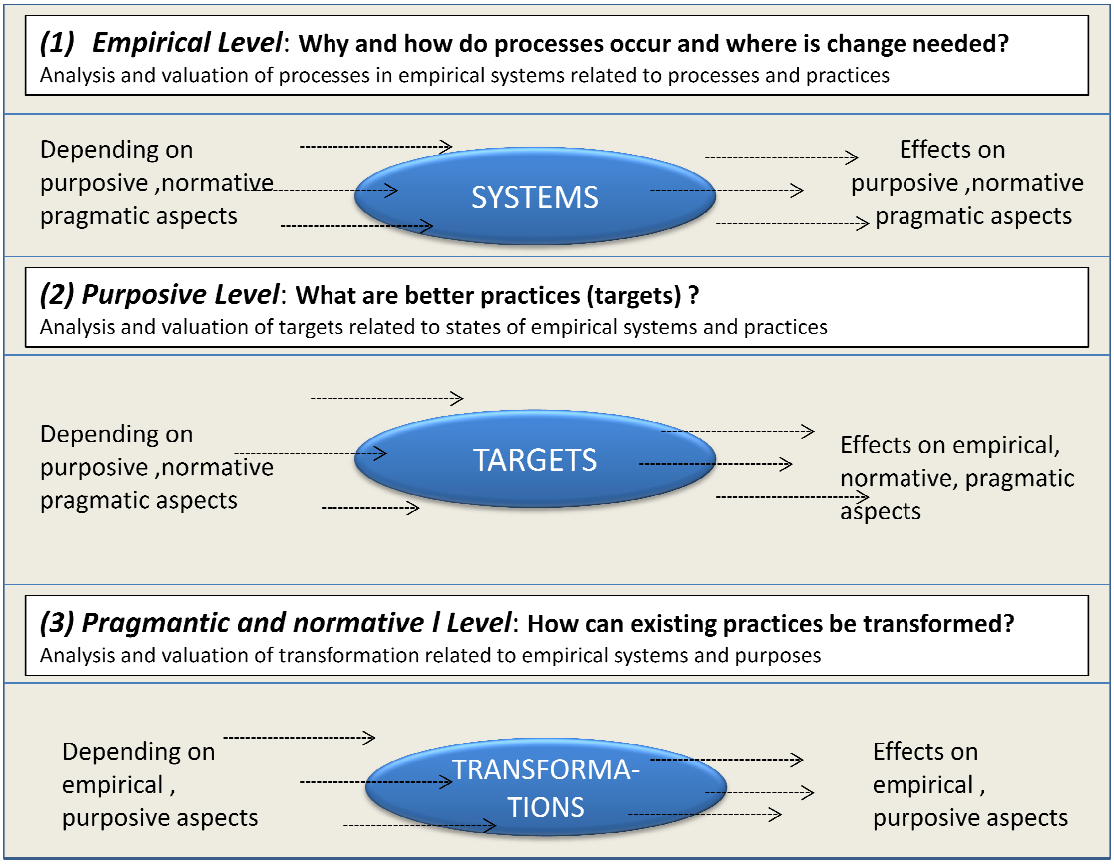

Figure 3. Structuring complexity in transdisciplinary research
Adapted from: Hadorn et al, 2006

In order to achieve transdisciplinary researches, Pohl and Hirsch Hadorn (2007) highlighted three qualitatively different types of knowledge to use: systems knowledge, target knowledge and transformation knowledge, which I will further elaborate with the empirical studies in my case.

5. SETTING

5.1 A Water Tower in China

Located in the central part of Qinghai-Tibet Plateau (Figure4), the Three Rivers Sources Region is the cradle of the three greatest rivers in China – the Yangtze, Yellow and the Lancang (upper reaches of the Mekong) Rivers, with an area of 363,000 km^2, 50.4% of Qinghai Province's total area (Li, 2007). These three rivers provide 60 billion cubic meter water to the lower reaches (Chen *et al.*, 2007). The annual surface runoff of Three Rivers Source region provides 25% for the Yangtze River, 49% for the Yellow River and 15% for the Lancang River (ibid). The majority of the rivers in Asia also flow from this region. Thus, it is also named 'Water Tower' for China/Asia. Moreover, with a typical plateau continental climate featured with geographical highness and frigidity, whose altitude ranges from 3,335m to 6,564m, the Three Rivers Source region has the highest alpine wetland in China and is reputed as a natural bank of alpine plants (Li, 2007). The types of its vegetation are featured with forest, shrub, grassland, meadow, alpine cushion plant, rock-flowing-hillside plant, aquatic plant and sand plant etc. (ibid). Apart from this, it is home to important populations of numerous large birds and mammals, including vultures, tigers, snow leopard, procapra przewdskii, with largest distribution and amount of rare wild animals in China (CI, 2012c; Li, 2007) . Additionally, it has the officially largest nature reserve in China- the Three Rivers Source Nature Reserve, with the highest concentration of biodiversity and potential ecosystem service among the high altitude regions in the world(QHNEWS, 2006). The Three Rivers Source Nature Reserve was established in 2000 for the protection of the three rivers in China, the area of which is 152,300 km^2 (Li, 2007).

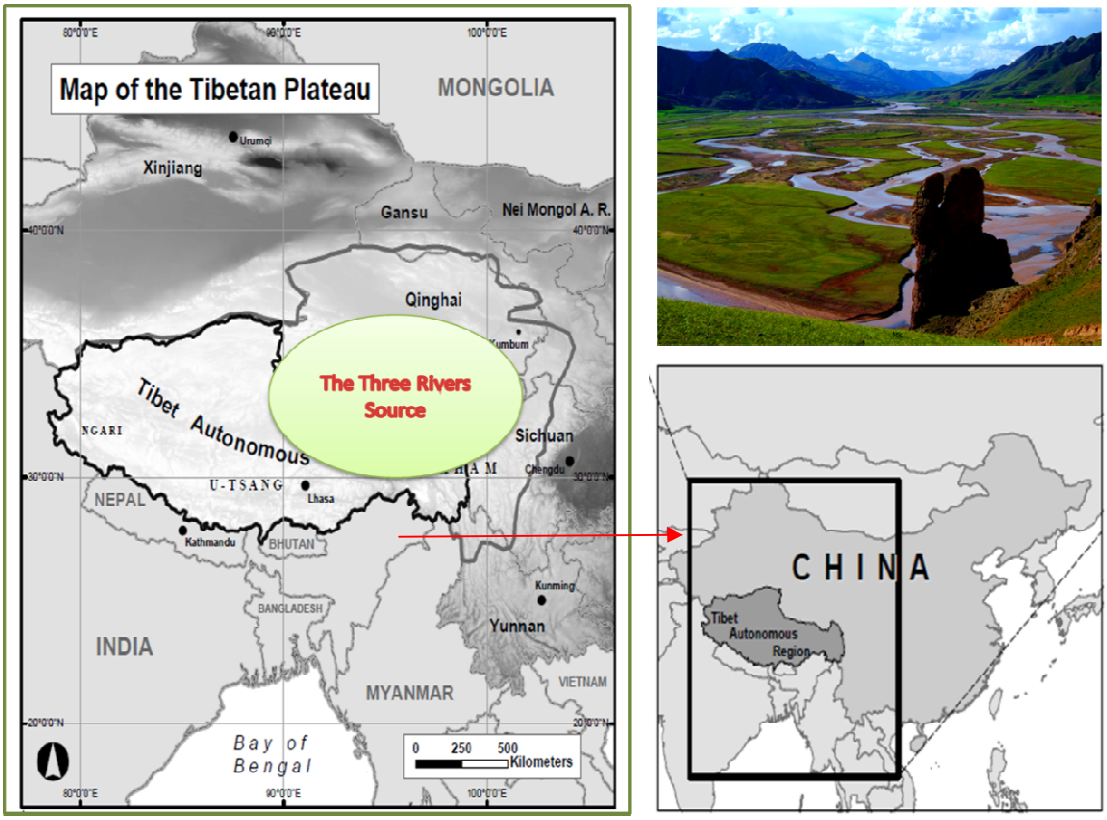

Figure 4. Location of the Three Rivers Source region in China
Derived from: East-West Center[6], 2004

5.2 A habitat of Tibetan nature and culture

The majority of inhabitants in Three Rivers Source region are Tibetans. On the Tibetan Plateau, the sparseness and limitation of natural pastures and their geographic and/or orographic location encourage nomadic livestock production (Wu, 2003). For generations, the local people have lived a semi-nomadic existence, moving their livestock seasonally (Xu *et al.*, 2005). In ecological terms, the exploitation of heterogeneity in pastoral society involves optimizing forage use through local strategies of habitat division and the dispersal of grazing pressure (Wu, 2003). Generally, herders have a diverse mix of livestock, including sheep, goats, cows and yaks; composition varies significantly between the wetter and drier areas of different parts of the Tibetan plateau (Yeh, 2005). This mobilize grazing strategy has been termed 'climatic opportunism' because their local flexibility matches well with ecological heterogeneity and highly localized grass growth (Wu, 1997; Miller, 1997). According to Miller (1990), these pastoral grouping and mobile keeping are well-adapted responses to different range and environmental conditions, and are ecologically sound and sustainable.

In the Tibetan culture, humans are intrinsically a part of nature and biodiversity. In

[6] http://www2.eastwestcenter.org/environment/spatial/ewc_sdi/maps/tibet.pdf

this sense, they do not merely see the rangeland as something to be exploited but part of a wide-ranging spiritual landscape (Williams, 2002). Thus, nomadic wandering and communal management are intertwined with the local people's sense of the environment (Xu *et al*., 2005). As high mountain dwellers, mountain worship is the most characteristic cultural belief and practice among the Tibetan people (Xu *et al*. 2004). The local communities believe only by showing respect and stewardship to lives in the mountains can villagers maintain good relationships with their sacred land and, hence, a good living for the villagers (ibid). In line with this, Tibetan sacred geography is an embodiment of the integration of cultural sites and natural ecosystems, beliefs arising from a mixture of Tibetan Buddhism and the local Bon folk religion that attributed all natural things with spirit (Ma and Tam, 2011). Thus, reverence for these mountains also includes restricting use of resources on their slopes (ibid). Such cultural value, implies the local people's pursuit of harmonious relationship between human and nature, by respecting and protecting all life beings (Shen *et al*., 2012).

However, the younger generations in Tibetan communities become insecure and confused about their own cultural identity as the rapid socio-economic change in their place. In a study about education in Qinghai-Tibetan Plateau, Lin (2008) argues that the younger generation in Tibetan community are faced with the cultural dilemma to be 'ordinary' or minority. In order to increase their competitiveness in the job market, more young people nowadays prefer to study in ordinary school rather than the minority school (ibid). If we believe the peculiar religious and cultural background of traditional Tibet benefit environmental protection, the challenge is how can we inspire people's pride on their own tradition (Shen *et al*., 2012)? Following is a local vision of ecological protection articulated by a leader of a local environmental organization in the Three Rivers Source region:

> The protection of the biodiversity and cultural diversity in the western part [of China] should receive equal respect. The development of the western part is the development of the minority regions. Therefore, it also involves the issue of cultural diversity. There is a lot of emphasis on the protection of biodiversity, but not enough emphasis on the protection of cultural diversity.
>
> ---- Haxi Zhaxiduojie 2002 (cited in Yang, 2010:128)

6. THE CASE STUDY

6.1 An agent of change – Shanshui Conservation Center

In 2007, Shanshui Conservation Centre was established as a local environmental NGO in Beijing, with its vision to strike a balance between maintaining China's natural splendor and achieving economic development, collaborating with

governments, local communities, research institutes and private sectors. The Shanshui Foundation consists of four offices in China: the headquarters is in Beijing and the other three associated centers are located in Southwestern China - Sichuan, Yunnan and Tibet. The project sites are mainly located in southwestern China (Figure5). Their conservation programs are generally divided into four overarching themes: saving endangered species; protecting critical ecosystem areas; improving environmental leadership in the local community; adapting to climate change (Shanshui, 2012c). The employees are gathered into each of these thematic teams that tackle overarching issues like ecosystem management, policy initiative and climate change.

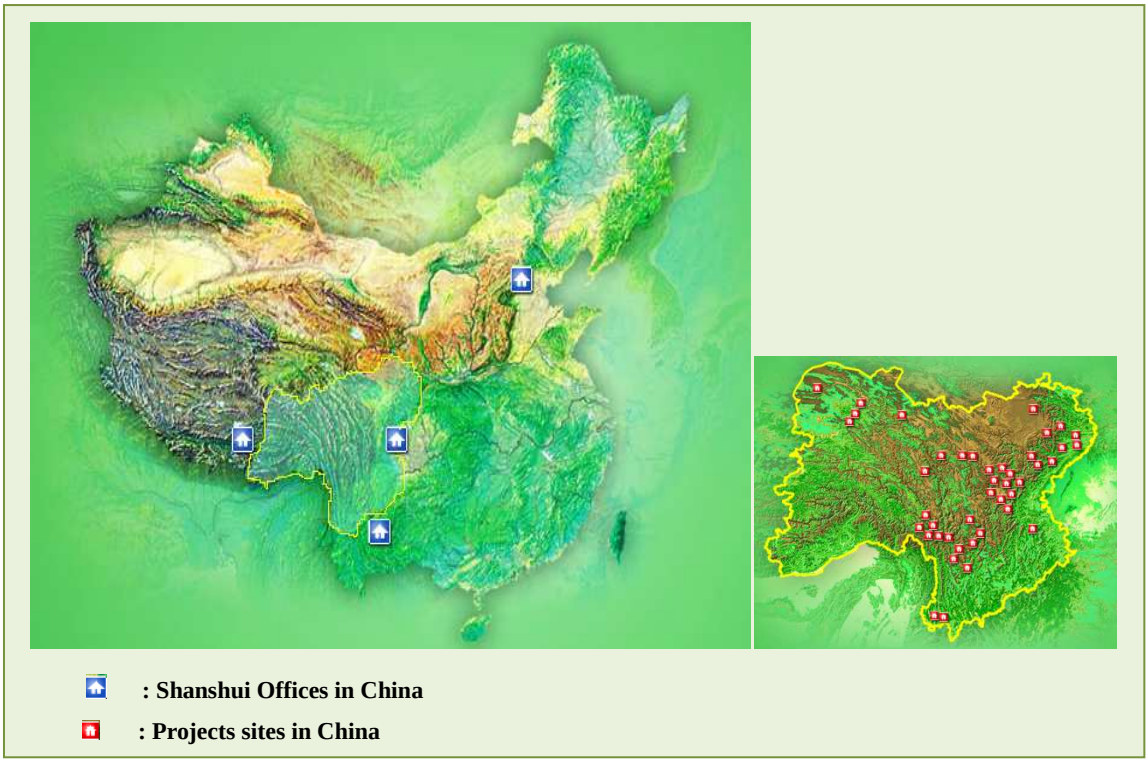

Figure 5. Shanshui offices and its project sites in China
Adapted from: Shanshui[7], 2012

Several key employees including the founder Lu Zhi, worked with Conservation International before the establishment of Shanshui. With the intention to focus on grass-root efforts and reinforce the collaboration with local communities, Lu Zhi took the initiative to establish a local environmental organization- Shanshui Conservation Center (Personal communication, 2012). Conservation International is an important strategic collaborator of Shanshui now, with its support on funding, advisory expertise and leadership etc.

·Departing from science
With an ambition to use rigorous scientific analysis to support improved ecosystem management, Shanshui has partnered with a research institute-Beijing University

[7] http://shanshui.org/Landscape/Map/

Center for Nature and Society. So far they have initiated some key projects for endangered species (i.e. pandas, snow leopard, procapra przewdskii) protection. Moreover, collaborating with this research institute, Shanshui is engaged to design and adopt sound conservation models to support their field projects. These models, built upon a foundation of science, are used as basis for scaling-up efforts to ecosystem management (Shanshui, 2012a).

·Policy Initiative

Based on the research results and field demonstrations, another important task for Shanshui is to communicate sound conservation action to the government. The main findings and conservation suggestions are formulated in reports, and they are submitted to the policy-makers (Personal communication, 2012).

·Strengthening grassroots efforts

With the belief that local knowledge and traditional culture are crucial to maintain biodiversity in southwestern China, Shanshui has partnered with key local actors including religious institutions, local communities, conservationists, spiritual leaders and other critical players at the grassroots level. In addition, they strive to achieve the multiple benefits of empowering local people and maintaining their natural and cultural patrimony (CI, 2012d), through providing training materials for conservation that appreciates the value of the Tibetan culture.

·Corporate partnerships & Funding

With expertise and advisory support from the Center for Environmental Leadership in Business created by Conservation International in 2000, Shanshui also partner with the private sector, based on its belief that business represents an essential part of the solution to our most critical environmental challenges (CI, 2012b). As this collaborative relation, Shanshui also managed to get funding for their projects by the support from these private sectors. So far, these private sectors have contributed more than 6 million US dollars to Chinese ecological construction, including the biodiversity protection in the hotspot areas (ibid). Additionally, Shanshui also gets funding for their conservation programs from CI and the central government (Personal communication, 2012).

6.2 Conservation “on the move” - Context for action

In 2000, the government initiated to establish the Qinghai Provincial Three Rivers Source Nature Reserve, to protect the three greatest rivers in China. In 2003, it was upgraded to a national level Nature Reserve. To date, in September 2011 with the issue of the official document - *Ecological Protection for* Three Rivers Source *National Comprehensive Experimental Zone Overall Program*, the Three Rivers Source Nature Reserve is included into the Three Rivers Source comprehensive experimental zone, to further its ecological construction (RMLT, 2012).

In this 2011 document (NDRC, 2011), the state mentioned several key aspects in order to further the ecological improvement. I highlighted three important points which are relevant to the purpose of this study:

1. Respect the **local culture** and involve the local herders for ecological construction programs
2. Encourage the **public and civil organization** to participate
3. Establish a new green performance evaluation mechanism in order to change the local administration's conceptualization of performance evaluation and reverse their value of development with focus on economic growth

In a 2005 study on pastoralism in Western China, Yeh commented that it would be very difficult to activate a bottom-up approach for conservation with the state's support, under the institutional landscape at that time. In this context, this study was initiated to investigate what the limiting factors are that hinder a bottom-up approach for conservation. Interestingly, in this 2011 *Overall Program* document, the government unprecedentedly mentioned the importance of incorporating local culture for conservation in this kind of national level document (Personal communication, 2012). Thus, this project proceeds to investigate under those limiting rules of environmental decision-making, how did Shanshui steer the muddy water of Chinese politics to improve ecosystem management and support improved policy-making?

7. RESULTS AND DISCUSSION

In the first section of this chapter, I start off by presenting an overview of the conservation programs implemented in the Three Rivers Source region. Using the idea of complexity in Natural Resource Management, three factors which lead to the deficiencies of these programs are outlined. The second section spells out three strategies Shanshui adopt to address these deficiencies, embodied in three specific projects which further elaborate their ideas for conservation action. In the last section, I apply the framework for structuring complexity in transdisciplinary research into my case study, and highlight three important functions which enable Shanshui to operationalize transdisciplinary research for improved ecosystem management.

7.1 Overview of ecological construction in the Three Rivers Source region and challenges for improved policy-making

In this thesis, the data analysis process departs from the understanding that conservation is primarily not about biology but about people and choices they make, and thus it is influenced by an array of socioeconomic and political conditions (Balmford and Cowling, 2006). In this vein, I will present a timeline of Three Rivers Source region environmental policy development, under the background of two

large-scale ecological construction programs – Natural Forest Conservation Program (NFCP) and the Grain to Green Program (GTGP). Following this, I will single out several factors which lead to the deficiencies of these ecological construction initiated by the state.

In the context of Three Rivers Source, rangeland health has been an important discussion among the issues of ecological construction, due to the fact that it affects biodiversity directly and indirectly because all native flora and fauna have adapted to the long-term evolutionary forces that have shaped these rangeland environments (Harris, 2009). After the severe floods in 1998 which caused massive economic damage to the more affluent parts in East China, the government highlighted the need to address land degradation issue in the upper parts of watershed (MacBean, 2007 cited in Andersson *et al*., 2011). For many of the policy-makers and Chinese biologists, they deem the livestock numbers in the Qinghai-Tibetan Plateau are too high and overgrazing, human activities are the main reasons for the rangeland degradation. Conversely, Shen *et al*. (2004:329) found that local herders insisted that current livestock numbers are the lowest in history. In spite of this, the state was continuously calling for the technological fixes (e.g. rodent and locust control, artificial rainfall, infrastructure building) to land degradation. In the Qinghai province, where the Three Rivers Source region is located, *converting pastures to grasslands* (tuimuhuancao) was carried out as the first small-scale pilot projects in 2000 (Table 2). It was seen as a local variation of GTGP - an 'GTGP for pastoral areas' (Yeh, 2005). In 2003, tuimuhuancao was significantly expanded (Table 2), with migration as its major component in Three Rivers Source region. This is related to the state's increasing concern about the ecological function of the Three Rivers Source region (Li, 2007), after the massive floods in 1998. In line with this, there established the Three Rivers Source Nature Reserve to protect the sources of the Yangtze, Yellow and Lancangjiang (Mekong) Rivers in 2000 (Table 2). To date, the Three Rivers Source region is included to the Three Rivers Source national comprehensive experimental zone[8] for ecological protection in 2011 (Table 2), with the state's intention to scale up its conservation.

Table 2. Development of Environmental Policy and Conservation Programs in Three Rivers Source region since 1998

1998	**National Level- Natural Forest Conservation Program(NFCP)**
1998	Qinghai Provincial Level- NFCP
2000	**National Level – Grain to Green Program(GTGP)**
2000	Qinghai Provincial Level- *Converting pastures to grasslands* (tuimuhuancao) - a

[8] See RMLT(2012) - Study for the relation between the THREE RIVERS SOURCE region and the THREE RIVERS SOURCE national comprehensive experimental zone

	local variation of GTGP -an GTGP for pastoral areas implemented as pilot projects in Qinghai
2000	The officially largest Nature Reserve- Qinghai Provincial Level **Three Rivers Source Nature Reserve** was established
2003	*Tuimuhuancao* significantly expanded in Qinghai, accompanied with other programs such as rodent and locust control, ecological migration, artificial rainfall, infrastructure building etc.
2003	The Provincial Level **Three Rivers Source Nature Reserve** was upgraded to National Level Nature Reserve
2005	The government promised to invest more than ＄1 billion in central government funds for Three Rivers Source ecological construction, with the issue of *2005 Three Rivers Source Nature and Ecological Protection and Construction Master Plan*
2011	The National Level **Three Rivers Source Nature Reserve** was included to the national comprehensive empirical zone, with the issue of *2011 Ecological Protection for Three Rivers Source National Comprehensive Experimental Zone Overall Program*

Derived from: NDRC,2011; NDR, 2005; Yeh,2005; Xin,2008

Commentators criticized that the aim of these environmental programs was to transform mobile pastoral livelihoods to sedentary, town-based lives. In addition, critics worried that simple engineering solutions aren't adequate; they could lead to the same kind of brute-force, monolithic strategies that caused trouble in the first place (Xin, 2008). Many officials who advocate ecological improvement, Smith asserts, "do no science, utter proclamations, and spend ferociously to engage in activities that are totally unproven" (ibid). Furthermore, according to a Chinese academy of social science's study of GTGP in a western region of China, Zhang et *al.* (2008) argue that policies that aim to protect ecological environment in poor areas will not succeed in the long term, unless the participation of local people and social capital of development be taken into account by policy-makers. In conjunction, I argue that local people will possibly be harmed by these top-down environmental conservation programs, particularly when these guiding policies ignore their needs (Cao *et al.*, 2010). Importantly, we should remember that the ultimate goal of environmental protection is to improve human livelihood, not just restoring vegetation (ibid). Using the lens of complexity in Natural Resource Management, my findings show that the *knowledge gap, value gap* and *implementation gap* are the three main factors that hinder the promise of ecological improvement in the Three Rivers Source region delivered by the state. In the following section, I will elaborate how each of these gaps affects the implementation of these ecological construction programs.

In a recent study about rangeland degradation on Qinghai-Tibetan Plateau, Harries (2009) pointed out that the sensitive issues bearing on cultural conservation and political control prevent a nuanced scientific analysis of the problem of rangeland degradation. Correlations can be also found in Bäckstrand's (2003) statement that,

scientific advisory processes are deeply intertwined with political and cultural processes. This reflects the *ontological complexity* of Natural Resource Management that the physical, technical, human components of Natural Resource Management create a diversity of relations by the interaction of these components (Mollinga, 2010). In the context of Three Rivers Source region, multiple actors (e.g. scientists, policy-makers, NGOs, local communities) involved in ecosystem management, increases the diversity of human relations. In this case, I argue that increasing accountability of human aspect, particularly the local people in scientific endeavors, rather than simply pursuing accurate conservation models, is of particular importance to understand the complexity of ecosystem management. Another scientific challenge for the academics is that researchers coming from different disciplines do not have shared analytical tools or the measurement techniques that enable them to incorporate in one analysis, the hybrid sets of parts and relations that compose Natural Resource Management systems (ibid). In line with this, Liu *et al.* (2007) criticized that the two large-scale conservation programs in China- NFCP and GTGP have both ecological and socioeconomic effects. Nevertheless, they are often evaluated by ecologists and social scientists separately (ibid).This reflects the *analytical complexity* identified in Natural Resource Management. Hence, the question that lies in front of us is how to build up a national network of interdisciplinary research on ecosystem service, to coordinate and promote integrated social and ecological research (Liu *et al*., 2007). This also prompts the question for the Chinese academic society, how can today's relatively independent activities of research planning, monitoring, assessment and decision support in different sectors be better integrated (Kates *et al.*, 2001), so as to bridge the *knowledge gap* for ecosystem management?

In the state's pursuit of a harmonious society[9], a paradoxical effect of the persistent demand on political unity is diversity-cultural and regional, to which the policy of the state needs to adapt (Guo, 2008). Concerning this, in the recent decade there is actually a policy shift to cultural identity and tourism development in ethnic minorities' areas. In the context of Three Rivers Source region, the state has more ambitious plans to transform Three Rivers Source into tourist areas by making use of the sacred sites whose identification is based on Tibetan Buddhism. Critics worried that in most situation, the Tibetan culture is still seen as an economic resource by the local government. In a recent interview conducted by media with two key persons from the Tibetan administration, the officials highlighted the importance of increasing the awareness of competitiveness among the Tibetan people for economic development (INFZM, 2012). On the other hand, they indicated the necessity to deliver 'free education' to the local people. Nevertheless, this 'free education' recently is criticized for the state's intention to change the traditional Tibetan knowledge system (ibid). Given the dreadful poverty that pervades in Western China and the pressure of political achievement from the central state, the local government's priority on growing economy and creating jobs are critical. This value,

[9] The pursuit of a harmonious society was put forward by the Chinese Community Party Politburo in 2005 as the principle guiding the government work in the new era.

however, is based on economic growth and political achievement. Therefore, it hinders the consideration of local people and their need into environmental policy-making. In the cases of environmental conservation in southwestern China, several studies have proved that incorporating the traditional- and local-knowledge systems into conservation agenda and enhancing the participation of local people, may create stronger societal support for conservation implementation (e.g. Xu et *al.*, 2011; Shen et *al.*,2012; Mcneely et *al*.,2008). This reflects Mollinga's (2010) statement that the boundary between experts and laypeople hinders the implementation of a participatory approach for conservation. In this respect, activating the appreciation of local knowledge is an incremental step to bridge the *value gap* among the local administration.

To date, with the issue of the official document - *Overall Program 2011*, I would like to believe it is a sign of that some officials have gradually realized that the top-down approaches alone can not grapple with the pressing problems and complex dimensions of sustainable ecosystem management. Relevant to this, despite Beijing's authority, political power was actually decentralized slowly in China (Edward and Xu, 2011). However, the decentralization of political power is susceptible to individual influences and discretionary power (Li, 2010; Xu and Ribot, 2004 cited in Edward and Xu, 2011). Furthermore, this creates restricted communication between government and the local people (Edward and Xu, 2011). Moreover, there is also implementation deficit between central government rules and local government implementation (Morton, 2010). Economic development and competition for political achievement have primarily been the drivers in the local government. Particularly, the competition of multiple ministries and bureaus makes conservation work more difficult in China. In some of the environmental programs, different government departments (e.g. Bureau of Forestry/Husbandry) are usually assigned different tasks and sometimes these tasks overlap and conflict with each other, which produce problems for the collaboration among the local institutions. This reflects that the different purposes shared by different groups of people involved in Natural Resource Management, lead to the *societal complexity* of Natural Resource Management (Mollinga, 2010). Additionally, many of the existing environmental policies conflict with each other, leaving little room for development of wise policies favoring local and national level conservation priorities(Mcneely *et al.*, 2008). In this sense, the local administration struggle to make sense out of a conflicting mix of mandatory and discretionary power. Lastly, due to the inefficient capacity of the local administration, the rosy picture painted in government publications concerning the promise of decentralization and enhancing the participation of local people into conservation, was faintly applied. Based on this concern, I deem grassroots construction will be an important task to bridge the *implementation gap*, if they are motivated to incorporate local people into ecosystem management.

So far, the first research question is considered. Based on the argument above, I summarize three factors (Table3) leading to the deficiencies of these ecological

construction programs implemented by the state.

Table 3. Three gaps which lead to the deficiencies of the ecological construction initiated by the state

Knowledge gap	between science and management, due to the sensitive issues bearing on politics and culture; and intellectual boundaries in the form of disciplines among the researchers
Value gap	among the local administration, due to the boundary between experts and laypersons; this keeps them from adopting a dispassionate analysis on the local people's way for natural resources management
Implementation gap	due to the organizational boundaries between different government departments

7.2 Promoting a community-based approach for ecosystem management

In this section, I will present the case study analysis, with focus on Shanshui's strategy for conservation and how they communicate conservation action with the policy-makers, based on the research results and field demonstration. Furthermore, the discussion will focus on how they create a cultural arena and collaborative network to promote a community-based approach for ecosystem management.

7.2.1 A debate on rangeland degradation, acquisition of ecological knowledge, and use of ecological knowledge to communicate with policy-makers

Following the lines of thought in the rangeland health issue, with the increasing awareness of the ecological status of Three Rivers Source region, the government has further enlarged the investment into ecological construction. According to Xin (2008), a green fervor has swept the Qinghai-Tibetan Plateau to safeguard or rehabilitate existing rangelands. Furthermore, with the issue of *Master Plan 2005* (NDRC, 2005), the government has been promised more than ＄ 1 billion in central government funds over 6 years for its ecological construction. However, the challenge is that the academic society need to response and produce meaningful research results to policy-makers, in situation where the rangeland degradation issue in Qinghai-Tibetan Plateau is structurally characterized by uncertainty, nonlinearity, and unpredictability (Mollinga, 2010). A large body of literature, a review and analysis of which is beyond

the scope of this thesis, has traced the reason of rangeland degradation in Qinghai-Tibetan Plateau. A key issue among the Chinese Academic Science (CAS), according to a researcher from CAS institute of Earth Environment in Xi'an, is to determine if environmental changes are the result of global climate change or are caused by local human activities, such as grazing, that could be better regulated (Xin, 2008). Moreover, in a study conducted at the CAS Haibei Research Station, Chinese scientists produced convincing evidence that some Qinghai-Tibetan Plateau rangelands are sensitive to high livestock densities and standing biomass declined with increasing grazing intensity (Wang *et al.*, 2005 cited in Harris,2009). In contrast, Western (and some Chinese) investigators questioned the assumption that human activities are main reason for rangeland degradation in Qinghai-Tibetan Plateau, and raised the questions for the Chinese academics to analyze the influences of rapid changes in socioeconomic systems on rangeland degradation (Harris,2009). Connecting to this, the founder of Shanshui NGO Lu Zhi responded, "There has not been any rigorous research conducted in Three Rivers Source with nuanced approaches to study the reason of rangeland degradation until now". This reflects Harris' (2009) statement in his study about the evidence of its magnitude and causes for rangeland degradation on Qinghai-Tibetan Plateau that, among the 12 non-exclusive hypotheses to explain range degradation on the Qinghai-Tibetan Plateau the author identified, none of them has been explored sufficiently rigorously to confidently assert a causal linkage.

Regardless of these complexity, diversity and uncertainty of rangeland system, Chinese provincial officials often cited overgrazing as a major cause of rangeland degradation on the Qinghai-Tibetan Plateau (Xin, 2008). Lu Zhi indicated that, "The herders have coexisted with rangeland for a long time in Three Rivers Source region. There may be a need to adjust grazing intensity, but it is not necessary to remove grazing entirely. The local people should be the guardians of the rangeland system." I describe the project initiated by Shanshui, which addresses the importance to incorporate the local practices and their traditional knowledge for conservation.

Holy Mountain and Sacred Lake Project

To demonstrate the necessity to implement a community-based approach for ecosystem management in Three Rivers Source, Shanshui conducted the *Holy Mountain and Sacred Lake* project, partnering with the research institute from Beijing University. The project was initiated by Lu Zhi in 2004 and her PH.D student Shen (See Appendix B2) took the main responsibility in this project. In some of the Tibetan areas of western China, people's livelihood and their use of natural resources based on the traditional Tibetan knowledge demonstrate a harmonious relationship between human and nature. In this vein, it is one of the main purposes of this project to use scientific knowledge to study the correlation between Tibetan traditional practices and biodiversity. With an ambition to use a transdisciplinary approach and combine both natural and social science into the project, Lu Zhi explained, "When the project

started, we realized it was difficult to use an appropriate framework which can incorporate both natural and social science." Regardless of this, the project managed to demonstrate the relationship between Tibetan traditional practices and bird community richness and diversity based on science and a quantitative model. Some other results (see Shen et *al.*, 2012) also indicate that villager with high traditional practices, had a more positive attitude towards conservation and more actively participated in conservation than villager with low traditional practices (ibid). Conversely, in a project about policy options on sustainability in the Three Rivers Source region approved by the Ministry of Commerce in China (See Appendix A), the Chinese scholars from Qinghai Economic Institute, argue that most of places can be seen as holy mountain or sacred lake in Tibetan areas without scientific evidence, and the traditional Tibetan culture to some extent, leads to the local people's blind worship toward nature and god (Li, 2007). In respond to this, Shen described her experience when conducting the *Holy Mountain and Sacred Lake* project, "As a researcher, I was able to live in the local community and communicate with some local Tibetan scholars. By having a deeper understanding about the Tibetan culture, I feel more comfortable and confident to estimate the level of traditional practices and conservation knowledge-attitudes-behaviors in my research." This allude the question that whether it is possible for the policy makers to live in the local community for a certain period of time to observe the local people's interaction with their environment, and how this affects the provision of ecosystem service. In the case of Three Rivers Source Region, Shanshui acts as an important bridge between the local people and the government. However, the challenge is to find a right way to build up the dialogue with policy makers and communicate the positive relations between traditional Tibetan practices and biodiversity protection to the policy makers.

According to the interview, the primary step to build up the dialogue with the policy-makers, is to obtain rigorous scientific analysis and meaningful research results (Personal communication, 2012). Relative to this, Shanshui has partnered with a research institute from Beijing University and implemented several key researches in Southwestern China. For example, in the biodiversity hotspots[10] places in China, there are many "blank" areas without any data-base with information related to its characteristics of biodiversity. In this case, under the Conservation International Biodiversity Rapid Assessment Program, Shanshui worked with the research institute of Beijing University and built up an *Eco-Partnership* network with 34 members from different institutions in China, collecting critical data about the striking biological characteristics in different places of Sichuan Province and southeastern part of the Tibetan Plateau (Shanshui, 2012b). Additionally, in use of the conservation models which are developed from the research institute and built upon a foundation of science, Shanshui has endeavored to prove that these conservation models can work for biodiversity and people (Personal communication, 2012). On the other hand, with

[10] China holds four biodiversity hotspots: the Mountains of Southwest China, Himalaya, Indo-Burma and Mountains of Central Asia CI 2012a. *CHINA*. Conservation International Available: http://www.conservation.org/where/asia-pacific/china/Pages/overview.aspx [Accessed 2012-05-05]..

support from these conservation models and field demonstration, Shanshui has been engaged in policy initiative over the past years. Relative to this, the founder of Shanshui Lu Zhi is a professor of Beijing University. The vice-president of Beijing University Han Qi De, is also the president of the Jiu San Society, which is a political party based on science and technology. The Jiu San Society are engaged to collaborate with mid-level intellectuals, and keep co-operation with the Chinese Communist Party of China (JSS, 2012). Lu Zhi's involvement in the Jiu San Society and connection with 'important person' due to her network in Beijing University, enable Shanshui to communicate conservation action with the state and present their findings based on researches and filed demonstration. This reflects the argument of Edward and Xu (2011) that, China's government has the power to initiate enormous changes without the due process that informs problem definition and policy implementation in other nations. It can be a good thing sometimes for environmental policy. Shanshui's strategy shows that key persons are important for networking and collaboration. On one hand, this requires personal competence of knowing the local context. On the other hand, navigating the larger environment requires competencies of interpreting scientific knowledge and experiential knowledge other sides, understanding the legal-political arrangements so as to build up the dialogue with the state (Hahn *et al.*, 2006).

7.2.2 Creating a cultural arena to enhance environmental leadership among the local communities

As a NGO with academic background, Shanshui has been committed to use rigorous and objective scientific analysis to support ecosystem management and improved policy-making. Nevertheless, finding a pragmatic solution for environmental issue, rather than scientifically describing or interpreting it, involves some elements of complexity, uncertainty and contextuality which scientific knowledge alone cannot inform (Després *et al.*, 2004). Relative to this, Hadorn *et al*. (2006) argued that often natural science research based on quantitative models lack the perspective from the local people with regard to their views to an issue which is under investigation. In response to this, Lu Zhi expressed her concern that, "She also realizes there are many limitations in their conservation models." Nevertheless, there is far more natural science research compared with social science research conducted in Three Rivers Source region now. This may be the fact that somehow people have blind worship to scientific knowledge.

In this context, innovation and adaptivity are important strategies, if we are to merge scientific knowledge with the qualitative and interpretative approaches of social science and humanities that are needed to develop sound knowledge for ecosystem management. In this vein, I present the *Eye of Community* project to illustrate how Shanshui endeavor to incorporate the local people's practice and their traditional knowledge into ecosystem management.

Eye of Community Project

In April 2011, six documentaries (See Appendix C) produced by the local people from the Tibetan communities in Three Rivers Source region, were shown in several key universities in Beijing. It is the initiative of the *Eye of Community* project to create an open platform and encourage the local people to share their traditional stories for conservation in relation to the local culture (Personal communication, 2012). One Tibetan scholar who is also the leader of Nian Bao Yu Ze local environmental organization in Three Rivers Source region put it, "'silent' changes have strike both the nature and culture in my hometown. Young people are gradually changed by the modern value and feel their own cultural value and traditional practices antiquated. These urge me to record these changes and tell the stories to outside people" (Tian, 2011). This reflects the suggestion by Shen *et al.* (2012) that increased effort to promote the traditional practices for natural resources management, especially targeting the younger generation and local communities influenced by modern society has particular importance. In my opinion, this kind of project with focus on the local culture, is particularly important if we are about to enhance the participation of local people for ecosystem management. Specifically, without recognition, accommodation and cherishment of the local people's own culture, that is, without the feeling of its cultural ethos and the motivation and interest of self-expression, the local Tibetans will still feel that they are disempowered or devalued to protect their environment (Lin, 2008). Thus, to increase the environmental leadership of the local community, the 'symbolic recognition of their culture and traditional practices for natural resources management in the outside society' (ibid) is more important than others in the sense that this recognition will directly increase their enthusiasm to participate in ecosystem management.

However, the sustainability of this project, also requires political leadership of a kind I do not see much of today. According to the interview, one limitation of this project is that they have not attracted much attention from authorities and organizations at higher levels of society (Personal communication, 2012). Also, this is the reason that the local government is more concerned about how their village presented by the news report rather than this kind of community video with more focus on the local people (ibid). Interestingly, after the documentaries shown in Beijing's universities, the public develop interest into the story told by the Tibetan scholar and his environmental organization in Three Rivers Source region (ibid). As a consequence, the local government is motivated to collaborate with this environmental organization for conservation programs (ibid).

7.2.3 Constructing a collaborative arena for knowledge exchange

My finding shows that the third strategy Shanshui adopts for their conservation action is to construct a collaborative social network with local actors. The local actors they

have partnered with are tailored to specific projects, but mainly include: Qinghai Forestry Department, Qinghai Animal Husbandry Department, Three Rivers Source National Nature Reserve Management Bureau, and the local administration ministry of Public Security, religious institutions etc (Personal communication, 2012). According to the interview, one of the striking characteristics of Shanshui is that they have advantages to work with those 'difficult' institutions (ibid). It is the result of long-term trust-building with the local partners (ibid). Correlation can be also found in literature that building a collaborative arena is to invest a large amount of time to get to know each other, the goals as well as the incentives of each partner (Jernberg and Södergren, 2011). Importantly, this time is needed during the whole collaboration to maintain the relationship (ibid). Process and some key elements for trust-building achievement are concluded in the table below. According to the interview, the first incremental step in the direction of trust-building is to make the position correctly. As an outsider working with the local people, it is important to avoid positioning of viewpoints and de-learning is also a necessary skill to start the two-way learning with local actors (Table 4). With a humble and open-minded attitude, we can start to collaborate on a small scale and communicate ecological knowledge with the local people (Personal communication, 2012). Rather than simply using local people as data collectors, it is important to slow down the process and observe the local way of natural resources management.

Table 4. Process and strategies used by Shanshui to construct a collaborative arena for knowledge exchange

Avoid positioning of viewpoints, de-learn and start the iterative and two-way learning with local actors (communication on ecological knowledge)
Start to collaborate on a small scale, and doing deals that involves little risk
Repeated interaction with focus on face-to-face meetings through different channels, personal and professional relationships
Formalize and normalize the local way of ecosystem management, assisting their action in navigating formal institution for legal, political and financial support
Enjoy the process

Derived from: Personal communication,2012; Jernberg and Södergren,2011

In its pursuit to construct a collaborative arena for knowledge exchange, Shanshui has endeavored to promote a "good dialogue" among their partners. According to the principle from Isaacs' (1999) dialogue model – to achieve a good dialogue is to bring the whole system in one room, i.e. invite people who have different roles in relation to the actual topic, so that a wide sphere of perspectives and specialized skills can be used (Jernberg and Södergren, 2011). In this light, I will present the Three Rivers Source Forum initiated by Shanshui to enhance communication among relevant stakeholders.

Three Rivers Source Region Forum

In April 2011, Three Rivers Source Forum was initiated by Shanshui, with support from Jiu San Society and the Qinghai provincial government. The participants include policy-makers, practitioners, representatives from local communities, leaders of local environmental organization, researchers, media, Tibetan scholars etc. The forum produced meanings by making relevant stakeholders realize the complexity of the issue (Personal Communication, 2012). This kind of forum, according to Jernberg and Södergren(2011) can be viewed as an example of the creation called a "new knowledge producer" , which can promote both research-based practice and practice-based research for ecosystem management.

According to the interview, had Shanshui not organized such a meeting, the local people would probably not have chances to launch their speech in front of the governments (Personal communication, 2012). In this sense, it is an important step to assist the local people to navigate formal institutions for financial, political and legal support (see Table 4). On the other hand, it is a challenge to keep the discussion flow in the forum as the diversity and different values shared by the stakeholders, which reflects the societal complexity of Natural Resource Management systems. In this sense, it is important to begin with small topics and practical issues. Additionally, the speeches about the importance of Tibetan culture and sacred geography for ecological conservation launched by the local Tibetan scholars, provided a 'new' perspective for the outsiders, particularly the policy-makers to rethink the current practices for conservation planning.

Most recently, with the tourism expansion and the increasing interest in the culture of ethnic minorities in western China, plans have become more ambitious to transform the remote mountainous landscape of Three Rivers Source region into a thriving modern economy (Ma and Tam, 2011). The key successful development, however, most likely lies in the sacred geography of this region, as it is this cultural and religious belief system that set out a protected area network much stronger in many ways than the formal nature reserve network (ibid). Unfortunately, not all the stakeholders agree with this. This reflects the *value gap* among the local administration and the appreciation of local knowledge. In this perspective, Three Rivers Source forum creates an arena for conflict resolution and 'elevating' the issues to identify win-win projects. I call this a "sewing together" (Simmel, 1955) of the forum "by a variety of cross-cutting conflicts between its component parts" (Burrell and Morgan, 1979). Importantly, coordination is necessary to achieve this kind of "sewing together". Thus, the issue becomes more a matter of having a type of organization which can breed cooperative interdependence and collaboration among the actors (Lotrecchiano, 2010).

To answer the second research question, my findings show that acquisition of scientific knowledge based on the partnership with a research institute from Beijing University and their field demonstration, is a primary step to open the dialogue with

the policy-makers. With an attempt to improve the environmental leadership among the local communities, Shanshui has been engaged to create an informal setting for learning and innovation, by providing conservation training materials or techniques that appreciate the value of their traditional Tibetan culture. Lastly, cultivating leadership through the process of trust-building, Shanshui constructs an open platform for multiple actors to communicate ecological knowledge for ecosystem management.

7.3 Operationalizing transdisciplinary research for improved ecosystem management and policy-making

In the first part of this chapter, I summarize three factors which lead to the deficiencies about the ecological construction initiated by the state. Given the uncertainty about the future design of conservation programs, in this section I will broaden the discussion and investigate the third research question. Specifically, the discussion will focus on what functions that is necessary and enables Shanshui to enhance the collaboration among different actors, and support improved ecosystem management and environmental policy-making.

In my opinion, in order to cross the research-policy boundary and promote more effective links between science community and policy-makers (Figure1), it is necessary to build bridges between researchers in different disciplines, and between them, policy-makers and lay-people (Lawrence, 2004b). Using the framework for structuring complexity in transdisciplinarity researches in this thesis (Figure3), my findings show that there is potential room to improve ecosystem management and environmental decision-making, if transdisciplinary thinking is cultivated across the empirical, purposive, normative and pragmatic aspects of Shanshui's conservation action (Table 5). However, due to the access problem, I did not manage to go to the field site. Using the lens of transdisciplinarity for my data analysis, I may have some biased interpretation. In spite of this, in the next paragraphs I will illustrate how each type of transdisciplinary knowledge can be implemented for ecological improvement.

Table 5. Using transdisciplinary knowledge for improved ecosystem management and environmental policy-making

Factors leading to the deficiencies of ecological construction (initiated by the state)	***Project & Goal*** (initiated by Shanshui)	***Barriers*** to achieve the goal	Apply three types of ***transdisciplinary knowledge*** for ecological improvement

Knowledge Gap (research-policy boundary)	*HOLY MOUNTAIN AND SACRED LAKE* Incorporating social and natural science research into their ecological knowledge production	Lack a framework to operationalize transdisciplinarity	Empirical level- Systems knowledge: knowledge about the genesis and possible development of a problems and about life-world interpretations of a problem
Value Gap (boundaries between experts and lay-people, including the appreciation of local knowledge)	*EYE OF COMMUNITY* Communicate traditional ecological knowledge to the outside society	Inadequate channels to promote the documentaries to authorities and organizations at higher level of society	Purposive level- Target knowledge: knowledge to determine and explain the need for change, desired goals, and better practices
Implementation Gap (boundaries between different agencies and government departments)	*THREE RIVERS SOURCE REGION FORUM* Mediate cooperation among the stakeholders	Keep the discussion flowing or going among the stakeholders who share different value and interests on conservation	Pragmatic and normative level- Transformation knowledge: knowledge about technical, social, cultural, legal, and other possible means of acting to transform existing practices and introduce desired ones

Derived from :Mollinga,2010

Procedure One: Using systems knowledge to cross research-policy boundary

Nowadays, with systems knowledge being the domain in science community, its applicability on conservation has not yet gone unchallenged. Mollinga (2010) criticized that many modeling and decision support system developed by academic researchers, with help of statistics and mathematical methods, are science driven, not user driven. As a remedial strategy, systems knowledge should combine with the meaning that societal actors in the problem field give to the process under

investigation (Hadorn *et al.*, 2006). In this vein, I look into the *Holy Mountain and Sacred Lake* project again, to investigate what the factors are that hinders a transdisciplinary approach to combine societal actors in their researches. Furthermore, if/how to overcome these barriers to activate transdisciplinary researches in the future.

In response to this, Lu Zhi put it, "the big challenge is to find a framework to operationalize transdisciplinarity." She further expressed her worry about the issues of "practical doing", e.g. academic language, conceptual communication, inertia of thinking, acceptance of this way of "doing science" by the society. Another comment about future transdisciplinary researches from Shen is that, "To be respectful and open-minded, trying to understand and communicate with the local people are important elements for transdisciplinary researches." Additionally, Liu expressed his opinion that, "Academic language wouldn't be a big problem for him to cooperate with the natural science researcher, as in the context of Three Rivers Source region, ecology construction and cultural preservation is indivisible." Relative to this, Liu is a journalist with a social science background (See Appendix B2). In this context, the complexity of ecosystem management prompts the researchers for "dissolution of disciplinary boundaries, respond to and reflect on problem in specific context" (Lotrecchiano, 2010). Furthermore, this also prompts the researchers to construct an "open system for information exchanges across boundaries" (ibid). In conjunction, these reflect the transdisciplinarity characteristics (See Table1) identified by Lotrecchiano (2010). However, according to the answers from the researchers, I found that transdisciplinarity is quite a vague idea for them and it is not a common terminology either. Thus, in order to activate transdisciplinarity in the future researches, I suggest that the first step is to cultivate transdisciplinary thinking among the researchers before they go into the field and conduct researches. Correlations can be also found in Max-Neef (2005) statement that the achievement of integrating synthesis must occur inside each of the brains, instead through the accumulation of different brains. Additionally, in order to facilitate the collaboration among researchers from different disciplines, the development of suitable *boundary concept* is necessary to allow thinking and conceptual communication among the researchers (Mollinga, 2010). Apart from this, my findings also show that the attitude of researchers is particularly important to activate transdisciplinary research, and at least as demanding is that they need to get prepared to collaborate in each procedure of transdisciplinary research. Noteworthy is that, as Pohl (2005) suggested, at the beginning of this trial-and-error process, the pressure to produce usable results should be reduced if collaboration is to emerge. Moreover, a role of strategic initial mediator such as Shanshui to facilitate the collaboration and communication among researchers is important to safeguard transdisciplinarity adopted in each of the researchers' brains.

Procedure Two: Using target knowledge to bridge the policy-makers and lay-people

In the purposive level, in order to understand what better practices are for ecological

improvement, target knowledge to understand the reason of various stakeholders is in need (see Table 5). In the context of Three Rivers Source region, the importance of traditional Tibetan culture in conservation has been recognized by scholars and conservation NGOs in China, but has yet to be adopted by the Chinese government (Shen *et al*., 2012). In this respect, we need to think about the existing practices of actors, specifically what the conditions are that keep the policy-makers from observing and having the believe that, the local people will "get the science right" if they are allowed to participate in resource management (Edward and Xu, 2011). Connecting this to Max-Neef's (2005) argument about the dichotomy between western and eastern culture, I deem that most policy-makers in China see the local practices for conservation, which is shaped by Tibetan Buddhism, as mysterious and sometimes irrational, but seldom as efficient and competent as the scientific ecological knowledge (or so called *global knowledge*). In this sense, to activate the appreciation in policy-makers on local knowledge and bridge the *value gap*, target knowledge should be used to explain the need for change. My empirical study shows that such bridging organization like Shanshui, plays critical role as a translator between the local people and policy-maker, and deliver important function to translate the source language and culture into the outside society (Yang, 2010). Nevertheless, how practically adequate and efficient, of this translation process will prove to change the value on policy-makers and local administration, will have to show.

Procedure Three: Using transformation knowledge to bridge different institutions

In the pragmatic and normative level, transformation knowledge is necessary to change the existing practices (See Table 5). For the Three Rivers Source Forum, my findings show that such open platform for communication among multiple actors, reduces complexity by specifying the need for knowledge and identifying those involved (Pohl and Hadorn, 2007). Furthermore, to increase the grass-root efforts and bridge the *implementation gap* among the local administration, such opening network facilitates integration of different government departments, through open encounters (ibid). Moreover, apart from scientific knowledge, it is an effective means to gather other forms of transformation knowledge, e.g. instrumental, ethical, aesthetic knowledge, with participation of different actors including the local Tibetan scholars and religious leaders in the Three Rivers Source region. According to Klein (2004), an ideal outcome of this process is a fifth type of knowledge, which is a kind of hybrid product – the result of "making sense together", or "sewing together" according to Simmel (1955). Nevertheless, to achieve a "sewing together" of various social affiliations, my finding shows that such bridging organization like Shanshui, delivers important function of coordination. Furthermore, this coordination is driven by the function of managing the interactions, through their interdependent activities, conflicts and power struggles arise between different actors (e.g. science community, policy-makers and local community) for ecosystem management (Lotrecchiano, 2010). Such a role of coordinator, is important to safeguard the process of

transformation.

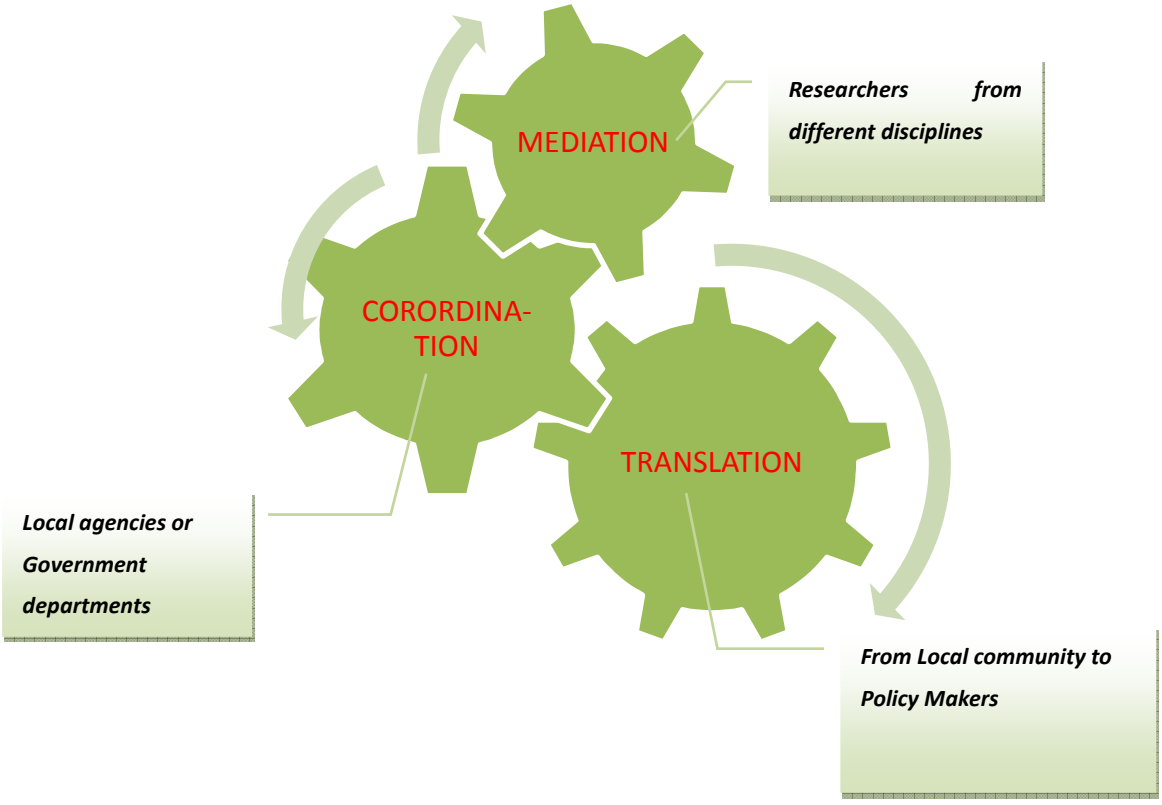

Figure 6. "Sewing together"- Three Important Functions delivered by a Bridging Organization to Operationalize Transdisciplinary Researches

So far, the third research question was considered. Using the transdisciplinarity lens, my finding implies that Shanshui delivers important functions of coordination, mediation and translation to bridge different actors for improved ecosystem management and policy-making (Figure 6). In this sense, a bridging organization plays a critical role to stimulate a good dialogue, facilitate the communication and collaboration among the actors, and help to achieve a status of "sewing together". On the other hand, the role of such a bridging organization is also important to operationalize transdisciplinary researchers. Specifically, three types of transdisciplinary knowledge- systems knowledge, target knowledge and transformation knowledge influence each other in a given project and provide tools to articulate these linkages (Mollinga, 2010). However, in practice a division of labor also tends to exist (ibid). Thus, the role of a bridging organization is particularly important to facilitate the explicit integration of these three types of knowledge, and keep each procedure of transdisciplinary research on track to ensure they are implemented together.

8. CONCLUSION

In this thesis, my empirical studies about Shanshui NGO and their conservation action, reflect Ho and Edmonds' (2008) statement about the essence of Chinese activism-limiting while enabling. Limiting in a sense refers to that in the political agenda of environmental decision-making, the strategies which positively link the local people with conservation are still in the early stages of development (Mcneely *et al.*, 2008). In order to push the political agenda forward and being able to contribute, Shanshui needs to be adaptive and innovative. In this sense, partnering with a research institute of Beijing university and having connection with important person from Jiu San Society, creates an opportunity for them to communicate conservation action with policy makers, based on the research results and their field demonstration. In order to further the acknowledgement of these research results by policy-makers and promote more sustainable options for ecosystem management, the biggest challenge, however is to bridge the *value gap*. In my opinion, this is a really long and difficult process.

Nowadays, in the urban consumer society of Eastern China, people need to work hard to be rich and compete with others in order to reach the upper class of the society. People are getting more anxious and struggle to make sense of their busy life. For those living in the Tibetan areas of Western China, people are faced with psychological and emotional pressures to catch up - catch up intellectually, economically, or culturally with those living in the urban consumer society, in order to be absorbed into the mainstream to progress (Lin, 2008). If we are about to move into a harmonious society that maintains cultural and biological diversity, as promoted by the state, there may be some lessons that we can learn from a rural Tibetan community. As shown in those visual messages of the documentaries from the *Eye of Community* project, the way to harmony may be well-illustrated by showing our respect and gratitude in everyday life to Mother Earth, the very reason and means for all existence (Xu *et al.*, 2004). In this thesis, I don't argue that the traditional practices in Tibetan communities should replace modern science for conservation. However, given the cultural and political conditions in Chinese context, I believe incorporating both the scientific and traditional knowledge for ecosystem management will make a difference. In this sense, a bridging organization to translate the source culture from a Tibetan community to outside society, is a prime mover of change to reconstruct balance between human well-being and ecosystem service. Such a translator is a constrained but artful mediator and a skilled coordinator (Fligstein, 2001 cited in Yang,2010) for ecosystem management.

9. FUTURE RESEARCHES

· Recently, the notion of *boundary work* has gained increasing interest among the

researchers and policy-makers. In order to facilitate the process of transdisciplinary researches, researchers and practitioners may gain some insights by looking into the development of boundary concept. Specifically, to further the collaboration between researchers, science community and local community, the boundary concepts may facilitate the communication between them.

- Shanshui has partnered with the research institution of Beijing University. There are also some young scientists from relevant programs of Beijing University participating into their researches in the Three Rivers Source region. Connecting to this, Lotrecchiano (2010) proposed a model about complexity leadership in transdisciplinary learning environments with a knowledge feedback loop. With reference to this model, future research can be conducted on-the-ground to investigate how to cultivate transdisciplinary thinking among young researchers, by educational leadership of Shanshui NGO in the learning environment to encourage innovation and adaptation.

10. REFERENCE

<Knowledge for the sustainability transition.pdf>.

Andersson, E.,Brogaard, S. & Olsson, L. 2011. The Political Ecology of Land Degradation. *Annual Review of Environment and Resources,* 36:295–319.

Bäckstrand, K. 2003. Civic Science for Sustainability: Reframing the Role of Experts, Policy-Makers and Citizens in Environmental Governance. *Global Environmental Politics,* 3:4.

Balmford, A. & Cowling, R. M. 2006. Fusion or failure? The future of conservation biology. *Conserv Biol,* 20:692-695.

Banks, T. 2003. Property Rights Reform in Rangeland China: Dilemmas On the Road to the Household Ranch. *World Development,* 31(12):2129–2142,.

Banks, T.,Richard, C.,Li, P. & Yan, Z. 2003. Community-Base Grassland Management in Western China Rationale, Pilot Project Experience, and Policy Implications. *International Mountain Society* 23(2):132-140.

Bauer, K. 2005. Development and the Enclosure Movement in Pastoral Tibet since the 1980s. *Nomadic Peoples,* 9.

Blaikie, P. & Muldavin, J. 2004. Upstream, downstream, China, India: the politics of environment in the Himalayan region. *Annals of the Association of American Geographers,* 94 (3): 520–548.

Bryman, A. 2008. *Social research methods* New York Oxford University Press Inc.

Burrell, G. & Morgan, G. 1979. *Sociological Paradigms and Organisational Analysis : Elements of the Sociology of CorporateLife,* London: Heinemann.

Cao, S.,Chen, L. & Zhu, Q. 2010. Remembering the Ultimate Goal of Environmental Protection: Including Protection of Impoverished Citizens in China's Environmental Policy. *AMBIO,* 39:439–442.

Chen, G.,Li, X. & Guo, X. 2007. *Three Rivers Source Nature Reserve Region Ecological Protection and Construction* Qinghai, China: Qinghai People's Press

CI 2012a. *CHINA*. Conservation International Available:

http://www.conservation.org/where/asia-pacific/china/Pages/overview.aspx [Accessed 2012-05-05].

CI 2012b. *Corporate Partnerships* Conservation International Available: http://www.conservation.org/how/partnership/corporate/Pages/default.aspx [Accessed 2012-04-30].

CI 2012c. *Himalaya* Conservation International Available: http://www.conservation.org/where/priority_areas/hotspots/asia-pacific/Himalaya/Pages/default.aspx [Accessed 2012-04-30].

CI 2012d. *Supporting Communities* Conservation International Available: http://www.conservation.org/learn/culture/communities/pages/overview.aspx [Accessed 2012-04-30].

Clark, W. C. & Dickson, N. M. 2003. Sustainability science: The emerging research program. *PNAS,* 100(14): 8059–8061.

Daily, G. C. & Matson, P. A. 2008. Ecosystem services: From theory to implementation. *PNAS,* 105(28): 9455-9456.

Després, C.,Brais, N. & Avellan, S. 2004. Collaborative planning for retrofitting suburbs: transdisciplinarity and intersubjectivity inaction. *Futures,* 36 (2004) : 471–486.

Dickens, P. 2003. Changing our environment, changing ourselves: critical realism and transdisciplinary research. *Interdisciplinary Science Reviews,* 28(2).

Edward, G. R. & Xu, J. 2011. Creating a 'Conservation with Chinese Characteristics'. *Biological Conservation,* 144: 1347-1355.

Fligstein, N. 2001. "Social skill and the theory of fields:. *Sociological Theory* 19(2): 105-25.

Gladney, D. C. 2004. *Dislocating China. Reflections on Muslims, Minorities and Other Subaltern Subjects* London: Hurst& Company.

Guo, J. H.,Liu, X. J.,Zhang, Y.,Shen, J. L.,Han, W. X.,Zhang, W. F.,Christie, P.,Goulding, K. W. T.,Vitousek, P. M. & Zhang, F. S. 2010. Significant acidification in major Chinese croplands. *Science,* 327:1008–1010.

Guo, X. 2008. *State and Ethnicity in China's Southwest* Leiden: Brill.

Hadorn, G. H.,Bradleyb, D.,Pohlc, C.,Ristd, S. & Wiesmannd, U. 2006. Implications of transdisciplinarity for sustainability research. *Ecological Economics,* 6 0 (2 0 0 6) : 1 1 9 – 1 2 8.

Hahn, T.,Olsson, P.,Folke, C. & Johansson, K. 2006. Trust-building, Knowledge Generation and Organizational Innovations: The Role of a Bridging Organization for Adaptive Comanagement of a Wetland Landscape around Kristianstad, Sweden. *Human Ecology* 34:573–592.

Harrell, S. 1995. Introduction: Civilizing projects and the reaction to them. *In:* Harrell, S. (ed.) *Cultural encounters on China's ethnic frontiers* Seattle, USA:University of Washington Press.

Harris, R. B. 2009. Rangeland degradation on the Qinghai-Tibetan plateau: A review of the evidence of its magnitude and causes. *Arid Environments* 74 (2010) :1–12.

Ho, P. & Edmonds, R. L. 2008. "Perspective of time and change: rethinking embedded environmental activism in China". *In:* Ho, P. & Edmonds, R. L. (eds.) *Embedded activism : opportunities and constraints of a social movement in China.* London:Routledge

Hsing, Y.-t. & Lee, C. K. 2010. *Reclaiming Chinese society,* USA and Canada Routledge.

INFZM 2012. 南方周末[Online]:Xiao, B. (Ed). *Twentey Thousand Officials will be assigned to villages in Tibetan areas.* Available:http://www.infzm.com/content/73602 [Accessed 2012-04-04].

Isaacs, W. 1999. *Dialogue and the art of thinking together : a pioneering approach to communicating*

in business and in life, New York: Currency.

Jernberg, S. & Södergren, B. Bridging Theory and Practice in the Humanities and Social Sciences: The Case of a Collaborative Arena in Sweden. *In:* NFF, ed. 21st Nordic Academy of Management conference 2011 Sweden. Stockholm University

Jiang, H. 2006. Decentralization, ecological construction, and the environment in post-reform China: case study from Uxin Banner, Inner Mongolia. *World Development,* 34 (11), 1907–1921.

JSS 2012. *Rule.* The Central Committee of the Jiu San Society Available: http://www.93.gov.cn/contact/index.shtml [Accessed 2012-03-23].

Kates, R. W.,Clark, W. C.,Corell, R.,Hall, J. M.,Jaeger, C. C.,Lowe, I.,McCarthy, J. J.,Schellnhuber, H. J.,Bolin, B.,Dickson, N. M.,Faucheux, S.,Gallopin, G. C.,Grubler, A.,Huntley, B.,Jager, J.,Jodha, N. S.,Kasperson, R. E.,Mabogunje, A.,Matson, P.,Mooney, H.,III, B. M.,O'Riordan, T. & Svedin, U. 2001. *Sustainability Science Science* 292.

Klein, J. T. 2004. Prospects for transdisciplinarity. *Futures,* 36 (2004) : 515–526.

Kolås, Å. 2008. Sacred space, state territory and tourist destination. *In:* Kolås, Å. (ed.) *Toursim and Tibetan culture in Transition :A place called Shangrila* USA and Canada Routledge

Krohn, W. & Daele, W. v. d. 1998. Experimental implementation as a linking mechanism in the process of innovation. *Research Policy* 27 : 853–868.

Kvale, S. & Brinkmann, S. 2009. *InterViews: Learning the Craft of Qualitative Research Interviewing,* Thousand Oaks California: Sage Publications.

Lawrence, R. 2004a. Futures of Transdisciplinarity. *Futures,* 36**,** 397-405.

Lawrence, R. J. 2004b. Housing and health: from interdisciplinary principles to transdisciplinary research andpractice. *Futures,* 36 : 487–502.

Li, C. 2010. China's communist party-state: the structure and dynamics of power. . *In:* Joseph, W. (ed.) *Politics in China: An introduction.* London,UK:Oxford University Press

Li, Y. 2007. *Policy Options on Sustainability in the Three River Sources Region of the Qinghai-Tibet Plateau,* Xining, China: Qinghai People's Press

Lin, Y. 2008. *Cultural exclusion in China : State education, social mobility and cultural difference* New York Routledge.

Liu, J.,Li, S.,Ouyang, Z.,Tam, C. & Chen, X. 2007. Ecological and socioeconomic effects of China's policies for ecosystem services *PNAS,* 105(28):9477-9482.

Long, H.,Liu, Y.,Li, X. & Chen, Y. 2010. Building new countryside in China: a geographical perspective. *Land Use Policy,* 27:457–70.

Lotrecchiano, G. R. 2010. Complexity leadership in transdisciplinary learning environments : A knowledge feeback loop *International Journal of Transdisciplinary Research,* 5(1): 29-63.

Ma, J. & Tam, C. 2011. Cultural services and non-use values. *In:* Kareiva, P., Tallis, H., Ricketts, T. H., Daily, G. C. & Polasky, S. (eds.) *Natural Capital: Theory & Practice of Mapping Ecosystem Services.* Oxford,UK:Oxford University Press

MacBean, A. 2007. China's environment: problems and policies. *World Econmic,* 30:292–307.

Malayang III, B. S.,Hahn, T. & Kumar, P. 2005. Responses to ecosystem change and to their impacts on human well-being. *In Millennium Ecosystem Assessment, Findings of the Sub-global Assessments Working Group, chapter 9.*Island

Max-Neef, M. A. 2005. Foundations of transdisciplinarity *Ecological Economics,* 53 (2005) :5-16.

Mcneely, J. A.,Kapoor-Vejay, P.,Lu, Z.,Olsvig-Whittaker, L.,Sheikh, K. M. & Smith, A. T. 2008. Conservation Biology in Asia: the Major Policy Challenges. *Conservation Biology,*

23(4):805-810.

MEA 2005. Ecosystems and Human Well-being :A Framework for Assessment. Washington, DC, USA:IslandPress, Millennium Ecosystem Assessment

Miller, D. 1997. 'Range Management and Pastoralism: New Perspectives and Their Implications'. *ICIMOD Newsletter (Kathmandu),* 27:1-7.

Miller, D. 2000. Tough times for nomads in western China: snowstorms, settling down, fences and the demise of traditional nomadic pastoralism. *Nomadic Peoples,* 4 (1), 83–109.

Miller, D. J. 1990. Grasslands of the Tibetan Plateau. *Rangelands* 12 (3): 159-163.

Mittermeier, R. A. & Mittermeier, C. G. 2005. *Megadiversity: Earths Biologically Wealthiest Nations,* Houston, Texas Cemex

Mollinga, P. P. 2010. Boundary Work and Complexity of Natural Resources Management. *Crop Science* 50:S-1-S-9.

Morton, K. 2010. Policy case study: The Environment. *In:* Joseph, W. (ed.) *Politics in China.* New York:Oxford University Press

NDRC 2005:*TRS Nature and Ecological Protection and Construction Master Plan.* People's Republic of China National Development and Reform Commission

NDRC 2011:*Ecological Protection for TRS National Comprehensive Experimental Zone Overall Program.* People's Republic of China National Development and Reform Commission

Pinkerton, E. 1989. *Cooperative Management of Local Fisheries: New Directions for Improved Management and Community Development,* Canada: University of British Columbia.

Pohl, C. 2005. Transdisciplinary collaboration in environmental research. *Futures,* 37**,** 1159-1178.

Pohl, C. & Hadorn, G. H. 2007. *Principles for designing transdisciplinary research* Munich Oekom Verlag.

QHNEWS 2006. Qinghai News [Online]:Ma, F. (Ed). Four Striking Characteristics of the TRS Nature Reserve Available:http://www.qhnews.com/sjy/system/2006/09/29/000005511.shtml [Accessed 2012-04-30].

Ragin, C. C. & Amoroso, L. M. 2011 *Constructing social research* Thousand Oaks, California: Sage

RMLT 2012. *Study of the Relation between TRS Nature Reserve and TRS Comprehensive Experimental Zone*. Ren Min Lun Tan Available: http://www.rmlt.com.cn/News/201204/201204280912192793.html [Accessed 2012-04-30].

Rubin, H. J. & Rubin, I. S. 2005. *Qualitative Interviewing: The Art of Hearing Data,* Thousand Oaks, California: Sage.

Sajise, P. E. 1995. Biodiversity and methods: a synthesis. *In:* Pei, S. J. & Sajise, P. E. (eds.) *Regional study on biodiveristy: concepts, frameworks* Kunming, China:Yunnan University Press

Shanshui 2012a. *Based on Science* Shanshui Conservation Center. Available: http://www.shanshui.org/Landscape/speciality1.SHTML [Accessed 2012-04-30].

Shanshui 2012b. *Effectiveness monitoring and scale-up conservation planning*. Shanshui Conservation Center. Available: http://www.shanshui.org/Landscape/Project/om/ [Accessed 2012-04-23].

Shanshui 2012c. *Project Introduction.* Shanshui Conservation Center. Available: http://www.shanshui.org/Landscape/Contact.Shtml [Accessed 2012-04-30].

Shen, X.,Li, S.,Chen, N.,Li, S.,Mcshea, W. J. & Lu, Z. 2012. Does science replace traditions? Correlates between traditional Tibetan culture and local bird diversity in Southwest China. *Biological Conservation,* 145(2012) 160-170.

Shen, Y. Y.,Ma, Y. S. & Li, Q. Y. 2004. Grassland restoration in Dari County, Qinghai Province. In: Katsigris.

In: E., X., J. & White, T. A. (eds.) *Implementing the Natural Forest Protection Program and the Sloping Lands Conversion Programs: Lessons and Policy Implications, CCICED-WCFGTF.* Beijing, China:Beijing Forestry Publishing House.

Simmel, G. 1955. *Conflict,* New York Free Press.

Sommerville, M. & Rapport, D. 2000. *Transdisciplinary Recreating Integrated Knowledge,* Oxford EOLSS Publishers.

Tian, Z. 2011. The stories told by Tibetan people. *南方日报 Newspaper*, 2011-05-10, p.B16.

Wang, Y. B.,Wang, G. X.,Sheng, Y. P. & Wang, W. L. 2005. Degradation of the ecoenvironmental system in alpine meadow on the Tibetan plateau. *Journal of Glaciology and Geocryrology,* 27: 634–640.

Westley, F. 1995. Governing design: The management of social systems and ecosystems management. *In:* Gunderson, L. H. & Holling, C. S. (eds.) *Barriers and Bridges to the Renewal of Ecosystems and Institutions.* New York:Columbia University Press.

Williams, D. M. 2002. *Beyond great walls: environment, identity, and development on the Chinese grasslands of inner Mongolia,* Stanford, California, USA.: Stanford University Press

Wu, N. 1997. 'Indigenous Knowledge and Sustainable Approaches for the Maintenance of Biodiversity in Nomad Society' *Die Erde* 128: 67-80.

Wu, N. 2003. Social, cultural and economic context of yak production *In:* Li, C., Winerr, G., Han, J. & Long, R. (eds.) *The Yak.* Bangkok,Thailand Food and Agriculture Organization of the United Nations, Regional Office for Asia and the Pacific.

Xin, H. 2008. A Green Fervor Sweeps the Qinghai-Tibetan Plateau. *Science* 321.

Xu, J.,Li, B. & Waltner-Toews, D. 2004. Habitat of Tibetan Nature and Culture. *EcoHealth,* 1**,** 327-329.

Xu, J.,Ma, E. T.,Tashi, D.,Fu, Y.,Lu, Z. & Melick, D. 2005. Integrating Sacred Knowledge for Conservation: Cultures and Landscapes in Southwest China. *Ecology and Society* 10(2):7.

Xu, J. & Ribot, J. 2004. Decentralization and accountability in forest management: Case from Yunnan, Southwest China. *The European Journal of Development Research* 14:153-173.

Yang, G. 2010. Civic environmentalism. *In:* Hsing, Y.-t. & Lee, C. K. (eds.) *Reclaming Chinese Society:The new social activism.* USA and Canada Routledge.

Yeh, E. T. 2005. Green Governmentality and Pastoralism in Western China:' Converting Pastures to grasslands'. *Nomadic Peoples,* 9.

Yeh, E. T. 2009. Greening western China: A critical view. *Geoforum,* 40:884-894.

Zhang, L.,Tu, Q. & Mol, A. P. J. 2008. Payment for Environmental Services: The Sloping Land Conversion Program in Ningxia Autonomous Region of China. *China & World Economy* 16(2):66-81.

APPENDIX

Appendix A: Background of the Sino-Canadian Project11

Policy Options on Sustainability in the Three Rivers Sources Region of the Qinghai-Tibet Plateau

Located on the "world's roof", the Qinghai-Tibet Plateau, the Three River Sources Region is the cradle of the three great rivers as its name implies, they are the Yangtze, the Yellow River and the Lancang River (upper reaches of the Mekong). The majority of the rivers in Asia flow from this region. It is climatically a sensitive area in the Northern Hemisphere, the ecological function of whom would directly threat southeastern Asia. In recent years, global warming and shrinking of glaciers and the snow pack have directly affected the water source supply to the plateau lakes and wetlands and lead to an extremely fragile ecology that brings many negative impacts to the downstream ecological safety and local sustainable development.

Such ecological circumstances is a mirror of the relation between mankind and nature, before which the local government falls to a dilemma of economic development and environmental protection as there is no available systematic policy options on economic, social and environmental sustainability based on an all-round analysis. So it is definitely of great significance to explore such policy options which prioritize the human's development at all respects with a precondition of better protection of the environment in the Three Rivers Sources Region.

Approved by the Ministry of Commerce and granted by *Canada International Development Association*, this project aims at providing international expertise and assistance on the environmental control in west China. Canada has earlier findings on sustainable development and has developed a series of expertise and practice. There are many similarities between the Northwest Territory of Canada and Qinghai with regard to their natural environment. Therefore it is of great help to make our own counterpart policies by learning from Canada on the practice of sustainable economic development in less developed ethnic- inhabited areas.

[11] Li, Y. 2007. *Policy Options on Sustainability in the Three River Sources Region of the Qinghai-Tibet Plateau,* Xining, China: Qinghai People's Press

Appendix B: Data Collection

Appendix B1: Semi-structure Interview Questions

Theme One - Policy Initiative

In the recently issued national-level document – *2011 Ecological Protection for Three Rivers Source National Comprehensive Experimental Zone Overall Program (Overall Program),* the government mentioned several key aspects in order to further the ecological improvement. I highlighted three important points which are relevant to the purpose of this study:

1. Respect the local culture and involve the local herders for ecological construction programs
2. Encourage the public and civil organization to participate
3. Establish a new green performance evaluation mechanism in order to change the local administration's conceptualization of performance evaluation and reverse their value of development with focus on economic growth

Compared with the 2005 document- *Three Rivers Source Nature and Ecological Protection and Construction Master Plan*, the local people are now seen as the main protectors rather than the threat for the local environment.

- What is your opinion about this process of change? What do you think are the factors that lead to this policy transition?
- What do you think is the role of Shanshui in this process?
- What are the challenges and opportunities for Shanshui to implement the conservation programs during this transition process? How did Shanshui overcome those challenges and go beyond the limiting conditions?
- In the overall program document, the government initiated to establish a new green performance evaluation mechanism. Over the past years, Shanshui endeavors to create a platform to "voice" the local culture in Three Rivers Source region (e.g. the Eye of Community Project) to the outside society and policy-makers. Have you seen the change of governments' opinions on local people's way of natural resources management and their value on the local culture?
- Do you know anything about the follow-up programs or direction for ecological construction after the 2011 document?
- What do you think are the challenges and opportunities to improve conservation planning, under the existing rules of political language?

Theme Two – Science

·In the context of Three Rivers Source region, what kind of natural science researches has Shanshui been involved?
·In the Holy Mountain and Sacred Lake Project initiated by Lu Zhi (founder of Shanshui), how did Shanshui manage to involve multiple actors with different backgrounds? What kind of role does Shanshui play in this project to coordinate different actors?
·In the context of Three Rivers Source region, what are the challenges to implement transdisciplinary research for ecosystem management in the future?
·How do you think of the roles of scientists/ biologists to support improved environmental decision-making?

Theme Three – Building collaborative social network

·What local institutions Shanshui has partnered with so far?
·How does Shanshui construct trust-building with the local actors? How does Shanshui mediate different interests/value shared by different actors?
·Given the importance to build a collaborative network for ecosystem management in the context of Three Rivers Source region, what messages or implications did the Three Rivers Source Forum bring in?

Appendix B2: List of Interviewees

Lu Zhi – Founder of Shanshui Conservation Center, Professor of the college of Life Science in Beijing University, biologists. Personal interview conducted in Shanshui Beijing office at 24th Feb, 2012.

Li Shengzhi – Field Programs Manager. Interview conducted via phone at 2rd Feb, 2012.

Yin Hang – Snow Leopard Protection Program Assistant. Personal interview conducted in Shanshui Beijing Office at 6th Feb, 2012

Lu Bin - Project manager of Eye of Community. Personal interview conducted in Shanshui Beijing Office at 27th Feb, 2012

Liu Jianqiang – Journalist, vice-editor of *CHINADIALOGUE,* author of the book *Tibetan Legend,* the publishing of which is funded by Shanshui. Personal interview conducted in Beijing at 27th Feb, 2012

(During 2006- 2008 year, Liu was invited by Shanshui to participate into the Holy Mountain and Sacred Lake project. During this time, Liu conducted interviews in the local communities of Three Rivers Source region and some other Tibetan areas in southwestern China, with focus on the social issues of ecological protection. His book *Tibetan Legend* was published in 2010 and has gain considerable influence among the public. The book activates people's interest on Tibetan culture and its relation with local people's conservation action.)

Shen Xiaoli – PH.D, the main researcher in charge of the *Holy Mountain and Sacred Lake* Project initiated by Shanshui. Interview via phone conducted at 16th Feb, 2012.

Appendix C: Six documentaries produced by the local Tibetans- from the Eye of Community Project

FILM	PRODUCER	CONTENT
Anzi (Saddle)	Luo Zhu	With the update of the modes of transportation in the Tibetan communities, the herders lose their traditional knowledge to make a spectacular and exquisite saddle. And the saddles have also gradually disappeared from people's daily life..
Suyou (Tibetan Butter)	Le Wang	Beyond the staple food - the 'Butter Tea' for the Tibetans
Tao (Pottery)	Chun Tian	The popularity of the hand-made potteries in the village, opens the dusty memory of the elder Tibetans.
A gift from Nature	Zhaxisang'e Nacuo	It is a story about how Mother Nature helped the local community to overcome the large-scale hunger during 1961.
Suori's Home and the Snow Leopard	Zhu Jia	For the Suos, whose family live in the foot of the Sacred Mountain *Nian Bao Yu Ze*, as the influence of environmental change, the snow leopard has become dangerous to their livestock nowadays.
Niu Feng (the Cow Dung)	Lan Ze	Cow dung- the soul of grassland

The Cow Dung

Source[12]: Tibetcul, 2012

[12] http://news.tibetcul.com/movie/201104/26369.html