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Risk and Social Construction of Nuclear Power Development in China:

Local People's Participation in Civil Nuclear Issues in China at the start of the 21st Century

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Declaration

I hereby declare that this thesis was composed by the author, the work contained herein is my own except where specific reference is made to other sources, and it has not been submitted for any other degree or professional qualification except as specified.

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Abstract

China's civil nuclear power programme is a sensitive topic which has seldom been researched by social or political scientists inside or outside of China. In the past, public participation activities in relation to nuclear power issues in China were rare. However, in 2005, when the central government decided to promote civil nuclear development and build 40 more nuclear reactors within the next 20 years, the public started to become aware of the potential environmental risks that might be caused by nuclear power sites. Based on six months of ethnographic fieldwork conducted between 2007-2008, this thesis represents the first in-depth study of local people's ways of participation concerning a potential inland nuclear power project in China. It provides rich empirical materials to illustrate local people's differing perceptions of nuclear power and its risks.

The thesis reviews developments in the sociological theorisation of 'risk' and, by bringing this body of literature into dialogue with the empirical case study, explores its possibilities and limitations as a means of understanding the social construction of risk in contemporary China. In exploring the social, cultural and political context of risk construction, it illustrates how political power and social status influence local people's participation in nuclear power issues. It also demonstrates that citizens' growing environmental risk awareness helps to create space within which they can make their voices heard and, simultaneously, that generating open spaces for people to express their opinions helps to shape their awareness of environmental risk. The central conclusion of the analysis is that, in the context of Chinese society political power, by which I mean policy makers' ideology and all levels of governments, plays a particularly crucial role in the definition, management and governance of nuclear risk.

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List of Abbreviations

CAEA	China Atomic Energy Authority
CAIN	China Atomic Information Network
CCP	Chinese Communist Party
CGNPG	China Guangdong Nuclear Power Group
CNPTC	China Nuclear Power Technology Corporation
CNNC	China National Nuclear Corporation
CSA	China Science Academy
DRCGP	Development and Reform Commission of Guangdong Province
DRCSC	Development Research Centre of the State Council P. R China
EHT	Extra High Tension
GNPC	Guangdong Nuclear Power Corporation
GONGO	Government organized Non- Government Organization
HAB	harmful algal bloom
HLW	High-level Waste
IEAE	International Atomic Energy Agency
ILW	intermediate-level wastes
INNET	Institute of Nuclear and New Energy Technology
LLW	low-level wastes
LNG	liquefied national gas
LPC	Local People's Congress
MPC	Municipal People's Congress
MPCC	Municipal Political Consultative Conference
MPDs	Municipal PDs
MNI	Ministry of Nuclear Industry
MWE	Ministry of Water and Electricity
NDRC	National Development and Reform Commission
NGO	Non-government Organization
NNSA	National Nuclear Safety Authority
NPC	National People's Congress
NPG	National Power Grid
NRSMD	National Radiation Sources Management Division
NSTIC	National Security Technology and Industry Commission

PC	People’s Congress
PDs	People’s Deputies
PPC	Provincial People’s Congress
PPDs	Provincial PDs
QRA	quantitative risk assessment
SCSIO	South China Sea Institute of Oceanology
SEPA	Station Environmental Protection Administration
SEPB	Shantou Environmental Protection Bureau
SMMB	Second Ministry of Machine Building
SNERDI	Shanghai Nuclear Engineering, Research and Design Institute
SOE	State Owned Entrepreneurs
SSK	Social Scientific Knowledge
STS	Science & Technology Studies
SWT	Sea Water Temperature
TVPC	Town and Village People’s Congress
UKAEA	UK Atomic Energy Authority

Table of context

Chapter 1: Introduction

As Chinese people who were born in the 1980s, we were seen as the generation that was growing up alongside the country while it was in the process of reform and opening up. Our generation witnessed the country's rapid economic development in the areas of science, technology and industry, and its development as well in areas concerning environmental degradation. Most of us who lived in the cities had the experience of moving out of flats in five- or six-floor buildings without elevator access, to flats in buildings with elevator access to forty floors or more. From the mid-1990s to the beginning of the 21st century, people thought this moving process symbolised an upgrade to modern living. More recently, however, those able to afford housing located at the edge of big cities, have been considered as enjoying a better natural living environment and better lifestyles in general. Chinese people who have benefited from the country's economic development (especially in big cities) now pay more and more attention to their well-being besides money-earning. They are becoming aware of the environmental risks that come with scientific, technological and industrial development. Since the 80s, the country has become the leading factory for world manufacturers. In order to support huge manufacturing demands, the country faces a continuing challenge to its energy supply; it also faces an ongoing challenge to pay attention to industrial air, water and soil pollution. An over-dependence on coal power has caused the country to become the world's number one emitter of carbon dioxide (Zbicz 2009). The conflict between economic and industrial development, and the related negative effects on nature and the

environment, is becoming one of the most serious conflicts in Chinese society. Along with this conflict, it seems that ‘risk’ has become an unavoidable concept worth being discussed in the Chinese context. It is important to consider how countryside areas and less developed regions can catch up with the country’s modern development – and how risks can be minimised in the process. Sustainable development and the building of an environmentally friendly society are national policies in China.

Risk is a concept that has been widely discussed by Western sociologists and anthropologists since the 1970s. The ‘risk’ I discuss in my thesis is not the same as the risk with which people are familiar in economic and financial areas. It is the risk related to nature, and especially the risk caused by science and technology development and the influence of that development on nature. This kind of risk will typically be discussed in relation to modern technology, such as nuclear power projects, GM food, environmental crises such as global warming, and also health disasters, such as BSE. However, as a student from a totally different cultural, social and political context, it is sometimes difficult to understand how different disciplines and subjects (especially in Western developed countries) interpret definitions and perceptions of risk.

This research intends to see how risk – as a concept and discourse derived and embedded within Western rationales – makes sense in the local context in Chinese society. In my thesis, China’s civil nuclear power development has been used as a case study for interpreting the concept of risk in Chinese society. This research uses

the ethnography-style case study as a methodology for analysing the controversy over the potential inland nuclear power project inside Guangdong province.

1.1 Context of China's civil nuclear power development

Nuclear power has been widely used as a case study through which to discuss risk issues. As a kind of powerful technology that has been used in military and civil energy recourse, nuclear power has a special technological and scientific background, and is also a highly politically-orientated technology. When the UK and the US first discovered the use of nuclear power as energy, it was thought that human beings had stolen the secret from nature itself (Welsh 2000). In France, the development of a nuclear industry after World War II was seen as a way for the country to recover its national identity as a technological nation (Hecht 1998). Although nuclear power has been used as the 'big science' for securing the leadership position of Western Industrial Countries, debates and concerns about technological risks have been ongoing. Moreover, accidents which happened in Windscale, UK in 1957, only one year after the world's first nuclear power station was operated, and later accidents such as Three Mile Island and Chernobyl (which happened in the 70s and 80s), have caused nuclear power development to face more serious challenges and difficulties. Nuclear power has become a controversial energy resource. On the one hand, its value is attractive. On the other hand, the public are concerned about the risks. Recently, because of the rise in oil prices and an increased instability with the oil supply, the UK government started new discussions about nuclear energy. China is a developing country that faces huge difficulties in energy supply and demand, and

also greenhouse gas release pressure. The country is promoting nuclear power as a long-term energy resource. According to the development plan, 40 more nuclear reactors will be built by 2020 (NDRC 2007). China's civil nuclear power development model is different from the UK and US model. Firstly, this is because the nuclear power development policy is decided by the central government. Provincial governments cooperate with nuclear power companies to compete for nuclear power projects to be located in their areas. Secondly, the country mostly depends on technologies and equipments imported from foreign countries. International nuclear power companies bid for China's nuclear power projects. And thirdly, the electricity market is not completely market-orientated. Although the price of nuclear power electricity is still more expensive than coal-fired and hydropower electricity, the National Power Grid (NPG) buys and sells all electricity from nuclear power. According to these reasons, when policy-makers make decisions about nuclear power policy, they do not simply consider technological and economic elements. They also consider energy safety, national security and military issues. It is true that policy-makers in Western countries also consider these issues. Just like Welsh has claimed, "*At the national level nuclear capability became a defining feature of the political, ideological and economic anatomy of both capitalist and socialist states*" (Welsh 2000). However, in China strategic considerations (national security, energy safety, military industry) are much more than economic and technological considerations in nuclear power issues. Recently, thanks to an institutional reform of the electricity industry and some resistance activity to civil nuclear power projects, civil nuclear power development is now on the way of transferring from government to governance. It is this complicated industry and the

special moment of its transformation which offer rich empirical sources for my research.

1.2 Academic Objectives

This research originates from three theoretical perspectives. Firstly, I was fascinated by the relationship between risk, science and modernity in Beck's risk society theory (1992a, 1992b; see chapter 2). Beck's theory had a strong effect on me from the very beginning, which made me feel that I had come across a totally different social organisation system in modern Western society. I started to formulate the question: if China keeps following the model of modernity used by Western developed countries, will Chinese society face the same risks and uncertainties? Is there any way that Chinese society – which developed in an entirely different historical, cultural and political background – can learn from modern development and minimise its risks? This is how I first started to try to see the applicability of Beck's risk society theory to China. Through the research process, I became aware of the limitations of using Beck's theory as a theoretical background for interpreting empirical cases. I came across Wynne's critiques about Beck's theory. Wynne (1996, 2001; see chapter 2) offers a much deeper consideration of the relationship between real existing risk and people's risk perception. Wynne offers rich empirical research to interpret and analyse how lay people's knowledge of risk was denied and ignored by scientists and experts, and to demonstrate how ignorant lay people were about their own knowledge of risk. There are also other criticisms (Elliott 2002; Irwin 2001; Jasanoff

1999; Yearley 2005) about Beck's theory. Wynne's insightful argument about lay knowledge constructs my first academic objective.

Secondly, I intend to analyse the power – and space – that is needed in order for the public to define risks and make their voices heard in environmental issues. Jasanoff (1998), in science studies, discusses three regulatory, policy decision-making models that link policy-making with public perceptions of risk. In Chinese studies, Wang (2008) discusses six models of the public issue agenda and policy decision-making. Wang's model represents the linkage of public policy and policy decision-making in the Chinese context. I found that both models (Jasanoff's and Wang's) represent the important position of power in policy decision-making. The discussion of power in environmental sociology suggests that risk constructions are controlled by industrial and scientific authorities. In order to gain a certain power to define risk and to influence policy decision-making, individuals have to cooperate as groups or join together in other environmental protection organisations (Freudenburg & Pastor). However, a country's public policy style is continually influenced by the public's participation activities, and vice versa. The second point I intend to research in my thesis is the relationship between power and public space, and the people's participation in governance of environmental risk.

The third academic purpose of this study is to provide ethnographic data from the field. Nuclear power has been one of the most popular empirical cases for risk studies in Western countries (Beck 1992b; Irwin 2001; Pidgeon, Lorenzoni & Poortinga 2008; Welsh 2000; Wynne 1982; Zonabend 1993). In China, however,

nuclear power is a sensitive topic that has rarely been discussed. The third main contribution of this research, therefore, is to use China's civil nuclear power as an empirical extension of Western theory in the Chinese context.

1.3 The unit of research

The research uses the controversy of the potential inland nuclear power project in the upper reaches of the Han River as the single case for in-depth study and analysis. The case concerns a controversy over a potential inland nuclear power project that might be located in the upper reaches of the Han River. The Han River is one of the main rivers in the east area of Guangdong province. It is the main drinking water resource for over 10,000,000 people in the lower reaches. It was reported that the three locations (two in the Dapu townland and one in the Fengshun townland; see map 5.3 in chapter 5) had passed the preliminary test for building the inland nuclear power site. The news provoked debates about the potential nuclear power project, and people in the lower reaches began to worry that their drinking water resource might be polluted. People's Deputies (PDs) from two of the main cities in the lower reaches, Chaozhou and Shantou, asked for an inquiry meeting at the Provincial People's Congress. In the inquiry meeting, officials from Guangdong provincial government and government agencies – along with experts from China Guangdong Nuclear Power Group (CGNPG), had a face-to-face meeting with PDs and answered questions and concerns directly. After the inquiry meeting, PDs also produced official paperwork for inquiry and the Guangdong Development and Reform Commission (GDRC) gave feedback to PDs on two different occasions through

official reply letters. My case study starts with this controversy. The fieldwork research was conducted in Dapu townland, Chaozhou city and Shantou city in order to understand the local context of the three locations, people's daily lives, the local political system (mainly focusing on the Local People's Congress), and the local understanding of nuclear power and nuclear risk. In the two phases of fieldwork (three months each), over 60 formal and informal interviews were conducted with local residents in the townland, farmers in the villages, local government officials, local civil servants, PDs who attended the inquiry meeting, journalists who reported the news, and other officials and experts in Guangzhou city and Beijing.

1.4 Thesis structure

Following this introductory chapter, Chapter 2 provides a literature review of relevant theories and scholarship concerning risk, science and society. Chapter 3 offers the historical background of China's civil nuclear power development and briefly introduces general information about China's civil nuclear power stations and reactors; the decision-making of nuclear power stations; the economic and technological status of the country's civil nuclear industries; and also the government and governance of civil nuclear power in China. Chapter 4 is the methodology chapter that discusses the process of the fieldwork research, problem resolving in the field, and the various methods for case and data collection. Chapters 5 to 8 are the four main field-finding chapters. Chapter 5 mainly introduces the local context of the Han River basin and the townland where I conducted the ethnographic research; the local geographical situation (with maps and pictures); the local living conditions; and

the local culture and environmental awareness. Chapter 6 focuses on local understandings of nuclear power and its risks, constructions of trust and ignorance regarding nuclear power and its risks, and risk-benefit trade-offs. Chapter 7 mainly discusses power issues and bottom-up politics in the local context. The main point of analysis is the Local People's Congress. Chapter 8 is about the media and online communities. Chapter 9 is the final discussion and conclusion chapter.

Chapter 2 Literature Review

2.1 Introduction

Risk has been an important topic in the multiple disciplines of social research in Western countries for over thirty years. Authors have discussed risk in the disciplines of Science and Technology Studies (STS), the Sociology of Scientific Knowledge (SSK) and Environmental Sociology. Leading theorists researching risk include: Beck and Giddens (risk society and reflexive modernisation), Douglas and Wildasky (risk and culture), Foucault ('governmentality' theorists) (Lupton 1999:24). In his risk society theory, Beck considers risks in knowledge and perception of risks as the same (Beck 1992b). In his later work Beck displays ambivalence as to whether risk is real or socially constructed. Besides these leading theorists and their theories about risk, in the area of science studies risk is also a traditional theme (Yearley 2005). In the SSK discipline, authors like Wynne and Irwin discuss the influence of interests, power and institutions in shaping lay and expert knowledge of risk (Jasanoff 1998). The purpose of reviewing Beck and Giddens' risk theory and critiques through the STS/SSK discipline is to clarify one key theoretical concept of the thesis: whether to treat risk in a realist manner or a subjective constructing process according to different people's perception. In this chapter I firstly conduct a critical review of risk society theory and reflexive modernisation through the SSK discipline. In this section, I intend to review how authors in the SSK discipline point out the problematic nature of Beck and Giddens' theory about risk when they treat risk as a realistic matter from the very beginning. Secondly, I review literature about the

division between lay and expert knowledge of risk. Thirdly, I focus on Jasanoff's three models which link risk perception and policy decision-making. Fourthly, I review literature about risk in the environmental sociology discipline, which focuses on the risk constructing and defining process. Fifthly, I try to link those arguments in the previous section with the concept of risk perception and participation in risk governance. The final two parts are about literature in China Studies about China's risk and changing social class and models of public agenda and policy decision-making.

2.2 Critical Review of Risk Society and Reflexive Modernisation

In this section I review Beck and Giddens' theory of risk, modernity and reflexive modernisation. I have put this in the first section of the chapter because of my special interest in the risk society theory and the definition of risk which is quite different from what I am familiar with in the Chinese context, for example risk in the financial market, and risk from smoking. Some social scholars claim that 'risk' finds its origins in the Latin word *risco* and was first used as a navigational term by sailors entering uncharted waters (Giddens 1999; Lupton 1999; Strydom 2002). Risks have existed in various aspects of social lives for a long time; for example, investment will bring economic risks; smoking will bring health risks; driving cars will bring safety risks. Risk means the possibility for bad things to happen. However it does not mean that the bad things *do* happen, and no one knows *when* they will happen; for example, smoking carries the risk of cancer, but it does not mean people who smoke will

definitely get cancer. However in Beck's theory, "a risk, for him, is another word for a hazard or danger" (Lupton 1999:59). In the very beginning of my PhD study I had the notion that modern Western society is just like what Beck has described in his book 'Risk Society: Towards a New Modernity'. I assumed this was especially the case for the risk of nuclear power which he uses to represent the kind of risk he analyses in his thesis. In the risk society as Beck has described it, the development of science and technology no longer primarily distributes benefits as they used to do in the industrial society, but distributes risk (Beck 1992b). Giddens defines this kind of risk as 'manufactured risks' (Giddens 1999), and claims that this manufactured risk is "created by the very impact of our developing knowledge upon the world" (Giddens 1999:26); given its novelty, people have very little experience of dealing with it, and it is not insurable or calculable. Both Beck and Giddens claim that environmental risks such as global warming and the hole in the ozone layer should be counted as so-called 'manufactured risks', being what we have done to nature. Certainly, manufactured risk does not refer only to nature and the environment. It is also represented in other aspects of people's lives as well. However, risks relating to the environment and nature are the main issues I discuss in my thesis.

Beck and Giddens believe that it is the development of science and technology in the modernisation process of Western countries that creates this kind of risk which makes people's lives full of uncertainty. They also believe that the uncertainty that the public have about their lives in modern society creates a new social regulation system, and the discourse of risk is the key topic in this system. Giddens claims that "risk was supposed to be a way of regulating the future, of normalising it and

bringing it under our dominion" (Giddens 1999:26). In this section I will summarise three main criticisms of arguments that Beck makes about risk and modernity which are relevant to my thesis.

Firstly, Beck overemphasised the negative thoughts that the public generally have about modernity and especially developments in science and technology.

"'*Risk society' means an epoch in which the dark sides of progress increasingly come to dominate social debates. What no one saw and no one wanted – self-endangerment and the devastation of nature – is becoming the motive force of history*." (Beck 1995:2)

Beck claims that in the risk society science and technology change from key social values to troublemakers. Developments in science and technology and the public's concerns about the risks caused by these developments become the main conflict of the society. This will lead to a new social system.

"*We do not yet live in a risk society, but we also no longer live only within distribution conflicts of scarcity societies. To the extent that this transition occurs, there will be a real transformation of society which will lead us out of the previous models of thought and action*." (Beck 1992b:20)

Simply put, Beck believes that the dark side of science and technology development will take over the world in the coming future. People worry about everything including their daily drinking water, food, the air they breathe, and also unpredictable harms such as nuclear pollution and so on. Irwin claims that although environmental risks like nuclear radiation and global warming are horrifying, they are not yet central to people's lives compared to other ordinary everyday risks like poverty and unemployment (Irwin 2001). Moreover, Beck ignores the 'high level of public support for new technologies' (Irwin 2001:65). Although science and technology developments did bring with them controversies and problems such as nuclear power and GM food, this does not change the fact that technological innovation is essential to make people's lives more convenient and advanced. Welsh argues that techniques will not destroy tradition; moreover, it is a crucial way for tradition to be reinvented within modernity (Welsh 2000). Dicknes (1992) claims that Beck does not consider what the public really thinks; he simply puts down his own critical thoughts on society (Wilkinson 2001). My field findings on local people's understanding of nuclear risk (see chapter 5 and 6) indicate that in the local context, people do not actually worry so much about risks from nuclear power projects. Compared to risks and difficulties they face every day, nuclear technology sometimes is actually seen as an opportunity rather than a risk.

Secondly, Beck believes that risk will end class inequality in society. Risks like nuclear pollution and global warming are equally distributed to people whether they are wealthy or in higher social classes. In industrial and modern society, wealth and higher social classes mean the ability to avoid some social risks, such as

unemployment, poverty and hunger. Rich people will be able to buy organic food which is considered much safer than normal supermarket products. However, in the risk society, risk is coming globally and is unavoidable; the wealthy and the poor are equally affected by risks such as global warming.

Yearley believes that Beck's claims about equality of risk in environmental issues are incorrect. Environmental justice movements provide good examples in showing that the environmental risks which Beck talks about in risk society are not equally distributed to everyone (Yearley 2005). A lot of harmful chemical factories and polluting industries are situated close to residential areas inhabited by poor people. "Environmental 'bads' are still often distributed quite unequally along ethical, gender and class lines" (Yearley 2005:141). My field findings also point to the inequalities in the location selection of potential nuclear power sites. The poor economic conditions and low population are reasons why Dapu townland has been picked up as the potential location site of a nuclear power project rather than economically developed and rich cities in Guangdong (details of Dapu townland will be discussed in chapter 5).

Thirdly, Beck takes for granted lay people's knowledge of risk and science, and also their ability to be reflexive on expert systems and institutions. Beck believes that people's concerns and perceptions of non-accessible and non-insurable risks give them power to challenge experts and authorities. "*Beck's analysis of the 'risk society' suggests that centralised institutions such as national governments are fundamentally incapable of responding to contemporary environmental and risk*

concerns" (Irwin 2001:52). Apart from his claims about institutions, Beck also points out the lost function of expertise, since experts and authorities would not be able to give convincing solutions to this kind of risk. This provides individual power in the public sphere to choose one's way of life, which never previously happened in any kind of social system. Because of the existence of manufactured risk, people gain the power to become involved in defining and managing risk. This is the so-called 'individualisation' in Beck's theory. People's lives in more and more areas escape the control of traditional politics, cultures and experiences. *"People must choose paths for a more rewarding life – all of which requires planning and rationalisation, deliberation and engagement"* (Elliott 2002:298). Elliott (2002) claims that Beck's idea of individualisation does not consider the influence of class and economic context on people's choices and decision-making. Today, even in Western capitalist society, the division between rich and poor is getting bigger, and class difference is distinctive, just as in socialist countries like China[1]. People do not have equal access to the resources and ability to define risks even though these risks may be equally distributed to them.

"*It has also become evident – and this is crucial – that one must be able to deploy certain educational resources, symbolic goods, cultural and media capabilities, as well as cognitive and affective aptitudes, in order to count as a 'player' in the privatisation of risk-detection and risk-management. People who cannot deploy such resources and capabilities, often the result of various material and class inequalities, are likely to find themselves further disadvantaged and marginalised in a new world order reflexive modernisation*" (Elliott 2002:305).

[1]Details of China's income inequality, class and social status will be discussed in 2.6.

In Beck's risk society theory, he treats risk as a realistic matter that comes along with society's development of science and technology. In STS/SSK literature authors generally discuss people's perception of risk. Authors like Wynne and Irwin use empirical cases to research lay people's knowledge about science and risk.

Wynne criticises, firstly, Beck's understanding of lay people's knowledge of risk. It is not that the public do not trust in institutions to handle real risk, and then react to those institutions and expert systems. In reality, the public's knowledge of risk is influenced and shaped by cultural and political background, and at the same time depends on institutions and expert systems. Secondly, the public would not be able to react to those institutions and expert systems because they are dependent on them for the control of risk (Wynne 1996). The social and cultural framing of risk which is represented in the case of the proposed inland nuclear project is what I want to discuss in this thesis. It matches Wynne's idea and critiques of Beck's and Giddens' arguments about lay and expert knowledge of risk which will be discussed further in the next section.

2.3 Lay and Expert Knowledge of Risk

Beck and Giddens believe that risks in modern society are real, universal and unmanageable. There is another group of authors (Wynne, Lash, Irwin, Jasanoff, Yearley, Hannigan) who discuss risk through constructivist epistemology. These authors, from a background of science studies, the public understanding of science and environmental policy analysis, focus more on lay knowledge and public expertise rather than the institution of science (Yearley 2000). Moreover, Beck and

Giddens have been criticised for "their uncritical reproduction of 'realist' concepts of scientific knowledge" (Wynne 1996:45). Wynne and Lash suggest that: "they have understated the importance of the cultural nature of science, and especially of implication of fundamental indeterminacies in knowledge which a cultural perspective should be able to capture" (Wynne 1996:5). Wynne thinks that Beck and Giddens take for granted lay and expert knowledge about risk. They do not consider the power embedded in institutions and expert systems and their influence on lay understanding of risk and science. Wynne also discusses the ambivalence of lay people's trust and their dependency, which I will address later in this section and also with my field findings in chapter 6.

2.3.1 Defining lay knowledge of risk

Before analysing the division between lay and expert knowledge of risk, it is first important to review how authors define lay knowledge of risk. Wynne believes that lay people's knowledge of risk is based on their cultural backgrounds and everyday experiences, and is also influenced by lay people's ignorance[2].Wynne argues that lay people and scientists might have different but equally important expertise with regard to local risks (Yearley 2000). However, the knowledge and expertise of lay people have been ignored, and they are also ignorant about the knowledge they have. Scientific definitions of risk have been seen as "objective, natural and universal representations" (Wynne 2005:70), while lay knowledge has been seen as having "no

[2]"Ignorance: 'We don't know what we don't know.' In other words, we don't even know the main parameters for sure." Wynne, Brian (1992b) 'Uncertainty and Environmental Learning ', *Global Environmental Change* 2: 111-27.

real content or authority beyond the parochial, subjective and emotional world of its carriers" (Wynne 1996:63). Wynne's famous sheep farmer case supports his criticism. The case concerns a sudden ban on hill sheep sales in the UK six weeks after the Chernobyl nuclear accident in 1986, because radioactive clouds passed over the UK. Scientists and experts only expected the ban to last for three weeks; however, their advice was based on incorrect assumptions about the soil[3]. "Because they had assumed that the knowledge drawn from particular conditions was universal knowledge the scientists did not understand that in these conditions the sheep were exposed to continual recontamination and hence probably much longer-term restriction" (Wynne 1996:66). Some hill farms in Cumbria and North Wales could not sell their sheep for six years (more than a hundred sheep farm bans were still in place in Cumbria and Snowdonia in 2010). In this case lay people (sheep farmers) actually have certain knowledge of the soil and climate, as they deal with the natural situation all the time. On the one hand, the scientists and experts only conducted the research in labs without knowing the real soil and climate conditions. However, they misunderstood local people's scientific knowledge. It is not because the public do not have enough knowledge; it is because their knowledge has been ignored. On the other hand, farmers did not know how much they knew. They did not at first think of their everyday life experience as 'knowledge'. Wynne (2001, 2005) believes that experts misunderstand the public concern of uncertainty. It is not because the public worry about uncertainty and want to have zero risk. It is because lay people do not know what they know or do not know, so they worry. Wynne points out that lay

[3]"The scientists made a spectacular mistake in predicting the behaviour of radiocaesium in the environment of interest. It was gradually learned that the reason for the mistake was that the original prediction had been based on the observed behaviour of caesium in alkaline clay soils, whereas those of the areas in question were acid peaty soils." Ibid.

people's ignorance of their knowledge of risk, and experts' and authorities' ignorance of lay knowledge, have been misunderstood as lay people not having enough scientific knowledge so they trust expertise. Besides Wynne, Michael (1996) is another author who analyses public ignorance in SSK. Michael's research indicates that people are actually constructing their attitude to science when they claim ignorance to science. Michael's research about public ignorance to scientific knowledge explains some of my research findings during fieldwork research (for details see 6.3).

2.3.2 Trust

Giddens (1990, 1991, 1994) and Wynne (1996) offer two interpretations of public expressions of trust in those institutions that manage risky local technology. Giddens' interpretation considers trust from a reflexive modernisation approach. In this approach he defines two kinds of trust. The first kind (in 'simple modernity') is present in an expression of unexamined trust in expertise (Giddens 1994). The second kind happens when people obtain scientific knowledge that has been provided by an expert system, and then respond to (are 'reflexive' to) the system and actively choose what to trust (Giddens 1994). The difference between these two kinds of trust is that one is being reflexive to scientific knowledge and the other is not (Szerszynski 1999). Wynne criticises Giddens' interpretation of trust, arguing that:

> "*He (Giddens) thus makes two mistaken and mutually reinforcing assumptions – that the earlier, ostensibly publicly uncontested status of expertise equalled public trust; and that the reflexive processes of late*

modernity in which expertise is widely and openly contested are a result of the choices that have to be deliberately made by people exposed as they are (on this view) to a new dimension of insecurity, namely the problematisation of (supposedly) previously unproblematic expert authority." (Wynne 1996:48)

Wynne's research about the hill sheep-farmers of the Lake District indicates that local people's trust is found through the process of social identity negotiation and also certain levels of dependency among some groups (Wynne 1992a). Here the trust that Wynne discusses is not just tied to the issue of claims of knowledge, but to a broader set of issues of institutional integrity, social dynamics of trust relations, and the way that trust is achieved in different social and cultural contexts. In the hill sheep-farmer case, it is local farmers' identity, their dependency on institutions and also their lack of agency which gave them no choice under the circumstances but to accept the credibility of scientists' advice. My field findings which will be discussed in chapter 6 are incredibly similar to Wynne's case.

2.3.3 Critiques of Objective Risk Assessment

In comparison to lay knowledge, scientific knowledge has been defined as the objective way of understanding risk. Risk assessment as an objective way to measure and calculate risk has been used in policy decision-making processes (Yearley 2005). Policy-makers use risk assessment to calculate how much cost is worth spending on how much risk. However, Yearley (2005) claims that it is difficult to assess risk and cost in a practical way. Firstly, it is difficult to compare risk in different fields: for example risk from transport, industry and agriculture cannot be calculated in the same way. Secondly, the data needed for risk assessment can not be equally provided in different risk issues; for example, there is much more data on car accidents

compared to nuclear accidents. Thirdly, it is hard to quantify risk: for example, “it is just not possible to come to an objective solution to the question of how many severe injuries are equal to an average death” (Yearley 2005:132).

In risk assessment, normally risk is calculated using the standard size of man to represent the average person (Yearley 2005). Yearley uses the case of air-bags to point out the problem of the average person in risk assessment. In the US the average person for a crash test is a standard-size American male weighing around 78kg. The design of air-bags of motor vehicles uses this as a reference point. However, it has been reported that drivers who are shorter or lighter are injured by the inflation of the bag. Obviously, using the average person to represent all passengers in risk calculation posed serious problems for people’s safety.

It is not possible to have an objective or scientific view of risks, since objective risk assessments have a lot of practical problems, and the scientific view of risk is not universal and correct in all conditions. In the sociology of scientific knowledge approach, risk has been considered as socially constructed. In this approach risk is shaped by culture, history and politics in different social contexts (Jasanoff 1999).

2.4 Risk Perception and Policy Decision-Making

In SSK authors like Wynne and Irwin concentrate on how lay people’s knowledge of risks has been ignored and misunderstood. However, neither of them has conducted much analysis on how lay people’s perception of risks is shaped. Psychometric

research on risk perception highlights the distinction between lay people's perception of risk and scientific measured 'actual' risk, and also risk perception has been considered as shaped by "ignorance, prior beliefs, and subjective personal experiences of non-experts" (Jasanoff 1998:91). Although I am not going to discuss the psychometric research on risk perception in my thesis, in this section I review Jasanoff's three models about the relationship between the public's risk perception and public policy (table 2.1).

"*Theories of risk perception are inherently political because they carry within them implicit understandings about how to organise and implement policies for managing risk*" (Jasanoff 1998:93).

In Jasanoff's article "Political Science of Risk Perception" (1998), she uses a new approach beyond the psychometric paradigm, but combines social construction and social theory to put the analysis of risk perception forward in the direction of political science (Jasanoff 1998).

First is the realist model. The main feature of this model is that risk "can be objectively mapped, measured, and controlled" (Jasanoff 1998:94). In this model experts hold the authority of knowledge, and they take over lay knowledge. Risk perception is centralised and controlled by bureaucracies (Jasanoff 1998). The public's fear has been considered as irrational, while expert knowledge has been seen as rational. Expert knowledge has simply been taken as the evidence for policy decision-making due to its higher status in the hierarchy.

The second is the constructive model which considers risk as socially constructed through the process of negotiation and discussion in public participation activities. In this model knowledge is shaped by interactions and stockholders' interests and experiences. Social and cultural factors also influence the shaping of knowledge. Both expert and lay opinions about risk have been considered in the policy decision-making process. Experts' perception of risk should be studied more carefully.

The third model is the discursive model. It shares the idea of risk construction with the second model, while emphasising "the role of professional languages and analytic practices in shaping public perception of risk" (Jasanoff 1998:94). Risk analysis is a specialised and formal term to allocate power to society (Jasanoff 1998). According to the case that Jasanoff discusses about the use of quantitative risk assessment (QRA) in the US regulatory process, this model represents a kind of scientific social movement through which ordinary people understand risk based on QRA. However, this model is different from the simple and instinctive acceptance of the authority of science and expertise in the realist model. It goes into deeper consideration of how QRA-influenced causation, agency and uncertainty determine risk.

In comparison to the realist model, the policy decision-making of the constructive model and discursive model is inclusive rather than hierarchical (Jasanoff 1998). Welsh's (2000) research about the scientific social movement of nuclear power in the UK matches the discursive model. Although Welsh and Jasanoff do not reference

each other, I found a link between the model and the nuclear power scientific social movement in the UK. Welsh points out that there were in fact debates and concerns about nuclear power even from the very first use by the UK government of nuclear weapons. However, there are indications that the public's opposition to nuclear power only began in the 1970s after nuclear power stations had already been built. Welsh claims that the policy decision-making of nuclear projects is not government-dominated as people imagine. There are interactions and negotiations between policy-makers, scientists and experts, and the general public. Welsh also claims that in the initial stage of the UK's nuclear development, politicians have to trust an elite group of theoretical physicists to give them advice (Welsh 2000). In the nuclear case, people's perception of risk is shaped by scientific discourse along with the social scientific movement of nuclear power, and finally decision-making is decided by power and expertise.

From the development process of China's civil nuclear power (details in chapter 3) and the dynamics of public participation (the Daya Bay and Silver Beach cases in chapter 3, and the Han River case in chapters 5, 6, 7, and 8), I suggest that in China, although nuclear power has not yet emerged as a social scientific movement, the decision-making on civil nuclear power is changing from the realist model to the constructive and discursive models.

Model	Epistemology	Location of authority	Policy prescription	
			Style	Mechanism
Realist	realist	expert communities	managerial	expert advice
Constructivist	constructivist	social/interest groups	pluralist	public participation
Discursive	constructivist	professional discourses	critical	social movement

Table 2.1 Models of risk perception for public policy. Source: 'The Political Science of Risk Perception'

2.5 Risk in Environmental Sociology

In the environmental sociology discipline, risk is also a very important topic. Discussions about risk in this context also concentrate on whether risk is real or socially constructed. As I have reviewed in the previous section, a group of authors (Irwin, Wynne, Lash) take the route of public understanding of science to make critical arguments about Beck's risk society theory and point out the division between lay knowledge and expert knowledge about risk. The authors reviewed by Hannigan (Dietz, Renn, Hilgartner & Bosk, Freudenburg & Pastor, Clarke & Short) take the social construction angle and focus on how risk has been socially defined and constructed. Hannigan emphasises the important role of science in pointing out and defining risk in the first step for the public to notice the risk. However, scientific findings and research data also make people confused in risk definition. Hannigan uses the case of how scientific findings on eating salmon caused a dilemma for the public as an example to show how individuals are involved in the process of risk assessment and risk perception (Hannigan 2005). Salmon has been presented as a

good food to reduce the risk of heart disease. The factory-farmed salmon industry has offered ordinary people a cheaper and easier way to access this healthy diet. However, scientific research points out that farmed salmon contains a higher level of toxins which bring with them a higher risk of cancer. Another scientific finding showed that the toxic pollution of farmed salmon is too low to worry about. There are also other scientific findings suggesting that the toxic pollution is only contained in the skin of farmed salmon, and that there will be no risk if people remove the skin before eating. There is even a research report claiming that people should eat more farmed salmon. All these dissident scientific findings about farmed salmon made people afraid to eat it, so they chose wild salmon, or not to eat salmon anymore. However, later on consumers found out that some shops and restaurants sold farmed salmon as 'wild' salmon. After all these claims about salmon, this fish has changed from a good diet to reduce the risk of heart disease to a risky product in itself.

The relationship of power and risk perception is another main theme which is discussed by authors in environmental sociology. Dietz raises issues about whether power differences among social actors decide their perception of risks (Hannigan 2005). Also, he looks at how people's risk perception is rooted in their social context, meaning influence from friends, family and also the mass media (Hannigan 2005). These two issues raised by Dietz will all be discussed together with my field findings in chapters 6, 7 and 8. Freudenburg & Pastor and Clarke & Short point out the important position of power in the risk construction process, which is a crucial point in my field findings chapter (chapter 7). They point out the importance of relationships in negotiating whether something is risky or not. Because of their

power and social positions, institutions, experts and political authorities have more channels to assess and dominate risk construction compared to ordinary individual citizens. After reviewing Freudenburg & Pastor and Clarke & Short's argument about power and risk construction, Hannigan reviews Kaminstein's (1988) case about the 'toxic talk' in New Jersey, USA to support their points.

"Kaminstein (1988) argues that embodied in the public presentation of scientific information at meetings concerning the health and safety aspect of toxic waste dumps is rhetoric of containment which restricts discussion, avoids tough questions and pursues its own agenda." (Hannigan 2005:118-119)

The Lipari landfill in Pitman, New Jersey is one of the worst dump sites in the US. After three years of observing meetings held with local people about how to clear up the landfill in their residential area, Kaminstein points out that local people have not played the important role that they were thought to. Scientific experts and institutions use "toxic talk to stifle discussion and smother public concern" (Hannigan 2005:119). In meetings, documents provided for residents were full of technical information which was hard for them to understand. At one meeting, EPA[4] distributed documents totalling 44 pages. Moreover, residents never received the information that they wanted; they were forced to listen to what consultant scientists wanted to present. The meeting room setting, the presentation style of EPA officials and scientists, and the professional and technological language that scientists and officials used to answer residents' questions all show how government officials and scientific experts

[4] The Environment Protection Administration in the US.

directed the hearing and set the risk agenda. Local residents found it hard to get involved in the meetings and actually develop conversations with scientists, experts and officials, since they used technical, ambiguous and intellectual language in presentations. This 'toxic talk' and the hearing meeting are quite similar to what I saw in the Han River case. Details about the case and analysis will be given in chapter 7.

2.5 Perception and participation of risk governance

Risk governance is a wide topic which can cover almost all issues about risk in both the scientific-technology area and the social-cultural area concerning multiple interdisciplinary risk research. The purpose of introducing risk governance is to offer a framework to see "an interplay between governmental institutions, economic forces and civil society actors, such as non-governmental organizations (NGOs)" (Renn 2008:8). Besides this multi-actor participation, risk governance also includes institutions' arrangements (Renn 2008), for example, the institutional transformation of China's civil nuclear industry which I will discuss in chapter 3. In his book "Risk Governance", Renn proposes four consecutive phases of the risk governance framework: "pre-assessment; appraisal; characterization/evaluation; and management" (Renn 2008:47). Renn also claims that: "the four phases correspond to two major challenges of risk governance: generating and collecting knowledge about the risk, and making decisions about how to mitigate, control or otherwise manage it" (Renn 2008:47). Narrowing down Renn's claims about risk governance to the social-cultural risk, I discuss in my thesis risk perception and participation of risk

governance. These are two points of risk governance on which my theoretical framework is focused. one is my review of Beck's theory and critiques; the other is Wynne, Irwin and Yearley's argument about lay knowledge and expertise, which actually attempts to pinpoint the division between risk assessment and lay people's perception of risk. Risk perception is an important indicator in risk governance because of its political relationship to risk management as Jasanoff has claimed. Jasanoff's models about risk perception and policy decision-making are actually good cases of risk governance in Western society. They offer three different models which represent lay people and experts' participation in decision-making on risk issues. However, Renn also points out that risk governance can not be isolated from the social and political context of different countries and regions (Renn 2008). China, as a country which is traditionally administered by strong central government and is now changing to a more open public policy agenda, offers good cases for governance (for details see Wang's six models in 2.7 which show the changing style of decision-making on public issues in China).

In order to integrate risk governance with China's environmental issues, I found that Mol & Carter's article offers insightful points. Mol & Carter (2006) claim that discussing the transition of China's environmental governance is to see the new relationship between the state, market and civil society (Mol & Carter 2006). Intending to answer the question about how China deals with environmental threats and risks faced by the country now and in the near future, Mol groups his analyses into four categories: "political transitions, and the role of economic actors and market dynamics (this section), emerging institutions beyond state and market, and process

of international integration" (Mol & Carter 2006:155). In my case, participation does not make an appearance in all of the four categories. I can only see PDs, the media and people's comments online. Details will be discussed in chapters 7 and 8.

2.6 Risk and the Changing Chinese Society

Theories and concepts about risk in the social research field point to the relationship between risks and social, political and cultural background. Risks have been defined by Beck as the key issue at a certain stage of social development – post-modern society. In my thesis I attempt to extend to Chinese society Beck's theory of risks associated with concepts of risks in the SSK and environmental sociology disciplines. To see the applicability of a theory and concepts in a certain society is not like testing for a disease; there is no answer of an effect or otherwise. The key issue of the thesis is to answer the question: in the modernity development process, how do Chinese people define and understand risks? However, in order to find the answer to this question, first of all we have to know certain social, political and cultural contexts in the changing Chinese society. In order to fulfil this purpose, in this part I intend to review literature on risk and changing social class in Chinese society.

In this section I review some Chinese scholars' articles about risk society and Chinese society, and also some literature about class and Chinese society in the Chinese studies area. The relationship between risk and class is a new topic for Chinese authors in social research. Li Youmei (2008), for example, discusses whether risk distribution will become a new route for China's social structure

reorganisation after the distribution of wealth. Lin Ting and Xu Doudou (2008) discuss the influence of social risk on China's changes in class. Li's article analyses China's social conflicts along with economic development in the recent thirty years after the reform and opening up. Li introduces risk as a new angle from which to view the influence of social conflict on Chinese society. Li claims that:

"*In the 21st century, risk has existed as a form of power to reorganise social restructuring (mainly represented in the form of 'interest groups') in Chinese society. Risk is framing another kind of path of social disintegration and reorganisation. Its influence on Chinese society is increasing, and it is moving the social structure in a more complicated direction along with the distribution of wealth and other powers.*" (Li 李友梅 2008 :2; my translation)

Here Li introduces the concept of 'interest groups' which explains some phenomena in my case study. I also find that this links with Fei Xiaotong's claims about Chinese people's selfishness and interest-oriented attitudes. Fei did his research on traditional China since the 1930s and has made a significant contribution in analysing the social order of Chinese society. Details about Fei's theory and interest groups through which people fit into the nuclear power issue will be discussed in chapter 6. Li claims that "our country's recent situation fits the risk society on a certain level, which makes the historical requirement of 'risk society equal to late modernity' not necessary in China" (Li 李友梅 2008:7; my translation). To support this claim Li makes two arguments. Firstly, the process of globalisation has made China confront risks (for example, the global economic crisis, terrorism, global disease) no differently to other countries in the world. Secondly, the blind admiration of

economic, scientific and technological development has broken the traditional Chinese ideal development model of 'harmony between man and nature'. In these thirty years after reform and opening up, the pollution to the environment and harm to nature caused by economic development have led Chinese society to face a serious ecological crisis. According to these results, present-day Chinese society is becoming a risk society although it is only in the initial stage of modernity. Although risk distribution influences the social structure at some level, class and wealth distribution do not seem to be approaching equality. Moreover, the gap between rich and poor is getting bigger in both developing and developed countries. China actually faces both risk and wealth distribution and this leads to a complicated social structure. I agree with Li's claim that China has some characteristics of a risk society when considering the environmental and ecological crisis. However, her arguments are vague and lack any critical analysis of Beck's theory. The article merely describes the theory and generally analyses some of the country's recent problems. Generally speaking Chinese scholars' research on risk and society are still at the surface level. There is still no theoretical framework or discipline of the research. Normally they simply describe some points and concepts in the risk society theory and match them with some aspect of Chinese society. There is no critical analysis or discussion about the theory and its application in Chinese society. This is precisely the gap I am attempting to fill with my thesis.

Chinese society did have a complicated social structure. Economic development has brought in new riches and significant changes in social class. On the political side, decentralisation means more space for participation around certain issues within the

country's borders, for example environmental issues (see 2.7). In this section I discuss the changing social class in Chinese society, followed by models of policy decision-making in the next section.

It is commonly accepted as a fact that before the reform and opening up in 1978, people in China considered class conflict to be the main social conflict (Perry & Selden 2003). From the establishment of the new People's Republic of China in 1949 until Mao's death in 1978, the whole country was affected by class movements and struggles (Cao 2004). The political direction at that time was an attempt to beat capitalism and build the socialist new China, meaning a society without *Bo Xue Jie Ji* (exploiting class **剥削**阶级) and wealth. Egalitarianism was seen as the highest achievement for the country. Following Mao's death in 1978, China's post-Mao reform officially began after the 'Third Plenum of the Eleventh Party Congress' in December of that year. After that, Deng became the new leader of the Party and country. People gradually thought less about class conflict and more about economic development. 1978 was a historical point at which the political orientation of People's Republic of China began to work on economic and social development, just as in Deng's famous words: 'development is the strong theory (*Fa Zhan Cai Shi Ying Dao Li* 发**展才是硬道理**)'.

"*China's market reforms over the last two decades or more brought about a significant degree of societal stratification and rise of class politics. The diversification of class interests forces the party-state leadership to take sides in the*

emerging class warfare and to show a manifest class orientation in government policy-making"' (Chen 2003:141).

Below, I summarise the three main major changes of social class in post-Mao China.

1. The new upper and middle classes

Social researchers in the area of China studies, such as Goodman (2008), Chen (2002, 2003), Liu (2006) and Tomba (2004), claim that recently there are 'new rich' or so called 'middle classes' in China which include economic and political elites, petty bourgeoisie and professionals (Chen 2003). According to an online article from *News of the Communist Party of China*, it was reported by 2007 that China's Gini Coefficient is nearly 0.48, which means that China has become one of the most unequal countries in the world. The richest 20% of households earn 50.24% of the total social income (Bai 白书祥 2008). According to the news reported in the Yangcheng Evening News on 4 March 2010, the most up-to-date survey by the Ministry of Finance indicates that in China the richest 10% of families occupy 45% of the total income of urban inhabitants, and the poorest 10% of families occupy only 1.4% of it. The high consumption (third highest in the world) of luxury handbags, shoes, jewellery, and perfume has also been highlighted (Goodman 2008). In Western countries social class relates to inequality and hierarchy, and "it is usually categorised on the basis of occupation, income and wealth" (Chen 2002:408). However these new upper or middle classes in China, although they do exist, are not as easy to define as in Western countries. One of the most distinguishing features is

that these classes in China "are not readily separable from the Party-state as a social, political or even economic force" (Goodman 2008:6). Unlike most Western people who are subjectively assigned different class categories, "for historical and practical reasons, most Chinese urban citizens tend to identify themselves as the working class" (Chen 2002:410), or they avoid being identified as middle or upper class.

2. The special position of government officials and party cadres

Government officials and party cadres, as well as lower-level officials and administrators, so-called 'petty cadres' (*Xiao Gan Bu* 小干部) (Goodman 2008), occupy a special position in the context of the country's development. The power they have actually makes them the real upper classes of society. Private entrepreneurs, government officials and party cadres are considered to have higher social status in particular.

3. The changing position of the proletariat and working class

"*In Mao's China, the proletariat was said to be the most progressive force of history and the embodiment of the most advanced forces of production. Together with the peasants, they were the 'masters of the country' and constituted 'the regime's only, or surely most legitimate, political actors' (Solinger 2004:54-55). Today the key players in China's socialist market economy are those who generate material wealth by producing, providing and consuming goods and services"* (Guo 2008:40).

Since the State Owned Entrepreneurs (SOE) reform in the mid-90s, a multitude of urban working class and proletarians lost their jobs in SOE. These people either became unemployed, have a very small business or are in unstable employment serving private entrepreneurs or individuals; few of them had the opportunity to be re-employed in other SOE or to access decent positions in proper companies (Solinger 2002, 2004). The proletariat and working class is defined as the foundation and master of the country because of the Chinese Communist Party (CCP) and also the country's development plan in the Mao period. The development of *Zhong Gong Ye* (heavy industry, 重工业) including iron and steel, coal-mining, shipping and railways, etc in the Mao period gave the proletariat and working class a very high position in society (Goodman 2008; Guo 2008). While modern entrepreneurs and enterprise development since the early 1990s changed the country's industrial structure, the proletariat and working class lost the benefits of both economic and social status. When the working class lost their advanced social position and faced a changing social status, they simultaneously lost their voice and power to participate in social issues. If we go back and look at history, farmers and workers used to make their voices heard much earlier in the newborn China. In my fieldwork research, I also observed the silence of farmers on environmental and nuclear issues.

After the reform and opening up in 1978, the new rich emerged in Chinese society. However, looking at the historical background of the concept of 'middle class'[5], in

[5] "One middle class was the early capitalist of the early industrial revolution in Northwest Europe during the first half of the nineteenth century, the bourgeoisie between the aristocracy and the townspeople. Another has been the state and capitalist enterprise sponsored managers and professionals of the managerial revolution during the first half of the twentieth century, between the capitalists and the workers. More recently, the term has been applied to the vast majority of

the Chinese context it is quite complicated to define who fits this definition. 'Middle class' is not simply defined by income, property ownership or positions and titles in the workplace. According to Nee's (1989, 2005) research, in China political capital is a stronger force than the market to bring benefit to individuals (Goodman 2008). High incomes after China's economic reform and building up of the market economy do make people rich; however this does not give people equal political power. Government officials, political leaders and party cadres who hold the power to decide the use of political capital in reality occupy a high social status. Meanwhile, the entrepreneurs, managers, businessmen and other professionals might have a high income but not the equivalent political power and social status held by their middle class counterparts in Western countries.

2.7 Models of China's Public Policy Agenda

Risk issues are essential topics in the public agenda in Western developed countries. In Chinese society, before discussing how risk discourse influences policy decision-making, it is worth discussing how the public agenda influences the policy agenda. In the public policy area Wang Shaoguang's article (2008) "Changing Models of China's Policy Agenda Setting" is worth reviewing. Wang argues that through the transformation of policy agenda-setting models we can see the changes of China's political system. In order to explain the relationship between public agenda and policy agenda Wang proposes six models (see table 2.2) of policy agenda-setting: 'closed-door', 'mobilisation', 'inside access', 'reach-out', 'outside access', and

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consumers in late capitalist industrialised societies, between the rich and the poor". Goodman, David S. G. (ed) (2008) *The New Rich In China: Future Rulers, Present Lives* Routledge).

'popular pressure' (Wang 2008:59). The order of these six models is from low to high public participation according to the initiator (decision-makers, advisers, and citizens).

Models of the Policy Agenda Setting in China

		Initiator of Agenda		
		Decision-Makers	Advisers	Citizens
Degree of Public Participation	Low	I. Closed Door	III. Inside Access	V. Outside Access
	High	II. Mobilisation	IV. Reach-Out	VI. Popular Pressure

Table 2.2 Source: "Changing Models of China's Policy Agenda Setting" (Wang 2008:60)

In the **closed-door model** the public do not participate in the decision-making process. "Decision makers believe it is easier for them to set the policy agenda and implement policies that result from it if they can prevent the issue from expanding to the mass public" (Wang 2008:60). The policy decision-making agenda of the civil nuclear power development plan in the 1970s and 80s fits the closed-door model. Those key policy-makers in central government set up the plan for building Daya Bay Nuclear Power Station without any public consultation. However, in 1986, the participation of the people of Hong Kong forced the central government to set up a communication and reporting system with the public (see chapter 3).

As with the closed-door model, policy-makers are still the initiators of the policy agenda in the mobilisation model. However, in the **mobilisation model** policy-makers try to interest the public in the policy agenda, in order to win their support for it. This kind of model happened most in Mao's China before the reform and opening up. In Mao's China most of the major and strategic agendas fit this model, for example, land reform, the great leap forward, and so on (Wang 2008).

The key players of the **insider access model** and the reach-out model are the policy advisers. The policy agenda is proposed by policy advisers instead of policy-makers. The difference between these two models is that in the insider access model, policy advisers are official 'trusted brains'[6] (智囊团) (Wang 2008): they do not care whether their suggestions are supported by the public or not; they only care whether policy-makers buy their advice. The single-child policy discussed by Greenhalgh (2008) as a distinguished case from the 70s shows how scientists, as 'trusted brains', played the most important part in the decision-making process. Greenhalgh argued that the scientist Song Jian, an expert in the missile industry, played a central role in this policy. In 1976, right after the Cultural Revolution, China was lacking in scientific expertise in all areas apart from the military industry, and this lack was especially prominent in the social research field, since for decades the leaders thought that Marxism alone was enough to guide social research. This special historical context made Song Jian and his colleagues, with their skills in computing and statistics, important people to work on population modelling. Since the 1970s, Mao and later Zhou made important speeches about birth and population control.

[6] Scientists and experts who, like government consultants, offer professional knowledge to government officials.

Song Jian and his group projected a population growth rate over the coming decades that could result in catastrophic consequences for the country's modernisation. His model, along with Chinese leaders' ideology of population control for modernisation, shaped the single-child policy (Greenhalgh 2005, 2008). Greenhalgh makes the essential argument that Song was able, with his research data and model, to persuade the key leaders to endorse the single-child policy and also make it a basic national policy. This case shows how expert knowledge shaped and cooperated with political leaders' ideology leading to policy decision-making in China in the late 1970s.

However, in the **reach-out model**, policy advisers tend to get support from the public in order to help their suggestions reach policy-makers. After the reform and opening up, the insider access model was applied more frequently. Along with this policy agenda, research institutions and universities started to conduct more specialised research in order to fulfil the requirements of government policy decision-making. Unlike the insider access model, the reach-out model is not common in China. Mostly, policy advisers will not use the public to pressurise policy-makers in order to draw attention to their recommendations, apart from in some special cases, such as medical reform since the 1990s, which is market-oriented (Wang 2008).

Citizens are the initiators in both the **outside access model** and **popular-pressure model**. The former means that "citizens or a group of citizens submit suggestions on public affairs in the form of a letter to central decision makers, excluding complaints or appeals about the interest of an individual or a small group" (Wang 2008:69). In

both civil nuclear power project cases I will discuss (the Silver Beach nuclear power project in chapter 3 and the Han River inland nuclear power project in chapters 5, 6 and 7), citizens and deputies use the outside access model to write letters to policy-makers in order to express their concerns about the projects. Although the outside access model has rarely been seen in China before now, recently it has been used to influence policy decision-making in some of these big projects by citizens who are not experts or policy advisers but have certain social positions and social relations and networks. The popular-pressure model is the upgraded version of the outside access model, which means that the degree of participation is higher. Wang points out that the popular-pressure model only applies "when a certain 'focusing event' suddenly occurs and quickly attracts public attention" (Wang 2008:72) at the same time: normally bad things such as disasters, accidents and harm to the general public. These kinds of events are more likely to involve some kind of environmental hazard or serious disease; for example, the grassroots campaign to stop dam building in the Nu River (Yang 2004) used both the outside access and popular-pressure models. The campaign had four features: firstly, the important position of environmental protection groups in mobilising opposition to the project and raising the public's environmental awareness; secondly, collective actions were taken including public forums, study exhibits, petition letters, collection of signatures and so on; thirdly, funding was collected from international connections; and fourthly, media professionals played a leading role (Yang 2004:5). In the Nu River case, premier Wen Jiabao claimed that the project was suspended due to "a high level of social concern". In China public participation in environmental issues reflects the use of both the outside access model and popular-pressure model. Although authors like

Peter Ho (2001, 2007), Guobin Yang (2004, 2005) and Shui-Yan Tang & Xueyong Zhan (2008) write about China's environmental issues through the lens of civil society and new social movements and NGOs for environmental protection, their main research topics are environmental protection social organisations. Environmental issues have been a hot topic on the public agenda since the mid-twentieth century. Between 1994 and 2007 China's environmental NGOs and activism groups grew from 8 to 96 nationwide (Wu 2008). Famous environmental events such as the Three Gorges project and cleaning of Lake Tai all demonstrate the popular-pressure model.

2.8 Summary

In Western social science research, risk – and particularly the relationship between risk, science and politics – has been a popular topic since the publication of Beck's risk society theory, and relates to various aspects of social life. Wynne and Irwin discuss risk within the theoretical framework of the sociology of science; Jasanoff uses a new form of approach associated with social construction theory to connect risk with political research; and Hannigan discusses risk through the environmental and social construction discipline. The public's risk perception and their method of participation are essential in risk governance. There are two main questions to ask about risk. Firstly, how does risk influence human society? Secondly, how does the public understand and define risk? It seems that Beck's theory attempts to answer both questions; however, it ends up confused about whether risk really exists or is socially constructed. Authors in science studies and environmental sociology

contribute to the discussion of people's understanding and construction of risk. Also within this construction process is the inter-relationship and influence between risk and science and politics. China as a developing country is in the initial stage of modernity development. Because of its rapid development speed and unequal development style, on a certain level China has some characteristics of the so-called 'risk society' (Li 李友梅 2008). However, historical reasons and China's different political system distinguish the country too much from Western ones. In discussions of China's risk, science and modernity are interesting and valuable topics which give insight to understanding of risk in the developing socialist country.

Chapter 3: Methodology

This chapter discusses the methodology of this research. To conduct an ethnographic-style case study of China's civil nuclear power issues, I spent six months doing phases of fieldwork research in China. As a Chinese student studying in the UK and doing fieldwork research back in her hometown, I benefited from my Chinese identity and family and social networks. Thanks to reliable insiders who introduced me to the field, I spent a considerably small amount of time on gaining access and collecting data. Throughout the process of fieldwork I was aware of the importance of relationships (关系 *Guanxi*) in conducting research in the Chinese context. In this chapter I discuss seven aspects, beginning with gaining access to documents in the preliminary stage of my research and becoming aware of the importance of relationships, followed by choosing a practical case with which to commence the case study. The third and fourth parts are about obtaining access and my changing identity during the research period. The fifth part is about the detailed data collection methods that I used in the field. The sixth focuses on data analysis. Finally I discuss problem solving, mainly concerning data collection and analysis.

3.1 Obtaining documents

At the beginning of my PhD research I had only limited knowledge and understanding of the country's civil nuclear power development, including some general information on nuclear power stations and operating reactors. I mainly

collected this information from the Internet during the research for my master's dissertation. Moreover, I was aware of the limitations of documents and literature about China's civil nuclear power development. Finally I identified a series of books called Nuclear Power Development Strategy Research, which was published in 1999 by several official or academic research institutions[7]. I expected this series would be helpful since it is referenced by Wu Bang Guo (the vice-Prime Minister of the country at that time). Since I was in the UK by then, I asked family members to try to find the books in the bookstore; however, I was told that they had never been sold publicly. Finally I was able to obtain the books from family friends in the electricity industry. The same situation occurred when I looked for some more key literature: Li Peng Nuclear Diary. This series of books was received through the same channel, from family friends within the industry. Apart from these two series, I collected some important Hong Kong newspaper articles about Daya Bay and Ling Ao nuclear power stations in the 1990s from a friend's former colleagues who had worked for the newspaper in the past. I started to become aware of how important it is to know people who are insiders of the industry and insiders of the field if I want to conduct research. This awareness, together with practical considerations, influenced my choice of case after the pilot study in February 2007.

3.2 Choice of case

In this section, I will first briefly introduce the single case that I used as the unit of research, and then explain the reason why I selected it. The case is about the debates

[7]Details will be introduced in 4.4.

over an inland nuclear power project in Meizhou City in Guangdong province. The provincial government planned to join the bidding for an inland nuclear power project. The Han River basin was used for exploratory testing and research. Local people living in the lower reaches of the Han River basin worried about the risks of water pollution. The People's Deputies (PDs) asked for an inquiry meeting in the Provincial People's Congress (PPC) on 4 February 2007 to discuss the potential impact on the drinking water resources of the Han River. Details of the location and local context of the case will be introduced in chapter 5.

In February 2007 I went back to China after the board meeting. The board had suggested I take six weeks for the pilot study before commencing the formal fieldwork research. The pilot study had two purposes: firstly, to identify a practical and accessible case in order to conduct fieldwork research, and secondly, to help me identify a much clearer set of research questions, and a more viable programme of research. On 5 February 2007 a news report was published in Southern China Daily: "A nuclear power station might be built in the upper reaches of the Han River. People's Deputies asked for an inquiry meeting—10,000,000 people's drinking water might be polluted?" I felt that this was a very interesting issue that I could research. However at that time I was not sure whether I could get access to Daya Bay Nuclear Power Station or whether I could find a way to research it. My research has been influenced by subjective coincidences. Besides the objective reasons I will address later in this section, a coincidence took place which helped me to make my decision. On 7 February 2007, I was invited to my cousin's wedding which was held in her husband's hometown in Dapu townland. After I arrived in the townland I noticed that

it was exactly at the potential location of the inland nuclear power station. My cousin-in-law's family live in Taohua village, located just on the opposite side of the Han River to the village of Shanzhou, which is one of the potential sites for the nuclear power station. The two villages are situated less than 50 metres apart. There were further reasons to pick the Han River case.

- Location of the case

The Han River case is situated in Guangdong Province. How can Guangdong's civil nuclear power development represent the whole country's situation?

Firstly, Guangdong has been identified as a window on the whole country's reform and opening up, which began in 1978. The city of Shenzhen in Guangdong province was the first Special Economic Zone in China. The government allowed the city to have different economic polices to other cities. Shenzhen was free to solicit foreign investments, set up joint-venture companies, enjoy special tax preferences, and so on. Shortly after Shenzhen, Zhuhai and Shantou were approved as Special Economic Zones as well. Because of the special economic policy, Guangdong province achieved huge development in the last 30 years. Compared to other provinces Guangdong conforms more to the idea of a modern society. And the southeast area is the wealthiest area in the province.

Secondly, 60% of the whole country's nuclear electricity output is produced by Guangdong province. At present nuclear power provides 1.6% of the whole

country's electricity output. By 2020 this number will have increased to 4% and Guangdong province will account for 60% of the total output of China's nuclear electricity. Due to this high level of nuclear electricity output, Guangdong province is a key location for a civil nuclear power study.

Thirdly, the country's first big commercial nuclear power station was set up in Guangdong, and it was reported that the province is now competing to construct the first inland nuclear power station.

- Timing of the case

The debates about the inland nuclear power project on the upper reaches of the Han River started in September 2006, and continued to 2008. The timing of the case made it very suitable for research. As a recent case, it would be much easier to contact interviewees, find documents and conduct participant observation. It is also good timing to conduct research when the subject is a recent hot topic.

- Information on the case

The new nuclear project on the upper reaches of the Han River prompted the media to report debate and negative news about civil nuclear power development for the first time in mainland China. It was also the first time that the PPC organised an inquiry meeting to discuss people's doubts and worries about civil nuclear power with local people's deputies. This case represents the development of people's

understanding of nuclear power and the willingness of local people to voice their worries about the risks of civil nuclear power.

3.3 Access

As I mentioned in the previous section, family relationships and social networking played very important parts in this fieldwork research. The three important gatekeepers (Whyte 1993) in my research all have a relationship with my family network. The first one was DXu, my cousin-in-law's father. He is an official in the local government of Dapu townland. I first met him at the wedding ceremony in February 2007. Later on my cousin-in-law let him know of my intention to conduct fieldwork research, and DXu offered to help directly. In May 2007 when I formally contacted him about the fieldwork research, he kindly offered to help me access the field. I could stay with his family and have free entry to his work department. He also offered to help with contacting all the interviewees I hoped to meet, and arranged for me to visit the villages which had passed the test to be the potential sites. However, he requested one condition, which was that I had to have a visiting studentship in a domestic university. I was going to register as a visiting student in China Science Academy (CSA) when I went to Beijing in July 2007 with reference letters from my supervisor and the director of my research institution. However, I would not be able to receive the studentship before I officially registered in CSA. DXu then asked whether I would be able to find some Shu Ren (熟人'people that I know') in Sun Yat-sen University, where I did my undergraduate degree, to do me a favour and write an official letter to confirm my identity. Unfortunately, at that time I

had not yet had contact with the sociology department in Sun Yat-sen University. Also my previous tutors in business school would not be able to help with my social research. Given these issues, I asked whether my invitation from People's University for the international conference would be of help. DXu vouched for me in accessing the field as a researcher and his family member who was doing fieldwork research for a very important international conference in Beijing. From then on, I was aware of the importance of identity in fieldwork research. This will be discussed further in the next section. I suspect that in the local context gatekeepers have to have a good reason to introduce you to the field, which means you should make them feel important. In my case, a PhD student at a famous university was a suitably impressive identity for DXu to introduce me and arrange meetings and trips for me. Local people are not familiar with foreign universities and might not find them credible. However, Sun Yat-sen University, People's University and CSA are all very well-known universities and research institutions. In fact, when DXu introduced me to interviewees they never asked me for any ID. My identity was only significant in convincing DXu that I was worth introducing. Both DXu and his wife DYan have been resident in the town for over thirty years. DXu used to work as the headmaster of a local middle school and DYan is a primary school teacher in the town centre. They have a very wide network of friends, colleagues and students around the town. During the three weeks I stayed in their home, I met with their social contacts, which made for a very good research environment.

Following my first phase of fieldwork, I went to Beijing in July 2007, registered as a visiting student in CAS, and went to Shantou and Chaozhou to continue my

fieldwork research. The second gatekeeper was SWeng, a major in Shantou city military sub-district. The research format in Shantou and Chaozhou was quite different from that in Dapu. I had a clear idea of who I would like to interview, having seen their names in the newspaper. I intended to interview PDs who went to the inquiry meeting about the inland nuclear power project. In order to gain access to these people I went through the military source. SWeng was assigned to assist me by my mother's friend, who is a general in Guangzhou provincial military, several levels higher than SWeng's post. SWeng's duty was to assist my research; he was keen to offer me whatever I wanted in order to please the general. I gave SWeng my reference letter from CSA and the list of PDs I wanted to interview when I arrived in Shantou city. He contacted interviewees for me through Shantou Municipal People's Congress. As well as interviewees in Shantou city, SWeng was able to contact Chaozhou military sub-district to arrange meetings for me with PDs there. Thanks to his efficient work, I interviewed most of the PDs who had attended the inquiry meeting.

The third gatekeeper was DWLi, the officer in the Dapu Armed Forces. Because of sudden flooding during the first phase of fieldwork research, I was not able to visit those villages in the townland. In the second phase of fieldwork, the main purpose was to conduct research in villages. My experience of the first phase of fieldwork taught me that using military contacts would be much more efficient than going through the local government officials in the field. However in this case gaining access took longer. I suspected that as it had been half a year since the first phase of my fieldwork research, the local government, government agencies and also the

military department might have heard some rumours about my research. Those officials became more careful with their words and also with granting me access to the field. It took several days for DWLi to consider whether to guide me to the villages. The problems were resolved by two dinners and several rounds of toasting. DWLi at last sent two officials to guide me to the villages.

With the help from these three gatekeepers I did not face many problems in gaining access to the field. With references from them, people were normally not suspicious of my identity and purpose for visiting such a small and rural townland. However, without the help of these gatekeepers it would have been impossible for me even to find where the villages are. There is no public transport to get to them. They are surrounded by mountains. The only way I had tried was to negotiate with taxi drivers to rent their car for a day to the villages. In the end, I did not use this method due to security concerns.

3.4 My identity

My identity benefited the research a lot, as someone who was born and brought up in Guangzhou city (the capital city of Guangdong province) and finished her undergraduate education in the top university of the province. Moreover the military background of my family and its strong social network were advantageous to the fieldwork research. I was considered as an insider most of the time instead of a spy from the UK who wanted to search for information about the country's civil nuclear power development. However, as mentioned in the previous section, I was requested to prove formal enrolment in a Chinese research institution in order to interview local

government officials and visit the proposed sites of the civil nuclear power station. Since the research institutions (RCSS, ISSIT) to which I belong have official connections with CSA, I was able to officially register as an international visiting PhD student in CSA with references from my supervisor and the director of RCSS. Thanks to good relationships with scholars from CSA who had previously conducted research in RCSS, I received my student identity documentation smoothly and quickly in Beijing. In the first phase of my fieldwork, this student identity helped me a lot. I simply told the People's Deputies in Shantou and Chaozhou city that I was a student from CSA, and they were all willing to be interviewed. Local government officials might have assumed that, since I was a student from CSA, I had some relationship with the central government and that my research might influence decision-making on the nuclear power project - they have such ideas about researchers from Beijing (the capital city).

In January 2008, before I started the second phrase of fieldwork, I contacted Professor Wang Ning, the head of the department of sociology in Sun Yat-sen University. I was invited to give a seminar in the department about the subject of environmental sociology in Western countries. After the seminar I asked Wang to write me a reference letter from his department, stating that I was working for a project with the university and needed to do research in Dapu townland. As the top university in Guangdong, Sun Yat-sen University is known to people in Dapu townland. With this official letter, I was identified as a researcher from Sun Yat-sen University instead of a student from Edinburgh University. In the field, I always had to think of the best identity which could help the research, and then try to use Guanxi

(connections) in order to access it. This was parallel to my situation in trying to enter the field as an insider.

3.5 Methods of data collection

The main methods I used to collect data were qualitative interviews along with participant observation and analysis of documents.

Qualitative interviews

Qualitative interviews were the most important data collection method used in the ethnographic research (Bryman 2004). There is a dearth of published documents about the situation of China's civil nuclear power development, so I needed to collect a lot of background information through interviews. Interviews were conducted at high, middle and low levels during the research. Interviewees included government and agency officials at both national and local levels, scientists, experts and the media, and also local people.

Interviewees

Interviews were conducted on general information about the civil nuclear development background in Beijing, with scientists and experts in Guangzhou, journalists and also government officials and lay people in the local context.

I interviewed three categories of people. Firstly, the local people live around the proposed sites of the inland nuclear power station in the upper reaches of the Han River. People in this category live in Dapu townland, in Meizhou City. These people can be divided into five groups according to their occupations: local farmers, local small business owners, teachers, students and manual labourers. Their ages were between 16 and 60. The ratio of male to female interviewees was nearly 50:50.

Secondly, I interviewed People's Deputies, government officials, scientists and experts who were connected with the inland nuclear power station project issue in local, regional and central government, nuclear power companies and environmental protection agencies.

Thirdly, I interviewed journalists and media officials who had been involved in civil nuclear power issues.

In the first phase of fieldwork research, I interviewed thirty-six ordinary local people and local government officials formally and eighteen ordinary local people informally. I interviewed the local government officials with consideration given to their titles and duties; in my interviews with ordinary people I considered their age, gender and occupation. As I observed and talked to people during the fieldwork research, I identified three main characteristics.

Firstly, there is a lack of adults in the town who have received higher education or are considerably skilled. There is no university in Dapu townland or even Meizhou

city. Young people leave for higher education, and people rarely come back to work in the townland after graduation. Those who are young and unable to enter university also find opportunities to work in big cities rather than stay in the townland. So those adults who stay in the townland are either less educated, less skilled, or take the country's civil servants examination[8] and are signed to work for local government after graduating from college or university.

Secondly, the town is a typically male-dominated society. In local government, 95% of high positions are occupied by males, while females mostly hold positions as assistants. Women's incomes are much lower than men's. The man is the head of the family and the woman is obliged to serve her husband. Men are the breadwinners and women spend most of their time within the home.

Thirdly, people in the town have close relationships. Friends and colleagues like to visit each other frequently. People who work in the same unit will also have flats in the same building or nearby. They regularly visit each other after dinner and drink tea in each other's flats. In the weekend they will go to play mahjong[9] in friends' homes.

[8]In China, in order to work for the government as civil servants, people have to take the exam after graduation from college or university. Different positions have different requirements. Some positions are very competitive and are only open to university graduates.
[9]Mahjong is a kind of traditional Chinese gambling game played by four people.

Interviewees	Number
Senior officials in government agencies connected with civil nuclear power in Beijing	2
Scientists and experts connected with energy	3
Journalists	3
People's Deputies and government officials in Shantou City	5
People's Deputies and government officials in Chaozhou City	5
Local government officials in Dapu town	10
Ordinary local people in Dapu town centre	20
Village leaders in Dapu	3
Farmers in the villages	15

Interview types

The interviews I conducted in my fieldwork research were not standardised interviews. They were more like conversations, but involving key information (Fielding 2001). These conversations (interviews) about nuclear power issues were either with individual people or with groups of people, and were sometimes conducted by telephone. The strategy for conducting interviews in a local context was flexible. For example, I found it very hard to carry out one-to-one interviews with local government officials in Dapu. In local government, most of the time staff members share offices. Local government officials have very close relationships with one another. There was always somebody else sitting nearby when I wanted to talk to one person, and they did not have the sense that we should talk privately. They felt comfortable with their colleagues remaining there. Most of the interviews with local

government officials became group discussions by the end. The same situation happened in schools and other places where people shared offices. As nuclear power is a sensitive topic, people did not like being tape recorded, which meant I had to take many notes. However, since I wanted to know the facts and also to understand people's opinions on the issue, I was content to note down points that I found useful and interesting. This kind of group interview did have its benefits. I found people were more willing to talk and discuss when friends and colleagues got together (Morgan 1997). They would come out with some new ideas when talking in groups. So I found that this kind of interview style helped me to collect useful research data.

Due to poor weather conditions during the first phase of my field research period, I was not able to go to the villages where the proposed sites were located. Local farmers and government officials were busy with the flooding and rebuilding of damaged facilities after that. With both this and my safety in mind, they thought that it was inappropriate for me go to the villages. My gatekeeper DXu suggested I conduct telephone interviews instead. The leading official in the Gaobei town gave me a list of numbers. I made calls randomly to people I selected with help from DXu and DYan. As some people do not speak very good Mandarin, I let them introduce me first on the phone, then commenced the interviews if those farmers felt comfortable to talk to me. Luckily most of the people in the villages now had telephone access. Ten telephone interviews were conducted with farmers in the villages. Telephone interviews are an efficient alternative way to find out local farmers' views on the potential nuclear power project (Fielding and Thomas 2001).

However in the second phase of my fieldwork research I was able to go to the villages and interview people face-to-face.

Interview questions

Interviews were conducted with officials and insiders in Beijing and locally to collect information about the country's nuclear power policies, the functions of different government agents connected with nuclear power and risk management, and also some historical context to the nuclear power industry. This information is very hard to confirm through documents or other resources. In order to guarantee the reliability of the information, I normally asked similar questions of numerous people from different backgrounds. If two or three people from different backgrounds gave the same answer to a specific question, it should be seen as reliable.

Interviews were conducted with ordinary local people to gauge their knowledge and opinions about nuclear power, its risks, and the inland nuclear power project. In order to help people open up to me, my research questions were quite simple. I would start by asking their opinions on the nuclear power project, then follow with some "why" questions. These are helpful in making people explain their feelings. The interviews had no standard schedule or question guidelines. The object of each interview was to find out what kinds of things were happening. Freestyle conversations about the nuclear power project were more helpful in understanding people's feelings about it.

Participant observation

With DXu's help I was able to observe how people work in the local government. DXu and DYan's friends and colleagues are all middle or upper class people based in the town centre. Their social class is decided by their jobs. They work for the local government, schools or state-owned companies, as opposed to working as shopkeepers, farmers or manual labourers. As well as interviewing DXu and DYan's contacts, I also went out in the street to meet people by myself. In order to chat with local doctors, I went to the local hospital with DYan when she was sick. Since I stayed in the town centre for nearly a month, there were many opportunities to get in touch with local people in the lower classes. I talked to people in bookstores, hair salons, middle school, etc. I also talked to a dressmaker, shopkeepers and farmers in town. I tried my best to ask people about their opinions on the nuclear power project, and tried to understand their culture and lifestyle through observations. In the villages I observed people's living conditions and tried to understand their culture (Bryman 2004). Most of the time participant observation was mixed with interviews (Hammersley and Atkinson 2007). I used it as a supplement to understanding people's attitudes about the nuclear power project.

Analysis of documents

Documentary analysis was used in two different aspects of the research. One relates to the background of the whole country's civil nuclear power development situation

and risk management situation; the other is related to the specific case. The background information covers diverse topics relating to the country's civil nuclear power development. There is not in fact a great deal of literature related to the policy decision-making and nuclear power development. The main resources used were internal books published inside the electricity industry, newspaper articles and also some information published on the web.

Key texts

1) A series of books called Nuclear Power Development Strategy Research.

This series has two volumes made up of 8 separate research reports, published in 1999. China Guangdong Nuclear Power Group (CGNPG) commissioned this research. Eight different research institutions or research groups wrote the eight reports, and carried out their research studies separately. These groups are:

- The Development Research Centre of the State Council, PR China (DRCSC). DRCSC is a research and consultancy institution that lies directly under the State Council. The main responsibility of the research centre is to conduct research on the country's national economy and social development and to give political suggestions on the problems resulting from the country's opening up and reform.
- The State Planning Office Macroeconomic Research Group
- Development Research Centre of the People's Government of Guangdong Province. The research centre is directly under the Guangdong Council, and is a policy research and consultancy institution.

- Guangdong R&D Centre for Technological Economy — a research centre founded in 2001. It is a research and consultancy institution directly under the Department of Science and Technology of Guangdong Province.
- Institute for Nuclear and New Energy Technology, Tsinghua University.

  The Institute was founded in 1960 as a top nuclear research and experimental base in China. In the last forty years, it has become a comprehensive research centre with multi-disciplinary research, design and engineering projects mainly in nuclear technology. To further broaden the academic disciplines of the institute, the full official name was changed to the Institute of Nuclear and New Energy Technology (INET), in September 2003.
- School of Economics and Management, Tsinghua University
- DECADAES/DECPAC software research group
- JCESS Journal. The journal publishes research on the socioeconomic system of China.

The series is an internal document for government and power companies and departments and is impossible to find in public bookshops. It contains many details about the current situation of China's nuclear power development. However, as it was published in 1999, some of the information is out of date.

2) Li Peng Nuclear Power Diary 2004 (Xinhua) - A series of books which has two volumes, written by Li Peng, the former premier of the State Council, about the Chinese civil nuclear power development process. Li Peng is the key person in the planning and construction of Daya Bay Nuclear Power Station.

Official websites

1) The official website of China National Nuclear Corporation (CNNC). The CNNC website publishes information about regional nuclear power companies and the nuclear power stations which are operating right now, and also information about worldwide nuclear power stations or civil nuclear power programmes. The website is in both Chinese and English.

2) The China Atomic Information Network (CAIN). The CAIN website is a Chinese website containing a wide range of information about atomic development in China and worldwide. The organisers of the website regularly invite managers from nuclear power companies to do online interviews on different topics relating to the development and management of China's civil nuclear power. People with an interest in the specific topic can register on the website and ask questions online.

Journal

"China's Energy" (1986-2007) China Energy Research Institute

Newspapers

The Southern China Daily

Meizhou Daily

The Yangcheng Evening News

Internal documents from local government agencies in Dapu townland and Shantou City

Survey data about the relocation situation of Dangxi and Shanzhou Village

The Dapu statistic yearbook 2007

Internal journals from the Shantou Social Science Institute

Letters

I have two copies of official letters made available to me by Chen Han Chu, which are formal replies from the Development and Reform Commission of Guangdong Province. They wrote to reply to his inquiry about the nuclear power project on the upper reaches of the Han River. I was also able to collect some documents about the water protection regulation and planning of the Han River.

3.6 Data analysis

Taking fieldnotes was my usual way of recording observational and interview data in the field, although I did make use of tape recording on occasion. I noted down all the useful and interesting things that I saw and heard each day, and then reorganised and input them in my laptop at the end of the day. Other data I collected in the field included journals, newspapers, letters, and internal documents, as well as online information and virtual documents (pictures that I took in the field). In this section I will discuss analysis of these materials and documents collected from fieldwork research.

I do not use any software for coding data; all coding is done by hand. “In ethnographic coding, there is no requirement that items of data be assigned to one and only one category, or that there be explicit rules for assigning them”(Hammersley and Atkinson 2007 p153). In order not to miss any useful information in the documents and materials, I always go over them multiple times

during the writing process. Data was first separated into different folders for storage according to fieldwork locations (Beijing, Hong Kong, Guangzhou, Dapu, Chaozhou and Shantou cities). For each location it was then organised into different categories for storage: for example in Dapu there were data from interviews with government officials and civil servants, data from interviews with local people, online discussions about the inland nuclear power project, notes and memos for data organising, etc. A Microsoft Excel table was used to compile the list of interviewees from Dapu townland, within which I listed each interviewee's name, gender, education, place of birth, occupation and contact details. The data that I collected in Dapu townland was widely concerned with local people's daily lives and local culture. The data collected from Beijing and Hong Kong was mostly used for background information and contextual information related to the development of China's nuclear power industry. Its function was to provide information rather than in-depth analysis. I did not use any systematic coding methods for data analysis before I began writing up the thesis. The data analysis in fact took place all the way through the writing and redrafting of the thesis. Data was analysed and exploited through the process of connecting the theoretical concepts with real situations that I saw and heard in the field.

3.7 Problem resolving

Reliability of interview data

When I reflect on my interview process, gatekeepers and family relationships on the one hand helped with a lot of the research, and on the other hand also brought in problems. Since I was always introduced by insiders who were in a relatively high

position to that of interviewees, the reliability of their words is worth considering. How much did they want to tell me what they really thought? Did they want to please me or the gatekeepers? People do not always say what they really think in everyday life; they will subjectively frame their words no matter who I am. When I interviewed people in the field, I did not feel that they were trying to please the gatekeepers; most of the people I interviewed did not have a direct relationship with the gatekeepers. They were reached via snowball methods through the gatekeepers' networking, for example gatekeeper DXu in Dapu townland: although he is a government official, he is not in a high position in the government. Most of the interviewees introduced by him were his colleagues and friends. They did not need to please him; they wanted to help me with my research and answer my questions because I was related to DXu. However, I did feel that some interviewees, especially local government officials in Dapu townland and PDs in Shantou and Chaozhou cities, chose their words carefully. Their purpose was not to please me and say something I wanted to hear, but to demonstrate their approval of or resistance to the nuclear power project. They actually said what they wanted, and hoped I could pass the message on to individuals or agencies in charge of the project. Simply put, I was not somebody they wanted to please, I was somebody that they wanted to use. I will discuss local government officials' active construction of their trust of nuclear technology in Chapter 6. I posit that local people's words are mostly reliable because what they described about their situation matches with what I observed in the field. In Shantou and Chaozhou cities, PDs' concerns had already been published by the newspaper. What they told me were the opinions that they had expressed in the inquiry meeting.

How to deal with the missing category of population?

As mentioned above, young adults between the ages of 18-35 who are skilled workers or have received higher education are missing in the town. It was difficult to find out their opinions about the civil nuclear power project and its risks. Although these people do not physically live in the townland, they have tight and close relationships with their families in the townland: for example, some of them will buy or build flats in the town for their parents, and some want to go back to the town when they retire in the future. Simply put, Chinese people have very strong emotions connected to their hometowns (Fei 费孝通 2005 [1947]). Even if those people do not physically live in their hometown anymore, their opinions still matter. As they have received higher education and are considered to know more than local people, local people tend to listen to their opinions. I had to use a different strategy to resolve this problem. Online information had become a very good resource. Two online forums organised discussions and votes about the nuclear power project. Registered members who took part in voting amounted to nearly 300 people. People also left messages about their opinions on the project and discussed potential environmental concerns in the online forum. According to their online ID and people's conversations, I found that most people using the online forum were originally from the townland but working outside in other cities now. Their age and occupations were hard to confirm since it is not necessary for them to provide any of this information in the forum. However, according to the style of their usernames and the icons they used to represent themselves I believed that their ages were roughly

between 20 and 35. I used the online forum as a supplementary resource to analyse people's opinions and debates about the nuclear power project and its risks.

Tape recording and field notes

Nuclear power issues are a sensitive topic. People feel uncomfortable about being tape recorded. Sometimes I just went to talk to local people in shops or restaurants; it was very inconvenient to do tape recording. When people have already started to talk it is unethical to record their words without asking for their permission. In the case of local government officials, they will tell you straight out that they do not want to be tape recorded. So most of the time, I took notes of people's words. Only three interviews were tape recorded. As I was trying to use interviews as a way to understand people's feelings on a specific issue, the most important thing was the context of the conversation. Taking notes was enough for me to collect data I wanted; the question of whether or not to tape record was not very important. One local government official did not want to be tape recorded. When I started to record the interview, he began to sweat; the tape recorder clearly made him feel nervous. He also avoided some of my questions which related to the risks of nuclear power. Nigel Fielding also argued about whether we should do tape recording or write field notes in ethnographic interviews. I agreed with his claim that although recording speeds things up, it has the disadvantage of leading to a reflective approach; also, in comparison with tape recording, writing often yields better analytic themes (Fielding, 2001:153). As I could not do tape recording, I tried to write down everything I thought important. I needed to rewrite the field notes as soon as possible when I went

home in order to record anything I had missed out. I noted my feelings about the interviews and also summarised what I did every day.

Problems with translation

As the whole fieldwork research was conducted in mainland China, all the primary data resources I collected were in Chinese. The translation job was huge. I also faced some difficulties here.

1) Difficulties in translating location names. Dapu town is actually a very big town (the total area is 2470 km²), and if its size is taken into account it is even bigger than a city in the UK. But it is a very small place in China and also at quite a low administration level. The administration of Gaobei Zhen (镇; 'town') is managed by Dapu town. Gaobei Zhen can be viewed as having a similar size and administration level as a town in the UK. So if Gaobei is a town, Dapu should be understood as a bigger place with a higher administration level than a town, but lower than a city. When I looked in the dictionary, it was translated as the word 'county'. In the UK a county is similar to a 'shire'. But in the US 'county' seems to be the right word to identify the situation of Dapu. After considering these differences, I ultimately decided to use 'townland' to describe Dapu.

2) Difficulties in translating government officials' titles. The higher position that a government official holds, the wordier a job title he/she has. It is really a headache to

translate people's titles, some of which do not make sense when translated into English.

3) Problems in preserving the meaning of some words. Some words became meaningless when translated into English. Sometimes I needed to find another way to make things clear. It was a challenge to explain things clearly without losing their original meanings, for example the news report about the inquiry meeting. The original version is (see picture 4.1):


2007年广东"两会"特别报道·热点话题

韩江上游拟建核电站，汕头、潮州代表团提出询问——

1000多万人饮水可能被污染？

海岸线那么长 为何选址韩江上游

上游建核电站 到底会不会污染水源

潮汕人口密集 万一核泄漏怎么办

一定尊重科学和民意 高度审慎推进核电站建设

科学和民主 陀螺齐飞转

Picture 4.1

My translation is:

"A nuclear power station might be built in the upper reaches of the Han River. People's Deputies asked for an inquiry meeting—

10,000,000 People's Drinking Water Might be Polluted?

A nuclear power station to be built on the upper reaches of the Han River, 10,000,000 people's drinking water in the middle and lower reaches might be polluted? Yesterday, the Shantou and Chaozhou PDs standing group queried the Development and Reform Commission of Guangdong (DRCGD), Guangdong Environmental Protection Administration (GEPA), Guangdong Water (GW) about the 'first inland nuclear power station to potentially be located in Meizhou'. The field atmosphere is *huo bao* (火爆 hot)**.**"

In comparison to the word *huo bao* (火爆) in Chinese, 'hot' in English does not cover and represent all of its meanings. When translating such words into English sometimes their function is diminished and the actual situation is harder to represent.

Another example comes from an interviewee's words:

Wang: "I won't do it. We *Lao Bai Xing*[1[10]] (老百姓 1. ordinary people 2. the 'person in the street') always listen to the government. We are not going to express disagreements. People like us have no power to say no."

[10] *Lao Bai Xing* is the term Chinese people always use to distinguish themselves from soldiers and government officials. It sometimes also means innocent and powerless people.

Here if we just directly translate '*Lao Bai Xing'* into the first or the second meanings in English it loses its full meaning in representing lay people's identity.

4) Limitations of using a single case study to generalise findings. Yin (1994) points out the limitations of scientific generalisation. How can one single case represent Chinese people's construction of nuclear risk in general? There is no way to know to what extent the Han River case is similar or different from other nuclear power cases in China. Theoretically, a single case study is not a method to collect data which represent a larger population. In my research, the case shows the real situation that happened in the specific local context. It offers rich material and empirical data for readers to understand the low levels of people's perception of risk, and how their risk perception was influenced by their social, cultural and economic background. So if we weaken the 'generalised' function of the single case and strengthen the real situation beyond the actual case, limitations have no major influence on the research.

Summary: The research data was supplemented by note-taking which means I subjectively wrote down things that I considered important and useful. I subsequently translated those Chinese texts into English, which may have lost some of the original text's meanings. These are two problems which might slightly influence the reliability of the interview data and documents. However, no single piece of research can be - or needs to be - one hundred percent objective. I was also aware of the limitations of the research and try to avoid them as much as possible.

Chapter 4: Background to the civil nuclear industry in mainland China

4.1 Introduction

In this chapter I intend to address for the first time some sensitive topics related to China's civil nuclear power, including its technological situation, its policy decision-making since the 1960s, its industry governance, and – perhaps the most sensitive – its nuclear waste disposal. The process of China's civil nuclear power development shows the transformation of the industry from a military, top-down planning system to a civil and preliminary market-oriented system. This transformation trend offers more opportunities for public participation and bottom-up politics. Even with this change, however, the industry still keeps its strong 'Chinese-style' development model.

This chapter contains four main parts. The first section aims to give the reader a general understanding of the civil nuclear industry of China, via a brief introduction to the whereabouts of operating nuclear power reactors and nuclear power stations; it is also an introduction to the general condition of the country's energy supply – and to the economic and technological conditions of the civil nuclear power industry. The second part is about the process of policy-making for the country's first big commercial nuclear power station – Daya Bay – at the national level. In this part, I

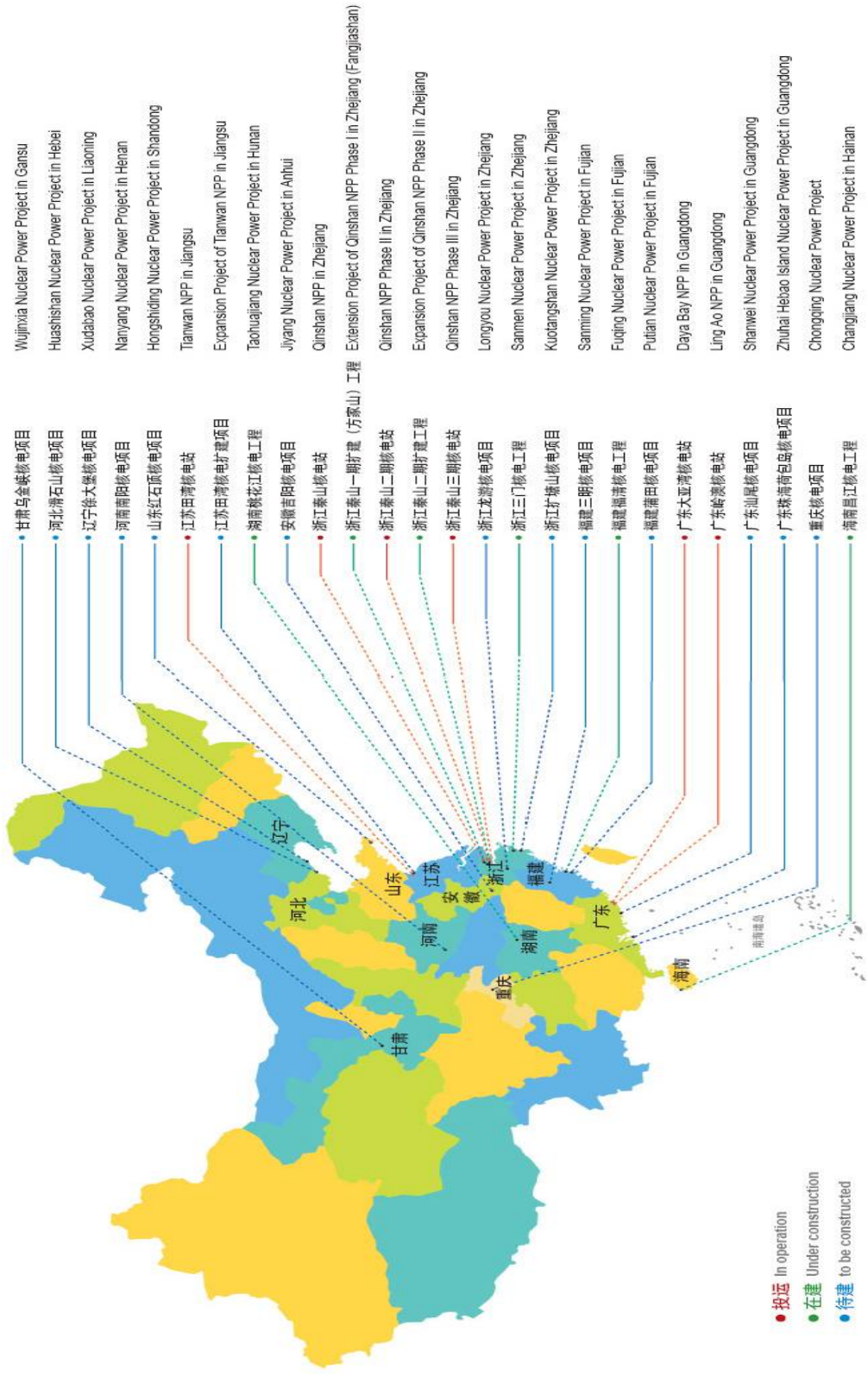
discuss key policy-maker considerations regarding nuclear power in a specific historical period. In the third part, I discuss the governance of civil nuclear power in China at three levels: government and institutions; nuclear companies; and the public. From these three levels of information, readers will have some basic understanding of nuclear power governance in China. The final part of this introduction considers the most sensitive topic of all: nuclear waste disposal. In this part I introduce some of the preliminary discussions (concerning location, technology, and the economic conditions of waste disposal) taking place among Chinese scientists and experts. I also introduce a comparison case using the United Kingdom's decision-making process regarding waste disposal.

4.2. Number and location of nuclear power stations in mainland China

Moves to develop nuclear power commenced in mainland China in the late 1970s. Since then, the industry has moved into a phase of steady development. Nuclear power technology has been imported from France, Canada and Russia, with local development based largely on French equipment. The first big commercial nuclear power station in mainland China was the Daya Bay nuclear power station that was built in Shenzhen, Guangdong (map 3.1). This station has been in operation since 1994. To date, there have been six operating nuclear power stations (eleven nuclear reactors) in mainland China (see table 3.1): Daya Bay and Ling Ao (Guangdong,

south littoral), Qinshan phase I, II and III (Zhejiang, east littoral), and Tianwan phase I (Jiangsu, east littoral) (map 3.1).

According to the Civil Nuclear Power Mid-Long Term Development Schedule (2005-2020) (核电中长期发展规划 2005-2020), published by the State Development and Reform Commission (SDRC) in 2007, there are three other nuclear power stations (eight reactors) currently under construction (see table 3.2). They are Ling Ao Phase II (Guangdong, south littoral), Qinshan phase II extension (Zhejiang, east littoral), and Hongyanghe phase I (Liaoning, northeast coastal areas). Recently on the China National Nuclear Cooperation (CNNC) website I found a map labelling the most up to date information on the state's nuclear power sites (see map 3.1), including not only those in operation, but those under construction and at the planning stage. According to this map, six nuclear power projects are currently under construction: Changjiang Nuclear Power Project (NPP) (Hainan), Fuqing NPP (Fujian), Sanmen NPP (Zhejiang), the Expansion projects of Qinshan NPP Phases I and II (Zhejiang), , and Taohuajiang NPP (Hunan).



Map 3.1. Source: http://www.cnnc.com.cn/Portals/0/images/fenbutu.jpg

Operating Mainland Nuclear Power Reactors

Reactor	Technology source	Domestic production (%)	Net capacity (each)	Start up (Year)	Location
Daya Bay 1 & 2	PWR [11] France	0	2x984MWe	1994	**Shenzhen, Guangdong**
Qinshan Phase I	PWR China	90%	300Mwe	1994	**Haiyan, Zhejiang**
Qinshan Phase II	PWR France & China	40%	2x650Mwe	2002, 2004	**Haiyan**
Qinshan Phase III	PHWR [12] Canada	0	2x700Mwe	2002, 2003	**Haiyan**
Ling Ao Phase I	PWR France	20%	2x990Mwe	2002, 2003	**Shenzhen**
Tianwan 1 & 2	VVER		2x1060Mwe	2007	**Lianyungang, Jiangsu**
TOTAL 11			**9068Mwe**		

Table 3.1Sourced from Nuclear Power in China, China Nuclear Power Development Strategy, Civil Nuclear Power Mid-Long Term Development Schedule (2005-2020) (核电发展中长期规划 2005-2020)

[11] Pressurised Water Reactor

[12] Pressurised Heavy Water Reactor

The **Daya Bay** nuclear power station in Guangdong province is the first big commercial nuclear power station. As a joint-venture project with France and the UK, it occupies a special position in the history of China's civil nuclear power development. Seventy percent of the electricity produced by Daya Bay nuclear power station is sold – for a great deal of profit – to Hong Kong. The Qinshan nuclear power base in Zhejiang province contains five reactors. The **Qinshan phase 1** is the first nuclear power station to be designed locally (by Shanghai Nuclear Engineering, Research & Design Institute) and to use domestic technology. This reactor was first connected to the electrical grid in 1991 – three years earlier than reactors in Daya Bay. The other six reactors (Ling Ao, Qinshan Phase 2 and 3) were set to operate in these [two] nuclear power bases after Qinshan phase 1 and Daya Bay commenced operation. **Ling Ao** nuclear power station (2x1000 MW PWR reactors operated from 2002) is located just half a kilometre away from Daya Bay power station; its reactors are replicas of the Daya Bay facility. Hong Kong residents living a mere 50 kilometres away from Daya Bay are concerned about the close distance of the two power stations. They thought it risky to have four nuclear reactors built in such close proximity (Zhu 朱汉强 1996c).

Nuclear power reactors under construction

Reactor	Type	Net capacity	Construction start date	Start up*
Ling Ao Phase II-1	PWR	990MWe	2005	2010
Ling Ao Phase II-2	PWR	990 MWe	2005	2010
Qinshan Phase II E-1	PWR	650 MWe	2006	2011
Qinshan Phase II E-2	PWR	650 MWe	2006	2011
Hongyanhe Phase I	PWR	4*1110MWe		
Total (8)		7720MWe		

* Latest announced commercial operation.

Table 3.2: sourced from Nuclear Power in China & CNNC website; Civil Nuclear Power Mid-Long Term Development Schedule (2005-2020) (核电发展中长期规划 2005-2020)

4.3 Energy supply and civil nuclear power

Welsh claims that after World War II "*Politically and scientifically there was the hope that 'nuclear boilers' would revolutionise the generation of electricity and end dependence upon coal and oil"*(2000:36). Since the 1950s, Western developed countries such as the UK, the US and France have, together with Russia, promoted the use of nuclear power as an energy resource. The development of civil nuclear power has carried some political and military significance for all these countries since the very beginning. China started to plan the use of nuclear power for its energy supply since the late 1970s. In this section I discuss three issues: reasons for

using nuclear power, energy alternatives, and the economic conditions of nuclear power.

4.3.1 Why use nuclear power as an energy resource?

Why does the country or central government want to use nuclear power as a kind of energy resource? Three reasons have been widely discussed: the security of the energy supply, environmental protection requirements, and growing energy demands (Zhou 1986; Jiang 1989; Rong, Lai et al. 1999; State Council Development Research Centre 1999; Shen 2005). Apart from these three main reasons there are authors who have also discussed that the development of nuclear power can ease the pressure on coal transport[13] and benefit the country's technology development (Ren 1990; Zhang 1990).

1. Security of energy supply

China's energy supply depends mainly on coal. Coal-fired electricity makes up 74% of the country's electricity supply, while hydropower supplies 24% and nuclear power only 1.6% of the electricity supply (Shen 2005). Coal-fired electricity obviously occupies a much higher percentage of China's energy supply than the average world level (Xu 2005). The country is certainly rich in coal resources. However, the State Council Development Research Centre points out that over-

[13]China's coal resources are distributed in an unbalanced way. The main coal-producing areas in China are in the West and North, while the main coal-consuming areas are in the East and South. The coal transporting systems are called 'Bei Mei Nan Song' (北煤南送North coal sending to South) and 'Xi Mei Dong Song' (西煤东送，West coal sending to East). There are three main means of coal transportation: rail, road and water. Over 60% of coal transportation depends on the railway; coal transportation takes up nearly 40% of the country's railway transportation capability. In 2007, the whole country's coal railway transportation was 1.54 billion tons. The growing demand for coal has put increased pressure on the railway transportation system. (Source from: http://www.ccoalnews.com/101782/101868/102811/96300.html; my translation.)

dependence on one kind of energy resources is not secure for the whole country's energy supply system (State Council Development Research Centre 1999).

2. Environmental protection requirements

Because of its over-dependence on coal-fired energy, the country feels a great deal of responsibility (and international pressure) to reduce its greenhouse gas emissions (Li 李永江, 2004). Another serious pollutant is sulphur dioxide from coal-fired power stations, which has an extremely negative effect on forests, water and crops. In 1995, sulphur dioxide released from coal-fired stations cost 99.35 billion RMB lost in forests and crops (Pan 2001). Since most small to medium coal-fired power stations do not have desulphurisation systems, they often pose a threat to the environment. The transportation of coal from the north and the west to the south and the east also causes various environmental problems, such as an increase in dirt pollution along the railway.

3. Energy demands

A conservative estimate would suggest that China's energy consumption will continue to increase until 2035, finally exceeding that of the US and becoming the highest in the world (Xu 2005). The development of nuclear power is a solution for energy demands in the meantime. China's uranium storage is enough to supply the recent nuclear power development plan for over 100 years (State Council Development Research Centre 1999).

4. Benefiting the country's military and civil nuclear technology

This is the main point that policy-makers in the central government considered when making decisions about civil nuclear power in the 1970s (Li 李鹏 2004). The development of civil nuclear power is a means to maintain personnel and technology

in such a fashion as to increasingly benefit the country's military development. The central government raised the slogan of '*Yi He Yang He*' (已核养核 "use nuclear power to grow nuclear power"), meaning that civil nuclear development can be used to maintain and support military nuclear technology and development (State Council Development Research Centre 1999; Li 李鹏 2004).

4.3.2 Energy alternatives

Overall, China's alternative energy situation is poor. The whole country's energy supply situation can be summarised into three main categories.

Firstly, I have discussed in footnote 7 the unbalanced distribution of coal resources and the pressures upon coal transportation. The Yunnan Province in southwest China has a rich source of hydropower, as does the famous Three Gorges project in Hubei Province. The government is promoting the development of southwest hydropower in order to satisfy the high electricity demand of south coastal cities. Electricity has been transported by Extra High Tension (EHT)[14] cables from the west to the east.

Secondly, as I have discussed in 3.3.1, emission gases from these coal-fired stations have been released directly into the atmosphere – inevitably causing serious air pollution. The greenhouse gas emissions from coal-fired power stations and vehicles made China the biggest CO_2 producing country after the US. In order to relieve the imminent environmental crisis, the central government has prioritised energy-saving and emission-reduction as important government activities.

[14]EHT is the special cable used for long distance electricity transport.

Thirdly, the development of renewable energy sources is very slow. Renewable energy sources make up less than 1% of the whole country's electric output. Take wind energy as an example: nowadays the country is encouraging private companies, state companies, and foreign companies to compete in wind energy projects. Wind power development, however, faces three difficulties. Firstly, state investment in wind energy projects is very low. Secondly, wind power electricity (on average around 0.8 RMB/KH) is two times more expensive than standard coal-fired electricity (average around 0.3 RMB/KH). Thirdly, the cost of wind power electricity will not be reduced even if its generating capacity grows. The cost of wind power electricity comes down to two things: equipment costs and land costs. China imports its equipment from Switzerland and Finland. And unless the country can make its own domestic equipment, the price of these imports will not go down. The cost of land, on the other hand, can only be more (and not less) expensive in the future. Based on this information it would seem that wind and solar energy do not have the ability to play a reliable role in contributing to the state's long-term energy supply (State Council Development Research Centre 1999). China's energy system is currently using coal and oil as a base energy source, so nuclear power and hydropower need only function as supplementary energy resources; renewable energy sources are the next phase in energy research. But with the serious trouble caused by coal and oil, and with the slow development of renewable energy resources, hydropower and nuclear power have become truly vital to the country's energy supply. Since hydropower is mostly concentrated in southwest China, the country is now strongly promoting the 'West-East Power Transmission (西点东送)' Project in order to transmit electricity from western areas to East China.

4.3.3 The economic conditions of nuclear power

According to research reports and journal articles, electricity produced by nuclear power stations is more expensive than that produced by coal-fired and hydropower stations (Jiang 1989; Su 1997; State Council Development Research Centre 1999). The report published by the State Council Development Research Centre in 1999 included a comparison of nuclear power, coal and liquefied national gas (LNG). A nuclear power station is a huge investment. When comparing nuclear electricity with other energy (sources), the most important indicator of the relationship between investments and changing interests is the discount rate. The result of the report eleven years ago is as follows[15]:

1. If the discount rate is 0, then nuclear electricity is more economical than coal electricity.
2. If the discount rate is 5%, then nuclear electricity is similar to coal electricity.
3. If the investment of a nuclear power station can be reduced by 25%, then nuclear electricity is much more economical than coal electricity.
4. Our country's current discount rate is 8%-12%. So coal electricity is much more economical than nuclear electricity.

Economic comparison of nuclear electricity and LNG electricity:

1. If the discount rate is 0-5%, nuclear electricity is much more economical than LNG electricity.

[15]The data for comparison is collected from Ling Ao Nuclear Power Station Phase I, Shaojiao C Coal-Fired Power Station and Huizhou LND Power Station. These three power stations are all located inside Guangdong Province, and capabilities are all 1980WMe.

2. If the discount rate is 8%-10%, nuclear power stations should decrease costs to about 10%-20% and then nuclear electricity will be similar to LNG electricity.
3. If the discount rate is 12%, then LNG electricity is always much more economical than nuclear electricity.

Economic comparison of coal electricity and LNG electricity:

If the price of coal is 420yuan/tonnes and the price of LNG is $4.50/tonnes, then the de-coked coal electricity is similar to LNG electricity.

According to these results, it was actually the discount rate that decided the cost of nuclear power. If the country's discount is reduced in the future, then nuclear electricity might possibly be cheaper than coal and LNG electricity. However, all these comparisons have been made by considering the cost of building and running nuclear power stations, but ignoring the cost of waste disposal and plant decommissioning. The initial investment of a nuclear power plant is much higher than a coal-fired station. If building a new nuclear power station, the nuclear power company has to borrow large sums of money from its investors. The research centre considers this point when making comparisons. The higher discount rate will raise the initial investment – which accounts for these results. But if waste disposal and plant decommissioning fees are also considered, then the result will be totally different. According to the experience of Western developed countries, a lower discount rate will make waste disposal and plant decommissioning costs much higher. In the case of the Qinshan Phase I nuclear power station, the waste disposal fee

would start to be withdrawn from the sixth year of operation and the decommissioning fee would start to be withdrawn from the eleventh year; poor decision-making in the 80s resulted in a lack of funding from the very beginning(Su 苏宁 1997).

Although the price of nuclear electricity is still higher than coal-fired and hydropower electricity (at least until recently), the electricity price of localised nuclear power stations will become competitive in the long run (Li 李永江 2004). If we consider the price of nuclear power overall, together with the waste disposal and decommissioning fees, it is much higher than coal-fired and hydro-powered electricity. If it is not compulsory for power grid companies to buy nuclear power, if the purchase follows the market price, then nuclear power will not be consumed in mainland China (State Council Development Research Centre 1999). It is obvious that compared with other energy resources nuclear power does not hold an economic advantage, according to data discussed in this section. The state plans to promote the development of civil nuclear power. According to materials that I can find, China's consideration of civil nuclear power is similar to that of most Western countries. Policy-makers give more consideration to energy supply and technological development for strategic reasons (national safety, energy safety and international relationship). In the long run, traditional resources are facing dry-out. Nuclear power has the potential to become the most reliable new energy resource in the future. China will not avoid the technology of nuclear power.

4.3.4 Technological status of civil nuclear power

Technology is an important indicator of a country's nuclear power development. At present, China is importing technology and equipment from France, Canada, Russia and the US. China's 11 operating nuclear power reactors fall into the category of second-generation technology[16]. For developed Western countries such as the UK and France, nuclear technology in the 1940s and 1950s was considered a symbol of a country's modernity. This technology has been treated as a very important tool for remaining a world leader (Hecht 1998; Welsh 2000).

For developed countries, nuclear technology is a tool for ruling the world, while for China, importing and learning Western technology is a way to escape from being ruled. Importing technology is reasonable and safe when a country's domestic technology is immature; I suggest, however, that the risks of importing technology should not be ignored.

In China, engineers and experts in the civil nuclear industry claim that the country's current overdependence on imports will be disadvantageous to domestic nuclear power development for several reasons. Firstly, the importation of technologies and equipment raises the cost of nuclear power (State Council Development Research Centre 1999; Li 李永江 2004). Secondly, reactor technologies and equipment imported from four countries makes it hard for China to learn foreign technologies and make progress with its own technology. Thirdly, an overdependence on foreign technology and foreign experts leads to lower efficiency in the problem-solving process, and a corresponding increase in safety risks (Xu 2005). The country's domestic engineers might not be able to resolve key operational problems, and might

[16]"Generation II reactors are typified by the present US fleet and most of the operations elsewhere. About 85% of the world's nuclear electricity is generated by reactors derived from designs originally developed for naval use. These and other second-generation nuclear power units have been found to be safe and reliable, but they are being superseded by better designs." Source: http://www.world-nuclear.org/info/inf08.html.

therefore have to rely on foreign experts. Foreign technology has been treated as a guarantee for safety, yet its potential risks have never been discussed publicly.

In the early 1980s, the only option available for China's Daya Bay Nuclear Power Project was to import the necessary technology and equipment from France (details will be discussed in the next section). Because it lacked sufficient expertise and financing, China needed foreign investment and technology to get started. Since the very beginning of its technology-related decision-making, the central government planned to use imported technology as a way to learn from foreign countries, hoping to later develop its own equipment in a domestic nuclear industry. However, 30 years have passed and domestic technology has still not been used for designing and making equipment for China's nuclear power stations.

Scholars claim that this delay is not because of China's underdeveloped nuclear technology, but rather because the country's nuclear power policy decision-making is at fault (Lu 2009). Policy-makers have changed their decisions about using domestic technology. In the 1980s they promoted the 'import + self researching' policy. In the 1990s they advocated import only. According to the Civil Nuclear Power Mid-Long Term Development Schedule (2005-2020) published by the NRDC in 2007, technology importation was still the main way of building up China's nuclear power stations: "Importing technology from Western developed countries has become a matter of diplomacy for the Chinese government" (interview with BL, secretary-general of the China Nuclear Academy). BL (2009) claimed that buying technology from different countries balances the profits of each country.

Consider the Yangjiang Nuclear Power Project as an example. This was the first time China opened its technology import competition to Westinghouse of the US (西屋公

司). After competing with Framatome for several rounds, Westinghouse was declared the winner because of its lower price. Liu also noted that the US government did not want to export the technology for security reasons. The US was concerned that China would use civil nuclear technology to make submarines. Insiders in the nuclear industry now claim that importing technology from Western countries is not only a commercial activity. There are also political and strategic considerations in the international relationships regarding China's nuclear power business, particularly with Western countries. Importing technology defines (at least to a certain extent) China's relationship with technology-exporting countries; for example, in the 1980s and 1990s, China primarily used technology from France and the UK. The importing policy nowadays is much more open. However, this issue is not openly discussed with the Chinese public, and literature about this sensitive topic is scarce.

4.4 Decision-making for the Daya Bay Nuclear Power Project

The Daya Bay Nuclear Power Project was China's first big commercial nuclear project and thus has special historical significance. In reviewing the decision-making for the project, readers will see the policy-makers' concerns about big science and technology projects. This project illustrates policy-makers' views of nuclear projects requiring Western technology.

4.4.1 Before and during the 1970s

China started to build commercial nuclear power stations much later than Western countries. When China officially started to use nuclear power for peaceful purposes

in 1955, this effort actually covered a nuclear weapons programme (Cappellano-Sarver 2007). Real civil nuclear power projects for producing electricity were not on the government's agenda until the 1970s (Li 李鹏 2004; Cappellano-Sarver 2007). Starting in 1964 the central government sent officials to visit and investigate civil nuclear power industries in Western countries. At that time China was still at war, and the central government put all its resources into developing the military uses of nuclear power. There were no plans for a specific civil nuclear power project until 1972 (Li 李鹏 2004).

In the 1970s the Chinese government started to have more diplomatic ties with Western countries and sent government officials and civil servants to visit other countries in order to discuss energy, economic and technological cooperation issues. At this same time, some key government policy-makers and government officials visited commercial nuclear power stations. Li Peng (李鹏)[17] was one of the key persons involved in China's civil nuclear power development. Li has worked for the country's development of the electricity industry for over 40 years. He was sent to Russia from 1948 to 1955 to study in Moscow Power Institute, majoring in hydro-electric power systems. After graduation he began work as an engineer, later on becoming a manager and key policy-maker for the country's electricity industry. Li is the person in charge of the Daya Bay project. In 1972, after attending the International High-Power Grid Conference, he spent one month in France visiting

[17]Li was the secretary of the Beijing Electricity Industry Authority (BEIA) from 1966 to 1979, the minister of the Ministry of Power Industry from 1979 to 1983, the vice premier from 1983 to 1988 and the premier from 1988 to 1998.

sites in the electricity industry: coal-fired power stations, nuclear power stations and electricity equipment factories. He later wrote:

> '*After a decade, France has made nuclear power the main energy source of electricity development. In its technological aspects, French reactors have been changed from gas-cooling reactors to pressure-water reactors (PWRs). The design of PWRs has already been standardised. Their development goal is that the capability of the circulation system will reach 3000MWe on circuit. Two 900MWe nuclear power plants are being constructed. Because of the advanced leaking resistance, emission and wastewater treatment facilities, pollution problems for this civil nuclear power have been solved appropriately*' (Li 李鹏 2004:6-7; my translation).

Li made three important points. Firstly, he noted that France focused its electricity development on big power stations (capability over 600MWe). Secondly, he recognised that the French PWR was standardised and mature. Thirdly, he believed that the pollution problems of nuclear power had been resolved. Here Li used the word 'pollution' to describe 'leaking, emissions and wastewater'. This shows his awareness of nuclear pollution.

I suggest that as a government official Li's knowledge of nuclear power and its potential risks was limited. Consider his background: he studied electric power as an engineer in Russia and worked for the electricity industry ever since he graduated and returned to China. Although he was a government official who had special knowledge of electric power, he was not a specialist in nuclear power. His

understanding of France's nuclear technology came from what he saw during his trip to France.

In 1979 Li visited Japan and inspected its electricity industry. He found that Japan was also promoting civil nuclear power. He observed, "*Japan has a lack of traditional energy sources. Although the US has just had a serious nuclear accident, this will not change Japan's energy development strategy*" (Li李鹏 2004:11-12; my translation). As a developed country geographically situated next to China, Japan has always been the competitor and model for China's development. As such, it is significant that Li mentioned Japan's energy strategy and its plan to promote nuclear power. It's clear that even though there were serious accidents, Japan was still determined to follow in the footsteps of developed Western countries: the nuclear power technology was still worth developing. In March 1979 Li was appointed as minister and also the secretary of the Party Committee [18] of the Ministry of Electricity Industry. In 1980, the top leader of China at that time, Deng, said that the country needed to build at least two nuclear power reactors in the south coastal area (Li李鹏 2004).

4.4.2 1980s onwards

On 20 March 1981 the Party Committee of the Ministry of Electricity Industry decided it would cooperate with Guangdong Province to edit the Guangdong Joint-venture Nuclear Power Station Feasibility Research Joint Report. The province and

[18]China is a party-led country. In regional and higher levels of government and institutions, the Party Committee has the highest administrative rights. Party Committee Secretaries are the highest leaders in the government and institutions. The Ministry of Electricity Industry is directly under the administration of the central government. Its level is higher than regional governments. So the mission of the Party Committee is making decisions.

the Ministry of Electricity Industry then used this report to apply for planning permission from the State Planning Office (under the State Council). From 1981 to 1982, the State Council held five committee meetings to discuss the Daya Bay Nuclear Power Station project. The nuclear power project could not be agreed until the last meeting as there were conflicts between key policy-makers (Rong, Lai et al. 1999). Economic problems were the main concern at that time. However policy-makers' concern over economic problems was not about whether nuclear power could provide cheaper electricity; it was about whether the country had enough money to build up a nuclear power station. The state did not have enough money to invest in the nuclear power project, and some committee members thought it was dangerous to take foreign investments and loans (Rong, Lai et al. 1999; Li 李鹏 2004). Others thought it was a good opportunity to attract foreign investment in the primary stage of the state's reform and opening-up policy.

When key policy-makers discussed the project, their main concerns were the strategic [19] and economic issues involved in the nuclear power project; in the technology and safety demonstrations, they trusted in and depended upon Western technologies.

The following quote reflects a point of view summarised during the State Council Committee meeting (Li 李鹏 2004:40; my translation): "*There is risk in nuclear power projects, but there is not a big risk. The whole world is developing nuclear power, the technology is mature*." The committee here easily believed that there was

[19] Strategic consideration, which has been always mentioned in decision-making on the Daya Bay project, means the comprehensive consideration of the military, international relationships, energy supply conditions and technological conditions.

not any great risk in nuclear power – even without domestic experts and specialists around to demonstrate nuclear safety and risk issues.

The Preliminary Economic Feasibility Studies of the Nuclear Power Project on 25 March 1981

"*The capability of the nuclear power station is 2*948WMe. Total investment estimates 4 billion USD. The capital fund is 400 million USD which is 10% of the total investment. Guangdong Province will pay 60% of it and Hong Kong will pay the other 40%. Guangdong Province will pay this money by RMB rather than USD. The loan is provided by Bank of China. Money will be paid back after the operation of the first reactor. The commercial loan needs to be paid back within 7 years, the equipment loan within 15 years and fuel loan with 3 years. The equipment utilisation is 75%. In the first year, the electricity generation cost is about 14 cents USD per KWH. The country will collect 30% income tax and 5% business tax from the power station. The power station will generate 150billion KWH electricity in the future 15 years. The total tax income will come to 5.3 billion USD. China owns 60% of its electricity and resells 30% to Hong Kong, which means Hong Kong will use 2/3 of the total electricity output. Referring to this percentage China will get 50 billion KWH of electricity. With this calculation, there will be a deficit of 4.2 billion USD. This can be compensated by the taxation and profit of selling electricity; and the investment and income will be balanced within 15 years. It means that the government does not need to spend any money on the nuclear power station. After 20 years (in 2008), the whole asset belongs to China. This was the way that we used foreign investment to build up the nuclear power station, and then paid back the*

money by selling electricity to Hong Kong. There are three benefits we will get from this project. First, the government will earn 4.5 billion USD in tax. Second, we will have 500KWH electricity output. Third, we can learn civil nuclear technology from Western countries."

(Li 李鹏 2004:28-29; my translation)

The Initial Decisions of the Nuclear Power Station in 1981

1. The Ministry of Electricity Industry and Guangdong Province to draft the programme proposal. Planning Committee, Construction Committee and Import and Export Committee will verify its applicability.
2. A civil nuclear power group organised by Gu Mu (the secretary of the Secretariat of the PRC Central Committee) and other leading people is strongly recommended.

Negotiations concerning the nuclear power station began between France and the UK in 1982. Li and Ye Xuanping[20] led the visiting group to inspect the nuclear power industry in the UK and France. After several rounds of meetings and demonstrations the Planning Committee in the central government finally decided that the Ministry of Water and Electricity (MWE)[21] to organise the nuclear power project at that time(Li李鹏 2004). According to Li's diary about the process of the Daya Bay Nuclear Power Project, nuclear power companies had not yet been founded at that

[20]Ye Xuanping was the Vice Governor of Guangdong Province and the Mayor of Guangzhou City from 1980 to 1985.
[21]The Ministry of Electricity Industry was set up in July 1955. In February 1957, the MEI merged with The Ministry of Water Resource and was called The Ministry of Water and Electricity. In February 1979 the MEI was reset, and then merged with MWE again in March 1983.

time. The nuclear power project was managed by the government ministry on a temporary basis. In 1982, the central government initially decided to use the French reactor code and British turbines to construct Daya Bay Nuclear Power Station. From 10 November to 3 December 1982 the China Nuclear Power Deputies Group visited France, the UK and Finland. The State Council at last approved the Guangdong nuclear power project on 13 December 1982 (Li李鹏 2004).

Four important events took place in 1983.

Firstly, the Nuclear Leading Group was founded inside the State Council.

Secondly, Li led the deputy's team in a visit to Hong Kong. They discussed the joint-venture project of the Guangdong Nuclear Power Station, electricity selling and equipment, and commercial loan issues with Hong Kong-related companies and institutions.

Thirdly, the 'China-UK Memorandum of Understanding on Cooperation' and 'China-France Memorandum of Understanding on Cooperation' were signed.

Fourthly, China joined the International Atomic Energy Agency (IEAE) on 11 October 1983.

From the decision-making process of the Daya Bay project, readers can sense that the central government always puts economic and strategic considerations at the forefront of decision-making. According to materials that I have obtained, the risk of nuclear technology and safety issues have not been highlighted or properly discussed. Throughout the decision-making process, experts and scientists did not play any important part in discussions. Decision-makers put a lot of effort into demonstrating

how to use foreign investments to build nuclear power stations in China, and how to sell electricity to Hong Kong to generate income. They discussed how the country would have a nuclear power station with low input and high profits, rather than considering how the station might bring about potential risks to nature and the environment. However, there could have been policy-makers against the idea of technology imports and cooperation with foreign countries. There could have been negotiations between policy-makers which outsiders can never know. At that time, policy-makers in central government felt the same way about the importance of economic and technological development. It was easy for them to come to an agreement on technology development issues, such as civil nuclear power development. But if we consider the project from another angle, the country in fact buys foreign technology, puts the risk inside the country and sees most of its outgoings[22] only at the end of the process. Whether or not someone has raised concerns about this has never been recorded. The entire decision-making process involves no form of public engagement or participation. The people of Hong Kong engaged in resistance activities after the decisions were made in 1986. Details concerning activities in Daya Bay will be discussed in the next section about the governance of China's civil nuclear power.

4.5 The governance of nuclear power

China's civil nuclear power governance model is decided by the country's political system and by development requirements of the industry. The governance model is transforming alongside the development of the industry. Since the 1980s, there have

[22]70% of electricity is sold to Hong Kong which was still a British colony at that time.

been several rounds of institutional transformation occurring both inside and outside the government. China learns from Western models of nuclear industry through the process of technology importation. There are also some institutions which have been set up for connecting with international nuclear governance. China's nuclear industry is transforming from military to civil usage, from management by government agencies and ministries to management by corporations. However, the development of the nuclear industry is not trying to copy the style of the Western countries in the same way that China used to mimic the Russian style. Rather, it is developing towards a localised governing style with the influence of Western advanced technology and management experience. In this process, the central and provincial governments still play the most important part. Just like Pierre and Peter's claim: "*Finally, governing is still discussed primarily in terms of national governments which exercise authority throughout the territories within their national boundaries and which can exert substantial control over international influences on their domestic policies and institutions (for example, national markets)*" (Pierre & Peters 2000:4).

To understand the governance of China's civil nuclear industry we should look first at China's real situation. Tait and Lyall (2005) summarise two levels of transformation occurring from government to governance. Firstly, on the governmental and institutional level, cooperation is replacing hierarchy. Secondly, on the public level, non-governmental actors are beginning to engage more in the decision-making process. Another issue raised is the importance of experts playing a more critical role in decision-making on nuclear power; this is clear to see in the

UK's civil nuclear industry. The knowledge of experts gives governments the power to make decisions (Welsh 2000). China's case matches these three points in some ways, but not in all. In the very beginning (from the 1960s to the beginning of the 1980s), the civil nuclear power industry was closely related to the military programme (Cappellano-Sarver 2007). Decisions were made by a small amount of people who held high positions in central government. However, during the developmental process of China's civil nuclear power, I see the dynamics of governance in both institutions and on a public level through the institutional transformation, the modern corporation system, and public participation activities. I will discuss this issue by reviewing the institutional transformation of the nuclear power industry from the 1960s until now, the modern corporation system from the 1980s until the present, and stakeholder engagements in civil nuclear power projects in Hong Kong and mainland China.

4.5.1 The institutional transformation

Institutional transformation is the initial stage of China's civil nuclear power shift from government to governance. From the policy-making process of the Daya Bay project (as discussed in the preceding section), we know that it was a committee – founded by several key policy-makers in the central government – that first initiated the country's nuclear power project. This was a top-down, power-over process. This kind of model was certainly not enough to fulfil tactical management requirements during the development process of the civil nuclear industry. The government and nuclear industry started to implement institutional transformations in the 1980s. Since then, the nuclear power project has become more open and systematic than

ever before. In this section, I intend to discuss three forms of institutional transformation.

1. The Second Ministry of Machine Building (SMMB 1958) 1982 → The Ministry of Nuclear Industry (MNI 1982) 1988 → China's National Nuclear Corporation (CNNC 中国核电集团公司).

This institutional transformation represents two levels of change: from military to civil industry, and from government institution to cooperation. The shift from SMMB to MNI is a process by which China's military nuclear power institution transformed and merged into the civil nuclear power industry. The SMMB was formed in 1958.

> "*It was tasked with the development of nuclear weapons, the nuclear submarine propulsion plant, and all associated industries. The Second Ministry controlled the nuclear industry from prospecting, mining, and processing uranium; processing fuel; constructing nuclear facilities; to developing and producing all instruments and control (I&C) equipment.*"
>
> (Cappellano-Sarver 2007 p116:)

From 1982 SMMB changed its name to the Ministry of Nuclear Industry (MNI). MNI was the organiser and owner of China's first domestically designed nuclear power station – Qinshan Nuclear Power Station Phase I. MNI was a transitional institution in the 1980s. The state's nuclear power industry is gradually transferring from military projects to big commercial civil nuclear power projects; the state's nuclear power plan is "Retain Military, Transfer to Civilian (Bao Jun Zhuan Min 保军转民)." MNI would not receive the same amount of resources and economic

support as the military had. At that time the central government offered the best man-power and also funding for their research and development of new technology (Li 李鹏 2004). MNI tried to apply for ownership of the Daya Bay project in 1984 from the State Council, but its bid was unsuccessful (Li 李鹏 2004). The Daya Bay project was owned by the Ministry of Water and Electricity (MWE) in the very beginning and the China Guangdong Nuclear Power Group (CGNPG) later on (I will discuss CGNPG and the Daya Bay project in the next part). The necessary technology and equipment (reactors, turbines, etc) were imported from France and the UK. MNI had no chance to participate in the design and manufacture of this big project, making the 1980s the most difficult decade for MNI. It lost its leading position in the nuclear industry, a position only achieved during the SMMB period. After the Qinshan Phase 1 Nuclear Power Project, the central government decided that the reactor style of Qinshan 1 was out of date and that the country would no longer build that kind of reactor. The technology for building Qinshan 1 (which was on hold by MNI) lost most of its value. In 1988, MNI was reorganised into China's National Nuclear Corporation (CNNC): "*Like the Second Ministry, the CNNC consists of over one hundred subsidiary companies and institutions and still controls the vast majority of the civilian and military nuclear programs*" (Cappellano-Sarver 2007:116). According to the cooperation introduction that I found on the CNNC website, the corporation is described as "a transformation result from military to civil-military cooperation, from simply military to various industrial systems, a transformation from planning operation system to market operation system." At present, the CNNC is in charge of military and civil nuclear technological development, building and running nuclear power stations, economic cooperation with foreign countries and the

import-export business. The CNNC is the biggest owner of all nuclear power stations – and is largely responsible for operating and constructing most nuclear power stations. The CNNC is a monopoly corporation of the country's nuclear industry. From its function and the monopoly-style operation system, it seems that the CNNC does not represent the shift to governance. However, the corporation style of management is closer to governance than that of government agencies and the Ministry. The CNNC still has a lot of room to keep transferring to a more market-style corporation.

2, The founding of the China Atomic Energy Authority (CAEA 1983) and the National Nuclear Safety Authority (NNSA 1985)

The CAEA was founded for the purpose of connecting with the IAEA as an internationally recognised institution. On 11 October 11 1983, the International Atomic Energy Authority (IAEA) decided to admit China as a member in its 27th conference. The CAEA was founded immediately afterwards. Although the CAEA is a member institution of the IAEA, it still retains its Chinese style – which means it also works for the military. For the military setting, the CAEA has another name, which is the National Security Technology and Industry Commission (NSTIC). These two institutions share the same staff and together work on both civil and military nuclear power issues (interview with general secretary of Chinese Nuclear Academy). According to the description on the website, the CAEA is in charge of creating decision-making policies and regulating the peaceful use of nuclear power. It also cooperates with government bodies and international organisations. Regulations such as the 'Regulations of the People's Republic of China on Export

Control of Missiles' and 'Missile-related Items and Technologies, Emergency Nuclear Accident Matters' are provided by the CAEA. It also participates in and organises international nuclear conferences, publishing White Papers on China's non-proliferation policy and measures.

The National Nuclear Safety Authority (NNSA) is in charge of the safety of the country's nuclear power development, and is under the supervision of the State Council. It performs independent reviews and surveys nuclear safety for civilian nuclear installations. The NNSA was founded in 1985 and was a subordinate department of Science & Technology until 1998, when it merged with the Station Environmental Protection Administration (SEPA) and became one of its primary departments. In 2002-2003, the National Radiation Sources Management Division (NRSMD) detached from the Ministry of Health and joined the SEPA. The NRSMD and NNSA were integrated into one department, but their names were kept for internal and external use. NNSA is the externally used name for licensing and low issuing. NRSMD is used internally as a division of SEPA (Interview with BL and BC, president and secretary of SEPA).

3. Research and design institutions of China's nuclear power industry.

One of the main characteristics of China's civil nuclear power industry is that China does not have a complete nuclear industry technology support team – this distinguishes it from the civil nuclear power industry in Western countries. In other words, China does not hold the key technology of design and did not produce civil

nuclear reactors when the country was making its civil nuclear power plans in the very beginning. This point can best be seen in my analysis (in the second section) of the technological condition of the country's civil nuclear power industry. China's civil nuclear power development plan is built mostly upon policy-makers' ideology rather than upon real technological development.

The Shanghai Nuclear Engineering, Research and Design Institute (SNERDI) was set up in 1970 for the purpose of designing civil nuclear power reactors. From May 2007 SNERDI was merged into the China Nuclear Power Technology Corporation (CNPTC) (http://www.snerdi.com.cn/01company/1backgd.asp). Several other institutions during the 1970s, primarily in various universities and in the China Science Academy (CSA), were also involved in the designing of civil nuclear plants. Tsinghua University Institute of Nuclear Energy Technology (INET) is the most important of these. However, these institutions in universities and in the CAS work primarily on military nuclear reactors and nuclear-powered submarines designed before the 1970s. The period 1978 to 1989 marks the transformation period of Tsinghua INET. Since the 1990s, the institution has been working on the research and design of civil nuclear reactors. In addition, it has also been researching renewable energy and environmental resources.

The institutional transformation of safety and research organisations in the civil nuclear industry shows how the civil nuclear industry became detached from the military nuclear industry. This was an important step in helping the country's civil nuclear power to found its own running and ruling system – and it was also the foundational step for potential governance in the future.

4.5.2 The modern corporation system

Although China's civil nuclear power industry had been undergoing some institutional transformation in the 1980s, the military settings, government institutions and corporations were not clearly separated even into the early 1990s. The State Institutional Reform in 1998 broke the cooperation of government and enterprises (State Council Development Research Centre 1999). The modern corporation system should be seen as the most important transformations of the state's civil nuclear power industry from government to further governance. The Guangdong Nuclear Power Corporation — which set up and was in charge of the Daya Bay Nuclear Power Project – is the starting point for the nuclear corporation system in the nuclear industry. Since Guangdong, the whole civil nuclear power operating and management system has been transferring to the corporation system, which means that civil nuclear power projects are no longer organised by the central government. The central government is only in charge of planning and decision-making, while nuclear power companies run and manage nuclear power stations. Nuclear power companies also become the legal owner to apply for the licence for nuclear power projects through the administration process. The nuclear power project is no longer centrally run by a central government plan. Instead, the State Council decides on the project, whilst other government agencies, institutions, and lower levels of governments then cooperate to facilitate the State Council's nuclear power development decision (Li 李鹏 2004). Nuclear power corporations like the CNNC and CGNPG were gradually transformed from government ministries.

In the previous section I briefly introduced the transformation of the CNNC. In this part I would like to discuss the Guangdong Nuclear Power Corporation (GNPC 广东核电合营公司) and its modern enterprise system. The GNPC is a part of the CGNPG and is also the owner of Daya Bay Nuclear Power Station. Because of the historical context behind the construction of the Daya Bay Nuclear Power Station, the GNPC is not a state-owned corporation. It is a joint-stock corporation operated by Guangdong Nuclear Power Investment Company and Hong Kong Nuclear Power Investment Company (owned by Hong Kong 'China Power' 香港中华电力). As a joint-stock corporation with the Hong Kong Company, the GNPC was not a government 'sub-agent' (Rong, Lai et al. 1999). As a modern corporation it was no longer just handling top-down decisions, but worked on benefits for all shareholders. In comparison to government sub-agencies and state-owned companies, this joint-stock style corporation is independent in France and has to take responsibility if people have any concerns about the nuclear power station handled by their company. It becomes the body for negotiating with local people, with NGOs, with the media and so on. For example, when journalists in Hong Kong want to gather information about the operating situation at Daya Bay Nuclear Power Station, they will contact the GNPC for access to that information, rather than contacting government agencies or ministries. In April 1995, the Hong Kong legislative Council Panel on Environmental Affairs requested that an independent nuclear expert team (organised by the Hong Kong Government) be put in place to monitor the operations of Daya Bay Nuclear Power Station (Zhu 朱汉强 1995c).

4.5.3 Stakeholder engagement

In this section, I discuss two stakeholder engagement activities. I discuss two unusual anti-nuclear power cases that happened in China. One happened in Hong Kong (1986) when it was still a British colony, and the other happened in the Silver Beach (2006), Shandong province, mainland China. There are two reasons for discussing these two cases. One is because they are the only two cases that I can find about public participation in nuclear power issues in China, apart from the Han River case which Iwill be discussed in depth later on. The other is because these two cases are representative and they reveal different styles of participation over nuclear power issues. They offer insights in explaining the concept of 'the public' which have also been used in public participation of environmental issues. Who are 'the public'? Are they stakeholders with a special interest in the local environment, or they are just ordinary people who live locally? The anti-nuclear activities in Hong Kong were led by environmental protection NGOs, and the media also played an active role in the issue. The participants were ordinary Hong Kong citizens who lived locally and had concerns about risk from the Daya Bay project. The Silver Beach protest was led by property owners who were not residents of the Silver Beach but who purchased flats there; their main tool for resisting the nuclear power project was the Internet. Their different styles of participation are related to different social contexts, to the resources that participators holdi, and to the attitude of local governments.

The Anti-nuclear Activities in Hong Kong

The anti-Daya Bay nuclear power project activity (the Anti-Daya movement) is quite similar to anti-nuclear power activity in Western countries. It was organised by

environmental NGOs and widely publicised by the media. The purpose of the activity was to express the concerns of the Hong Kong people regarding the potential risks posed to the environment and nature by the Daya Bay project. Daya Bay Nuclear Power Station is located 50km (30 miles) away from Hong Kong. The project did not draw much attention from Hong Kong citizens when it was first announced in 1980 (Zhang 张圭阳 2007). However, the Chernobyl accident on 26 April 1986 served as a catalyst sparking increased action against the Daya Bay Nuclear Power Station. On 6 May 1986, Hong Kong environmental protection organisations such as Long Green Team (长青社), Friends of the Earth（地球之友）, and Nuclear Power Concern Group (核电关注组）first expressed concerns about the Daya Bay project, and asked for its suspension. On 15 May, 167 university lecturers and teachers published an open letter asking related departments to circulate safety documents to the public. From 27 April to 5 June 1986 the Hong Kong Times (香港时报), Ming Bao （明报）, and Wen Wei Po (文汇报) published 478 pieces of news about the Daya Bay Nuclear Power Project – 10% of all the news in Hong Kong during that period (Zhang 张圭阳 2007).

After the public became involved in the anti-Daya activity, the Hong Kong government began paying attention to the issue. On 11 July of the same year, the Hong Kong Legislative Council sent two teams to Europe and the US in order to study the safety issues of nuclear power stations. On 13 August, the “Stop Daya Bay Nuclear Power Station Joint Meeting (争取停建大亚湾核电厂联席会议)” deputies brought 1,004,000 citizen signatures from Hong Kong to Beijing, an unmistakeable

representation of Hong Kong's concern about the Daya Bay Project. On 20 September 1986, Hong Kong Legislative Council members such as Tan Huizhu, and Li Pengfei visited Beijing. The members had a meeting with Li and inquired about safety and operation management issues. These anti-nuclear activities in Hong Kong, however, did not change the central government's decision regarding the Daya Bay Project. On 23 September 1986 all contracts and agreements about the Daya-Bay Project were signed between China, the UK and France (Li 李鹏 2004). This heralded the end of anti-nuclear activities in Hong Kong: from that point on, anti-nuclear activities became comparatively smooth. The focus shifted from confrontational resistance to risk management and safety issues. However, a rather serious incident of human negligence happened in the Daya Bay Nuclear Power Station in October 1987 – an accident of misplaced reinforcement in the Phase 1 reactor foundation. This issue was widely reported by the Hong Kong press, but was never mentioned by China's mainland media. Li (2004) recorded this issue in his diary: It has been found out by project acceptance staff from Framatome that the construction of the Phase 1 reactor cannot meet the standard since the Chinese company which is in charge of the construction project mistakenly put the reinforcement in the roof of the reactor. This issue caused a great uproar among Hong Kong's citizens. Based on this issue, in January 1988 the central government agreed that Hong Kong could organise a Nuclear Power Safety Inquiry Group. The China Nuclear Power Industry Department selected two staff members to maintain an ongoing connection with the group. They have two meetings annually in order to communicate about safety issues at the Daya Bay Nuclear Power Station.

Anti-nuclear activities in Hong Kong have primarily been organised (at least since 1986) by NGOs, Hong Kong newspapers, ordinary citizens, professionals and civil servants. The Daya Bay Nuclear Power Project has been openly discussed in Hong Kong society. Activists have a channel for making their voices heard and have an opportunity to receive feedback from both local government and the Chinese government. Although they were not able to change the central government's decision in the end, they have had the opportunity to supervise various safety issues at the power station. The anti-Daya movement in Hong Kong is a bottom-up public participation issue revealing the model of governance behind a nuclear power project.

The online anti-nuclear movement in the Silver Beach, Shandong Province

The Silver Beach campaign is a stakeholder engagement activity organised by property owners who buy retirement or holiday homes along the Silver Beach. Activists described their activity as an anti-nuclear Internet movement. One of the organizers whose Internet ID is 'Jingming' claims that:

"'Silver Beach no nuclear power'" is a self-organised mass movement. There is no formal organisation style. Netizens are spread out everywhere. Most of them have never met each other."

The purpose of netizens' anti-nuclear power activity is simple: to protect the surrounding environment of their flats. The Silver Beach case, the Han River case (which I will discuss later on) and many other environmental protection activities in China are quite similar. They are more concerned with living a 'well-off' life than in protecting the environment for its own sake (Jing 2003). People who are involved in this activity are not residents of Silver Beach. They are stakeholders who have a

certain social status and the network resources to organise and take part in the activity. Most of them are so-called '*nouveau riche*' or 'middle class' people who can afford a second property for holidays and retirement.

The Silver Beach is a Four A level[23] national travel resort in Rushan City, Shandong Province. It was reported that the nuclear power project with four 1000MWe nuclear reactors was to be built only 4-5 km (3 miles) away from the Silver Beach. The Internet anti-nuclear movement first began in response to this in March 2006. Several stakeholders who had purchased retirement flats in the Silver Beach area heard about the nuclear power project. These people called themselves netizens (网友 *wangyou*) and began posting articles on the Shandong Property webpage *Shan Fang Wan*g (山房网).

From March 2006, a key netizen started to circulate anti-nuclear power information on Xinghua Net[24] (新华网). The click-through rate of these anti-nuclear power articles was over 10,000. In April 2006, these netizens drafted a letter to Wen (the present prime minister), mobilised other netizens to sign the letter, and then sent it along to Beijing. From that point on these netizens, who were also future flat owners, worked together on the anti-nuclear Internet movement in order to resist the nuclear power project in the Silver Beach. Their articles and Internet activities drew attention

[23]The highest national travel resort level is Five A. It is the standard evaluatedand approved by the National Tourism Administration. The five elements for evaluation include transport, tour guide, sanitation, and number of visitors. A Four A level travel resort has achieved full marks in four of the five elements.

[24]Xinhua Net is organized by Xinhua News agency. It is an official web page for the central government's news agency.

from the local government and from newspaper journalists. On 25 May 2006, for example, “The No.1 Finance and Economic Daily” reported news about the public’s concern over the Silver Beach nuclear power project. In June 2006, however, the entire forum about Silver Beach in *Shan Fang Wan*g was suddenly removed by the website administration. Netizens lost their network for the anti-nuclear movement without any notice. At that time an environmental protection NGO called Ocean Environmental Protection Commune (**大海**环**保公社** *Dahai Huan Bao Gong Se*) invited those netizens to post anti-nuclear information on their online forum. Throughout this anti-nuclear power movement, netizen activities were not limited to an online forum. In addition, netizens also:

wrote letters to the State Environment Protection Administration (SEPA) and to the State Development and Reform Commission (SDRC);

organized two ‘on beach’ anti-nuclear propaganda activities called “Yan Tan Wu He (银滩**无核** Silver Beach No Nuclear)”, taking place on 1 May and 27 July 2007.

Source: http://www.txdyt.com/read.php?tid-29459-fpage-0-page-11.html accessed 27 November 2009.

3) passed “Silver Beach No Nuclear” promotion material to provincial and municipal government officials.

The local government did not take a neutral position on this issue but actively welcomed the nuclear power project[25], even going so far as to organise a public exhibition for educating the public about nuclear technology. They hoped in this way to somehow win over the Silver Beach stakeholders. However, it could not succeed. Netizens were not convinced by the exhibition. The municipal and provincial governments at last realised that the netizens’ anti-nuclear movement should not be ignored. On 28 May 2007, the Rushan municipal government announced a public review of the Silver Beach nuclear power project on their official website. On 12 June 2007, netizens collected 628 copies of these public review forms and handed them in to the Silver Beech nuclear power planning office. However, the netizens did not receive any feedback from the municipal government. In November 2007, the Civil Nuclear Power Mid-Long Term Development Schedule (2005-2020) (核电中长期发展规划 2005-2020) was published. The Silver Beach project is not considered an ongoing project. Netizens published and discussed this news in their online forum. Their Internet movement successfully resisted nuclear power. As the Civil Nuclear Power Mid-Long Term Development Schedule (2005-2020) declares, there will not be any nuclear power project built on the Silver Beach before 2020.

I have kept a close eye on the development of the Silver Beach anti-nuclear Internet movement since 2007. This is a stakeholder engagement, a bottom-up policy

[25]This attitude is very common for local governments in dealing with nuclear power projects. It is the same in the Han River case; details will be discussed all together in chapter 7.

decision-making process, and a social education process concerning knowledge of nuclear power. During the online anti-nuclear activities, rich information was circulated about nuclear power and its potential to harm the environment and human beings, accidents which have happened in the history of nuclear power development. Even netizens who are doing ecological research in the US posted articles about professional knowledge of nuclear radiation and nuclear risk on the forum. This activity was successful in drawing attention from the local government. The local government and nuclear power companies sent nuclear experts to communicate with netizens both online and offline, in order to bridge the division between lay knowledge and expertise on nuclear power. After experts communicated with netizens they became aware of the fact that nuclear power is a social as well as a technological issue. Unfortunately, the way that local government and nuclear power companies dealt with the public review results could not have satisfied the netizens: the results were never published. The Silver Beach case, however, as a self-organised, anti-nuclear social movement made up of netizens, highlights the negotiations and interactions taking place during the policy-making process of a potential nuclear power project. Stakeholders did find a way to make their voices heard by policy-makers. This should be regarded as an important step in the governance of civil nuclear power in China.

4.6 Nuclear Waste disposal

Waste disposal has always been the most controversial issue of civil nuclear power development. Each country has different decision-making processes for determining waste disposal policy. The policy decision-making process in the US “included

several agencies in [the] federal government, Congress, the courts, state and local governments, industry, scientific organisations, public interest groups, and the general public"(Woodhouse 1981). In Western developed countries the most difficult part of waste disposal is deciding how to fill the gap between a scientist's assessment of the risks and local *perception* of those risks (Kemp 1992). Blowers, Lowry and Solomon claim that there are three main conflicts faced in nuclear waste disposal: at the national level; in central, regional and local communities; and in cross-frontier transport (Blowers, Lowry et al. 1991). Lack of funding and investment is another big issue in waste disposal. Nuclear waste disposal was clearly a hot topic in the public agenda during the 1980s and 1990s, especially in Western countries where nuclear power is or has been used with a degree of success. The situation in China, however, is quite different. Nuclear waste disposal, like nuclear power, is not on the public agenda and is a much more sensitive topic. Scientific assessments have never been published concerning the risks of nuclear waste. In this section, I can only provide general and preliminary information about the country's nuclear waste disposal. Before discussing the country's economic and technological situation in this regard, I want to discuss intermediate-level wastes (ILW) and low-level wastes (LLW) as identified in the UK.

The UK has proposed two programmes for dealing with ILW and LLW disposal: the shallow land burial programme and the deep disposal programme (Kemp 1992). As Kemp (1992) introduced in his book The Politics of Radioactive Waste Disposal, the UK government has adopted the policy of disposal of radioactive waste rather then indefinite storage because of the influence of the Sixth Report of the Royal

Commission on Environmental Pollution (1976). The agency responsible for implementing this policy is UK Nirex Ltd, which is jointly owned by BNFL, Nuclear Electric, Scottish Nuclear and the UK Atomic Energy Authority (UKAEA). In 1983, Nirex announced two potential sites that were to be examined for physical suitability: a sea-dumping mine in Billingham, for long-lived ILW and LLW, and Elstow, a shallow repository for short-lived ILW and LLW. The Billingham proposal was quickly opposed by an anti-dumping group and the sea-dumping idea has been banned until sufficient international studies have been conducted. The Department of the Environment indicated that Nirex also provided at least three alternative sites for both deep disposal and shallow trench disposal in 1985. In 1986 Nirex announced three sites apart from Elstow, each of which was swiftly opposed by the local authorities. In 1987, the whole plan for shallow trench disposal was similarly abandoned. Kemp claims this was due mostly to the fact that Nirex tried to prevent local involvement (Kemp 1992). Nirex learned the importance of involving people in the decision-making process. In the selection of a location for deep disposal, they made much more of an effort to find out the local response to the project. In 1991, Sellafield was selected as the deep disposal site. Based on this UK case, it is clear that the public and local communities play a very important role in the decision-making process surrounding nuclear waste disposal. In China, however, the situation is not the same. Nuclear waste disposal is only decided by the industry and the government.

In China, nuclear waste disposal and management has only been in effect practised for 16 years - 35 years after the commencement of nuclear technology (Zhang 张欣 2007a).

> "*At the initial stage of development of nuclear power, the most important mission is bringing out the product, while from the end of the 1980s when the country started to adjust its military development, some of the early military nuclear power sites were going to be closed and decommissioned, the problem of waste disposal and management suddenly came up. From the Eighth Five-Year Plan, the state started the 'Military Nuclear Sites Decommissioning and Radiation Waste Disposal' special plan.*" –Wang Yiren (Director of the Second System Engineering Division, the National Security Technology and Industry Commission (NSTIC)) (Zhang 张欣 2007a:1; my translation)

China's nuclear waste disposal and management obviously began quite late (at around 1992) compared to Western countries. High-level Waste (HLW) disposal, for instance, is still in a phase of research and exploration. HLW from military sites has been stored in the factory in Lanzhou Province (west China), and is still waiting to be properly disposed (Wang 王祥科 2005). "Wastes from civil nuclear power reactors are mostly stored in the temporary waste disposal storage inside the nuclear power stations" (Liu Hua, SEPA Nuclear Safety and Radiation Environment Management Division Director) (Zhang 张欣 2007b:1; my translation). Moreover, the cost of waste disposal did not factor into the cost of nuclear power projects until quite recently: "The nuclear waste disposal and management will gradually follow the

market economic operation" (Pan Ziqiang, expert from China Academy of Engineering) (Yang 杨阿卓 2007a:1; my translation).

According to Yang, the waste disposal of nuclear power has yet to follow the market economy. This is why the waste disposal fee has never been discussed at the same time as the economic conditions of a nuclear power project. In 1990, the central government earmarked 1.35 billion RMB (around 200 million USD) for nuclear waste disposal (Yang 杨阿卓 2007a). The nuclear industry embarked on the waste disposal project with this amount of money. Pan claims that within the first 15 years, the country built a solid foundation in nuclear waste disposal technology. In the next 20 years the country should expect to see huge developments in the economic, technological and personal realms (Yang 杨阿卓 2007b).

4.7 Summary

This chapter presents background information on China's civil nuclear power industry, including discussions on the context behind energy supply; the economic and technological situation of China's civil nuclear power; decision-making throughout the history of nuclear power projects; the governance of the civil nuclear power industry and the issue of waste disposal. The purpose of this chapter is to offer a brief introduction to the field, especially for those readers who do not know the background information about China's civil nuclear power industry. However, another more important purpose is to show the conflicts and dilemmas inherent in the development of a civil nuclear power industry. I expect readers to understand how civil nuclear technology – which is originally from Western countries – is managing

to find a place in China. In addition, in order to work for the later chapters on field findings, I would like to show how the top-down decision-making of civil nuclear power plans confronted public debates and participations.

Chapter 5: Civil nuclear power in a preliminarily modern society[26]

5.1 Introduction

As the first of the field finding chapters, one of the main purposes of this chapter is to introduce the local context behind the Han River case. In the very beginning, it is worthwhile to explain the concept of a 'preliminarily modern society' as used in the title. There is simply no easy way to define a country's modernity. There is no fixed standard to indicate the level of modernity that a country has reached. In Chinese society, 'modernity' or 'modern society' has always been an especially vague concept. 'Preliminarily modern society' is a phrase that comes up as people describe their living conditions in (and the social aspects that characterise) the townland. It is also a phrase used by the central government in official debates on China's recent development stage. The country has just started to work for economic and modernity development since the reform and policy of opening up. After thirty more years' development, Chinese society has reached a preliminarily modern level. People in the big cities are living comparatively well-off and modern lives. Those who live in a poverty-stricken townland in China are eager to seek opportunities for industrial and commercial development. 'Modernity' and the benefits of 'well-off living' are key goals for local people. In this process of working on development and modernity the townland is full of conflicts and risks. This social background shapes the local

[26] With the approval of the supervisor, some research findings in chapter 5, 6 and 7 have been published in "China Environmental Series 10" (2008/2009) pp151-155

understanding of the potential inland nuclear power project. People's different perceptions and formalisation of risks in response to the inland nuclear power project are strongly influenced by their social, economic and cultural positions (5.3 and 5.5). In this chapter I want to reflect upon what I saw during my field research and consider the different things people said concerning their lives in the townland.

This chapter is divided into four sections. The first section provides a brief introduction to the controversy surrounding the potential nuclear power project. The second section considers the geographical location of the Han River Basin, the geographical location of Dapu townland, and the living conditions of the local people. Having provided this background information, I will then discuss my field findings in the third section, using concepts related to risk and modernity. Different risks are constantly coming together and causing uncertainty in the lives of townland people: including risks from the environment, risks from other development projects, and risks from daily life. In the fourth section, I analyse the environmental awareness of the local people, arguing that (wealthy) local people are more interested in protecting the Han River from nuclear pollution for their own sake, than for the purposes of environmental/water resource preservation.

5.2 The Controversy of the Potential Inland Nuclear Power Station

From June 2006, experts from the China National Nuclear Corporation (CNNC) and China Guangdong Nuclear Power Group (CGNPG) started using the Han River Basin to conduct preliminary tests for the potential inland nuclear power project. On 9 September 2006, news about the project was published on Meizhou Daily (appendix 1.4). It was reported that three potential locations in Dapu and Fengshun Townland had passed the 'preliminary feasibility' research test.

News about the project provoked controversy and opposition by People's Deputies (PDs) and also by local people in the lower reaches of the Han River Basin, especially in Shantou City and Chaozhou City. PDs from the two cities asked for an inquiry meeting in the Provincial People's Congress on 4 February 2007. In the inquiry meeting, the deputies expressed several concerns about the risks that the inland nuclear power project might bring to the Han River, and especially to the lower reaches of the Han River Basin. The inquiry meeting took the form of a Q&A session. The provincial government officials and experts from the CGNPG answered PDs' questions directly in the inquiry meeting. According to the News report, the meeting was held in a 'hot atmosphere' (Chen陈枫 2007).[27]

[27]This inquiry meeting was a political activity rather than a public participation activity. The stakeholders in this inquiry meeting were all provincial People's Deputies. This inquiry meeting was far more politically embedded than the anti-nuclear Internet social movement discussed in chapter 3. Topics related to PDs, the people's congress system, and the public sphere will be discussed in chapter 7.

After the inquiry meeting, PDs consolidated their ideas and sent an official letter to the provincial leader. The Development and Reform Commission of Guangdong Province (DRCGP) replied to the letter on 12 April 2007. This reply (appendix 1.2) did not satisfy the PDs, and so they sent another letter to DRCGP. On 25 June 2007 the official reply letter (appendix 1.3) from DRCGP declared that the potential nuclear power project would be postponed. The letter from DRCGP also declared that nuclear power projects would only be planned along the coastline until 2015.

5.3 The geographical location and the local context

The fieldwork research of this thesis was conducted in the Han River Basin, in places such as Dapu townland, Chaozhou city and Shantou city. Dapu townland is a site that represents the conflict of a preliminarily modern society in several aspects. There are conflicts between economic development requirements and geographical limitations; between low-income levels and high levels of consumption; between commercial and industrial development and environmental degradation. These problems and conflicts shape the social background of the case, and also influence local understandings and opinions about the nuclear power project.

5.3.1 The Han River Basin

The Han River Basin (Map 5.2 and 5.3) is located in the east of Guangdong Province (the green part of Map 5.1). Dapu townland (the area inside the white circle in Map 5.2) is located at the east edge of Guangdong Province. Shanhe (the upper mark in Map 5.3) marks the starting point of the Han River and is located inside Dapu

townland. Dangxi village and Shanzhou village (see Map 5.4) are the two areas that have passed the preliminary test for the potential site. Taohua village is just opposite Shanzhou village (see Map 5.4). The three villages all belong to the Gaobei Zhen area (the white circle on the bottom left of Map 5.4) [28]. Shantou and Chaozhou city are the two biggest cities in the lower reaches of the Han River (see Map 5.2 and 5.3). My fieldwork research is basically concentrated in Dapu townland, in Chaozhou city and in Shantou city. This is because the potential locations for the inland nuclear power station were selected and subsequently tested in Dapu townland, and because the controversies concerning this project first began in Shantou city and Chaozhou city.

There are two main areas in the Han River Basin, in the Meizhou area (Meizhou city) and in the Chaoshan area (Chaozhou city, Shantou city, Jieyang city, Puning city, Shanwei city and so on). These two areas are very different in terms of economic development, geographical conditions and population. The Chaoshan area is a wealthy coastal area in Guangdong province with an active economic atmosphere that opened up after the reform. The area mainly depends on its manufacturing and exporting business. The Meizhou area is the poorest area in the province. This area has very little industry, and business investments are mainly concentrated on developing agriculture and forestry. Chaoshan is the biggest flat area inside the province. It is the breadbasket, producing mainly rice and economic crops. Meizhou is a mountain area where the lands are poor and where there is little advantage to be derived from agriculture and farming. The forest acreage is high, up to 68.6% (Jiang

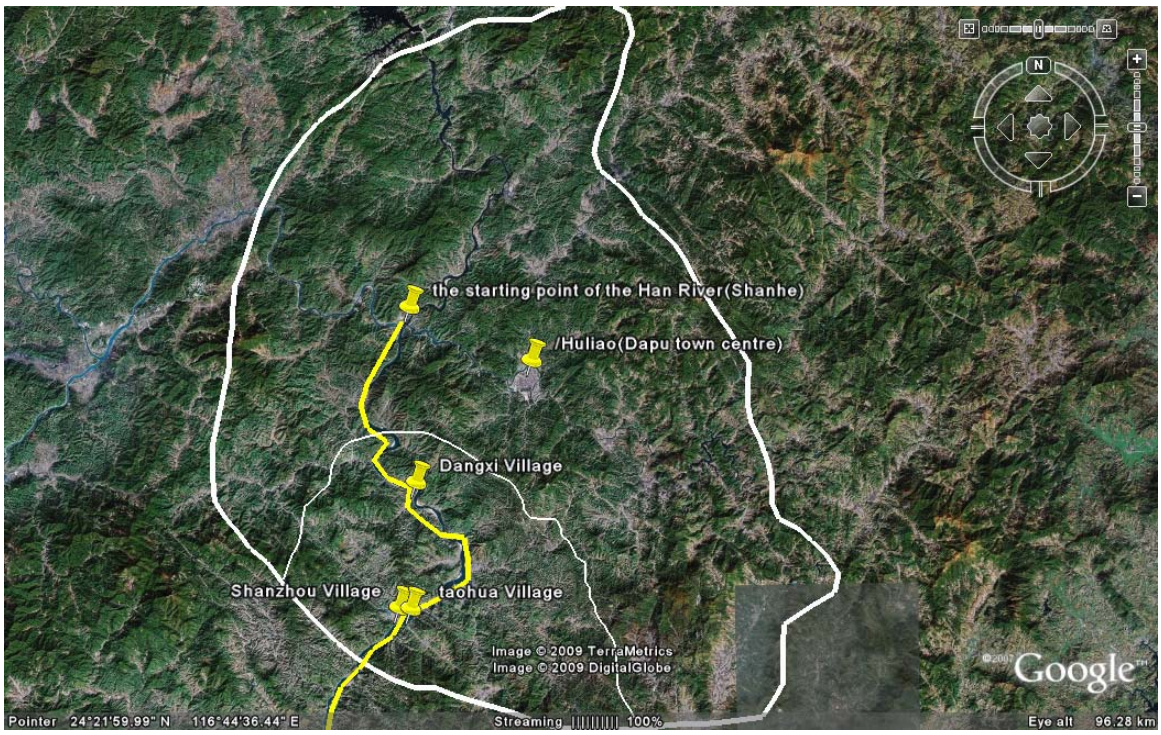
[28]A place that is smaller than a town but bigger than a village is called Zhen (镇) in China. Its administration level is between town and village as well.

2009). Because of the good economic conditions, Chaoshan has higher education levels and a more highly skilled workforce than Meizhou. Shantou city boasts a high-level comprehensive university, Shantou University, which attracts young people to the city. Most of the young people work and study outside Meizhou city since there are no higher education or work opportunities to be found in Meizhou city.

Map 5.1 Guangdong Province in China

Map 5.2 The Han River Base in Guangdong Provinc

Map 5.3 Dapu townland, Chaozhou city and Shantou city



Map 5.4 Shanzhou, Taohua and Dangxi village inside Dapu townland

5.3.2 The Han River

The Han River is the second largest river in Guangdong Province. Its length is 410 km. It is created by the convergence of three rivers called the Ting River, the Meitan River and the Mei River in Shanhe (map 5.4). The Ting River and the Meitan River both flow from the northeast and the Mei River from the northwest. They converge in Shanhe, running towards the south and finally joining the South China Sea. The Han River is one of the main rivers inside Guangdong Province that today adequately supplies water for agriculture, for industry, and for the major cities in the basin—a rare fresh resource in much of China. The Han River received its name from a famous poet in the Tang Dynasty, Han Yu (韩愈), who was serving as a minister in the sovereign's governing body. He was sent to the Chaoshan area in his fifties. At that time the local people in Shantou were suffering from crocodile attacks in the

river. Han Yu discovered a way to keep the crocodiles away from the people, and saved a great many lives. Local people named the river Han River to remember him after he left. This story is familiar to people in the Chaoshan area, and there are temples built along the river in his honour. I visited one of themI: it is well built, managed and maintained, and is visited by people all the time. From a cultural aspect, the Han River is highly respected by local people in the Chaoshan area: it is a symbol for the local culture and people's safe and happy lives. Apart from this cultural meaning, the River is also the most important drinking water resource for local people.

People who live in areas lower than Shanhe drink water from the Han River. According to weekly reports on the condition of the Han River water, taken from the website of the Shantou Environmental Protection Bureau (SEPB), the 'drinking water condition' of the river meets the national standards for a level II rating. This means that the river water is very good for drinking. Regulations, rules and plans have been set up by the province and by cities along the Han River in order to protect current water conditions. Local governments and local people in Shantou city are very serious about the river since it is the only river that is not polluted in the city. I visited the automatic water condition monitoring station in Shantou city in August of 2007. The station began operating on 18 October 2003. It runs 24 hours a day so as to monitor the condition of the water from the upper reaches of the Han River. The water monitor machine is operated and managed by staff in the SEPB.

5.3.3 Dapu townland

Dapu townland is the starting point of the Han River. The townland (Map 5.4) is located on the east edge of Guangdong next to Fujian Province. The total area is 2470 km². The total population is 520,000. People who live in Dapu townland are so-called Hakka People[29] (客家人 Guest People). There are two main aspects of Hakka culture: education and migration. Their ancestors were often said to have arrived from northern China or from central China centuries ago: "*As a late comer to places initially occupied by locals, Hakkas usually had to struggle and survive on the less desirable land*"[30]. I was told that because of geographical limitations, the Hakkas only have two opportunities available to change their lives and create better living conditions: studying and working outside. It is very common for local people in Dapu townland to study and work outside the townland. Each family I visited in the town centre and in surrounding villages seemed to have a family member working or studying in other economically developed cities of the province. DXu, my host, told me that there are 500,000 Dapu people living in the townland, 500,000 spread out into the country and another 500,000 spread out all over the world.

The town centre of Dapu townland is called Huliao. When I stayed in the town centre, I had casual chats with local people in order to understand their feelings about their lives in the town. From these conversations, I now want to discuss local feeling concerning the environment and economic development. The comparisons people drew between their town and big cities can be summarised in three points. Firstly,

[29]"The term Hakka, which literally means 'guest people' or 'strangers,' is the name of a Chinese ethnic group whose ancestors, like those of all Han Chinese, are believed to have originated in north central China" (Constable 1996:3).
[30]Quote from http://www.asiawind.com/hakka/

Dapu townland is located in the mountain area. The natural condition puts the townland at a disadvantage when it comes to economic development. This is a general point always made by local people and by local government officials.

DY (local government official): "*Dapu townland is one of the hundred poorest townlands in the country. We do not have competitive industry, plus it's in a mountainous location. Our economic situation is very difficult.*"

Secondly, local people always talk about the good natural environment in the townland. For example, they say that the air condition is very good in the town compared with other big cities in Guangdong province[31]. One is less likely to get sick in the townland because of the air is good and because the townland is covered by trees. Thirdly, locals indicate that life in big cities such as Guangzhou and Shenzhen appeals to them. They are attracted by the education and medical services that people can access in big cities. One of my host's friends, who has a 13-year-old daughter, said:

"*There is only one good middle school in the townland. It is not as good as the famous middle school in Meizhou city, and can not compare to middle schools in Guangzhou city. If my girl goes to the middle school in the town centre, I don't think she can go to a good university in the future. I am sending her to Dongshan Middle School in Meizhou city in September. Hopefully she can go to the famous university in Guangzhou like you*."

[31]Local people mostly have the experience of staying with offspring and other relatives who are working in other big cities.

Most people whose children work in big cities are in their 50s and 60s. It is common for those people to see doctors in big cities rather than in the townland. Local people consider that the medical facilities in the townland are not advanced enough to deal with serious diseases and surgeries. I saw more traditional Chinese medical hospitals than Western medical hospitals in the town centre. My host DXu told me that:

"*We went to Guangzhou to see a doctor last year. I needed a small operation on my nose. The hospital here is not good enough, so my son asked me to go to Guangzhou. It is a really big city. The traffic is so busy that I am afraid to go outside. The air is so polluted. But it is safer to have the surgery in a big hospital in Guangzhou."*

People who receive higher education and have higher level skills are all leaving the townland to work in economically developed cities. For those people who stay in the townland, feelings towards the environment and towards economic development are very complicated. On the one hand, people know that modernity might have a bad influence on the environment. On the other, they feel there is no choice but to sacrifice the environment so as to achieve a certain level of development. In this sense some local people (especially government officials) claim that the proposed nuclear project offers a good opportunity for the townland's economy and that it will not pollute the environment. Based on this consideration, local government officials describe the nuclear power project as a win-win plan. Details of how and why local government officials want a nuclear power project will be discussed in chapter 6.

The townland has three main industries: China clay manufacturing, hydropower stations and forestry. The Gaobei area in the south of the townland (see Map 5.4, the area inside the white circle) is where most factories are located. Most of China's factories are family workshops. The factory that I visited had two floors: the ground floor was the main manufacturing workshop and the first floor contained an office, a display room and the factory owner's home. DG, the mayor of Gaobei, told me that the family workshop style of kaolinite manufacturing consumes a high level of energy and produces a high level of pollution. Their method of digging and burning China clay has had a particularly bad impact on vegetation, earth and air. The provincial government raised a tax on the industry. Besides, family-style manufacturing cannot catch up with craft and design technology innovation. Dapu's China products are no longer competitive in the market. A lot of factories are now closed, or are in the process of closing down.

Hydropower is another natural resource for the townland that is set to be fully exploited. As DXu said, each of the three rivers (the Ting River, the Mei River and the Meitan River) that converge in to the townland can have six to seven hydropower stations assigned to them. These hydropower stations are the main income for the townland. Ninety percent of the hydropower resources have been or are going to be exploited.

Fast-growing forestry offers a new source of income for the townland. The townland is starting to grow this kind of forest in order to sell wood in a very short period of

time[32]. On my way to villages from the town centre, I noticed that nearly all the mountains were full of stumps and bundles of wood by the side of the road.

Besides these three industries, farming brings in an income for the townland as well. It is said that if divided into ten parts, the townland is seven parts mountain, two parts water and one part farmland. Generally speaking, however, farming creates limited economic growth because of geographical limitations. In order to make a profit these days farmers have started to grow economically viable fruits and crops such as golden grapefruit and tobacco.

According to strategic and economic considerations, nuclear power stations are supposed to be built in relatively rural places that are far from cities and have relatively low population densities. Firstly, Dapu townland qualifies as a potential site because of its geographical and economic situation. Secondly, its lack of other potential incomes from industries and the urgent desire for economic development are key reasons why the local government committees are happy with the nuclear power project. The economic and geographical disadvantage is the reason for Dapu townland to be picked up as the potential site rather than other economic developed place inside the province. This point conflicts with Beck's argument about the equally distribution of risk that I discussed in 2.2. In this case, economic developed places in the province are more likely to avoid the risk from nuclear power stations.

[32]This is a new kind of forest being grown in China. This kind of fast-growing forest is quite destructive to the land. Although these trees take only 2-3 years to grow (meaning they can be sold very quickly) they have a truly negative effect on the soil.

After staying in the town centre to conduct ethnographic research for two months (June-July 2007; February-March 2008), I became very aware of the low levels of income locally. The salary for a local government office director is only around 900RMB/month (equivalent to £60/month). If the local government was better off financially, then there might be other welfare and bonus opportunities available. Because of the poor financial conditions of the town government, a basic salary is the only thing that can be guaranteed. According to statistics from Xinhua Daily, the average annual income for an urban resident in 2006 is 11,759 yuan (Goodman 2008), which means that in the Dapu townland, a local government office director's annual income (10,800 yuan) is even lower than that.

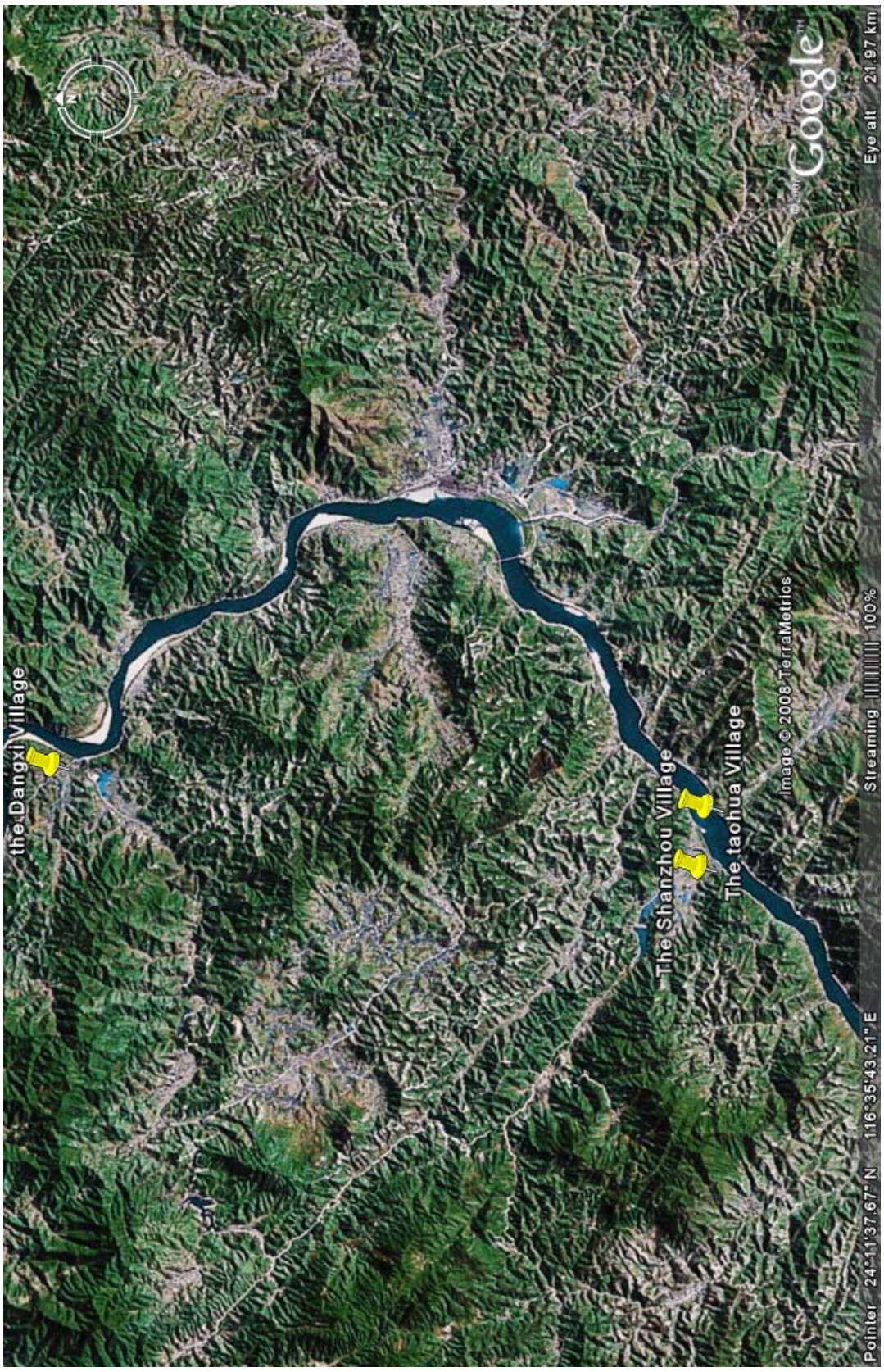
Food and living costs are certainly not cheap when compared to the income level. Pork, for example, costs around 16RMB/kg (equal to £1/kg). This number shows that even a local government office director's salary can only just meet the demand of regular clothing and food standards. On average people living in the town are not well-off. I interviewed local people about the imbalance between income levels and prices. They told me that nearly every family has one or more members who work outside the townland and send money back to support parents, wives and children. People rely not only on their own salary income, but also on family members outside the town.

5.3.4 Villages in Dapu townland

I visited three villages (Map 5.5) in the townland in order to analyse lay opinions about the nuclear power project and people's understanding of the risks of the project. Two of these villages have passed the preliminary feasibility research test so as to be

candidate sites for the project, while the other village is located just on the other side of the river. The three villages share some characteristics: most young and skilled members of the workforce leave the village and work outside; villagers do not receive much education; the influence of modernity increasingly impacts upon their traditional lives. As a researcher I was lucky to see people from these three different villages displaying different attitudes and opinions about the potential nuclear power project. Villagers' personal reflections on the influence of modernity or modern technology on their lives were different due to their specific circumstances, namely the village's geographical location, economic and management condition.

We passed one place called 'Migration New Village' (移民新村). It is a new village built by the local government and by the electricity company for people who need to move because of the hydropower station and flooding. This kind of new village offers a way to resolve conflicts between hydropower projects and local villagers. The government official told me that villagers along the Han River suffer from flooding nearly every year. Whenever there are electricity companies hoping to develop hydropower projects along the Han River, villagers face the possibility of being relocated. The local government comes in to work for the benefit of both the electricity companies and the villagers. A 'migration new village' was considered by local authorities to be a win-win situation. Villagers got their new homes in a better location – without having to pay any money, and sometimes even receiving supplemental money as well. Electricity companies can then develop their projects more easily and efficiently without upsetting local villagers.



Map 5.5 Dangxi village, Shantou village and Taohua village

Dangxi Village

Dangxi village is the poorest village of the three (see picture 5.1). Over 40% of its population works outside the village (interview with the village leader). It is surrounded by mountains. Experts from nuclear power companies selected three locations in the surrounding mountains suitable for geological exploration. Dangxi village has houses in the traditional style, and is covered by trees and surrounded by farmlands. Local farmers believed that, due to the ancestral home of Lee Kuan Yew (former president of Singapore) being located in the village, the 'Feng shui (风水)' in the area was very good. The geographical location of the village is not very good as it is in the lowest layer and sees flooding every year. From my observations there are two main reasons for Dangxi's poorer economic conditions. The first is its simple production style. People in the Dangxi village only farm for living, receiving only a moderate income due to geographical limitations. The second is the poor management performance of the village committee. This is a vicious circle: nobody wants to join the village committee because of the poor economic conditions, but in the absence of capable leaders, the economic conditions continue to deteriorate. I arrived in the village at around ten in the morning, on the day when local people send *Cai Shen* (财神Buddha of wealth)[33] away, after sending *Cai Shen*, New Year's Day is over. People will normally go back to their workplaces after sending *Cai Shen* away. It was also the day of the village committee election. I went to the village with two officials from the town government, and we visited the local committee office

[33]Traditionally, people believe that the *Cai Shen* will move from the place where he lives to people's homes on New Year's Day and bring them luck and wealth. After the New Year, *Cai Shen* will go back to his place, and a ceremony is held to send him there. Different areas have different dates for welcoming and sending *cai shen.*

first. The local village management committee and the village cadre Wang[34] (from Gaobei) were all present. Officials from the town introduced me to many people. Afterwards, we had a relaxed discussion about the nuclear power project.

The village leader, DH, said that all the villagers were tired of hearing news about the nuclear power station. They had heard about it as early as 2006, and yet no one had been able to confirm the project after that. News about the project, however, had had a bad influence on the development of the village. Businessmen became very cautious about investing in the village because they knew they could lose all their profits if the village had to move. Local people also became doubtful over whether or not to spend money on house renovations. I conducted interviews in local homes after the conversation with the village committee. Wang asked a local farmer to guide me to the location where experts did their exploration tests. On our way, we had a conversation about the flooding in the previous June (2007). I asked whether her family had received any relief money or crops from the government after the flooding. She said they hadn't received anything at all.

There is a deep hole (around 10 metres) of around 10cm in diameter on the middle mountain (see picture 5.2). Experts from the China Nuclear Power Company made the hole in order to test the geological condition of the rock. According to the information I obtained from officials from Gaobai Zhen government (see table 5.1), within 1km² area of Dangxi village there are 513 families, and 2,493 individuals will

[34]Village cadres are a kind of supervisory cadre sent by the town government to the village. They all have ordinary jobs in the town government. They can be office directors or secretaries in the town government. They are sent to villages in order to pass along information and conduct supervision. Wang was supervising and observing the village management committee election on that day.

be relocated. A total of 342 houses within the area need to be relocated and the total measurements of these houses are 41,040m²[35]. These statistics come from the Zhen government for the purpose of preparing for possible relocation, and have been provided to nuclear power companies for their reference. The table in the next part (table 5.2) gives the same information for Shanzhou village.

Picture 5.1 Dangxi village

[35]Some families share a house. They are sometimes siblings who have spouses but do not have enough money to build a new home, so two or three families share one house.

Picture 5.2

Radius	Relocation family	Relocation individuals	the number of houses	The housing area (m^2)
1km	513	2493	342	41040
2km	680	3226	454	54400

Table 5.1

According to my observation, I summarized that in Dangxi village most people welcome the nuclear power project to change their lives. The geological limitations they faced, and the poor management and economic condition of the village make local people lose the confidence to actively work for a better tomorrow for the

village. They passively wait for the nuclear power project to become an opportunity to offer them better lives. However, since they can not confirm whether the nuclear power project really going to happen, village development goes in to a dilemma situation which actually makes their lives worse.

Shanzhou village

Shanzhou village is a leading village of the town, and was made famous for its development in the 1970s. DZ, the village leader, was very proud to introduce the future development plans for the village. He pointed out that they would develop some mountain areas in order to grow golden grapefruits. Businessmen in Shenzhen[36] also invested in raising fish. As part of a long-term plan they are now going to develop a tourist industry in the village. There will be plenty of hotels and farming areas so that people can stay and enjoy the countryside way of life. There is a flood control dam inside the village that was constructed in 1974. DZ said, *"We started to build the dam in 1970. Nine hundred local farmers worked together with town soldiers to build it. We also develop our village independently; we never just sit and wait for help from the town government."* From 1974 the village has rarely suffered from flooding. It has several sources of income: farming, raising fish, planting fruit trees and investing in other commercial projects. Scientists and experts also picked up three locations on surrounding mountains for geological exploration. DZ said that if Shanzhou village is selected for the nuclear power station, then everything that had previously been built would be destroyed. He said he was not keen to have the project in the area, but that if the state made the decision to build the

[36]Shenzhen is the Special Economic Zone in Guangdong province right next to Hong Kong.

station in the village then he would have to accept it. He also said that they were still planning village development - regardless of the state's decision.

From the housing conditions people can tell that farmers in Shanzhou village are much richer than those in Dangxi village. Their houses are quite 'in fashion'. Their 'modern' houses were built in the 1990s. Unfortunately, they actually ruined the beauty of the village.

In comparison Dangxi village, people's attitude to their village's development is much more active. They believe they can depend on themselves to work for the village's modernity. They do not see nuclear power project as the only opportunity to bring them investment and economic development, they even think that nuclear power project might ruin their harmony lives. According to information leaked from local government officials, the geological situation of Dangxi village is much more suitable for building the nuclear power station than that of Shanzhou village. The village leader is happy with this information and continues the village's development plan.

Radius	Relocation family	Relocation individuals	the number of houses	The housing area (m^2)
1km	513	2493	342	41040
2km	680	3226	454	54400

Table 5.2

Taohua village

Taohua village is on the east side of the Han River, just opposite Shanzhou Village. The distance between the two villages is less than 500 metres. The village population is 2,900. Taohua village is well managed and is doing well economically. There is a hydropower station inside the village which guarantees an income for the village. Although Taohua village was not picked for the nuclear power station, it could still be situated inside the relocation area. However, people in the village do not have much awareness of this situation. They think the nuclear power project is going to be located in the other villages (Dangxi and Shanzhou village). The geographical location of Taohua village is elevated: people live along the mountain ridges, and living in such high places makes it difficult to visit commercial centres to buy daily necessities. Local people who earned money outside the village tend to build new houses for their parents who still live there. Farming does not generate much income for the local people, so they use some of their farmland in the flat area, mostly by the side of the road, to build new houses.

A big hydropower station was also located in Fengshun townland[37] (the townland next to Dapu). Farmers there will receive some supplemental money because the project actually caused some of their farmlands to become submerged. Farmers often lost their farmland or had to be relocated because of power projects or road construction projects in the villages. This is very common in the countryside these days. For them, there is not much difference between moving to make way for

[37]The location of the hydropower project in Fengshun townland is in the upper reaches of Taohua village. The impounded level of the Dam is up to 25.5 metres. Taohua village is in the lower reaches and the lower layer. Part of its farmland will be submerged. Source: http://www.gaobei.cn/LT/dispbbs.asp?boardid=5&Id=1603&page=10

nuclear power plants or to make way for highway development. They normally have no opportunity to say no to the state's development.

In comparison to Dangxi village and Shanzhou village, people's attitude of nuclear power project is in between in Shantou village. They do not really welcome or against the nuclear power project, they just do not aware nuclear power project might influence their lives. Even thought the project might be so close to them, they do not border to think of its effects just because they are in different villages.

5.4 Modernity and risk in the townland

Apart from those conflicts arising from poverty and the poor natural conditions of farming, and between low income and high expenditure, and between fast developing town centres and peasant villages, there are also serious ongoing conflicts between those supporting modern development and those emphasising environmental risk. As I have mentioned before, the townland's main industries are China clay manufacturing, hydroelectricity and forestry. Each of these brings risks to the local environment. Family-style China clay manufacturing workshops constitute a highly polluted and high-energy consuming industry. Hydroelectricity causes ecological risks and flooding. Fast-growing forestry has a bad influence on the soil. Apart from these local industries, people also have to face other modern developmental projects, such as highways. According to my interviews, local people in the townland prefer to talk about their desire for modernity and economic development rather than about risks to the environment that might be caused by the modernisation process. Although there are local people who are aware of the risks to nature and the environment, their attitudes to those risks are passive. They know what will happen,

and accept it as a fact rather than trying to do something to change it. In this section I use the flooding that I experienced in 2007 as a case study for analysing local awareness and the local attitude towards risk.

I arrived in Dapu townland on 4 June 2007. It started to rain from the afternoon of 5 June. The rain was much heavier than I had ever seen before, and it kept raining after that day. By 9 June the flooding had become very serious and TV news and newspapers started to report on what was happening to the townland and to Meizhou City:

"*There is TV news about the flooding tonight. Most of the road connecting with Dapu town had landslides. Traffic connections to Dapu town from outside were nearly paralysed. The flooding had also damaged the railway from the town to other parts of the province*." (Research fieldnotes on 9 June 2007)

I was stuck in the town after that. Because of the flooding I could only make the trip to Gaobei Zhen, but could not go further into the villages in the first phrase of my fieldwork. According to the news on Meizhou Daily on 11 June, the Hanzai Dam was in danger because of heavy rains and the flood discharge in the upper reaches reservoir. Local government officials, soldiers and local people were trying their best to save the dam. Eighty percent of the Gaobei Zhen was underwater. The highest water level reached 5.33 metres. People moved to the upper floors of their houses and went out in boats.

According to local descriptions, there is flooding nearly every year in the townland. In 2007 the main reason for the flooding was heavy rain, while in 2006 it was mainly caused by a hurricane. Apart from natural reasons, however, some people believe that hydropower stations along the Ting River, the Meitan River and the Mei River also caused the flooding. One significant interviewee is DEL, an engineer who works in the Dapu Environmental Protection Administration. DEL claimed that reservoirs in the upper reaches of the river needed to release flood water when there were heavy rains, and that these hydropower stations added more pressure to the water release of the Han River; during dry seasons, however, these power stations wanted to save the water for making power. In his opinion, this system makes the flooding more serious in rainy seasons; it also makes the river drier in dry seasons.

In the online forum of Dapu townland, there are also netizens claiming that hydropower stations are the reason behind frequent flooding every year. One netizen, whose ID is Mei Na Zhong Ming, said that:

"Another important reason [for the flooding] is that vegetation has been damaged. In recent years, unauthorised and wasteful mining of kaolinite cased serious damage to vegetation cover."

This person's word highlighted the negative impact of kaolinite manufacture on the environment. Wen Chuan Dao Ren responded to this comment by asking:

"What you said is right. What shall we do in the future?"

Other netizens read their comments and asked whether the government should do more to manage the situation. There were others who claimed that the government was entirely useless. The conversation ended without ever dealing with the flooding. It was just a casual chat.

As a researcher, I believe there is a high risk in planning an inland nuclear power station in a place that experiences serious flooding every year (see pictures 5.3 and 5.4). This risk should be taken into account by local people, by people in the lower reaches, by people in the media and by PDs. However, this issue has never been discussed.

These words represent two levels of information. Firstly, there are local people who are aware of the risks to nature and the environment caused by modern developments in the townland. Secondly, there are people who question the government's management but who at the same time depend on the government to deal with ongoing conflicts between risks and development. When facing relocations, flooded fields, or other problems caused by development, local people will normally depend on the local government to work on their behalf, rather than searching for external support from environmental protection NGOs, the media or other organisations. In the local context, governments and government agencies work as mediators among industries, companies and local people. They have a dual role: they help industries and companies to communicate with local people, and they help local people to gain more supplements from industries and companies. This scenario illustrates a recent trend in Chinese society – a tendency for the government and for government agencies to actually cover a great deal of business that is supposed to be managed by

civil organisations. This introduces a much wider topic related to China's public policy agenda and to civil society, which I am not going to address in detail in my thesis. However, the main point to make here is that all levels of governments have taken too much roles in dealing with civil nuclear power issues.

Picture 5.3 Gaobei Zhen flooding (picture adopted from www.512400.cn)

Picture 5.4 road to Dapu town centre after flooding

5.5 Public environmental awareness

The controversy over the potential inland nuclear power project was always tightly connected to the Han River. When PDs expressed their concerns about the nuclear power project, they always referred both to water and to the environment. Most of the time the concept of 'risk' was actually missing in our conversations; however 'water pollution' and 'environment' came up repeatedly in the words expressed by PDs. When the media reported news about the inquiry meeting, they highlighted PDs' concerns over water rather than talking about nuclear risks. In chapter 8 I will analyse the journalist's main argument when he drafted his news release. The journalist was concentrating on science and democracy – and 'risk' was not a topic he wanted to discuss. I claim that this is firstly related to how much the local people

know about nuclear risk; and secondly, to how much power the media, PDs and local people have to form their own discourse concerning nuclear risk. In Chapter 6 I intend to address the first question, and in Chapter 7 the second. In this section, however, I will discuss public environmental awareness. I claim here that the public's growing awareness over the environment is one of the most important elements to shape PDs' claims about the environment and water.

After the inquiry meeting PDs summarised their inquiries in an internal letter to Zhang Dejiang, the province's prime minister. Their points are as follows:

***First**: The Han River is the mother river of Shantou, Chaozhou and Meizhou City. 10,000,000 people who live below the Meizhou Valley are dependent on the Han River as a drinking water resource. If there were to be any leaking problems, it would not only pollute the ocean but also pollute the Han River basin. 10,000,000 people's lives would be put in danger, and this would be a catastrophe.*

When reference is made to other countries' experiences with nuclear power operation, it becomes clear that nuclear power is not 100% safe. There have already been several serious nuclear accidents in western countries to date. Additionally, scientists and experts do not have very strong evidence to show that there are no risks from nuclear reactor operations. And they cannot guarantee there won't be any invisible pollution of the river that could have consequences for the later generations of inhabitants.

***Second:** It was reported that the capability of the reactor is up to 1000 MW. How much cooling water is needed to support nuclear reactors? How much is the current capacity of the Han River in a year? How much is the current capacity in the winter*

and dry seasons? How is the nuclear power plant going to influence the water temperature? There might be 'heat pollution' affecting fishes and other aquatic creatures. If the temperature rises, bacteria and microbes will increase; this could turn the river into a 'dead river'.

Third: *The other problem is related to transportation. The shipping of building materials, radiation materials and waste is another problem. Shipping those materials to the upper reaches of the Han River will be expensive and will also create a risk of water pollution. Considering this issue it is also better to build the nuclear power plant along the coastline. Guangdong province has a very long coastline. We think that there are still spaces to develop nuclear power plants along the coastline. If accidents happen, then the damage and costs will be lower.*

Fourth: *The Han River is the best drinking water resource inside the province, and we produce the best fish in the estuary. We are not going to put the only ecological river in Guangdong province at risk of pollution. The Province People's Congress is issuing the "Guangdong Drinking Water Resource Protection Regulation". Does the nuclear power project meet the requirements of this regulation?*

Fifth: *In recent years economic development in east Guangdong is in a downturn period. The provincial government plan has policies to improve economic performance in east Guangdong. The nuclear power station will have a bad influence on the investment environment of the Shantou and Chaozhou city.*

(Translated and edited from Shantou Social and Science Journal 2007.3)

A news release also highlighted the potential dangers this project could bring to the Han River. The headline concerning the inquiry meeting (Appendix 1.1) reads:

'A nuclear power station might be built in the upper reaches of the Han River. People's Deputies asked for an inquiry meeting—
10,000,000 People's Drinking Water Might be Polluted?'

In this news title, both 'nuclear power station' and 'water' are mentioned. It is obvious that 'water pollution' is highlighted.

All questions asked by PDs in the inquiry meeting focused on the potential danger of water pollution as well. The questions that were laid out in the news were:

"There are Daya Bay, Ling Ao and Yangjiang Nuclear power stations which have been built or are being built inside Guangdong province. We have a very long coastal line inside the province. Why is [the province] still planning to build inland nuclear power stations? Why pick up the Dapu and Fengshun town district in Meizhou City district? May I have officials from the Development and Reform Commission of Guangdong Province (DRCGP) explain this?" - Chen Han Chu, PD from Shantou City

"The Han River is not the Daya Bay. It is our mother river. Over 10,000,000 people living in the middle and lower reaches of the Han River depend on it for drinking water. I asked how the question stands for these 10,000,000 people: if [they are]

really going to build the nuclear power station in the upper reaches, will there be any pollution in the water?" - Liang Yinying, PD from Chaozhou City

"I studied biology before. The temperature of this cooling water is up to 310 degrees. This must have a bad influence on aquatic creatures in the river!" - Chen Shaohe, pearl-growing expert and PD from Shantou City
(Chen 陈枫 2007; my translation)

The PDs' letter and their questions in the inquiry meeting show three levels of information. Firstly, PDs are a group of people who have the political power to participate in decision-making on the Han River project (details will be discussed in chapter 7). Secondly, at the same time they are also stakeholders who live locally and are familiar with the local conditions of the Han River Basin. They raise questions based on their specific knowledge and life experience of the Han River, for example the possibility of earthquakes, the dire season of the Han River, etc. As stakeholders who live locally they will be able to raise questions which may be ignored by scientists and experts when they conduct the applicability test. Thirdly, local people are becoming more environmentally aware. In this section, I discuss the growing public awareness of environmental issues and the influence of this awareness on PDs and on discourse in the media. Public knowledge and understanding is communicated and developed according to specific social and cultural contexts (Irwin, Dale et al. 1996). In China, public awareness of the environment is shaped by both top-down political influence and bottom-up participation activities. In the Communist Party of China's Fifth Sixteen Plenum, the top party leader, Hu,

announced “building a resource-conserving and environmentally-friendly society” as a strategic goal of the country’s eleventh five-year plan. This goal has also been marked as a basic national policy. This slogan may not make much sense to readers in Western countries, but in Chinese society, this is a policy everyone must know. Because of this top-down political influence, the country is now working on environmental reform. Government officials in Dapu townland also mentioned the relationship between environmentally-friendly policy and the inland nuclear power station. DL is a government official in Dapu townland who wants the nuclear power project to go forward. He worries that PDs’ concerns about the project might cause Dapu townland to lose the investment.

DL: “*We are worried about PDs’ claims about water pollution in the lower reaches. Nowadays the central government is promoting an environmentally-friendly society. PDs use water pollution as a tool against the nuclear power project. There is a high possibility that the provincial government will ban the project because of environmental concerns*.”

From the bottom-up level, local environmental protection agencies and emerging environmental protection NGOs all over the country are the most important motivating forces behind the public’s environment awareness:

“During that intervening decade, the central government put unprecedented effort into environmental protection, adopting more laws, imposing heavier penalties for violations, and applying advanced technology to control pollution. One result of this

effort was the establishment of the National Environmental Protection Agency in 1979, whose network of 70,000 employees has since been extended to every county. More recently, a few non-governmental organisations have emerged in the larger Chinese cities […T]he priority of these citizens' organisations, usually led by intellectuals, is to raise public awareness of environmental issues through exhibitions, organized tree-planting trips and tours of wildlife areas." (Jing 2003:206)

Every year in April, since 2005, citizens from the Meizhou and Chaoshan areas, as well as people from Hong Kong, Macau and other foreign countries, join the activities of 'Save Water Resources, Protect Mother River (**珍惜**水资源，**保**护**母**亲**河**)'. Tens of thousands of people walk 20km along the Han River in order to show their respect for it; they use activities like this in order to pass along environmental protection information. These people do not want the Han River to be polluted by industrial pollution like the other two rivers in the Chaoshan area. I suspect, however, that the nuclear project is not their main concern – primarily because this event happened in 2005, prior to any nuclear project planning. In their 2007 event, the nuclear project was not even mentioned. These water protection activities are carried out together with the local government and with media propaganda to shape local awareness of water protection along the Han River. I suggest that this is one of the most important reasons why PDs introduced the controversy over water pollution with regard to the nuclear power project.

However, local understanding and knowledge of the environment cannot be separated from everyday life. In the Dapu townland, which marks the starting point

of the Han River, I saw a different understanding of and attitude towards the environment. People who live in Dapu townland are obviously not so interested in water protection issues. When I asked about the protection of water in the Han River, local people informed me that they do not actually drink water from the Han River.

Local resident A: "*We do not drink water from the Han River; in the townland people drink water from the mountain. People who live in areas lower than Dapu drink water from the Han River – as in places like Chaozhou and Shantou*."

DL: "*Dapu townland has been contributing to the water protection of the Han River for a long time. The industry in our district has lagged behind. That's the reason why the Han River hasn't been polluted. It is the only main river inside Guangdong province which hasn't been polluted and that provides good quality drinking water to lower reaches. However, the bad economic conditions of Dapu townland shouldn't be ignored. Although Shantou city in the lower reaches has already experienced a booming economy, we are still poor. If they don't want us to have the project, will they pay us for protecting the water for them?*"

People in the lower reaches want to protect the Han River because it is their source of drinking water. People in the Dapu townland support or ignore the nuclear power project because they do not drink water from the Han River. Urban people and local people's perceptions of the potential risk that the nuclear power project might bring to the Han River are strongly connected to their economic and social positions. It is obvious that people in the urban area, who live well-off lives, consider drinking

water resource protection as a comparatively serious issue. People who live in the Dapu townland care less about the potential risk to the Han River just because they do not drink its water. This phenomenon also represents people's self-interests, much like the Silver Beach case that I discussed in chapter 3.

5.6 Summary

Form the introduction through to the local context of Dapu townland, the reader can get a basic idea of where the potential inland power station will eventually be located. I use the concept of a 'preliminarily modern society' to represent the developmental conditions and conflicts within the Dapu townland. Because Dapu is a poor townland in the mountain area, people in the Dapu townland are aggressively seeking any opportunity for further development in order to fulfil their demand for better lives. The development process therefore causes a conflict between human needs and nature. The three villages - two of which might be picked up as the potential site and the other being located nearby - share diversity and similarity in this nuclear issue. They face similar challenges regarding the modernity process, and they represent different attitudes towards the nuclear power project. Villagers in Dangxi village see nuclear power as an opportunity for a better life given that their current situation is hopeless. Villagers in Shanzhou village do not want the nuclear power project because they are doing well in managing their place. Villagers in Taohua village do not pay much attention to the nuclear power project, even though they are just 500 metres away from the potential site.

The Han River as the drinking water resource links the potential nuclear power project from Dapu townland to Chaozhou city and Shantou city in the lower reaches. Water safety is the main reason for people in the lower reaches to express concerns over the potential nuclear power project. People in the Dapu townland and in the lower reaches have different attitudes towards the potential risk to water resources due to their social, economic and cultural position; this also represents people's different self-interests. This contextual information should offer the reader the appropriate social, cultural and economic background for understanding the public knowledge of nuclear risk; this will be examined more fully in the next field-finding chapter.

Chapter 6: Risks or benefits? The social construction of nuclear risks

6.1 Introduction

In Chapter 5, I introduced the local context of Dapu townland, and also made some comparisons between Dapu townland and Chaozhou and Shantou cities in the lower reaches. In this chapter I intend to discuss local people's risk construction. How do local people, from different social positions and under different circumstances, perceive risks posed by the nuclear power project? Theoretically, this chapter employs two concepts: firstly, Wynne and Irwin's argument about public understanding of risk; secondly, 'situated risk' introduced by Boholm. 'Situated risk' is a concept which will be discussed in this chapter in association with people's perception of nuclear risk. Based on their research on American Indians' situated risks from radioactivity, Stoffle and Arnold claim that:

'*Environmental pollution risks can be situated; that is, clearly bounded in space and time. Situated risks are narrowly tied to specific peoples, living in specific places, who are confronting specific pollution threats. Situated risks are subject to very specific cultural interpretations by the people who are impacted.*' (Stoffle and Arnold, 2009:231).

In the Han River case I see the same phenomena as in Stoffle and Arnold's claim. The 'situated risk' from the potential nuclear power project affects specific people who live in the lower reaches of the Han River who are confronting threats of water

pollution. At the same time, the specific cultural and social background also influences people's perception of nuclear risk.

Different attitudes in Dapu townland, Chaozhou and Shantou cities to the nuclear power project and its risks make the Han River Basin the perfect location to study people's risk perception of nuclear technology and ignorance of nuclear power (for more details see 6.2 and 6.3).

In the Han River case I can see similarities and also differences with Wynne's sheep farmer case. In terms of similarity, in both cases local people show their trust of science and technology, and their ignorance and dependence upon institutions. The difference is that, firstly, Wynne's case is already in existence. The case I am working on concerns a *potential* nuclear power programme. I claim that since people do not yet face the risks of the nuclear power station, they are less interested in discussions about its risks. Furthermore, because there is some possibility of being relocated and leaving the village, local people are more interested in their own risk/benefit calculations than in understanding the scientifically defined risks of nuclear technology, or the actual safety and security of the potential nuclear power project. It can obviously be seen through different attitudes shown by villagers in the three villages that I visited (see 5.3.4). Secondly, in the sheep farmer case, local farmers represent trust in science and technology, dependence on scientific research institutions, and also ignorance of the knowledge they have about the local soil and

climate. In the Han River case, people claim trust of technology on the surface. However, their trust and ignorance are all tightly related to their dependence on the government.

This chapter aims to answer two prepared research questions: how do local people understand the risks of nuclear power, and how do they construct nuclear risk based on their understanding and knowledge of nuclear technology? The research targets are local people in Dapu townland, including local government officials, residents in the town centre and peasants in the villages; PDs in Shantou city and Chaozhou city. These are residents who will live near the nuclear power station every day, drink water from the Han River, or will be relocated if the building of the power station is confirmed. Michael (1996) discusses and analyses the ignorance of lay people concerning science and technology. He writes that "when talking to lay people about their scientific knowledge, in many cases we found that people simply do not possess any of the 'relevant' (at least for the investigator) scientific knowledge; they do not simply have a 'defective' body of quasi-scientific knowledge, they have none at all" [38] (Michael 1996:107-108). Irwin (1996) similarly points out the absence of science in local conversations about hazard issues. I saw the same phenomenon in my fieldwork research in Dapu townland. Science and scientific determinations of risk were generally absent from conversations about the potential nuclear power project.

[38]Here there is some difference between the ignorance that Michael discusses and what Wynne discusses in the sheep farmer case. Details will be interpreted in 6.3.

Drawing on these field findings I will now discuss four dimensions that contribute to the social construction of nuclear risks. These are: local trust in nuclear technology; local ignorance of nuclear risks, local risk and benefit trade-offs; and the silent majority. In this chapter I will primarily analyse interviewee data collected from local people in the Dapu townland. For comparison purposes, I will cite some PDs and analyse statements from people who originate from Dapu townland but who work outside it (Dapu migration). I will analyse the words of PDs and Dapu migrants in chapter seven.

6.2 Trust

Wynne claims that people are trusting because they depend on institutions and risky industrial plants. They have no choice but to trust. However, their trust can indeed be reflexive to the situation they face. Their trust is not reflexive to an expert system based on their understanding of institutional scientific knowledge, as Giddens has claimed (see 2.3.2), but to the division between their knowledge and expertise – and their identity and the fact that lack agency (Wynne 1996).

Dapu townland as a place in the process of developing towards modernity is perfect for examining Giddens' and Wynne's argument about trust. Wynne believes that it is worth examining "*what the relationships of lay public to expert system is or was under 'simple modernity' condition*" (Wynne 1996). I analyse people's claims about trust concerning three questions: uncontested status of expertise or trust, lack of agency or simple trust, and reflexivity to the actual situation they do or do not confront. In Dapu townland, when local people spoke about their trust their words

indicated that their trust functions on three different levels. Their trust in nuclear technology expresses their self-interest, their ideas concerning power relationships and social status, and their obvious dependence on the government (the country). I summarise these three kinds of trust as follows:

1. Trust with no doubt at all

Government officials in the Dapu townland express this kind of trust. The government official DL told me about this kind of confidence in nuclear technology when we were on our way to Gaobei Zhen; I had a discussion about the nuclear power project with him and with other local government officials in the vehicle.

> DL: "*In the technology aspect, we absolutely trust the safety of the nuclear plant, and we do not worry about leaking or radiation pollution. This is because our country has been developing nuclear power for 10-odd years. Daya Bay and Ling Ao Nuclear Power Stations are both running very safely. We absolutely believe that nuclear power is reliable technology.*"

The reason for DL's trust is the safe operation of other nuclear power stations inside Guangdong province. From his statement I assume that he understands some simple information about the country's nuclear power development; he knows, for instance, that there are two other nuclear power stations inside the province and that they have been operating successfully for 10-odd years. His claims about the safe running of Daya Bay and Ling Ao Nuclear Power Station, however, deserve further analysis. I assume either that he really thinks Daya Bay and Ling Ao Nuclear Power Stations are running very safely, or that he knows something else but does not want to share it with me. His trust is shaped by two factors. Firstly, he just wants to believe in the

safety of the nuclear power station. He takes it for granted that Daya Bay and Ling Ao are running very safely and does not bother to reflect on the information he has received; he thus has no motivation to collect further information in order to support his trust. Secondly, he has no way to access information about whether or not Daya Bay and Ling Ao are running safely. Government officials at DL's level cannot approach the institutions that manage the operating conditions of the nuclear power stations. Ordinary people have no way to assess scientific research data held by institutions.

I collected a research report from the China Academy of Science (CAS), South China Sea Institute of Oceanology (SCSIO) that details changes in water temperature as well as the development of harmful algal blooms (HAB)[39] in Daya Bay in the Northern South China Sea. In this report, researchers used 3188 pieces of data from 1970-2005, along with data collected by satellite about the Sea Water Temperature (SWT), in order to examine the effect of chlorophyll (Chl-a) and the HAB frequency in Daya Bay. Their research findings show that:

> "*The High temperature effluent from the power station was one of the main artificial impacts. Increase of water temperature and nutrient supply from land-sources may stimulate Harmful Algal Blooms (HABs).*" (Yu, Tang et al. 2007:26)

The research report claims that the increase in SWT in Daya Bay strongly relates to the shape of the Bay, which is semi-closed. In order to know more about the research

[39]"HABs are regarded as a serious problem throughout the world and have also caused considerable economic loss in Daya Bay" - Yu, J., D. Tang, et al. (2007). "Changes of Water Temperature and Harmful Algal Bloom in the Daya Bay in the Northern South China Sea." Marine Science Bulletin **9**(2): 25-33.

I went to the SCSIO in CAS in July 2007 and interviewed the second author of the report, Professor Tang. Professor Tang pointed out that Daya Bay is not actually a good location for nuclear power stations because of its semi-closed shape. The warm water discharge from the power station can only circulate inside the bay, which causes the rise of SWT. If local people or PDs in the lower reaches can access this research report, it will reveal strong 'scientific proof' of the risk of nuclear power projects. However, this kind of research report is unavailable to lay people. Tang said that they only publish this kind of scientific research report in international English-language journals.

As I will discuss in chapter 8, the media is not allowed to publish any negative news about nuclear power in mainland China. So scientific and propaganda-related barriers provide another reason for why DL trusts the safety of nuclear technology.

Another example of this kind of 'trust without doubt' is found in my conversation with a local farmer in Dangxi village, a woman in her fifties. I did not ask her name. I use the abbreviation 'DA' to indicate her voice here:

> DA: *"I don't worry about it [the safety of nuclear technology]. People who work inside the nuclear power station are scientists and experts whose lives are worth much more than ours. If they can work inside the power station, there is nothing for us to worry about.*"

DA's words reveal a comparison that she has already made between people like her – farmers who have not received much of an education and who do not have the skills and abilities to work outside the village (or who are too old, etc) – and scientists and experts who have received a higher education, have good jobs, and are important and

useful for the country. DA does not need scientific knowledge to trust in the safety of nuclear technology. She draws the conclusion that if those people whose lives are worth much more than hers can work inside the nuclear power station, then she should believe in its safety. DA's words indirectly show some reflection on her relationship to 'scientific knowledge and/or its institutional embodiment'(Michael 1996:111). DA believes that scientists and experts who have scientific knowledge and expertise are much more valuable to society than she is. Scientific knowledge and expertise are key elements that add value to the identity of these scientists and experts.

2. Trust in the technology but worry about other things

Local garage owner DHe spoke about his opinion concerning the nuclear power project when I had my father's vehicle repaired in his shop. It was my first day in the townland.

> DHe: *"I do not worry about the technology. The country will not build things that will harm people. Some people are worried about radiation and water pollution. I do not worry about these at all. I only worry about the war. Dapu is so close to Taiwan. If there is a war, then the nuclear power station is really dangerous.*"

DHe does not worry about nuclear technology because he trusts the country, but he worries about war. This means that DHe thinks that the country can handle nuclear risks such as radiation and water pollution, but that the war is too far outside of the country's control. He worries that the country cannot handle the risks that will be brought in by the nuclear power station.

3. Trust with no choice

Village cadre DXu (i) said:

> *"I don't worry about the technology. The country decided to build it [and] it will be no problem. If the country has decided to go ahead with the project, then what we say makes no difference*."

DXu (i)'s words carry two different meanings. On the one hand, he believes safety can be guaranteed because the country decided to build the nuclear power station. And on the other, he believes that the government will act no matter what the public thinks. DXu (i)'s words show that he is aware of his own powerlessness.

To summarise local people's claims of trust, DL, DA, DHe and DXu (i)'s words echo what Giddens has described as unexamined trust in expertise in simple modernity. However, Giddens' theory of trust does not cover, as Wynne's does, the social influence on lay people which shapes their trust. If we consider people's words and the social and political context they inhabit, it clearly demonstrates local people's lack of agency as Wynne has claimed. In the local context, firstly, local people cannot access scientific findings. Secondly, they do not have social relations and social networks to express their opinion. Thirdly, they do not receive enough information from the media which shapes their awareness of concerns and questions about the nuclear power project. Apart from lack of agency, local people's dependence on 'the government' is obvious. However, when I am in the field and have conversations with local people I feel that their perception of 'the government' is a vague concept. 'The government' is a concept that covers all institutions that

might be involved in running the nuclear power project. Local people – even local government officials – might not know how many agencies (or which ones) are actually working and running the nuclear power project. They do not even distinguish between institutions which deal with science and technology research and government agencies. In local people's mind they all simply function together as one body. When local people talk about 'the government', 'the government' represents Shang Ji dan Wei (上级单位 upper level institutions) that they are not able to reach. Their trust is not based on what they know; it is mixed with ignorance and dependence. However, their ignorance not only represents what they know or do not know about science and technology, as Wynne argues: it delivers more complicated meanings and choices as well. I will analyse these in the next section (6.3). Their dependence is just like what Wynne claims: that local people have no choice but to trust institutions to run the nuclear power project (Wynne 1996). By comparison with ordinary local people, I suggest that the 'trust' of local government officials represents a higher degree of self-interest. Fei (2005) claims that the most serious problem among China's villagers is 'selfishness'. 'Self-interest' is the key reason why people join or leave a social network. Local government officials claim that their trust relies upon the fact that they think the project will bring in some benefits to Dapu townland. Details about Fei's theory about Chinese people's selfishness and benefit-risk calculations among local government officials will be discussed in 6.4. I suspect they thought I was going to Beijing and had some means of passing their opinions along to the government. DL and DXu had this in mind when they invited me to dinner. They said, "*You should let the government know our townland really needs the nuclear power project.*" Their trust is objective-oriented – and their main

object is not hoping the government will be responsible for the safety of the nuclear power project. Their main object is centred on an inherent trust in the nuclear technology and government, and a hope that the government will choose to build the nuclear power station in their townland.

In comparison to local people in Dapu townland (local government officials, farmers, residents in the town centre), PDs in Chaozhou and Shantou cities did not easily express their trust in nuclear technology. Deputy CH from Chaozhou city said:

"*It is not that we do not trust the country's technology. However, there are leaking accidents happening in other countries internationally. What if there is a war or an earthquake happens? We are in an active earthquake area. The Han River's drinking water is in a very good condition; people from Jieyang City [another city in the Chaoshan area] drink its water as well.*"

As a PD who lives in Chaozhou city, CH actually outlined his concerns about the nuclear power project instead of trust of nuclear technology. He raised the issues about leaking, earthquakes and water condition based on PDs' consultation with experts from Shantou University, and communicated with PDs who have special knowledge about water. Their special identities as PDs also gave them the power and duty to collect information about the nuclear power project. From the different attitudes of local people in the townland and PDs in Chaozhou and Shantou cities, we can see that actually it is not whether people are reflexive to scientific knowledge

that shapes their trust. It is their power and whether they will be able to approach and make use of scientific knowledge that matters.

6.3 Ignorance

Apart from ‘trust’, ‘ignorance’ concerning nuclear power and its risks is a significant phenomenon in my interviews and conversations with lay people in the townland.

According to my interview data in the Dapu townland (taken from 36 formal interviews and 20 informal interviews), 35 interviewees showed some ignorance about nuclear power. These people who claim ignorance are peasants and ordinary local residents who have no administrative positions, who are less educated, or who are female. If people claim that they do not even know what nuclear power is, then there is no way to determine their understanding of its risks. However, ‘ignorance’ is a common idea in the social research of lay scientific knowledge. In his famous sheep farmer case, Wynne explains lay people’s ignorance as not knowing what they do know about science and technology, while Michael interprets lay people’s ignorance with a different angle. Michael (1996) analyses the discourse of ‘ignorance’ in his research of the public understanding of science. He claims that scientific knowledge is neutrally framed in society, and that people are influenced by institutional and political resonance (Michael 1996). He also claims that an understanding of a certain technology or science is not merely epistemological circumspection: *“it is a political process whereby our participants construct a more or less critical relation with science and the institutions of science”* (Michael

1996:111) After making several claims about scientific knowledge among lay people, Michael continues his arguments about ignorance.

> *"Firstly, ignorance cannot be treated as simple deficit; it entails active construction. Secondly, in the process of that construction, people reflect upon the epistemological status of their knowledge. Thirdly, in the act of such reflection, social and political contexts are drawn upon in order to resource a relation to science. … The general point is that lay understandings of science and scientists are supplemented by people's recognition of their 'ignorance' of the actual working of science.*" (Michael 1996:111)

Michael distinguishes and discusses the discourse of ignorance in terms of four categories: unconstructed absence (not shown in the table below); 'ignorance' and mental constitution; 'ignorance' and the division of labour; and 'ignorance as a deliberate choice' (Michael 1996:115-121). Table 6.1 below shows Michael's summary and categorisation of different kinds of ignorance – and how those ideas work together to construct an attitude towards science among lay people.

Category Type	Discursive from	Implied form of Lay/ Science relation
Mental construction	Non-scientific mind	Subservience/dependence
Division of labour	Not my job	Coexistence/co-operation
Deliberate choice	Not interested/relevant	Moral/ political challenge

Table 6.1 A typology of discourses of ignorance (adopted from Michael 1996:122)

In these four categories of 'ignorance', the first one – unconstructed absence – means that people just want to represent the fact that they don't know any thing about the science and technology, and that their ideas do not require any further explanation.

This kind of ignorance does not express any construction information. However, the other three categories of ignorance pass along information related to identity as represented in a person's ignorance of science and technology. Michael sees the third kind ('ignorance as a deliberate choice') as delivering a totally different attitude towards science than the other two. He claims that those people who lack a scientific mind may still think that science is good, but simply have no ability to understand it. This means that people still admire the scientific authorities. The division of labour also means that people accept the collaborative relationship with science. The third one delivers the idea of a position choice, and indicates that these people choose not to believe in science and technology.

After analysing Michael's claims about scientific ignorance among lay people, it is now time to go back to the Han River case and observe the relationship between ignorance and risk.

According to my interviews in the Han River case there are many people who totally do not understand nuclear power and who never think about its risks. For example,

> Sample1: Peasant DL (female) in Tiao Hua village
>
> DL: "*I have heard about the project, I don't know anything about nuclear power and its risk…*"

Most people in the Dapu townland have never heard about or confronted the issue of nuclear power. Moreover, nuclear power has never been defined as risky in China. As I discussed in chapter 3, China's nuclear power has just recently transformed from government to governance. Public propaganda regarding nuclear power is

limited[40]. As discussed in 6.2, ordinary people in the townland have limited channels for knowing and hearing about nuclear power and its risks. Stakeholders such as People's Deputies and local government officials in the townland will be able to receive information about nuclear power according to their position and social status, while most of the local people cannot automatically receive and pass along information concerning nuclear power and its risks unless it either has an influence on their lives, or they pay attention to research information. That is to say, knowledge and information networks have yet to build up in the local context.

Apart from this simple ignorance which has no deeper meaning, there are also people who construct their ignorance (Michael 1996). Moreover their ignorance reveals their dependence on the government and their own self-interest. For example:

> A local resident, DHH (female), in the townland told me: *"I heard about the project, but I don't know where it is. I never discussed this with people, it is not my business. This is the government's job."*

Local doctor DS (male) in Dapu townland owns a small traditional Chinese medical clinic and Chinese medicine shop. His clinic is quite well-known in the town centre. I went there with my host Yan when she had a cold. There were already five or six patients ahead of us. When Yan was seeing the doctor, I asked DS whether I could interview him about the nuclear power project. He agreed, and I went to the clinic the next day. When I asked whether he knew about the nuclear power project and its risks, he said:

> *"I [have] heard about the nuclear project. The potential location is just near my ancestral home. I am a doctor; I know there is radiation from nuclear*

[40]Details about nuclear power propaganda will be discussed in chapter 7.

power reactors. You see that high voltage substation over there. It also [has] high radiation. People want it to be moved away. But the government built it here. Who can move it?"

When I asked him to explain more about nuclear risks and whether he worries about the waste disposal problem, he said:

"I don't know, this issue is not one we can ask questions about and get involved in. The country plans the nuclear power project, they should take care of the waste."

Both interviewees mentioned the government (the country) in their statements. They think the nuclear power project and its risks are none of their business. The government (the country) will take care of everything. DS reiterated that he is a doctor. He uses his professional status to indicate his knowledge of radiation. However, he does not think his knowledge can be useful, since once the government (the country) is planning something, it makes no difference whether ordinary people know the potential risks or possible harm. He used the high voltage substation in the residential area to support his claims. As discussed in chapter 5, people in the local context are dependent on the government to care for their lives. This governance is strongly related to how much power local people can have over the discourse of the nuclear power project (details of the concept of power will be discussed in chapter 7). How can they make their voices heard? Will they be able to influence decision-making on the project? Local people have gotten used to lives that are planned and organised by the government, or 'the country'. This is based on China's centralised economic system. According to local people, the government decides everything. It

will make no difference whatever they think about nuclear power and its risks, so why should they care?

Apart from their dependence on the government (the country) to resolve nuclear risks, these statements also show a relationship between ignorance and self-interest.
One of the interviewees, DW, who is the president of Gaobei primary school in Gaobei Zhen, said:

> *"I never think about it. People in Chaozhou and Shantou are worrying about it. They drink the water from the Han River."*

DW's words show his awareness that the potential risks from the nuclear power station relate to the drinking water of the Han River. He is not bothered because he does not drink the water of the Han River and because the project does not relate to his self-interest. This attitude of ignorance concerning nuclear power and its risks is directly related to the next issue that I am going to address: the risk and benefit trade-off.

Compared with what locals say about the plant, the words of People's Deputies reveal much more complicated meanings behind expressions of ignorance about nuclear technology and its risks. According to their words (details will be coded in 7.2.1) they invited science and experts from Shantou University to demonstrate the potential risks of a nuclear power station on the Han River; they searched for information about other nuclear power stations and nuclear accidents on the Internet; and they organised committee meetings to discuss the issue. As I have claimed, self-interest is essential to understanding local claims to, and attitudes towards, ignorance.

Moreover, social positioning and networking ability also determine each person's attitude towards nuclear technology and its risks.

6.4 Risk or benefits: What are they trading off?

As I discussed in the previous two sections, local people in the townland show their trust and ignorance concerning nuclear power and its risks through statements about the proposed nuclear power plant. It is not fully convincing, however, to judge a person's thoughts on these issues simply by analysing what he/she has said. People do not always say what they really think and believe. In this case, it is very important to conduct research by observing and analysing people's daily lives and their social and cultural backgrounds. In the risk construction process, people choose their own positions according to their actual situations. Simply stated, their actual situations include an understanding of personal benefits and interests. Once there are risks, people start to use insurance. Insurance means that people can trade off risk with payment. Risk does not go away, however; it is just redistributed (Giddens 1999). Beck and Giddens tried to introduce a certain kind of risk that is not insurable, a so-called 'manufacture risk'. Although risk from the nuclear power project is not insurable at the state or business level, many people did actualise the trade-off in their minds – in a kind of risk redistribution, or a kind of risk/benefit trade-off. I argue that people present a more straightforward attitude towards risk from this trade-off perspective. Chinese anthropologist Fei Xiaotong claims that in Chinese society the self is the centre of one person's network, and the society is founded upon relational social networks which are based on these personal networks. In traditional

Chinese society people need different social groups under different circumstances. Based on Chinese traditional social order there is no boundary between the self and the social groups. Specific social groups will be found when people work for the same benefits and interests, and abandoned when benefits and interests disappear. I will now organise these people into three categories: benefits more than risk; risk more than benefits; and those who are unsure about benefits and risk. Once risk is connected to benefit and interest and people are organised in different interest groups, their words are much easier to understand.

Benefits more than risk

The first category means that people think that the nuclear power project will bring in benefits and interests and that they will face small levels of risk, or no risk altogether. People in this category are typically local government officials in the townland and farmers who live in the potential location of the nuclear power stations. Government officials in Dapu townland are people who strongly support the nuclear power project. Broadly speaking, the local government officials that I interviewed believe that the project will benefit the townland. They believe that:

1) Income from the nuclear power station can be used to improve the town .
2) The size of the project will mean a lot of work opportunities for local people.
3) The project will result in a commercial boom in the town.

For example:

> DXu: *"The town government really wants to have the project located in Dapu townland. It is very helpful for the economy and development of the town. Dapu is one of the hundred poorest town districts in the whole country.*

We do not have much industry; farmland is very limited as well. The nuclear power project can bring in tax income and work opportunities…"

DHe(i): "*I personally really want the project [to be] located in Dapu townland. This project is a big boost to the economy, and [the] nuclear power station's influence [on] the environment is very limited.*"

After hearing their opinions and linking this with the actual situation of the townland, I now doubt these three benefits. Some local people also noticed that the potential nuclear power project would not bring such direct benefits and interests to them as local government officials have claimed.

1) It is correct to say that the power project will bring in a large amount of tax income for the townland. However, whether the townland will be much improved depends on how the local government is going to spend this money. Will it build schools, give unemployed people free training opportunities, or build new local government office buildings? For example, during my pilot study in February 2007 the main road of the city, called Dapu Da Dao (Dapu city bypass 大埔大道), was being constructed. In June 2007, during my first phase of fieldwork, a six-lane cement city bypass was completed and opened to traffic. In my opinion, the city bypass really does not match the style of the town centre. And I do not think it makes people's lives any better: there are not that many cars in the town and people just walk on the six-lane bypass. Quite a lot of money has been used on this 'surface job' – much like it was used for the new office building of the local government (see picture 6.1).

Picture 6.1 The new office building of the Dapu town government

2) As I have said before, most educated and skilled adults are working in big cities rather than in the townland. Those people who are left in the town might not qualify to work on the nuclear power project. Some may be able to work on the site as construction labours. Local people will not be suited to high technology or high-income jobs. Others recognise this as well:

"I can't see anything good [[that the nuclear power project] can bring to people in Dapu. Would you guys say something? Are there any specific benefits?

Does it mean that we can have cheaper electricity? Not really.

Can rich electricity resources bring in companies and investments? People will feel scared to come. They may invest in other towns nearby. It is easy to make electricity transfers. Increased employment? I don't think so. This is high technology, not labour-intensive industry. So the nuclear power project will bring in trouble and risk.

People are not positive about coming here. And it is no longer a good place for retiring." (Comments on the online forum, my translation)

This person's online ID is Finalfantasy. From this self-introduction on the website I got the information that he/she is originally from Gaobei Zhen, Dapu townland, and is now working in Shenzhen city. This group of people uses the Internet to express opinions about the potential nuclear power project in their hometown. Details of online communities will be discussed in chapter 8. Finalfantasy points out that the nuclear power station is something that has people scared. It will bring risks to the townland rather than benefits. He/she made the distinction between nuclear power and other industry. Finalfantasy denied that the nuclear power project would increase employment in the townland, because it demands high technology. He/she thinks people who live in the townland can only work for labour-intensive industry. Finalfantasy's opinion here proves insightful: it lays out the fact that the nuclear power project would not benefit the townland, unlike government officials' ideology.

DW (the head master of Gaobei Primary School) said that:

"This project cannot bring any benefit to ordinary people. But it can benefit the local government, because of the tax income. Those farmers who will be relocated can receive some supplemental support as well. People like us will not benefit at all. If the town becomes famous in the future, then prices will rise. Wha tkind of benefit can we receive? We discuss this project sometimes. The government is too poor. They need this project to boost the economy."

DW's statement points out that local people like him will not benefit from the nuclear power project, but will possibly face higher expenses in the future. He talked

about the taxes that will go to the local government, and about supplemental money for relocated families. DW has a clear understanding of the situation that he will face. It is true that more people will come to work in the town because of the big project. It is also true that they will spend some money in town on food and living supplies. This is good news for those who might open stores and supermarkets. But since more people are spending their money in town, things are also getting more expensive.

Whether the project will really benefit the town is still to be seen, though it will certainly benefit government officials. First, a nuclear power station signifies a major achievement for the local government officials. To arrange such a big project in town will be an important addition to their CVs. Second, a large number of investments and a higher income from taxes can raise the town's GDP. And this GDP might not have any environmental deduction during the duration of their duty. Rapid rural industrial development has recently brought about serious pollution problems (Tilt 2007). SEPA and its bureaucracies on all levels received more power from the central government so as to control and assess environmental problems. Environmental assessment results directly influence the achievement assessment of government officials, which means that if the local GDP grows on the heels of serious environmental pollution, local government officials will then have to take the responsibility. The normal duty duration for government officials is five years. If they have good economic achievements without any environmental or family planning deductions, then they are sure to be promoted to higher positions, mostly in other townlands or cities. In this case nuclear power projects are more attractive to local government officials since they do not produce any industrial pollution in the

local environment. If accidents happen in the future or if there is any other pollution caused by radiation, then nuclear power companies and experts should take responsibility instead of local government officials. Third, if the project is really located in the town, then the local government will get some income from taxes and financing conditions will become very good. Then people who work in the local government will get much more income than before[41]. Their standard of living will rise immediately.

People who live in the potential location also think they face higher benefits and lower risk situations. Dangxi village has the worst geographical situation but is the most likely place to be chosen as the location for the power station. As a low-level area by the side of the Han River it has suffered from serious flooding every year. Farming on the mountain areas is hard, while flooding makes the situation even worse. Sometimes farmers lose all their harvest within several days. When flooding comes they have to move to the top floor or roof of their houses, and wait for the government to rescue them. In this situation, relocation due to the nuclear power project could be seen as a chance for them to have a better life outside the village. On the one hand, manufacturing risks from the power station will not affect them since they will have been moved out. And on the other hand, they will no longer need to suffer from the external risks of flooding. Besides, they can still receive supplemental money from the nuclear power company for the relocation. This is a win-win situation.

[41]The country fixes the standard salary for local government officials. However, in addition to salary there is another form of income called Jiang Jin (奖金, bones). This income depends on the financial condition of the local government. If the local government collects good taxes from industries and companies, then the government office will be able to provide Jiang Jin. However, if local governments do not have enough tax income, there will be little or no Jiang Jin for local government officials.

Risk more than benefits

The second category includes those people who think they will suffer from risks caused by nuclear power and who will receive few benefits or personal interests. The typical people in this category are locals who live in the lower reaches of the Han River and are drinking its water, and those farmers who live close to the potential nuclear power station, but outside of the relocation district.

The PDs from Shantou and Chaozhou cities who asked for the inquiry meeting on behalf of people in the lower reaches have serious concerns about the potential inland nuclear project. For them, it poses a significant risk to their drinking water resources without any economic benefits.

> *"We are not against nuclear power; we just do not want it to be built on the upper reaches of the Han River. There will be no problem to build it by the coastal line. Why not build it at Shanwei[42] (the other city next to Shantou)?"*
>
> (Interview with CH; my translation)

The situation is similar for those people who live in Taohua Village (for details see 5.2.4). The village is located along the east coast of the Han River, directly opposite Shanzhou village. Being on the other side of the river makes people care less about the nuclear power project. When I talked to local people they said the news about the project did not influence their daily lives. Compared to those who complain that they cannot decide whether or not to renovate their housing in Dangxi village, I see lots of people in Taohua village who are happily moving into new housing in the New Year.

[42]Shanwei city is one of the poorest cities in the Chaoshan area. Every year Shantou city spends a lot of money to help resolve the poverty problem of Shanwei. If there is a nuclear power station in Shanwei, then the tax income will help the city's economy.

I visited a family who had just moved into a new house during the spring festival. The house owner, who was doing business in Shenzhen (where the Daya Bay nuclear power station is located), said:

"I built this new house for my parents; my sister and brother-in-law also stay here.

They look after the old people and do the farming. We use some of our farmlands. I want my parents to live here because it is more convenient. It is hard for them to buy fresh food on the mountain. If we have to be relocated they [the local government] must provide housing for the old people. If they can make us settle down in the new place, [then] we are happy to move. It would not be possible to let the old people stay in bad conditions."

Here is another problem. It is still unclear whether Taohua village is inside the relocation area. This is one of the major points influencing attitudes about the project. If the answer is yes, this means that their situation is similar to that in Dangxi village. They do not have to suffer from both external and manufactured risk; plus they will receive supplement money. However, if the answer is no, then the situation is completely the opposite. Since Shanzhou village is quite close to the potential site, they have to worry about the risk of radiation and nuclear power leaks, as well as the risks of external flooding. And because they will not move, there is no supplemental money available for them. In this case the project brings no benefits but only risks.

<u>Not sure about risk and benefits</u>

There are also people who do not know whether the potential nuclear power project will bring them benefits or risks. The people who live in the town centre of Dapu townland are in this category. These people do not drink water from the Han River: their drinking water comes from the mountain. They think they live far enough away from the potential site and pay little attention to the controversy over nuclear power.

Summary

After observing people's daily lives and analysing their words I tried to organise attitudes towards the potential nuclear power project into three categories. This organisational strategy reveals an interesting geographical layout of support both for and against the project inside Dapu townland (see figure 6.1). People who live inside the potential relocation areas are supportive of the project. People who live nearby but outside of the potential relocation areas do not support the project. Most people in the town centre (apart from local government officials) have no opinion on the project. This layout is created according to local risks and benefits:

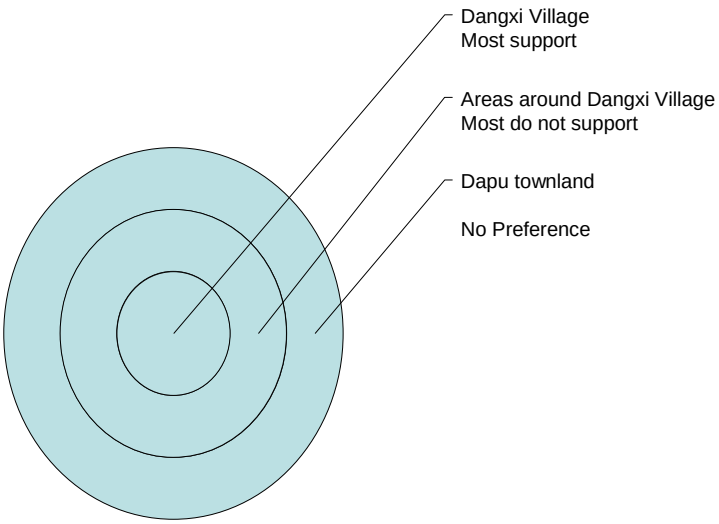


Figure 6.1

6.5 Discussion: The silent majority

In this chapter I analyse and interpret local trust, ignorance and risk/benefit trade-offs. It has been widely accepted in social research about risk that people worry more about risks with which they are unfamiliar and have no experience to deal with, than risks they see as common occurrences in their daily lives: for example, people worry more about nuclear accidents than car accidents, although the latter are more likely to take their lives. In the Han River case, I do not feel that people consider the nuclear power project to be more risky than other risks they have to face in the townland. For most people in the townland, the nuclear power project holds no special meaning. They see it as one of the government's development projects that is no different from other projects such as hydropower stations and highways. People weigh the risks of the potential nuclear power project according to the reality of their everyday lives,

social contexts and benefits; they consider what kinds of benefits and risks they might encounter in the potential project. Most local people say nothing about the project. Compared with local people who live in the townland, those who are originally from the townland but who work outside it are more likely to express doubts and concerns about the risks of the nuclear power project (as in the case of Finalfantasy, detailed in 6.4). One of the reasons for this is that people are more willing to express their real concerns in online spaces (Yang 2003). This is one of the topics that I will address in chapter 8. PDs in Shantou and Chaozhou cities are also people with concerns about the risks of the nuclear power project. In chapter 5 I discussed their ideas concerning the risks posed by the nuclear power station to the Han River. I will discuss these claims together with the Local People's Congress (LPC) system in chapter 7.

However, the 'silent majority' (Feng 冯仕政 2007) is a common phenomenon highlighted by grassroots-level social environmental researchers in mainland China.

> *"In China's General Social Survey (GSS) 2003, conducted in [an] urban area, when confronted with the reported environmental hazards, only 38.29% of the respondents mobilised to protest, while 61.71% kept silent, taking no action at all."*
>
> (Feng 冯仕政 2007:184)
>
> *"Most people are forced to keep silent about environmental hazards. Firstly, living is the most important thing. More people care more about their daily lives than about environmental hazards. Secondly, there is a professional barrier in making claims about environmental hazards. Local lay people lack*

the scientific knowledge to defend themselves. Thirdly, lay people lack the power to fight companies. Fourthly, lay people normally work individually and the government does not want to see [the emergence of] NGOs. When there is any problem the government is willing to act as a 'father' which helps people work for their benefit."

(Chen 陈**阿江** 2007:238; my translation)

Although I am not exactly in agreement with Chen's four claims, especially his simple words about people's lack of scientific knowledge, I recognise that it describes the phenomenon of silence among the local people. The absence of lay people in environmental debates has also been discussed by social researchers inside and outside of China (Jing 2003, Litzinger 2007). In the Han River case local residents who will actually be faced with risks from the nuclear power project remain silent, as do village cadres. Lu, a cadre in Taohua village, said that:

"Nobody will be against this project. He who says no will become the Qian Gu Zui Ren (千古罪人 Sinner)."

Some Chinese researchers in environmental sociology, such as Chen, believe that this silence exists because people lack scientific knowledge about environmental hazards. Irwin and Wynne (1996) have recognised the same misunderstanding. They suggest that the people are silent because of powerlessness; because their lay knowledge has never been considered rational and objective; and because of their dependence on institutions (Irwin & Wynne 1996). In the Han River case, local powerlessness and a dependence on institutions is obvious. The project has not yet begun and the people are not yet living with the risks of nuclear power. They are living with the risks of poverty and natural disasters. It is artificial if people talk

about their understandings of science and nuclear risks, rather than about their daily lives and the risks/benefits they are facing.

> *"Whilst, from the perspective of the scientific community, science 'disappears' within everyday life; from the perspective of local people, science has no necessarily special or privileged status alongside such routine concerns as unemployment, rent increases, or factory pollution'*(Irwin, Dale et al. 1996:52).

In Dapu townland, people choose to trust the 'country' and to remain ignorant and silent according to their self-interest, power, and social positioning.

Chapter 7: Participation of Local People's Congresses and Deputies: The growing power of risk definition and bottom-up politics

7.1 Introduction

PDs (and the Local People's Congresses that they work for) as the most powerful group, or in other words the only group to initiate the official and direct inquiry of the Han River project, are the research targets of this chapter. As well as Local People's Congresses and PDs who participate in the inland nuclear power project controversy, the media and online community also briefly join in the discussion and communication of information. Details about the participation of the media and online community will be analysed and discussed in chapter 8. When talking about the public participation of nuclear power issues, it is easy for people to think about environmental protection NGOs, stakeholders' groups, local communities, the general public and their debates and resistance activities. Renn claims that "emphasising governance rather than governments or administrations is meant to underline the importance of having stakeholders and public groups participate in the risk-handling process and consequently establishing adequate public-private partnerships and involvement processes" (Renn 2008:273). However, in the Han River case, it is local PDs and the Local People's Congress who stand out. This shows the Chinese characters in risk governance in nuclear issues and similar types of public issues. In this chapter I intend to analyse this kind of Chinese style of

participation in risk governance and bottom up politics. PDs should be seen as the deputies of the general public, local communities and stakeholders, although I will also discuss the disconnection local people have with PDs later on (7.3.2). However, in accordance with their duties they are supposed to work this way. As I have reviewed in chapter 2, the first category mentioned by Mol in his claim about China's environmental governance system is 'political transaction' (Mol and Carter 2006:155). I claim that the participation of PDs and Local People's Congress represent the transition within the political system, which offers PDs more power to represent people and engage with issues relevant to people's daily lives.

In Chapters 5 and 6, I mentioned several phenomena that I observed, and local people's discourse about the potential nuclear power project. These phenomena have to do with power. The power I discuss in this chapter is approached in terms of an institutional nexus which formally structures participation in the political and policy process. By employing it in the context of my case study, I discuss the institutional power on two levels. On the top-down level, I want to focus on an individual's capacity to define the meaning of nuclear power and to have his/her definitions accepted by other people. I claim that an individual's ability to define risk is determined by his/her social position and by the institutions that he or she works for. On the bottom-up level, it means the institutional power held by Local People's Congresses (LPCs) and People's Deputies (PDs). I intend to analyse how much power LPCs and PDs have in the country's political system. In order to combine these two levels of power, I claim that in the Han River case the growing political power of LPCs and PDs was what enabled them to ask for an inquiry meeting and to

then define the potential risks of the inland nuclear power project in the inquiry meeting. However, LPCs and PDs operate as state organs and represent a complicated relationship between governments and party communities; they therefore face many limitations and difficulties when representing the people they stand for. This chapter has three main parts. In the first section I analyse the newspaper report of the inquiry meeting and the official reply letters to the nuclear power issue. The discourse in these documents reveals how inquirers and respondents negotiated with each other based on their capabilities and positions. In the second section I then analyse the Local People's Congress system and the power and duties held by Public Deputies. As institutions that supervise local government achievements on behalf of local people, LPCs have growing powers and also limitations. I will end this chapter with a discussion section.

7.2 The power to define nuclear risk

Both Freudenburg & Paster (1992) and Clarke & Short (1992) emphasise the importance of power in risk construction. Clarke & Short (1992) claim that compared to institutions, 'the public' (or the 'individual') has less power in risk construction (Short 1992). Institutions such as the Local People's Congress, the media and also the local government each have a certain degree of authority, networking and negotiating powers at various stages in the risk construction process. This offers them the possibility of playing a part in the risk construction arena. If the public plays as individuals in the local context, their power is very limited. Normally we can see that the public has more power when individuals work as consumers, voters

and protesters, especially when they have groups and organisations behind them (Short 1992), such as environmental protection NGOs. In the Han River case, however, there are no NGOs involved. PDs are the most important players in the issue. They asked for an inquiry meeting so as to have the industry, provincial government and government agencies answer the questions they raised on behalf of the local people. In more recent hearings and public inquiry meetings, industries which produced risk and government agencies which promoted science and technology development are playing together as organisers or managers (Hannigan 2005). I argue that in the Han River case the CGNPG and government agencies dominated the inquiry meeting. They used their identity as experts, government officials and civil servants to make (and govern) the discourse. I claim that their words in both the inquiry meeting and in the reply letter express a 'rhetoric of containment' (Kamenstein 1988), which allows them to avoid further communication, responsibility and future questioning.

7.2.1 The inquiry meeting

The inquiry meeting was held on 4 February 2007, four months after the news about the nuclear power project was reported in the Meizhou Daily (appendix 1.4). PDs in fact did a lot of preparation before the meeting. It was part of their duty to conduct research and raise Yi An (motion) in the People's Congress. Chen said that in Shantou city they had one meeting with PDs and experts before the provincial congress went into session. They also searched for information on the Internet in order to obtain general information about nuclear power in the world.

> *"We outsiders prepared three months for this meeting, and have nearly become half-experts!" Chen Han Chu smiled and said that the deputies searched the Internet and went to the library to search for information. "And we also invited ocean, biology and physics experts from Shantou University to the demonstration forum.*" (Southern China Daily 2 May 2007:A04; my translation)

PDs in Chaozhou city said that compared to what they had done, the officials from provincial government agencies and the expert from CGNPG seemed not to have done any 'homework'. PDs CH and CW pointed out their dissatisfaction with these other officials:

> CW: *"We raised our questions very directly in the inquiry meeting. We did our preparation. We had experts in relevant subjects. They [provincial government agencies and the expert] were not able to answer our questions. They cannot provide any data that proves that there are no negative repercussions created by nuclear power stations on the water. When we asked about [an] accident emergency plan, they did not give any reply. And [we asked] about where they are going to dump the waste. They did not [respond to this either]."*
>
> CH: "*Most of them are officials; they have only one expert from CGNPG. He is a PhD graduate from a Germay university. His attitude is really perfunctory."*

CH and CW's claims pointed out that the CGNPG and provincial government agencies were not able to provide any work or research that related either to the security or risk assessment, or to the management of the project. The questions that

PDs had in the inquiry meeting, and the replies that they received, illustrated the fact that the governing definition of nuclear power and its risks was based solely on the 'official' capacity of the CGNPG expert and the provincial government representatives.

According to the news report on Southern China Daily, the first question PDs wanted to know was:

"Daya Bay, Ling Ao and Yangjiang Nuclear Power Stations have been built or are being built inside Guangdong province. We have a very long coastal line inside the province. Why is [the province] still planning to build inland nuclear power stations? Why pick up the Dapu and Fengshun town district in Meizhou City? May I have officials from DRCGP explain this?" - Chen Han Chu PD from Shantou City.

The answers were as follows:

Li Miao Juan, the vice director of DRCGP and director of the Provincial Energy Office: "Our province lacks traditional energy resources (coal and oil); it is the province's policy to develop nuclear power!" (Appendix 1.1)

"The capability sites of nuclear power stations are not rich in Guangdong!" Li Miao Juan explained that the selection of nuclear power sites have yan ge de (严格的 strict) geological requirements, and the cooling systems have to be built by the side of the sea or river. The previous nuclear power stations were built in coastal areas, but locations that can meet the current requirements are limited, so that's why new plans were set for inland areas. (Appendix 1.1)

"The report that the first inland nuclear power station will be located in the Meizhou city district is not true. The project will not be started until 2020. Recently, Hunan and Guangxi provinces have also joined the competition. Our province is just surveying sites along the Han River, the Xi River and the Bei River. Dapu and Fengshun just met the basic requirements. Now [that the locations] are at the survey level, we haven't even li xiang (立项 set up the project[43]). " (Appendix 1.1)

The second question was:

"The Han River is not the Daya Bay. It is our mother river. Over 10,000,000 people living in the middle and lower reaches of the Han River depend on it for drinking water. I asked the question for these 10,000,000 people: if [they are] really going to build the nuclear power station in the upper reaches, will there be any pollution of the water?" - Liang Yinying PD from Chaozhou City. (Appendix 1.1)

Replies by expert Ma Jie, a specialist from CGNPG:

'"After exploration and research for 20 years, the nuclear technology in our country is very mature. There is no pollution!" He said that there are very complicated and yan ge de (严格的 strict) requirements for designing and operating nuclear power stations. The investments are mainly spent on the disposal of solid, liquid and gas emissions, and on radiation protection and a relevant safety system. High radiation

[43] *Li Xiang* (立项set up the project) is the official word used to describe the working process for big projects. If GRDA has applied for a big project and agreed to set it up after research and survey, it means the project is already *Li Xiang*.

industry waste-water will not be released to rivers and sea. It will be stored after concrete curing and will then wait decades to undergo a process of natural decay.

He said that the waste-water that would be released to the river mainly comes from daily washing and cleaning. And this waste-water must run through the waste-water treatment system before it is released. According to the Daya Bay test results, the waste-water release is only 1% of the country's sewage indicator, and is very safe. The cooling tower only takes 4~5 m³ water from the river every second. It is the same as coal-fired power stations where there is no radiation. 'No pollution.' (Appendix 1.1)

The third question was:

"Does the so-called 1% of the state's sewage allowance indicates our country's low requirement 'zhong guo te se' (中国特色 Chinese special) standard, or the international standard?" - Professor of Shantou University Wu Lan Ha (appendix 1.1)

Replies by Ma and Li:

"The standard we are using in nuclear power is the old standard of foreign countries," Ma Jie replied with a smile. "The old standard is stricter, because the research level was quite low in the past. Nowadays many standards in foreign countries are more and more 'kuan song' (宽松 casual)." (Appendix 1.1)

"You guys look at this, in France two thirds of nuclear power stations were built in inland areas!" Li Miao Juan brought out a French map. France started to promote nuclear power developments after the oil crisis in the 1970s. A large number of nuclear power plants were built around big cities like Paris and along the Seine River[44]*. French people think it is normal. (Appendix 1.1)*

Li and Ma tried to convince PDs of the necessity and safety of the nuclear power project from two different angles. Li's word is official as Li is a government official. Li's answer to the first question is: "*Our province lacks traditional energy resources, it is the province's policy to develop nuclear power!"* From this statement, we can see the top-down decision-making style behind the nuclear power project. When PDs ask why the province wants to build an inland nuclear power station, the first answer given by the government official is that '[to] *develop nuclear power is the province's policy*'. This is a case of informing rather than negotiating. In the very beginning Li tried to use the *province's policy* in order to stop the PDs from speaking. When the PDs kept asking questions, Li said that the project hadn't been *li xiang*. The unspoken words were that people should not worry about the project right now, since it will not be started until 2020. Government agencies have not yet conducted any detailed research on the feasibility of the project. It is possible that the project can never be *li xiang*. Why should we discuss so many details about whether the station is going to pollute the river? Obviously, Li's words are nothing related to scientific knowledge or expertise about nuclear power technology. Her power in making claims comes from her position as a government official who is permitted to announce the government's decision and policy. Ma tried to speak about the safety of

[44]Actually there is only one inland nuclear power station in France; it is located along the Seine River and is called Nogent-sur-Seine.

the nuclear power project from a technological angle. He is a nuclear expert in CGNPG with a professional knowledge of the technology. He spoke about the water recycling system of the power station, and gave some figures to support his claims that the nuclear power station will not cause water pollution. For example, *"According to Daya Bay's test results, the waste-water release is only 1% of the country's sewage indicator, very safe."* This data that Ma provides is very informal. Secondly, Daya Bay and the Han River are not comparable. PDs have claimed that the Daya Bay nuclear power station is using seawater and that water is being released into the sea as well. The Han River is a drinking water resource. It is not representative to use the data collected from seawater to prove the safety of the drinking water. Thirdly, Ma's data is not easy for people who have no expertise in water pollution to understand. He did not provide the country's sewage indicator, or any information about how this indicator works, or about what the cost will be if people drink water that contains too much sewage. Ma gave this data so as to create a barrier and keep PDs from asking further questions. Both Li and Ma used international examples to convince PDs. Li provided some photos about French inland nuclear power stations (interview with PDs). Ma claimed that foreign countries' old standards were used as a benchmark for running China's nuclear power station, thereby making it much safer. As I have written, PDs were not satisfied by official replies that failed to answer their questions. The inquiry meeting did not provide any actual plan or management schedule that showed that the government, agencies and nuclear power companies would work for safe public drinking water. Government officials and the expert stood firm in their views in order to show PDs that they were worrying too much.

PDs summarised their questions and concerns and submitted formal written material to Zhang Dejiang, the province's prime minister (details have been given in 5.5). DRCGP, as the government agency involved in planning the nuclear power project, has been appointed to provide feedback to PDs.

7.2.2 Replies after the meeting

After the inquiry meeting, DRCGP wrote an official reply letter to PDs (dated 12 April 2007) in order to further explain the inland power project (appendix 1.2). PDs were not satisfied by this official reply.

The reply letter addressed three questions: the location of the nuclear power project, the safety of the nuclear power project, and its influence on the water temperature. In the reply letter we can see a lot of language transformation. These grammar transformations reveal the attitude of provincial government. They tried to avoid responsibility by shifting the conflict. As Kress and Hodge claim, in the *transactive model*[45] there is an actor, a verbal process, and an affected entity. Some sentences in the reply letter have clearly been transformed in order to hide the actor. Take this sentence for example:

"The nuclear power station is going to be run by very strict operating regulations and by very strict environmental protection and monitoring standards. It will have very little influence on the surrounding environment."

If they wrote this sentence in a transactive model it would be:

[45] "When the action is seen as passing from the actor across to the affected, we can call this the *transactive model."* (*Hodge, R. and G. Kress Language as Ideology, Routledge 1993).*

*** *"[Nuclear Power Company A] is going to run the nuclear power station by very strict operating regulations and by very strict environmental protection standards."*

The sentence has become passive and the writer has made the actor disappear. The reason for constructing the sentence in this way might be to express the following:

*** "There is a nuclear power company that is going to run the nuclear power station, I don't know which one/I know which one, I don't want to name it, because once I name it, it will have to take the responsibility – the PDs might request further information, I might have to hide this company, then PDs will find no target to go further."

This is one ideological motivation (Hodge & Kress 1993) that the writer(s) might have.

A second kind of transformation in the letter acknowledges abstract entities (such as the actor) on the surface.

"The design of the third generation technology adopted a lot of prevention and controlling measures. These all help to reduce the risk of accidents. ."

Take these two sentences as examples:

"The design of the third generation technology adopted many control and prevention measures."

This is a transformation sentence that shifts from active to passive, just like the first case I gave in this section. The actor who should assume responsibility for 'the third generation technology' is missing. And in the next sentence:

"These measures will reduce the risk of large scale accidents."

The abstract noun 'these' has been used in this sentence as the actor to 'reduce the risk of accidents'. These two sentences together indicate that:

*"The third generation of technology will reduce the risk of large scale accident*s."

However, 'the third generation of technology' cannot be responsible for 'reduc[ing] the risk of accidents'. When PDs read these sentences they cannot get any information about which institution will be responsible for reducing the risk of accidents in the nuclear power station. DRCGP does not want to give a clear explanation of the safety of nuclear power reactors. They just use 'the third generation of technology' because it is plausible – and because it will make people believe that the safety of nuclear power can be guaranteed by technological developments. They hide the actors so PDs cannot ask further questions. This style of official documentation or reply letters is similar to a format used in China and in the UK as well. The government agencies use this kind of grammar transformation in order to avoid direct responsibility for decision-making. It is called *guang yang wen zhang (官样文章 official paper)* in Chinese, which is actually a meaningless phrase. The government agency gave this kind of reply letter to PDs indicating that this was the way the agency worked. The power of Chinese government agencies in nuclear risk construction is granted according to political positioning and legitimacy.

PDs were not satisfied with the answers in this letter. Chen wrote another letter to DRCGP. Three and a half months later, on 25 June 2007 (appendix 1.3), Chen received another official reply letter from DRCGP. This letter claimed that:

"Recently, we started to revise the Province's nuclear power development plan. According to the research and discussion that has been conducted of late, and according to a synthesised consideration of the construction and location reservation conditions, we believe that Guangdong's nuclear power programmes should be planned along the coastline until the year 2015. In this revised version of the development plan we are not considering building a nuclear power station on the upper reaches of the Han River.

It is just like you have described on your feedback suggestions that 'the government should work for the people's benefit''. We will be very careful when dealing with issues related to the public benefit. The Han River is the drinking water resource for 10,000,000 people in Shantou, Chaozhou and Meizhou cities; we will be very careful with every construction project on the river.'

According to the second reply letter, there will not be any inland power project on the upper reaches of the Han River before 2015. This Han River debate is officially finished after the second letter. This is a dramatic sudden ending to the nuclear issue. Obviously, it is not because of PDs' inquiries that the government halted its plan. I tried to ask an insider about the government's reasoning for this (I cannot provide their name and position). One possibility is that the potential locations are actually in conflict with the country's defence routes. It will not be possible to receive a licence from the National Development and Reform Administration (NDRA). The provincial government does not want further inquiries about this abandoned project. They just reply to PDs in such a way as to indicate that the provincial government has considered their advice and that the nuclear power project is no longer being planned.

7.3 Local People's Congress and People's Deputies

In this section I discuss the People's Congress system (focusing on the Local People's Congress) and the People's Deputies in the local context. My intention is to see how much power PDs have to negotiate with the provincial government, with the government agencies and with the nuclear power companies. I will analyse both the duties and limitations of LPCs and PDs. PDs traditionally held a lower political status in comparison to the local government and the Party. They acted as 'rubber stamps[46]' in the past. However, since the Party's political regulation and law reform, LPCs have been permitted to delegate matters (Manion 2008). After the concept of a 'harmonious society' was announced in 2006, more attention has been given to people's lives and people's voices. LPCs, as institutions that supervise government jobs on behalf of the people, are gaining a more important position and status in the country's political system. In this section I discuss all the issues related to LPCs and PDs associated with the Han River case.

7.3.1 The People's Congress System

"*The people's congress system is the fundamental political system by which the Chinese people act as masters of the state. The Chinese people exercise state power through the National People's Congress (NPC) and the local people's congresses at various levels. China has adopted a unicameral parliamentary system based on its national conditions, rather than a bicameral system as instituted in Western countries."* (http://www.china.org.cn/english/features/book/145935.htm)

[46]Always saying yes to governments and the Party.

While comparing books and articles about China's People's Congress system, I found this paragraph in China.org.cn that provides a general introduction to the system. Simply stated: The People's Congress is a democratic system in which people exercise state power. The duties of the PC include law-making (at the provincial level and above), oversight, and personnel appointment and removal. However, the PC system is distinguished from the parliamentary system in three main ways.

Firstly, only deputies at the county level are directly elected by votes. Lower level deputies elect any Deputies who hold positions at a higher level.

> *"Deputies are chosen in direct, popular elections up to the county level, and indirectly by lower-level congresses after that. Under current law, all elections are contested; with 20-50 per cent more candidates than positions for indirect elections and 50-100 per cent more for direct elections. Some deputies serve in single member districts; most serve in multi-member districts. Districts are usually established to coincide with work units, but sometimes residential status is used…"* (O'Brien 1994:363-364)

Details about deputy elections will be discussed in 7.3.2.

Secondly, PCs on all levels are financially dependent on all levels of government.

This financial dependence is one of the most important reasons for a limitation of the PC's duties. Although PCs have the right to review government draft budgets and oversee implementation, PCs also depend on the governments to pay off all of their expenditure (Cho 2002). The government can therefore influence and manage through fiscal bureaux (Cho 2002).

Thirdly, the Party Committee at all levels decides the appointment and removal of the People's Congress Standing Committee and deputies.

> "*Party-dominated election committees closely control nominations and local organization departments conduct political examination of candidates.…Short biographies of candidates are provided to voters and election committees increasingly sponsor assembly hall question-and-answer sessions or arrange for voters to meet candidates personally. In most units at most times, however, open campaigning has been forbidden.*" (O'Brien 1994:364-365)

Details about the relationship between PCs and the Party Committee will be discussed in 7.3.2 and 7.4. The situation of party-dominated elections has changed since the 1990s (for details see 7.3.2).

The PC system can be divided into administrative levels: the National People's Congress (NPC), the Provincial People's Congress (PPC), the Municipal People's Congress (MPC), the County People's Congress, and the Town and Village People's Congress (TVPC). There are also other relevant minority area PCs which are not related to my research, and in order to make it simple and clear, I separate the system here into the National People's Congress and the Local People's Congress. PCs lower than the national level all belong to LPCs – which is where my research is targeted. The NPC and LPC at all levels allow citizens to supervise government work. When there are no NGOs, civil society and victims of pollution can turn to deputies in the People's Congress at national, provincial, municipal, and country levels; they

can put forward motions and proposals that will suspend pollution and compensate victims (Shi & Zhang 2006). However, it is not enough to just read from official or legislative documentation if we want to know the real political power and status of LPCs. Moreover, it is one-sided to isolate LPCs from governments and the Party and to discuss their function only. LPCs, local governments and the Party are inextricably connected. In his research paper Cho (2002) discusses how LPCs have a lower political status than the local governments and the Party. Because the party hierarchy of government leaders is higher than leaders in LPCs, local governments are not always willing to listen to the requests of LPCs. The important government policy is decided by the Party, LPCs can supervise government jobs, but they still have to listen to the Party (Cho 2002). So actually, LPCs will normally cooperate with the Party in order to achieve their supervision goal. In some local issues, LPCs will gain approval from local governments and the Party in order to work. Because of the existence of the Party and also some limitations of the LPC system, LPCs do not exactly have legislative power. However, this is changing due to the Party's reflection and China's political reform and innovation. The Han River case is a good example of the PC's power of supervision.

In the Han River case, provincial PDs used their power to ask for an inquiry meeting when the Provincial People's Congress (PPC) was in session. The issue about the inland nuclear power station was first raised in Shantou City. A teacher who worked in a vocational-technical school first read the news in Meizhou Daily. She thought that it was a very serious issue, and wrote a letter to the Shantou Municipal People's Congress office to inquire about it. Meanwhile, a provincial people's deputy, Chen

Hanchu in Shantou City, also read the news. Chen also thought this was a very serious issue for Shantou City. Chen is the president and associate research fellow of Shantou Social Science Association, the PD of the Tenth PPC, and also the organiser of the inquiry meeting.

> Chen: "*After receiving the letter from the teacher and reading the news about the project, myself and other Provincial and Municipal PDs in the Municipal People's Congress had a discussion about this issue. We were all worried that this project might cause pollution to the Han River. So we contacted the professor in the ocean biology department in Shantou University, and another professor in the physics department. We had a discussion meeting. We wanted to discuss and inquire about the risks with professionals*."

In Chaozhou City, information was passed from the Chaozhou Municipal government to MPC. Officials in the municipal government office read the news in the Meizhou Daily. After discussion and inquiry, they thought that it was better for PDs to raise this question when the PPC was in session (interview with Huang and Wang).

> Huang: "*We were about to ask about this issue in the PPC, and then we heard that PDs in Shantou City were going to do it as well. We thought it would be much better for us to cooperate and raise the issue in the PPC together. The power is much stronger*."

Along with a duty to supervise, PCs at the provincial level and above also have a duty to make laws and issue regulations. I asked PDs what they would do if the provincial government wanted to build the inland power station in the upper reaches of the Han River in the future. Provincial PDs such as Chen in Shantou city and

Huang, Wang and Liang in Chaozhou city claim that they will try to draft a law in order to protect the Han River and forbid pollution and risky industries along the river. They claim that once the law is set up, they will no longer need to worry about nuclear power projects. The PCs' powers are still limited, however, because of their financial dependence on political positions lower than Party committees and governments. If the Guangdong Provincial government and Party committee want the nuclear power station to be built in the upper reaches of the Han River, it will be very hard for the PPC to set up the law. There will be negotiations and ongoing difficulties between the Party, the government and the PPC.

7.3.2 People's Deputies in Local People's Congress

After a discussion of the LPC system, this section focuses on important actors in LPCs: People's Deputies. PDs are the primary link between the public and the institution. They have various duties and limitations imposed on them as well. This section will discuss how they worked in the Han River case and what kind of limitations they faced along the way.

According to the People's Deputies Working Handbook, PDs have a duty to raise Yi An (议案 motion) when the People's Congress is in session. And they have the right to raise Jian Yi (建议 suggestion) at any time. According to the law, Yi An is the legislative proposal required to be issued in a PC and its standing committee to congress agenda in order to make decisions, and is raised by statutory agencies and statutory proposal people. Jian Yi is a casual way for People's Deputies to

communicate suggestions, critiques and opinions to their own level of government and to lower levels of governments. In order to rise Yi An, PDs have to conduct research before the congress is in session. During this time they listen to the opinions of ordinary people concerning various government achievements, big projects, and other relevant issues that people think might be addressed in the coming year.

O' Brien explains their duties as follows:

> "*On the one hand, people's congress deputies are still expected to explain government policy to their constituents - to act as a link (niudai 纽带) from the leadership to the citizenry. Serving as regime agents, they represent state authority, explain the pattern of state extraction and justify allocations...*
>
> *On the other hand, deputies are also expected to be advocates: they are charged with reflecting mass opinion and bringing regional and group demands to the attention of decision-makers. They receive constituent letters and visitors, write proposals, and attend meetings with local and national leaders that highlight injustices and mistakes and convey requests to improve government performance.*" (O' Brien 1994:359)

PDs have changing roles at the local level. They used to act as a link between government and citizens, rather than as a supervisor on behalf of citizens (O' Brien & Li 1993). The Party used to have strong control over the election of PDs, because the PD candidates had to be nominated by the Party committee. O'Brien and Li (1993) claim that the People's Congress was constructed rather than elected. In the 90s, however, this situation began changing with the development of the PC system – especially in the local context. In 1995, a reform of Party regulations and the law

meant that more than 17,000 Communist Party candidates lost in the first set of PD elections after 1995 (Manion 2008). Local PC and PDs are playing a more and more important role in law-making (Cho 2006), the development of democracy (Ho 2007), environmental issues (Lo & Leung 2000), and so on.

Duties

Three questions will be discussed in this section: Who are my deputies? What is the PDs' hierarchical system? And who do PDs stand for?

In the Han River case, the PDs I spoke with operated at two different levels – one made up of Provincial PDs (PPDs) and the other made up of Municipal PDs (MPDs). PPDs' duties are to supervise provincial government and MPDs' duties are to supervise municipal government. PPDs attend the Provincial People's Congress meeting, while MPDs attend the Municipal People's Congress. Neither PPDs nor MPDs are directly elected by local people. They are elected by PDs at lower levels: PPDs, for example, are elected by MPDs. Local people directly elect only those PDs who work below the township (county) level. This means that local people in the city can only elect PDs in their residential areas or work units. If Shantou city residents want to report their concerns about the nuclear power project, they can first contact PDs in their residential areas or work units, as they may have elected them directly. Afterwards, the PDs to whom they reported can contact PDs at higher levels and keep reporting the issue until it reaches the provincial level. Or, if local people know PDs in the upper levels, they can contact them directly to express their concerns.

Secondly, local people can either visit or write to the Shantou MPC office to report their concerns about the nuclear power project. MPDs will help to pass the information to upper levels of PDs.

Thirdly, local people can write to or visit the Shantou municipal government office or the environmental protection division in Shanzhou city to discuss the nuclear power project and their concerns. The municipal government office or environmental protection division would then approach the upper level of government or division to express a local citizen's concerns about the project.

The teacher who wrote to the Shantou MPC office was doing her duty as a citizen in reporting the issues about which she was concerned. As the project was under review by the Development and Reform Commission of Guangdong Province (DRCGP), the inquiry about the project needed to be made at Provincial level. In this case MPDs needed to contact PPDs in order to make inquiries about the project in the PPC meeting. Chen told me that if the project was under review by the National Development and Reform Commission (NDRC) they would have contacted the National PDs in Shantou City.

Limitations

In the Han River case, PPDs in both Shantou and Chaozhou City stood for their citizens and the local government to ask in the PPC meeting for an inquiry meeting. Their duties included working for the benefit of local people and standing up for the

local people who elected them. However, I can see some limitations in the PD system that might hinder them as they try to fulfil their duties.

First, PDs work part-time. They still have a full-time job to do for a living. To be a deputy of the people is just a part-time, unpaid job. It is not possible to apply for funding to do Yi An researching and information collecting. PDs have to have a certain degree of security, economically and socially, in order to work for the people.

> Xiang: *I heard that you did a lot of research and data collection before the congress. Can you apply for any money from the provincial congress or the provincial government to cover the research fee?*
>
> Chen: *No, there is not any money for research; we all pay by ourselves.*
>
> Xiang: *That means PDs spend their own money to work for people.*
>
> Chen: *Yes, we don't have any funds. We all work part-time. Deputies in foreign countries all have money. My situation is better, people like me have Dan Wei (单位, work unit). We still have some resources that can be used. It is more difficult for those labourers' and farmers' deputies.*
>
> Xiang: *Does that mean that PDs are supposed to have certain social and economic foundations?*
>
> Chen: *This is the reality. Some PDs with certain social and economic foundations cannot completely represent the opinions from Xia Ceng (下层 the grassroots level), while people who know clearly about what happens in Xia Ceng have no power to present lay people's opinions. There are people who have been PDs in the PPC for five years without saying a word. This PC system is a good system, but it needs to be refined. Some people from Ji Ceng (基层 bottom) had limited knowledge. They did not recognise that*

environmental problems are an issue. They sometimes might ignore it; think it is all about nature. Or, it is possible that they really had no way to express their ideas.

Chen's words do not only point out the first limitation of the PC system. It also reveals a second problem, which is the gap between PDs and the grassroots level. How much do PDs really know about voices from the bottom? During the interview with PPD Liang (The Agricultural Bureau of Chaozhou City), I asked how they researched farmers' opinions about the nuclear power issues. Liang did not give a direct response, but merely said that they collected information from farmers through everyday work and according to their experiences. PDs do not normally hear much from local people. A lot of Chinese authors have written about the deputies' representativeness (Yang and Yang 1999; Qin 2003; Bian 2005). Bian argues that PDs should reflect on and have a clear understanding of their real role. In the past, PDs would take the title of PD as an award for having a good reputation in their everyday jobs. They would take on the PD role as an honour instead of as a real job representing and serving the people who elected them. Qin claims that there is not enough publicity to let people know who their deputies are and who they should refer to when they have problems (Qin 2003). The communication channels between people and their deputies haven't been well built. I argue that the gap between PDs and the grassroots level is the most important limitation for people's duties. This PD system is not operating as it is supposed to if their PDs have never been identified and if the PDs have never reported to the people who voted for them.

Thirdly, how much power do PDs really have in the policy decision-making process? This is a question that I have been curious about since the first time that I read the news about the inland nuclear power project on a website. As far as I know, PDs have always agreed with the government and the party. Although PDs are supposed to supervise how the government works, they have rarely had a chance to do it in the past. There is a case used by Peter Ho in his 2001 article about Huang Shunxing, a member of the Standing Committee of the NPC and an expert on hydroelectricity. This man tried to voice his criticism of the Three Gorges Project at the Fifth Session of the Seventh NPC in April 1992. When it was his turn to speak, the microphone was unplugged and he could not make the speech at all. He resigned from the NPC in response to this incident (Ho 2001). As I discussed in 7.3.1, Party groups are formed in LPC standing committees, and it is the LPC standing committees that nominate the PDs. When LPCs conduct their supervision duties they have to wait for instructions from the Party. For example, if the LPC wants to dismiss leading officials, it has to wait for authorisation from the Party. Leading officials in the government normally have a much higher position in the party hierarchy than LPDs. The power of PDs is much reduced because of these complicated party hierarchies and because of the mixed positioning among government officials and party leaders.

7.4 Discussion: Local People's Congress – a growing power for bottom-up politics

Public Deputies and the LPC system play essential parts in the inland nuclear power issue. Literature that discusses the growing power of LPCs concentrates on two things: law-making ability and supervision. The Local People's Congress (LPC) is changing from a Congress of 'Rubber Stamps' to 'Iron Stamps' as supervisory powerhouses in the politics of law-making (Cho 2002; 2006); "LPCs at provincial level have also grown in importance as local law-makers, or as 'information brokers' between the central and local levels thanks to their complex networks"(Cho 2002:724). Legislation and supervision are two of the most important duties for PCs, while the NPC concentrates on law making and LPCs at various levels concentrate on supervising (Cho 2002). The inquiry meeting in the Han River case represents LPCs' growing supervisory power at a certain level.

Nowadays we can see that members of the NPC and Local People's Congress are quite active in environmental issues (Lo & Leung 2000), just as PDs have been in Shantou and Chaozhou cities. Compared to the NPC, most of the time LPCs are more active and effective in their supervision of government work (Cho 2002). Those PDs I interviewed mentioned that PDs are gaining power on issues related to Min Sheng (民生 people's daily lives) – and drinking water is one of the most important issues related to Min Sheng, which is a key reason why PDs were successful in asking for the inquiry meeting.

Another reason for PDs' success is that the MPC, the municipal government and the Municipal Political Consultative Conference (MPCC)[47] all had the same view of the situation.

Although the PDs that I interviewed did not clearly mention that the three leading bodies all had the same view of the issue, it is easy to see this in the words of a PD who has done political research (as a Chinese person) for three years.

> Huang: "*The municipal government officials read this in the Meizhou Daily. After discussion and making inquiries to relevant agencies they thought it is much better for PDs to raise this issue in the PPC…"*

I can also see this though the PDs' original work agencies. Chen, the leader of these PDs, is the president of the Social and Science Institute which is an agency under the Shantou MPCC. This means that Chen is a PD who currently works for the sub-agency under Shantou MPCC. According to what I have discussed about the duties of a PD, Chen is actually representing voters in his work unit (Shantou MPCC). It is the same for PD Huang from Chaozhou city. He works as the vice-president of Chaozhou MPCC, which means he represents the preferences of Chaozhou MPCC as well. From the original work units of these PDs, it is obvious that the aforementioned three bodies (MPC, municipal government and MPCC) have the same view of the project – and this may indicate important support of PDs' Yi An. This is a very important strategy when it comes to PDs working in the local context. The current goal of LPDs is to cooperate with local governments, MPCC and the Party in order to influence the decision-making of upper levels of governments.

[47]People's Congress, People's Government, People's Political Consultative Conference and also People's Communist Party and the Party Central Committee Commission for Discipline Inspection comprise the so-called Wu Tao Ban Zi (**五套班子**, five sets of bodies) of governing.

The power of LPCs (as institutions and state organs) is beginning to grow and to play a more and more important part in law-making and supervision. In my case, however, I see the gap between PDs and the people they are supposed to represent. In other words, the institutional power of LPDs is growing, but the participation of the people is still limited. PDs still have a lot of space to work out their primary duty as a link between institutions and ordinary people. The LPC system should offer enough resources for PDs to fulfil their duties and should build up the supervisory system so as to evaluate PD achievement.

Chapter 8: Space and Awareness – the Media and Online Communities

8.1 Introduction

In this chapter I discuss people's environment and risk awareness, and the spaces in which they communicate with each other and receive information. Here 'space' refers to communication forums. These communication forums take multiple forms: face to face, traditional media (newspaper, TV and radio news) and virtual forms (online forums and chat rooms). These different forms of communication forums are not separated from one another. Exclusion from one does not influence people to receive information through other forms: for example, even if one has no access to the internet, he or she can still get information through talking to relatives/family and through newspaper and TV news. The space for communication of environmental and risk information is multi-layered. The research targets of this chapter are mainly the traditional media and online communities. Within China's social and political context, the traditional media's (TV, newspaper and radio) news propaganda is influenced and controlled by the Party and the government, and commentaries about nuclear risks are forbidden, in contrast to the situation in Western countries. In the UK and the US, news and comments about the risk of nuclear power can comprise a hot topic and valuable news resource for the media. However, some recent issues indicate that Chinese media are gaining more freedom in news broadcasting, especially of environmental issues which are relevant to people's daily lives (Wen 1998; Yang 2005; Martens 2006; Mol & Carter 2006). People's growing awareness

of and interest in environmental issues has encouraged media broadcasts of environmental news (Parlour & Schatzow 1978; Wen 1998). Under these circumstances, issues concerning nuclear risks can be reported using the angle of environmental issues.

The Internet is a more open and free space for communication and discussion. The Party and the government have far less influence and control over it compared to traditional media. Recently, the Internet has become another way for policy-makers to know people's opinions about public issues. In online environments it is much easier for individuals to gain access and have their voices heard, and also find support. The main argument of this chapter is that people's growing environmental awareness and their interest in environmental issues offer the media a basis for reporting debates about the nuclear power project, using a less politically sensitive angle. At the same time, media and Internet propaganda on environmental issues shape people's environmental awareness and risk perception.

8.2 The media

In China the media are under control and remain in an awkward position, having to please and serve both the Party and government as well as the market (Yang 2005:56). On the one hand, the media, especially TV and newspapers, have always been seen as the 'throat and tongue' of the government, which means they put out the propaganda that the government wants them to. On the other hand, along with the country's reform, economic development and decentralisation of the political system and market competition, the media have to work for the people as well (Mol &

Carter 2006). To broadcast news which relates to people's daily lives, a story on pollution in drinking water resources, for example, will meet citizens' needs. "*The mass media, particularly television, newspapers, and the Internet, pay increasing attention to environmental problems, and with economic development the general public now has substantially improved access to these media*" (Shi & Zhang 2006:289). It is true that the media are more open and they are encouraged to report environmental problems. This phenomenon is similar to the Soviet Union at a certain level. When Soviet communism went through a collapse, the social and political impact of environmental issues became a motivating factor of the transition of the society (Tickle and Welsh 1998). In China the media have the freedom to report on environmental issues within the boundaries of political requirements. Under this special context, the 'angle' of the news reporting becomes particularly important. The 'angle' in this case means how to frame environmental stories. Before I analyse the news framing of the Han River case, I want to distinguish it from Hannigan's claim about news manufacturing in the constructionism approach. In the Chinese context, to find the 'angle' of reporting environmental hazards or debates is to avoid touching on politically sensitive topics in order to make the news publishable to the public. It is distinguished from Hannigan's argument on finding a new angle to publish news to meet the public's interests or how to make news (Hannigan 2005). To publish a nuclear debate is not easy in the Chinese context. I argue that the news can be reported in accordance with three factors: the government's approval, people's growing environmental awareness, and the media's active role in broadcasting environmental issues. Public environmental awareness is raised by the media broadcasting environmental issues (Wen 1998); while at the same time,

people's growing interest in environmental issues encourages the news broadcasting. However, the government and the Party will control the news broadcasting at a certain level. In this section I will first discuss the growing power of the media in broadcasting environmental issues. In the second part I analyse the three main practical reasons for the successful publication of the inquiry meeting and controversy about the potential nuclear power project.

8.2.1 The power of the media in environmental issues

"*Newspapers and television have correspondingly become powerful networks and the largest means of disseminating information on environmental protection.*" (Wen 1998:39)

The media have been considered to have more power in broadcasting environmental problems for both top-down and bottom-up reasons. It is similar to what I have discussed in 5.5 about people's environmental awareness. The environmental degradation caused by economic development has been one of the most serious problems for the government. To build an 'environmentally friendly' society is the main achievement for the country's eleventh five-year plan: it is one of the national policies. At the same time, China's environmental problems have attracted international attention. At the top-down level, the government wants to promote environmental protection and public environmental awareness. The government has to depend on media propaganda to achieve these goals (Wen 1998).

At the bottom-up level, the emergence and growth of environmental protection NGOs and GONGOs encourage citizens to join in environmental protection activities, especially in economically developed urban areas where people pay more attention to the influence of environmental degradation on their living conditions. Public interest in and attention to environmental issues encourage the media's broadcasting and its power. Parlour and Schatzow (1978) discussed similar findings about public concerns and media broadcasting of environmental issues. They summarise the model in Figure 8.1.

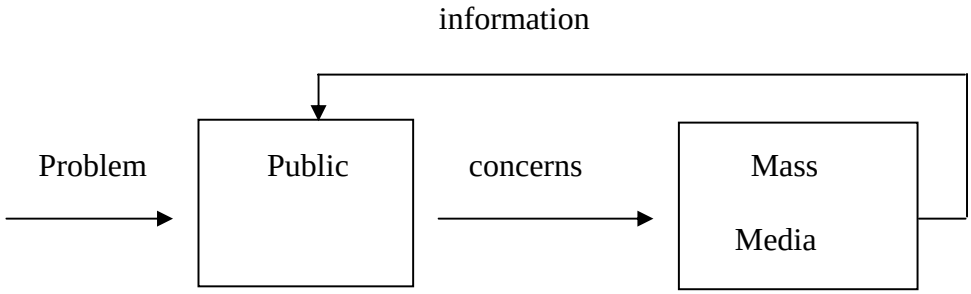


Figure 8.1 The Public Mass-Media Interaction Model

Source: The Mass Media and Public Concern for Environmental Problems in Canada, 1960-1972 (Parlour & Schatzow 1978:14)

Both top-down and bottom-up requirements offer the media a relatively free and open space for broadcasting environmental issues. However, the state remains dominant in the mass media since they are mostly state-owned and under constant state censorship (Martens 2006). Also, the media are very careful not to take serious political risks, and the reporting of public debates is heavily influenced by the official state policies (Martens 2006, Lee 2003). The political influence and control

of media broadcasting has its historic and political reasons. It is straightforward, but changing at different times due to the requirements of market economy and democracy.

"*News media in post-Mao China, in short, are in the paradoxical situation of at once being changed and remaining the same. Economic reforms and an open-door policy introduced market logic into Party-controlled news media system and led to a fledgling journalism reform movement and the emergence of discourse on media in the mid-1980s, which threatened to challenge the Party's monopolistic control. While the crackdown on the democracy movement in 1989 suppressed democratic discourses and reimposed tight political control, market forces gained momentum after the Party's unreserved embrace of the market economy in 1992. These developments produced the current mix of Party logic and market logic - the defining feature of the news media system. It is a scene full of constructions, tensions, and ambiguities.*" (Zhao 1998:2)

The ownership decided which body of the government or Party committee that a newspaper works for: for example, the Southern Daily subordinates to the Guangdong Province Party Committee; the Guangzhou Daily subordinates to Guangdong Provincial Government. This is known by insiders of the government and newspaper companies. When interviewing people who work in the mass media field, I always heard them mention '*Dang De Chuan Bo Ji lv*' (党的传播纪律; the party's broadcasting rule). This is something journalists or people who work in the mass media should always remember. It is important that the media do not touch on politically sensitive topics when broadcasting environmental issues: for example, nuclear power issues are not free for discussion. This is not only applicable in China

- even in Western countries some of the sensitive nuclear power issues are not open for free discussion, for example, in the UK the Windscale fire of 1957 (Allan, Adam et al. 2000). In the next section I discuss how the news about the inquiry meeting of the potential nuclear power project was reported by Southern China Daily.

8.2.2 How is the news published?

The 'angle' of news reports on the inquiry meeting influenced whether they got published. In this section, I first analyse the angle chosen by the journalist to frame the news, and how it matters. Secondly, I analyse the timing and people's environmental awareness, which positively influence the publication of the news. Thirdly, I look at the special position of the newspaper in the province.

Framing the news

"I did not frame the Han River inquiry meeting as a debate on nuclear power issues. I try to report this news in the theme of 'Science or Democracy (科学还是民主)'."

Chen Feng, the journalist who reported the news about the Han River inquiry meeting in Southern China Daily, told me the above when I interviewed him in July 2007 in his office.

"About nuclear power issues, the government normally don't like [the media] to propagandise and report. In general there might be some positive and official introduction or some technological information. For example, where a nuclear power station is going to be built; what kind of reactor; how big is the capacity. We [journalists] are not allowed to visit or report news about nuclear power issues

unless we are invited by nuclear power companies or they arrange the press release. We normally publish press releases that the media departments of nuclear power companies send us."

In China nuclear power is a sensitive topic which the media are not allowed to discuss freely. In 2005 my master's dissertation focused on a comparative study of four newspapers in the UK, Hong Kong and mainland China with regard to their news reports about nuclear power. There is no news relating to debates on nuclear power in Guangzhou Daily (广州日报) from May to August 2005.

Wen Bo, an author who wrote about China's media in China Environment Series, wrote that:

"*There is virtually no reporting of nuclear power issues in China and, consequently, there is a complete lack of awareness among the Chinese public about the environmental impacts of nuclear testing and nuclear power production, the generation of radioactive waste, and the potential for devastating nuclear accidents. Though many Chinese have heard about the Chernobyl disaster, few believe that such an event could happen in their own country. In this regard, the Chinese media has failed to inform citizens about nuclear safety issues and the hazards associated with potential problems at nuclear sites.*" (Wen 1998:43-44)

In order to collect information about the news broadcasting of nuclear power issues from the authorities, I visited GZH, the director of the Publicity Management Office, Province Broadcast and Television Bureau.

GZH: *"This is a sensitive topic, the management is very strict. We have meetings every year to discuss the broadcasting of this kind of issue. Actually the government doesn't want to propagandise [this issue]. Because Lao Bai Xing (老百姓 1. ordinary people 2. the ' person in the street') is afraid of this, so normally we do not propagandise or make it less."*

The angle that Chen used to frame the news was 'science or democracy' instead of debates on nuclear power projects. The issue is mainly concentrated in the environmental concerns and protection of people's drinking water. He claims that this is one of the most important reasons that the news release can be published. The main argument Chen made in the news report is *"from this inquiry meeting, we see that science meets democracy in the potential inland nuclear power project"* (Chen 陈枫 2007). Chen said that the news passed the examination process without any problem[48]. However he talked about how he worked on telling the story according to his profession.

Chen: *"As journalists we are very careful in writing news releases. We should stay neutral when reporting news. A lot of work has been done on balancing different positions. The scene of the inquiry meeting was very tense. I seldom saw this kind of*

[48]Chen: *"I can tell you the process of news publishing. We are daily news. So normally the deadline of acceptance of drafts is 10pm. And then the news will be finalised and ready to print at around 12.30 am. Journalists finish news releases, and then hand in to the department releases section. The duty director will go over important news. If there are any problems, the director will discuss with journalists and then make some changes. After that, the news releases will be passed to the night editor. The night editor will go over them again. And then the news releases will be sent to the duty vice deputy general manager. After the vice deputy general manager goes over them, news stories can be published. That night I finished the news release at about 10.30. Then I handed it in to the duty director in my department. He did not make any comments."*

situation before. I tried to present the real process of the inquiry meeting on my news release. And they just let it be published."

Timing and People's Environmental Awareness

The timing of the inquiry meeting has always been highlighted by Chen.

Chen: "*The timing of the inquiry meeting was very important, since this inquiry meeting was held during the 10th National People's Congress (NPC) and Chinese People's Political Consultative Conference (CPPCC). During this period the government wanted the media to report more about people's opinions. For example: what do people think about their lives? Are they satisfied with the government's activities? How do they feel about some big projects that were being conducted? Etc. So this was the time the media had more freedom on reporting news related to people and their opinions. That's one of the most important reasons that I could get the news published."*

When People's Congresses are in session, it is the time that People's Deputies (PDs) express people's opinions about the government's achievements and about their lives. This is the time of year when PDs make people's voices heard on their behalf. For ordinary people, it is a time when they will pay attention to media broadcasting (newspapers, TV news, radio, Internet) to see whether PDs have expressed their opinions and their voices to political leaders and decision-makers. It is the period of the year that the government wants the media to report more about people's opinions.

The identity of the province's main newspaper and journalist's personal profession

This point illustrates the 'Chinese character' of China's media. In Western countries newspapers are mainly privately owned, while in China newspapers are all 'state-owned'. The most significant newspapers are owned by different levels of governments and government agencies. As I have explained in 8.2.1, the Southern Daily belongs to the Guangdong Provincial Party Committee, and the Guangzhou Daily belongs to Guangdong Provincial Government. There is another main newspaper called Yangcheng Evening, which belongs to Guangzhou Municipal Government. All three of these newspapers received an announcement about the inquiry meeting beforehand, while other, smaller newspapers are not allowed to access and report the news (interview with Chen).

Chen: "*I got an announcement on that morning (4 February 2007), which said that there was going to be an inquiry meeting in the Province People's Congress (PPC). It was about a new nuclear power project on the upper reaches of the Han River. People's Deputies (PDs) from Shantou and Chaozhou city were coming for the inquiry meeting. At that time, with the professional sensitivity of a journalist I sensed that it was something big (大料 daliao). And an inquiry meeting is unusual in the PPC. Especially when PDs from two cities asked for the inquiry meeting, which was something that had never happened before. There are two types of meeting which can be held in the People's Congress when PDs have serious things to inquire of the*

government. One is called '询问 xunwen (inquiring)'; the other is called '质询 zhixun (questioning)'. The former one is gentle while the latter is quite stringent."

It is because Chen works for Southern China Daily that he was informed and able to publish the news.

From Chen's word, and literature about China's media, we know that news broadcasting of nuclear risks is forbidden. However, news broadcasting of environmental issues has been promoted. The potential risk of the inland nuclear power project to water resources and the environment, along with the angle of 'science or democracy' which matches the theme of the People's Congress, allowed the news about the inland nuclear power project to be published. The broadcasting of this news release also shows that the media has more power and freedom in broadcasting news about people's daily lives and environmental issues. Compared with newspaper and other traditional forms of media in which it is even harder to run stories on nuclear debates, the Internet is a much freer and broader space in which to share news, and moreover, for people to participate in communicating and discussing nuclear power issues. In the next section, online communities will be discussed as the most popular sphere for people to talk about nuclear power.

8.3 Online Communities

In contrast to interviews and conversations with local people, people's online discussions about the nuclear power project are more active and wide-ranging. Yang,

who conducts research about the relationship between the Internet and China's civil society, claims that:

'*The Internet facilitates civil society activisms offering new possibilities for citizens' participation. Civil society facilitates the development of the Internet by providing the necessary social basis - citizens and citizen groups - for communication and interaction.*'

(Yang 2003:405)

In Western countries there is also a large amount of research on this cyberactivism. Tim Jordan, as a representative author, claims that activism and hacktivism in the cyber world constitute a new form of political action which informs changes to our society (Jordan 2002). Recently, the Internet has become a very important tool for Chinese citizens and citizen groups to communicate about knowledge, social life and political ideas (Yang 2003). At the same time, people's willingness to voice their opinions on social and political issues encourages the development of online communities. Yang's claims show that technology and society shape one another, and it is wrong to only emphasise the influence of the former on the latter. I am not going to address the controversial and complicated topic of the development of China's civil society in my thesis. My claim is that the Internet, as a space for people to communicate environmental knowledge and opinions, shapes people's environmental awareness – and vice-versa. The online anti-nuclear movement which I discussed in chapter 3 is a good example. In the Silver Beach case, citizens used the Internet as a platform to express their opinions about the nuclear power project, communicate scientific and technological information and knowledge, and organise events. There are authors who discuss the government's control (Michael & James

2002, Harwit & Duncan 2001) and impact (Taubam 1998) on online society. In comparison to traditional media, the Party and the government's influence on online communities is far less significant. However, online communities are also a platform for governments to know people's opinions and to communicate with people. Quite a lot of Internet communities are organised by all levels of governments and government agencies, for example the Gaobei forum and Dapu forum, which I will discuss in this section. The Dapu town government organised this online forum in order to give citizens a space to express their opinions about all kinds of issues. In the Han River case I claim that the online forum is an effective platform for people to express their opinions about the inland nuclear power project. However, people only use this forum to communicate information and knowledge and express their opinions about the project. People did not organise any events or try to use any methods to influence decision-making on the potential inland nuclear power project.

8.3.1 Online communities in the field

Before I visited the field I read Yang's article about civil society and the Internet. Although I was aware of the boom in online communities in China, I was surprised that even a small *Zhen* like Gaobei has a complete and functional online community with 1,300 members[49]. When I arrived at the Gaobei Zhen government office and asked about local officials' opinions on the inland nuclear power project, they suggested I simply visit the online forum (www.gaobei.cn/LT) and read people's

[49]One of the seven Zhens in Dapu townland.

opinions there. The computer operator DZC met me in the computer room[50]. She helped me open the page and view people's opinions on the nuclear power project; around 20 people had posted opinions. But the post in the forum has subsequently vanished. I suspect that they blocked the posts after I went to the town as they knew some people had started to pay attention to the project from outside.

The online forum at Dapu Net (www.514200.cn) is the community which I intend to study in depth. Dapu Net has 16,955 members (accessed 9 August 2008). The forum was set up by local government on 13 June 2003, and is a place for people from Dapu, living both inside and outside the town, to discuss its issues. Topics include Dapu's economic, social and cultural development; people's daily lives; government achievements and local policies; and some tourist information. The forum has a very strong local atmosphere. As discussed in Chapter 5, people from Dapu with higher education and skills work outside Dapu townland and do not physically live in it. From the netizens' IP addresses, self-descriptions and posts I noticed that quite a lot of netizens who actively join in discussions about the inland nuclear power project fit into this category, just like Finalfantasy who I mentioned in 6.4: for example, an active netizen whose username is Dong Guan You Zi (东莞游子 Traveller in Dongguan)[51]. As well as these migrants from Dapu, Dapu Net is also a popular online community visited by local people, and was recommended to me by several interviewees. On my third day in the town centre, I went to a local gold shop. The shopkeeper was a young man of around 25. When I discussed the inland nuclear power project with him, he said, *"I don't know the project. You should go to the*

[50]There were four computers, two printers and one phone/photocopier in the computer room at the government office. Officials (other than the manager) who want to use computers or other equipment have to use this room, as they do not have computers for everyone.

[51]Dongguan city is an industrial and commercial city in Guangdong province next to Hong Kong and Shenzhen.

Internet. People talked about the project in the online forum. The address of the webpage is www.514200.cn. It is easy to remember. 514200 is the postcode of Dapu."

I followed his instructions and found the following threads about the inland nuclear power project in the online forum:

1. Dapu became a candidate site for a nuclear power station; please vote with your opinions. (07/09/2006)
2. Information on the Dapu nuclear power project, location and demonstration. (07/09/2006)
3. Re-discussion about the Dapu nuclear power project. (07/11/2006)
4. The nuclear power project is not our business, is it worth discussing anymore? (27/11/2006)

There were a total of 113 posts about this issue. In the online forum, discussions are quite heated and open. A total of 193 people voted on the issue. They had a choice of three options and the results were:

1. Building the nuclear power station will benefit the people of Dapu. 96 (49.74%)
2. There is no benefit to the ordinary people of Dapu and there will be potential risks. 88 (45.60%)
3. Don't care. 9 (4.66%)

People's posts on the matter were mainly about how the inland nuclear power project might influence Dapu's economy, people's daily lives and the environment, and whether it is good or bad for the town. There were also posts about the Chernobyl disaster and some brief introductions to civil nuclear power.

The style of the posts was more like a conversation about the inland nuclear power project. People supported or disagreed with each other's opinions on it. Some posted several times on the topic; sometimes they also criticised each other's words.

For example:

A Wen: "The sun is reacting all the time. If there is no radiation from the sun, human beings will die. Hydropower is the same, people die in reservoirs every year. Does this mean that we should not develop hydropower? Nuclear power is not a nuclear bomb, don't worry too much."

Dong Guan You Zi (in response to the above):

"The radiation from the sun is safe, because of the filters in the atmosphere. People died in the reservoirs because of carelessness. Actually, nuclear bombs are safer than nuclear reactors, because the bomb is still but the reactor is reacting all the time. The danger of nuclear power comes from daily waste disposal. The most dangerous thing for people living nearby is waste disposal, and outsiders never know what is happening. So the daily management of nuclear power is very important. Who can guarantee staff will not make any mistakes in operating the reactors?"

A Wen: "There is scientific proof that nuclear power is an environmentally friendly, safe and economic energy source."

Mzliaohuei: "A Wen, are you a government official?"

These are four posts in one thread, illustrating the argument. A Wen supported the project and gave his reasons. Dong Guan You Zi quoted his words and made some comments. He also showed his concern about the safety of the project. A Wen replied straight away by saying that nuclear power is safe. Mzliaohuei expressed a suspicion that A Wen must be a government official if he takes that view.

Apart from discussions, netizens share information that they collected about the Chernobyl accident as well. Shuixi, one of the netizens, posted a copied article of over 10,000 Chinese characters with general information on the accident and local people's descriptions of its influence on their lives. Laowantong posted an image (Picture 8.1) from local television news about preliminary testing of potential locations.

Picture 8.1

8.3.2 Netizens' reflections on nuclear risks and their ability to play a part in decision-making

As discussed in chapter 6, from my interviews with local people I do not feel that they see the nuclear power project as different from other development projects such as highways or hydropower stations. However, in online communities, people talk a lot more about the risks from nuclear power stations, such as the accident in Chernobyl, radiation pollution, bombing, earthquakes and war. These risks stand out in the way they talk about nuclear power.

Finalfantasy: "*The hydropower project will benefit Dapu townland. It can be used to develop tourism as well. I do not support the nuclear power project. I support the hydropower project.*" (Finalfantasy's comments about the risks of the nuclear power project have been coded in 6.4.)

In the online community netizens not only reflect on nuclear risk; they discuss their potential to influence decision-making on the nuclear power project. In the post 'The nuclear power project is not our business, is it worth discussing it anymore?' dated 27/11/2006, 肖秀娜, who started the post, claims that:

"*Firstly, we do not have spoken rights at all, because the government do not need to ask for our agreement. Experts make the decision whether to build the nuclear power station. Once they finish the research and testing and then decide that Dapu is a suitable site to build the nuclear power station, we have to accept. Why waste energy [to talk about this issue] here?*"

1111's reply to 肖秀娜's words:

"*We should think of it in this way. It is true that we cannot intervene on whether to build the nuclear power station or not. However, discussing this issue can help us know about the reality of the project.*"

This conversation is essentially the crux of my argument. Netizens understood their lack of power to influence decision-making about the nuclear power station. However, even if they cannot change anything, there should be a space for those who are interested in the issue to communicate opinions and share information. I believe that in China online communities meet this requirement. They function as a relatively free space which presents few barriers; people can communicate freely and search for information that interests them. They do not need to have any expertise or

scientific knowledge; they do not need to hold positions of power or high social status; they do not even need to say who they are; they can just say what they want to say. They will easily find support and disagreement on the Internet, just like the conversation I quote in 8.3.1 between A Wen, Dong Guan You Zi and Mzliaohuei. The online community met people's need for personal expression and public participation, filling the gap which traditional media could not (Yang 2003). Especially in my case, it offers me rich material to understand those young and educated people's views about the potential nuclear power project. Since most of them are physically located outside the town, I cannot approach them for information face- to-face. However, access to online communities helps to resolve this problem.

8.4 Summary

In this chapter I make one key argument: that the media and online communities, as a space for people to communicate and receive information about environmental issues, shape people's environmental awareness, and people's growing environmental awareness encourages media news broadcasting and people's communication around environmental issues in online communities. Although China's media are still serving both the Party and the market, many authors who write about China's environment and civil society (Wen 1998; Yang 2005; Martens 2006; Mol & Carter 2006; Wang 2008) claim that they have growing power and more freedom in broadcasting environmental issues. According to my field findings in the Han River case, journalists can find an angle related to people's daily lives and environment in order to construct debates about nuclear power and have them published. It seems that debates about nuclear power are no longer forbidden in news broadcasting if the theme of the news is not just about nuclear risks but people's daily lives,

environment and democracy. The Internet, as a new form of technology, offers people a relatively free and wide space to communicate and share information. With regard to sensitive topics like nuclear power, people are more willing in online communities to say what they really think and understand about nuclear risks. The online community on a certain level erodes the barriers of power, scientific knowledge and institutions in nuclear issues. In Chinese society, in comparison to the media, online communities, having been subject to less control and influence by the Party and government, have become a key space for people to communicate, share information and give their opinions on nuclear power and its risks.

Chapter 9 Conclusion

My research aims to see how Chinese people construct risk with regard to nuclear technology, according to differences in social identity, economic and cultural background, in the process of science and technology development. The case I chose to study for my research was the civil nuclear industry, specifically an inland nuclear controversy in Guangdong province. In this chapter I will conclude the thesis by summarising four of my key field findings, and connecting them with the three academic objectives set out in the introduction. I will then give some recommendations for policy decision-making regarding the development of civil nuclear power.

9.1 Local people's perception of nuclear risk

The first of my principal field findings indicates that local people in the case-study area deal with a significant degree of risk through the way they manage their trust and ignorance of nuclear technology. As I have discussed in chapter 6, one particular villager claimed that she did not worry about risks from the nuclear power project. She thought that people like her knew nothing about nuclear technology, while those scientists and experts working inside the nuclear power site knew much more than her. If these specialists in nuclear power could work on the site, she reasoned that there was nothing for her to worry about. Other villagers and people living in the town centre claimed that it did not matter whether they agreed with the nuclear power project or not, as the government would make the decisions on it. Regardless

of what they thought about its risks or benefits, the government would build the nuclear power site once the decision was made. Local ordinary people have no choice but to trust the government to manage the risk of nuclear power. Beck claims that people have no choice but to trust science and technology, and cannot perceive risks because they lack scientific knowledge which should be used as the tool with which to reflect on science, technology, and resultant risks. However, in giving deeper consideration to the local context and what people said in Dapu townland, I argue that Beck's theory is problematic and that Wynne and Irwin's argument about lay knowledge is more convincing. In China, when faced with modern technology such as nuclear power, people do not understand risk through scientific knowledge, but through the actual situation that they face. In my case, in Dapu townland the real situation is their ignorance of nuclear power and its risks, their dependence on the government to make decisions and take responsibility to guarantee the safety of the nuclear power project, and the fact that people expect the development of modernity will improve their lives.

My case study of the Han River nuclear power project challenges Beck's theory about scientific knowledge and lay people's perception of risk in two ways. Firstly, from my case study I suggest that scientific knowledge has been overemphasised as the essential tool to understand risk for local lay people. Secondly, people know that they lack the agency to define risk. In my case, I found that lay people do not actually invest their trust in competing experts. It is not necessary for scientific knowledge to have a place in their conversation when they talk about risk of nuclear power (Irwin, Dale and Smith 1996). It is just as Michael claimed and as I found for

myself in the fieldwork research: firstly, local people reflect upon the epistemological status of their knowledge of nuclear power. Secondly, they reflect upon the social and political context in which they live. In the Han River case, local people are aware of the government's domination of nuclear power issues. They know that they do not have the opportunity to participate in decision-making on the nuclear power project. Based on these two reflections their understanding of nuclear technology and its risks are supplemented by their recognition that they do not know what the government and experts will do with nuclear power. They choose to trust that it is safe rather than worry about its risk.

9.2 The community

In my research I observed that generally, people's individual characteristics – for example, their gender, education level and income level – do influence their attitudes about the nuclear power project. However, the different local communities in which they live are significantly more influential than their individual, demographic characteristics. Although I conducted interviews and observation instead of survey research, this point was still made very clear in my research.

As I discussed in chapter 5, people living nearby each other in three different villages have noticeably distinctive attitudes to the nuclear power project. People in Dangxi village think that their village's economic and management conditions are poor, and that they might never live a modern life if left to their own devices. So they welcome the nuclear power project as an opportunity for better lives. People in Shanzhou village do not really want the nuclear power project because they are good at

managing themselves and they are happy with their lives nowadays; they do not want to change. People in Taohua village, although located close to Shanzhou village, seem not to care about the project. They think that it is not their business. These findings indicate that in the local context people's attitudes towards modernity or modern technology are significantly impacted by their geographical locations. Different geographical locations represent the different social-economic contexts of people's lives, to which perceptions of risk are heavily tied. This sociological finding provides useful insight in researching people's perceptions of risk in the Chinese context. The real situation that we see in China is that big projects such as civil nuclear power stations, hydro-power stations and highways have mostly been built up or planned in the less economically developed countryside, at a certain distance from cities. Local communities always have very different attitudes about these big projects, related to the economic and social conditions which they are facing. This local situation offers rich material for sociological research about different people's perceptions of risk in the local context.

9.3 Benefits and interest groups

In the Han River case, as discussed in chapter 6, people's self-interest and consideration of benefits are essential in deciding their stance on nuclear risk and whether to participate in decision-making. The 'selfishness' which Fei has discussed with regard to Chinese people is obviously represented in nuclear power issues. Although Fei's research was conducted 70-80 years ago based on fieldwork in the Chinese countryside, it continues to provide insight into people's behaviour in society nowadays. In both the Silver Beach anti-nuclear campaign which I discussed

in chapter 3 and the Han River case in chapters 5, 6 and 7, I sense a strong selfishness (calculation about one's interests and benefits) on the part of property owners (Silver Beach case), local people and local government officials and PDs. As I have discussed in chapter 6, people always talk about what kinds of benefits and interests that the nuclear power project will bring them, while not caring whether these benefits will incur risk to other people. Local people in Dapu townland claim that they do not consider risks posed by the nuclear power project to the drinking water resource of the Han River, because they drink water from the mountain rather than from the river. Government official DL claims that they want development. He asks whether Dapu townland, if it does not build the nuclear power station in order to preserve drinking water quality for people in the lower reaches, will be paid by cities in the lower reaches for doing so. Local people demonstrate these selfish opinions about the natural environment. It is not merely a case of 'the nuclear power project is not in my backyard, so I do not care'. It is a case of 'the nuclear power project is in someone else's backyard but I reap the benefits. If you do not want the project and it incurs a loss for me, you have to pay me'. This is the way that people think. People joined the interest group in order to participate in decision-making on the nuclear power project, for example, in the organisation of property owners in the Silver Beach case and PDs' cooperation in the Han River case. However, the group can include everyone who works for the same interests. It will also disappear once the project is cancelled or if the property owners sell their properties. There is no stable organisation participating on the issue which works for environmental protection of the Silver Beach. In the Han River case, PDs also get together because they share the same interests. They are free to connect and disconnect according to interests other

than environmental protection. The research findings of interest groups in Chinese society at a certain level point out the realities of researching China's environmental issues. Mostly environmental controversy comes up when people think certain projects influence their benefits. This is a kind of passive reaction to protect their interests rather than to actively protect the environment for its own sake.

9.4 Power and social status determine participation

In the final point of field finding, I raise the important issue of power and social status, and also their direct and indirect influence on local people's participation in nuclear power issues. Besides those points discussed in 9.1, 9.2 and 9.3, we see that in the Han River case, power and social status determine who can express their opinions about the nuclear power project to policy-makers. Directly, PDs have the legitimate power to participate in the nuclear power issue by asking for an inquiry meeting. Indirectly, PDs have a network through which they can approach other PDs, scientists and experts to find cooperation and support. As I have discussed in chapter 6, PD Chen Hanchu was able to contact the professor, who is also a PD, from Shantou University to inquire about professional opinions on the influence of nuclear power stations on water. Their power and social status support and strengthen each other, which made their participation possible. However, ordinary local people show their powerlessness on the issue. The media has power to publicise the issue. However, they have to work inside the boundaries and avoid making any political mistakes: hence why Chen Feng claimed that he framed the issue on the theme of 'science or democracy' rather than a debate on nuclear power. I posit that the PDs'

participation in the nuclear power issue within the political system represents the transition of civil nuclear technology from government to governance. It shows that different powers negotiate within the political system to make decisions on the nuclear power project. However, participation within the political system has its limitations, as discussed in chapter 7: the quality of official replies does not always satisfy inquirers. Besides, even PDs' duty is to supervise government actions on behalf of the people; they do not have enough communication and connection with the people for whom they stand. Chen Hanchu also claims that PDs do not in fact have much connection with the grassroots. People who know what happens in the grassroots find it hard to convey their opinions to the government.

Outside the political system, the most active way that people participate is to use the Internet as a platform for communication and circulation of information about nuclear risk. In the Silver Beach case discussed in chapter 3, netizens wrote and signed letters and passed them on to ESPA and policy-makers. They organised events on the beach in order to attract more attention to the nuclear issue. Their methods of participation were just like Wang's outside access model and popular-pressure model. However, this kind of participation outside the political system also has limitations. Firstly, there is no way to confirm whether people's opinions really reach policy-makers (Wang 2008), since the government and its agencies do not need to reply to individuals and inform them of their decisions on how to manage risk. The public have to wait until specific policies have been made and the results announced; for example, netizens waited until NDRC published the "Civil Nuclear Power Mid-Long Term Development Schedule (2005-2020)", at which point they

knew that the Silver Beach project was postponed. However, there is still no way to know whether this was due to their resistance activities. Secondly, the organiser and participations in risk issues are not ordinary local people. They hold a certain social status; they are educated middle class people who have Internet access and a special interest in risk issues. According to my fieldwork research, the ordinary local people constitute a silent majority in risk issues. I claim that people's power and the space for them to participate in risk and environmental issues is getting bigger, but is still relatively limited thus far.

9.5 Suggestions for policy-making

As I have discussed in chapter 3 the limitations of doing a single case study, it is not fully convincing to give policy suggestions based on the research of just one case. Following the fieldwork research on the Han River case, and my general reading on the background to the country's civil nuclear power development, I would like to make three suggestions for policy-making on civil nuclear power in China.

Firstly, the development of independent institutions should be promoted to monitor the safety and environmental impact of nuclear power sites. Besides nuclear power sites and environmental protection bureaux there should be independent research institutions just like SCSIO in CSA which monitors Daya Bay Nuclear Power Station's impact on sea water. Particularly when inland nuclear power sites are going to be built, the impact on drinking water should be monitored by independent institutions and findings should be made available to the public. It is obvious that in the inquiry meeting government officials and the expert from CGNPG did not give

PDs satisfactory answers about the nuclear power issue. Following the inquiry meeting, the reply letters from GDRA were also vague. If the civil nuclear industry were to have more transparency, and research data not controlled and accessed by only government officials and experts, PDs would not receive answers like these. I acknowledge that the promotion of independent research institutions to provide quantitative data on the environmental impact might cause endless arguments about the reliability of the data and so on. We would then return to the argument about whether the risk of nuclear power can be objectively assessed or not. For the purposes of my recommendations here I wish to put aside the theoretical arguments and focus on what to do to balance the domination of the government and its agencies on all issues of civil nuclear power. Or, in other words, provide the public with other sources to collect information about the safety and environmental impact of civil nuclear power sites. Should the public want to participate in policy decision-making, they would make use of these open data produced by research institutions to support their claims. I suggest that at this stage, when the country is promoting the development of civil nuclear power and also inland nuclear power projects, it is both important and necessary to promote independent research institutions to work on the transparency of risk monitoring and supervise the safety and environmental impact of nuclear power sites in China.

Secondly, different powers inside and outside the political system should be encouraged to participate in negotiations before finalising nuclear policies. Both PDs and netizens' participation inside and outside the political system are very helpful in highlighting risks which might not have been considered by policy-makers and

experts. Although in China NGOs do not yet participate in nuclear issues, PDs can use their special identity to supervise all levels of government and express their concerns on people's behalf. It is very important to encourage PDs to forge a stronger connection with the people for whom they stand and encourage people to express their opinions through the media, online communities and their deputies. At the same time, more space should be made available for both international NGOs and GONGOs to engage in nuclear power issues. Nowadays, it is not possible to hide nuclear power projects from the public. People's growing environmental awareness and growing power of participation in environmental risk governance require more space and power to influence policy decision-making.

The development of civil nuclear power in China nowadays faces a great deal of challenges and conflicts. It is a dilemma for the government to make decisions, and for the public to accept nuclear power projects, especially inland ones. I suggest that opening discussions and negotiations on nuclear power projects inside the political system and between the government and the public is far better than to keep them closed and depend on policy-makers' ideology.

There is one further consideration which I believe is important in framing decisions about nuclear energy, even though it has featured little in the case studies I have reviewed: the price of electricity. The viability of nuclear power stations clearly depends (as we saw in chapter 3) on the price that is set for electricity and on expectations about the likely future price. At present, according to state policy, nuclear electricity has not joined the market competition. NPG will buy all electricity produced by nuclear power stations. Once nuclear electricity has to compete with other energy resources, provinces will not compete for nuclear power projects unless

there are real profits to be seen. Prices will decide which technology to use. It can at the same time benefit the development of China's domestic technology. The cost of waste disposal and decommissioning will also be considered openly with regard to nuclear power projects. Recently, the government has already begun promoting electricity market reform. Traditional energy resources (coal, oil, hydro) have all joined the market competition. Power stations with no profits are facing closure or have already been closed down. Market competition should be helpful for the nuclear industry to develop in a much healthier way.

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Appendix 1 Documents analysed in the Han River case

1.1 The news in the Southern China Daily (南方日报 nan fang ri bao) about the process of the inquiry meeting on 4 February 2007

A4 Southern China daily 2 May 2007 Guangdong 'two congress[52]' special report (hot topic)

"A nuclear power station might be built in the upper reaches of the Han River. People's Deputies asked for an inquiry meeting—

10,000,000 People's Drinking Water Might be Polluted?

A nuclear power station to be built on the upper reaches of the Han River, 10,000,000 people's drinking water in the middle and lower reaches might be polluted? Yesterday, the Shantou and Chaozhou PDs standing group queried the Development and Reform Commission of Guangdong (DRCGD), Guangdong Environmental Protection Administration (GEPA), Guangdong Water (GW) about the 'first inland nuclear power station is possible to locate in Meizhou'. The field atmosphere is *huo bao* (火爆 hot)."

First question: **The coastline is very long. Why choose the upper reaches of the Han River?**

[52]The Provincial People's Congress and the national committee of the Chinese People's Political Consultative Congress

“There are Daya Bay, Ling Ao and Yangjiang nuclear power stations which have been built or are being built inside Guangdong province. We have a very long coastal line inside the province. Why is [the province] still planning to build inland nuclear power stations? Why pick up the Dapu and Fengshun town district in Meizhou City district? May I have officials from DRCGP explain this?” Chen Han Chu PD from Shantou City asked the first tough question.

“Our province lacks traditional energy resources, it is the province’s policy to develop nuclear power!” Li Miao Juan, the vice director of DRCGP and director of the Province Energy Office, explained the recent situation: all coal mills are now closed. Oil in the sea is limited. The country requires Guangdong to reduce 16% of its unit energy consumption in the ‘eleventh five-year’ plan duration. We are facing big pressure! The current trend is to actively promote clear energy resources like nuclear power. Of late, nuclear power constitutes 17% of energy power in development countries. The goal of our country is for usage of nuclear power to reach 4% by 2020.

“The capability sites of nuclear power stations are not rich in Guangdong!” Li Miao Juan explained that the selection of nuclear power sites have *yan ge de* (严格的 strict) geological requirements, and the cooling systems have to be built by the side of the sea or river. The previous nuclear power stations were built in coastal areas, but locations that can meet the current requirements are limited, so that’s why new plans were set for inland areas.

“The report that the first inland nuclear power station will be located in the Meizhou city district is not true. The project will not be started until 2020. Recently, Hunan

and Guangxi provinces have also joined the competition. Our province is just surveying sites along the Han River, the Xi River and the Bei River. Dapu and Fengshun just met the basic requirements. Now [that the locations] are at the survey level, we even haven't *li xiang* (立项 set up the project[53]).”

“*Hao zai* (好在 luckily) it hasn't *li xiang*! If it has already been decided there is no point in this inquiry meeting!” Xu Shi De, deputy from Chaozhou, reacted with *xin zhi kou kuai* (心直口快 think it and say it immediately). It attracted laughter.

Second question: **Will water resources be polluted if a nuclear power station is built in the upper reaches of the river?**

“The Han River is not the Daya Bay. It is our mother river. Over 10,000,000 people living in the middle and lower reaches of the Han River depend on it for drinking water. I asked the question for these 10,000,000 people: if [they are] really going to build the nuclear power station in the upper reaches, will there be any pollution of the water? ” Liang Yinying PD from Chaozhou City caught up and asked loudly.

“After exploration and research for 20 years, the nuclear technology in our country is very mature. There is no pollution!” Ma Jie, a specialist from CGNPG, replied. He said that there are very complicated and *yan ge de* (严格的 strict) requirements for designing and operating nuclear power stations. The investments are mainly spent on the disposal of solid, liquid and gas emissions, and on radiation protection and a relevant safety system. High radiation industry waste- water will not be released to

[53] *Li Xiang* (立项， set up the project) is the official word used to describe the working process for big projects. If a big project have been applied from GRDA and agreed to set it up after research and survey, it means the project is already *Li Xiang*.

rivers and sea. It will be stored after concrete curing, and will then wait decades to undergo a process of natural decay.

He said that the waste-water that would released to the river mainly comes from daily washing and cleaning. And this waste-water must run through the waste- water treatment system before it is released. According to Daya Bay's test results, the waste-water release is only 1% of the country's sewage indicator, and is very safe. The cooling tower only takes 4~5 m^3 water from the river every second. It is the same as coal-fire power stations where there is no radiation. 'No pollution'.

"I studied biology before. The temperature of this cooling water is up to 310 degrees. This must have a bad influence on aquatic creatures in the river!" Chen Shaohe, pearl-growing expert and PD from Shantou City, said that he believed the safety technology is very strong. But the waste from the nuclear power station is cumulative; will there be any potential radiation pollution to surrounding environment and later generations?

The vice-inspector of the GEPA, Ma Ming Hai, explained in response to these questions that once [the project] li xiang there would be yan ge de environmental protection standards. And afterwards, when applying for the permit from the CEPA, there would be a whole set of yan ge de scientific standards, so people should please not worry about that.

Third question: **The Chaoshan area has a dense population. What if there is leaking?**

“Is the so-called only 1% of the state’s allowed sewage indicators our country’s low requirement ‘*zhong guo te se*’ (中国特色 China special) standard or the international standard?” Professor of Shantou University Wu Lan Ha Si persisted in questioning the pollution standard.

“The standard we are using in nuclear power is the old standard of foreign countries.” Ma Jie replied with a smile. “The old standard is more strict, because the research level was quite low in the past. Nowadays many standards in foreign countries are more and more *kuan song* (宽松 casual).”

“You guys look at this, in France two thirds of nuclear power stations were built in inland areas!” Li Miao Juan brought out a French map and said, “France started to promote nuclear power development after the oil crisis in 1970s. A large number of nuclear power plants were built around big cities like Paris and along the Seine River. French people think it is normal.”

“We knew that the French people are okay with that, but we also knew that Germany and Belgium pledged not to build nuclear power stations anymore! Moreover, is the population density in France comparable to ours? The population density in Shantou is 3000 people/m². If there are any accidents, losses will be difficult to restore.” Wu Lan Ha Si and Chen Han Chu said the Provincial People’s Congress is drafting the ‘Guangdong Drinking Water Resource Protection Regulation’; it was suggested that there should not be a nuclear power station in the upper reaches of the Han River.

“*Bu pa yi wan, jiu pa wan yi* (不怕一万就怕万一, not afraid of the usual situation, afraid of the accident) what if there are wars or leaking like the Chernobyl accident?

How can we deal with an emergency situation?" Chaozhou PD Chen You Biao asked urgently.

"The reactor type in Chernobyl has been disused for a long time. We are using the most advanced third generation technology. There are three layers of protection, which can guarantee no accidents like Chernobyl."

Answer: **Respect scientific and public opinion; a high degree of caution will be exercised in the construction of nuclear power stations.**

"Thanks for PDs' attention and understanding!" Li Miao Juan and Rong Ming Hai said sincerely. "Safety is the lifeline for nuclear power stations. The project is still in the preliminary survey stage. It needs to be *yan ge de* checked and issued by the CEPA. It would not begin earlier than the period of the twelfth five-year plan. The relevant department in the provincial council will definitely respect scientific and public opinion, and will exercise a high degree of caution in the construction of the nuclear power station.

After more than one hour of 'chun qiang she zhan (唇枪舌战 fighting with mouth and tongue), were PDs satisfied with the result? "Today we have enough communication, we are quite satisfied with the result," said Chen Han Chu and Wang Hong Fu. "We understood and support the province's policy on promoting nuclear power stations. We hoped the province would consider the selection of location further, listen to people's opinions and think about the economic and social benefits.

And we hope the energy problem can be resolved properly. PDs will keep following this issue."

The first reply letter from DRCGP

"Mr Chen Han Chu and other deputies:

Your suggestions that 'it is inappropriate to locate the first inland nuclear power station in Meizhou — the upper reaches of the Han River (Provincial People's Congress BIZI No. 6003, the fifth conference of the Provincial People's Congress People's Deputies suggestion No. 1304)' have been accepted. The major leaders of the province instructed our commission to do the research. During the period of the fifth conference of the tenth Provincial People's Congress the Shantou and Chaozhou People's Deputies also inquired about this issue with our commission, Province Environmental Protection Administration, the China Guangdong Nuclear Power Group, and so forth. Your suggestion is very important. It fully reflected the responsibility of People's Deputies. We would like to thank you for working for the people.

Our administration handled the research together with the GEPA and CGNPG to give you the following reply:

1) The location of the nuclear power project on the upper reaches of the Han River.

In order to guarantee the stability of energy supply and reduce the environmental pollution caused by energy consumption, the state has raised the strategic policy of 'activity promoting the construction of civil nuclear power'. Guangdong province is highly lacking in energy resources. The development of civil nuclear power is one

very useful path for energy supply. It has been projected that up until 2010 the capability of the province's nuclear power will reach 6000MW and by 2020 it will reach 24,000MW, with 10,000 under construction. Referring to the location problem of nuclear power projects, as you have suggested, our priority was to consider the coastline locations. Until recently all the operating nuclear power stations and nuclear power projects planned by the state have been located along the coastline. Although the coastline in Guangdong province is long, the siting requirements of nuclear power stations are very strict. The locations which can meet the requirements have nearly all been picked up already. So the coastline is not enough to satisfy nuclear power developments in Guangdong province. The construction and operation experiences of inland nuclear power stations are very well-established worldwide. In accordance with improvements in nuclear power technology levels, the state has begun to select qualifying locations for inland nuclear power stations. And the state will start to build them very soon. That's why the Guangdong province has begun to consider selecting potential locations for inland nuclear power stations on the three main rivers (the North River, the West River and the Han River). Now it is just at the location selection stage; whether the project can be set up or not must go through *shi fen yang ge de* (十分严格的 very strict) scientific research and testing.

The initial preparation job for a nuclear power plant takes a very long time. For example, the nuclear power location selected in 1988 in Taishan City is still competing for being *li xiang* on the country's eleventh five-year plan. In order to fulfil our province's nuclear power development plan, we must prepare for the location selection and protection jobs beforehand. So the province focuses the location selection on the coastline and at the same time starts to select the potential

locations of nuclear power stations on the three main rivers. After the experts from the State General Electricity Design Institution estimate the locations on the three main rivers, they will primarily select one qualifying location for more in-depth research. At the next stage, the province will organise related institutions and experts to conduct further research on the candidate sites. They conduct very serious research and testing on every construction condition *yang ge de* (严格的 strict) according to the nuclear power project management regulations. It was not like some media had reported that 'the first inland nuclear power station will be located on the upper reaches of the Han River'.

2) Safety problems of the nuclear power project.

Safety is the most important point in nuclear power construction. From the very beginning of the nuclear power development plan in Guangdong province, the provincial party committee and council always emphasise the safety problem of nuclear power. Safety comes first. To strengthen the management of nuclear power operations and guarantee the healthy development of nuclear power, the province always puts safety at the top level of nuclear power development.

There are well-established construction and operation experiences of coastal and inland nuclear power stations all over the world. Because of the general acceptance of the safety of nuclear power together with rapidly rising oil prices, nuclear power is developing very fast all over the world. The capability of nuclear ower came just after coal and was equal to hydropower in 2005. For example, France is a major consumer of nuclear power (about 80%). They have nuclear power stations all over the country (including big cities like Paris). The public is satisfied by the safety of

nuclear power. Recently, our country has been successfully importing the most advanced third generation of technology. And the main distinguishing characteristic of the third generation of technology is its safety. The design of the third generation technology adopted a lot of prevention and controlling measures. These all help to reduce the risk of accidents. The main incoming projects in Guangdong are supposed to use the third generation technology. So the safety of nuclear power plants is guaranteed. Besides, the nuclear power station will have a *shi fen yan ge de* (very strict) waste management system, in order to reduce the impact on the surrounding environment of maximum limits. The state will monitor the waste disposal of the nuclear power station *shi fen yan ge de* (very strictly). The solid waste and high radiation liquid waste will not be disposed in the environment at all. Low radiation sanitational waste will pass very strict processing and will only be released when it is checked and has qualified. The actual release amount is much lower than the national standard. The nuclear power station is running under *shi fen yan ge de* (very strict) operation regulations and *shi fen yan ge de* (very strict) environmental protection and monitoring standards. It has very little impact on the surrounding environment. It seldom has any influence on people's lives and farming production nearby. The Daya Bay nuclear power station in Shenzhen city is a good example. According to the long-term data of 15 environmental monitoring stations in Guangdong province, Shenzhen city and Hong Kong, there are no differences between the environmental radiation level at present and before the power station was built. And there are no changes taking place in the regional ocean ecology categories and figures. The level of the marine environment in Daya Bay is equal to that of a seashore.

3) The influence of the nuclear power station on the water temperature of the Han River.

The inland nuclear power station planned by our province will be executed on *yan ge de* (strict) environmental protection measures. The cooling system of the nuclear power station will use the double recycling format, which means the water will be recycled internally. The recycled water will be cooled by air inside the cooling tower. There will not be any warm water discharging to the river. The cooling water will be reused after cooling by air. This will reduce the amount of water consumption and stop warm water discharging to the river. Because of the internal water recycling system, the amount of water consumption is just to supply the evaporation. There will not be any impact on the residents consuming water in the lower reaches of the Han River. All amounts of water discharged will be far lower than the state 'nuclear power station environmental radiation protection regulation' control level.

The Han River is the drinking water resource of 10,000,000 people in Shantou, Chaozhou and Meizhou city. To build a nuclear power station on such an important river, we will refer to your recommendations to be very careful.

Thank you very much for your valuable recommendations.

12 April 2007

(Contact people and telephone: Jing Chu Hong, Liu Zai Zheng 83133078 83133183)"

(My translation)

The second reply letter from DRCGP

"Mr Chen Han Chu and other Deputies:

Your feedback to the 'the reply of the Provincial People's Congress BIZI No. 6003, the fifth conference on the Provincial People's Congress People's Deputies suggestion No. 1304' has been received. Your suggestions are very important. They fully reflect the responsibility of People's Deputies. They fully represent your concern and support for the Guangdong nuclear power development. We appreciate that. We would like to reply to your suggestions after very careful checking.

The news reported on 28 April 2007 that Meizhou has been selected to build the nuclear power station. It was not in accordance with the facts. It could cause confusion and misunderstanding for readers. Actually the fourth meeting of the Guangdong nuclear power construction leader conference did not discuss the subject of location. We did not make any decision on the location of the nuclear power project.

To commence the general selection of the nuclear power location is a long- term strategy of the province's nuclear power development. The purpose is to increase the reserve resources for the province's nuclear power station locations. In fact the nuclear power programmes on the three main rivers have not yet been set up or reached the practical stage. The start date of the inland nuclear power project depends on the state's nuclear power development policy. There will be very strict and full testing and research, and recommendations collected from the upper and lower reach areas before a specific project can be set up. Only projects in very good

construction conditions can be set up for preliminary preparation. Because Guangdong has a very long coastline, and the reserve locations for the nuclear power station are considerably rich, we still planned to build a nuclear power station along the coastline in recent years.

Recently, we started to revise the Province's nuclear power development plan. According to the research and discussion has been conducted of late, and according to a synthesised consideration of the construction and location reservation conditions, we believe that Guangdong's nuclear power programmes should be planned along the coastline until the year 2015. In this revised version of the development plan we are not considering building a nuclear power station on the upper reaches of the Han River.

It is just like you have described on your feedback suggestions that 'the government should work for the people's benefit'. We will be very careful when dealing with issues related to the public benefit. The Han River is the drinking water resource for 10,000,000 people in Shantou, Chaozhou and Meizhou cities; we will be very careful with every construction project on the river.

Thank you very much for your concern and support of the development of Guangdong nuclear power programme. We hope your concern and support for Guangdong's nuclear power development will continue, and together we will promote social and economic development in Guangdong province.

25 June 2007

(Contact people and telephone: Jing Chu Hong, Liu Zai Zheng 83133078 83133183)”

(My translation)

1.4 The news in the Meizhou Daily:

Title: The first inland nuclear power project in Guangdong province is going to be located in Meizhou City.

Meizhou daily

（Reporter: Luo Juanjuan）A four-day conference on the preliminary feasibility research report of the indeterminate power project in the Han River Basin ended yesterday. Three locations named Dangxi, Wailou in Dapu town, and Shensha in Fengshun town, Meizhou city, have passed the preliminary feasibility research test. The first inland nuclear power project is going to be located in Meizhou city. The municipal party committee assistant deputy secretary and routine deputy mayor Li Jia attended the summing-up meeting yesterday morning.

Nuclear power experts and engineers first went to Dangxi, Wailou and Shensha to conduct an investigation of the sites. After that they were divided into six groups (power system; location; geological and seismic; hydraulic and hydrometeorological; environment and safety; and technical and economic) to discuss. After that they provided a comprehensive analysis and feasibility study of the location, transport, geology and seismology, hydrometeorology, drainage conditions, environmental and safety conditions, project investment and economic evaluation. Experts believed that these three locations basically satisfy the demand of different types of nuclear

reactors. The transport conditions of road and railway also satisfy the requirements. At the same time, considering the population distribution, the possibility of external and artificial events and radiation effects in normal and accident situations, there are no subversive factors in the three locations. So the conditions of the three locations basically meet the requirements for constructing a nuclear power station.

Experts hope Meizhou city can extend protection to the three potential locations and generate support. This would help to create a good environment for promoting the nuclear power project on the Han River.

Li Jia showed his appreciation for the experts and the distinguished jobs they have done for Meizhou city. He said that having the nuclear power project when Meizhou city is in need of development is good news for local people. He also said that constructing a nuclear power station is an historic and strategic project. All levels of departments of the city council will do their best to protect the three potential locations and help with other relevant jobs. And he hoped that the inland nuclear power project on the Han River can be agreed and that construction will begin soon, along with bringing benefits to people living around the mountains [54] .

[54]Meizhou city is surrounded by mountains.

Appendix 2 List of Fieldwork Events

Visiting studentship: July – August 2007, Registration as visiting student in China Science Academy, Beijing

Conferences and meetings:

4) 30 June 2007 – 02 July 2007, Beijing International Conference on Environmental Sociology, Renmin University of China

5) 15 July 2007, Opening Conference of 2007 Summer School of Nuclear Science and Engineering, Tsinghua University, Beijing

6) 8 January 2008 – 12 January 2008, Fourth Annual Graduate Seminar on China (GSOC), The Hong Kong Chinese University, Hong Kong

7) 15 March 2008, First Citizen Forum in Guangzhou

Visiting:

4. 6 August 2007, visited the automatic water condition monitoring station, Shantou city

5. 7 August 2007, visited the wind farm on Nan'ao Island, near Shantou city

6. 24 February 2008, visited selected location of nuclear sites in Dangxi village and Shanzhou village, Dapu townland

Selection of important Interviews

BL, secretary-general of the China Nuclear Academy

BC, president secretary of State Environmental Protection Administration

Professor Tang Danning, China Science Academy, South China Sea Institute of Oceanology

Chen Feng, journalist from Southern China Daily

Chen Hanchu, Provincial PD from Shantou city

CH, Provincial PD from Chaozhou city

CW, Provincial PD from Chaozhou city

DL, local government official, Dapu town

DXu, local government official, Dapu town

DHe (i), local government official, Dapu town

DEL, engineer in the Dapu Environmental Protection Administration

DHe, local garage owner, Dapu town

DS, local Chinese doctor

DH, leader of Dangxi village

DZ, leader of Shanzhou village

GZH, director of the Publicity Management Office, Provincial Broadcast and Television Bureau

Zhu Hanqiang, jounalist report news about Daya Bay nuclear power station in Hong Kong fro, 1994-1996