Who was in charge of the water conservation? - Investigation of water conservation and management in the upper reaches of the Huai 1912-1949

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Abstract

This thesis examines water conservation in the upper valley of the Huai River in Anhui Province, close to the border between north and south China, during the Republic of China (ROC) era (1912-1949). Two main flood relief and water conservation projects are studied in detail. In order to gain a deeper and broader understanding of water conservation policies and practices in China during that period, additional comparative studies were undertaken of two water conservation projects in the lower areas of the Yangtze River in south and northwest China. The main question addressed in the thesis is: What are the key factors affecting the conservation and management of water in China during the ROC era? A further aim of the thesis is to reveal the inter-relationships between water conservation and ROC government policies, and the influence of grass roots actors and international powers in that period.

This thesis includes a review of the literature on environmental history, in particular the history of water conservation. For the empirical investigation, a multi-disciplinary, mixed method was adopted, combining the study of historical documents and fieldwork in a series of detailed case studies. Firstly, this study investigates the relief work project in the upper area of the Huai River. The work and the lives of peasant labourers in a water conservation project, including their cooperation and conflicts with upper class engineers and officials are considered in order to provide a vivid and thorough exploration of the worksite. Secondly, the thesis describes and analyses the relationships between various groups (including engineers, the gentry, residents and officials of the Anfengtang Pond community), through a series of stories that highlight their activities, roles and priorities within water conservation and management initiatives. Thirdly, the thesis considers the history of the Lotus Polder and the story of the Jinghui Channel. Fourth, it explores the relationship between international politics and water conservation in the ROC to explain how modern culture and industry penetrated an old water conservation community. The interplay and influence of a wide variety of factors that affected water conservation in the ROC era,

such as land policies, economic situation, national finance, wars, traditions and western factors, are addressed and analysed in this thesis.

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Table of contents

Abstract ..... **II**
Acknowledgments ..... **IV**
Table of contents ..... **VI**
List of Figures ..... **X**
List of tables ..... **XIII**
Abbreviations ..... **XV**

Chapter 1: Introduction **1**
1.1 Introduction 1
1.2 Aim and objectives 2
1.3 Research areas 3
1.4 Research period 4
1.5 Research significance and structure of the thesis 6
Chapter 2: Literature review **8**
2.1 Introduction 8
2.2 Environmental history: the global scale 8
2.2.1 Environmental history in the US 9
2.2.2 Environmental history in the UK 11
2.3 Environmental history of China 13
2.3.1 Chinese environmental history by western scholars 14
2.3.2 Chinese environmental history by Chinese scholars 17
2.4 History of water conservation 20
2.4.1 History of water conservation globally 20
2.4.2 The history of China's water conservation by Japanese and western scholars 25
2.5 Conclusion 29
Chapter 3: Methods **31**
3.1 Introduction 31
3.2 Archives 33
3.3 Local chronicles 35
3.4 Newspaper and secondary published materials 36
3.5 Reports, maps and handbooks 36
3.6 Fieldwork 38

3.6.1 Participant observation and research diary....38
3.6.2 Oral history and interviews....40
3.7 Qualitative data analysis....41
3.8 Assessment of the sources and limitations of the approaches....42
3.9 Conclusion....46
Chapter 4: Conflict and cooperation – flooding and relief work in the Huai River Basin in Anhui province in 1931....47
4.1 Introduction....47
4.2 The Huai River in reports of engineers: relief work in the Huai River Basin in Anhui in 1931....48
4.2.1 Huai River floods 1931....48
4.2.2 Rivers and Anfengtang pond: Shou County....61
4.2.3 Floods and robbers: Fengtai....63
4.2.4 Floods and kidnapper: Huoqiu....65
4.2.5 Levees and experience: Fuyang....66
4.2.6 Levees and thrift in foodstuff: Yingshang....67
4.2.7 Silting: Mengcheng....69
4.2.8 Floods and reed: Guoyang....71
4.2.9 Terrain, transportation and economy: Bo....72
4.2.10 Disputes: Taihe....73
4.3 Causes....75
4.4 Rescue....80
4.5 Post–disaster relief....85
4.5.1 The significance of relief work: to recover water conservation and public security....86
4.5.2 Organisation of relief work and personnel....91
4.5.3 The magazine *relief work in three days:* refugees and engineers....93
4.6 Discussion and conclusion....113
Chapter 5: Policies and disputes–the relief work in Anhui after 1931....115
5.1 Introduction....115
5.2 Recruitment, organisation, finance and management....116
5.3 Slow progress....123
5.4 Various disputes....127
5.4.1 Disputes regarding levee digging in Luyi county, Henan province127
5.4.2 Dispute regarding levee digging led by Lianyun Fu a ward chief (the shot 'traitor')....128

5.4.3 Disputes regarding dyke construction between Fuyang and Yingshang: two counties and their gentry 129
5.4.4 Disputes about the levees of Wucha channel:terrain and finance 130
5.4.5 Dispute regarding the link between the Quan and the Ying rivers131
5.4.6 Zhujia dyke: the disputes over 100 years 131
5.5 Game theory and review 138
5.5.1 Objections to levee construction 138
5.5.2 Causes of calamity: reviews on land policies and relief Work 142
5.6 Discussion and Conclusion 147
Chapter 6: All and sundry - the Anfengtang pond in the era of the ROC (1912-1949) 150
6.1 Introduction 150
6.2 A brief history: the origin of the Anfengtang pond..... 151
6.3 Story of a charge statement: conflict between the Anfengtang Pond water office and villagers around Anfengtang Pond..... 162
6.4 Story of project plans in spring 1934: the dream and the dilemma of engineers 170
6.5 Present circumstances and the proposal: gentry's considerations for Anfengtang Pond..... 180
6.6 Defalcation and turbulence 200
6.7 Priority of the farming season 214
6.8 Disputes from the wasteland reclamation 228
6.9 Discussion and conclusion 239
Chapter 7: Locally and Internationally – Lotus Polder in the ROC era (1912-1949) and the Wang Jingwei Reign (1940-1945) 242
7.1 Introduction 242
7.2 Managed by local communities: Lotus Polder before the era of the ROC..... 243
7.3 The electrical irrigation & drainage system of Lotus Polder (1912-1932) 247
7.4 Lotus Polder during the puppet regime led by Wang Jingwei 253
7.4.1 Japanese permit: survey of Lotus Polder..... 253
7.4.2 Under management of the Water conservation Commission: maintenance of Lotus Polder..... 255
7.4.3 Frequency of issues: steamship and kidnapping 258
7.4.4 Electrical irrigation and drainage 286
7.5 Influence of foreign powers: review of Lotus Polder in the ROC era 268

7.6 Discussion and conclusion 269

Chapter 8: Western influence - investigation of Jinghui Channel in Shaanxi province during 1932–1948 272

8.1 Introduction 272

8.2 Brief history (246BC–1932) of Jinghui Channel 273

8.3 Case study in Yongle Dian Town: brief description of agriculture in Jinghui irrigation area 284

8.4 Management and maintenance during 1932–1947 289

8.5 Agricultural experiments and small-scale industry during from 1937 to 1949 293

8.6 Gentry, foreign powers, technology, engineering and peasant labourers: reflections on Anfengtang Pond, Lotus Polder and Jinghui Channel 298

8.7 Discussion and conclusion 300

Chapter 9: Conclusions and further studies 301

9.1 Research findings 301

9.2 Key themes 305

9.3 Further research 309

Bibliography 313

List of Figures

Fig. 4.1: Map of China 49

Fig. 4.2: Map of representative counties in Anhui province and the relevant rivers 50

Fig. 4.3: Map of relevant counties and rivers in Anhui province 51

Fig. 4.4: Illustration of Refugee density of the counties suffered in the flood 1931 53

Fig. 4.5: The flooded areas in the 1931 flood in the Yangtaze and Huai River Valley 55

Fig. 4.6: The flooded areas in the 1931 flood in the Anhui Province 56

Fig. 4.7: General view of a flooded areas 57

Fig. 4.8: With a mighty rush the water overwhelmed farm and village when a dyke was breached 57

Fig. 4.9: Nearly half of the farm buildings in the flooded area were destroyed 58

Fig. 4.10: Refugees in the flooded area 58

Fig. 4.11: Ratios of the farm land under water to the sizes of the farm land of corresponding counties 59

Fig. 4.12: The terrain of Shou County 62

Fig. 4.13: The terrain of Fengtai County 64

Fig. 4.14: Flood in Fengtai 64

Fig. 4.15: The terrain of Huoqiu County 65

Fig. 4.16: The terrain of Fuyang County 67

Fig. 4.17: The terrain of Yingshang County 68

Fig. 4.18: View of the flood outside of the South Gate of the city of the Yingshang(1); View of the flood outside of the city of the Yingshang (2) 69

Fig. 4.19: The terrain of Mengcheng County 70

Fig. 4.20: The terrain of Guoyang County 71

Fig. 4.21: The terrain of Bo County 73

Fig. 4.22: The terrain of Taihe County 74

Fig. 4.23: The statistics of refugees and population of counties of Anhui Province 81

Fig. 4.24: Reconstruction of dykes 87

Fig. 4.25: Refugee labourers 91

Fig. 4.26: The fundamental tools used by labourers in the relief work 99

Fig. 4.27: The view of delivering earth with Shoulder pole and baskets .. 100

Fig. 4.28: A woman joining the earth delivering 100
Fig. 4.29: The fundamental tools used by labourers in the relief work, and some notes of the experiment..... 102
Fig. 4.30: Shed of the refugee labourers 104
Fig. 4.31: Refugee labourers collected foodstuff/wheat 107
Fig. 4.32: Illustration of the six-grid chess. O represents child, X represent tiger (left); The child A is far away from the crowd and has no way to avoid the attack from the tigers(right)..... 111
Fig. 5.1: The Japanese soldiers in the flooding (left); Refugees from the flood (right) 118
Fig. 6.1: The terrain of Anfengtang Pond area..... 152
Fig. 6.2: The location of Anfengtang Pond..... 154
Fig. 6.3: A statue of Shuao Sun (1); and the Shuao Sun Temple beside Anfengtang Pond (2) 156
Fig. 6.4: Some historical relics found in ruins of Sluices and Dams Project in Han Dynasty the location of Anfengtang Pond 157
Fig. 6.5: The Geographic profile of the source for the south part of the Anfengtang Pond 2580 years ago (1). the Geographic profile of the source for the Anfengtang Pond in the Ming and Qing Dynasties (2). Geographic profile of the Anfengtang Pond in the early time of the ROC (3)..... 162
Fig. 6.6: Water level of Zhengyang Gate station in 1931 165
Fig. 6.7: The Irrigation Project of the Anfengtang Pond 294
Fig. 7.1: Location of the Lotus Polder 245
Fig. 7.2: Layout of facilities of the Lotus Polder 246
Fig. 7.3: Sketch of Lotus Polder and its location with respect to Jiangyin, Wujin and Wuxi Counties..... 249
Fig. 7.4: The first page of the letter from the Japanese Embassy granting approval for the use of instruments for a survey..... 255
Fig. 7.5: The scenes of waterfront construction near Shuang Temple, and construction near Jiuqu Bridge in Wujin County..... 260
Fig. 7.6: The scenes of construction on the Shundang Polder waterfront in Wujin County, and construction near Xilan Dock in Wuxi County 260
Fig. 7.7: Sketch of sluices, culverts, and dams under construction (1)..... 263
Fig. 7.8: Sketch of sluices, culverts, and dams under construction (2)..... 264
Fig. 7.9: Sketch of sluices, culverts, and dams under construction (3)..... 265
Fig. 7.10: Sketch of sluices, culverts, and dams under construction (4)... 266
Fig. 8.1: The site of the water-introduction project in upper reach..... 276
Fig. 8.2: Jing River basin, the upper reach of Jinghui Channel 277

Fig. 8.3: Sketch of irrigation system of Jinghui Channel.....278
Fig. 8.4: Construction sites of the Jinghui Channel Project.....279
Fig. 8.5: The upper terminal (1); and an entrance of the Jinghui Channel Project (2).....280
Fig. 8.6: A gate on a tributary of the Jinghui Channel.....281
Fig. 8.7: A sluice on a culvert of the Jinghui Channel Project (1); and an operating machine of the water introduction sluice (2) 281
Fig. 8.8: The sluices near LongwangTemple (1); and the sluices on Zhaojia Bridge(2) 282
Fig. 8.9: Scene of farm land in irrigation area of Jinghui Channel.....283
Fig. 8.10: Peasants in Yongle Dian town.....284
Fig. 8.11: A winch used to lift water from wells 286
Fig. 8.12: Drawing of a winch 286
Fig. 8.13: A sluice to divide water (1) and a sluice applied in complex terrain (2) to divide water.....290
Fig. 8.14: The irrigation size of Jinghui Channel 1932–1946.....291

List of Tables

Table 3.1: Timeline of the second fieldwork 38
Table 4.1: Refugee density of representative counties suffered in flood 52
Table 4.2: The collapse in the flooding in representative counties 60
Table 4.3: Rainfall in Beng Bu and Xuyi Counties in 1921 and those in 1931 76
Table 4.4: Numbers of deaths in the flooding 80
Table 4.5: Statistics of food production and the food store of various counties one year after disaster 82
Table 4.6: Statistics of food prices before and after the flooding 83
Table 4.7: The increased ratios of food prices after flooding in various counties 84
Table 4.8: Estimation of the Work load of fixing the collapse in various counties 88
Table 4.9: Estimated cost of earth work and labourers needed for construction in various counties 89
Table 4.10: Time (in seconds) of earth-work operations 97
Table 4.11: Typical usage of the wheat offered for labourers 106
Table 4.12 Statistics of labourers of different characters in Huaiyuan and Fengyang Counties 108
Table 5.1: The land occupied by the big landlords in Anhui Province 145
Table 5.2: Some landlords and the sizes of their land 145
Table 6.1: Two candidate plans for water introduction project through dredging up of Pei river 174
Table 6.2: Candidate budget plans of *Water Introduction from Pei river to Anfengtang Pond* 176
Table 6.3: Three main parts in the plan of "fixing of Anfengtang Pond". 185
Table 6.4: Past land prices in the area surrounding Anfengtang Pond 201
Table 6.5: Present land price in the area surrounding Anfengtang Pond .. 201
Table 6.6: Land prices in the area surrounding Anfengtang Pond in the future 202
Table 7.1: Instruments and accessories carried by the survey team 254
Table 8.1: Water demand and proper irrigation time for various crops 287
Table 8.2: Water demand of crops in north area to Wei River 287
Table 8.3: The prices of irrigation on land of different levels in various years 292
Table 8.4: The statistics of factories in countryside in Jinghui Channel .. 296

Table 8.5: Expenditure at Jingyang Cotton Ginning Mill.....297

Abbreviations

CIFRC	China International Famine Relief Commission
NEC	National Economic Committee
ROC	Republic of China

Chapter 1: Introduction

1.1 Introduction

The Republic of China (ROC) era brought great change to the Chinese people. Feudalism ended and awareness of the concepts of democracy began to grow. The ROC government stressed the importance of water management and conservation, carrying out a series of construction activities and launching numerous specialized organizations. With the aid of western technology, the construction techniques used for irrigation and water conservation improved significantly over those of the Ming and Qing dynasties. These activities laid the foundations for modern water conservation in China. While some work has been done to improve water conservation in the ROC, including research into the construction of water conservation and irrigation infrastructure, management and policies (Li, 2014; Zhou and Guo, 2015), this study identifies gaps in these efforts. There are two major gaps in the literature regarding the relationship between water conservation and society in the ROC. Firstly, most previous studies have only paid attention to massive projects. Secondly, few studies have explored the social or cultural context of water conservation stakeholders, or the relationship between labourers and water conservation managers. The importance of the large number of medium-sized water conservation projects, which are more intimately linked with the lives of ordinary people, has received little attention. Most studies of water conservation have focused on the general history of construction and its positive effects, while ignoring other related effects (e.g. water usage, water events and negative effects on the environment). These studies have tended to focus on engineering and management regulations, but have ignored the human element, particularly the actions of people at the grass-roots level. Moreover, water conservation in the ROC is closely connected with agriculture, although most previous studies have paid little attention to policies related to farming. As a result, these studies have tended toward a narrower scope, and fail to thoroughly investigate the source of the issues surrounding water conservation

efforts. In this thesis, work, life and the society of ordinary people involved in water conservation are investigated thoroughly.

1.2 Aim and Objectives

The aim of this thesis is to use a wide range of historical materials and macro analysis of ordinary events to explore the relationship between water conservation and grass-roots society in the ROC era China. More specifically, this research attempts to answer the question 'Who was in charge of water conservation?' Here, the word 'who' refers to the various stakeholders including labourers, engineers, the gentry and government actors at different levels and the fundamental factors affecting water conservation. Particular attention is given to the ways in which their roles were influenced by factors including farming seasons, ecological environment, culture, politics, war and international events. In line with this, the main objectives of the research are as follows:

- To identify the geographical conditions of representative counties, the Anfengtang Pond, Lotus Polder and Jinghui Channel.
- To analyse the activities of key stakeholders (including labourers, engineers and gentry) involved in the management and construction of water conservation projects with particular reference to Anfengtang Pond, Lotus Polder and Jinghui Channel.
- To investigate the causes of the flooding in the northern areas of the Huai River Basin in 1931 and to examine the post-disaster relief and reconstruction work for evidence of conflicts or collaboration between peasant labourers and technical officials.
- To use case studies to explore how the local residents, government, natural environmental conditions and wider international events affected water conservation in the ROC era.

1.3 Research areas

This research focuses on the regions along the Qinling mountain range and the Huai River, particularly the areas around the upper reaches of the Huai River. The Qinling mountain range and the Huai River represent the agricultural border between north and south China. Since the Ming dynasty, from feudal to semi-colonial times, it has been seen as a boundary between paddy fields and dry agricultural land; a line geographically separating the southern culture from that of the north. Although many researchers have focused on either north or south China, few have focused on this "border" region. In fact, the border is a region, not a line. Research in the region is useful for examining the environmental history of the whole of China.

Additionally, the thesis examines some areas in the Yangtze delta and in the north of China, which attracts intense interest from researchers. The research on these areas and those mentioned above is complementary and helpful for revealing a fuller picture of water conservation in China.

Throughout Chinese history, the exact location of the north-south demarcation line has been the subject of debate. Since the 20th century, a clearer definition of this line has emerged. In 1908, Mr. Zhang Xiangwen, the first president of The Geographical Society of China, pointed out in his book *New Physiography* (Zhang, 2013), that the Qinling Mountains-Huai River Line should demarcate the border between north and south China. However, many contemporary scholars acknowledge that the "Qinling Mountains-Huai River Line" is not merely the "North-South Geographic Demarcation Line" in China, but the "North-South Geographic and Climate Demarcation Zone in China (hereafter referred to as the 'North-South Demarcation Zone in China'). Distinct differences in natural conditions, geographic features, farming methods, and customs exist between the north and south. With the development of GIS (geographic information system/science), Chinese scholars completed the *Map of the North-South Demarcation Zone in China Based on GIS* (Chen, 2010*)*, based on climatic, geographic,

population and other data. These data were mainly from the report *Expert Systems for Development Ecology and Grass Industry in China* (Chen, 2006) and the information system *Data Sharing Infrastructure of Earth System Science* (DSIESS, 2015). These data included the average yearly temperature, yearly precipitation, annual accumulated temperature, moisture index, average monthly temperature, frost-free period, relative humidity, altitude, and ratio between paddy fields and dry land. With a total approximate area of 145,500.74 square kilometres, the north-south demarcation zone looks like a strip that contains 130 counties and cities in the seven provinces of Sichuan, Gansu, Shaanxi, Hubei, Henan, Anhui and Jiangsu. The narrowest strip has a width of 26.42 kilometres, and the broadest strip is 195.41 kilometres in width. The southern part of the demarcation zone typically features a subtropical climate, with some warm temperature zones, whereas the northern part, mainly features warm temperatures, with some areas characterized by subtropical climate.

1.4 Research period

The events or stories investigated in this thesis occurred during the era of the ROC, when society was politically unstable. During that period, the political system in China changed from feudalism to a semi-colonial and semi-feudal society, and then moved into socialism. The Chinese Nationalist Party (Kuomintang) was the ruling party during the ROC. However, some regions were controlled by a Puppet Regime led by Wang Jingwei, or by the Communist Party of China (CPC). After October 1949, the CPC became China's ruling party. Before that, China had gone through World War II and the Chinese Civil War (1927–1949). Meanwhile, the world as a whole had experienced colonial expansion, anti-colonial struggles, the development of capitalism and industrial expansion, and the World Wars. This thesis investigates relief work projects for water conservation in the border regions between north and south China that occurred against a backdrop of significant events on the global landscape. In addition, similar studies are extended to regions in southeast and northwest China. This is done

to produce an objective, overall and comparative view of the construction of water conservation projects during this time.

Most research on the ROC era (1911–1949) has focused on the coastal region of the Southeast, while the inland areas have received little attention. The few studies that have investigated these areas have focused on the history of the economics, policies or social structures in the northern areas of the Huai River Basin. The present research will focus specifically on water resource management in these regions during the course of the ROC period and will investigate the roles of key stakeholders, including local governments, communities, and key individuals involved in water conservation.

After the Sino-Japanese War of 1884–1895, the existing feudal economy was gradually supplanted by the development of national capitalism and increased investment from western powers. The siege of the International Legations in 1900 and *The Peace Protocol of 1901* (Baike, 2015) transformed China into a semi-colonial society, mixed with remnants of feudalism. Politically, China had become a colony, while retaining feudal economic and social structures. On the one hand, the imperialism of the Qing Government strengthened the military control and political slavery of the Chinese people. On the other hand, the economic plunder of Chinese people was extended due to the huge amount of indemnity and investment by western powers. After that, the social nature of China was changed even further.

After the Revolution of 1911, Russia made Outer Mongolia an autonomous zone and forcibly occupied China's Tannu-Urian Khai. The UK incited Tibetan independence, but in vain. However, they also created the illegal "McMahon Line," which segmented the territory of over 90,000 square kilometres in China's eastern Tibet to the south of the line. Then, Japan declared war on Germany, sent troops to Shandong, and occupied the Qingdao-Ji'nan Railway and Qingdao. Japan also induced the Yuan Shi-kai Government to sign the treaty of "*Twenty-One Demands."* After the death of Yuan Shi-kai, the imperial powers found their own representatives and implemented the "Using

Chinese to subdue Chinese" policy, resulting in a situation of separatist warlord regimes and continual in-fighting.

In 1931, Japan occupied and colonized the three provinces of northeast China. Then, the full-scale invasion by Japan on July 7, 1937 caused China to lose a vast amount of territory in the northern, central and southern regions. Because of this, it was thought very likely that China would become a Japanese colony. When the People's ROC (PRC) was founded in 1949 after the Second Sino-Japanese War and China's War of Liberation, the semi-colonial and semi-feudal society came to an end.

This thesis focuses on water events in China during the 1912–1949 period. The semi-colonial and semi-feudal aspects of Chinese society during this period are the main topics. Social and political structures are observable, for example, in the conditions of the villages in the upper reaches of the Huai River, where land rent played a decisive factor in the creation of water conservation projects. Similarly, in the Anfengtang Community the gentry, a traditional remnant of feudal China, served as a lubricant between the government and community. Other examples include the ways in which the powers of the western countries and Japan influenced the construction of Lotus Polder, as well as how the Jinghui Channel Project, involving the implementation of new technology from the West, was being put into practice in China. In sum, the mix of semi-colonial and semi-feudal tendencies in China were being influenced by international forces. Moreover, these influences triggered resistance and forced China to open up. As far as China was concerned, the resistance brought about the founding of the People's ROC and a self-directed opening of China to the world.

1.5 Research significance and structure of the thesis

Little research has been carried out on water conservation in the areas of the upper reach of the Huai River Basin, Anhui Province and along the border between north and south China in the era of the ROC. The main cause for such a spatial and temporal blind spot is the shortage of historical resources. By studying a large amount of collected archives,

magazines and newspapers, the author was able, for the first time, to piece together and analyse a series of stories regarding water conservation at the time. Through the investigation of water conservation in the period of the ROC, various aspects of the ROC, including its land policies, social structure and diplomatic relationships, were revealed.

This thesis consists of nine chapters. Following the introduction, Chapter 2 will provide a review of the literature on environmental history, the history of water conservation, and related disciplines both in China and globally. Chapter 3 will detail the methodologies used. The empirical study and analysis can be found in Chapters 4–8. Chapter 4 focuses on the flooding of the Huai River in 1931 and its causes, and subsequent relief work projects commencing that same year. Chapter 5 explores the Relief Work projects after 1939. Chapter 6 examines Anfengtang Pond in the era of the ROC. Chapter 7 and 8 are cross-regional studies, with Chapter 7 concerned with Lotus Polder in the Yangtze River Delta, and Chapter 8 the Jinghui Channel in north-western China. Chapter 9 concludes the thesis and outlines areas for further research.

Chapter 2: Literature review

2.1 Introduction

A key task of the thesis is to investigate the relationship between the conservation of water resources and society, as well as the relationships between the different organisations and people responsible for conserving and managing water. This chapter critically reviews studies of the history of water conservation and its related disciplines in China and globally. The research period for this thesis is the era of the ROC, a period of intense and frequent domestic and international conflict. In tackling this subject, it is helpful to consider the environmental histories and the history of water conservation of other countries. Chinese environmental history studies need the perspective of world environmental history whilst at the same time, world environmental history cannot do without Chinese environmental history studies (Bao, 2004, p. 493). The review first examines key characteristics of environmental history in America the UK and Southeast Asia. It then examines environmental history studies in China by western and Chinese scholars and links this with the work of historical geographers. The review goes on to examine the environmental history of water conservation again starting with international studies before focussing on studies in China and the Yangtze River.

2.2 Environmental history: the global scale

Though there are several well-known definitions of environmental history, generally, it is considered the study of the relationships between humans and nature over time. Donald Worster (1988, p. 289), a key figure in the development of the sub-discipline, argued that "environmental history is the interaction between human cultures and the environment in the past" while J. Donald Hughes (2001, p. 4) defined the subject as “the study of human relationships through time with the natural communities of which they are a part in order to explain the processes of change that affect that relationship.” He later added that it is “history that seeks understanding of human beings as they have lived, worked and thought in relationship to the rest of nature through the changes brought by time” (Hughes, 2006, p. 1). In 2003, McNeill argued that environmental history is “the history of the mutual relations between humankind and the rest of nature” (McNeill, 2003, p. 6). Hornborg and McNeill (2007) subsequently published a volume

which linked environmental change to political economy, environmental sciences and social injustice, offering a global, historical, and transdisciplinary approach to environmental history.

2.2.1 Environmental history in the US

Environmental history as a sub-discipline appeared in the US in the 1960s. Before 1990, research on the environmental history of the US focused on natural preservation and resource conservation. Such research can be divided into five main categories: Native Americans and the environment; forest history; history of water resources; history of the wilderness, and biography (Cowdrey, 1983; Kirby, 1978; Silver, 1990). Regarding resource conservation, more attention has been paid to rural landscapes, particularly forests and water. Undoubtedly, this is closely linked to resources per capita in the US. Perhaps the most important stimulus to the development of environmental history was the publication of *Silent Spring* (Carson, 1962), which focused on abuse of insecticides and pollution and is considered a key instigator of American environmental protection. Rachel Carson describes how a beautiful village experienced big changes because of the use of insecticide, which not only killed insects but also did harm to the health of residents, to animals and to the surrounding environments. This created fears about the potential of having a world without birds, bees, and butterflies and helped to arouse human attention to environmental issues.

A shortage of water is a fundamental factor constraining development of the dry and broad western part of the USA. To solve the issue, many big water conservation projects have been constructed there. Worster's (1992) book *Rivers of Empire: Water, Aridity, and the Growth of the American West* is a history of water and human activity on water in which he explores the role of nature, particularly water, in the evolution of the west. Based on his investigation of dams, technology, and capital, Worster (1992) helped people to understand the relationships between water and humans and the history of hydraulic society in the west. He demonstrated how with the development of society and technology, the water-control modes changed from an agricultural hydraulic society to a capitalistic one, arguing that both conflict and cooperation between individuals, enterprises and the state promoted this transition.

Building on this theme, Arthur (1986) examined the relationship between resources, economics and law in Californian fisheries with reference to the management tools used by different fishing communities. In particular, he investigated social and environmental issues related to fisheries, and the theory and politics of resource management. Using law as a starting point provided a highly useful model for research into environmental history and its related subjects (Arthur, 1986). From the perspective of the social and economic structure of urban communities, Hurley (1995) found that people from various classes and races had different feelings and attitudes towards environmentalism. Hurley (1995) also conducted comparative research between cities, including those of developed and developing countries.

Early American environmental history demonstrated how different groups and individuals involved in the environmentalism movement had different interests and emphases. Consequently environmental history in the US paid attention to a series of specific issues and produce detailed and deep case studies. These regional, professional, and diversified studies provided new knowledge and conceptions for environmental history. However, a danger with the emphasis on case studies may be that environmental history tended to ignore concerns about fundamental issues, such as the relation between environmental history and human history. Bernard Bailyn, president of the American Historical Society, stated that the biggest challenge of American history was to produce integrated and synthesised publications rather than to deepen specific study (Bao, 2002).

However, the field of research has been expanded since 1990 and is no longer equivalent to the history of environmentalism (Rothman, 2002). American environmental historians gradually realised the necessity of integrated environmental history set in the context of human history. More analysis was undertaken on the urban environment, women, politics, technology, economics and cultural factors. Text records, stories, narratives, films, etc., received more attention. Actually, it was a result of the transition that more and more members of the public became concerned about environmental protection. McNeill's (2003) proposal that the study of environmental history comprises topics from material environmental history and cultural environmental history to political environmental history is important. This is an approach that I will make use of in this thesis on the history of water conservation and

management in China. Overall it can be seen that a benefit of the methods developed by American environmental historians lies in its concern with present-day environmental issues and the need to set detailed research in its broad social and cultural context. It shows that an important role of history is to assist in finding real solutions for current issues. As such, practical issues must be examined seriously in historical research.

2.2.2 Environmental history in the UK

Environmental history, as a sub-discipline, appeared in the UK in the late 1980s and has since expanded greatly. In 1995, the journal *Environment and History* was launched in London and now is one of the two most important journals regarding environmental history. The journal helped to extend environmental history studies to Africa, Asia, Australia, and other regions. Research on British environmental history has arisen from the multiple cultures of Britain. Such research has emerged from a strong background in historical geography, historical ecology, and the history of material and culture. H. C. Darby (1953; 1961; 1973) helped to establish historical geography in the UK and demonstrated how the geographical environment had affected humans and vice versa. It is clear that the topics covered by historical geography are quite close to those of environmental history. Compared with environmental history in the US, British environmental history not only concerns agricultural ecological history but also pays attention to urban and industrial environment issues. Historical ecology was established by John Sheail, George Peterken, Oliver Rackham and other ecologists and geographers in the 1960s and 1970s (Rackham 2003). Smout *et. al.* (2004) examined the relation between humans and trees, the balance between society, economics, and environmental factors using approaches from history and geography. Everett (1994) combined research about physical landscape and political culture, attempting to explore the operation of power behind the evolution of the landscape. The UK was the first country to reach industrialisation and urbanisation and consequently, the UK encountered and addressed industrial pollution and urban environmental issues relatively early. Mosley (2001) carried out research into coal pollution in Manchester. He showed that people had different opinions regarding pollution which raised intense disputes. Some people thought it was an unavoidable step of industrialisation while others encouraged debate which helped to stimulate the development of a series of technologies and policies to

deal with pollution. Coal pollution was not just related to technology but also to culture, economics, politics, and social issues. Ian Simmons (1993) investigated production modes at various stages and the roles of political organisations, conflicts, beliefs, perceptions, and technology with a particular focus on agriculture. He also turned his attention to conflict or war. In contrast to the widespread attention given to collateral damage to non-combatants, particularly children, Simmons argued that plants, animals, soil, and water in wartime and afterwards needed more attention. A key feature of Simmons' environmental studies is the relationship between nature and culture. He argued that pollution resulting from steel production was not just a simple, separate 'air pollution' but a procedure including ore mining, waste treatment, and intake by the lungs. Simmons (1993) claimed that nature was a material space in which humans exist and creatures experienced evolution over millions of years; that the environment comprises materials interacting with humans, including air, water, animals, plants, and terrain, and that culture means ideas, beliefs, knowledge, and technology. Similarly, John Sheail (2002) argues that the relationship between people and the natural world is dynamic. Based on available sources, particularly archival sources, Sheail (2002) examined various issues, including changes to management modes, ways of protecting the environment, public health and ultimately environmental health, the evolution of farming and forestry in the countryside, the transport revolution and the measurement of environmental hazards at the local, regional**,** and national levels.

The development of research on the history of the urban environment and the history of industrial pollution in the UK has been both fruitful and influential. Scholars have concluded that problems of pollution in the urban environment are not only an issue of technology, but are also closely linked with economic development, social differentiation and political struggles (Mosley, 2001). The methods and ideas behind this approach are drawn upon in my research on the environmental history of water resources in the ROC. Although the urbanisation movement started more recently, China has already been suffering from serious "urban disease" (i.e. pollution, and the big gap between the rich and the poor). There is considerable potential to make use of approaches from historical geography and environmental history to examine the work of the engineers and peasants who were the main actors in water conservation and management projects in China in the era of the ROC. Research on environmental history during the colonial period has been an important and valuable part of research

by British environmental historians such as Richard Grove (Grove and Sangwan, 1998). Unfortunately, his work seldom mentioned environmental issues in China in the era of the ROC. Fundamental factors promoting the study of the environmental history of Southeast Asia come from rapid development coupled with environmental (especially forest) degradation and the increase of environmental consciousness. Grove's (1998) edited volume provides a series of stories of settlement archaeology, climate change, the history of famine, the history of deforestation, the history of fishing and hunting and forest management to examine the environmental history of Southeast Asia from 5,000 BC to the present. Chapters by historians, archaeologists and geographers all reveal the highly complex relationship between people and their environment in Peshawar and the Maluku Islands in eastern Indonesia. The Dutch historian Peter Boomgaard (2006) in his study of Indonesia focuses on population and economics, technology, trade, and foreign communities and provides a broad investigation of how these factors have affected the environment over time. British and European scholars have made great achievements in relation to studies of oriental nations, but relatively little investigation has been done on semi-colonial countries such as China, and particularly the inland regions of China. Like coastal districts, which have more direct links to western society, inland regions have also changed with time. In addition, most of inland region changes affect land and water conservation.

In summary, in terms of research tradition, methodologies and fundamental issues, there exist significant similarities between research into the historical geography and environmental history of the UK and that of China. Because of the difference in geographical conditions, UK-based research has placed much focus on forest and cities, while research on China has focused more on the big events of water conservation, including major projects, policies and disasters (see for example Yao 1987 and Dong 2003). Nevertheless, the main philosophy behind the research does not differ much between countries and pays attention to the activities of people and the relationship between them.

2.3 Environmental history of China

It was only in 2000 that the term 'environmental history' appeared formally in China's sphere of learning (Bao, 2004). However, ongoing environmental problems coupled

with a growing environmental consciousness among Chinese people has caused Chinese environmental history to develop rapidly in subsequent years. Even Chinese environmental history studies have their own characteristics with scholars from both China and foreign countries having contributed to their achievements.

2.3.1 Chinese environmental history by western scholars

A number of Western scholars, including Robert B. Marks and Mark Elvin, have made a significant contribution to research on environmental history in China. Marks (2005) endeavoured to identify fundamental questions of Chinese environmental history. He argued that changes in the environment were the result of natural activity as well as human activity, and that human-land relationships were an important subject of environmental history. Marks (2005) also argued that it is essential to examine water conservation and land policies together. His research findings make a good starting point for my study of the conservation of water resources in China as previous investigations focused on technology and water rights, but not on water conservation connected with agriculture.

McNeill (1998) raised another important question about the unique features of Chinese environmental history. He looked at the environmental history of China from the view of global environmental history and argued that the main aim of research into environmental history was to reveal ‘specific features’ and ‘general laws’ (1998). The specific feature in the environmental history of China lay in its relatively big scale and the details of it, not in its structure. McNeill (1998) argues that the Chinese government, depending on its water/river system, controlled diverse ecological areas and possessed a series of useful natural resources since the Song Dynasty and that the phrase “ecological diversity” was helpful for examining China’s “flexibility/elasticity”.

In terms of the research methodologies applied, both Marks and McNeill attached importance to the interpretation of the historical data. They believed that the abundance of materials on Chinese history benefited the development of Chinese environmental history. In addition, they payed attention to local chronicles, because they argued that the chronicles, compiled by national, provincial and local government bodies or literati, contained much relevant information about population, agriculture, water conservation, fishing and so on.

Mark Elvin (2004) in his now classic book *The Retreat of the Elephants* provides an overview of the environmental history of China. Elvin has two main aims. One is to sketch the factual record and the other is to try to answer the question: 'Why did human beings here interact with the rest of the natural world in the way that they did?' (Elvin, 2004, p. xvii). Elvin (2004, p. xvii) argued that the long retreat of the elephants was a 'reversed image in space and time of that of the economic development and environment transformation of premodern China'. Following the story of the elephants, Elvin explored 'the original social driving forces and the economic forces, behind the long-term environmental transformations of China, both constructive and destructive' (Elvin, 2004, p. xvii). He examined (2004, p. xviii) how 'environmental changes, especially water-control engineering, interact with economics, and with social and political institutions'. He stressed that 'China has an unusually long record which allows tentative answers to many questions that are hard to answer for other areas' (Elvin, 2004, p. xxi).

Based on his broad knowledge, Mark Elvin used a wide variety of materials including state history, but also notes from missionaries, local chronicles, and poetry. These relevant materials cover about four thousand years. He drew on the findings of Chinese, Japanese and Western, scholars with various backgrounds including historical geography, local histories, arts and engineering. This approach is supported by Xiaohong Chao (2014) and Lihua Wang (2011) who argue that environmental historians should have no prejudice against any text source or non-text data. Water conservation is a fundamental subject of Elvin's concern and is a key to understanding the history of China regardless of the perspective of agriculture, economics, technology or the environment. Chinese historians paid much attention to the positive effect of technology and the construction of water conservation and management structures, rather than their negative effects upon economics and environment as Elvin did. Elvin accepted that Chinese water conservation was overall a great achievement but he argued that the huge costs in terms of labour, material and money for maintenance and construction made water conservation in China dangerous when environmental factors were taken into account.

Studies by Elvin (2004) and Wang (2011) consider Chinese environmental history as a whole including the ways in which different regional environments relate to each other

whereas Bao argues that 'regional studies which point out local features have laid the foundation for comparative studies and comprehensive studies as a whole' (Bao, 2004, p. 489). Due to the diversity of the geographical environment in China, regional research has made an important contribution to Chinese environmental history. The core task of regional research lies in carrying out various detailed investigations, selecting representative periods, places and events based on abundant documents and in the careful analysis and investigation of specific aspects of environmental history. There is also scope for the result of regional research to have wider applicability.

Previous regional studies have been mostly concerned with regions in south China, Northwest China and lower areas of the Yangtze River. Marks (2006) focused on interactions between nature and humans in South China that were linked to several serious flooding events. Despite his intention to cover a 2000 year period in his research, he ultimately focused on the much shorter Qing Dynasty (267 years) and selected Guangdong Province and Guangxi Province as two typical study regions. Although his work can be criticized for its methodological limitations including non-representative location choices, Marks made some excellent use of rainfall and monthly average temperature data for Guangzhou City to investigate the temperature trends from the 17th century to the 19th century in China. The data he used were mostly drawn from contemporary scholars and compared with data from a US-based database which has reconstructed the temperature of the Northern Hemisphere since 1671. On the basis of finding no abnormal climate phenomena between 1764 and 1765, the author reconstructed the monthly farming calendar for paddy planting based on sources including written reports, statements, memorials, or letters to the throne (folded in accordion form). Also, the author draws on agricultural literature in English to interpret the relationship between climate and agriculture, especially paddy planting. He found that irrigation, national water storage and an effective market in China helped to weaken the impact from climate and argued that the government played an important role in that link (Marks, 2006).

Case studies are important for both regional research and full-scale research. Menzies (1998) points out that "Case study requires detailed supporting materials" (1998, p. 185). This viewpoint was reflected in a paper by Helen Dunstan (1998) on official thinking on environmental issues in eighteenth century China. Her research required a

deep understanding of the thoughts, moods and motivations behind environmental policies and was based on careful study of a wide range historical documents. This research highlights the large number of documents needed for the analysis of case studies that can be used to enhance broader-scale understandings.

In summary, western scholars have contributed much to the environmental history of China and have been concerned with various fields of environment and society of China. However, to some degree, their research into China's environmental has been affected by difficulties in collecting and understanding a sufficiently large quantity of relevant documents coupled with limited temporal and spatial coverage. Most of them focus on human-land relations in the Qing Dynasty with few investigating the period of the ROC.

2.3.2 Chinese environmental history by Chinese scholars

Although environmental history is a relatively new discipline in China the topics covered by environmental history were covered to an extent by other sub-disciplines such as historical geography, the history of disasters and agricultural history (Bao 2004). It is necessary to consider the research undertaken in these areas to achieve a better understanding of the environmental history of China.

Traditional history in China stresses human history and seldom pays attention to the history of the relationship between humans and the environment. But this is not true of historical geography which 'focuses mainly on changes in the geographical landscape over the course of human history and the laws of its changes. It tries to recover the geographical landscape from the past' (Bao, 2004, p. 476). Historical geography therefore looks at similar questions to those explored by environmental history and has laid a basis for environmental history studies to some extent.

The fundamental points of historical geography were that the environment around humans was variable and human activities played a key role in modifying that environment (Hou, 1962). Historical geographers needed to develop the ability to use methodology in history as well as in geography but this needed to be combined with fieldwork. Shi (1986) stated that for historical geographers, local chronicles ranked as important materials, but this needed to be combined with field investigation to avoid drawing incorrect conclusions from historical materials (Shi, 1981). Some

methodologies from natural sciences such as GIS, archaeology, statistical analysis and pollen research have also been widely applied in historical geography (Mao, 2003). Nianhai Shi examined changes in the distribution of Chinese vegetation. According to text records, archaeology and C14 radiocarbon dating, he found that some forest regions had become grassland and some desert. These changes were caused by a combination of natural factors, such as climate, and human-made effects, such as population migration and land reclamation (Shi, 1991). Kezhen Zhu was a pioneer in the use of massive text-recorded historical data to analyse and reconstruct past climate changes in China and his research (Zhu *et al.* 1972) is of importance in both the natural sciences and historical geography. After Zhu's research, more and more ancient documents were analyzed using scientific methods.

Much importance has also been attached to research on the relationship between climate change, politics, economy and culture. "Catastrophic politics history," for example, is an important field of history of China and argues that an event can be called a disaster when people become victims or significant damage takes place. This viewpoint stresses the interactions between human beings and non-human nature. Normally, the factors which cause such disasters are twofold: natural factors and social factors. Early research paid much attention to social factors such as corruption, non-effective measures used to tackle disasters and wars (Mollory, 1929). Later, scholars linked the occurrence of such disasters to the natural and social environment, though the reasons related to astronomical, global physical and social factors. Due to its dynastic dependence, it is important to analyze and summarize the features of catastrophic politics (Chen, 1997). Furthermore, attention needs to be given to the roles played by different classes, including western missionaries, and regional variations. (Xia, 1997). Some researchers discussed the different policies and their regional features (Xie and Bo, 2001), and examined the influence of religious ideas (Liu, 1997). Due to the features of "Catastrophic politics history", some scholars thought there were not enough documents to undertake research on catastrophic politics history based on state history (Zhang, 1994), local chronicles, notes and works of literature (Gao, 1995) and new research approaches were considered to be necessary. Shao (2004) argued that analyses of disasters and descriptions of water conservation should be combined together and be linked to sociology, anthropology, geography and environmental science. Agricultural history is of central importance in the study of Chinese environmental history. Although

ancient China has a long history, it was basically “an agricultural society in which the relationship between humans and the environment didn’t change much” (Bao, 2004, p. 492). In traditional Chinese society, agriculture relied mostly on the natural environment. In other words, agriculture was a product of environment.

One of the key scholars focusing on these interactions was Yuhu Wang (1907—1980), who was an agricultural historian and economic historian. He undertook research on the history of the economy until 1949, then in 1952, changed to the history of agriculture. He investigated reasons why agriculture prospered in the Yellow River area from the perspective of climate, vegetation, population, disease, lifespan, policies and the pH value of soils. He believed that research on agricultural history was closely linked to geography and the environment and that geographical surroundings affected the development of the agriculture but was not decisive.

Generally, Chinese agricultural history studies still focus on subjects regarding technological progress, such as crops and cultivation methods paying particular attention to crop distribution, tool structure, agricultural measures, etc. In modern China, it is accepted that the development of agriculture helped determine the evolution of China but relations between agriculture and social institutions deserve further investigation, specifically policies of the land, tax revenue, irrigation and labour structure of villages (Sadao, 1966).

This section has reviewed western and Chinese work on the environmental history of China. Although the main aim has been to investigate the evolution of environmental history in China, I have also introduced other key subjects here. The reason for this is that those subjects are closely connected with environmental history. In China, most scholars agree that environmental history requires co-operation between history and natural subjects and environmental history focuses on human-environment interactions (Bao, 2004). To some extent historical geographers, catastrophic politics history and agricultural history have developed similar approaches to environmental historians. Furthermore, the above three subject areas all have long-term traditions and their own valuable features. One common feature is that they emphasise the need to combine historical documents with fieldwork and all three display multidisciplinary features

based on natural subjects and human subjects. As a consequence, these approaches and methods are drawn on throughout this thesis.

2.4 History of water conservation

Water is one of the most fundamental elements in the environment. The history of water conservation has a natural relationship with environmental history. Environmental history examines the history of the environment, the history of human beings, and the history of relationships between human beings and environment, while water conservation investigates the history of water, the history of human beings, and the history between human beings and water. Therefore, the history of water conservation is an integral part of research into environmental history that also expands the depth and breadth of research on the history of water conservation.

2.4.1 History of water conservation globally

The history of water conservation covers broad fields such as water facilities, water projects, water pollution, water culture, water politics, etc. In this section I review the literature on the history of water conservation starting with research from outside China. Bell and Roberts (1991) investigated the politics and culture of dambo irrigation in Zimbabwe and studied a wide range of water resource-oriented topics such as technology and the natural environment, politics and technology, water resources and society, colonial areas and western technology. Keith Smith (1972) aimed to explore the relationship between water and society through the relationship between national and local districts. He demonstrated that water availability in Britain was a regional rather than a national problem, and that difficulties in it arose from the misdistribution of supply and demand rather than from a basic inadequacy of resources.

With regard to how water is normally used for daily lives or industrially, Paolo Squatriti (1998) examined how early medieval Italian societies used water and dealt with problems of water shortage and surplus (1998). Other scholars have focused more closely on the role of water in agriculture. James (1970) edited a book on this with chapters by hydrologists, geographers, meteorologists, engineers, applied biologists, agricultural scientists, pedologists, plant physiologists, administrators and advisers. This long list indicates the diversity of hydrological science and services and water

resource and their growing importance in Britain. Smith suggested one possible solution to water shortages would be to set up accurate and carefully planned instrumentation for an accurate estimation of water demands and supply. Additionally, the relationship between water and transportation and facilities such as dams and canals have attracted the interest of scholars (Haites and Walton, 1975).

Other scholars have extended their interest beyond water to an exploration of power and control over environmental resources. Two major studies which are highly relevant to this thesis are by Matthew Evenden (2004) and Pater Coates (2013). In *Fish Versus Power* Evenden (2004) presents an environmental history of the Fraser River, located in British Columbia, Canada. It is the most productive river for salmon in the world and he investigated the transnational forces that affected the river and examined attempts to dam it for power and to defend it for salmon. Even though Evenden's research is focused on the salmon his research covers many environmental history-related factors such as fish, fishers, aborigines, immigrants, fishery, enterprise, provinces, nations, economy, culture and law, and various complex issues. It also involves transnational disputes and how they have been dealt with by the law drawing examples form the politics of post-war relationships between industry (the Aluminium Company of Canada) and fishery.

Peter Coates' (2013) book *A Story of Six Rivers: History, Culture and Ecology, meanwhile,* examines the dynamic relationships between humans, rivers, nature and society through a focus on six rivers: the Danube, Los Angeles River, Spree, Po, Mersey and the Yukon. Through a series of in-depth stories of how the different rivers are used for drinking water, irrigation, food, transportation and power, he explores the functions they provide for cities and agriculture, investigating in the process, their impact on humans and vice versa.

In summary, there is considerable research on the history of water conservation but little of it is focused on the history of water conservation in East Asia in the early twentieth century; primarily as a result of the limited available historical materials. This thesis seeks to address this research gap through an investigation of a range of water conservation schemes in the ROC. Particular attention is focused on factors including supply–demand imbalances, difficulties linked to the local terrain, shortage of labour

and unbalanced profit distribution from water use. Drawing on Hassen's (1998) research on the costs of supplying water and the politics, social benefits and costs associated with its use and Kliot's (1994) examination of the role of law in Middle Eastern water disputes, a range of regulations, laws, and folk customs of the time of the ROC are explored. Work by Cosgrove and Petts (1990) on technology as a media connecting humans and nature also influenced my investigation of how technology use is not only determined by the environment but its complexity depends on the combination of politics, financial conditions, international relations and culture. Work by Coates (2013) and Evenden (2004) on the dynamism of human-nature-society-power relationships, meanwhile, were an important influence on my investigation of water disputes between different interest groups in the ROC; especially how solutions were sought through reports by officials to their superiors which stimulated compromise and agreement between local officials, central commissioners, landowners and ordinary people.

2.4.2 The history of China's water conservation by Japanese and western scholars

The history of water conservation in China has attracted the attention of scholars from around the world. Japanese scholars started their research into the water conservation of China early on and had a broad scope of study including water resources, water construction, water control, irrigation, water transport, the relationship between economic history and water resources, urban water and environment and water resources in China (CIWRHR, 2006). They studied water conservation in order to examine underlying social structures and have also considered changes in ecosystems, resources and relationships between local governments and the wider population. They focused on issues such as relationships between water organizations, villages and the state and considered whether the government, water community or the landed class had the right to control water (Shiba, 1987; Morita 1974, 1990; 2002; Haobing, 1993). What they achieved has significance for research on the history of regional water resources and society. Shiba (1987) examined the *economic history* of the area south of the Yangtze River in the Song Dynasty and proposed a method termed "Broad-sociology history", in which topics are to be investigated from various angles. He took into account factors related to population, social migration, cultural ecology, economic ecology and technical factors based on national history and law arguing that the major

causes of regional differences were population migration, particularly the elites, construction of farming land and water conservation, changes to social organisation and the army. Shiba also examined the penetration of Western culture and technology and the effect of global conditions upon China. Without a doubt, Shiba (1987) made great achievements in theory and regional analysis. However, he considered historical reports, national history and law to be the most important sources and paid little attention to oral history, local chronicles and private letters (1987), creating a gap in the research literature which I intend to fill in part in this thesis.

Morita (2002) made an important study *of water conservation in the Qing Dynasty* with specific studies of Jiangsu Province, Shandong Province, Shanxi Province and Hebei Province. His research examines relationships between water resources and land, industry, commerce, trade, local autonomy and academic research of itself. All these aspects reflected his concerns about the relationship between water conservation and society and his research provides important context for the research in this thesis.

Early Western scholars with an interest in the history of water conservation in China preferred general discussions covering long historical periods and used these to develop theoretical frameworks. A well-known example is research by Karl A. Wittfogel (1957) whose theoretical work 'Hydraulic society – Oriental Despotism' had a huge effect on western academic society as well as Japanese academics with Xing Long (2005, p. 53) arguing that "topics about water-control society always naturally link to Wittfogel." Wittfogel linked water to politics and drew on comparisons from around the world to suggest that oriental society could not have developed without "water control". This was because the large-scale construction of water projects and the management of these projects needed an organisation which covered the main population centres and the people who controlled such organisations always wielded the greatest power. Although *Oriental Despotism* helps to account for the relationship between water conservation and social structure, Wittfogel's work has been criticized by Xing (2004) for ignoring factors underlying political decision making and misunderstanding the extent to which water controlcould manipulate the politics of ancient China.

Another historian, Chi Ch'ao-ting (1963) used historical data from China to conduct detailed research on "water control vs. bureaucracy systems". His book *Key Economic*

Areas in Chinese History contains analyses of the transformation of political, economic and military centres in China between 255B.C to 1842. He paid particular attention to the relationship between water control and country management and his findings enabled a re-appraisal of the history of water-control events in China (1963). Both he and Wittfogel and Chi Ch'ao-ting demonstrated that combining studies of water resources with politics and ideology was a valuable way to conduct research on the history of water conservation in China in the era of ROC.

More recent research has focused less on the big theoretical ideas associated with Wittfogel, instead placing greater attention to specific case studies providing, in the process, greater attention to differences in different regions or time periods. Weng's (2007) research on *river basin management in the Pearl River Delta of China,* for example, describes the evolution of dikes and deltas, land reclamation and coastline extension and dike-pond landscapes. The use of contemporary publications rather than historical documents in this research is associated with a lack of depth of analysis, however.

By contrast, Lamouroux's (1998) use of case studies to understand the management of overall river systems or basins allow a deeper exploration of relations between society and water. Lamouroux describes the first-term harnessing project (993-994) of the Yellow River which was associated with intense disputes among officials responsible for it. The project considered various technological and military factors with Lamouroux (1998) pointing out that the harnessing of the Yellow River depended not only on technical methods, but also on the aims of officials in power. To illustrate this, he discusses how in the winter of 1128 an official, Du Chong used flooding (by breaking the bank of the Yellow River) in order to prevent attacks from enemies.

In Northwest China, Pierre-Etienne Will (1998) made use of local chronicles to study the *Zheng-Bai Channel Irrigation System of Shaanxi Province in the Late-Imperial Period* arguing that in the 17th and 18th centuries, the cost of the repairs had surpassed the potential benefits. Environment, technology, economics, society and political factors lost their balance in this environmental event and Pierre-Etienne Will's findings echo my own research on the "Jinghui Channel". Research by Shiba (1998), meanwhile, examines the development of the Yangtze Delta arguing that a saturation of population

and resource occurred much earlier outside the Delta area than within it. Antonia Finnane (1998) focused her research on an area to the north of the entrance of the Yangtze River. In her book *Water, Love, and Labour: Aspects of a Gendered Environment,* she cited many ballads, local chronicles and memoirs that help to provide a history of this area since the 19th Century. These ballads enable the opinions of people from lower socio-economic classes to be reflected in the history of this environment. She also tried to examine the relationship between females and the local environment, explaining gender-specific socio-cultural and religious norms including foot-binding, weeding customs, language and marital rejection. Research on women is particularly useful in revealing how they were confined by the environment and how the environment, in turn, can be explained partially by their lives. Her work illustrates that the preservation of customs is usually easier and longer than that of terrain and shows how important it is to examine interactions between customs and the environment: findings that are valuable for informing other studies.

In summary, Western and Japanese scholars have paid much attention to the history of water resources in China after the 17th century, and have made studies on water/river resource projects, though most of these are limited to well-known projects only. With the exception of Wittfogel whose study provides a useful framework for understanding key relationships between Chinese society and water conservation, few scholars have focused on Chinese social structures from the perspective of water conservation projects.

2.4.3 Studies of the history of China's water conservation by Chinese researchers

Chinese scholars' research regarding water resource and society reached a peak in the late 20th century with the fields of science and technology and historical geography having made a big contribution to research on water conservation history. This is reflected in the *Compendium of Water Resource History in China* by Hanyuan Yao (1987). Yao wrote in the preface of his book that although he paid much attention to the evolution of projects, it is not only a book regarding to the history of engineering and technology; it also considers the relationship between politics, economics and water resource and provides rich materials for experts who care about water resource history and economics (1987). Fortunately, the boom in social history, particularly regional

social history, brought a change in research on traditional water resource histories in the late 20th century that compensated for weakness in traditional water resource histories. These studies covered almost all fields related with water resource with Xing (2005) pointing out that a transformation had occurred from a "water-control society" to a "water resource society". At the same time, a range of water-related projects with novel theoretical approaches and methodologies were put forward (Xing Long, 2006).

In North China the "water resource in North China and social organisations" project organized by Beijing Normal University and the French School of Asian Studies, collected many village based oral historical materials. The scholars involved were historians, sociologists, anthropologists, historical geographers and engineers and their resulting book, *Bu guan erzhi: Shanxi si she wucunshui li wen xianyu min su,* included results from extensive fieldwork in small counties and villages (Dong, 2003). The project found that that some areas suffered from serious water shortages although in the places mentioned in this book, emphasis was placed on water saving. Water management was the dominant factor affecting local human-nature relationships, marriage, trade, religion and politics, etc. with small counties and villages having their own historical traditions.

In addition to the use of local chronicles, the authors worked on a collection of water leaflets and stele inscriptions. Water leaflets were owned by certain people, usually those with some power, and contained information on general regulations for water use in villages. Normally, this information was not open for public consultation. In some cases, regulations were required by government to be combined with official water laws. Most water leaflets were applied in a specific area and used for a long time. Most stele inscriptions were formed and used by government and, in contrast to the water leaflets, were issued publicly. The authors found a good way to investigate how the government cooperated with the village to apply water law, and to examine conditions which led to the formation of community water regulations (Dong, 2003). The materials collected for this book provided a model for similar research on water conservation.

Another two projects led by Xing (2006) attempted to examine relationships between population, resource and environment and to construct a "water-oriented" social structure and identify changes in how it operated since the Ming Dynasty (Xing, 2004).

In summary, water saving or water use allocation are key subjects associated with research on the history of water conservation in North China and provide starting points for exploring the relationship between water conservation and society in areas with different types of water conservation.

Water conservation in Northwest China has also attracted attention due to the region's shortage of water and the fact that had developed advanced irrigation and agriculture due to its position (particularly Shaanxi Province) as the centre of politics and economics in ancient China. The Weihe Plain is a major food production area of Northwest China and to some extent, Weihe Plain bred the Qing Dynasty so it is regarded an important area for research on ancient history. Lingfu Li's (2004) project entitled "Historical-geography research on development of water resource in Weihe Plain" started in 2000 and examined a range of water resource projects but stopped short of investigating the relationship between water resource projects and the society. Chunchang Huang's (2005) project on "the interaction between development, migration of central city around ancient Weihe valley and change of environment", started by considering disasters. Using detailed statistics and analysis of droughts and water disasters in the Weihe Plain in the historical period, the scholars involved argued that over more than 2,300 years (from 370 BC to 2000 AD), natural disasters occurred most frequently in two periods. One was from 610 to 850 AD (from the late Sui Dynasty to the late Tang Dynasty) and the other was from 1580 to 2000 AD (after the late Ming Dynasty). Frequencies of natural disasters were, on the one hand, linked with climate change and the development of ancient cities, while on the other, were related closely to population changes. Excessive exploitation of natural resources, human disturbance and damages to the ecological environment were major causes of the increased frequency of drought and water disasters (Huang 2005).

Research on more contemporary water environment characteristics of Weihe River has been undertaken since 2005 as part of a project on "water usage policies and change of water resource environment in representative areas of Northwest China" supported by the Ministry of Education of the P.R.C. (Zhao, and Wang, 2006). The results indicated that over the past 50 years, changing water and sand condition and the development of industry and agriculture in recent decades have changed the Weihe River greatly. The main conclusions were that annual river flux and seasonal floods decreased sharply

while water pollution and sediment concentration both increased, creating sand silting problems; the frequency of flooding increased. These findings indicate the importance of getting the right balance between the environment and sustainable development.

Most Chinese research regarding water conservation in upper reaches of the Yangtze River has been carried out in the Qinling Mountains and the Daba Mountains where water resources are rich and economies are undeveloped. Xiaohong Chao's project on "Environment of water resource and change of social economy in contemporary Shaanxi" examined these areas from 2002 beginning with an investigation of weir-ditch irrigation in Hanzhong Area (in the upper reach of the Hanshui River). The project sought to investigate the relationship between state power and regional society and to reveal changes in grass-roots society and corresponding contributions to the ecological environment and the financial economy (Chao, 2005)**.** Despite the detailed nature of his investigation, the project paid little attention to the era of ROC and land policies.

Jianming Zhang (2007) in his book *Resources Exploitation and Environment Change of the Yangtze Valley in the Ming and Qing Dynasties* addresses the construction of agricultural irrigation and the development of paddy fields in the Qinling and Daba Mountains. He described agricultural water irrigation works in the south of Shaanxi Province in the Ming and Qing Dynasties, in mountainous area of northwest Hubei Province, and in mountainous areas of northeast Sichuan Province in different segments of the book. The book draws on a range of useful documents and provides an excellent case study of how social change was linked to the existence and number of wells. Zhang's studies indicate that in the Ming and Qing Dynasties, the well was considered to be a symbol of high-level sanitation and good quality of life and changes in the number of wells reflect population immigration and social stratification.

The lower reaches of the Yangtze River have attracted the attention of researchers as water conservation there is relatively developed, culture and economics are flourishing, and it is the major rice production region of China. Huafeng Zhuang's project on the "Development of arable land in Lower reaches of the Yangtze River between 7th to 19th century and the change of environment" (Zhaung, 2005) uses large amounts of historical documents to investigate the evolution of paddy fields with dike enclosures over a long period in ancient China. They discussed the impact of surrounding paddy

fields on the ecological environment, arguing that paddy over-cultivation led to the destruction of the original hydro-geological environment (Zhaung, 2005). This echoes my own research in the Anfengtang Pond region in the era of the ROC when competition for water between humans and farmland happened frequently.

The above projects indicate that recent research has paid much attention to interactions between water resources, social economy, environment, city development and changes of rural society. To date, however, most scholars have focused on North China, and areas in the "small South of Yangtze" area leaving a gap in knowledge about the area along the South-North border of China.

2.5 Conclusion

Environmental history has evolved differently in different countries. In the UK, it has a close connection with historical geography, while in the USA, the environmental movement had a great effect on it. Environmental history in China has a similar background to that of the UK, maintaining a tight connection with historical geography as well with the history of agriculture. Water has been central to research on environmental history in all countries with the UK paying particular attention to water in industry and life and the USA maintaining an important focus on water pollution. Other key differences include emphasis on comparative research, interests in agricultural ecological history and a more global perspective among UK scholars compared to a greater amount of nationally oriented research focused on wilderness among environmental historians in the USA (Mosley, 2001; Worster, 1992). China has made great efforts with regards to river courses, flood control, water conservation and agricultural irrigation systems with key similarities and differences reflecting natural and social environments as well as variations in political culture and historical development. In all contexts, interdisciplinary studies have helped to both broaden and deepen understandings of environmental history (Bao, 2004).

Studies of water conservation in China from western researchers focused on the Qing Dynasty (1644–1911) because historical resources for this were plentiful. The characters were relatively simple and convenient to read and it was convenient to carry out global correlation analysis on environmental history in China, as China in that period was greatly influenced and affected by the western world. Most research on

water conservation by Chinese scholars was related to the era prior to 1911 as scholars from neither the western world nor China paid much attention to water conservation in the period of the ROC due to the poor availability of historical resources. The limited studies that were conducted on water conservation in the period of the ROC were focused on the Yangtze delta area and the regions in the northwest of China as official historical documents on the Yangtze delta were relatively plentiful. By contrast, field work, oral history and local literature formed the main research methodologies in the northwestern areas. Overall, research in these areas included very few case studies or detailed descriptions, and seldom covered local governments, communities or ordinary residents and, as a consequence, provide an incomplete history of water conservation that is not linked to broader social changes. But it is important to recognise that the technologies involved in human activities are not only connected with the natural environment and market demand, but also depend on the state of the economy. These actions are intricately interconnected with politics. With regard to China, water conservation is an important part of the Chinese government's, both historically and in contemporary society, and the activities of the government reflect governmental politics. The study of water conservation is the examination of political desire as well as the actions of many individuals and organisations.

Chapter 3: Methods

3.1 Introduction

Environmental history explores the relationship between humans and their environment. It has developed as a growing sub-discipline within the study of history. Great attention has been paid to the importance of using an interdisciplinary approach, by drawing on research and methodologies from the fields of geography, geology, ecology, economics, political science, religion, sociology science, technology and anthropology (Simmons, 1993; Bao, 2004). Ideally, a comprehensive analysis of environmental history relies on the availability of abundant data. As with other historians, environmental historians still largely rely on written evidence for primary source material in order to investigate human experiences or socio-economic conditions. Additionally, multidisciplinary approaches to the subject matter emphasize the role of nonhuman nature in environmental history (Hughes, 2016).

In recent years, fieldwork methods such as participant observation have increasingly been used by environmental historians, who have directly acquired the experiences of residents in the communities and environments studied, and learned how people interacted with nature (Kleinman and Coop, 1993; Bao, 2004). This thesis develops the concept of using an environmental history approach in order to combine written sources with the results of community-based fieldwork.

My studies focus on counties in the upper reaches of the Huai River in Anhui Province, China. Specifically, the Anfengtang Pond, the Lotus Polder in the lower area of the Yangtze River, and the 'Jinghui Channel' in the Northwest. These can be seen as ordinary counties on which no detailed research on river management and environmental history has been focused to date. This may be due to insufficient historical documents from the era of the ROC being available, particularly in the aforementioned areas. To make up for this, my research will draw on several types of information. A range of national historical materials were used to construct a broad, in-depth historical background. Good quality archival records, which have not been used by others, were studied to investigate the relationships between central and local governments, amongst local government stakeholders, and amongst village-based

communities in the study areas (Zhou and Guo, 2015). Oral history was used to reveal local and strongly human-related historical stories associated with water (for example, memories of Quebei in the ROC), some of which cover the period of the last 100 years. A great many newspapers and academic journals (for instance, those in the fields of geography, water resources, and social science) which were published from 1911 to 1949 were used not only as references, but also as research objects. Detailed and specific information from these sources was critically reviewed in order to re-construct the interaction between human society and the environment in the area of the Qinling Mountain range and the Huai river basin.

Through analysis of written sources and from fieldwork data, relationships between water conservation, governments, grass roots actors and international powers were investigated in this thesis. Key stakeholders including local gentries, engineers, foremen and peasants were the main characters involved in a series of events or scenes related to water conservation. This is also a striking feature that can be found in my thesis. Similarly, Menzies (1998) also emphasizes that the study of environmental history has to examine and take into account the views of people from different social classes.

The definition of the local gentry used for this thesis is quite similar to that of the 'rural elites' in *Village Governance in North China: 1875–1936* by Huaiyin Li (2005). 'Rural elites' are the people who controlled village governments and primary schools; their influence sometimes extended beyond the village when they joined urban elites to hold positions in county-level institutions, such as the deliberative assemblies and offices in charge of police, education, and financing. Their prestige and influence was based on their literacy, seniority, wealth, or social connections (Yang, 2008; Wang, 2013).

An engineer is a professional practitioner who has received modern education in western engineering disciplines. Engineers are specialized in research and development, construction and production, operation and maintenance, management and organization, and so on. In this thesis, all leading engineers in the water conservation events described, such as Yisheng Mao, Huzhen Wang and Yizhi Li, studied in Europe or America. The engineers working on site normally received university educations in engineering or short-term training after secondary education. In general, all of them

were considered well-educated and with high incomes, in comparison with peasants and civilians. To some degree, they were also able to influence government and public affairs and were adored or even revered by peasants.

A foreman was the title of a temporary job position. The foremen, in most cases, were the fellow-townsmen of the peasants in water conservation construction sites. The fact is that foremen were also peasants in country life and they still belonged to the lower classes at that time, but, compared with ordinary peasants, they knew how to find better ways of surviving. They were appointed to be leaders for small teams of ten peasants, as their competences either in education, communication, wealth, physical strength or other areas were somewhat stronger than other peasants, and they also tended to have the ability of being able to build closer relationships with contractors. Further, their statuses were differentiated from that of other peasants in the type of food eaten, the amount of labor undertaken and differing levels of remuneration (Wang and Zhang, 2008).

Due to the diversity of regional conditions in China, in order to gain an overall understanding of the history of water conservation, it is essential to carry out a comparative analysis between various regions of the country. Such regional research serves to extend the breadth and depth of investigations of the history of water conservation. Bao claimed: "Regional studies are another effective tool in Chinese environmental history studies. China is vast in territory and has a long history. There are large differences among natural environments and among relations between humans and the earth in different areas" (Bao, 2004, p. 488). A combination of regional and comparative research is applied in this thesis. This combination not only requires knowledge of 'local conditions', but also a broad spatiotemporal history in order to understand local features or history. Consideration at both local and overall level requires various methodologies and a diversity of historical materials.

3.2 Archives

French historians and leaders of the Annales School, Fernand Braudel and Emmanuel Le Roy Ladurie (1979), place special emphasis on archives. Usually, laws and regulations reflected only the ideas of management from the government and corresponding procedures. However, archival data tell us what governments actually

implemented and why they did it (Shu, 1999). Archives play a special role in China, as this country has a long-term tradition of keeping administrative documents. Official letters or documents played an important role in the operation of the Chinese regime (Lin, 2003). Thus, researching the archives is a useful way of becoming familiar with the details of or the factors behind an event. The main historical materials used in this study are archives from the era of the ROC. Most of these are being used in academic research for the first time. From the events and regulations recorded in the documents obtained from the archives, details of water conservation activities in relation to the population in the north of Anhui Province were extracted and analysed.

This is the first known study focusing on water conservation in the north of Anhui Province. The main reason for the absence of studies into this topic previously reflects the difficulty in obtaining first-hand materials. Unlike the easier availability of documents describing well-known or national water conservation events (newspapers, journals or reports), with respect to water conservation at grass-roots level, archives are the main (sometimes the only) source of historical materials (Li, 2013; Tian, 2013).

The management of archives in China has the following characteristics: they are state owned, and therefore serve the advocated ideology of the government. Government in the era of the ROC was controlled by the Nationalist Party, whilst the current government is run by the Communist Party, with a contrasting political propaganda (Zhang, 2000). A professor of the Association of Archives suggested that some archives from the era of the ROC are politically sensitive in the view of the current Chinese government and it is therefore difficult to gain access to them. Most of the time, availability depends on the staff of the specific archive concerned.

Furthermore, the difficulty of access to archives is linked to laws pertaining to Chinese archives. Under these laws, the open access period for archival records, which is related to safety or key interests of the nation, may begin only after 30 years, and is defined by the archive's administrative staff. Negotiating access to various archives is a time and energy-consuming exercise.

I could not have completed this thesis without data obtained from archives, including: Anhui Provincial Archives, Shaanxi Provincial Archives and the Second Historical Archives of China. Some data, such as documents addressed in this study relating to

water resources of Anhui Province and relating to the 'Quebei/Anfengtang Project', was also obtained from the database of the Institute of Modern History, Academia Sinica, Taiwan.

3.3 Local chronicles

Scholars' selection of historical materials depended on their knowledge and reflected their understanding of research objectives (Zhang, 2010). Typically, national history was documented and edited by palace officials and famous intellectuals, whilst local chronicles were written and edited by local officials or intellectuals. Even though they were similar in structure and format, their materials had different sources. It should be noted that officials and intellectuals at different levels had varying understandings of water conservation, due to their different positions in the empire.

For my research, the chronicles provide a comprehensive historical context on many aspects of water/rivers and rural life (Dong and Xia, 2012). Hence, the local chronicles are essential materials for background reading and references for analyses. Particularly, in the section on food and production of chronicles, disaster relief was mentioned and recorded. This is a suitable source for researching water conservation as disaster relief links with natural disasters such as flooding and drought, which are also associated with rivers and water resource projects. Combining evidence from different sources such as this can enable the construction of compelling accounts that reflect a situation more accurately.

Chronicles containing records of river management and the achievements of officials are useful, particularly the former. Sometimes lawsuits between two villages were recorded by inscriptions in local chronicles. These types of small events are scarce in national histories. As confirmed in *Bu guan erzhi: Shanxi si she wucun shui li wen xianyu min su* (Deng, 2003), which details folk water resource projects with inscriptions, local chronicles are helpful as a secondary source.

Furthermore, appropriate use of chronicles helped form general observations in this thesis. Some situations and phenomena are not limited to specific areas. For instance, the chronicles regarding rivers and mountains at any Chinese regional level are valuable; they provide us with ample material with which to compare and contrast.

For example, Shou County, once the capital of the Chu Nation (BC 1042 to BC 223) during its last 17 years (BC 241 to BC 223), had Quebei, which was one of four ancient extensive Water Resource Projects. After its completion, Quebei played an important role in irrigation for approximately 2,500 years (Gu and Kan, 1993; Hui and Huang, 2007; Liu, 1998; Lu and Wang, 2007). There are many documents describing the Quebei Project at both national and local levels, and also a book - *Local Chronicles of Anfengtang Pond* (BTWCAP, 1995).

3.4 Newspaper and secondary published materials

In 1822, China acquired its first modern newspaper. In the era of the ROC, only the upper-middle classes cared to read the newspaper, which was a new phenomenon. At that time, newspapers were not only a media in which to publish news, but also to classify people. In order to undertake research on water conservation at that time, particularly for the study of the relationship between various classes and the 'water-related society', the newspaper was an obvious documentary source to use as it reflected the viewpoints of particular groups of people. The newspaper used in my thesis is called *Wanbao (Anhui News)*.

Another important source is the *Journal of Geography (monthly)*, which was in print from 1910 to 1937 under the management of the Chinese Geographical Society. It was the first publication in the field of geography in China. It published manuscripts in the categories of Commentary, Maps & drawings, Notes of conferences, Introductions of books and Letters from readers. Most articles in it dealt with economic, political and natural geography. Until 1937, there were 181 issues in total. I collected 169 of them.

3.5 Reports, maps and handbook

- **Reports from National Library**

In my thesis, several reports were used as written sources. These include the *Report of Survey of Flooding in Anhui Province*, written by engineers involved in relief work, and the survey report of the *Graduate School of Land Economics,* edited by the Central Political Institute. I obtained both of them from the National Library of China. As a matter of fact, many scholars are confronted with the challenge that there are few

trustworthy and proper historical materials (Menzies, 1998). It is extremely difficult and time-consuming to accumulate such materials, so these massive reports became an important part in this thesis.

- **Collected historical documents from the first fieldwork**

In order to collect a wider range of historical documents, I left Beijing for Fuyang, Anhui Province on 13th of November, 2008. In Fuyang, I visited the local Water Resource Bureau and obtained river channel maps and some handbooks. I then went to Taihe County for additional water channel maps from the local Water Resource Bureau. I went to Yingshang County and obtained river channels maps and "Chronicles of Water Resource" of Yingshang County. To the south of Yingshang County, beyond Fuyang City, is Shou County belonging to Luan District. Shou is located to the south of Huai River. I obtained maps of local rivers and channels, took photographs of the *Local Chronicles of Shou*, obtained forest distribution maps from the Forest Bureau, copied the "local chronicles of forest" which had records on everglades and finally detailed records about local animal species. These maps and information were utilized for the comparison of present and ancient records, in order to evaluate changes to the environment in the areas of concern. I visited a 2500 year old water project called "Anfengtang Pond", which is the "Quebei" described previously. During my visit, I obtained a copy of *Local Chronicles of Anfengtang Pond* (BTWCAP, 1995).

- **Collected historical documents from the second fieldwork**

During my second period of fieldwork, I collected significant amounts of historical documents related to the era of the ROC. Some of these were from the National Library of China. Material collected included policies, regulations of water resources, as well as newspapers and magazines (for example, Redflag Weekly(红旗周报), Hohai Weekly (河海周报), Anhui Construction (安徽建设), Anhui Politics (安徽政治), Anhui Agricultural news (安徽农学会报) etc. All were used for research on water resource and 'relief work' projects in the ROC era. Some material was also obtained from the Archives of Anhui Province regarding this province's water resources, particularly of the north. This was focused on the period 1935 to 1949, particularly regarding relief work projects from 1937 to 1945. Finally, some material was taken from the Huai River

Water Resources Commission of the Ministry of Water Resources, P.R.C. They related to progress of 'relief work' projects in 1945.

3.6 Fieldwork

Community-based fieldwork was also an important data source for this thesis and was undertaken in two phases. The first was carried out in the winter of 2008. I conducted interviews in Shanghai, Hangzhou and Beijing. I then undertook fieldwork in Fuyang City, Taihe County, Yingshan County, Shou County and Jieshou County (located in Henan Province). In mid to late 2009, the second period of fieldwork was conducted, during which I made frequent visits to areas of Beijing, Shanghai, Nanjing, Bengbu, Hefei, Yingshang and Shou Counties, in order to search for materials and conduct interviews.

Table 3.1 Timeline of the second fieldwork

19th May 2009	Left for Beijing
20th May- 30th May	Stayed in Beijing for about ten days to look for or search archives and local chronicles
1st June-10th June	Went back home for a ten day visit
11th June-1st August	Went to Yingshang County and stayed for one and a half months
2nd August-8 August	Go to Hefei City for relevant documents
9th August-20th August	Went to Beijing to discuss some topics with relevant scholars
21th Aug-10th Oct.	Stayed in Shou County for further fieldwork
13th Oct	Back to UK

3.6.1 Participant observation and research diary

A major focus for my thesis was the Northern Anhui Province. This area has often had a relatively low reputation in terms of developmental status. Several events involving problems associated with food security have been reported in the area since 1990.

3.6.1.1 Participant observation and my research

I kept a field diary during fieldwork, in order to record discussions between myself and interviewees (Punch, 2012). In addition to recording interviewees' lives, emotions, and the relationships between them and water, I also became a member of their culture and was able to join in some of their activities. Such participation was helpful in building trust and also in order to find answers to the questions posed. During my Masters research, I gained relevant experience of fieldwork. For example, the productivity of the local Yao minority is much less than that of external areas, such that they felt self-contempt, unease and a dread of outsiders. In that situation, knowing how to approach them, obtain their trust, and enter their community were important factors necessary for successful fieldwork. Although an outsider, I was not seen as an invader. I was viewed as a friend, who associated with their lives, listened to their complaints and provided assistance for them. As a female, it was arranged for me to live with an unmarried girl. I was able to converse at length with this girl and gain invaluable insights into the Yao culture (Ren, 2006).

The fieldwork for my PhD is somewhat different from that which I undertook in Guangxi Province in 2005. The areas are comparatively wealthier, however the villagers always consider people from cities as having a higher social class and economic status. In the early stages, some friends or officials helped me to enter villages. This method was effective, but not entirely suitable. It was important to alleviate concerns that I would report their activities to the government. Therefore, I attempted to create a 'similarity of identity' based on equality and respect. This involved trying to view the world from the perspective of a peasant and think and act like them as far as possible.

3.6.1.2 Research diary

The possession of a research diary not only enabled the analysis of daily progress, but also provided reassurance that fieldwork was progressing satisfactorily (Punch, 2012). Fieldwork in the north of Anhui Province included not only interviews, but also experiencing rural life and observing local behaviour. These were all recorded in the fieldwork diary, including information related to such questions as:

Why and how did I choose this interviewee? In which situation did I meet the interviewee? What was their attitude towards my interview, and for what reasons? How could I make them feel happy to accept my interview? What comments did the interviewee make? What impression did the interviewee give me? How did I deal with this impression? How did I deal with it later? What role did I play today? For tomorrow's interview, what 'role' will be most helpful to let me become closer to them? What photos, materials, and information did I obtain today? Which were expected? Which were unexpected? Did the unexpected information have any effect on my future interview? Do I have new thoughts from that unexpected information? Did the interview today go smoothly? If so, could I still learn something from it? If not, what were the causes and solutions? Did my arrival have an effect upon the village, families, and other people? What was the effect? How can I comment on this effect? What tools and facilities did I see today? What walking route did I take today?

It should be noted that many events in villages had links (or an indirect relationship) with water.

3.6.2 Oral history and interviews

Given the limited number of intellectuals in the North of Anhui Province during the ROC era, it is not surprising that historical documents addressing water conservation in this area are few. Oral history often attracts the attention of researchers. However, oral research in the north of Anhui Province is nearly non-existent. Therefore, oral history provides a method with which to collect data in conjunction with those methods described previously. Further, there were few intellectuals in northern Anhui Province. Oral history helps us to understand grass-roots society and to see history through the eyes of narrators.

Generally, oral history can be defined as recording (writing, audio, and video), preserving and interpreting historical information, based on the personal experiences and opinions of the speaker (Ritchie, 2003). Oral history can be of importance in the discovery of historical truths, and make up for limitations of traditional archives. Currently, its importance lies in investigating the history of an area's people, social life, women, cities, communities and disasters.

Traditional history tends to focus on elites, whilst oral history opens a door to ordinary people. Thompson (1988) argued that the most important role of oral history is that it provides us with an opportunity to give history back to local communities, to link history closely with reality. The abundance of oral history can deepen our understanding of many historical events. Further, some information from oral history has been linked to important historical affairs; often revealing their complexity and aspects neglected by traditional history. Oral sources represent popular culture and collective memory (Harvey and Riley, 2005). Generally, 'collective memory', linking the past with the present, is typically associated with the field of politics. Oral histories in the U.K. and U.S. are also considered an effective tool for social reform (Johnson and McLennan, 1983).

3.7 Qualitative data analysis

This thesis relied mainly on a qualitative research methodology. The main qualitative data involved historical documents, interview transcripts and oral histories. The qualitative methodology included observing, collecting, and thinking (LeCompte and Millroy, 1992). These processes are interlinked and cyclical. I will use the following example of field work, in order to illustrate how qualitative data analyses were undertaken for this thesis.

The analysis process began by listening to tapes, transcribing interviews, and analyzing written transcripts in order to determine meaning of the data (Michael, 2002). Systematic and rigorous analysis was then undertaken. This involved organizing data, finding ideas and concepts, building themes in the data, ensuring reliability and validity of the data and the findings, and finally making plausible interpretations (Michael, 2002).

Each interview produces a significant amount of data. In terms of the interview guide, I grouped these data as either normal, or unexpected. The latter tended to inspire future research considerations, or provide a new direction. For example, in my initial interview guide, I included only males for interview. During interviews, I discovered important information regarding the roles of women in water events, which illustrated the importance of considering gender in the history of these events for future studies. Interviews provided a platform for participants to communicate face to face (King and

Horrocks, 2010). Besides words, I was able to interpret interviewees' perceptions, attitudes and feelings about the topics. In this way, the interviewer is able to recognize the reliability of oral messages.

As an example, one participant often repeated his appreciation of the communist government in his interview and his oral history magnified the roles of the peasant, tenant and farm labourers in water conservation greatly. This participant was from a small-scale landlord family. He was concerned that the details he had given may be open to analysis by the current government, and therefore, he was keen to keep the information given confidential.

In terms of previous qualitative data analysis components, the most important for this thesis is the process ensuring the reliability of data and subsequent findings, as validation needs to be considered for the whole interview, from collecting data to writing the final report (Patton, 2002). Differences in gender, age, background, education and language can affect the interview's outcome. The following points were important when undertaking my interviews, in order to ensure their validity:

- On a specific question or topic, several people from different backgrounds were arranged for interview respectively.
- When inconsistent or conflicting findings occurred, the interview was repeated and help sought from local people.
- A friend named Mei Jin, who was born in Shou County gave me much help and acted as a key informant. He listened to my interview tapes and helped me to undertake a reliability analysis. My findings were also compared with the literature as part of the validation process.

3.8 **Assessment of sources and limitations of approaches**

This section evaluates possible limitations of each method and information sources including reports, national histories, local chronicles, archives and oral histories.

- Evaluation of sources

The *Report of survey of flooding in Anhui Province* was edited by the Central Water Conservation department. It was professionally written by engineers and technical

officials. The writers had been trained well and were good at writing and technical knowledge. The main aim of the report was to provide a reference for government decisions. Additionally, before the use of the report, some documents have been used to corroborate the reliability of it. These documents are: report of *Land Distribution and Farm Tenancy in Anhui* written by members of the *Central Political Institute* and organised by government; *Temporary report of the Anhui flood relief* edited by Anhui relief division and *The 1931 flood in China: an economic survey* edited by Nanking University. (CAF, 1932)

In March 1932, a magazine called *Relief Work in Three Days* was published by engineers. Key publications reflected the work and life of relief work. Some technical staff contributing to this magazine were from Anhui Province and were therefore familiar with local conditions. The breakout of the 'pacific war' increased patriotic feelings amongst engineers. This was reflected in their work at that time. In this magazine, they detailed their lives and work.

As previously discussed, archives have been valuable sources for this thesis. The archives used here were from the Historical Archives of China, Anhui Archives and archives from the Institute of Modern History, and the Academia Sinica. For the study of Jinghui Channel construction in the era of the ROC, project reports written by provincial and national engineers were used. These reports have been accepted widely as reliable documents (Lin, 2003). Additionally, an official newspaper was used. As an important supplement to written sources, oral histories have also been collected. Participants were in their 70s. They had relatively clear stories regarding the Anfengtang Pond from their parents.

- Limitations of approaches used

Several reports were used as historical materials for this thesis. Some deviation from actual events may exist in the descriptions of these materials due to possible pressure from central or local government. Therefore, as claimed by Huang, in order to increase the credibility of analyses, contents of the reports were only utilized and cited after they were verified with data obtained from archives or local chronicles (Huang, 1984).

One limitation of the notes in the magazine *Relief Work in Three Days* is that the contents may not have analysed the opinions of labourers thoroughly. However, these notes reflected the real lives of the labourers on water conservation work sites and can be considered a valuable firsthand material source for the physical reality of such sites.

It should also be pointed out that in the upper reaches of Huai River, there are relatively few supporting documents to refer to. This is due to the large number of natural disasters and wars in the area at that time. Further, the economic situation in the area was poor, people were less educated and there were fewer scholars or social elites in the area. Additionally, numerous wars and a turbulent society meant that an official document transfer and exchange system was not in order during the period of the ROC. After the flood in 1931, local government officials at every level, as well as local people, were busy with disaster relief. Understandably, process documentation at that time was not a priority. The central government had no alternative but to conduct research and prepare records and reports about the disaster. Limitations of the magazine *Relief Work in Three Days* were to some extent made up for by referring to newspapers (for example, *Shanghai News*, *Anhui News*) and archives issued after 1931, in order to obtain information about the flood and verify text recorded in 1931.

Comparatively speaking, archives are seen as the most important material for the study of history in the period of the ROC (Shu, 1999). However, we still need to address the reliability of archives. Archives function to document national remembrance and activity and, as such, may be susceptible to influence by political powers (Liao, 2008; Huang, 2011). Additionally, whilst compiling archives, writers may have written things that did not take place but that reflected his or her personal perceptions or interests (Ye 1996; Cai, 2015). There are two ways to address this problem. One is to verify the information by reading materials from various archive offices located in the country, province, county or town. Another way is to use sources other than archives. In this thesis, I collected many relevant archives from various archive bureaus, and referred to newspapers etc., as mentioned previously.

In order to confirm the reliability of oral information, several interviewees were involved in each interview topic. Prior to the use of oral histories, other materials were cross-referenced with them. Wang believe that oral evidence can be used to convert ‘the characters investigated in research’ into the people investigating history (2008, p. 27).

As a result, a history will be more profound, vivid or moving, and even more authentic. By contrast, as observed by Thompson (1988, p. 93) "... a sense of randomness can be generated, because there are constraints for oral history. And also, people's memory is limited. It can be restricted by people's knowledge, intelligence and interest, or it can even be influenced by people's emotion and the environment at that time." Oral history is passed from mouth to mouth, but sometimes the narrator may never have experienced or witnessed the events being described. In this study, some interviewees were born after the water conservation events occurred. Therefore, particular attention was paid when using these oral histories, as the content may not have completely reflected the events accurately. In the thesis, the oral messages utilized have been verified by more than one person or compared to written records and actual objects related to the events to increase reliability. As there was no TV or radio in the Chinese countryside at the time of the event, children were used to sitting around their family, listening to their stories. The interviewees confirmed those water conservation events involved in the thesis were a main source of the stories and had been told many times. Therefore, these events are clear for them. It is also important to understand that the reality may lie between the lines or behind superficial words of interviewees. Therefore, it is imperative that oral statements are verified by comprehensive analysis of other sources.

In summary, most historical documents used for this thesis were considered reliable. Document sources used here have also been used for other studies of Chinese history (Peng, 1981). The reliability of the historical documents typically depends on the authors of those documents. Most of the writers of the historical documents consulted in this thesis were technical staff or engineers. Like traditional intellectuals, they set out to serve the public with knowledge. They were heavily influenced by western science and democracy. As China suffered from domestic trouble and foreign invasion, many intellectuals at that time were devoted to providing service for their country by developing or applying technology. They considered their own documents as one way to disseminate this knowledge. Accuracy was an important part of this process. Moreover, this thesis is focused upon qualitative investigation rather than quantitative analysis. Many other sources, such as books and articles, were used to verify economics, culture and public emotion at the time concerned.

3.9 Conclusion

This study was focused on research into water conservation in the areas along the border between north and south China in the era of the ROC, due to scarce and rudimentary previous studies in these areas. Additionally, investigation into two other representative water conservation schemes in south and north China were included in the study for comparative analyses. National history, local chronicles, archives, newspapers, journals, interviews and fieldwork were combined in the study. The history of water conservation was not considered an isolated issue in this study, but as part of an overall investigation comprising a combination of water conservation, land policies, domestic economics and politics and global circumstances. Through this research, the author attempted to answer a fundamental question, 'who' took charge of water conservation.

Chapter 4: Conflict and cooperation – flooding and relief work in the Huai River Basin in Anhui Province in 1931

4.1 Introduction

Oliver Rackham, a forest historian in the U.K., considers that environmental change in Mediterranean Europe resulted from multiple factors including the productive activities of humans and natural change (Rackham 2001). It is clear that his view can be applied to the study of the history of water conservation. In fact, there are two areas of focus in water conservation. One is the element 'water', through which we can study the progress of the natural world, the action of nature on human beings. The other element is 'interest' or 'benefit' through which we can examine the actions or thoughts of human beings and examine the influence of humans upon the natural world. The following will consider the perspectives of both nature and human beings when exploring the flooding and relief work in the Huai basin. The river I focus on is the Huai, which is considered as a border between South China and North China. This river has been the center of many discussions from many researchers. Those discussions were focused on ancient or contemporary times, rather than the ROC era (Yao, 1987; Tan and Zhou, 2003).

This Chapter investigates the Huai River flooding of 1931 and its causes and discusses the relief work project in 1931. The first section of this chapter will provide a picture of flooding in nine counties of the upper reaches of the Huai River Basin in 1931. The second section of this chapter will examine the causes leading to the disaster. The third section will focus on rescue activities against the flooding. National finance and the action of charity play an important role in these activities. The final section will explore Post–disaster relief. Relief work projects were the main strategies for people there to recover lives and homes. It is the first time that life on work sites, local dyke protection organisations and labour services in the relief work project in 1931 have been examined. Investigations of cooperation and conflict between state and local governments, within local governments and between refugee labourers and both engineers and foremen are

discussed. Regulations and laws, local customs, engineers' notes and meeting notes were used to reflect budget, personnel, political struggles and military interest in the project.

4.2 The Huai River in reports of engineers: relief work in the Huai River Basin in Anhui in 1931

4.2.1 Huai River floods 1931

Anhui province is located in the middle of China across the basins of the Yangtze and the Huai rivers, as shown in Fig. 4.1. Anhui borders Jiangsu to the east, Henan to the northwest, Zhejiang to the southeast, Jiangxi to the south, Hubei to the west, and Shandong to the north (see also Fig. 4.2). Anhui is quite diverse topographically and in size it is 162,669.6 square km. Traditionally, Anhui province has been divided into three parts. The north of the province, part of the Huai River basin, is a plain. Most crops are dry crops. The north-central area is located between the Huai and the Yangtze rivers. The southern part of the province is located south of the Yangtze River. Land for crops is in short supply and most of it is used for rice, which needs abundant water. The land becomes more uneven further south, with the Dabie Mountains occupying much of southwestern Anhui and a series of hill ranges cutting through southeastern Anhui. In the past, there were many lakes in the north of the province. Due to the flush of the water from the Yellow and Huai rivers, more deposited alluvium was formed there. In the south of the province, the area around Yellow Mountain was rich in Granite, limestone, schist and sandstone. The mountains in the middle of the province have similar geology (Guo and Hong, 1937). The Huai River originates in Tongbai Mountain in Henan province. At source its altitude is 1,127 meters. It flows around 300 km east to the Henen-Anhui boundary and meets the Hong and the Ru rivers at Shanhejian and then enters Anhui. Before Shanhejian there are only a few water sources joining it. Because of the steep river bed, even after extensive rainfall there was seldom an extensive disaster because of the good discharge.



Fig. 4.1: Map of China[1]

After Sanhejian the Huai flows across Yingshang, Huoqiu, Shou, Fengtai, Huaiyuan, Fengyang, Wuhe and Xuyi counties in Anhui and then arrives at Laozi Mountain located on the Anhui-Jiangsu boundary. It then joins Hongze Lake in Jiangsu province. There are many tributaries joining it, such as the Ying, Xifei, Ci, Guo, Tuo, Pei, Beifei and Hao rivers. The section of the Huai that flows through Anhui is 410 km in length; in total the Huai River is 610 km long. Due to the many tributaries in the upper reach, a relatively flat river bed and the slow flow in the lower reach, flooding and levee collapses occurred frequently (ARC, 1931). The distance from Hongze Lake to the Yellow Sea is about 150 km. Originally, the Huai flowed into the Yellow Sea directly.

[1]Available at: http://image.baidu.com/, Accessed: 10 October 2011

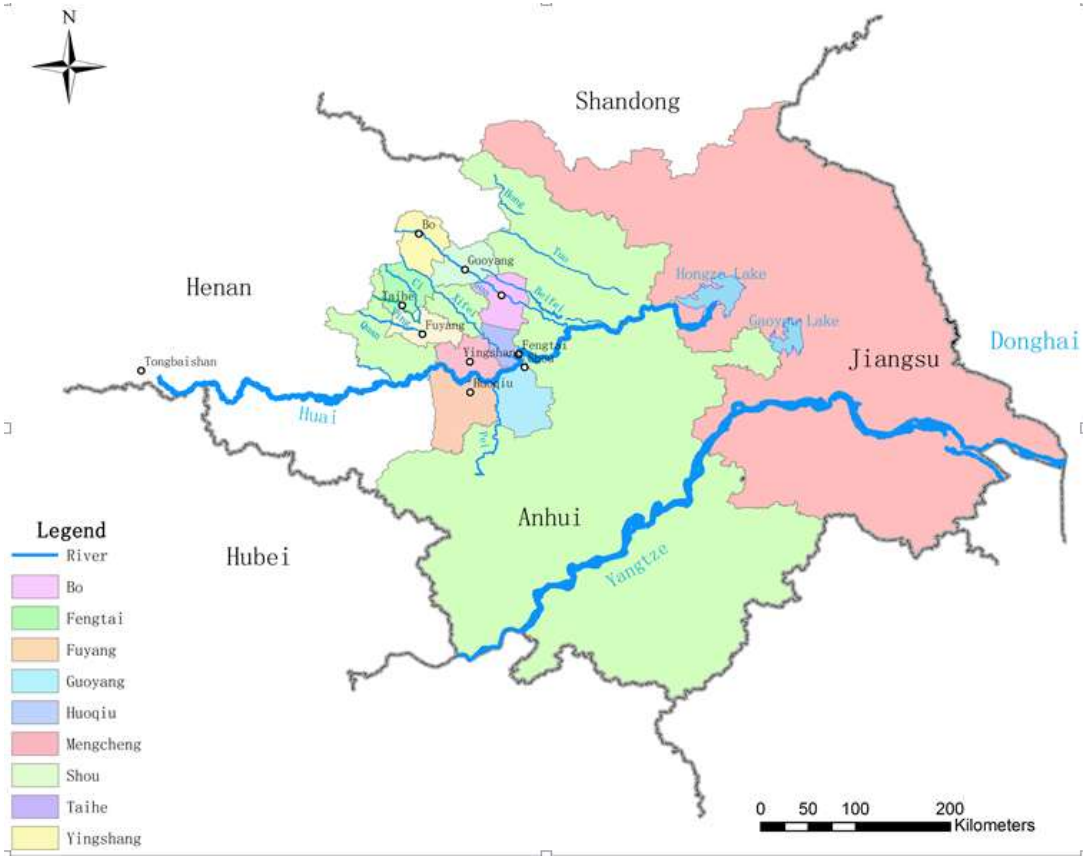


Fig. 4.2: Map of representative counties in Anhui province and the relevant rivers [2]

[2] Reprinted according to the data of Chinese Geography, by Bo REN

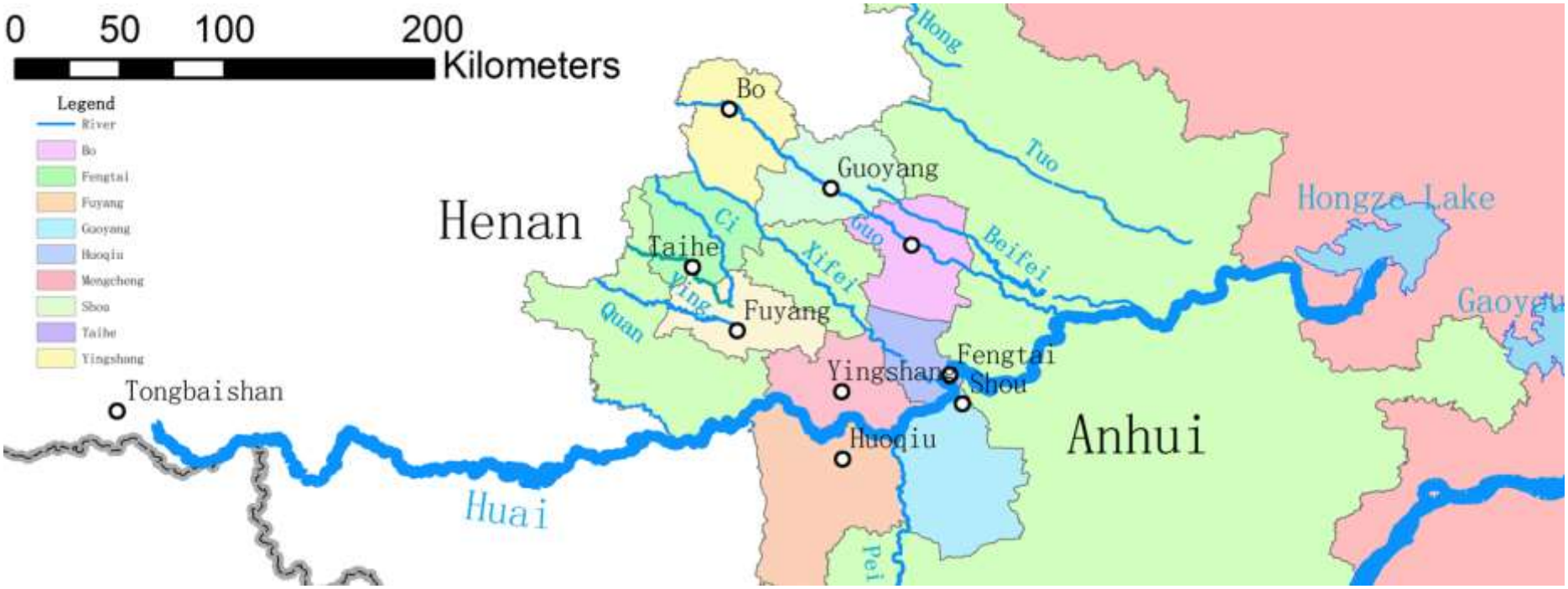


Fig. 4.3: Map of relevant counties and rivers in Anhui province [3]

[3] Reprinted according to the data of Chinese Geography, by Bo REN

Table 4.1: Refugee density of representative counties suffered in flood 1931 (ARC, 1931, p. 5)

Counties	Size (km^2)	Refugee number	Refugee density (heads/km^2)
Fuyang	7,123	680,000	96
Yingshang	1,983	180,000	91
Huoqiu	4,207	125,000	30
Mengcheng	2,597	340,000	131
Taihe	2,050	220,000	107
Guoyang	2,770	305,000	110
Bo	2,837	250,000	88
Shouxian	4,070	380,000	94
Fengtai	2,633	400,000	152
Anhui Province	158,000 (size of Anhui Province)	9,632,000	61

After the Song and Yuan Dynasties (960-1368), the Yellow River caused many floods in the south of China. The Huai subsequently became silted in low-lying areas of Huaiyin County. What was originally a bog became the huge Hongze Lake which covered approximately 2500 $km.^2$ And then the Huai changed part of its course. Until the middle of the Qing Dynasty (1644-1912), Hongze Lake, Zhangfu River and some other lakes and rivers experienced silting up due to the inverse flow of the high sand-content water of the Yellow River.

A new river called the Sanhe flows across Gaobao, linking Hongze Lake and joining Gaoyou and Shaobo lakes, and then enters the Yangtze. Even the course of the Yellow River changed a little toward the north, and the Huai River lost its former course, as its riverbed was high (ARC, 1931).

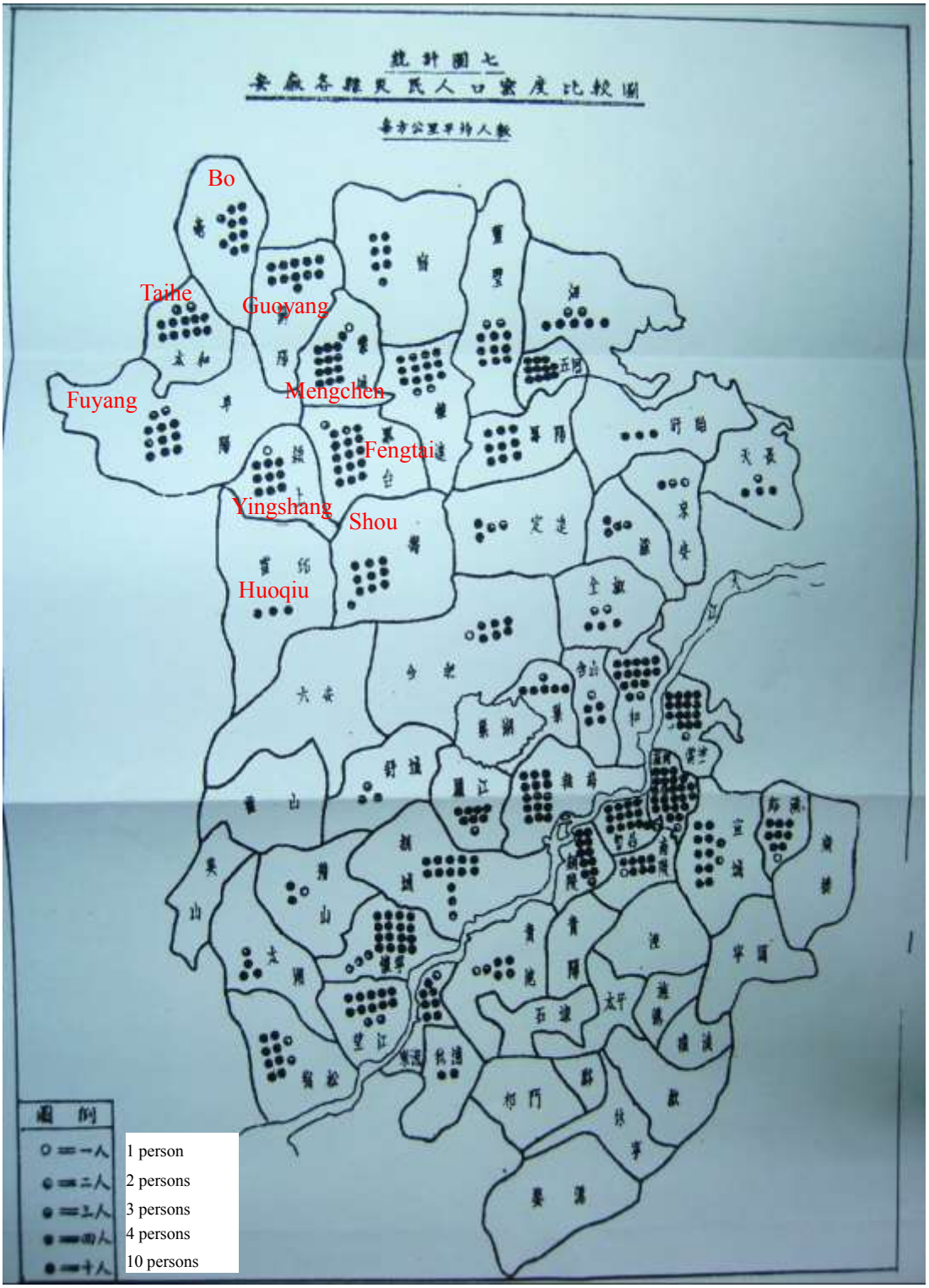


Fig. 4.4: Illustration of refugee density of the counties suffered in the flood 1931 (ARC, 1931, p. 6)

The climate seemed unusual in 1931. From early summer, steady drizzle fell over most parts of China. The number of rainy days in the Pearl, Songliao, Yangtze and Huai river basins between June and August was in the range of 35-50. Additionally, many provinces experienced several days of very heavy rain. Significant flooding therefore happened across China. Some 592 counties in 16 provinces were involved in the disaster. The calamities in the middle and lower reaches of the Yangtze and Huai river basins were particularly severe (seen Tables 4.1, and 4.2, and Fig. 4.4)

In Anhui, there are 60 counties (total area: 158,000 km^2). Of these, 44 were affected by the disaster, covering an area of 58,641 km^2, or 36% of the province). The resulting famine in the north of Anhui was more serious than that in the south (ARC, 1931, p. 15). The biggest area involved in the flood was Fuyang County, at over 7000 km^2（Wang, 1990.

In this chapter, the flooding in the Huai River basin in 1931 is used as a case study to reflect the flooding in that area in the era of the ROC. Writers of the documents used in the chapter were the technical staff from departments of water conservation. They not only joined the post-disaster survey, but also carried out design, supervision or construction. In fact, the post-disaster survey was one aspect of disaster relief, and was the basis of post-disaster policies and action.

Floods had a serious effect on the lives of residents, particularly in agriculture, since industry in Anhui was undeveloped. There were only 40 medium-sized factories, among which about ten factories used machines for production. So most people simply relied on farming (Guo, and Hong, 1937). There was farmland totaling 9,160,000 acres in Anhui.

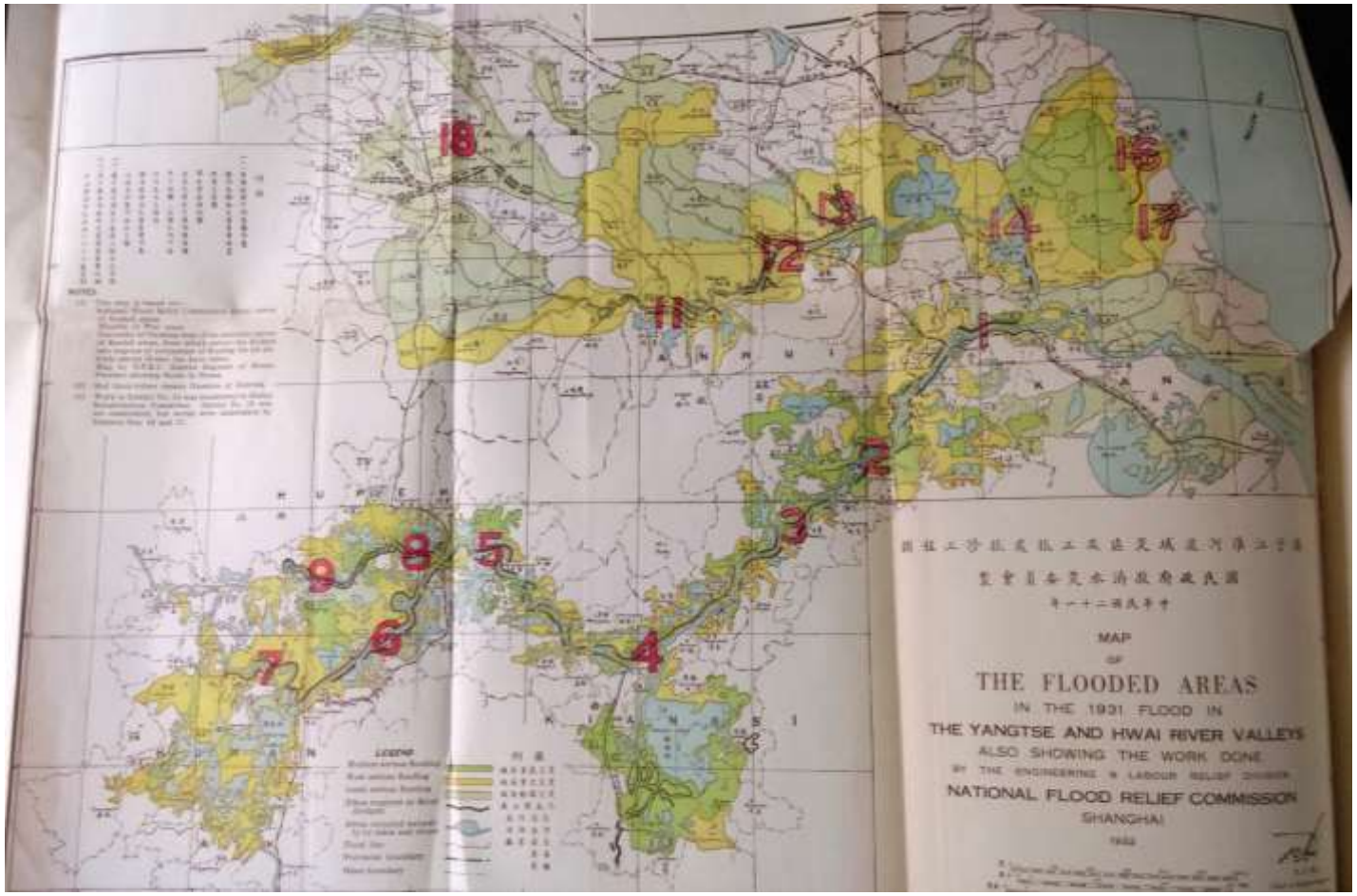


Fig. 4.5: The flooded areas in the 1931 flood in the Yangtaze and Huai River Valley (NFRC, 1933)



Fig. 4.6: The flooded areas in the 1931 flood in the Anhui Province (NFRC, 1933)



Fig. 4.7: General view of a flooded area in Anhui (NFRC, 1933)



Fig. 4.8: With a mighty rush the water overwhelmed farms and villages when a dyke was breached (NFRC, 1933)



Fig. 4.9: Nearly half of the farm buildings in the flooded area were destroyed (NFRC, 1933)



Fig. 4.10: Refugees in the flooded area (NFRC, 1933)

The size of the submerged land was about 5,170,000 acres, of which 900,000 were from Fuyang County. Most of North Anhui was flat plain and so was relatively susceptible to flooding. All the farmland in Wuhe County was submerged. Fengtai County had 93% of its farmland under water, as shown in Fig. 4.11.

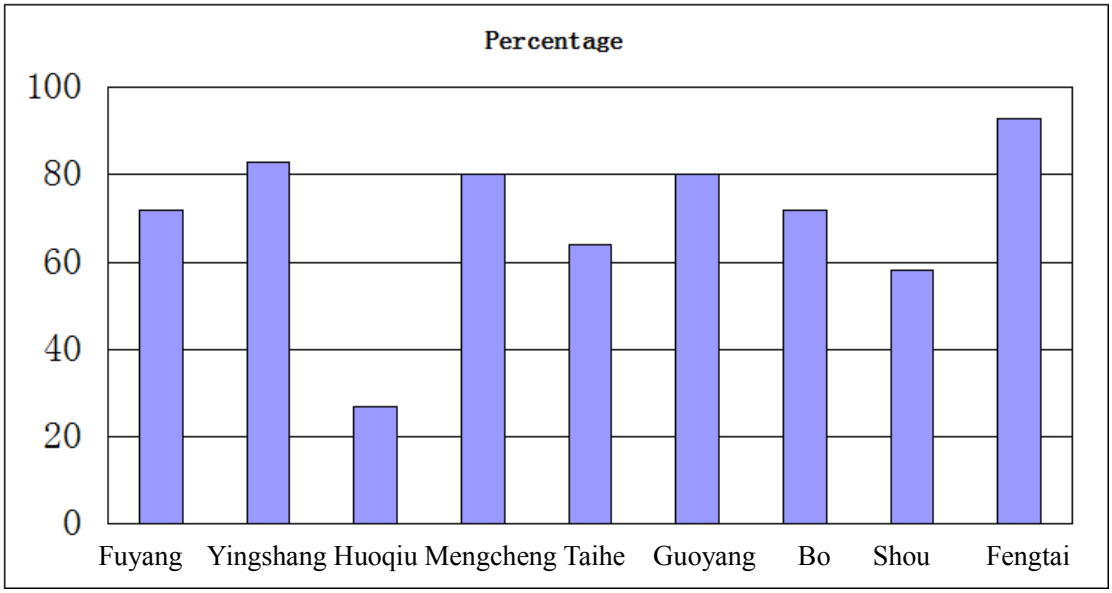


Fig. 4.11: Ratios of the farm land under water to the sizes of the farm land of corresponding counties (NFRC, 1933, p. 15)

Table 4.2: The levees collapse in the flooding in representative counties (ARC, 1931, p. 8)

Counties	Collapse Date	Collapse length (m)	Height of levee (m)	Upper width of levee (m)	Bottom width of levee (m)	Notes
Huoqiu	June 21–23	8,000	3.5	6.0	16	South levee
Yingshang	June 25	2,000	7.5	6.0	22	North levee
Shouxian	June 26	10,200	3.5	4.5	6	South levee
Fengtai	July	300	2.0	3.5	12	North levee
Huaiyuan	July 11	1,180	5.5	3.5	16	North levee
Fengyang	July	1,530	4.0	4.5	12	North levee
Wuhe	July	260	3.5	3.5	16	North levee

In order to know the scale of the calamity and prepare for post-disaster reconstruction, engineers were organised to investigate the flooding in various counties in the upper reach of the Huai in Anhui (ARC, 1931, p. 1). The following are descriptions of the situation in various counties. Moreover, the engineers' investigations were deemed helpful to find the causes of the flooding, to understand the actions of local organisations and various-level government actors.

4.2.2 Rivers and Anfengtang pond: Shou County

The terrain of Shou County was relatively flat. Huai river, Pei river, Anfengtang pond, and Chengxi lake were situated west of the county centre. In the east of the county, there was Dongfei river and Waguan lake. A moat was built around the county centre to link the Huai river. In 1931, excessive rain resulted in a reverse flow of water of the Huai and this led to the most serious disaster in over 100 years (ARC, 1931, p. 58). Pei river was the main river in the west and was the longest river joining the Huai in middle Anhui. The flash floods in the Summer of 1931 resulted in several collapses to levees of the Pei. The Dongfei river was another main river in the east but did not have high levees. The altitude of the lower reach of it was relatively high. The rise of water in the Huai river led to an inverse flow into the Dongfei and this resulted in flooding.

Anfengtang pond was the only reservoir in the southwest of Shou County. It had provided irrigation to a large area of farmland around it. Due to recent silting up of the Pei river and private wasteland reclamation in Anfengtang Pond, it normally dried up in the drought season and filled again in the rainy season. Around 30 km southwest from the centre of the county there was Zhengyang Pass, where the Ying river and Pei river joined the Huai. In the Zhengyang Pass area there were many boats and business was very prosperous. The floods in that Summer were around 1 meter in depth. The water in the town centre was nearly 1 meter as well. Gentry there thought the floods came from the inverse flow of the Huai river and the narrow mountain pass that the Pei river went through. So they arranged the closure of discharge gates linking with the Huai and extended the mountain pass between Jia mountain and Jingtu mountain and broadened

the channel of the Pei river. The small discharge gates made the water difficult to release. Jia mountain and Jingtu mountain worsened the flood but were not the main cause of it. For safety reasons it was proposed to dredge up the channel between Wabu lake and Huai river, to build more discharge gates and sluices and to widen and heighten the levees along the Pei and Huai rivers (ARC, 1931, p. 59). Water is a fundamental element of agriculture. On the other hand, agriculture in China, as in other parts of the world (Trimble 2003) makes great changes to water distribution and river landscapes.



Fig. 4.12: The terrain of Shou County [4]

[4] Reprinted by Bo REN, according to photomap from Google

The above analysis indicated that the fundamental causes of the disaster in Shou County were from two sources: natural conditions and human factors. Human factors were twofold. One stemmed from people who just cared about their private or current interests, for example wasteland reclamation and the other stemmed from improper water management and conservation policies. Both causes echo Shi's (1991) findings that the reasons for desertification stemmed from both natural factors (such as climate) and human-made effects linked to population migration and land reclamation.

4.2.3 Floods and Robbers: Fengtai

The condition of the Huai in Fengtai was affected by its terrain, as was that in Shou County. The upper course of the Huai river in Fengtai County was in zigzags and silted up easily. It was restricted by Jia Mountain. There were many tributaries linking with the lower part of the Huai in Fengtai County. Moreover, the lower part was restricted by Jingtu mountain. Flash floods or excessive rain always resulted in severe disaster. Moreover, the shallow riverbed of the Xifei river linking with the lower part of Huai river was silted up so that didn't help. In 1914, levees were built to prevent overflow from the Xifei river. However, the levees collapsed soon as the soil of the levees was too loose.

Additionally, the soil of the land in the disaster area was sandy and poor and not suitable for cultivation. Even in a fine year there was only one round of harvesting. Usually, there were few foodstuff reserves in storage. As a result of the disaster some people set barriers in the river and carried out blackmail or robbery (ARC, 1931, p. 61). So, the causes of the flooding in Fengtai resulted mainly from natural factors. Barriers to the post-disaster water traffic made the delivery of materials difficult creating a vicious circle. Therefore, flooding is not only a natural disaster, but also has great effect on social security, and, as stated by Bao, can result in social unrest (2004, p. 483).



Fig. 4.13: The terrain of Fengtai County [5]

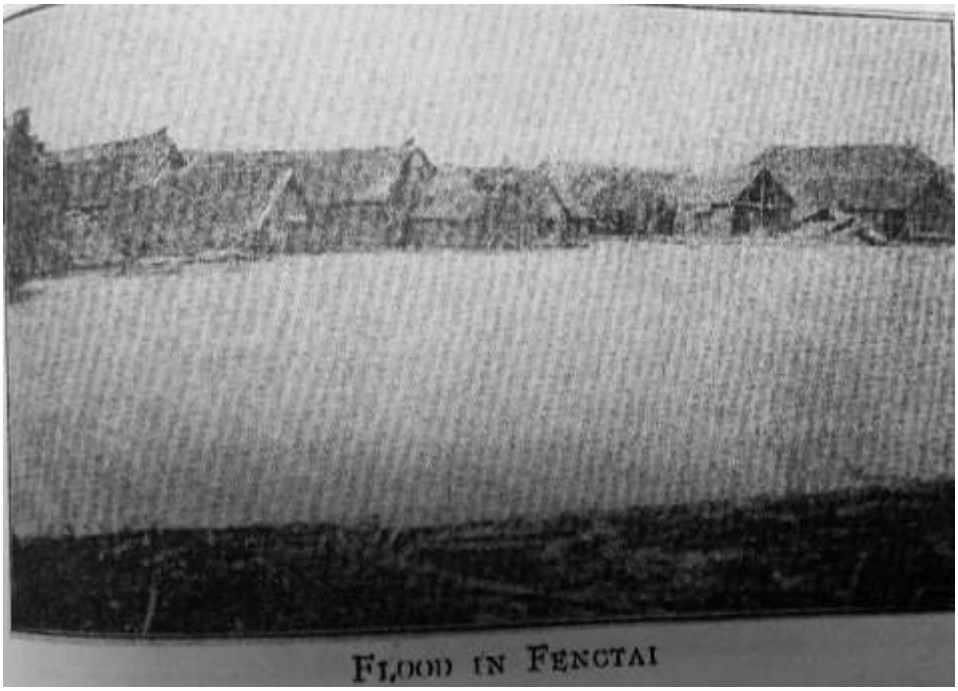


Fig. 4.14: Flood in Fengtai (ARC, 1931)

[5] Reprinted by Bo REN, according to photomap from Google

4.2.4 Floods and Kidnapper: Huoqiu

Few people were involved in the reconstruction in Huoqiu. Huoqiu County was located in the upper reach of the Huai river which flows along the Yingshang-Huoqiu boundary. The levee of the Huai in Huoqiu was about 75 km in length. Two lakes called Chengxi and Chengdong were located in the west and east of the county respectively. The area of these two lakes was around 30% of the whole county. Soil there was fertile and this made Huoqiu the county that produced the top harvests in northern Anhui province.



Fig. 4.15: The terrain of Huoqiu County[6]

[6] Reprinted by Bo REN, according to photomap from Google

In July, heavy rain lasted for a long time and this resulted in 28 collapses to the Huai river. Residents suffered from the floods and bandits. The head of the county had been kidnaped and there was nobody in charge of the reconstruction and relief. After the retreat of the flood waters, bandits still stayed in Huoqiu and this hampered cultivation of the farmland. It was proposed to get rid of the bandits prior to the reconstruction (ARC, 1931, p. 67). The above analysis echoes Mollory's (1929) findings on the importance of social factors to disaster management.

4.2.5 Levees and Experience: Fuyang

Both Fuyang and Huoqiu are located in the upper reach of the Huai. The section of the Huai river in Fuyang County was around 60 km in length. In the middle and northwest of Fuyang there were the Sha river and Xifei river. Analysis of archival data (ARC, 1931) revealed that in 1917, Sichong Ni, a governor of Anhui Province arranged for residents in the area up to 25 km away from Fuyang centre to build levees for the corresponding section of the Huai. It took them 2 years and cost about 300,000 Yuan to build the levee from Fangjia Market down to Nanzhao Market; a length of 50 km. However, there was no levee for the segment from the Hong river entrance to Fangjia Market. There was no levee for another segment (about 500 meters in length) near Nanzhao Market as well. Fuyang suffered much from the sections without proper levees. Most of these rivers did not have dykes or good levees (ARC, 1931, p. 62).

There were two possible reasons for the absence of the proper dykes. Fuyang was located in the upper reaches of many rivers. The second was that except for the Huai, those other rivers seldom flooded. However, three big rises of the Huai river between June and July 1931 submerged the gulf area along the Huai. The first rise of the river submerged most plants such as sorghum and soya. Replantation of buckwheat and mung between June and July had been flushed away again by the second rise. Then it was quite difficult to get seed even when higher prices were offered. The peasants even tried several plantations but the frequent flooding made them fail to have a harvest. Archives indicated that residents there held inordinate trust or dependence on their high terrain

and their previous experience. The experience led to a misjudgment (ARC, 1931, p. 63). Fortunately, at that time, local communities set up a Flood Relief Committee which organised donations and rescued thousands of people by opening several porridge factories (ARC, 1931, p. 64).



Fig. 4.16: The terrain of Fuyang County

4.2.6 Levees and Thrift in Foodstuff: Yingshang

Compared to Fuyang, the altitude of Yingshang was relatively low. Analysis of archival data (ARC, 1931, p. 65) showed that 70% of its farmland was low-lying. The Ying river flowed across the middle of Yingshang County and was in length about 130 km. The county Government had organised the improvements on the river since 1912. Another two main rivers were the Xifei (in length 10 km) in the northeast and the Run (in length 15 km). The Huai flows across the south of Yingshang County and zigzags. The section

of Huai river in Yingshang County was around 85 km in length. In 1917, Sichong Ni organised construction of levees on the section from Cao Taizi, west of Nanzhao Market to Liuzi Kou near Zhengyang Pass in the west. The levee was about 60 km in length. Besides the levee of the Huai river, he also arranged for construction of levees on Qiujia lake, Duozi lake and Daijia Lake. The total length of levees was around 130 km. The construction took two years. With the construction of sluices and extra improvements in the following 10 years, the project reached its completion (ARC, 1931).



Fig. 4.17: The terrain of Yingshang County [7]

In the period of June to July 1931, continuous rain saw water levels rise dramatically. The Ying and Fei rivers were affected by flash flooding in Henan Province as well. Most areas including some high-altitude land were submerged. Many livestock and a quantity

[7] Reprinted by Bo REN, according to photomap from Google

of seed were washed away. As many main rivers converged in Yingshang, the flood brought significant damage to the levees of them. It was urgent to reconstruct them. The flood caused severe food, firewood and cattle shortages in Yingshang. County government proposed to pause brewing to save food and buy rape seed for the whole county (ARC, 1931, p. 66). One cause of the disaster was from the weakness of the levees. Besides the reconstruction of the infrastructure, an important way to get through the disaster was to save foodstuff.

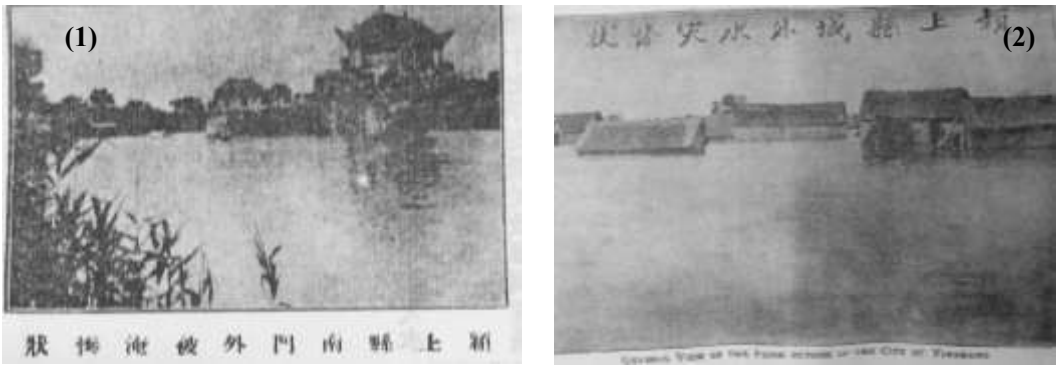


Fig. 4.18: View of the flood outside of the South Gate of the city of the Yingshang (1); View of the flood outside of the city of the Yingshang (2) (ARC, 1931)

4.2.7 Silting: Mengcheng

Echoing work by Chao (2005) on the relations between water resource and changes to social economy in contemporary Shaanxi water conservation of the North Anhui Province was found to have tight links with economy and water transportation. Guo river was the main river flowing across Mengcheng County. The section of the Guo river in Mengcheng was 100 km. Because of long term silting up the river bed was relatively high. With scant rainfall, water transportation was difficult and the market

was affected greatly, while with a heavier rain, transportation was affected by flooding. The Qian river was situated in low-lying land in the south of Mengchang. Due to loose soil near the Qian river, rain always caused silting. It had been dredged in 1899 and 1905, then nothing had been done for over 20 years. The Beifei river was in a similar condition. Furthermore, there was a lot of reed on the levee of the segment in Huaiyuan. This affected the water flow and worsened the disaster. It was written that the main cause of the frequent floods did not come from natural factors but from insufficient dredging. In Guoyang County, which bordered the north of Mengcheng, there are many rivers linking each other. When Mengcheng suffered floods from normal rainfall, however, good harvests were still reaped in Guoyang County (ARC, 1931, p. 67).



Fig. 4.19: The terrain of Mengcheng county [8]

[8] Reprinted by Bo REN, according to photomap from Google

4.2.8 Floods and Reed: Guoyang

Guoyang County bordered Yongcheng County of Henan Province and Fuyang, Bo, Suxian, and Meng Counties of Anhui Province. It had carried out much work on water conservation over the years. The development of its village became a model for other counties in the north of Anhui. The Guo river flowed across the middle of Guoyang County. The Qian river and Xifei river were situated in the south of it. In the north of it, there were main rivers like the Beifei and Bao. Furthermore, there were many tributaries linking with these main rivers. Normally, the river system worked well yet actually, part of the Qian was silted up. The gate linking it with the Huai was too small. Moreover, plenty of reeds were planted along the Guo river in Huaiyuan County.



Fig. 4.20: The terrain of Guoyang County [9]

[9] Reprinted by Bo REN, according to photomap from Google

Due to the reeds, heavy rain often brought floods to Guoyang and Mengcheng Counties. Another river, the Bao flows, across Guoyang and then enters Suxian County. Compared to Guoyang, Suxian County suffered greatly from the silting up of the Bao. Disputes regarding this lasted for many years and agreement was hard to achieve (ARC, 1931, p. 69). People in both Mengcheng and Guoyang planted reed. Compared to some crops, reed could bring the residents more income. However, it seemed that peasants did not realize that only if the reed had entered the market, it could have become a commodity. However, the market was frequently damaged by the flooding. In many ways, findings from Guoyang County echoes Zhuang's (2005) work which highlights how over-cultivation or improper cultivation can lead to the destruction of the original hydro-geological environment.

4.2.9 Terrain, transportation and economy: Bo

Bo County bordered Henan Province to the north. Both water and land transportation were convenient and this helped Bo to benefit from the export of herbal medicines such as *paeoniae alba* and *chrysanthemum*. So trade in the north was normally flourishing. Drizzle was persistent in June and July and this caused rivers in the north to rise dramatically. Simultaneously, rivers in the south suffered floods due to an inverse flow of flash floods in Henan Province. The flood created serious problems for transportation, crops and markets.

Analysis of archival data (ARC, 1931, p. 65) indicated that the main cause of the flooding might have come from the high terrain in Henan Province. Another possible cause was that rivers including the Guo, Fei, Qian, Baichi, Dongming, and Bao did not have proper levees. Engineers in water conservation thought it was essential to dredge the rivers to prevent floods. The residents realized the importance of proper river levees as well (ARC, 1931, p. 70). If local governments had organised and encouraged local residents to carry out construction, they might have been happy to do so. So this disaster resulted from both natural factors and unexecuted duties.



Fig. 4.21: The terrain of Bo County [10]

4.2.10 Disputes: Taihe

Echoing work by Evenden on the transnational forces affecting the Fraser River (2004), Taihe had disputes regarding water conservation with its neighboring counties. Little work was done to dredge rivers in Taihe over a long period. The rivers got dry usually in the small rainfall season but overflowed after heavy rain. Except for the south levee

[10] Reprinted by Bo REN, according to photomap from Google

of Dongming river, there was no levees for other rivers, such as the Ying, the Gu and the Fei in Taihe County. The levees of the Dongming were built by Qiu Ge during the period of 1795-1797. The north levee of the Dongming belonged to Luyi County, Henan Province, while the south one belonged to Taihe County, Anhui Province. As most of the north levee had gone, the rising waters of the Dongmingr caused Luyi to suffer flooding in 1931.

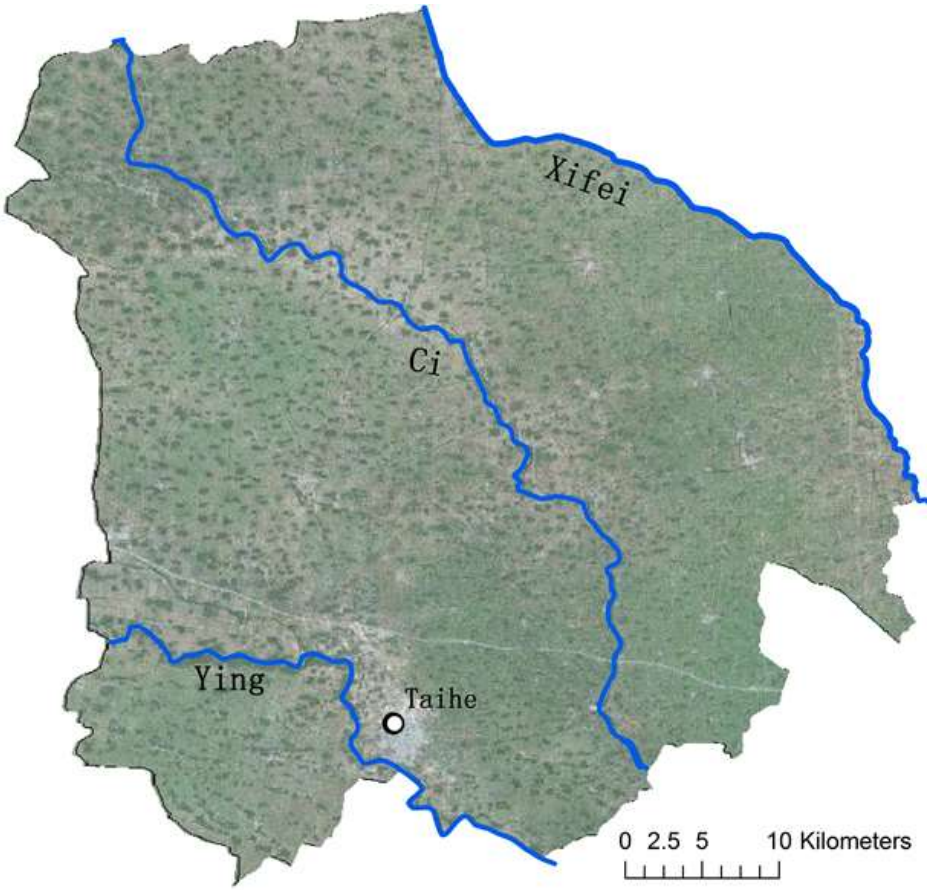


Fig. 4.22: The terrain of Taihe County [11]

Analysis of archival data (ARC, 1931, p. 65) revealed that Luyi County thought the

[11] Reprinted by Bo REN, according to photomap from Google

south levee of the Dongming hampered the water flow, causing flooding. They paddled their boats to the south levee with guns for protection and dug it. Then the waters flowed into Taihe County as well. Residents of Taihe fought back and there were deaths on both sides. The dispute resulted in legal action (ARC, 1931, p. 68). As the Dongming river was connected to the interests of three counties (Luyi County of Henan Province, Bo County and Tiaihe County of Anhui Province) it was important to balance the interests among them and then carry out the reconstruction of the levees otherwise floods would happen regularly and disputes would never end.

4.3 Causes

The flood disaster status of the counties of the upper reach of the Huai river in Anhui Province has been described above. In summary, the causes of the disaster came from natural factors and human error and negligence.

The following is analysis based on an investigation of natural factors carried out by experts in water conservation. Analysis of archival data (ARC, 1931) revealed that in July 1931, many provinces (up to 16 of 39) experienced the most serious rainfall and floods in over the previous 100 years. Compared to that in 1921 when serious flooding happened, the rainfall in 1931 was much higher. Rainfall data in Beng Bu and Xuyi Counties in 1921 and 1931 are shown in Table 4.3. Rainfall amounts may be linked with storms. It was reported by Kezheng Zhu, who used data from Okada Takematsu, a director of the Japanese Observatory as references, that storms had passed the lower reach of Yangtze 12 times in July 1921, and 7 times in July 1931 (Zhu and Liu, 1931). Moreover, the storms blew from west to east, consistent with the flow direction of the rivers. Furthermore, the long-time drizzle lessened the evaporation of water and worsened the floods (ARC, 1931).

Table 4.3: Rainfall in Beng Bu and Xuyi Counties in 1921 and those in 1931 (ARC, 1931)

Counties	Rainfall in July 1931 (mm)	Rainfall in July 1921 (mm)
Beng Bu	488.1	376.9
Xuyi	490.5	390.3
Bo		370

North of Anhui was part of Huaibei Plain. So, when floods occurred, there was little higher ground to limit them. It was easy for water from the Huai to flow inversely to other rivers, as most entrances of tributaries linking with the Huai were low. Moreover, before Hongze lake, the distribution of tributaries of the Huai river was in the shape of a fan. This made it difficult for the lower reaches to discharge water and thus worsened the disaster. In terms of comparison of the water level records between the upper reach of the Huai river and Hongze lake and hydraulic calculations (ARC, 1931, p. 9, 11), the direct cause of the floods in the upper reach of the Huai was not the so-called silting up of the Hongze Lake as even high water levels in the Hongze could hamper the flow of the Huai. The fundamental causes of the flood of the Huai were from its silting up, reduced capacity and a high riverbed. All these caused an inverse flow and flooding to the land.

Echoing Mollory's (1929) argument that the causes of disasters are rooted in social as well as natural factors, another important cause for the flooding was a dereliction of duty and malpractice from local people. All the rivers in the above mentioned counties had the problem of silting up. There were some possible reasons for the silting up: the natural terrain, poor attention to soil and water conservation, insufficient channel dredging. Furthermore, many rivers there did not have complete embankments. Little maintenance had been done on the rivers. The most recent record of it was in 1915. Moreover, the record was just for some main rivers, so maintenance might have not

been carried out on many tributaries for many years. Any maintenance was just a small scale operation. Moreover, many people carried out destructive action to water conservation for their private interests, for example, private wasteland reclamation or reed cultivation near levees. Some improper actions were from bad decisions from leaders in local communities. For example, county gentry had organised people to block water entrances. Additionally, ceaseless disputes and conflicts had brought extensive harm to water conservation. As analyzed above, many factors including natural factors, and human error and negligence resulted in difficulties in the construction of water conservation structures. These difficulties created a vicious circle for water conservation and also frequently resulted in a phenomenon that flooding produced many refugees, but no person was responsible for flooding.

This chapter has focused on the north of Anhui. There were similar issues in the south of Anhui where the polder land along rivers decreased the water capacity of the rivers. To make use of mountain land as farmland also increased the frequency of flooding (ARC, 1931, p. 9). Additionally, engineers in the past had paid more attention to lower reaches rather than upper reaches, however, this made the dredging of lower reaches ineffective. Technical staff thought it was essential to consider dredging for the whole river, to carry out afforestation, to improve cultivation styles and reclaim terraced land (*ibid,* p. 81), to build weirs and reservoirs to hold sand and stones (*ibid,* p. 82). Actually, all the above suggestions were just technical solutions to lessen the problem. Marsh land reclamation was a human action in the struggle of land with water. To change mountain land into farmland was a human struggle with the mountain for land. As declared by Shi (1991) and Shiba (1987), population migration had close connections with water and environment. In Anhui, the key cause of the struggle for land between humans and water and struggle for land between humans and mountains was the increase of population and the disharmony in human-land relationships locally. The peasants thought more land would produce bigger harvests and more income. However, they had not foreseen that a flood could leave their efforts wasted. The peasants thought the harvest would always be proportional to the amount of land. That may prove true in any one year.

However, the difficult environment was a consequence of human activities over hundreds even thousands of years and was hence impossible to manage perfectly. Many people viewed disasters as simply their destiny. They did not recognize that their present challenging environment was the consequence of improper management by generations of their ancestors. In turn, improper activities by themselves would bring negative environmental consequences to future generations. Government too was responsible for its failure to balance land ownership and to educate the peasant population.

An uncooperative attitude from residents was another important cause of the disasters. There were many dykes in the south and middle of Anhui. Governments were responsible for carrying out annual maintenance on important ones. They were called official dykes. However, when floods happened, villagers always just carried out repairs on minor dykes. The fact was that once the official dykes collapsed, most minor levees would collapse as well (ARC, 1931, p. 9). Some levees were situated close to or within the property of local residents. Even when leakage happened to levees, some of them would not like to report it as they worried the repair and rescue works would destroy their properties. On 17th August, bandits destroyed levees of marsh land in Wuhu Lake. However, villagers just focused on the rescue of crops but did not cooperate to rescue the levee (*ibid*) and as a result, many marsh lands were submerged. In the report, two comments were used to describe the action of villagers: 'spoil the ship for a halfpenny worth of tar' or 'selfishness' (*ibid*). Actually, these comments on villagers were not completely improper, because, within the acts of the ROC, nothing was mentioned about compensation for private items destroyed during rescue or repair works. The concern from villagers was very simple. The government should provide funds to fix the destroyed dykes. If their property was damaged, they may have nothing to live on. Additionally, the villagers might not have knowledge to evaluate the status of the flooding in terms of the condition of leakage.

Analysis of archival data (ARC, 1931, p. 85) revealed that heads of local governments were encouraged to organise and chase villagers to dredge the existing channels or dig

new channels to connect tributaries. However, those local governments had not shown good cooperation either, as many channels were completely silted (ARC, 1931, p. 85).

General rules regarding the management and maintenance of water conservation had been issued by the Construction Bureau of Anhui. However, local governments and residents had not followed the rules well and just muddled through their work: For example, they used the sandy soil for levees; the levees they designed were too steep and short; and no breakwater had been built. Due to the force of the floods and long-time disrepair, most levees experienced collapse in 1931 (ARC, 1931, p. 85). It was suggested by engineers that after the construction of levees and breakwaters, peasants would be responsible for carrying out inspections along the levees in between farming seasons, then to add earth to the weak levees and fill the holes caused by burrowing animals. In the flood season, if leakages happened, repairs should be made immediately before further deterioration. If water levels rose greatly, extra earth should be added to the levee to prevent overflow. All the materials for the repair and maintenance should be ready in store in case of emergency (*ibid,* p. 86).

It was common for there to be conflicts between the residents and government, as well as between instructions issued and actual practice. Through all the various conflicts about water management and conservation, the fundamental concern behind them was economic interest, particularly short-term interests. However, it was difficult for short-term interests to be satisfied when water conservation measures were often undertaken over the long term. In other word, the cause is from the imbalance of interests of various sides. All of this led to the fact that water conservation plans were often unable to meet their goals, and the fact that water conservation was in an extensive state of disrepair.

The villagers were the people relying on water conservation facilities most. However, they did not combat flooding actively as expected, but cared for their own properties. In the archives (Chen, 1932, p. 152), there were many descriptions of the peasants as ‘ignorant’, ‘selfish’ and ‘lazy’. Engineers thought that the peasants’ ‘conformity’ mentality and poor judgment caused them to have misplaced priorities. Yet these

priorities were determined by the peasants' experiences of daily life. Peasant's attitudes and reactions to the flood actually were not unexpected given that floods were not rare events to peasants in Anhui. It can be argued, therefore, that as far as individual families were concerned, what the peasants did was their best choice.

4.4 Rescue

Over the years, Anhui had experienced the scourges of war and crime. For people there, life was difficult. Analysis of archival data (ARC, 1931) revealed that the disaster in 1931 was the most serious for over 100 years (ARC, 1931, p. 74). 9,630,000 people (44 percent of the total population of Anhui Province) were involved in the floods. 680,000 of those people were from Fuyang County. On the relief list, there were 5,741,400 people, of which 500,000 were from Fuyang County. In terms of the survey, there were 17 counties where refugees of flooding were over 60 percent of the total population of their respective counties (partly shown in figure 4.23). The ratio of refugees to the population was highest in Dang Tu County. In total there were 22,862 deaths (Shown in Table 4.4) in Anhui. Relief work needed to be carried out urgently. Most important was the saving of lives. This was an expensive operation. Together with charity organisations, Anhui Province arranged relief funds, and the distribution of flour to the worst affected counties. 'Bread is the stall of life'. Porridge factories were set up in places where there was a great need. For each place, the maximum amount of factories permitted was 4. This provision was for 4 months initially (*ibid,* p. 74).

Table 4.4: Numbers of deaths in the flooding (*ibid*)

Counties	Deaths	Counties	Deaths
Fuyang	1,200	Bo	100
Yingshang	1,870	Fengyang	336
Huoqiu	800	Shouxian	1,070

Mengcheng	26	Fengtai	1,500
Taihe	11	Huaiyuan	600
Guoyang	40	Wuhe	1,100
Total	**22,862**		

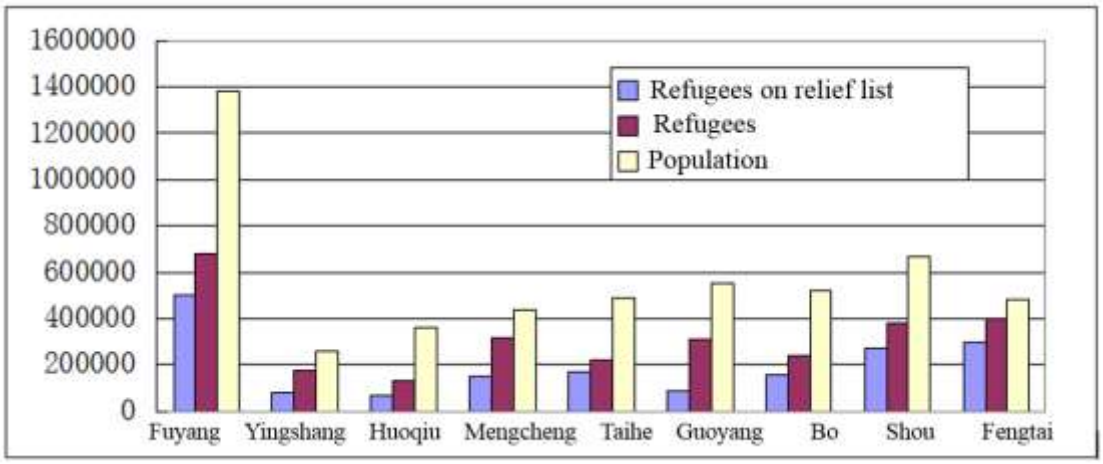


Fig. 4.23: The statistics of refugees and population of counties of Anhui Province (ARC, 1931)

The report (ARC, 1931) indicated some specific measurements:

> The elderly, disabled, and children were qualified firstly to get compensation from the relief fund for the following few months. As it was close to winter, asylum was suggested in the affected counties to prevent deaths due to the cold. Due to the limited capacity of asylums, some refugees (around 1,000,000 people) were encouraged to stay at home and were given coats. Post-disaster epidemics, particularly malaria, typhoid and cholera happened frequently. Immunization cost nearly 3,000,000 Yuan. The ambulance corps was very busy. An epidemic prevention team was set up in every county. The management budget for each team was around 10,000 Yuan. In total 680,000 Yuan, including the cost of facilities, was used for these teams.

Porridge factories were just one part of the relief measures. Analysis of archival data (ARC, 1931, p. 16) revealed that the disaster area was around 2/3 of Anhui. Agricultural production suffered huge losses. 33 of the 44 affected counties were in serious shortage of food. The shortage was around 750,000 tonnes. At that time, only 14 counties had enough food. The surplus from them was around 700,000 tonnes. So the food deficiency in Anhui Province should have been around 50,000 tonnes. It was pointed out by the report that if the food was redistributed well, Anhui Province need not to rely on other provinces, that the food relief could stop when people got the wheat harvest in the next year. Additionally, in the next year, peasants would have harvests from barley, (973,000 tonnes) soya beans, (59,500 tonnes) grain sorghum, (296,000 tonnes) buckwheat, (73,500 tonnes) and sweet potato, (462,000 tonnes) etc. Moreover, tea was another important sideline in Luan, Huoshan, Huoqiu, Shucheng, Yimen, Xixian, Xiuning and Jixi Counties. Usually, the total production of tea in Anhui was 10,800 tonnes. The income from tea could be used to buy food as well. So, if Anhui Province had a proper arrangement, it could live through one post-disaster year. Post-disaster, the price of food rose. Pre-disaster average prices of some food and average prices in post-disaster times are shown in the following Table 4.6, 4.7.

Table 4.5: Statistics of food production and the food store of various counties one year after disaster (ARC, 1931, p. 16)

counties	Usual annual harvest		Food store or deficit 1 year after disaster (10,000Kg)	Surplus or deficit
	Rice(10,000Kg)	Wheat(10,000Kg)		
Fuyang		88,800	8,400	-
Yingshang		12,600	2,550	-
Huoqiu		15,990	5,850	+

Mengchang		11,250	1,500	-
Taihe		16,000	5,100	-
Guoyang		7,150	3,570	-
Bo		25,600	2,400	-
Fengyang	10500	10,500	2,525	+
Shouxian	18700	10,675	2,795	+
Fengtai	750	6,675	4,125	-
Huaiyuan	880	8,720	2,785	-
Wuhe		3,805	1,795	-
Total	30,830	217,765	21,055	-
	Notes: + represents Surplus; - represents deficit			

Table 4.6: Statistics of food prices before and after the flooding (ARC, 1931, p. 17)

	Prices before flooding(Yuan)			Post-disaster prices(Yuan)		
	rice	wheat	sorghum	rice	wheat	sorghum
Fuyang	5	4	4	8	6	5.5
Yingshang	4.7	4.2	3.3	7.1	6.7	5.4
Huoqiu	4.8	4.4	3.7	7.6	6.5	5.5
Mengchang		5.3	4		6.67	5.67
Taihe		5	4		7	5
Guoyang		5.5	3.9		6.7	5.3
Bo	6	5	4	9	7	5.5
Fengyang	5.83	4.44	5.55	6.96	6	5.55
Shou	4.5	4	3	8	6	4
Fengtai	5.9	5.5	4.7	8.4	7	5.5
Average figures of Anhui Province	5.34	4.24	4.04	7.45	5.54	5.14

Table 4.7: the increase ratios of food prices after flooding in various counties (ARC, 1931, p. 17)

	Rice (percentage)	Wheat (percentage)	Sorghum (percentage)
Fuyang	60	50	37.5
Yingshang	51.02	59.52	63.64
Huoqiu	58.33	47.73	48.65
Mengcheng		27.74	14.99
Taihe		40	25
Guoyang		21.82	35.9
Bo	50	40	37.5
Fengyang	19.38	35.14	
Shou	77.78	50	33.33
Fengtai	42.37	27.27	17.02

It can be seen that the price of foodstuffs in the north of Anhui was always higher than that in the south of Anhui. The increment of wheat price was much higher than that of overall Anhui. Possibly, there was relatively a high demand and less supply of wheat in the north of Anhui. However, the increment of rice price in the north was less than that in the south of Anhui. The reason might be that the people in the north were used to flour. Additionally, grain sorghum just had its market in some local regions of the north of Anhui. So the foodstuff crisis in the north of Anhui was more serious than other regions of Anhui. Here are some possible reasons for this. Food in stock in the north of Anhui was in shortage. Importation of foodstuff was difficult due to the inconvenient transportation. Thirdly, many dealers speculated in the market and controlled the market prices. It was suggested to sell the foodstuffs in stock at normal prices and ask county governments to support it with the government budget. In total, 5.6 million Yuan was needed (ARC, 1931, p. 75).

Analysis of archival data (ARC, 1931) revealed that Agriculture Relief was proposed as the first task following the rescue for following reasons. Agriculture was the fundamental industry of China. Floods brought serious damage to crops and this caused many refugees to sell their farm cattle, eat seeds up and move to a new area for good. Most farm lands were in desolation, so agriculture had been almost completely destroyed (*ibid,* p. 75). After the retreat of the floods, it was urgent to recover cultivation. It was suggested to provide financial compensation or animal fodder to the peasants in order to help them feed their farm cattle, or to make loans available to help people buy more cattle. Additionally, seeds, fertilizer and agricultural tools were offered to some poor peasants. Because of both the importance and complexity of agriculture relief, an overall plan was essential. Moreover, the Agricultural Cooperative, Savings and Loan Office were proposed to support the village finance situation (ARC, 1931, p. 76).

National finance, the action of charity and the reallocation of regional foodstuff played an important role in relief. Relatively, these measures were quick and provisional actions. An effective way to take the advantages of the water conservation, and avoid its disadvantages was to carry out proper construction of the water conservation.

4.5 Post–disaster relief

Most publications available are focused on the big projects such as the *Guide to the Huai River Project* (Kang, 1989; Yin, 2010). They investigate policies implemented at the level of central and provincial government rather than local government or communities. These limitations may be because of the shortage of documents, sources might reflect the authors' preferred perspectives. For example, in the book *The Huai River and Reconstruction in National China (1927-1937)* (Pietz, 2002), the author pointed out in the preface that the purpose of the research was to reveal state construction in the ROC period. The authors paid extremely limited attention to the relationship between state construction and local residents. For example, there were some descriptions of labour recruitment in the text, but they were very simple. We

should note that big water conservation projects were usually located in rural zone and built by local residents. If there was no research on individuals or countryside, there would be no real concern for China's water conservation. The cooperation between different units in project construction could not be considered as an 'extension or diffusion' of duty simply between them. Similarly, it is not logical to argue that the 'conflicts' in construction mainly came from the incompetence of labourers and managers and poor cooperation between local officials. The foundation of cooperation exists in various aspects, for example corresponding divisions of different levels, positive mutual responses and common interest which is of particular importance. Findings arising from the examination of the documents indicated that common interest should be understood in relation to different events. These affected whether difference led to conflict and whether solutions to the conflict depended on common interest as well as what difference existed among the equivalent items, and whether common elements existed among different items. Solutions typically depend on specific events or contexts. As far as water conservation was concerned, it was not reasonable to look for the answers to these questions just from the files, regulations or rules of the big organisations involved in water conservation. In the ROC period, construction of dams and levees still relied on refugee labourers' manual work. For this reason, I wanted to begin with an investigation of the work site.

4.5.1 The significance of relief work: to recover water conservation and public security

A significant goal of the relief work was to fix or improve the key infrastructure that had been destroyed. Farmland in the south of Anhui relied much on the levees of rivers. Plains in the north of Anhui used channels to discharge water in low-lying places. As a result, some of the refugees could be employed to construct dykes and some to dredge the channels. Inspections and surveys were proposed prior to the design of the relief work plan (ARC, 1931, p. 76).


Reconstruction of dykes.

Fig. 4.24: Reconstruction of dykes (NFRC, 1933)

The first task of the relief work was to fix or improve levees and dams. Analysis of archival data (ARC, 1931, p. 78) revealed that the flood in 1931 was the most serious in over 100 years. Many dykes were eroded or collapsed. Work on levees of the Huai River in the north of Anhui, from Honghe Entrance to Fushan Mountain and the levees of relevant tributaries was divided into three segments. The total length of these relevant levees of the Huai was about 1,000 km. The Flood Relief Committee was responsible for appointing proper engineers to supervise the construction of these levees. To avoid wasting land between the old levees and the newly built higher levees, it was recommended that the damaged old levee be fixed to prevent normal flooding in the future; the land between them could still be used for cultivation. The newly built higher levees were designed to prevent occasional huge floods. Thus two levees offered more of a guarantee to protect the farm land. Additionally, local residents had built private dams for marsh lands. Prior to the reconstruction of the levees, the locations of these

dams had to be checked. All the unregistered channels or private dams, which decreased water-storage capacity needed to be removed or changed. Table 4.8 provides information on some of the collapses of levees and the relevant earth work on them. The completion date for the fixing of dykes was scheduled before the flood season in the next year: if the work started in February 1932, it was expected to be completed by the end of April (ARC, 1931, p. 78). The estimated volume of earth required to fix collapsed levees and maintain dykes and the cost and the demand for labourers are presented in Tables 4.8 and 4.9. As shown in table 4.9, the total earth work involved in fixing and maintaining the levees was around 55 million m^3 and needed a budget of about 9.9 million Yuan.

Table 4.8: Estimate of the Work Involved in Fixing the Collapse in Various Counties (*ibid*, p. 77)

	Length of the collapse (m)	Average height of dyke (m)	Earth work (m^3)
Fuyang	8,000	5	736,000
Huoqiu	8,000	3.5	379,000
Yingshang	5,200	6	680,000
Taihe	200	2	5,000
Fengyang	7,700	6	1,005,000
Fengtai	600	2.5	15,000
Huaiyuan	1,600	2.5	42,000
Wuhe	1,000	3	38,000
Yinbi	100	4	6,000
Shou	10,200	3	382,000
Total	318,006		27,328,000

Table 4.9: Estimated cost of earth work and labourers needed for construction in various counties

	Earth work in fixing collapses and maintaining the dykes (m^3)	Cost	The required number of labourers	Benefited land (acres)
Tianchang	990,000	178,400	7,100	1,833
Fuyang	1,473,000	265,400	10,500	666,667
Huoqiu	758,000	136,400	5,400	
Yingshang	1,360,000	245,000	9,700	
Taihe	10,000	1,800	100	
Fengyang	2010,000	362,000	14,400	
Fengtai	30,000	5,400	200	
Huaiyuan	84,000	15,130	600	
Wuhe	76,000	13,700	500	
Yinbi	12,000	2,160	100	
Shouxian	764,000	137,700	5,500	
.....				
Total in Anhui province	54,656,000	9,858,100	391,800	1,756,167

The project could therefore offer work for 390,000 refugees for three months. Because of the huge anticipated cost, it was suggested that the provincial government to issue government bonds as a guarantee, or borrow money from the finance industry. As the amount of benefited land (this term refers to the land benefiting from the construction) was over 1,750,000 acres, if land was taxed at 2.4 Yuan per acre, both principal and interest could be paid off in three years (ARC, 1931, p. 77). In addition to the need for dyke reconstruction, many rivers in Anhui had been silted up and needed maintenance.

Dredging the rivers was a big project that needed a huge budget. It was therefore thought practical to build new main levees through relief work and arrange the dredging as the next task (ARC, 1931, p. 78). Previously it was mentioned that silting up was the direct and main cause of floods. However, here, the funding opportunity was considered the direct factor that affected the release of project. As noted by Elvin (2004), huge amounts of labor, money, materials such as stones and wood, and administrative skill are usually needed to build and to maintain water-control systems. Due to the limited funds, the status of the river had not received enough attention. This would lead to a vicious circle: without financial support, no dredging work could be done, and then disasters would occur more frequently, which in turn made the economy and financial situation even worse. However, under the circumstances at that time, possibly the first task was to treat the critical matter: fixing the dykes.

Flooding made refugees of many residents, which brought heavy burdens on society. Liu wrote, "upset was reflected in various aspect of the society, particularly, when disaster occurred" (1997, p. 25). On the other hand, to fix the dykes and the levees, a supply of labourers was needed. Therefore, the relief work plan not only was expected to recover levees and channels but also offered refugees famine relief for half a year and help to improve social security. Analysis of the archival data (ARC, 1931, p. 80) showed that the relief work plan served over 700,000 refugees, among whom 150,000 people were involved in the construction of river levees, 130,000 in fixing the dykes of the Huai, 400,000 people were in recovering the dykes and 100,000 in work on the Sui River.



Fig. 4.25: Refugee labourers (NFRC, 1933)

4.5.2 Organisation of relief work and personnel

Building on Simmons' (1993) work on the role of political organisations in environmental management, this section explores the roles of organisations of the relief work. It was pointed out in the *Guideline of Relief Work in Anhui* that the Provincial Relief Work Committee was responsible for the management of the relief work. The director of the Construction Bureau was appointed as the chairman of the committee. Staff were selected from relevant departments of government and appointed with part-time positions. Four relief work regions were set up in Anhui. A chief engineer was elected by the Relief Work Committee and was put in charge of the relief work of a specific region. Its main work was to fix levees of the Huai River in these areas. Several Relief Work Offices were set up in various counties to supervise the project. The Construction Bureau had been asked to arrange engineers to conduct measurement and

design and to provide appropriate supervision. When necessary, the Construction Division of counties was required to join in with the above activities (ARC, 1931, p. 79, 80).

The amount of labour needed and the sections in most need were determined by the engineers and then forwarded to the corresponding Relief Work Region and then the county government. The county government was responsible for arranging reputable people from towns to recruit and manage refugee labourers. The work of labourers was then arranged by the engineers. Some facilities were provided by the committee, and some common tools such as shovels, spades, hoes and forks were provided by the labourers themselves (ARC, 1931, p. 80).

Accommodation for the refugee labourers was managed by local gentry. Sheds were built for rest and sleeping. Each shed served 25 labourers, among whom one was appointed as a head of the shed and was responsible for the management of the labourers. Information regarding all of this was recorded by the Relief Work Office. Labourers were paid accommodation expenses daily and other subsidies, which were calculated according to their workload by the engineers every ten days (ARC, 1931, p. 80). The head of each shed collected the subsidy on behalf of his labourers and then allocated it to them. Relief Work Offices were responsible for reporting the progress of construction and the usage of the budget to the Relief Work Region and Construction Bureau. Then this information was shown to the public regularly. When engineers felt too busy, they would arrange for supervisors or assistants to oversee the labourers. If a shed head or any labourer did not cooperate with the arrangement, engineers had the right to fire them. Police Stations was responsible for keeping good order on the work site (ARC, 1931, p. 80). It was clear that the engineers were required not only to guide the construction, but also to manage both labour and finance. It should be noted that in the relief work what the engineers worked with was refugee labour rather than machines (ARC, 1931, p. 80). Analysis of the Archives revealed that several Relief Work Offices were set up and responsibilities were re-arranged. Echoing Elvin's (2004) work, the organization of

these responsibilities reflected different environmental conditions and in some cases, environmental change forced management systems to shift from a relaxed community-based maintenance system to a tightly bureaucratized one.

4.5.3 The magazine *relief work in three days:* refugees and engineers

4.5.3.1 Work of refugees and engineers

In order to explore the roles of the refugees and engineers, a range of sources documenting their work were examined. Analysis of Cai's (1932) report revealed that from December 1931 to July 1932, Huzhen Wang, a well-known expert in water conservation, organized about 120,000 refugee labourers to fix 400 kilometers of levees and to dredge 27 kilometers of rivers. They completed earth works of 12,000,000 m^3 and were allocated 15,000 tonnes of relief wheat in return. Around 250 engineers were involved in the construction. Besides the work being done, most engineers were eager for other news, particularly about the war with Japan. However, it was impossible for them to come together to communicate, as a result of the large area in which they were working. A temporary magazine called *Relief Work in Three Days* was launched on March 3 1932, and circulated on work sites. The magazine was used to publish notes on the progress of the construction, information on the lives and experiences of the labourers, as well as news of the state. It was the only source available to reflect the work and lives of the engineers and labourers during relief work. Until the end of July 1932, there were 50 issues in total. The following is a description of some stories from the work site:

- The recruitment of labourers experienced some difficulties at the start. Initially, many residents thought it was a method to recruit soldiers and so would not join. When relief wheat was delivered to the sites, however, people quickly asked for enrollment lest they missed the opportunity (Chen, 1932).
- Within a short time there was real competition for jobs. Candidates who

were strong or owned some tools were preferred. Strong people could work more efficiently and their tools could help to save the budget (Tan, 1932, p. 141).

- The recruitment was managed by county gentry. However, they often employed foremen to carry out the recruitment directly. So the employment of labourers was usually determined by foremen. Actually, it was not easy for a foreman to get his position. Usually he needed to bribe gentry to get his position (Tan, 1932, p. 143).

In order to estimate work efficiency, engineers carried out some experiments on work sites. The following experiment concerns the time required for some of the main operations of labourers, for example, the time needed to shovel, dig, load, transport, and unload earth. Analysis of Zhu's (1932, p. 17) report showed that the tools involved were a spade, shovel, wooden shovel, pickaxe, fork (shown in Fig. 4.25), basket, shoulder pole and stop watch. Fifty labourers were selected to join the experiment. Two of them were responsible for soil cultivation. The others were divided into six groups, and two members of each group used a shovel or a pickaxe to dig earth. The others were responsible for delivering the earth. There were a variety of tools, each with different functions and shapes: a digging spade, a transplanting spade, a round shovel and a square-mouth shovel. Normally pickaxes were used to dig frozen earth. Forks and wooden shovels were used for soil cultivation. Baskets were used to load earth and were usually made of wicker. The bigger basket could take a load of 100 kg and needed two people to carry it; the smaller one could contain about 35 kg of earth. Normally, one person used a shoulder pole to carry one pair of the smaller baskets. Shoulder poles were made of poplar or bamboo. Some women were involved in delivering earth (shown in Fig. 4.27). Traditionally, women usually got less payment than men even when they achieved equally. Due to physical differences, women needed more time to finish a specific task than men. The participation of women indicated the shortage of male labourers or money.

As intellectuals in the era of ROC, most engineers were affected by the May 4th Movement,[12] and were happy to advocate the new 'science' associated with that movement. In China, 'science' was considered as knowledge from the West or "Western knowledge". The acceptance of "Western knowledge" by Chinese people had links with the action or activities of western power or people. Western technology had a significant effect upon water conservation in colonial areas (Bell and Roberts, 1990). Water conservation projects studied in this thesis were affected to some degree by Western countries or Japan. Most effects were reflected in voluntary efforts to learn about advanced technologies. The May Fourth Movement highlighted that modern knowledge including science was an important way for imperialism to control China,[13] and helped to promote the development of technology and 'scientific' methods in China.

Engineers carried out some 'scientific' experiments on the work sites. A stop watch was used to record the time for digging, loading, delivery, and unloading (Tan, 1932, p. 141, p18). Relevant data can be seen in Table 4.10 and reflects the work of labourers. Engineers admitted that labourers were different in strength and experience; furthermore, normal work was not as intense as it was in the experiment (Tan, 1932, p. 31). It can be seen that the engineers accepted western technology and western culture early and this influenced the ways in which they dealt with conservation in China, illustrating the important impacts that science and technology can have on the environment (Evenden, 2004). Those two subjects were too important to be bypassed in research in the ROC. So far, research into the technology of water conservation in the ROC still emphasizes the history of water conservation and the technology arising in the ROC, but pays little attention to factors behind the technology and engineers

[12] The May Fourth Movement took place in 1919. It was not an isolated event, but a reform that sought to promote "science" and "democracy".

[13] In 1904, Arthur Henderson Smith, a missionary, wrote a book called *Chinese Characteristics*《中国人的性格》,(明恩溥). He wrote a letter to the US president, saying that China had a strong sense of anti-foreign sentiment and nationalism. Then, he suggested that the US Government built Tsinghua School by using half of the Boxer Indemnity (approximately 11,000,000 US dollars). He also said, "China is facing a revolution. Any country who has capability to educate and guide the young Chinese generation could get the best rewards" spiritually and in business. Young Chinese engineers influenced by the May Fourth Movement were keen to take up state-of-the-art technology from the West and were happy to diffuse it to Chinese peasants.

themselves (Ru, 2015). In the ROC, engineers helped to link water conservation to wider developments in science and technology outside China. These findings reflect the work of Worster (1992) who argues that the development of society and technology played an important in water conservation.

Table 4.10: Time (in seconds) of earth-work operations (Tan, 1932)

Rounds	Digging & loading	Delivery	Unloading	Walk back	Waiting	Total	Notes
1st	17	20	4	10	8	52	The work is on the soil of the first layer, with a thickness of 0.23 meters. The soil is sandy.
2nd	12	20	4	17	12	55	
....							
18th	24	22	7	19	15	87	
....							
23rd	34	24	6	19	27	110	The work is on the soil of the second layer with a thickness of 0.47 meters. The soil is sticky
.....							
40th	36	22	7	18	35	81	
total	1225	920	248	732	832	3956	
Average (of 40 rounds)	30.6	23	6.2	18.3	20.8	98.9	

Some engineers pointed out that labourers worked with full strength in experiments because they thought there would be some rewards. Additionally, it was observed that the exhausting work meant that workers needed longer recovery times and then felt they weren't being given enough food. So the long-term ordinary work intensity was much better than the short-term high-energy one (Chen, 1932). These experiments were undertaken on good work sites and on fine days and were meant to reflect part of the circumstances of the real work site. Of course, the reality was quite different from the ideal estimates. There was sticky mud, black silt, and loose earth. Sticky mud and black silt were viscous and mushy and hard to load and carry. It was hard to dig loose earth, and when it was dug up, the soil was mixed with mussel shells, which frequently cut the feet of labourers (Zhang, 1932).

Working conditions were tough for workers as they frequently encountered springs during the digging. Because the residents near Fei River did not have a water wheel or water pump, labourers used buckets to scoop water out of the pit. It was therefore hard to drain the spring water. Due to the frequency of finding these springs, sometimes they had to change the direction of the earth work. A small channel was dug along the river. Then labourers were divided into two teams. While one team was responsible for dry soil, the other one was responsible for wet soil. They then exchanged roles after several days. It was tough work to move earth: field sites were very muddy and sometimes the mud reached ankle, knee, or even thigh height, so the refugee labourers spent nearly half the time delivering earth (Zhang, 1932). Furthermore, most tools were not really adequate for the job. Baskets were not suitable for moving the loose earth; buckets were better for this role, but it was difficult for labourers to afford the wood for a bucket, not to mention its manufacture. Due to serious conditions, some labourers cheated (Chen, 1932, p11). For example, some dug pits to the required depth at the edges where measurements were taken but left the centre of the pit higher. Some labourers dug the pit in the shape of bowed square like this . As the area of the square was determined by the locations of the vertices, the calculated value was bigger than the actual one. These deceitful actions were soon discovered, however and some labourers were

warned while others were fired. Engineers thought supervision was essential to stop cheating, but Cai (1932) argued that the best method to prevent cheating was to help workers retain hope and belief.

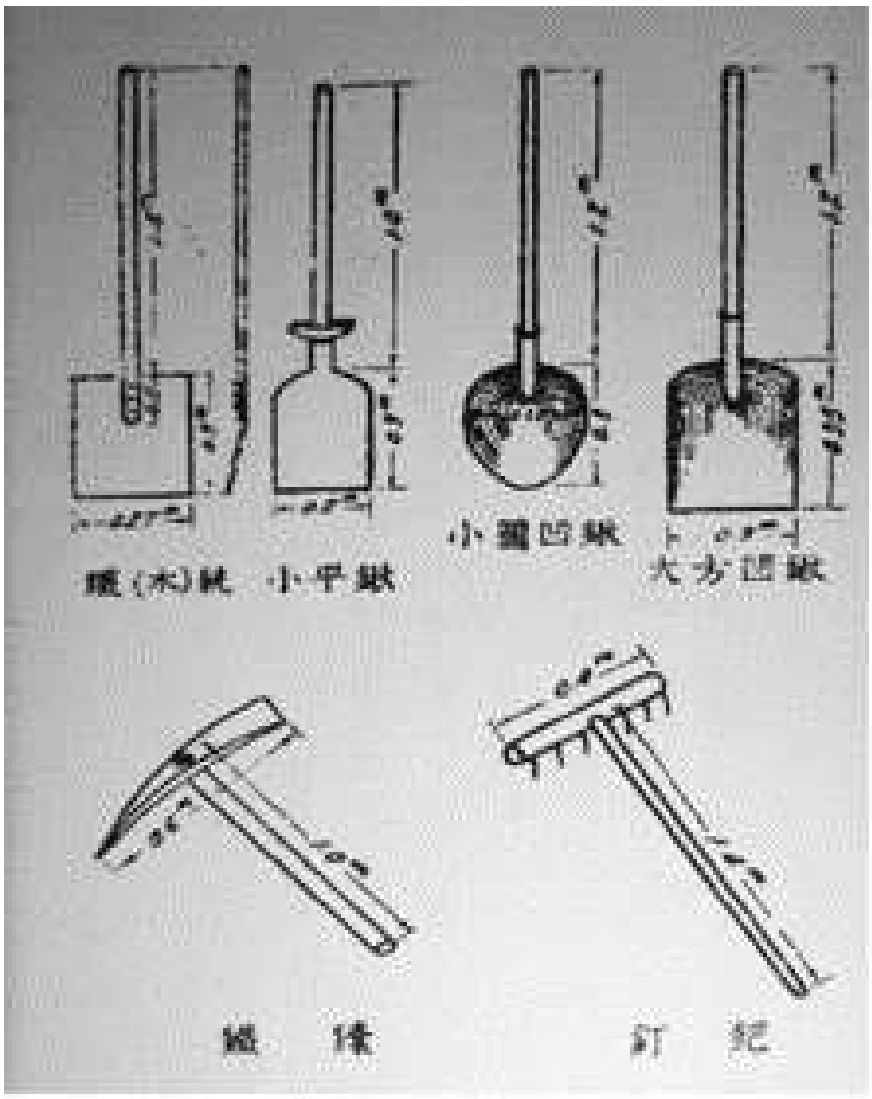


Fig. 4.26: The fundamental tools used by labourers in the relief work (Zhu, 1932, p. 18)



Fig. 4.27: Delivering earth with Shoulder poles and baskets (Zhu, 1932, p. 51)



Fig. 4.28: A woman joining in with earth delivery (NFRC, 1933)

As far as the construction of levees was concerned, different people produced different outcomes. Some levees were different in gradient or height (Chen, 1932, p. 13). Engineers thought that when the project was approaching the end, supervisors should be on site at any time of the working day. When necessary, they should work with labourers and set an example for them. All groups were encouraged to buy fine hemp rope to check the size of the construction, for example, the height, width and gradient. Labourers were required to report the nearly finished construction to other labourers in advance. Groups that finished their part first were required to check the construction in terms of design standards and then show it to others. Before the connection of different sections, which were built by different groups, no group was allowed to receive full food allocations, as errors frequently occurred in the connection of sections. If labourers were given their full food rations, it was quite difficult to get them to redo work when necessary. Some labourers did not understand this well and engaged in disputes or behaved negatively (Chen, 1932, p. 16). It was therefore suggested by the engineers that workers needed education to help them know that the quality of construction was linked with their reputation. Another key solution to the issue was timely supervision and patient explanation (*ibid*, p. 13).

Notes of the experiments	
Division No. of the labourers	1
Team No.	6
Squadron No.	12
site	Gejia Bay of Guo River
Delivery distance	28 m
tools	Spade, shovel, basket
properties of soil	The soil of the first lay was sandy. The second and the third lays were sticky.
Labourers in digging	2
Labourers in delivery	6
weather	fine
Experiment time	10am-11am
Delivery rounds	40
Work load	120 basket of earth
Earth work in total	8.558 m^3
Weight of the fully loaded basket	60Kg

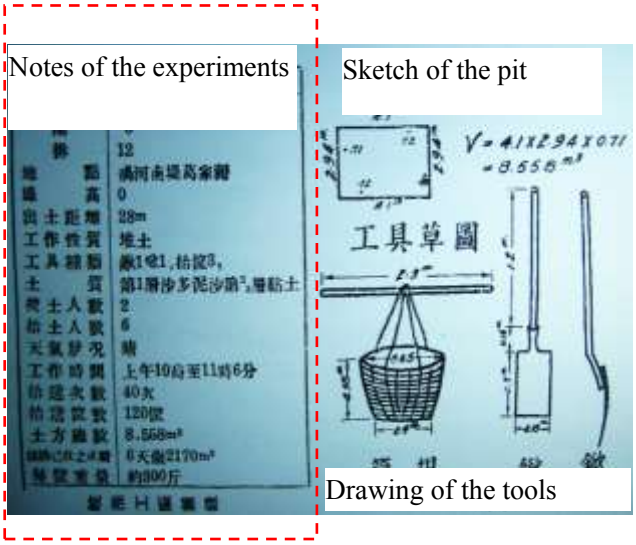


Fig. 4.29: The fundamental tools used by labourers in the relief work and some notes of the experiment (Chen, 1932, p. 51)

Analysis of Chen's (1932) notes[14] revealed engineers' roles in acceptance verification

[14] Chen, P(程鹏). (1932). *Management of the refugee labourers(灾工之管理)*. [C]*Notes on relief work in Anhui Province*. Printed by Relief Work Bureau of Water Disaster Committee in the twelfth area

of the work and routine issues. The engineers talked together frequently and came up with some helpful tips or methods. When overseers carried out acceptance verification, they were required to draw the pit on paper and label it with a number. At the same time, the same reference number was left in the pit. Usually, there were two overseers for the calculation of earth work. One used an abacus, while the other one calculated with a pen. Then they filled out the food voucher and the form for wheat allocation and wrote their report. Sometimes, engineers were asked to help to sort out other issues. For minor matters such as a local question or dispute among labourers, they were encouraged to sort out the issues creatively. Even though each overseer was assigned a specific area, he was required to hold a sense of responsibility toward all areas. For example, if labourers from other areas asked for help from him, he needed to try his best to resolve their issues and could not reject them by simply saying that the area was out of his assigned section. Engineers compared this to the army saying it did not care that the invading enemy was in its neighboring county (Chen, 1932, p. 56).

From the point of view of the engineers, conditions were tough for labourers. The tools were simple and they needed to provide them themselves. Inevitably, some labourers were not active. In contrast, the engineers, as the elites in ROC, advocated 'science' and were active in teaching labourers relevant knowledge and bringing anti-Japanese ideas to the work site. Both collaboration and conflict were reflected in the relationship between the engineers and the labourers. On the whole, however, they were the main people on the sites, and held a common aim: to quickly recover the land and water conservation structures. This echoes Worster's (1992) argument that both conflict and cooperation between individuals and the state promoted changes in water conservation.

4.5.3.2 Accommodation of refugee labourers

The daily work of the labourers were investigated in the previous section. Analysis of Chen's (1932) notes[15] revealed the conditions of the accommodation of the labourers. Many sheds were built for accommodation and they were very simple as shown in Fig.

[15] Chen, P. (程鹏), (1932). *Survey on labourers' expenditure of food*

4.30. Usually, the locations were selected close to a river.



Fig. 4.30: Sheds of the refugee labourers (Chen, 1932, p. 72)

Less fortunate labourers were usually crowded in a bigger shed. A half-meter-deep pit was dug for the internal room of the shed. Logs and bamboo were used to construct a frame. Straw of reed or wheat was used to cover the frame. The bigger shed was usually 15 meters long by 7 meters wide (Chen, 1932, p. 71). Straw was used as a mattress or quilt, although some relatively rich labourers might have had a shabby, dirty-coloured quilt. Close to one side of the shed there was a hearth alongside in which there were bowls and chopsticks. Normally, 25 labourers huddled in a small shed for sleeping.

Some sat against the wall for sleeping. At the end of their earth beds, there were some small raised square loess pillows. Other labourers dug a pit near the shed for sleeping (Chen, 1932, p. 72).

In the survey written by Peng Cheng, an engineer, it was pointed out that the greatest expenditure for labourers was the cost of food (Chen, 1932, p. 68). Wheat was the main food for labourers. Typically, panada was served for breakfast, steamed bread and water were used for lunch and noodles, steamed bread or panada was for supper (*ibid*, p. 68). No vegetables or meat were served (Chen, 1932, p. 72). Some labourers, whose homes were close to the work site might eat cake and soup (*ibid*, p. 72). Wheat was used as payment for the labourers. On average, each labourer ate 1.625 kg of wheat per day. The consumption of salt, oil, and firewood equated to 0.135 kg of wheat. Additionally, the purchase of tools, tents, etc., equated to 0.22 kg of wheat (*ibid*, p. 69-71). So, typically, one labourer consumed the equivalent of 1.98 kg of wheat each day. The market price of wheat was 0.125 Yuan per kg.

As declared by Huzhen Wang (1932), the chief engineer, when the market price of wheat was 0.125 Yuan per kg, if a labourer was allocated 2.5 kg of wheat per day, he could still offer some to his family. Table 4.11 shows the typical usage of the wheat offered to labourers. However, the market price of wheat at the time went down to the range of 0.06–0.07 Yuan per kg, so Huzheng Wang proposed that 3 kg of wheat should be allocated to a labourer each day. Unfortunately, whether this suggestion was implemented is unknown. The labourers were allocated food every week. As some labourers might have some days' leave due to illness, the workload was calculated in units of days, which seemed fair (Wang, 1932, p. 48). The fact was that if the labourer had not worked for 7 full days, he might lose part payment for his work. For example, if he had worked for 8 days but then was fired, he was paid only 7 days and lost payment of one working day. Some engineers also declared that some foremen would not share information about accommodation with the public. Some foremen frequently fired labourers and then took their food. Additionally, the large pool of available labour was

another reason for foremen to fire labourers (Wang, 1932, p48).

One reason for the greed of foremen was the cost of obtaining their positions. Analysis of Tan's[16] (1932) notes revealed that that foreman usually spent a lot of money to get their positions and the recruitment quota. Consequently, the foreman would try to get capital back and make a profit from the work of labourers. The fundamental cause behind it lay in exploitation by middlemen at each step. Public rights or interest were controlled by the gentry at that time, and there was no law to restrict the actions of the gentry. They were likely to make profits through recruitment and so public rights were abused for private interest. The labourers who had suffered through the flooding disaster were the real victims.

Table 4.11: Typical usage of the wheat offered for labourers (Wang, 1932)

Usage of wheat	Amount (kg)
Food for labourers	1.625
Exchange for salt, oil, tobacco, tools, tent, etc.	0.43
Food for family	0.335
Exchange For daily consumption of family	0.11
In total	2.5

4.5.3.3 Daily life and education of refugee labourers

Qixun Chen, an engineer, wrote that "hunger drove many labourers to work for a longer time so that they could get more food. Some worked for 13 hours a day (1932, p. 12)". According to the relief work rules, the more earth work, the more wheat. Many labourers started their work prior to sunrise and worked with the aid of a hurricane lamp at night (Xu, 1932). The work field was illuminated by weak light. The sound of 'yo-

[16] Tan, Y. (谭仪瑜), (1932). *Comments on Lives of the refugee labourers(*灾工生活感言).

heave-ho' could be heard from the field far away (Chen, 1932, p. 13). In order to get more food, some labourers insisted on working despite being injured. It was the happiest time for labourers when overseers came to carry out their weekly acceptance verification and allocated food vouchers. And then they could get food and take some of it back to their homes. Analysis of Chen's (1932) notes[17] (1932) revealed that the quality of life of labourers was closely connected to the foremen: some of the foremen were kindhearted, while others were wicked. Normally, what the foremen earned from exploitation of the labourers was proportional to the workload the labourers achieved, and some foremen made the allowance of the fired labourers their own. Many labourers could not stand the exploitation and decided to work slowly or strike; but, as a result the labourers got less or nothing. At the time of food allocation, they felt lost and depressed.



Fig. 4.31: Refugee labourers collected foodstuff/wheat (Chen, 1932)

According to engineers' judgement, Chen (1932) described the personalities of the

[17] Chen, Q.(陈其勋), (1932). *The real lives of Refugees labourers(*灾工生活写真*).*

labourers:

> Some engineers classified labourers into "five categories: honest, enthusiastic, straight, mischievous and lazy" as shown in Table 4.12, while some engineers classified labourers into "four categories: honest, industrious, lazy, and mischievous" (Chen, 1932, p. 152). 'Honest' workers just tried to obey instructions and be fair minded. The 'industrious' ones worked very hard for compensation and food. The 'lazy' ones worked well when overseers were on site but whenever they saw an opportunity, they slacked off. Mostly they complained about the shortage of food or the difficulty of the work and they were difficult to manage. The 'mischievous' often provoked the 'fatheaded' ones to disrupt the work site (*ibid*, p. 153). 'Lazy' ones usually supported the 'mischievous' ones. Engineers thought that the 'lazy' labourers needed to be taught both the importance of relief work and the benefits of hard work. They also felt that the 'mischievous' should be punished, maybe even fired or paraded through the streets. Hunger would make them think again! (*ibid*, p. 154)

Table 4.12: Statistics of labourers of different characters in Huaiyuan and Fengyang Counties (Ye, 1932, p. 58)

Counties	Percentage of labourers of different characters				
	honest	'enthusiastic'	'straight'	'mischievous'	'Lazy'
Huaiyuan	40%	10%	20%	5%	25%
Fengyang	25%	20%	13%	17%	25%

Indeed, engineers thought it was worthwhile to educate labourers as they didn't see education as the exclusive right of the upper classes (Xu, 1932, p. 74). Social classes

here refer to different social groups classified by their education level, income, social relations and social status. In this chapter, flood victims are regarded as a social group. Likewise, gentry, county officials, provincial officials and intellectuals belong to different groups respectively. However, each group contains a range of sub-groups. For instance, people such as Yisheng Mao, Huzhen Wang and Yizhi who were responsible for the project were clearly recognized as people in higher social classes than the engineers working at the workplace. Among the social classes, there sometimes existed contradictions, unions, changes or movement.

Education was meant to enrich the lives of the common people. The illiteracy rate of the adults in the north of the Anhui Province was approximately over 85% (EBlLCHC, 1992)[18]. Analysis of Xu's notes (1932) revealed that daily work of labourers was always the same—just digging and more digging. After work all they could think about was food. So, the lives of refugee labourers were very tedious and, "not much different from their domestic animals" (Xu, 1932, p. 75). Another benefit of education was the imparting of knowledge and practical skills. As the agricultural environment in northern Anhui was relatively good, peasants there had not developed the habit of intensive and careful cultivation. Conventionally, cultivation in northern Anhui Province relied on good soil and good weather (Chen, 1932, p. 114, 115). Chen (1932, p. 114) argued that many peasants were 'lazy' and hooked on gambling and opium and it was helpful for them to learn about wasteland reclamation, the use of fertilizers, soil improvement, afforestation, maintenance of rivers and levees and irrigation management. According to the survey of engineers, the most popular topics for labourers were 'methods to get rid of vermin' and 'benefits from afforestation'. It was essential for peasants to get knowledge to increase production and cut losses as they frequently suffered from vermin infestation and flooding (Xu, 1932, p. 75). Education also helped people cultivate the quality of diligence and have a more positive attitude and sense of fairness toward others (*ibid*, p. 75).

[18] In 1939, the illiteracy rate of the adults in Huoqiu County was 95.1% according to the records in local chronicles of the Huoqiu County.

Analysis of Chen's (1932) notes[19] (1932) revealed that the education programme produced some good results. As a consequence, labourers began to understand the real benefits of the Relief work project, for example the benefit of the active prevention of flooding over merely repairing the damage afterwards. Improved communication between engineers and refugee labourers brought those workers huge comfort and encouragement. For example, they frequently complained to engineers that the food allocation was not enough. However, after engineers gave them an explanation or comfort, then they worked with great excitement and an attitude of 'hurry, hurry, hurry' (Chen, 1932, p. 73). In fact, refugee labourers were very happy to get knowledge from the engineers (*ibid*, p. 77). They told engineers that after they received education they felt enthusiastic about constructing dykes. At times, an engineer or teacher took photographs of the workers, and this always caused much delight. When the photos arrived, the labourers were filled with what was termed pleasant surprise. These words 'pleasant surprise' reflected why refugee labourers were happy to communicate with engineers. Normally, common people had little opportunity to acquire education and seldom had an opportunity to communicate with engineers. It should be noted that many similar issues can occur in different regions, or in different eras. Workers at construction sites in the North of Anhui Province were inclined to work harder when engineers gave them incentives, as were the newly arrived Polish in the US (Qian, 2007). Engineers and labourers working together at this time of disaster brought benefits to both classes as they began to understand each other better, and for the ordinary labourer it provided the opportunity to acquire new knowledge and skills, made them feel cared for by the upper class, and gave them spiritual satisfaction. As far as the engineers were concerned, they thought that most labourers were simple and ingenuous and it was necessary to educate them to give them belief and hope (Chen, 1932, p. 73).

However, this did not mean that engineers considered labourers as equals. Many of the barriers between the two classes remained in place. Engineers regularly mentioned that labourers were simple in mind (Chen, 1932, p. 54) and knowledge (Ye, 1932, p. 58),

[19] Chen, Q.(陈其勋), (1932). *The real lives of Refugees labourers(*灾工生活写真*).*

and were ‘dishonest’ (Cai, 1932) and ‘idle’ (Tan, 1932). Also when associated with common people the engineers felt they were condescending in doing so and thought it was a way to practise their superiorities. However, there were differences within the attitudes of the engineers (Xu, 1932, p. 77). As a case in point, an entertainment called six-grid chess (shown in Fig. 4.32) was popular among labourers.

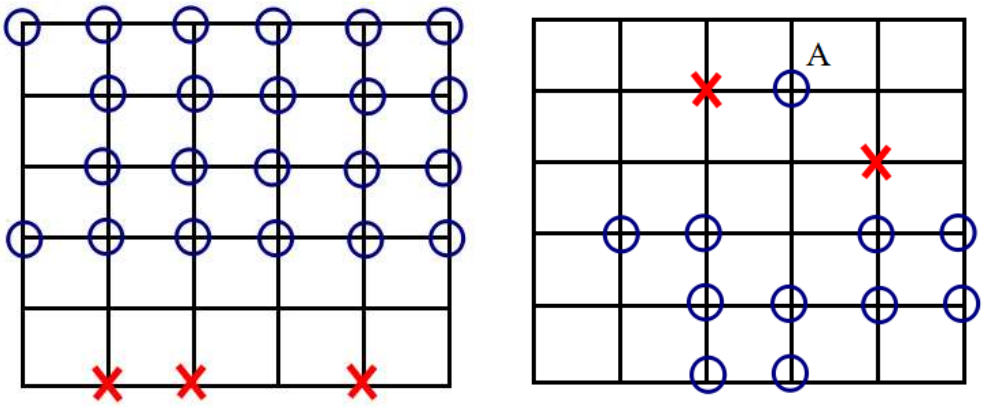


Fig.4.32: Illustration of the six-grid chess. ○ represents a child, X represent a tiger (left); The child A is far away from the crowd and has no way to avoid the attack from the tigers (right) (Zhu and Wang, 1932)

Some engineers considered it ‘simple and dull’, suitable only for the recreation of ‘beef-witted victim labourers’ (Zhu and Wang, 1932, p. 25). This argument was criticized by another two engineers, who believed that six-grid chess included two kinds, ‘six-step chess’ and ‘tiger chess,’ both of them graceful and instructive games. Moreover, these two engineers argued that the so-called popular exquisite chess played by some engineers was full of cruel struggle (ibid, p. 26). It is clear that some engineers showed sympathy for labourers and also held critical attitudes about themselves. The different attitudes to the six-step chess were reflections of the broader thoughts and views of the engineers about both peasants and themselves.

It seems that the relationship between labourers and engineers was elusory. This can be seen from the following description and analysis of the ‘Red Spear Association’. Many labourers considered themselves members of this Association. For example, in front of many sheds, there stood some old spears with red silk to show power or ‘self force’ (Chen, 1932, p. 73). Some engineers said that the Red Spear Association originated with the Boxers (the Righteous and Harmonious Fists), which was a non-governmental and secret community based in Shangdong Province and Hebei Province during the Qing Dynasty (Liu, 1932, p. 134). At the beginning, they, like other secret communities, protested against control and suppression from Manchu. With the invasion of international strength, the Boxers supported the Qing Government to resist the West. But they faced great restrictions. They held the idea that resistance meant complete anti-foreign behavior. Then, the Boxer rebellion failed, as the Qing Government surrendered to the foreign powers. After suppression, the Boxer movement went underground. With the threat from pirates and robbers in the early ROC, the Red-Speared Guild preserved the Boxer traditions to defend the villages by themselves. The young Chinese engineers influenced by the May Fourth Movement were concerned about the situation, and so attached great importance to the awareness of the Boxers to fight against the invasion. On one hand, they taught the victims scientific knowledge and technology; on the other hand, they also focused on quality education and anti-Japanese war propaganda.

The phrases ‘self force’ and ‘national interest’ reflected different perspectives, but regardless, survival was the first task for labourers. It should be noted that the reports used here were written by the engineers. Even if one assumes that the reports are accurate, it is difficult to determine the true motivation of the engineers. However, consistency could still be seen between engineers and refugee labourers. As Liu stated (1932, p. 134), when engineers told of the brutal behaviour of the Japanese army, most labourers were eager for a fight. Moreover, in the relief work in 1931, both labourers and engineers were active on the work site.

This reflected the fact that the political situation in China changed dramatically, after

Japan's invasion to the northeast. Japan was recognized as the major enemy of China. The national revolution against Japan's invasion became the major struggle of the people of all classes and nationalities in China. The people actively involved in anti-Japanese propaganda included Yisheng Mao, Huzhen Wang and so on, who were intellectuals in charge of the Huaihe River Project as well as young technicians working at the site. Meanwhile, although the disaster-stricken victims could not write or read newspapers, they were also influenced by anti-Japanese sentiments.

4.6 Discussion and conclusion

In 1931, most parts of China, in particular the basin of the Huai River, suffered from serious flooding resulting from both human-related and natural factors. Attention needed to be paid to both the construction of water conservation systems and the conservation of water and soil. The construction of water conservation systems was aimed not only at the recovery of agricultural production, but also at relieving refugees and preserving public security. Relief work has played an important role in the past and will continue its role into the future.

In general, central government was an advocate of water conservation, while provincial governments were the organisers and the county governments were the executors. Engineers, foremen, and labourers were the main actors involved in the implementation. Funding for construction usually came from the national finances, which meant that local financial departments did not undertake the construction. It was unavoidable that there would be various stakeholders or conflicts in the construction of the water conservation system.

The investigation of these water-related society began with a work site. In the early twentieth century, grassroots society in China was relatively stable and focused on hard work to avoid famine. They did not anticipate the emergence of later reforms. However, the engineers had been affected by western 'science' or ideas of equality and acted as educators and pioneers. The labourers, for their part, seemed to be forced to accept help

from the engineers. On the one hand, the engineers relied on the foremen; on the other hand, the engineers thought that the foremen exploited the labourers and that there was a good deal of inequality. The work site was like a small society in which the superior class changed with the time, while the labourers seemed immune and were affected only partially. However, there still existed common points between them. When the engineers lamented the brutal actions of the Japanese army, the labourers were filled with righteous indignation and wanted to go to war. As with other historical studies in China, there were limitations to the research methods of the present study. Although the reports or notes written by the engineers appear accurate, they reveal little about the views of the labourers themselves. This will be explored further in Chapter 5.

Chapter 5: Policies and disputes–the relief work in Anhui after 1931

5.1 Introduction

The previous chapter focused on the flooding of the Huai in 1931 and the post-disaster reconstruction, examining local conditions, the causes of the flooding and the culture of the worksite. In this Chapter, relief work policies and regional disputes in water conservation after 1931 are investigated. In addition, the issues of water conservation are examined from the perspective of land policies. This method is consistent with Marks' (2005) emphasis on placing environmental and historical change in relation to human history to allow an exploration of environmental and cultural inter-relationships.

The 1931 relief work project was managed by the central government, whereas most organisations involved in the relief work project after 1931 were located in Anhui Province. Therefore, the focus from each perspective differs somewhat. In the case of the pre 1931 relief work project, attention is given to work and life on the worksite. The second period focuses on the organisations in Anhui and the disagreements and conflicts between the counties and the Anhui provincial government. The post 1931 relief work period is also the first time that the relationship between land ownership and water conservation in the ROC period has been investigated. Additionally, the relationship between water conservation and social policies is explained during the course of this investigation.

McNeill (1998) suggests that the Chinese government, with its dependence on water/river systems, had controlled diverse ecological areas and possessed a series of useful natural resources ever since the Song dynasty. McNeill also wrote that "some relationships exist among population, flood disaster, additionally, those relationships have tight links with technology, ecology cost and national power" (McNeill, 1998, p. 42). McNeill argued that these relationships required further investigation, thus

prompting the present investigation of relief work in the Huai River basin. The aim of this study is to shed light on diverse ecological areas and natural resources in relation to population, land policies and water conservation. It is argued that China's water/river system is a product of natural resources and human activity, linking cities, towns and social classes throughout ancient imperial China. In other words, China's water/river systems represent a link between the political regime, natural resources and the environment, the stability of society and sustainable development (McNeill, 1998).

Archives are valuable sources for study. The archives used here were from Anhui Archives and Archives, Institute of Modern History, Academia Sinica. All of them were from the original editions written by brush pen and I am the first person to research these archives. China has had well-established archive management systems for a long time. One important task of Chinese governments in different eras is the delivery of official documents. The Kuomintang government was no exception. Nearly all the documents in which governments were involved were recorded in archives. When Kuomintang left the mainland of China, some were delivered to Taiwan and some were burned or destroyed. As stated by Shu (1999) and Lin (2003), the archives are of high reliability. Furthermore, the archival documents used in this thesis were from different archives and what they described was broadly consistent in content. Consequently these archives are good sources for revealing vivid disputes at the county level and to reconstruct water conservation in the reaches of the Huai.

5.2 Recruitment, organisation, finance and management

After 1931, the levees of the Huai River suffered serious flooding and collapse. Relief work projects were carried out to guard against the dangers. The aim of this section is to examine archival data to shed light on the natural and social backgrounds, recruitment, organisation, finance and management involved in the relief work project.

The left main levee of the Huai River started in Fuyang County, the right levee started in Huoqiu County. Both ended in Fusanji Wuhe County. In total the length of the main

levees was around 310 km. The right levee was around 105 km in length and gave way to ridges and mountains partly. The length of the levees which were formed by ridges and mountains was around one third. Relatively, the terrain of the left levee was flat. The unique flood in 1931 nearly destroyed the levees completely (ARC, 1931). The third Branch of the Relief Work Bureau was set up by the Flood Relief Committee in the area of the Huai River to fix the main levees of main rivers and their tributaries. Then it was managed by NEC. In 1934, the Relief Work Bureau was dismantled, and then all the unfixed and disconnected levees were in charge of Anhui Province (FDWR, 1939, NO.: 28-05-04-120-01). In every slack season, peasant labourers were recruited to carry on the construction of levees. After several years' maintenance, the levees got stronger. However, flooding due to reverse flow of tributaries of the Huai River had not been resolved (FDWR, 1939, Archives NO.: 28-05-04-120-01). However, on May 19, 1938, Japanese troops invaded Xuzhou and advanced into western and southern China along the Liangyungang-Lanzhou Railway. On June 9, 1938, to halt the rapid advance of Japanese forces, Chiang Kai-shek took a strategy 'using water to replace soldiers', and announced the opening up of dikes at Huayuankou, on the Yellow River near Zhengzhou. Thousands of square kilometers of farmland were covered and destroyed (Xia, 2008; Wang, 2013). Inundation from Yellow River made the Huai flood and 17 counties suffered serious flooding (Fig. 5.1). Most levees suffered collapse. The seriousness of the flood in 1938 was much worse than that in 1931. Refugees from that flood were around 3 million. Over 3.33 million acres of land was flooded. The only proposed practical way for combating the dangers and effects of flooding was the 'relief work project' which helped to construct home and levees. For that purpose, the Provincial government assigned related officials to prepare relief work and called on gentry to join it as well. The Relief Work Committee of the Huai River Basin, Anhui Province was launched officially on 11 August 1939 (*ibid*, Archives NO.: 28-05-04-120-02).



Fig.5.1: The Japanese soldiers in the flooding (left); Refugees from the flood (right)[1]

Analysis of archives (RWCHB, 1943) revealed that the relief work project made a great achievement. In 1939, there was farming land totalling 0.67 million acres in the counties of Fuyang, Yingshang, Taihe, Huoqiu, Shou, Linquan, Guoyang Mengchg and Fengtai. In 1940, the corresponding values were 4.64 million acres. In 1942, the water level of the Yellow river reached the maximum for 10 years.

However, the Huai River Basin was in danger of drought. Recruitment for military construction caused a shortage of labourers for relief work. So, progress was slow, and only Fengtai County had carried out the 'Dredging Project' and only 13 sluice projects had been finished (RWCHB, 1943). In March 1943, the Engineering Division of Water conservation of Anhui Province was reset and took charge of the relief work project in the above mentioned counties of the Huai River basin. In the summer rainy season, water levels on the Huai had reached the highest for over 20 years. There were 27 cases of river levees collapsing in the counties of Fuyang, Taihe, Yingshang, Fengtai, Huoqiu and Shouxian. The water from the Yellow River flowed into the Ying and this made the water level of the Ying quite high. Additionally, Bo, Guoyang, Taihe, Fuyang,

[1] http://baike.baidu.com/pic/%E8%8A%B1%E5%9B%AD%E5%8F%A3%E5%86%B3%E5%A0%A4/8511019/0/77094b36acaf2edd4196e8048c1001e9380193fc?fr=newalbum#aid=0&pic=f11f3a292df5e0fecda581535b6034a85edf7226

Yingshang and Fengtai suffered flooding from the Yellow River. All the projects in 1943 were paused due to the flooding. After the Second World War, in 1947 and 1949, Anhui Province requested all counties to construct trenches, pounds, channels and weirs through the relief work project (EDWCA, 1951, Archives NO.:1-5-683). The relief work project provided labour for water conservation projects during wartime, including maintenance for the channels, sluices, dykes etc. And to some extent, the relief work project had helped to keep good order in the countryside.

Analysis of Archives edited by FDWR (1939, NO.: 28-05-04-120-01) revealed that the details of the labourers of the relief work can be found in the *Rules of Personnel Management of Construction Team of relief work in Anhui.* The main labourers were recruited from able-bodied refugees of flooding. 120 positions of overseer were offered for relief work projects and 60 of them were recruited by the Relief Work Committee of Anhui Province. The overseers were required to have specific knowledge and were assigned to various counties. Every applicant was recommended by reference or warrantor. All applicants were required to have a certificate in construction from a technical institute or higher, and relevant experience in supervision. The employed foremen had to pass 4 exams: Calculation and Acceptance Verification Technique, Construction Principles, Relevant Earth Knowledge and an Oral Test. Another 50% of them were trained by the Construction Bureau. The courses were: Rules and Regulations of relief work projects, Earth Calculation and Acceptance Verification Techniques, Water Conservation Engineering, Basics of Official Documents, Political and Military Practice and Essentials of Aerial Defence. After 1 month's training, they were assigned to counties to oversee the construction (*ibid*, Archives NO.: 28-05-04-120-01). This indicated that the overseers were required to have skills in construction and knowledge regarding war and this requirement was relevant with the domestic and international conditions at that time. The following is a detailed description of the Construction Management team (*ibid*, Archives NO.: 28-05-04-120-01).

Analysis of Archives edited by FDWR (1939) revealed that construction personnel were

organised in terms of county. Each county had a general team. The head of the general team was appointed by the related provincial organisation and was responsible for the delivery of instructions from provincial organisations and the management of relief work project in the local county. Several overseers were appointed by the general team to carry out supervision. Each general team had several divisions and the corresponding directors who were either county officials or town heads. For each division, one person was appointed as a political tutor responsible for political training. Executives were sometimes assigned to manage routine work. Each division included many squadrons. A ward chief, Polder director or dykes member was assigned as the head of squadrons. Several squads constituted a squadron. Each squad had 50 people, among which two people were assigned as foremen to manage the squad, two were in charge of workers' accommodation. All the labourers were required to take charge of their accommodation in turn. The numbers in each team, division, squadron and squad depended on the projects in each county.

Supervisors, heads of divisions, squadrons and squads were appointed by the head of the general teams. Squad heads, foremen and surveyors were issued certificates by heads of general teams who in turn were required to have regular inspections of construction. Heads of divisions, squadrons and squads were required to work in the office on the work site and undertook daily inspections. They were not allowed to be off work without a permit from the head of the general team.

Foremen were managed by general team heads and overseers and offered assistance for construction of specific sections of levee. They were considered as a bridge between the management team and labourers. They were responsible for helping squad heads to manage labourers. A log book was ready for them to record construction difficulties, disputes with labourers and the solutions found etc. Acceptance verification and calculation had to be carried out precisely. A Bill of Statement had to be filled with Chinese capital figures and verified by supervisors.

Heads of divisions and squadrons were not allowed to get an extra salary, however, they

could get an allowance for accommodation or travel. The provincial division in charge of the relief work project was responsible for verification of the amount paid to labourers, and issued the money to counties in installments. Information on the induction of labourers was sent to the county head for recording so that funds could be made available to provide for accommodation and the construction of sheds. Accommodation fees would be deducted from the later labour payments. Overseers carried out an acceptance verification every 10 days. Payment amounts were prepared by directors of squadrons, and verified by county heads and general team heads and then issued by the finance committee in installments. Squad heads or foremen collected the labour payment from squadron heads on behalf of the workers. In the time of distribution of payment, the general team was required to arrange specific people to supervise the distribution.

Personnel management of the construction team was similar to that of the army. This showed the importance of the 'relief work project'. As for people involved in management, their reward and punishment were determined by personal performance in work. The performance of administrative personnel involved in relief work of levees of the Huai were evaluated by the general team head and county government and reported to the Provincial division that was in charge of the relief work project. If the construction in their designated area finished on time or in advance, if they carried out effective supervision, found proper solutions to the disputes with workers then a reward or promotion would be granted to them. Otherwise, they would suffer punishment such as criticism or dismissal. Persons who misappropriated relief funds would be punished in accordance with the terms of corruption rules. If the amount of misappropriation was over 500 Yuan, he might be sentenced to death. If it was less than 500 Yuan, he was required to refund and might be put in prison. As for labourers who worked well, they would be rewarded as well. People who did not work hard would receive criticism or more serious punishment. Foremen were responsible for reporting the relevant information to their general team.

The above policies were similar to those of a normal big project (ARC, 1931). However, the following was specific in wartime. In wartime, each county was required to build Air-defense posts at proper locations along the levees, where alarm bells, gongs, or horns were sounded. Principals of all units were responsible for proper aerial defense places. During air or poison gas attacks, principals were required to do the organisation, rescue and reconstruction (FDWR, 1939, NO.: 28-05-04-120-01).

Personnel management in the flood season was somewhat different to that for normal relief work. Flood control was normally managed by county government and less controlled by provincial government. The reason was that relief work needed strengths from all aspects, and depended on the arrangement of the provincial government overall. The aim of the relief work was to carry out reconstruction. Flooding happened suddenly and progressed quickly. Flood control relied on preparation and the capability of defense. In the flood season, whole levees were divided into many sections which were safeguarded by security squad teams provided by the corresponding county. Some team offices were set in key sections. The head of a group or unit had to be a member of a local Dykes Committee, Water conservation Engineering Committee, or a ward chief who had experience in water conservation. These positions were unpaid (RWCHB, 1943, Archives NO.:1-5-120).

Usually, team members were able-bodied men aged between 18 to 45 who lived around the dykes. When necessary, peasants of benefited land living a little bit far from the dykes were requested to join. The dykes located at boundaries of counties were safeguarded by teams from both counties together. As far as materials were concerned, wooden posts, wire made from copper, sack, rolled net, reed matting and grass blankets were bought from the rescue fund. Other common tools like wide-brimmed rain hats, hats, lantern, copper gongs, kerosene tanks, shovels, baskets, shoulder poles and axes etc. were provided by the labourers themselves. There were both fixed and mobile guards. Some sheds were set up for accommodation. When an accident happened, a gong was struck to summon help (RWCHB, 1943, Archives NO.:1-5-120).

Analysis of archives (RWCHB, 1943, NO.:1-5-1393 and FDWR, 1939, NO.: 28-05-04-120-01) showed the personnel and management in relief and flood seasons. In summary, the structure of personnel and management relied on geographic condition and administrative divisions. In the era of ROC, county governments had rights of finance, administration and partial military so it was convenient for them to execute the will of the upper government, and to realize this in local communities. A county government was the main unit for management. Labourers and most managers were local residents. Managers needed to know the customs and administrative circumstances of local areas. Overseers, as a part of technical staff were selected through examination. Their performance was judged on their knowledge, skills and construction experience rather than familiarity with the local area. As technical staff, they were one of the bridges linking labourers and the management team, linking work sites and offices. However, they were restricted by heads of team or squadrons, or units. It was the organisational structure that brought technical staff the following features. As mentioned above, technical staff were an important group on the work site and were essential to the success of the relief work. They provided services on behalf of the government. On the other hand, technical staff were usually strangers to the area and this at times caused some difficulties. Moreover, the overseer did not stay in the local area all the time. In the flood season, officials of local governments were responsible for directing the flood protection work, while local residents were the main people to fight the floods and undertake the reconstruction of water conservation. Unfortunately, the tools they used were usually just simple peasants' tools. Due to their unfamiliarity, the overseers could not have good cooperation with the management team. It is seen from the above description that tools, techniques and management practices had a big effect on the progress of water conservation.

5.3 Slow progress

Analysis of archives (FDWR, 1939) revealed that despite efforts to facilitate the relief work, it did not go smoothly.

Due to the long-term shortage of budgets for water conservation, the county government had been instructed by the provincial government to carry out infrastructure construction through self-financing or ask for help from the Finance Ministry directly. Additionally, post-disaster price increases made living costs higher and made construction work tougher (FDWR, 1939, Archives NO.: 28-05-04-120-02). Funds were often short. It was difficult to progress the project; particularly for Yingshang County as the proposed levees for construction or maintenance were quite long. Due to these practical difficulties, Yingshang County had planned to postpone the construction of subordinate dykes. However, a rumour that the county government would give up dyke construction spread. The dykes involved in the rumour made the affected local residents feel panicky (FDWR, 1939, Archives NO.: 28-05-04-120-04). Actually, the rumour had a terrible effect on public emotions. Then the government published its plans in order to calm down the public and progress the project.

Budget shortages not only affected the progress of relief work, but also risked finance safety and public security. Analysis of archives (FDWR, 1939, NO.: 28-05-04-120-02) revealed that some officers of the county government proposed to issue government construction bonds. However, the proposal was vetoed as central government did not have relevant regulations. The veto of the proposal just meant that the release of the bond was not authorized in an official and legal way, but did not show any compromise of local area. Actually, there were many bonds which were involved in various fields. Relief work token notes with values of 0.5 Yuan and 0.1 Yuan issued in Fuyang County were still in the market even though it was not allowed. The finance commission of Mengcheng County had issued token notes with a value of 1 Yuan for education. There was a similar phenomenon in Huoqiu County. As Huoqiu County Government could not collect security fees from towns on time, Huoqiu Government delivered unpaid bills to ward chiefs to chase them to collect. Then the ward chief allocated these bills to their employees as salary so that the employees would collect the security fee quickly. It was common for cafes, pubs, bathhouses and shops in North Anhui Province to issue token notes or coupons with a countermark, which joined *currency* circulation as well. Overall,

this situation resulted from the incapability of the government. At the same time, shortages of money for water conservation were caused in part by the war which cost much money and made industry, business and agriculture slack. In addition, most departments did not want to invest in a water conservation project that had long investment recovery period.

Relief work projects had tight links with military affairs. In addition, plants, animals, soil, and water need more attention in wartime (Simmons, 1993). As the southeast part of Shou County was close to the enemy and the puppet regime area, recruitment and construction work in 1939 were tough there. Furthermore, the regular appearance of the enemy made people panicky. A similar situation happened in Fengtai which was located in the area of the lower reach of the Huai. As Taihe County was within the Military Control Area, many fortifications were built close to levees, which did harm to dykes (FDWR, 1939, Archives NO.: 28-05-04-120-04). In April 1941, a meeting regarding construction and engineering in Huai River Basin took place in Xian city Shaanxi Province. Attendees came from the military and governmental organisations of Henan and Anhui Provincial governments etc. It was pointed out that projects in the Huai River Basin had strong links with military affairs thus cooperation between local residents and the military was necessary to enhance the capability to fight the enemy. Actually, this did not work well. In August, the enemy quartered in Taihe County went to the western boundary of Luyi County and destroyed the levee of the Guo River, causing it to flood over into the Fei River and Ming River. It was impossible to carry out construction in the Yushan area of Fengtai County as that area was seized by the puppet enemy. So nothing was done about the huge increase of water in the Fei. On 1st September, the levee burst, which flooded 45,000 acres (FDWR, 1943, Archives NO.: 28-05-04-120-03). This indicates how the war was sometimes a direct cause of the flooding and sometimes increased the toughness of post-disaster reconstruction. The construction of water conservation was of special significance in war time. It was possibly considered as an object of attack. Sometimes, military forces were used in construction of water conservation. For example, in 1947, some people proposed to assign soldiers to do

construction for agriculture and water conservation. The County government was asked to draft a plan of construction by soldiers. When necessary, provincial governments could be required to assign technicians. The army was to be divided into several teams to carry out water conservation construction. Local peasants who benefited from the construction were encouraged to offer tools or rewards to the soldiers.

Besides the budget shortage and the effect from military affairs, issues of management were also an important cause of slow progress of construction of water conservation. As for the attitude of the management team, most heads of counties or towns did not take on their full responsibilities in dyke projects. Secondly, the policy had its own disadvantages. Due to the shortage of money, payments for earth work were often late, and some were paid retroactively after the flood season. When a ward chief processed a payment, he always deducted some from it. So there existed regulations that wages had to be paid to labourers directly and also be overseen by a supervisor. However, the accommodation and travel fees of supervisors needed to be deducted from the payment. Due to the limited amount of funds, the construction of profitable dykes got less funding for wages and unprofitable levees got more (RWCHB, 1943, Archives NO.:1-5-1393). Because of the illegibility and various disagreements on acceptable wages, it was tough to take action, which increased management costs and made corruption and financial waste easier. Construction went slowly.

Echoing Elvin's (2004) emphasis on the interconnection between animal/plants/land and social activities, policies, customs and belief, local customs and habits were often found to impact on the construction of water conservation. Analysis of archives (FDWR, 1939, Archives NO.: 28-05-04-120-04) revealed that people in north Anhui Province were known for disputation and complaint, particularly those in Huoqiu County. This produced negative effect on the construction. According to a survey of the superior court of Fengyang County, over 70% cases were from Huoqiu County. Some people involved in cases from Huoqiu County were dishonest. Engineers thought the provincial government should carry out serious punishment of these ones. That wasn't really fair.

However, if the policies were clear, management procedures were simple, and administrative staff were strictly fair, the cases would have gone down greatly.

The organisational structure of the relief work in the north Anhui Province was similar to that of the government and this guaranteed the progress of the construction to some extent. On the other hand, this structure brought some drawbacks like those of administrative divisions, such as inefficiency, unclear definitions of relevant rights and responsibilities. Budget shortages were the main cause of the slow progress of the construction. As stated by Elvin, the huge cost of the maintenance or construction of water conservation of China had great impacts on its development (2004).

5.4 Various disputes

As stated by Zhao (2011), water disputes affected water conservation. Most previous research on disputes regarding water conservation has been limited to the events in some counties or villages in the dry northwest of China and in a bygone era (Wang, 2007). Little research has been done on similar events in the Huai River Basin. The following are 6 cases, found in archives of disputes regarding water conservation in the Huai River Basin. The origin, background, course and solutions regarding the disputes were investigated based on archives. Analysis of archives (FDWR, 1943, NO.: 28-05-04-120-03) revealed that in 1940, water levels in the Yellow River and the Huai went up dramatically, and were 0.7 meters higher than the maximum in 1939. At the same time, there were several cases of disputes regarding levee construction, which did harm to flood fighting. These disputes caused some areas in Taihe, Fuyang and Yingshang Counties to suffer serious flooding. The main causes of disputes were different interests and opinions from neighboring counties. Some dug levees or dykes. Some hampered the construction of levees.

5.4.1 Disputes regarding levee digging in Luyi county, Henan province

According to archives (FDWR, 1943, NO.: 28-05-04-120-03), before 1940, there were

no constructed dykes along the Ming River which was along the boundary between Taihe County and Luyi County. In 1940, a great amount of water flowed into the Ming due to the Yellow River bursting its levees. In the autumn flood season, the Ming flowed into Taihe County. 20,000 people were called together to build the south-side dyke. Construction finished quickly in several days because of the hard work of the labourers. However, people in Luyi County did not want to build the north-side dyke and thought south-side dyke construction would harm the north-side levee. In the evening of 22rd August, in heavy rain, people of Luyi County were called together to dig the south-side levee. Some of them took guns. Several diggings were made along the dyke which was around 5 km in length. Suddenly, the water surged. Then, thousands of people of Taihe County came to try to rescue the dykes. However, hundreds of people from Luyi County used guns to hold back the rescue. In consequence, villages up to 15 km away from the river suffered the flooding. Afterwards, Anhui and Henan Provinces negotiated and agreed to take urgent action to prevent an extension of the disaster (FDWR, 1943, NO.: 28-05-04-120-03).

5.4.2 Dispute regarding levee digging led by Lianyun Fu a ward chief (the shot 'traitor')

Analysis of archives (FDWR, 1943, NO.: 28-05-04-120-03) revealed that a dramatic increase of water in the Yellow River in middle August and the destruction caused by people from Luyi County to the levees of Ming and Ci brought flooding to the towns of northeast Taihe County, and also brought danger to towns to the southwest of the Ci River. The Relief Work Committee, county government, and local towns organised labourers quickly and started the dyke construction at the south side of the Ming. On 29 August, while they were working, Lianyun Fu, ward chief of a north side village led hundreds of people to hold back the construction and pulled down the constructed dykes. The head of the town tried to tell them the importance of the dyke construction. However, Lianyun Fu did not listen and hurt him. The building of the levee was paused, which caused 40 villages to suffer flooding. The Flood covered an area of 125 square km and

land of 5000 acres. The Relief Work Committee thought that the actions of villagers like Lianyun Fu, which made around 100,000 families suffer flooding, was considered worse than murder and arson. The Relief Work Committee suggested detaining Lianyun Fu under the accusation of being 'traitor' and in order to warn others, Lianyun Fu was sentenced to death by shooting (FDWR, 1943, NO.: 28-05-04-120-03).

5.4.3 Disputes regarding dyke construction between Fuyang and Yingshang: two counties and their gentry

Archives (FDWR, 1943, NO.: 28-05-04-120-03) showed that since the beginning of the construction of the main dyke of the Ying River and the dykes of the tributaries such as the Xin, Wu and Qi, Fuyang County and Yingshang County had different viewpoints. Those rivers were along the boundary between these two counties. The Fuyang side argued that to prevent reverse flow, it was necessary to block the entrance of the Wu River and connect the levees in the east side together. Yingshang County insisted on the need to construct dykes on the Xin. Wu and Qi. They thought the construction would make some water flow into the Huai through the Xifei River and then the Upper reach of the Ying River would have less risk in the flood season. The dispute was intense. In early April 1940, people of Fuyang blocked the entrances of the Wu and Xin Rivers. However, the people of Yishang County objected. After several rounds of negotiation, it was agreed that the main dyke needed to be constructed quickly to link Kouziji and Jiangkouji, a branch dyke of the Xin River was essential and another branch dyke of the Wu River and a dyke of the Ji River would be constructed. After finishing these tasks, the blockage of the entrances to the Wu would be removed to allow some water of the Ying to flow into the Fei. Echoing Elvin's concern that "When water is a menace, the need for collective action against danger is essential" (2004, p118), different interests and opinions often resulted in poor cooperation which delayed the whole construction. Fuyang County was mainly interested in the main dyke, while ignoring the branch dykes. Yingshang County was interested in the branch dykes, while ignoring the main dyke. So, construction was not achieved on time. A section of the left main dyke burst in the

flood season in August. Reports from Fuyang County said the burst was caused by Xilin Bo, the Overseer of Yingshang County who organised and led armed soldiers to dig the main dyke in Yingshang County. However, Yingshang County declared that the real cause for the burst was the objection from gentry of Fuyang County to the construction of branch dykes; if the branch dykes had been constructed, they would have helped the discharge of water from the Ying River. Each side held their own viewpoints and censured each other. Eventually, it was suggested to punish those who breached their duties in their section of the levee, and to enhance cooperation based on mutual interest (FDWR, 1943, NO.: 28-05-04-120-03).

5.4.4 Disputes about the levees of Wucha channel: terrain and finance

Wucha Channel started at its link with the left side of the Hong River, and went down to a link to the right levee of the Huai. The terrain on its west levee was high, while the east side of it did not have a strong dyke. Analysis of archives (FDWR, 1943, NO.: 28-05-04-120-03) revealed that in the flood season, a great amount of water from the Hong flowed into Wucha Channel. Frequently, the overflow over Wucha Channel made the flooding extend east for tens of miles. Fuyang County government had held the desire to build up the east dyke for a long time. However, the people of Hongji Town located on the west side of the Hong and the people of Xi County of Henan Province located on the right side of the Hong thought the construction of the east dyke would hamper water flow and do harm to west-side areas. The dispute had existed over a long time so that no construction had been carried out and the east-side area suffered flooding every year. After the survey, technical staff proposed that possible solutions were to dredge Wucha Channel and use the recovered earth to increase the height of the levees of Wucha Channel and the Hong River and to remove the sharp channel bend for a smoother flow. It would cost less and bring benefits to the people of both the upper and lower reaches. However, another lake and two dykes were required for smoother flow. The proposed dyke was about 100 km in length. The huge project would be expensive and labour intensive, so the proposal was not put in practice (FDWR, 1943, NO.: 28-

05-04-120-03). This reflects Mark Elvin's findings that huge costs (including labour and money) linked to maintenance and construction made water conservation in China became dangerous when environmental factors occurred suddenly (2004).

5.4.5 Dispute regarding the link between the Quan and the Ying rivers

Analysis of Archives (RWCHB, 1943, NO.:1-5-120) revealed that initially the Quan River flowed into the Ying which always suffered flooding from the Yellow River. Each time when water in the Ying rose, Quan River water could not flow into the Ying and suffered reverse flow from the Ying. Technical staff suggested to cut the link between the Quan and the Ying to avoid reverse flow and then introduce the water of the Quan to the Huai through the Xiaorun River and the Fei. However, Juncai Gao et.al. from Fuyang County thought the water introduction to the Xiaorun would cost a huge amount in labour and finance due to the ridges around the Xiaorun. The Relief Work Committee thought a discreet plan was necessary, and suggested following the initial proposal to carry out maintenance along the river, rather than carry on the dispute.

The above cases indicated that disputes mainly arose from unbalanced interests between several places and echoes work by Evenden (2004) and Mosley (2001) on competition over environmental resources by different interest groups. Each side favoured their local interests and would not make sacrifices for the common interest. Even if a feasible solution was available, it might not be put in effect due to the lack of finance and there were no solutions to maximize the interests of all sides. The following is a story regarding a dispute of water conservation over a long time.

5.4.6 Zhujia dyke: the disputes over 100 years

A dispute on the Zhujia Dyke which joins the area between Yingshang County and Fengtai County lasted from the Jiaqin era of the Qing Dynasty. They argued with and obstructed one another. For example, when Fengtai County started work, Yingshang County paused and vice versa.

Zhujia Dyke was a main levee on the left side of the Ying, and was 4851 meters in length from Ganluomu, Yingshang County to Fanjia Market, Fengtai County. In order to prevent reverse flow from the Ying to Jiaogan Lake, Zhaoluo Li, a governor of Fengtai County organised the construction of Zhujia Dyke, which was recorded in local chronicles. There was a stele record that Chen, a provincial governor of Anhui Province reconstructed Zhujia Dyke in 1888. In 1911, the dyke burst, and then Pei Liu, a governor of Fengtai together with Peilan Huang, a governer of Yingshang County agreed that both counties would fix the dyke and carry out maintenance separately. The upper one was the responsibility of Yingshang County, the lower one was served by Fengtai County; this was recorded in a stele in front of the Zhujia Temple. Another stele built in front of Fengtai County Government offices by the previous county governor wrote that every year, 200 Yuan needed to be assigned to maintain the Zhujia Dyke. Analysis of archives (RWCHB, 1941, Archives NO.:1-5-25) revealed that in 1939, Zhujia Dyke burst again. Due to the huge amount of work, the Construction Bureau instructed Fengtai and Yingshang Counties to fix the dyke with each side required to do half of the work. Yingshang County worked hard and finished its part quickly, however, Feitai County did nothing on Zhujia Dyke; instead they built a new dam 1 km farther away which put thousands of acres of land under water.

The Provincial Relief Work Committee criticized both counties severely and required both sides to finish the construction of Zhujia Dyke on time. Then Zhongnan Wang was appointed to carry out the inspection. It was reported by Zhongnan that the dyke constructed by Fengtai was not new but was the repaired dam across the Yanghu Lake; a dam that had caused Yingshang County to suffer many difficulties. He suggested building two culverts or sluices there to avoid dispute, and the relevant cost would be shared by both counties (RWCHB, 1941, Archives NO.:1-5-25). The archives (*ibid*) wrote that:

> Cifang Gao, the director of Supervision Commission of Yanghu Lake in Fengtai County declared that it was wrong for Yingshang County to refer to

> records of local chronicles as these were just a record which could not be used as law. From Febuary to 19th Sep, people of Fengtai County spent all their time on the construction of Zhujia Dyke except the leave period of 50 days for summer harvest. However, Yingshang County gave up construction on Zhujia Dyke and arranged their labour in the area around Jiangkou Market; this was reflected in the fact that there was no principal in the photos taken in the work site of Ganluo Mu. The construction of Yanghu Dyke by Fengtai County was a temporary action in a special time. The purpose of Yanghu Dyke was to help overall flood control in the north of Anhui Province. It had been proposed by the General Team of Dykes and was verified by related organisations. It was not a random action. Zhongnan Wang had declared that the dyke subjected thousands of acres of land to flooding which covered an area up to 20 km. Cifang Gao declared that the flooding only extended to 2 km away and said Zhongnan Wang's declaration was an exaggeration and a lie (RWCHB,1941, Archives NO.:1-5-25).

In the archives (RWCHB, 1941, NO.:1-5-25), Fengtai County listed several faults of Yingshang County:

> Zhongli Li, a member of Yingshang Committee dug a levee privately to introduce water for irrigation in 1926. In 1938, water levels at the upper reach were quite unusual due to the huge rise of water in the Yellow River. A villain tried to excavate the levee but he was forced to run away because he was detected by people that lived nearby. On 17 June 1939, Shuqiao Wang, a ward chief of Yingshang County, was assigned to be in charge of the upper section of Zhujia Dyke. At that time, the water level was 1.3 meters lower than the levee and as there was nobody on duty on site, the dyke suffered a burst afterwards which flooded an area nearly 50 km away and resulted in the failure of the second sowing of wheat (RWCHB, 1941, NO.:1-5-25).

Analysis of the archives (RWCHB, 1941, NO.:1-5-25) showed that Fengtai County

thought the above events indicated two points. Firstly, Zhujia Dyke was so long that it was difficult to avoid damage from humans and flooding. Secondly, it was useless to depend on Zhujia Dyke and the only way to protect all the levees of Huai River was to build an extra dyke to Yanghu Lake. The construction of the dyke to Yanghu Lake in the last year made the calamity area less, allowed a second sowing of wheat early and avoided refugee leaving their home towns (*ibid*).

Additionally, the Fengtai side thought Fengtai had sacrificed much and Yingshang was unreasonable. Cifang Gao et.al. added that the full length of this dyke was less than 1.5 km; even though accumulated water occurred, the size of the area covered by accumulated water should be less than tens of acres. Cifang Gao asked "If construction of a dyke at Yanghu Lake was just a waste of money and labour, why did the county build it as quick as possible?" (RWCHB, 1941, NO.:1-5-25). So far, Yingshang County had just achieved 1/5 of the work done by Fengtai County on Zhujia Dyke; as for the burst, the people of Fengtai County were determined to do something about it; the purpose of extra construction of Yanghu Dyke by Fengtai County was to enhance the levees of Jiaogan Lake and to solve the regular disputes between Yingshang and Fengtai Counties, not for private interest.

Analysis of archives (RWCHB, 1941, Archives NO.:1-5-25) revealed that in April 1941, Fengtai side suggested the provincial government should arrange separate construction by different counties. This was because:

> (1) Yingshang and Fengtai Counties benefited from both Zhujia and Yanghu Dykes. It was difficult to assign the construction according to the exact interest from the dykes. Separate construction made management easy and economical. (2) It was natural for people of Fengtai County not to be keen to join the construction of Zhujia Dyke, as Fengtai side had finished the construction of Yanghu Dyke. Separate construction made their interests clear and then made both sides productive. (3) Zhujia Dyke was far from Fengtai Conty. It was inconvenient for people from Fengtai to conduct maintenance on it and carry

> out emergency maintenance in the flood season. Over the previous years, both sides were required to join the construction. History showed that joint construction was not advisable as people had strong regional feelings, i.e. they were used to just caring what happened in their own area. In summary, it was clearer and simpler for the Yingshang side to take charge of Zhujia Dyke and for Fengtai to take Yanghu Dyke (RWCHB, 1941, Archives NO.:1-5-25).

Yingshang County still asked Fengtai County to join the construction of Zhujia Dyke but the Fengtai side rejected their request and insisted on Yanghu Dyke (RWCHB, 1941, Archives NO.:1-5-25). It was reported by Yingshang County that water from Longwang Lake flowed through a channel connecting to Yanghu Lake and submerged a lot of land in Yingshang (*ibid*). In 1942, Yingshang side suggested work should be undertaken to widen the rivers between Longwang Lake and Yangtang Temple which was 120 meters away from the lower reach of Yanghu Lake. It was believed by Yingshang that the construction would let water flow smoothly and keep lands free from flooding (*ibid*).

The above description showed that disputes on Zhujia Dam between Yingshang and Fengtai Counties had lasted for over 100 years. Points from both sides seemed reasonable. Practical agreement had not been achieved even with the involvement of the upper organisations. Upper government hoped the projects could balance interests between them and let them get along with each other. As for Yingshang and Fengtai Counties, they hoped to settle the project once and for all. In reality, the project had to benefit both parties, but even though the possibility to achieve this existed, it was quite difficult to make each side get the same level of benefit. So there were several conflicts, such as that between local governments and upper government, that between Fengtai County and Yingshang County and that between a practical project and the ideal project. The solution of the first conflict depended on the delivery of administrative power. Here, it was clear that local governments had not executed the instructions of upper government while the latter had not taken powerful administrative or legal action. The second conflict was a severe one and was tough to solve as both sides were at equal

levels, and wanted maximum benefit at minimum cost. The fact was that natural resources were limited. Both sides would not compromise when upper government was not involved. On the other hand, each side tried to get favoritism from upper government while always overlooking their suggestions. The third conflict was the substance to these problems, i.e. did the ideal project exist? Water disputes are ordinary events and laws are widely used as a solution to such disputes (Kliot, 1994; Evenden, 2004). Solutions to disputes regarding the Huai in the ROC began with the requirement that officials report issues to their superiors, which were then resolved through compromises and agreements made between local officials, central commissioners, landowners, and local residents. This approach has similarly been reflected in water management disputes in metropolitan regions since the Qing dynasty (Song, 2013).

Each of the disputes mentioned above stemmed from a complex litany of causes, which are further complicated by background (FDWR, 1943, NO.: 28-05-04-120-03; RWCHB, 1943, NO.:1-5-120; RWCHB, 1941, Archives NO.:1-5-25). These factors included supply–demand contradictions, terrains, labour shortages, or unbalanced profit distribution from water use. The conflicts had different patterns, causes, and backgrounds depending on the region. For example, regarding the water/river system crisis and the design of the Yellow River Harnessing Project, Lamouroux (1998) observed that disputes among officials not only resulted from their dependency on technical methods, but also on the aims of officials in power (1998). Ideally, water projects should be concerned with both justice and fairness. Several provinces and counties were involved in the construction of levees and dykes. As far as justice was concerned, the weak side should obtain much more support. In flood-prone areas, the weaker group normally inhabited the lower land. The weakness was caused by natural circumstances. However, weakness did not mean they were allowed to build a dam to block water flow which caused reverse flow and brought loss to other sides. If that was the case, both justice and fairness were lost. Simply, fairness was usually all about money. Sometimes, the same figure was required by both sides. Usually, that was impossible. Recruitment, cost of facilities, profit, loss, and even labour could be

quantified to some extent. However, the difference of geographical circumstances meant that equal amounts of money were produced by different efforts according to the area. So justice and fairness came to be understood in different ways. Both sides thought their actions were based on the public interest. Both sides would argue that the other one benefited at their expense. So it was impossible to satisfy both sides completely. Therefore, it was necessary to balance the interests of all sides.

Another cause of disagreements was the absence of proper reward and punishment policies. Analysis of the archives (FDWR, 1943, NO.: 28-05-04-120-03; RWCHB, 1943, NO.:1-5-120; RWCHB, 1941, Archives NO.:1-5-25) shows that people of Luyi County and supervisors of Yingshang County dug dykes with guns in hand and successive disputes between Yingshang County and Fengtai County were finally mediated by administrative methods. They were expected to not cause interference to the construction of dykes. However, Lianyun Fu who organised peasants to dig dykes was charged as a traitor and shot. He was a ward chief in Taihe County. It can be seen that similar action and damage accrued to dykes and land, however, different consequences happened to the organisers of the trouble. Similarly, the next several disputes reflected the absence of proper reward and punishment policies. The dispute between Luyi County and Yingshang County caused Henan and Anhui Provinces to become involved. In order to save administrative resources, avoid inter-provincial disputes and avoid interference in the anti-Japanese war, nobody was charged or punished in the dispute (FDWR, 1943, NO.: 28-05-04-120-03). As the dispute between Yingshang County and Fengtai County related to inter-governmental action, a series of meetings took place to mediate it (RWCHB,1941, Archives NO.:1-5-25). As far as Lianyun Fu was concerned, he was just a ward chief which meant he was a security director of a group of 100 families. He was not a registered official who got salary from government. He was still a peasant, but did some management in his local community. His social status in the bureaucracy was very low. Furthermore, that turbulence was organised by him directly. So it was easy for the government to take him as an example to warn others (FDWR, 1943, NO.: 28-05-04-120-03). It was more difficult to punish

group or governmental behavior. On the other hand, appeasement of trouble made by groups showed up the weaknesses of the upper organization, so it was hard for disputes to be resolved permanently. Their actions could not be simply considered as a threat from lower to upper government. Only the lower organisation which had economic and administrative power had the capability to do that. So Lianyu Fu was an unusual case. Normally, it was the County that was a local unit of the regime, with economic and political power. Most national revenue was from the Counties and each County had its own armed force. Moreover, Principals of provinces would not go against the County and take the risk of losing the foundation of their power. In summary, environmental history has close links with economics (Hurley, 1995; Smout, MacDonald, and Watson, 2004; Elvin 2004) and natural or social causes coupled with economical interest are usually at the core of disputes regarding water conservation.

5.5 Game theory and review

5.5.1 Objections to levee construction

Analysis of notes from Chen (1932) revealed that the flood disaster caused the death of many people from hunger. Peasants were always eager to get the harvest in and then they could feel confident about their future lives. Levee construction took up land and soil, so it was a benefit on the one hand but at the same time took away valuable resources. A pit 30 meters in length and 20 meters in width meant a loss of about 10 Yuan. In order to win the peasants' support and to prevent pillaging by peasants, some gentry used small amounts of money to help refugees. Because they had got alms from a landlord and were concerned about their small amount of land, the peasants were easily persuaded to object to levee construction. Moreover, landlords bribed and colluded with some officials who then maneuvered to interfere with construction (Chen, 1932, p82). Driven by benefit of land, refugees, landlords, gentry and some officials were linked together and conducted a series of tragedies and games. "Some small landowners committed suicide by hanging. Some gentry organised their female servants

to tear foremen's clothes" (Chen, 1932, p83). At that time the pressure of relief work came not only from the economy, but also from the public voice and morale. Relatively, death, loss of dignity of men and dissimilation of femininity attracted more sympathy. All these led to widespread disturbance in objection to the levee construction.

Analysis of archival records (FDWR, 1939, Archives NO.: 28-05-04-120-04) revealed that there were many absentee landowners in the North of Anhui Province. For example, in Tangduo Lake area, over 200 hectares were owned by Hua, an absentee landowner from Fuyang County, over 40 hectares of land belonged to Peili, a landowner from Huoqiu County and there were lands of about 170 hectares for Zhang, an absentee landowner from Yingshang County. In total these lands were nearly half the size of the lake area within the lower reaches of the Huai River. Because of the low terrain this area suffered flooding easily. Most tenants moved elsewhere, which meant that able-bodied labourers were in short supply. It was difficult to complete the construction of levees just with the support of peasants in the Tangduo Lake area. Most labourers were peasants whose land did not benefit from the construction. So they always complained about the construction or worked slowly and this negatively affected the progress of the project. Meanwhile, the government taught peasants that "social security depended on a stable life for all the people; that a disaster in one area interfered with and did harm to the people in another area as well; that it was compulsory for all people to carry out reconstruction for refugees; and that it benefited the refugees and the others as well" (RWCHB, 1941, Archives NO.:1-5-35). At that time, it was not obligatory for the landowners to join the construction. They still got rent from the land, so it was unfair. The government suggested that "tax collected from the benefited land be used to compensate the destroyed land and the affected labourers" (*ibid*).

Two solutions were proposed to charge the benefited land and to compensate the people, whose land was destroyed by construction and the labourers whose land did not benefit from the construction. The *Guidelines of Compensation to Lands Occupied by Levees Construction* was issued by Anhui and showed the compensation to the destroyed land

(FDWR, 1943, Archives NO.: 28-05-04-120-03). *Guidelines* pointed out that the built levees funded by relief work project were several hundred kilometers in length and occupied much of the peasants' land. In the terms of the '*land act*' issued by the central government, tax from the occupied land would be exempted, and losses from the occupied lands would be compensated by those that benefited from the works. It was encouraged to pay compensation in full in the first year. If not, the difference had to be paid up in the next year. All the occupied lands and benefited lands, including their locations, value and the names of landowners needed to be recorded and verified. Due to the different values and differences in the quality of soil, lands were classified. If disputes occurred in the valuation of land, the town office was responsible for mediation. If the town office could not resolve it, the related documents and evidence were to be delivered to the county government. The records of occupied and benefited lands and the relevant compensations had to be verified by the Supervision Commission and then a copy of it was sent to every town for a one-month publicity period. During that period, any disputes as to the figure would be verified again and recorded by provincial government.

Even the regulations entitled *'the modified temporary regulations regarding compensation for the expropriation of land and its use to unbenefited labourers in Yingshang' (*called *the regulations* in the following*)* (RWCHB, 1941, Archives NO.:1-5-35) were just the regulations of a county, although possibly, they could be considered as typical rules for other counties. The *regulations* pointed out that:

1) The distinction between benefited and unbenefited lands should be concerned with the circumstances of levees, dams and terrain of specific towns.
2) If a peasant was assigned to another area for construction and his land did not get any benefit from this construction, he could get compensation from the benefited user in that area. One cubic meter of earth was valued at around 0.2 - 0.3 Yuan, of which 0.1 Yuan would be paid by the relief work

fund and the rest paid by compensation.

3) Most benefited tenants had gone elsewhere and had not joined the construction. However, the land of some peasants who had joined the construction did not benefit from the construction. So they should get compensation from the benefited user.
4) Compensation expropriation standards should be determined by the amount of benefited land and the finished earth works. If a peasant had not achieved the earth work determined by his land he needed to pay compensation. As far as a tenant was concerned, either he or the landlord was required to pay half of the compensation. If the tenant had moved, the landlord was required to pay the full compensation in advance. The landlord would be repaid the half compensation by the tenant when he came back or by the new tenant.
5) Heads of towns and supervisors were responsible for filling forms regarding benefited land and the people who needed to get compensation. Together with the figure of expropriated compensation, the forms were sent to the finance committee. After verification by the General Engineering Team, the Town Office was responsible for the compensation collection within two months. Then the finance committee would ask the General Engineering Team to set an allocation date. The heads of squadron or foremen went to collect the compensation for labourers. (RWCHB, 1941, Archives NO.:1-5-35)

However, the above regulations could not guarantee that the labourers whose land did not benefit from the construction would be happy. For example, “some labourers from Linquan County, working in Yingshang County borrowed money from the relief Work fund frequently because of poor accommodation. If money was not available they threatened that they would stop work. Taihe County thought that in terms of loan regulations, borrowing money from the relief work project must be later than the evaluation of the earth work. Furthermore, many labourers from Linquan County had

not observed the scheduled dates and gone home" (RWCHB, 1941, Archives NO.:1-5-35). The escape of unbenefited labourers showed that they did not completely trust the regulations. They were unsure whether they could get the compensation in the next year. They thought that it was difficult to get compensation from the 'absent' peasants who were poorer than them. It was a judgment based on their economic status. Furthermore, future compensation would not in an emergency prevent death from famine and poverty. Even when the policies seemed reasonable and the compensation or expropriation levels were fair, they were not practical to some extent. The fundamental reason lay in the shortage of money, the slack economy, and the fact that no reserve fund was used as prepayment or compensation. The so-called benefited people were actually peasants who were very poor, so it was difficult to get compensation from them. Echoing Hassen's (1998) work on economics of supplying water and the politics, social benefits and costs associated with its use, archival data on the Huai river and its tributaries illustrates that financial conditions always restricted or affected political action.

5.5.2 Causes of calamity: reviews on land policies and relief work

Analysis of the *report of survey of flooding in Anhui Province* (ARC, 1931) revealed that in 1931, both the Huai and Yangtze River reaches were in flood areas. However, JiangNing County and Zhenjiang County went through the disaster by themselves. A request to recruit refugee labourers was put in the local newspaper due to the shortage of refugee labour. Similar difficulties in labourer recruitment arose in the areas of the Guoxia and Yun Rivers. The possible reason there was that most families in that area had savings and hence had some protection against famine. In the north of Anhui Province, apart from the landowner families, most didn't have savings to pull through the difficulty caused by the flood (Wang, 1932). Clearly the reason for the famine in north Anhui was not just the flood.

Marks (2005) argued that the human–land relationship constituted an important issue in environmental history. Previous studies of water conservation in China focused on technology and water rights, but not on water conservation issues which have close

connections with land policies. This issue will be addressed in this chapter which also draws on Sadao's (1996) findings that the relation between agriculture and social institutions should get more attention from researchers; specifically policies of the land, and the labour structure of villages.

Analysis of the report by Guo and Hong (1937) revealed that another reason for difficulties in relief work stemmed from ownership of land. There were landlords, middle-income landowners, peasant, tenants, and farm labourers. The landlord possessed land but did not cultivate it by himself, renting it out instead. Middle-income landowners owned some land, leasing part of it to others and using part for their own cultivation. A peasant had a small amount of land which was just used by him. Tenants possessed a small piece of land and also rented some from a landlord (Guo and Hong, 1937, p. 22). They had to pay for the rent fee as specified in the contract, no matter whether there was a good harvest or not. Farm labourer was the term used to refer to those who had very little (or even no) land nor equipment. With little education and poor income, they were hired by landlords to farm the land occupied by landowners. Farm labourers were the lowest class in the countryside. Some crops or money would be paid to them as remuneration at the end of the year. In Anhui, the landlords who received rent from land comprised 6.05% of the population. A further 29.9% of the population were peasants. The percentage of tenants was 42.65% of the population. That meant a great deal of land was occupied by 7% of the population. People who did not possess any land made up 43.25% of the population. It was therefore clear that the allocation of land was quite uneven (Guo and Hong, 1937, p. 18). Among landlords, land ownership was also not even. Most lands were occupied by a small number of landlords.

In Fengtai County, 27% of the land was occupied by those who had over 8.3 acres of land. These people made up 6% of the population. In Bo County, 13% of families had land over 8.3 acres. The land occupied by these families was 43% of the total land in Bo County. In Fuyang County, 5% of the families had land over 12.5 acres. The land

occupied by these families was 36% of the total land there. According to the survey by the Land Commission in 1935, there were 13 families in Huoqiu County who each possessed land over 4,166.7 acres (Guo and Hong, 1937, p. 24). A similar situation in other counties can be seen from table 5.1. So just a few landlords possessed most of the land. Some of those are listed in the following table. In addition, warlords seized land in large quantities.

Furthermore, the extent of land annexation in Fuyang County became more serious than before. Due to debt, more and more peasants became tenants. Taking Village Liu and Village Ma as an example, the number of peasants there went down from 32 to 27 in just 5 years (Guo and Hong, 1937, p. 27). Under those land policies, life would be tough even without famine. Most peasants in north Anhui province had little in the way of savings or possessions at home. They lived in thatched cottages. Windows, beds, chairs and desks were normally woven from sorghum stem. There was very little wooden or bamboo furniture. Common food for them was sorghum soup or poi. In festivals such as New Year they normally prepared kasha for themselves. Meat was scarce for them. They usually sat on the door step or a straw pile to eat their meals. At night they burned jute stem for lighting. A small family could use kerosene or bean oil. In winter, peasants always wore only a wadded jacket which was very shabby with many holes. They burned dried grass to keep their home warm. In summer, most men were barebacked with shorts. A few peasants in North Anhui did weaving as a sideline. They bartered wheat or poi for clothes. Although they planted wheat they seldom ate it. Once a disaster happened they had nothing to pull them through.

Table 5.1: The land occupied by the big landlords in Anhui Province (Guo and Hong, 1937, p. 45)

Counties	Number of big landlords	The land possessed by individual landlord (acres)
Huoqiu	13	In the range of 4166 to 13333
Wuhe	6	Over 500
Sixian	4	In the range of 333 to 4166
Linbi	3	In the range of 1000 to 2500
Mengcheng	4	Over 16667
Guoyang	4	In the range of 833 to 1667
Bo	7	In the range of 167 to 667
Taihe	1	Over 1667
Fuyang	16	In the range of 500 to 1667

Table 5.2: Some landlords and the sizes of their land (Guo and Hong, 1937, p. 46)

Name of landlord	Size of his land (Acres)	Name of landlord	Size of his land (Acres)
Xiangpu Chen	1333	Ruanqin Dong	666
Buchan Ni	1166	Daifeng Zhu	1166
Jiachen Ning	1333	Zaiqing Wang	333
Xinyuan Ning	500	Laoxiang Xie	1000
Junheng Ning	666	Lianruo Li	833
Zanqing Deng	333	Zichen Ning	500
Qingfu Lv	1000		

However, the famine provided rich landowners the chance to purchase land at low prices. Compared to the normal prices they could get land with 60-70% off. For survival many peasants sold land or other assets at very low prices. Also the floods caused peasants to have no seed left for cultivation. At that time, the landowners loaned peasants seed with high interest and required them to repay in the next harvest. Sometimes the interest rate was up to 50%. Some tenants sold their cattle or even children for survival. Each flood brought a chance for the rich to annex land. Correspondingly, floods changed many middle-income landowners into peasants, peasants into tenants, and tenants into farm labourers. Further land annexation by big landlords made the rent higher. Annexation made the rich richer, the poor much poorer. The rich families were extravagant and had a luxurious life, while the poor people almost had nothing to live on. Some were driven to steal from others, which at times caused fear in those communities (Guo and Hong, 1937, p. 94).

The frequent disasters resulted in landlords in Anhui Province possessing much land and brought them leadership in society. In 1926, the Northern Expedition started. The Communist Party agitated for a People's Revolution (Xu, 2013). Apart from some areas, the general land ownership in most regions of Anhui Province was not changed by the agitation. Landlords did not want to constitute an organisation, as they already held all the power. Tenants did not know how to form an organisation due to lack of education. Furthermore, the sequence of disasters made most tenants leave their hometown for survival. It was hard to form a tight link between themselves or constitute an organisation. Moreover, the landlords would not do anything to help peasants get organised. So there was little political organisation such as peasant associations in Anhui Province. It was difficult to develop a rural economic cooperative in Anhui Province as well. Most landlords of North Anhui lived in richer provinces such as Jiangsu, Shanghai or Beijing (Guo and Hong, 1937, p. 94). Some of them did not understand the tough life of tenants. Their only concern was rent collection and then they could spend it in the richer areas. The capital outflow brought serious effects to the economy of north Anhui Province.

5.6 Discussion and Conclusion

Echoing Evenden's (2004) conclusions regarding salmon production in the Fraser River, archival data on the Huai river and its tributaries served to illustrate ROC-era disputes regarding the maintenance of the Huai River and its tributaries for transport, irrigation and military purposes. Due to these competing interests, local officials, central commissioners, landowners, and local residents were involved in the disputes. Many social classes and processes were found to be involved in the post-flood construction and relief work. Reflecting Marks' (2005) argument that human-land relationships are an important subject of environmental history, detailed analysis revealed that improper land policy was the key cause of the seriousness of the disaster. The extreme convergence of land made grass roots society so poor that the peasants could not get through the disaster by themselves. The poverty of the grass roots society brought about government financial shortages, and in turn, the government was hard pressed to organise the relief. Many issues arising in relief work projects, such as the supply of services and the presence of labourers, had links with the land policy. As far as the policy of relief work was concerned, there was something illogical. Administrative interference had a huge impact on the relief work. Marks (2006) and Elvin (2004) argued that the government played an important role in agricultural affairs related to irrigation in China. Similarly, the findings of this study indicated that the government dominated water conservation and the more powerful the government is, the less impact the natural factors have on production and life. For example, it was only governmental officials that were appointed as leaders of the relief work project. An advantage of that was that political power could help to organise work and personnel. Actually, it was supervisors who really had the capability to implement water conservation schemes because they communicated directly with the labourers. However, the management of projects depended more on administrative power and financing than on the supervisors, particularly in the big projects. Labour recruitment was determined by foremen who normally colluded with corrupt landowners to exploit disaster-affected peasants. Apart from engineers, the refugee labourers had no opportunity to chat with the people who

had social position and influence, or voiced their complaints to them. However, engineers had limited power to change the condition of refugee labourers. Furthermore, it was written in policy that calamity labour was required to provide their own tools or money for the tools. That was impractical. After disasters, most peasants used bark and grass roots as their main source of food (Wang, 1932). To provide tools was a huge burden for them. The purpose of them joining the relief work project was for survival. The regulations (RWCHB, 1941, Archives NO.:1-5-35) stated that the owner of benefited land was required to pay compensation to the owner of destroyed land, and the calamity labourers whose land did not get benefit from the work. The former got compensation due to his loss; the latter got money because of his work. It sounded really fair; however, the reality was often different. Harvests on the benefited land depended on the good condition of levees and dams as flood disasters often destroyed the levees and dams, and then destroyed the harvest of those lands. However, the land that did not benefit from the construction of levees normally was free of disaster. It seemed to rob the poor to subsidize the rich, therefore creating real inequality. However, in wartime, when the state suffered internal trouble and foreign aggression, there might have been no better solution.

Relief work was a governmental action through which the state helped refugees to reconstruct their homes quickly. Recruitment through administrative power rescued people from serious famine and helped to construct infrastructure and to keep the order of society. Communication between engineers and refugees diffused knowledge and new ideology, which improved the quality of the people and indirectly the condition of the villages. However, the relief work projects could not solve the key issue: extreme convergence of land. There was a saying that “those without fixed assets are not determined” (Wang, 2012). What the peasants did seemed selfish, but in fact their judgments were based on long-term experience which made them go after profits and avoid disadvantages. At that time, there was no real organisation to protect the interests of peasants. Absent landlords would not disseminate new agricultural knowledge or invest in agriculture. “Many of them used up money on opium and gambling and ended

up in penury themselves" (Chen 1932, p. 114). The relief work plan was unable to fix the water conservation problem completely. It can be suggested that a succession of floods was accompanied by a succession of relief work projects. No or little possession of land, no efficient protection from government and the period of war left peasants struggling for survival. What they did sometimes harmed the collective interest, and this negative impact played its role gradually over a long time. Essentially, the relief work project was a short-term activity. The key solution to the problem of water conservation lay in the balance between population and land, the harmony between cultivation and environment, and regular maintenance of water conservation infrastructure. Big projects should have been able to balance both partial interests and overall interests. The main purpose of the project should have been to prevent disaster or decrease the loss from disaster and help sustainable development rather than to completely meet the needs of each side involved in the project. The intention of making all sides one hundred percent content only caused endless disputes which, in fact, ended up harming everyone.

Chapter 6: All and sundry – the Anfengtang Pond in the era of the ROC (1912–1949)

6.1 Introduction

The chapter focuses on the investigation on the Anfengtang Pond, especially in the era of the ROC. As one of the four famous ancient water conservation projects in China, Anfengtang Pond has long attracted the interest of scholars, but most of these studies are focused on its origin and the management of it in the Ming and Qing Dynasties. Far less work has been done on Anfengtang Pond during the period of the ROC; mainly because there is little supporting material about the pond from that period. It is unfortunate that there is a lack of studies on Anfengtang Pond because this community was located in the north-south joint area and could serve as a typical example for the study of the grass roots society in China.

In order to understand China where peasants make up the majority of the population, it is essential to understand the Chinese countryside. By nature, rural issues and politics affect all of China. Investigations of irrigation in the countryside provides us with a window through which to look at rural politics. In the Anfengtang community, villages are connected each other and with the state via water conservation. Owing to issues of water management, water usage, construction and maintenance of water conservation, a series of scenes of competition, conflict, compromise and collaboration have been observed. Officials, gentry, peasants and local organisations were the characters involved in these episodes. This chapter examines the politics, economics, military, culture, law and customs behind these episodes, and tries to explore the interactions between natural resources and social resources.

This chapter investigates people from different social classes in the construction of water conservation. The relationship between ordinary residents, gentry, engineers and officials from the government at various level, and the influences on water conservation

in domestic and international situations were examined. The work undertaken here is aligned with the research methods and traditions of environmental history (Hurley, 1995). It seeks to determine the important factors implied in the landscape dominated by the relationship between water conservation and society and provides in depth analysis of these different elements using case studies.

The research informing this chapter is based on two years of data collection using three key methodologies. The first involved obtaining materials from the various archives managed by the central government, as well as Anhui's provincial and county governments respectively. The second took the form of fieldwork investigations and interviews with people. My interview with residents around Anfengtang Pond brought me closer to the real Anfengtang Pond in the era of the ROC and helped me to understand how the real Anfengtang Pond was reflected in ordinary residents' minds. The interviews also supplemented and helped to explain the archives. Similarly, Shi argued that the researcher should undertake fieldwork to avoid drawing making incorrect conclusions from historical materials (Shi, 1981). The third involved collecting materials such as local chronicles and newspaper articles. Separately, each of these methods could produce only partial or incomplete data but together, after cautious analysis, they provide a means of corroborating key findings presented here. The Anfengtang Pond community is a small community in the middle of China. In 2008, I spent over 3 months here. I found that the peasants there were still used to listening to their educated elders. Some peasants thought of me as a designer from the department of water conservation, and hoped the government would improve the channels. They felt both curiosity and fear towards strangers. Like the peasants in the era of the ROC, they worked hard all of their lives.

6.2 A brief history: the origin of the Anfengtang Pond

The Quebei was an ancient and famous pond in China located 30 km south of Shou County centre (shown in Figs 6.1 and 6.2). It is now called Anfengtang Pond. There are

various records regarding the origin of the Quebei.



Fig. 6.1: The terrain of Anfengtang Pond area [1]

[1] Reprinted according to photomap from Google

Some records showed that its construction was led by Shuao Sun. For example, the records in the *History of the Later Han – Biography of Wang Jing* reveal that the Quebei was built by Shuao Sun in the Spring and Autumn Period (770–476 B.C.) (EBTWCAP, 1995). An account in the *Commentary on the Waterways Classic* stated that the Quebei was built by Shuao Sun and was located between the Pei River and the Fei River. It mentioned that the Shuao Sun Temple (shown in Fig. 6.3) was located to the north of the Quebei (*ibid*). Some historical documents, for example *Records about The Book of Han Dynasty: Prefectures Annals,* mentioned that construction of the Quebei was led by Zisi, and said that this was taken from the records in *Books for Emperor*.

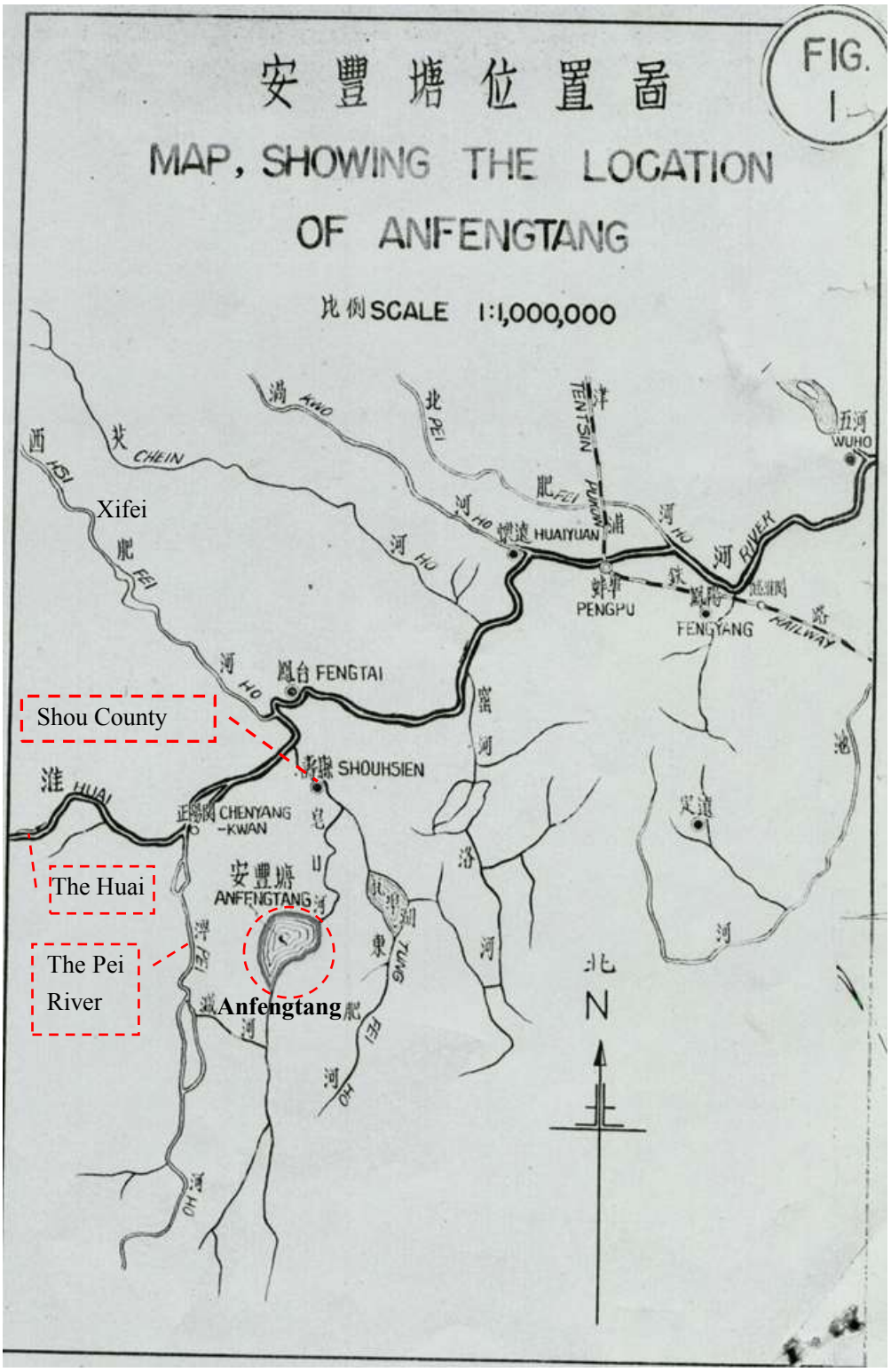


Fig. 6.2: The location of Anfengtang Pond (EBTWCAP, 1995)

However, two very important books, *History of the Later Han* and *Commentary on the Waterways Classic* did not accept that 'the Quebei was built by Zisi'. Although *Commentary on the Waterways Classic* cited many records in *Books for Emperor,* it also pointed out some mistakes in the same work. Thus, the note saying 'the Quebei was built by Zisi' was considered to be doubtful. In another paper entitled *Investigation on Origin of Quebei* by Zheng (1982) there is a detailed description regarding the founder of the Quebei. According to Zheng's findings, the Quebei was built by Shuao Sun, who was famous for great achievements in water conservation and held a high position in officialdom. He was appointed as prime minister during the period 601–594 B.C. After achieving powerful domination in 597 B.C., King Chuzhuang planned to enhance state strength, national defence and agriculture. King Chuzhuang thought it was essential and feasible to develop the Quebei irrigation area (Zheng, 1982). In addition, the rainfall in the Shou County area was rich but unevenly distributed. Shou County was liable to flooding in the rainy season and subject to drought in the dry season. Shuao Sun advocated and organised a series of irrigation projects along the Huai, Shiguan, Feng, Ji, Pei and Fei Rivers (ibid). These irrigation projects produced a vast irrigation region. A stretch of hills, which is a watershed between the Yangtze and Huai Rivers, was situated south of the irrigation region. The zone between the south levee of the Huai and the northern area of the irrigation region formed a plain. The irrigation region promoted the development of the Shou County area. Based on many historical documents, Zhaojin Zheng pointed out that the projects led by Shuao Sun were relatively simple, owing to the limitations of tools and technology (ibid). After extension and improvement, all these irrigation projects together were called 'the Quebei', although they have been called the Anfengtang Pond or the Quebei Pond since the Sui and Tang dynasties (420-581) (Zhao, no date).[2]

[2] *Geography Records of The Old Book of Tang History*; The Old Book of Tang History is the first classic historical work about the Tang Dynasty, comprising 200 chapters. The original chief editor was Zhao Ying , who was also the chancellor then. However, by the time of its completion, Liu Xu had become chancellor and taken over the work of organisation; as a result he was credited as chief editor when the work was presented in 945 to Emperor Chu of Jin; http://en.wikipedia.org/wiki/Book_of_Tang



Fig. 6.3: A statue of Shuao Sun (1) and the Shuao Sun Temple beside Anfengtang Pond (2) (EBTWCAP, 1995)

It was difficult to investigate the earliest construction technique of the Anfengtang Pond. Archaeological research carried out in May 1959 revealed some technical details regarding dyke construction for the pond in the Eastern Han Dynasty (25–220 A.D.) (Yin, 1960). In that period, some sluices were built over discharging channels. Wooden posts were used to construct the frame of the weir. Mixed layers of soil and grass were combined to form the body of the weir. The main role of the weir was to store water. In the dry season, water from the pond could flow through the gap between the grass layers, and then into the land. In the rainy season, water flowed over the weir. In addition, some iron harpoons, hoes, axes, saws, ploughs, a copper fishhook (shown in Fig. 6.4) and a bamboo basket bottom were found during the archaeological research. All these reflected the status of production and life in that era. Moreover, an iron hammer of a water official was found there (EBTWCAP, 1995). In terms of records in the *History of the Later Han,* a water official was responsible for the management of the Anfengtang Pond and for fishery taxes (ibid).

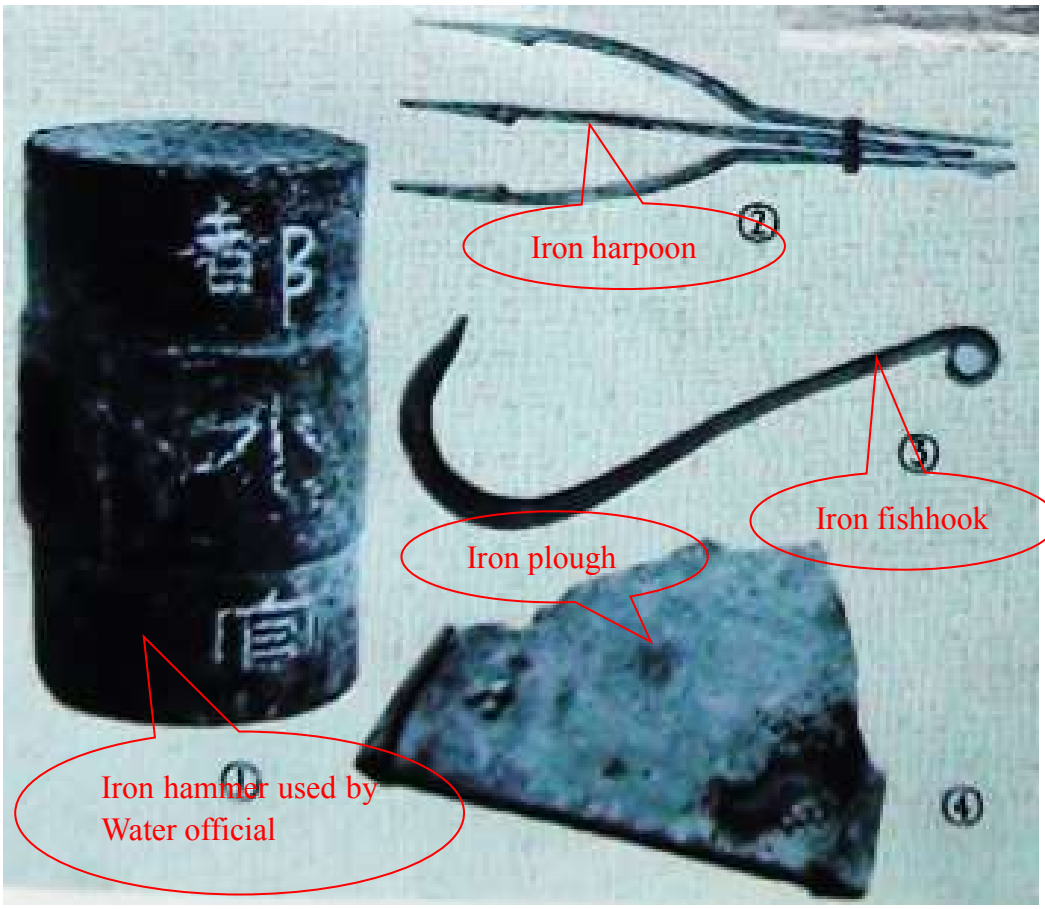


Fig. 6.4: Some historical relics found in the ruins of the Sluices and Dams Project in Han Dynasty at the location of Anfengtang Pond（EBTWCAP, 1995）

In 243, Ai Deng from Wei State carried out repairs and made improvements to the Anfengtang Pond. Fifty small dams were built. A new channel was dug to link the north levee of the pond and the centre of Shou County, where the water joined the Fei River (Zheng, 1982). Ai Deng's actions expanded the water storage capacity and the irrigation area, and improved water transportation (Chen, no date).[3] During that period, the efficiency of the pond reached its peak. During the early period of the Western Jin Dynasty (256–310), the pond experienced several maintenance operations. Tens of

[3] *Annals of Emperor Wu of Kingdom Wei,* It is the Volume 1 of *the Book of Wei*, which is a part of The *Records of the Three Kingdoms*. The *Records of the Three Kingdoms* is a Chinese historical text which covers the history of the late Eastern Han Dynasty (c. 184–220 CE) and the Three Kingdoms period (220–280 CE)

years later, silting up and collapses happened to the Anfengtang Pond as a result of war. Powerful families started to reclaim shoals for cultivation land or for property, including wasteland reclamation (Zhang, no date). In 590 of the Sui Dynasty (589–618), further maintenance was carried out. The number of sluices increased from five to 36 (Wei, no date). During the Tang Dynasty (618–907), wasteland reclamation took place several times and had led to good harvests (Zhao, no date). However, in the late Tang Dynasty, successive wars caused the pond to fall into disrepair and led to the collapse of many dykes (*Tuo, no date*). During the Song Dynasty (960–1279), there were numerous records regarding the destruction of the pond owing to flooding (Xu, 1984). In the period between 1032 and 1033, heads of local counties organised and encouraged rich families to make donations towards the dredging of channels and the construction of dykes and gates. This brought recovery and prosperity to the pond. However, the wars in the late Song Dynasty resulted once again in the silting up of the pond. During the Yuan Dynasty (1271–1368), some ministers submitted proposals to carry out repairs and maintenance on the pond. Wasteland reclamation during that period also brought a good harvest (Song, no date).

In the early Ming Dynasty (1368-1644), immigration for wasteland reclamation was encouraged. However, private wasteland reclamation by the landocracy was also very popular (Li, 1963; Xia, 1877). In 1483, some principal landowners involved in private wasteland reclamation were detained and severely punished (Huang, no date). During the period between 1522 and 1566, local officials organised the construction of channels, which were used as borders to prohibit private wasteland reclamation (ibid). However, many landowners continued to carry out private reclamation, eating away at sections of the pond.

During the period between 1567 and 1570, 70% of the pond had been converted into land and water covered just 30% of its area (Qi, 1983). In 1582, Kezan Huang, the governor, expelled 30 landowners involved in private reclamation (Huang, no date). This changed 10,647.5 acres of reclaimed land back into a water area. Even though

private reclamation was suppressed for a while, it was difficult to change the tendency for the size of the pond to decrease. Several maintenance operations on the pond were also conducted during the Qing Dynasty (1644–1911). In 1653, the governor of the local area organised 1000 peasant labourers to dredge the rivers, dig channels and fix sluices, dykes and collapses, and this greatly improved the irrigation efficiency of the pond. In the late 17th century, serious silting up of some channels happened again. In 1697, some powerful landowners obtained approval from the local government to change some shoals of the pond into land. Local peasants had strong objections to this and reported it to the central government, which agreed to the peasants' request (Xia, 1877). In 1698, under strong pressure from the local residents, the governor of Shou arranged for his assistants to organise the maintenance of the pond. Sluices were recovered or rearranged. By 1703, four sluices built in the Ming Dynasty had been recovered. The number of sluices decreased from 36 to 28, greatly improving the overall capability of the pond (*ibid*).

Analysis of local chronicles (Xia, 1877) revealed that in the middle of the Qing Dynasty, a management system based on local communities was gradually introduced. Several country gentry were appointed as board directors, who were responsible for discussing issues relating to the pond and offering solutions. Board meetings were held twice annually. Important events or issues needed to be discussed by the board first, after which solutions, agreements or suggestions were forwarded to the government for approval or were implemented by the directors of the pond. Normally, several directors managed various sections of the pond. Gatekeepers were assigned to the water entrances around the pond. The maximum number of gatekeepers serving one water entrance was nine, while the minimum was eight. One of every 10 gatekeepers, managed by the director of the pond, was selected as the head of the gate, and was responsible for the water discharge gates, sluices and helping the director to organise annual maintenance. The essence of the management policies of the pond in the Qing Dynasty was 'to share the water equally'. In terms of the distance between the land and the pond, land was classified into three levels. Correspondingly, the irrigation fees and the labour services

were divided into three levels. Inequality in water use was not allowed. The sluices were strictly managed. The key to the sluice was kept by either the government or a board director. The operation of the sluice was determined by the growth of the crops. Moreover, all the sluices were required to be opened at the same time. In order to avoid waste, the sluices were closed once irrigation was complete. The heads of the gates were required to register with the government. If a problem occurred, they might be punished. The use of the waterwheel was only permitted for the lifting of water for irrigation during the daytime. Inhabitants of lands in the upper reaches were not allowed to construct dams, although some people did not observe the regulations (Xia, 1877). Normally, in a dispute over water the weaker person held in his anger, while the bolder one applied violence. The struggle for water resulted in many deaths (EBTWCAP, 1995).

After 1799, the economy and politics of China fell into recession. Private construction of a dam to intercept water and the reclamation of wasteland in the pond occurred again. During the period between 1871 and 1908, just 30% of the pond could be used to store water (EBTWCAP, 1995). Even though part of the pond had been recovered afterwards, the capability of the pond was again limited. An increase in the population was the direct driver towards private reclamation. In 1828, the population of Shou State was 0.76 million, seven times that in 1541 (Zeng, 1985). As the soil around the pond was fertile and good for cultivation, the arable shoal of the pond and the land around the pond were converted into cultivation lands. This worsened the ecological environment around the pond and flooding became common as the capacity of the pond was reduced (EBTWCAP, 1995).

During the period between 1573 and 1620, the pond experienced a ten-year low water period and reserves were very scarce. Even though local residents had been organised by the government to combat breaking the rules governing the use of water, illegal actions had neither been prevented nor properly punished, as the action of the residents was not active and no measures were taken beforehand. Normally, the government intervened after the event, as with remediation. Moreover, changes in the dynasty or the

responsible officials made the management of the Anfengtang Pond erratic. Thus, it was common for the silted part of the pond to be changed into land and the shallow part into pastures. Profiles of the source for the Anfengtang Pond in different eras are shown in Fig. 6.6. It can be seen from Fig. 6.5(3) that in the early time of the ROC, no river was used as a source of the Anfengtang Pond.

So far, most publications regarding the Anfengtang Pond have focused on its origin or its evolution during the Qing Dynasty with little attention given to the pond during the period of the ROC. To the author's best knowledge, the only relevant publication was written in 1986 by Kuiyi Zhou, the Chairman of the Research Association of the History of Water conservation in China (1988). He also mentioned some reasons for the absence of research on the Anfengtang Pond during the period of the ROC. The first reason was the rarity of relevant documents, the loss of some archives or being forbidden to access the archives. The second reason is down to the researchers themselves who paid little attention to fieldwork and oral history as alternative methodologies for conducting research on the pond (1988).

In contrast to findings from Shiba's research on water conservation in China that drew on masterpieces, national history and law to examine the influence of population, social migration, cultural ecology, economic ecology, and technology, my research places greater emphasis on oral histories and documentary analysis that allows the voices of local community members to be heard. Such methods are particularly useful for exploring the mentality of the people involved in the events under analysis. Nevertheless Shiba's (1987) research is valuable for highlighting the need to apply caution during the screening of resources and has been drawn upon in the analysis of archival data and oral history utilised in this chapter. The archives I used are original versions from the second Historical Archives of China, Anhui Archives, and Archives, Institute of Modern History, Academia Sinica. There was good corroboration of the information found within them, which lends confidence to the overall analysis.

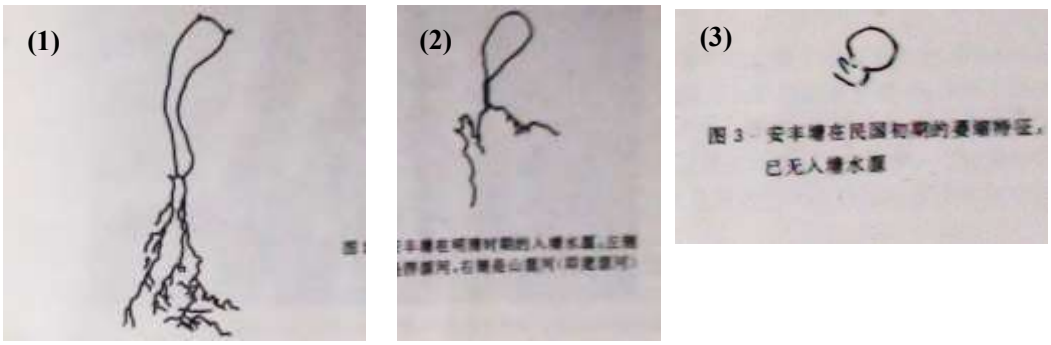


Fig. 6.5: Image 1 shows the Geographic profile of the source for the south part of the Anfengtang Pond 2580 years ago. On the left was the Peiyuan River, and the right side was the Shanyuan River (1). Image 2 shows the Geographic profile of the source for the Anfengtang Pond in the Ming and Qing Dynasties. On the left was the Peiyuan River, and the right side was the Shanyuan River (2). Image 3 shows the geographic profile of the Anfengtang Pond in the early time of the ROC (3) (EBTWCAP, 1995)

6.3 Story of a charge statement: conflict between the Anfengtang Pond water office and villagers around Anfengtang Pond

Analysis of chronicles (EBTWCAP, 1995) revealed that on 18 May 1925, the first convention was held by the newly-established Anfengtang Pond Committee. Regulations on organisation and management were voted on and issued, which built a solid foundation for the management of the Anfengtang Pond (EBTWCAP, 1995). In 1928, most main rivers linked to Anfengtang Pond were silted up, which caused its water storage capacity to decrease sharply, providing just enough irrigation for a total of 9,884–11,532 acres of land (ibid). It seems that the management by local communities was insufficient to fight drought.

The chronicles (EBTWCAP, 1995) also revealed that in June 1931, *Water*

Regulations of the Anfengtang Pond in Shou County (referred to as *water regulations* hereinafter) was examined and passed by the Anfengtang Pond Committee and copied to government. It was then printed by Meisheng Publishing House and distributed to villagers around the Anfengtang Pond. The *water regulations* consisted of three parts: the organisation, management and water usage regulations of Anfengtang Pond.

In terms of *water regulations*, the Anfengtang Pond Water Office was set up and located in the ancestral building called 'Sungong Ancestral Temple (EBTWCAP, 1995). Its members were elected at Anfengtang Pond Convention and included 12 executive members, three supervising staff members and one treasurer. It was registered in Shou County Government. Analysis of chronicles (EBTWCAP, 1995) revealed that during the period from 1925, when the Anfengtang Pond Committee was set up, to June 1931, the committee had not sorted out the problems of silting up and water capacity reduction for two possible reasons. One was from climate; the second was from the committee's low status/qualification. Anfengtang Pond Water Office was a non-government organisation, which made it difficult to get effective support, such as information or finance, from the government, and also made it difficult to undertake big projects. No registration meant that the office was not declared and protected by law, and the weak power of regulations from that office made it difficult to prohibit the bad behavior of 'contemptible' villagers and gentry to the pond. Activities such as allocation of work or collection of money organised by that office did not go smoothly. If it had been registered, it would have been more convincing as it would have the support of official permits and democratic elections.

In terms of the meetings of the Anfengtang Pond Water Office, the Anfengtang Pond area was divided into three segments. On average, for each segment, there were four executive members and one supervisor (EBTWCAP, 1995). This method was mentioned in the Anfengtang Pond Convention of 1925. The most important aspects of the management of the pond were: to prohibit fishing, cattle herding and sink digging for fish or for storage of cattle urine in the pond; to stop berthing, which blocked

transportation, and private sluices; to ask people to repair levees when their cattle or other livestock destroyed them; to remove dams, which were not allowed; to get rid of private or redundant sluices or culverts; to stop private wasteland reclamation and to conduct recovery; to organise maintenance of Anfengtang Pond; and to set proper sizes of sluices according to the amount of the water used (EBTWCAP, 1995).

The water *regulations* seemed complete and comprehensive. However, there were many drawbacks behind them. Firstly, the regulations were too simple and did not contain detailed descriptions, such as those relating to duties and responsibilities. One effect of the regulations was that local community organisations had limited capability to undertake maintenance based upon water conservation principles. The maintenance was just based on their customs and understanding of daily life. Execution of the regulations depended on individual will to a large extent. Regulations were often broken by villagers, as is reflected in the oral history of several respondents.

[Peasant, aged, 70]: *Some villagers thought part of Anfengtang Pond belonged to them and dug small ponds within Anfengtang Pond as fishing areas....*

[Peasant, aged, 72]: *Two sluices called Phenix and Zaokou had been built on Anfengtang Pond by two tyrannical villagers who did not allow anybody to use them…Some rich and powerful villagers had private culverts for themselves*.

[Peasant, aged, 74]: *One large family surnamed Xia (one of whose members was a powerful officer) had built a ditch (it was a private culvert) passing by his home and assigned other people to manage it for them. At harvest time, he collected crops as rent from those people who had used his culvert.*

Furthermore, owing to the absence of specific mechanisms of punishment, once the regulations were broken by one action like the above, similar actions would spread among villagers. When people involved in disputes reported to the gentry, who had power and social connections, rather than laws and regulations, there was a tendency for the gentry to forgive each other, and the gentry who broke the rules would be

protected by those of the same class. This sometimes provoked disorder.

As a result, conflicts became increasingly severe and frequent, and often led to lawsuits or violence. Therefore, the regulations were weak owing to the vague description of the punishments and incentives, and it was thus difficult to guarantee the effectiveness of the regulations.

In the *Anfengtang Pond Chronicles,* there is a record of significant flooding in 1931, which caused extensive damage to Anfengtang Pond in Huai River Basin (EBTWCAP, 1995). The water levels of Wabu Lake situated to the east of Anfengtang Pond and of the Pei River, which is situated to the west of Anfengtang Pond, rose drastically and flooded extensive areas of land. That event was mentioned by two interviewees [Peasants, aged 76, 72], who said that a "*severe flooding in 1931 caused big destruction to the west of Anfengtang Pond*"; "*people could swim in crops fields due to the big flood in 1931*". The graph below shows the water level of Zhengyang Gate station in 1931.

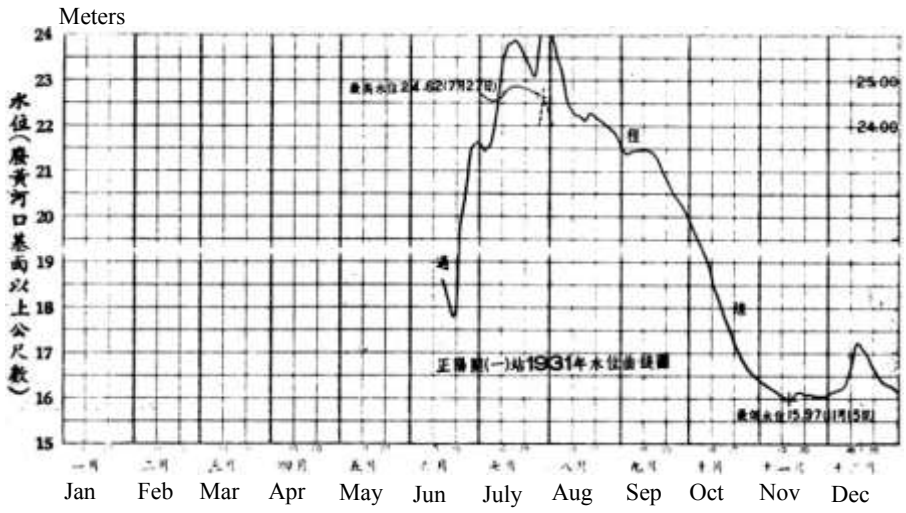


Fig. 6.6: Water level of Zhengyang Gate station in 1931 (HRWRC, 1956)

Prior to the end of the flooding, some villagers accused the Anfengtang Pond Water Office of being responsible for 'people killed due to collapse of levees' (Anon, 1933,

Archives NO.: 3317). The following extract from the *Chronicles* contained a statement from the villagers:

> It was normal practice that once the water level of Anfengtang Pond went up, Gunshui Dam would be utilised to relieve water and Bo Sluice and Feng Sluice would be used to discharge water. In an emergency case, all pond gates should be opened, which allowed the water level to go down so that no danger occurred. It was unexpected that in this year, the west levee of Anfengtang Pond collapsed and water submerged crops and caused damage to houses and death to humans and livestock. This was a disaster that had never happened before. The main cause for the collapse was poor management rather than natural factors. The claimants drew out nine charges, some were shown below. The claimants firstly questioned who the managers of the construction of the Anfengtang Pond were? Water conservation had been controlled by state government, and then by the Anfengtang Pond Water Office. The managers should have been elected from honourable gentry by local residents. However, Anfengtang Pond Water Office was controlled by a band of tyrannical villagers, which led to bad management and the deterioration of the pond. Secondly, Anfengtang Pond Water Office was charged with dereliction of duty. Anfengtang Pond Water Office had initially been set in Sungong Temple, which was located between the villages, which was convenient for communication. However, they had moved the office to Wuli Bay for their own convenience. This caused delays in coping with the dangerous situation. Thirdly, there were 15 staff members in Anfengtang Pond Water Office. If each person performed his duty, prepared ahead and adopted measures on time, then dangerous situations could have been avoided. During the rainy period of dozens of days, there were no staff in Anfengtang Pond Water Office, and consequently there were three collapses in one day in the area near the office. Additionally, the financial state of Anfengtang Pond Water Office was in disarray. The Anfengtang Pond Water Office had public land of 30 acres, which

> brought it rent of around 1000 Yuan annually. Additionally, it could obtain hundreds of Yuan from fishing taxes. Except for the cost (300 Yuan) of routine maintenance of the water conservation, the rest should have been used for annual maintenance of the levees. However, the staff members of the Anfengtang Pond Water Office expended this money at will, and considered the levee's collapse as an opportunity for them to accumulate a fortune. The state tried to ease the burden on the people, but staff members of Anfengtang Pond Water Office increased the tax on fishing and ferries. If the villagers did not donate as required, they were accused of refusing to donate (EBTWCAP, 1995).

The office broke the trust of the people. In addition, consultation of the *Chronicles* (EBTWCAP, 1995) revealed that clerks of the Anfengtang Pond Water Office smoked around 200 g of opium each day and abused the public project fund to fund their habit. At the end, they hoped that the government would verify and rectify the current situation to improve the status of the water conservation and people's livelihoods.

Following the statement were the signatures of 14 people dated on 26 August 1931. Three of them used personal stamps and the others used fingerprints in place of signatures with their names, which were written by someone else at the side. It was a lawsuit involving villagers led by gentry.

Zhang (1986) revealed that since 1855, the Huai River has experienced some significant flooding disasters, for example, in 1866, 1916, 1921, 1931, 1950, 1954, 1968 and 1975. In particular, in 1933 continuous rain lasting for around one month resulted in a significant flood, which caused serious damage to the lower-middle reach of Huai River. This disaster, which led to 23,900 deaths (Zhang, 1986), obviously could not have been controlled by the Anfengtang Pond Water Office, so the statement by the gentry and villagers that the causes of the disaster were mainly factors related to people, particularly the personnel of the Anfengtang Pond Water Office, rather than nature, is

not very reasonable.

Although the *regulations* advised on the organisation, management and water usage of Anfengtang Pond, there was no mechanism for supervising Anfengtang Pond Water Office. It was difficult for the superior organisation to receive messages/opinions from "root" classes directly and take timely measures to rectify the actions of Anfengtang Pond Water Office. On the other hand, villagers did not have the power to supervise Anfengtang Pond Water Office directly. As a result, the power of Anfengtang Pond Water Office was detrimental to the maintenance and construction of Anfengtang Pond, and it also created major rifts and enmity between villagers, some gentry and the management panel of Anfengtang Pond Water Office. When disaster and death occurred, the negative actions of Anfengtang Pond Water Office brought about an outbreak of hatred and complaints from villagers. Consequently, villagers entirely blamed Anfengtang Pond Water Office, and also displayed a dissatisfied and disrespectful attitude to superior organisations (EBTWCAP, 1995).

The accusation seems reasonable on the whole. Analysis of the statement (EBTWCAP, 1995) revealed that, however, there seemed to be something else behind some charges. The charges stated that Anfengtang Pond Water Office broke the law and tyrannised villagers, imposing extra taxes with the aid of adminstrative power. That action lost Anfengtang Pond Water Office the villagers' support so that few people were willing to undertake tasks relating to water issues. The above logic seems reasonable. If the reason that local residents had not carried out their duties was the hatred they felt for Anfengtang Pond Water Office, did this mean the villagers did not know what they needed and what they should fight against? Moreover, now that villagers could submit a statement of accusations against Anfengtang Pond Water Office after the disaster, why had the desire to ask if the district office to manage Anfengtang Pond been suppressed by Anfengtang Pond Water Office? Maybe the disaster had attracted the attention of superior organisations, and then the accusation statement could reach them easily. Maybe the desire had not been organised well. Furthermore, now that the members of

Anfengtang Pond Committee Water Office were elected by villagers, why were the members of the committee so immoral? Did the villagers need to account for part of the blame?

The *Treatise on Anfengtang Pond* (EBTWCAP, 1995) reveal that hostility occurred between villagers and Anfengtang Pond Water Office in 1931. Normally, Anfengtang Pond Water Office acted badly (EBTWCAP, 1995) and villagers were left feeling negativity and resentment. However, the disaster led villagers to actively accuse Anfengtang Pond Water Office. To whom did the villagers and some gentry submit their accusation statement? To the state. The definition of 'state' varied to different villagers and changed with the situation but was considered as the organisation that issued regulations, policies and laws relating to tax and work. In the villagers' minds, 'state' was a unit that was constituted by administrative organisations at the provincial level or above and the staff working there. However, the villagers did not consider local government, local officials and themselves to be part of the 'state'.

In many cases, the villagers would not consider the county government part of the 'state'. They thought that wicked gentry were in collusion with the heads of the county. There is a known saying in China, "the door of every government faces toward the south and would not welcome the people who are poor" (Liu, 2009), meaning that government members favoured the rich people, even if they broke law or regulations. However, the government referred to in *Treatise on Anfengtang Pond* (EBTWCAP, 1995) normally was the county government, which was the usual organisation villagers could reach. If villagers thought that provincial government could not uphold the justice of the lawsuit, they would no longer rely on the law, so they thought that county government could not act on behalf of the 'state'.

In short, the appearance or formation of the 'state' changed with time in the mind of the local villagers. However, its connotation did not change in their mind: the state was a dependable organisation that helped them. This opinion was reflected in a well-known novel, *Outlaws of the Marsh* (Shi, 1998) in which a band of quasi-bandits acted against

malfeasants, but not against the state. In addition, it was implied in another recent novel, *An Investigation of Chinese Peasants* (Chen, 2004). Both implied that the policies of the state in the eyes of ordinary people were right and most local officials were corrupt. Weaker groups therefore sought refuge and comfort but forgot to improve regulations or to execute them strictly. Of course, it was quite difficult for pond villagers to achieve those aims.

6.4 Story of project plans in spring 1934: the dream and the dilemma of engineers

Analysis of the *Anfengtang Pond Chronicles* (EBTWCAP, 1995) revealed that the dykes of Anfengtang Pond were in a bad condition owing to long-term disrepair and silting up of channels linking with Anfengtang Pond. This caused a decrease in the capacity of Anfengtang Pond and the occurrence of drought after only ten continuous fine days (EBTWCAP, 1995). Anfengtang Pond had experienced three serious droughts during 1932–1935. The situation that no water was available for irrigation caused villagers to move to dry crops, which led to a sharp fall in agricultural produce (EBTWCAP, 1995). In June 1933, the Anfengtang Pond Committee conducted maintenance on some dykes of the Anfengtang Pond (*ibid*).

The condition of the Anfengtang Pond during the period of winter 1933 to the spring 1934 is indicated in a proposal, *the Plan of Water Introduction from Pei river to Anfengtang Pond* (referred to as *the Plan* hereafter). *The Plan* not only mentioned the issues of techniques for water conservation, but it also discussed the relationship between technique and the economy. Moreover, the ambitions of the engineers, the compilers of *the Plan,* their skills in the ambitions and the limitations to their ambitions could be tracked from *the Plan*.

There were two versions of *the Plan*. One was the printed version (Pei, 1934), and the other was the original handwritten archives (WEDAP, 1934, Archives NO.: 26-00-003-

02). The printed version had a preface, old references and appendices, none of which were included in the archive. Except for the above differences, those two versions were the same in content, such as 'summary', 'measurements', 'project plan', 'budget', 'conclusions' and the 'enclosed drawings'. Another difference was the signed dates on their covers. The printed version was marked with the date of March 1934, while the handwritten one was marked with January 1934.

On the fourth page of the printed version was the preface by Yixiang Pei (head of Water conservation Division of Construction Bureau, Anhui Province). Pei (1934) wrote: "agriculture is the basis of China; the water conservation project has been instilled with great importance; recently, provisions/foodstuff for people depend on imports owing to the recession of the agricultural economy; and the revival of China depends on the development of water conservation projects". The words above reflected an official's opinion about society and water conservation projects. He then wrote that "Anfengtang Pond has been well-known since a bygone era, and its foundation was prior to Qin Trench, Han Trench and Zhengbai channel" (Pei, 1934). Analysis of the *Anfengtang Pond Chronicles* (EBTWCAP, 1995) revealed that the capacity of irrigation of Anfengtang Pond was 10,000 hectares initially, then down to 5,000 after an evolution of 3000 years, and then down to the 1000 hectares in 1934. As the head of the Water conservation Division of the Construction Bureau, Anhui Province, Yixiang Pei managed all water conservation in Anhui. There was little possibility for Yixiang Pei to downplay his achievements to the water conservation of the area under his management. Therefore, even if the figure of 1000 hectares was an estimated one, the actual situation should not have been very different from that. Analysis of *the Plan* (Pei, 1934) highlighted how Yixiang Pei declared that there should be three sources, Dongfei River, Pei River and Shanyuan River, for the current Anfengtang Pond. At that time, Dongfei River had almost disappeared and the water of Pei River had not flowed to Anfengtang Pond for a long time. Additionally, silting and private occupied reclamation in Anfengtang Pond decreased the capacity of the pond. Pei (1934) then wrote: "I took the charge of recovering the water conservation of the hometown and organised an

inspection of Anfengtang Pond in 1934". He went on to say that a "survey of the track of Ziwu Trench had been undertaken for the project, *water introduction from Pei river to Anfengtang Pond"* (Pei, 1934). It could be seen that the route of water introduction depended on the old channel, Ziwu Trench, and was not something imagined by Pei. Analysis of the *Anfengtang Pond Chronicles* (EBTWCAP, 1995) showed that Pei drafted two plans for the project with the aim of irrigating 65,897 acres and compared the cost with Jinghui Channel (located in Henan Province). He thought the cost of fixing Anfengtang Pond was less than one tenth of that, but would have a similar effect. As both Jinghui Channel and Anfengtang Pond were well-known old water projects, located in middle China and with similar financial situations, it was obvious for Yixiang Pei, as the chief official in charge of water conservation of Anhui Province, to consider the national situation and seek a balance between income and outgoings for his plan. Pei wrote that it was difficult to collect money locally at a time of serious financial shortage - even only 10,000 Yuan - so he appealed for donations from gentry and people with an interest in water conservation projects (EBTWCAP, 1995).

When did the survey of Anfengtang Pond described in Yixiang Pei's preface start? On the cover of the handwritten archive was written "*plan of water introduction project from Pei river to Anfengtang Pond issued by Water conservation Division, Anhui Province in January 1934*" (Pei, 1934). This meant, in January 1934, a plan of the project had been compiled and issued. It was reasonable considering the fact that the survey had been undertaken prior to the project. As a key person, why did Yixiang Pei write in the printed version that the survey of Anfengtang Pond was undertaken in 1934? It was clear that what he wrote conflicted with the original archive. The only explanation was that the 'January' in the original archive was in the lunar calendar format and the date in the printed version was in the solar calendar, as the January in the lunar calendar was approximately consistent with the period between February and March in the solar calendar. Additionally, there were two tables marked with March 1934 in both the original archive and the printed version. That meant the engineer and Yixiang Pei used the same date format – the solar calendar – but the person who compiled the documents

chose the lunar calendar. The *Anfengtang Pond Chronicles* mentioned that during the first half of the year of 1934, the Water conservation Division had been required by Shou County to arrange a survey of Anfengtang Pond. The survey took two months (EBTWCAP, 1995).

Therefore, it can be seen that the survey was undertaken during January to March of the solar calendar. It demonstrated that engineers used different calendar from officers. It reflected the intellectuals' responses to the new or old culture. Most technical people tended to accept the western calendar when they had been exposed to western technologies while the clerks whose work was to do writing and record daily events, were less affected by such things.

The Plan (Pei, 1934) also revealed that the Anfengtang Pond described in the 'summary' in 1934 was located 35 km south of the centre of Shou County and was 7.4 km in length, and comprised an area of 37.42 square km. In the section regarding 'measurement' results, it was recorded that the maximum capacity of Anfengtang Pond was 56.1 million cubic meters. Irrigation for nearby land needed the water to be 30 cm deep in Anfengtang Pond; that is to say, every 16,474 acres of land needed 18.42 million cubic meters of water. According to the normal situation of Anfengtang Pond, it just provided irrigation for 49,423 acres and as there was 164,744 acres of land, the only solution to meet the irrigation needs of the whole area was to introduce water from elsewhere.

One possible candidate source, the Shanyuan River had changed its route through Pengqian Mountain and provided little water to the pond. Another possible source was the Pei river. However, there was a silting problem in the segment of the Pei River between Sunjia Bay and Lianghe Entrance. The silting led to little water from Pei River reaching Anfengtang Pond. Therefore, it was impossible to introduce water from Pei River to Anfengtang Pond without dredging. How much water needed to be introduced? The answer from engineers was that the amount should be enough to irrigate a land area of 164,744 acres (EBTWCAP, 1995).

Table 6.1: Two candidate plans for water introduction project through dredging of Pei river (WEDAP, 1934, Archives NO.: 26-00-003-02)

Plans	Amount of irrigation	Efficiency	Level of River bed of entrance	River bed gradient	Ration of slope	key segment				Sub-key segments			The minor key segment			
						Description	Length of key segment	Dredging depth	Earth amount	Length of sub-key segment	Dredging depth	Earth amount	Description	Dredging depth	Earth amount	Earth amount in total
Plan I	98,846 acres	In withered water period, irrigation and shipping transport were available	8 cm lower than the lowest location of Pei river	0.01%	1：2	Upper segment: 2.5 km, lower segment: 2 km.	4.5km	4 m	197,817 m^3	10.5km	2.5 m	289257 m^3	It is 3.365 km upward to Lianghe Entrance	1.5 m	42723 m^3	529717 m^3
Plan II	66,600 acres	During low water period, irrigation is available and can for boat with water line less than half meter	42 cm higher than the lowest location of Pei river	0.01%	1：2	Upper segment: 2.5 km, lower segment: 2 km.	4.5km	3.5 m	117,636 m^3	10.5km	2 m	145758 m^3	The segment is 3.365 km upward to Lianghe Entrance	1 m	14790 m^3	278184.25 m^3

Analysis of WEDAP archival data (WEDAP, 1934, NO.: 26-00-003-02) revealed that the current difficult financial situation meant that the fixing of old branch channels could not be afforded. Complete fixing of branch channels and maintenance were left for seasons when agriculture was flourishing. Current finances could only just support the proper project plan. Two candidate plans (shown in Table 6.1) were put forwarded by engineers for water introduction projects through dredging up the Pei River. Of course, it was necessary to work on flooding control following the water introduction project.

It is evident from the same archives (WEDAP, 1934, NO.: 26-00-003-02) that engineers put forward two plans for flood control. The first one benefited flood control, and both water and land transportation. However, it needed a big budget. Compared with the first plan, the second one was simpler. It was appropriate for the flood control of Pei River. Additionally, its cost just was 1/4 of that of plan 1. However, as no measurement/survey had been done on the rivers in the lower reach, it was impossible to know the capacity of the lower reach. If local people went for plan 2 for the cheaper cost, a further survey would be necessary.

Table 6.2: Candidate budget plans of *Water Introduction from Pei river to Anfengtang Pond* (WEDAP, 1934, NO.: 26-00-003-02)

	Items	Earth amount (m^3)	Unit price (Yuan)	Subtotal (Yuan)	Total (Yuan)	Notes
Plan 1	Earth dug	529,797.05	0.2	105,959.41		Unit price of earth including cost of work regarding water drainage, damming. The dug earth was used as part of interal levee
	Relevant fee		5%	5,927.97		
					111,257.38	
Plan 2	Earth dug	278,184.25	0.2	55,636.85		
	Relevant fee		5%	2,841.84		
					58,418.69	

Analysis of archival data (WEDAP, 1934, NO.: 26-00-003-02) showed that plan 2 made many compromises for the sake of economy. Once the capacity of the lower reach changes or if the flooding is bigger than that in 1931, plan 2 might not play a role and the threat of flooding would still exist. The builder had calculated the budget for both plans as shown in the Table 6.2. Engineers said the choice of plans was up to local people who would make their decision according to their finances and requirements.

Archives (WEDAP, 1934, NO.: 26-00-003-02) indicate that the engineers had shown their opinions of the plans using the data and graphs. A close reading of the archives (ibid) indicates that plan 1 was much better than plan 2 in terms of safety and practice. However, for a water conservation project for irrigation of 164,744 acres, usually there were four fundamental parameters for consideration: feasibility of technology; workload, supply and demand of labour; cooperation between builders and local governments; and finance and project. As for the maintenance/repair of Anfengtang Pond, finance was a key issue that troubled people and organisations. It was difficult to choose a proposal.

In the concluding part of the plan, it was stated that "plan 1 could benefit 98,846 acres of land and needed a budget of 0.12 million Yuan. If there was not enough finance for plan 1, plan 2 could be an option. Plan 2 could benefit land of 65,897 acres and needed a budget of 60k Yuan only. It was reported that rebuilding Zhenbai Trench in Shaanxi Province in this year cost tens of millions of Yuan and the rebuilding afforded irrigation for 82,372 acres of land" (WEDAP, 1934, NO.: 26-00-003-02). It is evident from archives (ibid) that the description regarding the cost of the rebuilding implied waste. The following sentence in the 'conclusion' stated that "the project of *water introduction from the Pei river* had similar efficiency to the Zhengbai channel, but just cost 1/10 of the Zhengbai channel project" (WEDAP, 1934, NO.: 26-00-003-02). In a tight financial situation, budget competition led to criteria that the less money spent on project, the better the official was. Such words showed an implication or suggestion that plan 1 was excellent of course, however, plan 2 was good enough. When improper comparison or

competition was utilised by different parties, important factors, such as the quality of the project and harmony between water conservation, the environment and sustainable development, were liable to be ignored. Such negligence might arise from shortages of funds, from the fact that some people could not get direct benefit from a project, because the long-term effect of a project could not be evaluated currently, or might come from poor experience, knowledge or skills. In any case, evidence from archives (WEDAP, 1934, NO.: 26-00-003-02) indicates that competition among local governments or organisations like that did not play a positive role.

However, analysis of these historical materials (WEDAP, 1934, NO.: 26-00-003-02; (EBTWCAP, 1995) does indicate that the ambition of engineers was not in doubt. At the end of the proposals (WEDAP, 1934, NO.: 26-00-003-02), they pointed out that Anfengtang Pond was a benefit from the ancestors. They expected the gentry to put forward a plan and put it into use so that the project could begin earlier. When the budget for water conservation was available, they would conduct a survey for extension of irrigation and fixing of the main channel and branches and then the recovery of the project would be realised and would benefit the national economy and the people's livelihood, not just Shou County. Additionally, at the end of the proposals, engineers attached some historical materials relating to Anfengtang Pond. At that time, the engineers' dreams linked officials of water conservation, technology, finance, and local governments and communities through water conservation projects. The project plan was the stage for different parties to conduct compromise, competition and cooperation. As one party, engineers needed to offer various project options to satisfy the interests of each side. These findings reflect the work of Hurley (1995) who argues that various classes and races have different feelings and attitudes towards environmentalism.

As a chief official of water conservation and as a person born in Shou County, Yixiang Pei attached great importance to agriculture and water conservation in his letter to Chulin Xi, who was the commissioner of the fourth district. The letter was attached to the plan as an 'appendix' (Pei, 1934). He asserted that "yearly investment of ten

thousand Yuan would increase profit by hundreds of thousands of Yuan annually. Nothing else could compare with it" (Pei, 1934). Then he mentioned the difficulties: it was easy to talk about business but difficult to act, particularly to collect money. Those words showed his understanding of local government's trouble collecting money. He then said that "at that moment there were 16,474 acres of land benefitting from Anfengtang Pond and there would be lands of 49,424–65,897 acres that would benefit from the improved Anfengtang Pond" (Pei, 1934). Pei suggested getting some funding for the Anfengtang Pond Project from the 'budget of construction' of the local government, and to get some specific funding from the provincial government. It was also proposed that supplemental funding could be obtained by collecting money from villagers who would benefit. If land was taxed at 0.6 Yuan per acre, tens of thousands of Yuan would be collected quickly. In his letter, Yixiang heaped high praise on Chulin Xi: "You always think about people's livelihood; could you do me a favour to plot a blueprint for the project and put it in effect? Once the project is achieved, Shuao Sun would not be the only great person making a contribution to Anfengtang, you would be remembered by people forever; certainly, the project would benefit generation upon generation; if technical assistance was needed, we would be very happy to serve it; here is the plan and hope to get your comments and guidance" (Pei, 1934). The letter was dated 7th July.

As mentioned before, the original archive (WEDAP, 1934, NO.: 26-00-003-02) shows that the plan was issued in January 1934. The difference between the printed version (Pei, 1934) and the original version was the preface and appendix attached to the printed one. The preface and appendix showed Yixiang Pei's personal attachment to his hometown and his passion for water conservation. Secondly, he put forward his suggestions for money collecting. Thirdly, what he said in the preface and appendix achieved the effect of generating diffusion and appeal. It was possible that gentry and administrative officials were not given a chance to see the technical drawings and might not be patient enough to read the description of the construction plan. However, everyone could read the soulful, beautiful texts of the preface and appendix and knew

that the letter Yixiang wrote was for Chulin Xi, the commissioner of the fourth district. From the text, it was a letter to unite all parties. In addition, it was an open letter to ask for support from officials and to exert pressure upon them. He humbly ascribed the achievement to the chief official managing finance and put himself as a technical official. Additionally, the gentry felt pressure from his letter. On the other hand, the public was informed in advance that every acre needed to be charged 60 cents initially. Because of the open information, each family could prepare in advance. In this letter, the water conservation official took advantage of a transparent policy.

There is no record of a reply from Chulin Xi in the original archives, so it is difficult to evaluate the effect of the letter on Chulin. However, the book *Notes of Anfengtang Pond* put Yixiang Pei and Shuao Sun in the same column of the chapter *Water conservation Engineering* (EBTWCAP, 1995).

6.5 Present circumstances and the proposal: the gentry's considerations for Anfengtang Pond

Analysis of archival data (APC, 1948, Archives NO.: 06-27-802-2027) revealed that the flooding in 1931 and the complaints from the public attracted the attention of the government. The government decided to hold a re-election for members of the Anfengtang Pond Committee. In 1934, with the support of Shou County, a commissioner, Chulin Xi, arranged the re-establishment of the Anfengtang Pond Committee. The committee consisted of the gentry around the Anfengtang Pond, and it was responsible for managing irrigation and administrative operations. Lizai Shi and Huanan Wang were elected as the managers of the north segment of the Anfengtang Pond; Xingcun Zhou and Zhujiu Xu were elected as the managers of the west segment of the Anfengtang Pond; and Mengqi Li and Liaobai Huang were elected as the managers of the south segment of the Anfengtang Pond (APC, 1948, Archives NO.: 06-27-802-2027).

[Peasant, aged, 76]: *The Pond Committee, which had several members, was responsible for water conservation. The role of the committee was like that of the town government at present.*

Oral histories taken from local peasants indicate that the Anfengtang Pond Committee did not communicate well with residents in that area, or that the residents around the Anfengtang Pond did not know how to use their rights and gave up the option to join the management of the pond owing to poor education.

Liaobai Huang, the head of the Anfengtang Pond Committee in Shou County (APC, 1935, Archives NO.: 26-00-12-004-05), wrote to Ziwen Song, the director of the National Economic Committee (NEC), on 17th May 1934 soon after his appointment. Some of his statements can be found in his letter titled *Comments and suggestions from the Anfengtang Pond Committee and gentry around the pond*. Liaobai Huang wrote: "the Anfengtang Pond was in a state of long-term disrepair. The provincial government requested that the construction of water conservation should rely on local residents and government. Since 1929, the countryside economy of Shou County had been in recession. The current situation made it difficult for villagers to subsist, to say nothing of contributions needed for the fundraising and construction. The peasants had thought to borrow money, however, they had nothing to use for a mortgage and found it very difficult to repay it. As mentioned in the *Draft Regulations of the Water conservation Society of the Huai River Basin* issued by the NEC, and the documents of the Provincial Construction Bureau, the levees of the Huai River and other water conservation projects could be funded by the state or supported by a mortgage taken out by the county government. The records in *Notes of Anfengtang Pond* showed that, historically, the money for fixing and maintaining the Anfengtang Pond was provided by the government. A special position, Subdivision Director of Water conservation had been established in Shou County in the early Qing Dynasty to run the Anfengtang Pond" (APC, 1935, Archives NO.: 26-00-12-004-05). Archives (ibid) indicated that Liaobai Huang asked for urgent help from the NEC on behalf of 100,000 peasants around the

pond and hoped to get funds to introduce the water from the Pei River to the pond. If water introduction from the Pei River was successful, irrigation around the Anfengtang Pond would be guaranteed, the water flux in the upper reach of the Pei would decrease and the bay area of the Huai River would seldom suffer from flooding. The local peasants would benefit directly and the people along the Huai would benefit as well (APC, 1935, Archives NO.: 26-00-12-004-05).

It is evident from archives (APC, 1935, Archives NO.: 26-00-12-004-05) that in the letter, Liaobai Huang described the situation in the countryside and what the people there had done for the projects, and showed his understanding and expectations to the government. In terms of the regulations and files at that time, he also argued that the project '*Water Introduction from the Pei to Anfengtang Pond*' should be funded by the government. Moreover, he referred to local chronicles from an earlier era to support his point that the construction should be funded by the government. He thought the status of the Anfengtang Pond greatly affected the safety of the Huai River Basin. In his argument, he linked the local interest with the overall interest. The NEC rejected Liaobao Huang's request and did not provide any explanation except for the reason of an overdue application (APC, 1935, Archives NO.: 26-00-12-004-05). That reason would be more powerful than any other analytic explanation from the geography, environment and economy.

Even though Liaobai Huang's request was rejected, he wrote to the NEC again, and tried to persuade it to put the project on the budget list for the next year (APC, 1935, Archives NO.: 26-00-12-004-05). In addition, he suggested carrying out the recovery of the old irrigation system, which covered the area from Zongxing Market in the south to Pei in the west to the Baoyi Market in the west and to the border of county centre in the north. The recovery needed huge amounts of money. Huang argued that the absence of the project would hurt the peasants and force them to leave their homes, which was contrary to the state's desire to develop irrigated farming land. Liaobai Huang reminded the NEC of the risk and linked the construction of the Anfengtang Pond with the desires

of the state. As a leader of the community, he showed his appreciation for the relief work plan of central government and gratitude for the management of local government in advance. His proposal also implied that the realisation of the upper organisation's policies should depend on the local ones (APC, 1935, Archives NO.: 26-00-12-004-05). At the same time, Shou County Government wrote to the NEC and showed its financial difficulties with regard to the construction, and hoped the construction project would be on the list of relief work planned (APC, 1935, Archives NO.: 26-00-12-004-05). Because of the consistent proposals by the leader of the community and local government, and because of the same appeal from the residents and local government, the NEC replied that it would examine the proposed drawings for the pond and then make a decision (APC, 1935, Archives NO.: 26-00-12-004-05).

Analysis of archival data (APC, 1935, Archives NO.: 26-00-12-004-05) revealed that on 14 November 1934, Shou County Government submitted a proposal (a brief description is shown in Table 6.3) for the fourth-phase construction of water conservation. There were three parts in the plan for the '*fixing of Anfengtang Pond*'. Up to that time, the application to put the Anfengtang Pond project on the list of planned relief work had nearly ended. Over the past half a year, the Anfengtang Pond Committee, Shou County Government, Water Division of Construction Bureau and the NEC had been involved in it. It was seen that area of Liaobai Huang's concern was from the Anfengtang Pond to lands in Anfengtang Pond area, to Shou County, and then to Huai River Basin. Huzhen Wang, a clerk for the Water conservation Division of the NEC, mentioned that "the Anfengtang Pond was the biggest water conservation facility in the North of Anhui Province, and very close to the main transportation of the Huai. If it could be dredged up, massive agricultural production would be delivered at a low price, which would benefit the state greatly; in summary, it was a massively profitable construction with low cost" (APC, 1935, Archives NO.: 26-00-12-004-05). It was clear that the route of Huang's concern was from the Anfengtang Pond to transportation, to agricultural production and then to state interest. When the requirement of the communities met the state interest, the project was approved. However, even after

approval, it was still a long time before they received the money. The plan did not go smoothly. According to archives (APC, 1935, Archives NO.: 26-00-12-004-05), when Liaobai Huang, a 70-year-old gentleman finished his letter for Ziwen Song, his face was covered with tears.

Table 6.3: Three main parts in the plan for ‘fixing of Anfengtang Pond’ (APC, 1935, Archives NO.: 26-00-12-004-05)

	Description	Budget	Notes
Work on Shanyuan River	Recovery of old channel, which went through Zhuhui Ge and linked to Longxue Mountain(it was a source of water); fixing of collapsed levees of river linking to Pengqian Mountain (Another source of water); to conduct exploration; then apply specific funds; to perform construction by local people under government supervision.	30k Yuan	If the work is accompanied by the dredging of Pei river, the land in the lower reach area would get more benefit than that in the upper area; furthermore, the upper reach could avoid levee collapse. As the beneficiaries of the Anfengtang Pond were not capable of affording the costs by themselves, cooperation between the local residents and government was necessary. Additionally, a commissioner from superior government was needed to aid the Shou, Luan and Hefei Counties to cooperate with the local residents for the project. At the same time, they

Work on Pei River	(Continued from previous plan.) In terms of plan 1 made by the Water Resources Engineering Division, local people dredged Pei River together with officials with the support of funds issued by the National Economic Committee	120k Yuan	hoped the NEC would issue funds for the project. Liaobai Huang pointed out that current irrigation from the Anfengtang Pond covered the area from the Shuangmen Market to Zhaokou Sluice, with a width of 20–30 km and a length of 50 km. The amount of land that benefited was more than 167,000 acres. He also stated that the peasants in this county depended on the Anfengtang Pond very much: connecting the Anfengtang Pond to the Fei River and the recovery of the old system would extend the irrigation area of districts 1 and 5 to 60 km, and increase its size by 100% compared to the upper reach. Even though the project would cost some money, the benefits from the project would be permanent. Moreover, he said that Zhiqi Liang had made the same suggestion before, but had not put it into practice.
Work on Fei River	Introduce water to Fei River from Anfengtang Pond (through Daxiang Gate); water flowed to old city through Junying and Shuanggu Dui, then passed Erli Bridge in the south of the city, then flowed into the old channel to extend irrigation of Anfengtang Pond.	200k Yuan	

This may be because he held strong emotions about the Anfengtang Pond. Though the relief work in spring did not achieve the expected aims, it kept villagers' wishes for government support alive. Analysis of archival data (APC, 1935, Archives NO.: 26-00-12-004-05) revealed that on 8 July 1935, Liaobai Huang submitted a proposal, *Suggestions of the Anfengtang Pond Committee and the gentry around the pond* to the president of Shou County, in which the Committee commented on the sources of water, facilities, and management of the pond (*ibid*). They stated the importance to recover the Anfengtang Pond.

The sources of the water were vital for Anfengtang Pond. Sorting out the problem of the water source was the first key step in maintaining the pond. Archives (APC, 1935, Archives NO.: 26-00-12-004-05) indicated the main cause for the loss of the water source was the water interception of the Pei owing to silting up, long-term disrepair and some private damming. In a bygone era, people had a lot of land and did not pay attention to flood controls so only one bridge (the Shunjia Shi Bridge) was built near the entrance of the Pei. With the increase of the population and land value, people paid much more attention to the water supply. In 1915, a dam was built for flood control, which greatly decreased the possibility of letting water from the Pei River flow into the Anfengtang Pond. Disputes arising about the water happened frequently among the peasants along the Pei River and those around the Anfengtang Pond (*ibid*).

The Anfengtang Pond community was just a miniature version of the countryside of China. Intense human–land, or human–nature relationships were common in the history of agriculture in China. It was impossible for the small Anfengtang Pond Community to radically control the population, reform the land policies and solve these conflicts by itself. An effective way to solve the conflicts was to ask the government for help to build a new flood control sluice to replace the dam, then the people of both sides could join together to maintain the sluice and benefit from it. Echoing emphasis by McNeill (1998) and Marks (2006) on the Chinese government's control of diverse ecological areas through their water/river systems, the state vital for supporting water management

in the Anfengtang Pond.

Naturally, flooding and drought were dominant concerns for the peasants. However, Archives (APC, 1948, Archives NO.: 06-27-802-2027) revealed that the destiny of one's family was another important, but indirect concern as well. For example, water from the source in Longxue Mountain flowed through the east of the Juduan hillock. The descendants of officer Liu of the Qing Dynasty thought the river course was too close to their ancestors' tombs and would take away good fortune and geomantic omens. Therefore, they filled the river near their tombs and changed its course. Then the water flowed into the rivers near the Pengqian Mountains and caused the levees there to collapse (*ibid*). The local gentry were not capable of stopping the action of Liu, who was a member of the gentry too, so they asked the government to let the Liu family recover the old course (*ibid*). It was clear that the Liu family considered the river as their private property, and they put their private interests over the overall interest.

Archives (APC, 1948, Archives NO.: 06-27-802-2027) indicated that normally individual illegal action did not cause serious damage. Owing to changes in human–land relationships, illegal action was often followed by others and then became a public action causing serious damage. Subsequently, some channels were dug close to private land and some were dug near to homes. These channels were called 'private rivers'. However, the people living in the zones unsuitable for digging private channels wanted to get rid of the 'private rivers' and share the interest. Members of the local gentry thought that the private rivers harmed irrigation and transportation and so the proponents deserved to be punished. However, the communities did not hold the right to execute law. Therefore, if government did not have strong execution of law the situation could not change.

Interviews with peasants who had been involved in such activities revealed that many families had private facilities:

[Peasant, aged 68]: *There were 72 culverts that belonged to private families…But none*

of the 36 gates was occupied by a private family.

[Peasant, aged 72]: *The powerful family might have a private culvert. They used the culvert at will…*

[Peasant, aged 74]: *The Xia family had its private water gate. The others were not allowed to use it. One member of the Xia family had a good position in Central Government. He was an imperial censor.*

However, the resolution of this problem with the water sources could not bring an overall improvement to the Anfengtang Pond. The facilities of the pond, for example, the levees and dykes, needed maintenance or fixing as well. Since 1931, the levees had collapsed many times. It was suggested to raise and widen the dykes, and to build breakwaters to protect the lands. However, the local gentry thought that local residents would not like to support the proposal of the Anfengtang Pond committee. Therefore, they hoped that the county government would encourage the peasants to plant reeds to fight the wind and trees to enhance the dykes (APC, 1948, Archives NO.: 06-27-802-2027).

Here is an example taken from an interview where a peasant (aged 70 years) was questioned about the maintenance:

[Interviewer]: *Do you have information regarding the maintenance of the dykes of the pond?*

[Peasant]: *Before 1949, there was little large-scale maintenance on the Anfengtang Pond…There were a few trees on the levees*.

At the same time, the gentry proposed to improve the Guan Dam and the Phenix and Zhaoukou Sluices, which were located in the hinterland of the pond, and were used as key facilities to relieve the water (APC, 1948, Archives NO.: 06-27-802-2027).

Archives (APC, 1948, Archives NO.: 06-27-802-2027) revealed that they proposed to

measure the sluices around the pond to make regulations regarding water use and service of the sluice according to the relevant information, for example the amount of land benefited by the respective sluice and the names and addresses of the land owners. According to the regulations, every 12.8 acres lands of a family was requested to offer one labourer to serve the sluice. In fact, most labourers came from poorer families, as many influential families lived in cities and were always absent from this type of service. For example, rich businessmen usually would not join the service. Consequently one labourer corresponded to nearly 48 acres of land (APC, 1948, Archives NO.: 06-27-802-2027). In principle, the absent ones were supposed to pay some money according to the size of their land. Whether they paid or not is not known. Offering their labour to serve the sluice seemed a disorganised situation.

[Interview]: *Who managed the Anfengtang Pond?*

[Peasant, aged 68]: *The director of the pond was similar to the head of the current village. He mobilised villagers to fix sluices.*

[Peasant, aged 78]: *The small sluices were maintained by the user nearby usually…*

[Peasant, aged 72]: *There were 12 gatekeepers working with the director of the pond. The gatekeeper was in charge of three gates…The role of the committee was like that of the town government at present. Usually, the members were conversational, credible and well known…*

[Peasant, aged 75]: *If the head of the gates did well he might keep the position for a long time. Some people passed the position to their grandsons. The person holding the position normally came from a big family…It was a comfortable position…If he came from a powerful family, few people dared to make criticisms. If he was from a normal family, the director of the pond might fire him at will. Some people could keep the position for 10–20 years, some just took it for 2–3 years. Some heads of gates were relatives…*

Some peasants thought the head of the gates was a comfortable position, and others did not.

[Peasant, aged 72]: *The gatekeeper and the director were not good positions actually. In autumn, just like beggars, they could receive 1.5–2.5 kg of food from every family. Additionally, they cultivated crops as well…*

[Interviewer]: *Do you have information regarding management of water?*

[Peasant, aged 73]: *The gatekeepers were put in charge of the gate and controlled the water…but the allocation was not fair sometimes.*

[Peasant, aged 69]: *Sluices were managed by villages separately. They did not cooperate. If people could not get water from the pond, they thought it was their destiny…. Sometimes, the water supply depended on the feelings of the gatekeepers....*

[Peasant, aged 76]: *Gatekeepers controlled the water supply at will…If they did not have good-natured feelings, they might stop the supply…Sometimes, it was opened by peasants in stealth. The management of it was a little bit loose.*

The oral history examples above imply that the management of the gates and sluices was in disarray. The operation was affected by private interests, which interacted with each other. The gentry suggested servicing the sluices according to the land amount in the registered booklet. Archives (APC, 1948, Archives NO.: 06-27-802-2027) revealed that it seemed fair to everyone and a good way to save water (*ibid*).

Even though the problems of the water sources and facilities of the pond had been overcome, it was difficult to say if the pond had improved overall and would keep in this condition in the long term. The prosperity of the pond and its irrigation areas depended on the policies and management regarding the pond as well. Unfortunately, the Anfengtang Pond had been out of order and control for a long time. Archives (APC, 1948, Archives NO.: 06-27-802-2027) indicated that there were many immoral

peasants around Anfengtang Pond. They carried out private reclamation in the pond or around levees of the pond, for example in the area around Gejia Market, Laomiao Market and Wamiao Market. The reclamation land needed to be enclosed by ridges to avoid interference from the water of the Anfengtang Pond, so it was called polder land. In order to prevent the polder land from submersion, a central channel had been built to help discharge water. Unfortunately, it had been silted up for a long time. In the archives (APC, 1948, Archives NO.: 06-27-802-2027), it was suggested to dredge the channel and build a new dyke as a permanent borderline to prevent private reclamation. After building up the borderline, it was necessary to consider both the interests of the Anfengtang Pond and the polder land. Initially, two sluices were proposed to be built west and north to the Huashui Channel. When the water of the Huashui Channel was low, it was suggested that sluices should be opened, otherwise they were closed and the water flowed into the Bokou River. Moreover, it could prevent collapses owing to massive water storage. Therefore, the interests of the polder land and Anfengtang Pond were balanced. At the same time, the irrigation size was extended (APC, 1948, Archives NO.: 06-27-802-2027).

The Anfengtang Pond Irrigation Project is shown in Fig. 6.7. Archives (APC, 1948, Archives NO.: 06-27-802-2027) clearly revealed the anger of the residents towards the immoral gentry. It is indicated in this section that more considerate members of the gentry could not do anything against their less good-natured counterparts. The fact that local peasants mistakenly expanded private land caused the pond size to reduce. Even though the Anfengtang Pond Committee was elected by the peasants, it was difficult for it to control them. Although the Anfengtang Pond Committee had tried to change the reclaimed land back into pond, they had been unsuccessful and given the impossibility – due to geographical circumstances – of recovering the pond size, the Anfengtang Pond Committee decided to consider the polder land as benefited land, like the land around the pond (*i.e.* both kinds of the lands had the same water use right). Its concern to prevent community security from deteriorating meant sacrificing fairness.

Analysis of archival data (APC, 1948, Archives NO.: 06-27-802-2027) revealed that the gentry not only considered the Anfengtang Pond, but also planned to extend the irrigation area as officers of the NEC proposed. They planned to dig channels that connected Shou County, Hefei and Luan, and to improve the bridges for better traffic.

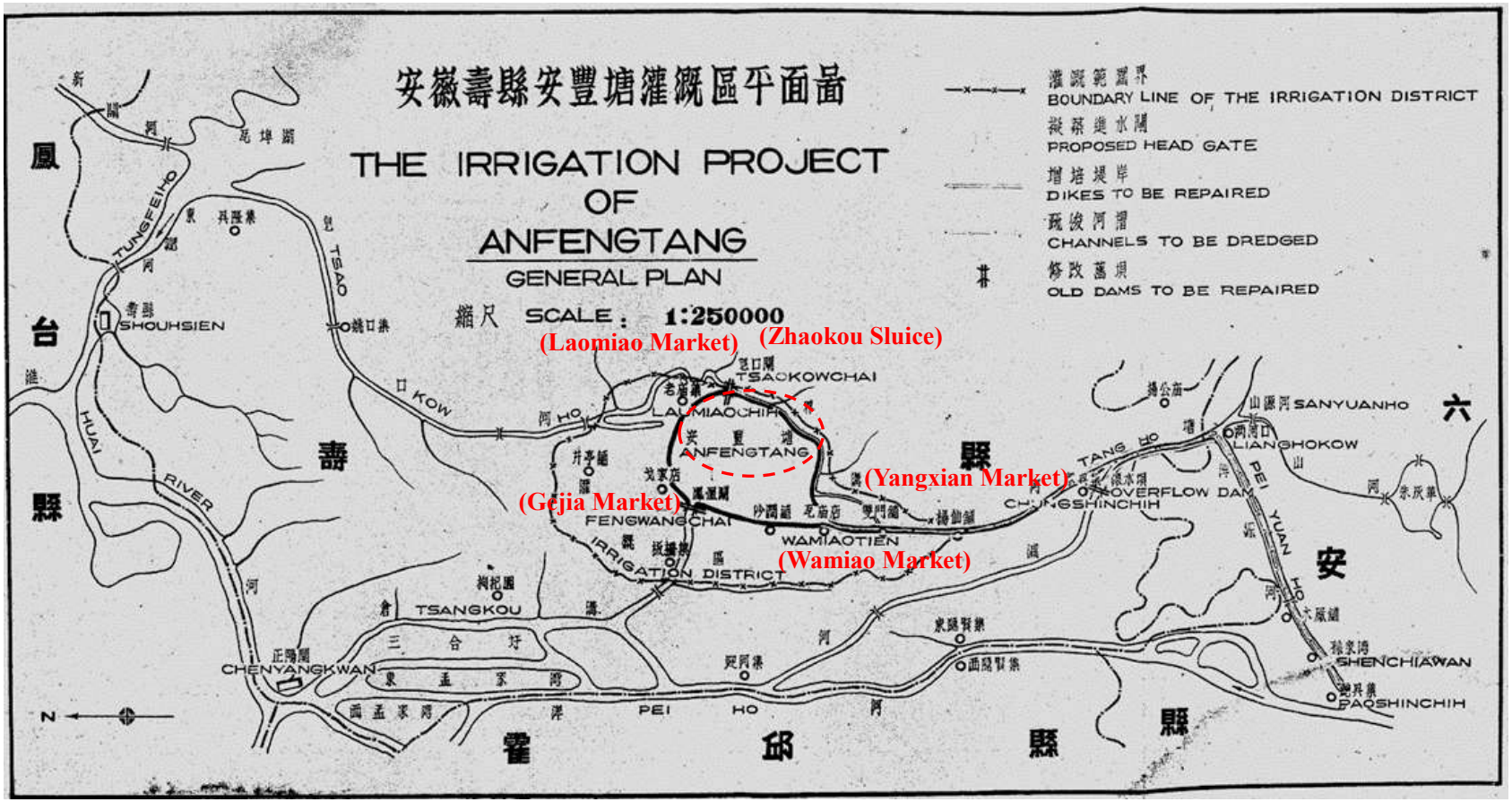


Fig. 6.7: The Irrigation Project of the Anfengtang Pond (APC, 1948, Archives NO.: 06-27-802-2027)

Liaobai Huang suggested proper management and proposed to build a water level station, rainfall station and water flux station. However, at that time, nobody there had the capability to do so. He argued that "even though several reforms had been carried out on the policy system of the pond, no goal had been achieved effectively owing to the shortage of intellectuals. On the contrary, the Anfengtang Pond had been used as a tool by ignorant and incompetent people for private gain" (APC, 1948, Archives NO.: 06-27-802-2027). The same archives indicated that the gentries hoped the government would arrange for 1000 Yuan to support one person annually to enter higher education in the field of civil engineering, and for two people to receive technical training. If the fund was not enough, the pond committee would be responsible for financing them. After graduation, they were required to serve the pond for several years and train new people. Once the first batch of graduated students started their jobs, no fund would be needed from the government any more. Liaobai Huang thought "a good system would let people show their best strengths. It was necessary to reform the old pond system and appoint the highly trained or educated intellectuals as members of Anfengtang Pond committee. It was essential for everyone to follow the new policies of the pond system" (APC, 1948, Archives NO.: 06-27-802-2027). The gentry not only realised the issues, but also pointed out that the solution to the issues was the cultivation of intellectuals. They realised the importance of the combination of excellent intellectuals and advanced policies. Besides the policies for cultivating community elites, they proposed regulations to restrict the improper actions of the ordinary residents. It was indicated that the multi-level design made the policies relatively complete and continuous. The finance for the scheme was the key to either the construction of the project or the cultivation of intellectuals. Liaobai Huang thought "there should be special funds for specific items of management" (*ibid*). At that time, the budget for the Anfengtang Pond greatly depended on the income from the 33 acres of land around the Sun Temple. Therefore, it was seriously lacking funds. Liaobai Huang suggested making some income or tax revenue from various fields: stockbreeding, water transportation, fishery and forests (*ibid*). Archives (*ibid*) indicated that some new channels linking with main rivers could be dug and used for water storage and fisheries. Wire netting was proposed

to be used at the gates between the channel and the main river. On the levees of the channels, they proposed to plant trees. They expected to get some income from water transportation, stockbreeding and fisheries in the first and second years, and more in the third year. Within four years, they hoped to get rental income from bulrushes. Moreover, the people trained by them could conduct the management in five years. If the funds were in short supply in the starting period, the owners of the land that would benefit were encouraged to offer money (APC, 1948, Archives NO.: 06-27-802-2027). The scheme seemed excellent.

The proposal (APC, 1948, Archives NO.: 06-27-802-2027) indicated that Liaobai Huang and other gentry had concerns about the sustainable development of the Anfengtang Pond. However, their concern was based on the local regulations, customs and instructions of the government. The efficiency of his proposals for the development would be determined by their acceptance by local peasants, their mutual supervision, and for the proper rewards and punishment mechanisms to be in place. Normally, operation of the local regulations and customs needed the support of law and depended on officials, professionals and powerful state organisations. The absence of any of the above would cause deleterious consequences for the Anfengtang Pond and its communities. Actually, the local gentry were not confident about community regulations. They had asked the government to carry out effective supervision or powerful instructions on several occasions. Had the gentry overrated the government or tried to shift their responsibility?

Comments and suggestions from the Anfengtang Pond Committee and gentry around the pond (APC, 1948, Archives NO.: 06-27-802-2027) was a letter showing reviews about the past, describing the present situation and planning for the future. Conflicts between individual interests and the collective interest as well as between local interests and the overall interest were reflected in it. It was seen that the community leaders there just showed their opinions, and could not control the occurrence of the events or guide the development of events effectively. They always offered compromises to the

influential classes. The weakness of community leaders came from their inability to affect collective action. Echoing widespread findings from environmental historians (Song, 2013; Zhao, 2011) regarding the use of open access resources, a popular credo in China is that 'no punishment occurs if many break the law.' This created an excuse for the people who held 'private rivers' or polder land to dodge punishment. In addition, it was a catalyst for illegal action. The large numbers of lawbreakers became their shelter. It was a vicious circle. The community leaders knew that serious destruction had occurred to the environment. They thought that it would cost vast amounts to change the environment back to its normal situation so consoled themselves with the credo, 'the die has been cast now' (*i.e*. the outcome has happened and is irrevocable) (Xia, 1993). To understand why observers of the regulations held this negative attitude, it is important to consider geographical conditions in the area. As the archives (APC, 1948, Archives NO.: 06-27-802-2027) point out, it was difficult to interfere with the construction of dykes at the location of the water source in a timely manner. Secondly, the archives indicate that the lawbreakers were normally influential people, for example the offspring of officeholders. This helps to explain why the residents thought themselves too weak to combat the lawbreakers. They thought their objections would be ineffective and wasteful so the community resorted to its *Comments and suggestions from Anfengtang Pond Committee and gentry around the pond* to ask for help from the government. They received a response on 24 September, 1935 when the NEC wrote to Shou County explaining that there were many valuable points in the *Comments and suggestions*. However, the NEC did not mention the time to arrange the money (*ibid*).

However, analysis of the archival data (APC, 1948, Archives NO.: 06-27-802-2027) revealed that the Anfengtang Pond area had just experienced the most serious drought for many decades. Since the summer, there had been no plentiful rain. The rice plants and bean seedlings were withered. The soil became dry and it was impossible to reseed. The grass was scarce in many areas. The conditions were reflected in an interview:

[Peasant, aged 82]: *Ordinary crops there were rice, wheat, red dasheen, sorghum, corn,*

bean, buckwheat…Water was scarce. If it did not rain, no harvest could be achieved.

According to the archives (APC, 1948, Archives NO.: 06-27-802-2027), the disaster forced some people to become bandits, while many others ones left home and became beggars. Water transportation broke down, which brought big difficulties to food delivery creating fears of famine. Oral histories indicate that was a normal phenomenon for some impoverished peasants to become bandits.

The following extracts are taken from interviews there:

[Peasant, aged 76]: *Most of the people with the surname Song were bandits…*

[Peasant, aged 77]: *There were many bandits at that time. Some did not carry out robberies but served the bandits…There were defense channels surrounding the villages to prevent bandits. The channels were deep, up to 10 meters. Usually, channels surrounding the richer villages were deeper…There were no fish in them and no regular maintenance was necessary.*

[Peasant, aged 72]: *In order to combat banditry, a three-storey building was built in the pond 80 years ago…Some landowners dug defense channels surrounding their courtyards. Some of them used guns or cannon to protect themselves from bandits…*

As the archives (APC, 1948, Archives NO.: 06-27-802-2027) indicated, however, when disaster occurred, most people were in poverty, and the defense channels were meaningless. The circumstances were awful. Local gentry including Liaobai Huang wrote six letters to the county government, provincial government and the NEC for appropriation in September, October and November, respectively. In the letters, they asked to start the relief work plan earlier. They proposed to divide the project into subsections and carry them out simultaneously. They wrote: “if water was available in the south of Shajian Market, and the nearby rivers, the early season rice would produce some harvest that might support the residents for several months. Furthermore, the relief work project not only provided the labourers with food to survive disaster, but also

improved public security. If the start of relief work were to be postponed to winter, some victims might die of cold or hunger….. It was very tough to work in the chilly weather" (APC, 1948, Archives NO.: 06-27-802-2027). They also cited a statement from the *Anhui News,* that "the state considered the Anfengtang Pond to be a water conservation facility as important as the Yangtze River and Yellow River" (ibid). Additionally, the gentry stated that even though they did not have land that benefited from the project, they were eager for the early appropriation and beginning of the relief work, which was of great importance to improve water conservation, to rescue the public, to eliminate banditry and to secure communities. Their frequent and pressing appeal eventually achieved a positive outcome (*ibid*). In November 1935, the Guide Huai River Committee wrote to the NEC explaining that it was improper to postpone the project any further. On 30 December, the NEC wrote to Shou County Government stating that it was fine to start the relief work project (*ibid*).

Analysis of the archival data (APC, 1948, Archives NO.: 06-27-802-2027) revealed that over the period of 24 September to 30 December 1935, the residents of Anfengtang Pond area, the Anfengtang Pond Committee, Shou County Government, the Construction Bureau of Anhui Province, the Head of Anhui Province, the Guide Huai River Committee and the NEC were involved in negotiations for the appropriation and start date of the project. The local gentry and local governments had been putting their emphasis on drought, famine and risks to community security, even though they had been informed many times by the upper organisations to wait for the plan. Their impatience might have come from local, serious and urgent circumstances. The slowness of the upper organisations possibly came from their concerns with the overall situation of the state and the balance within various organisations and local governments. During the long course of requesting help from government to improve the Anfengtang Pond, writing letters was the main means for them to communicate with each other. It was difficult for ordinary residents to communicate with state organisations directly as they were poor in education and finance. However, some well-educated gentry around the Anfengtang Pond knew the circumstances of the local

community well and were informed of the latest news. Out of their good reputation, their desire to maintain a stable tenancy system and stable community order, and their sense of mission and responsibility, they frequently negotiated with government on behalf of the local community. Oral histories indicated that based on their excellent literacy capability, graceful manner and remarkable courage, they took on their shoulders the task of passing notice from the government to the public and delivered their feedback on life in the local community to the upper organisations. To some extent, they played an important role in the security and development of the community.

The following extract is taken from an oral history interview where the peasant discussed the role of the gentry:

[Peasant, aged 72]: *The role of the committee was like that of the town government at present. Usually, the members were conversational, credible and well known… The state needed it to carry out the management of the Anfengtang Pond.*

Actually, there were various opinions among the gentry class. Local chronicles of *Anfengtang Pond* indicated that with the increase of 'contemptible gentry', the 'wicked gentry' might take charge of the community (EBTWCAP, 1995), for example the story of 'a charging statement' in Section 6.3. In that case, the opponents or other gentry would rely on state power or community opinion to carry out their struggle, which had direct or indirect links with the future of the Anfengtang Pond.

6.6 Defalcation and turbulence

The experience of applying for funding by the gentry in Anfengtang Pond and Shou County government was long and arduous. Analysis of the archival data (GHRC, 1936, Archives NO.: 27-06-004-01) revealed that in order to start the First-phase Irrigation Project of the Anfengtang Pond, in February 1936, the Guide Huai River Committee asked Shou County to provide a report regarding the land value in the region surrounding the Anfengtang Pond and the amount of the land that would benefit from

the construction project. Irrigation projects are closely linked with the surrounding lands. The aim of the project is to firstly increase the production of the land. However, it is unavoidable that some lands would be destroyed by the construction. As described in the last section, the project encountered objections from many land owners so it was essential to know fundamental information about the lands. It was shown in the report that the land value was closely related to the economy in the countryside.

Table 6.4: Land price in the area surrounding Anfengtang Pond in the past (GHRC, 1936, Archives NO.: 27-06-004-01)

Time	Maximum (Yuan per acre)	Minimum (Yuan per acre)	Notes
Before 1936	420	300	Anfengtang Pond area had normal weather

Table 6.5 Present land price in the area surrounding Anfengtang Pond (*ibid*)

Time	First-class land (Yuan per acre)	Moderate land (Yuan per acre)	Low-grade land(Yuan per acre)	Note
Year 1936	300	240	180	Successive disasters of flood, drought and banditry decreased the land value

Table 6.6: Land price in the area surrounding Anfengtang Pond in the future (GHRC, 1936, Archives NO.: 27-06-004-01)

Time	First-class land (Yuan per acre)	Moderate land (Yuan per acre)	Low-grade land(Yuan per acre)	Note
After 1937	360	276	201	Land would benefit from the Anfengtang Project

The past, present and estimated future values of the land are shown in Tables 6.4, 6.5 and 6.6. When rainwater was plentiful and rice prices were high the land value was also relatively high. The successive disasters of drought, flooding and banditry led to recession for the countryside economy and the fall of land prices. After improvements were made to the Anfengtang Pond, land values would hopefully increase. However, the land prices were still quite low. Moreover, around 32,948 acres of land would benefit from the project (GHRC, 1936, Archives NO.: 27-06-004-01). Because of the huge possible profits, it was clear that people in the Angfengtang Pond area were anxious for the project to start.

The archives (GHRC, 1936, Archives NO.: 27-06-004-01) indicated that on 18th March 1936, the Guide Huai River Committee issued a draft construction proposal for 'the first-phase maintenance of the irrigation system of Anfengtang Pond'. The draft symbolised the start of the project. The roles and responsibilities of various sides were established in the draft. The Construction Division of Anfengtang Pond, organised by the Guide Huai River Committee, was in charge of the supervision of construction and its acceptance verification (the action to check if the construction met the proposed requirement). Shou County Government was responsible for the recruitment and management of labour, and documentation for some small construction. A Labourer Management Division was also set up. A cashier was assigned to it by the Guide Huai

River Committee. The wage for earthwork (the work related to earth, for example the excavation and delivery of the earth) was decided by the Guide Huai River Committee and executed by the Construction Division of Anfengtang Pond. The labourers received 90% of their wages for the excavation work firstly. An accommodation fee of 1.5 Yuan and a management fee of 5% were deducted from their wages when the construction team was disbanded. Moreover, the labourers were responsible for the cost of tools and drainage facilities. The draft included the description of the construction procedures, start and end times, amount of labourers and some engineering criteria.

The construction began with the Peiyuan River, and then dykes of related rivers, and dykes of the Anfengtang Pond later. The start date and deadline for the construction of the Peiyuan were 20th March 1936 and 15th June 1936, respectively. All the work was to follow the drawings provided by the Construction Division. Low-lying levees were required to be increased greatly. After the completion of the construction, the Construction Division would measure the section of the levees and calculate the earth work done.

Additionally, there were compensation regulations regarding damage to land and properties. The draft stated the following: Plants and seedlings destroyed by the construction did not qualify for compensation. Owners of destroyed property could get a resettlement payment, which was financed by Shou County Government. Behind the regulations in the draft, there was a risk of conflict. The Construction Division of Anfengtang Pond, organised by the Guide Huai River Committee held the power to make criteria, to carry out supervision and tests, and to control the funds. A Labourer Management Division organised by Shou County undertook the task of construction. However, it was always restricted by construction management and money use, and often received complaints. Due to the absence or weakness of the compensation, some local residents were unhappy.

Disturbance to the construction was not allowed. The archives (GHRC, 1936, Archives NO.: 27-06-004-01) indicated that the Guide Huai River Committee asked Anhui

Province to station army personnel at the work site to help suppress banditry. No allowance was provided for soldiers; only some rewards were available. On 22 March 1936, the Construction Division was temporarily set up. Shou County asked the director of community security to organise the fixing of the temple (GHRC, 1936, Archives NO.: 27-06-004-01).

The archives (GHRC, 1937, archives NO.: 27-09-003-02) revealed that the project did not go smoothly. In April 1936, the labourers built an earth dam at the entrance of the Peiyuan River to cut water flow and then planned to start the drainage. Unfortunately, the successive rain made the water level of the Peiyuan River rise by 2 meters. The earth dam was destroyed as a result. It was difficult for labourers to rescue the new dam in a torrent. Accordingly, the labour and materials cost a great deal. The tough work made many workers gradually leave. In the first week of May, over 1,500 labourers left.

Regarding the leaving of labourers, the Construction Division thought the Labourer Management Division should take responsibility for that. The archives (GHRC, 1937, archives NO.: 27-09-003-02) indicated that the Labourer Management Division had bought cheap, damp rice from Luan County. As a result, the labourers always felt hungry. Furthermore, the workers were chased by the foreman to do extra work at night, and they were responsible for providing materials for sheds and drainage. Moreover, the Labourer Management Division had not shown the earthwork done or the rice prices to public. Many labourers worried that the current situation would bring them debt, and then left with their shovels. The Construction Division thought it was necessary to analyse the market price of rice, to store public food provisions and avoid damp rice, and asked the administrators of the Labourer Management Division to improve supervision and management. Foremen were asked to make relevant information transparent to labourers and were not allowed to skimp on payments and food provision. Otherwise, they would be punished severely.

However, Shizhen Zhu, the director and Administrators of the Labourer Management Division, and the site foremen thought that the Construction Division should answer

for the leaving of the labourers and argued that the supervisors gave unreasonable guidance and were not concerned about the hardship of labourers. Labourers were required by the supervisors to make their construction solid, with no dust seen. The supervisors hoped that the base of the excavation would be flat, and modifications had been made several times for that (GHRC, 1937, archives NO.: 27-09-003-02). Moreover, the gravelly, hard soil of the river bottom in the Muchang Market area destroyed many tools and made progress slow. As the payment was determined by the amount of excavation work, the tougher work brought less payment, but cost more time. Unfortunately, as the soil in the lower reach of the Peiyuan was very loose and crisp, several collapses had occurred, which hurt labourers. The supervisors treated labourers and foremen like livestock and abused or hit them as they liked, which destroyed the self-respect of labourers and foremen. Although the labourer director and foremen had tried to persuade labourers into staying, it was hard to recover their enthusiasm and the director and administrators were appointed by the county government, while foremen were elected by labourers. All of them were town-mates. The tough situation of the labourers made both administrators and foremen feel aggrieved (GHRC, 1937, archives NO.: 27-09-003-02).

The above information from the archives (GHRC, 1937, archives NO.: 27-09-003-02) indicated that the Labourer Management Division classed the personnel involved in the project into two sides. One side consisted of the supervisors, who were considered as demanding, unsympathetic strangers. The administrators, foremen and labourers were considered as maltreated natives who were injured physically and emotionally. However, the Guide Huai River Committee thought that the conflict in construction was just between the administrators, foremen and labourers, as a result of the discord amongst the local people.

The archives (GHRC, 1937, archives NO.: 27-09-003-02) revealed that disputes and conflicts got worse as time went on. On 9th May 1936, a turbulent event happened on the work site. Upon inspection, there were two versions that explained it. The first one

was reported by Jihou Zhang, a supervisor of the Construction Division:

> On 9th May 1936, Jihou Zhang was told by Jinrong Hua, a surveyor, that Yuzhou Xiao, a foreman, was stirring up a strike among the labourers and planned some violence. Zhang wanted to go to the site to check. As soon as they went outside the door, a flock of labourers and Yuzhou Xiao arrived. They wanted to surround the Supervision Branch. The security team tried to calm them down. Labourers would not accept their efforts. After a short warning, the labourers went back and Yuzhou Xiao was detained for punishment by the Labourer Management Division. The description of this version was simple, and just showed that Yuzhou Xiao had got the labourers together (GHRC, 1937, archives NO.: 27-09-003-02).

Another description of the turbulence comes from Shizhen Zhu, the director of the Labourer Management Division and his colleagues, Zonghan Liu and Jun Ouyang (GHRC, 1937, archives NO.: 27-09-003-02). Jinrong Hua, a surveyor, thought the size of the construction did not meet the required standard. He then made a construction example as reference for the labourers. The labourers were required to finish the construction as per the example by the end of the day. As it was dark, hunger and tough work made the labourers refuse to work at night. A dispute took place. Jinrong Hua went away in anger. Then the labourers and Yuzhou Xiao, the foreman, went to Wenjia Polder and wanted to explain the situation to Jihou Zhang, the supervisor. On the way, they took tools, such as shovels or dustpans, with them. When Jihou Zhang stepped out of his room, he saw a flock of people coming towards him. He asked them to stop and assign a representative to talk to him to avoid so many various opinions coming from the labourers. Owing to the noise from footsteps and voices, the labourers did not hear what Jihou Zhang said and kept going. Jihou Zhang thought the labourers would not follow his suggestion and fired a shot as an alarm. The stationed army heard the shot. As the army did not know what had happened, they fired an alarm shot as well. Then the labourers tried to run away. Some escaped and some people were seized. The

circumstances were verified by residents and the labourers nearby. This description of events was much more detailed.

From the supplement (GHRC, 1937, archives NO.: 27-09-003-02), it was clear that the Labourer Management Division considered labourers, foremen and the Labourer Management Division as opposed to the supervisors and surveyor, who were assigned by Guide Huai River Committee. The Labourer Management Division thought the causes of the turbulence came from the bad temper, captious criticism and improper guidance of the supervisors. The sly labourers then went away whilst the cowardly ones worked slowly on the construction. Furthermore, those recounting the event thought that conflict between Yuzhou Xiao and the surveyor was not serious, but the scared supervisor's alarming actions made the minor conflict more significant. If the supervisor were not punished, 4000 labourers might cause an adverse event. Therefore, the Labourer Management Division not only rebuked the Construction Division, but also threatened them.

According to the above two versions, it was seen that on 9th May 1936, Jinrong Hua, the surveyor, Yuzhou Xiao and a group of labourers did meet on the work site. It was true that a group of labourers went to Wenjia Polder together, a shot was fired in alarm and some of the labourers then went away. However, what they said, thought and did, and the reasons for it, have become vague. From the description, it was certain that there was not only cooperation but also conflict between the Construction Division, which was a dispatched unit of the state organisation, and the Labourer Management Division, which was a dispatched unit of the county government. It was the fact that the conflicts between the huge project and deficient labour, between vast spending and insufficient funds, between increasing rice prices and the food demands of labourers, had been beyond the capability of some people or a specific department to resolve. Clearly, the disappearance of labourers and the slow progress of the project could be attributed to the above conflicts. It was essential to find out which person or organisation was responsible for these consequences, but each side declared it was the

fault of the other.

Soon after the event, it was suggested by the Construction Division that acceptance verification of earthwork would be carried out once every 5 days so that money could be available for food purchases. Finally, it was agreed that capital of 3000 Yuan would be borrowed from Shou County Government and used to buy stocks of food from Luan Food Supplies Store for labourers (GHRC, 1937, archives NO.: 27-09-003-02). It was suggested by Shou County Government to increase the earthwork price to retain labourers (*ibid*), as it was the farming season. The Guide Huai River Committee agreed that the new price would take effect on 10 May and added afterwards that there was to be no compensation for the previous price (*ibid*).

The labourers' requirements of both food purchases and wage increases were met to some extent. The compromise was based on a practical concern. After all, the project was carried out locally. By compromising with local people, the government would help the progress of the projects.

Analysis of the archival data (GHRC, 1937, archives NO.: 27-09-003-02) revealed that the construction still went slowly, and the skills and loyalties of the labourers were different. On 2nd June 1936, the Construction Division suggested firing some labourers and just keeping 1000 able labourers, and then recruiting another 4000 workers (*ibid*). It also proposed that all the debt of the Labourer Management Division was for food suppliers and that wages to labourers would be paid off by the county government. The cost was not supposed to transfer to new recruited labourers. However, the recruitment did not go smoothly. Until 8th June, there were only 1500 labourers in total. The Construction Division thought that Shou County Government had failed in its work. Shou County Government responded that it was the time of wheat harvesting, and thus it was difficult to recruit labourers. In addition, Shou County Government hoped that the Construction Division would refund the deducted deposit, which would be used to buy food provisions. Moreover, the Guide Huai River Committee had approved the proposal for prepaid money so that 50% of the total could be paid five days in advance

(*ibid*). All the prepaid money would be deducted at the acceptance verification. Even though the number of labourers increased, the expensive rice, tough soil and the unskilled new labourers did not make circumstances better. No money could be made from the earthwork for the next purchases, such as food (GHRC, 1937, archives NO.: 27-09-003-02). Shou County Government reported to the Guide Huai River Committee that they had prepaid 8800 Yuan. However, the Construction Division thought the payment by the Shou County should be in the range of 3000 to 5000 Yuan and said that what they earned was not enough for their accommodation. Additionally, when it was raining, labourers were still paid at 70% of the normal accommodation fee; the Construction Division had huge debts already. If the construction could be completed by the end of July, the arrears of the Labourer Management Division to the Construction Division would be around 7000 Yuan (GHRC, 1937, archives NO.: 27-04-091-01).

Owing to the budget shortage, on 29 July 1936, the Construction Division submitted a report to the Guide Huai River Committee. In it, they wrote that: it had been raining on those days; it was impossible to complete the construction by the end of July; the remaining money for the project was less than 2000 Yuan; and they still needed to pay the accommodation fees at that time. They then asked the Guide Huai River Committee what was the next step. The Guide Huai River Committee suggested stopping construction immediately, and to arrange acceptance verification and then to introduce the water. In addition, the Construction Division was advised to ask Shou County to continue the unfinished project. On 15th August, 1936, Construction Division was abolished (GHRC, 1937, archives NO.: 27-04-091-01).

The archives (GHRC, 1937, archives NO.: 27-04-091-01) indicated that the dispute did not end with the closure of the Construction Division. Since December 1936, the Guide Huai River Committee and the Construction Division had written to Anhui Province Government several times for repayment of the project money from Shou County. Correspondingly, Shou County had written to Anhui Province Government and asked for its help to get repayment from the Guide Huai River Committee Construction

Division. On May 1937, Anhui Province Government made the decision (*ibid*) that Guide Huai River Committee should repay the Construction Division money used for drainage, construction and accommodation; while Guide Huai River Committee would be repaid 6147.52 Yuan from the budget of the second-phase Anfengtang Pond Project. The budget would be offered by the county government. Here Anhui Province Government played a strange role. Shou County Government hoped Anhui Province Government, its upper government, would help to get the payment back. On the other side, the Guide Huai River Committee hoped Anhui Province Government would help by governing the subordinate organisation. Possibly, both sides wished for Anhui Province Government to repay the money. However, the archives (GHRC, 1937, archives NO.: 27-04-091-01) indicate that Anhui Province Government was tricky and showed its duplicitous wisdom. It had not rejected the demands from both sides and had not made them meet directly. It suggested that they compensate one another. Its decision not only showed its duty in the dispute, but also relinquished itself of any charge. As a result, neither the Guide Huai River Committee nor Shou County Government received economic benefit from the other side. However, their administrative powers had been respected. To some extent, they had safeguarded their interests. Dignity on each side seemed to be protected and made them think their authority and governance were still strong.

The archives (EYRC, 1937, archives NO.: 3-10-5091) indicated that besides the deficient project budget and the difficult economy, there might have been other causes for the deficit. The reason for using the word 'might' here is that the archives' account describing a case of 'corruption' is without convincing evidence. In November 1936, several local gentry, for example Jichuan Zhou, accused Shizhen Zhu of corruption and procrastination with regard to construction. They sent an indictment letter to the executive Yuan of the ROC asking to get their money back and for punishment for his illegal actions. This was a statement regarding the 'corruption' of Shizhen Zhu.

To recruit victims was a way to help victims through the disaster. However, Shizhen

Zhu did not follow the regulations of the recruitment. It was stated in the regulations that in order to keep stable labourer power, the local villagers had priority with regard to employment. However, Shizhen Zhu appointed some of his friends, for example Zishi Wang, Sangji and Jie Zhang, as directors of the squadron. In addition, he recruited a group of vagabonds with low wages. After one month's construction, many labourers ran away, which put the project on hold for 10 days.

The archives (EYRC, 1937, archives NO.: 3-10-5091) indicated that in the regulations, the price of earthwork was set at 0.95 cents per cubic metre. Shizhen Zhu did not follow the regulations and changed the way to pay labourers. He paid the earthwork in terms of how many labourers worked and the time. Together with the directors of the squadron, he falsified the number of labourers so that he could get money on behalf of these fake records. In terms of the regulations, each labourer could receive a prepayment for the purchase of facilities and tents. He had not allocated that money but instead used it to buy rice. The market price of rice was 6.8 litres per Yuan at that time. The price of his purchase was 6.2 litres per Yuan. When he allocated the rice, he used a homemade gauge that was smaller than its labelled volume. In this way, he made 2716 Yuan through the purchase of rice. Moreover, as labourers had no money to buy tents, the labourers, whose work site was near the village, normally spent 1 cent to rent a room every day. Labourers, who worked far away from the villages had to sleep outside. The chill and hunger made labourers feel tired and work slowly, which delayed the construction. In June, an additional 4000 peasant labourers were needed for the construction. As it was farming season, no peasants joined, so Shizhen Zhu asked the directors of the villages to collect money from the peasants and used the money to hire other people. Each of them was paid 4 Yuan.

It was difficult to know what exactly Shizhen Zhu did. As mentioned previously, the recruitment in June was not a private action by Shizhen Zhu. The charge to Shizhen Zhu came from the gentry who did not know the circumstances. Analysis of the archival data (EYRC, 1937, archives NO.: 3-10-5091) indicated that the local government had

not posted a notice as the Construction Division required and the management was disordered. Indeed, the recruitment of a group of vagabonds, embezzlement of public money, use of false records and inaccurate gauges were harmful to the construction and the interests of the peasant labourers. If the charge matched the facts, what Shizhen Zhu stated in the 'event of Yuzhou Xiao' and his accusation against the Construction Division would be doubtful. In 1937, Anhui Province had an inspection on the dispute between the Guide Huai River Committee and Shou County, and the 'event of Shizhen Zhu' as well. Eventually, it made a decision that Shizhen Zhu had not been involved in corruption, but had just undertaken improper management (GHRC, 1937, archives NO.: 27-04-091-01).

It is ironic that Shizhen Zhu was accused. When Shizhen rebuked and threatened the Construction Division (most members of it were not local residents), he thought the local residents whom he was working on behalf of would stand by him all the time. He forgot that the definition of the 'insiders' or 'outsiders' depended on context and changed over time. When local people combated strangers, blood relationships, clans and provincialism were used as links to make them come together. When the strangers had gone, local residents were regrouped according to their interests. Some of them may have sought help from the upper government, which actually were classed as strangers once and stood together, and combated other members or leaders of the local circle.

The above description regarding the Anfengtang Pond project was from archives and reports of engineers or local managers, or complainants. All of them were elites who could read and write. These accounts were supported by responses obtained from interviews and oral histories with local residents:

[Interviewer]: *Do you know anything of the construction of the Anfengtang Pond Dam?*

[Peasant, aged 71]: *All males over 15 years old were required to join the maintenance of the levees…Normally, the maintenance was carried out after the planting of wheat*

in the autumn. My father joined the maintenance every year.

[Peasant, aged 78]: *Some women with bound feet joined the construction as well…Tents were built near the pond for accommodation. Labourers went there with food, which was durra, bean and rice usually…*

[Peasant, aged 74]: *Maintenance was usually carried out on the pond in autumn when the daytime was long…Usually, the maintenance took two months in autumn and winter…Villagers were assigned to the nearest section to carry out maintenance. It was not necessary for villagers to work in the evening. They started their work at 7 am and went home at sunset.*

[Peasant, aged 82]: *We stayed there for nights and provided food ourselves…*

Peasants were required to provide tools, as mentioned by the respondents:

[Peasant, aged 74]: *The labourers provided tools such as shoulder poles and baskets for themselves…*

The following quotes concern the organization of maintenance work and payment for the construction.

[Peasant, aged 78]: *Some local big landowners had organised the maintenance on the pond. The small sluices were usually maintained by the users nearby…*

[Peasant, aged 82]: *I do not remember who organised the construction of the dam before 1949. I joined the construction…I do not know whether the government issued money to support the construction, as I did not get any.*

It can be seen that work of the labourers was tough. The accommodation was simple and they were even required to provide food themselves so it is understandable that many left. As they did not get any payment and did not have knowledge of the management of the construction, they were liable to be instigated by others. When the

strangers were present, the local residents were kidnapped by regional protectionism and were in conflict with the strangers. When the strangers had left, some of the labourers came together to combat corrupt local people. According to the archives (GHRC, 1937, archives NO.: 27-04-091-01), one fundamental reason why the labourers were frequently involved in the conflict within the elites was that the labourers held few resources and received little education. If the nation had offered better resources to meet labourers' needs, there would have been less turbulence.

The first-phase maintenance project of Anfengtang Pond started in February 1936 and ended in August. However, the after effect lasted until May 1937. Within local governments and state organisations, disputes happened frequently. They rebuked each other for unkind management and skimping on payment of labourers, which harmed the progress of construction. The key source of the conflict was the deficient funds and massive scale of the project. It was difficult for both of them to achieve their desires. Anhui Province Government was the link between the state organisation and Shou County Government. It tried to patch up their quarrel and reconcile the parties concerned, to balance the interests of both sides. However, it did not want to sacrifice its own interests. Eventually, the Anfengtang Pond project and the residents in the Anfengtang Pond area were casualties of the compromise.

6.7 Priority of the farming season

The Anfengtang Pond Project could not achieve its objective immediately. It required labour and finance, the right natural conditions, and within its construction, it possibly needed an adjustment to the plan or schedule.

Analysis of archival data (GHRC, 1938, archives NO.: 26-09-003-01) revealed that in the *Draft guideline of the first-phase construction of the Anfengtang Pond Project* it was mentioned that the starting dates for the construction of the ponds and river dykes would be specified after construction of the Peiyuan River was completed. The director of the Construction Division had suggested that "gentry in the Anfengtang Pond area

should collect the peasants' opinions and forward them to the General Team Office as reference for further steps in the construction" (GHRC, 1938, archives NO.: 26-09-003-01). In May 1936, villagers around the pond came together and achieved an agreement to put the Peiyuan River to use because irrigation was scarce owing to the serious drought. To achieve this, it was necessary to change the construction procedure after earthwork for the Peiyuan river was completed. In the agreement, the villagers suggested to first build a flood control sluice near the Sun Temple, then to fix the Gunshui Dam, Phoenix Sluice and Zhaokou Sluice. These three steps were vital to cope with flood or drought disasters for the Anfengtang Pond and the relevant rivers. They thought that when their construction was finished, the water consumption period for crops would have nearly passed as well, and then it would be a good time to carry out maintenance on the levees of the pond or relevant rivers (GHRC, 1938, archives NO.: 26-09-003-01). However, the Guide Huai River Committee had not made any definite decision at the request of the villagers (GHRC, 1938, archives NO.: 26-09-003-01).

The above requirements of the peasants were reasonable as the irrigation term was very important to them. However, competition for water use was nearly a battle. The following extracts regarding competition for water are taken from interviews and oral histories with local community members:

[Peasant, aged 70s]: *Owing to the water shortage of the pond, most families used the waterwheel to draw water…June and July were the seasons to transplant rice seedlings. Then it was essential to draw water for the seedlings. Some waterwheels were driven by hand, some were driven by feet. Some families could not afford a waterwheel and used a bucket to lift water.*

[Interviewer]: *What tools were used to lift water?*

[Peasant, aged 82]: *Waterwheels to lift water were made of wood. Normally, several small families shared one waterwheel. Some big families held one. Normally, the wood used was Styphnolobium japonicum, as it was strong. A skilled carpenter needed 4–5*

days to construct a waterwheel. It was the main tool for peasants, so the peasants used it carefully and cherished it. After the season of using waterwheels, the peasants painted them with Chinese wood oil to protect them. Otherwise, they were liable to deteriorate. Normally, the lifespan of a waterwheel was 7–10 years.

[Peasant, aged 70s]: *Some families came together to buy one waterwheel, but that did not mean they used it together. Normally, they used it in turn…*

[Peasant, aged 82]: *Some small landowners asked a cook to prepare food for the people who operated the waterwheel for them...*

[Peasant, aged 76]: *Everyone involved in the competition for water was male…*

[Peasant, aged 70]: *As the water was limited, it was always a struggle for water. Some families who had plenty of land needed to hire labourers to draw water. Most of the labourers came from other villages far away… Some families might not cultivate rice. They might be hired to lift water with waterwheels, and only then would they get some food.*

[Peasant, aged 82]: *It was agreed that the waterwheels in the same trench needed to be operated simultaneously…*

[Peasant, aged 78]: *Some disputes arose from inconsistent times of operation…*

[Peasant, aged 70s]: *It was tough work to draw water. They got up early, and went home late.…Some waterwheels needed four people to drive them. Normally 12 people were arranged on one waterwheel. They took turns to drive the waterwheel, and swapped over every three to five minutes.*

[Peasant, aged 82]: *Some people had short tempers. If his waterwheel broke down, he needed the others to stop. It was common for them to fight over water. Normally, it was not too serious, as they were neighbours. Additionally, hospitals were rare and far from there and it was difficult for them to afford hospital treatment.*

[Peasant, aged 72]: *Some people would not follow the regulations governing the competition for water. Some people bullied the weak. Some people got their heads hurt and ended up bleeding.....Here is an example. In the west of Shou County, there was a family surnamed 'Zhang', having ten men. There were fewer men in another family, the Zhu family, from which a man named Yanqing Zhu had worked in coal mine in Shandong Province for many years. One summer, Yanqing Zhu joined his family to take water for irrigation. Usually all people observed the regulations that all the families taking water should pause simultaneously for a rest. The Zhang family relied on its power and would not follow this regulation. As a result, Yanqing Zhu took a shovel with him and hurt some people of the Zhang family. The peacemaker ruled that the Zhang family broke the regulations and was the guilty party.*

The above example showed that the weak side won the competition. However, as shown in the following interviews, this was not normally the case.

[Peasant, aged 70s]: *As the water was limited, it was always a struggle for water. The family possessing good tools and labourers usually won the struggle.*

[Peasant, aged 78]: *Some disputes arose from inconsistent times of operation. Normally, the big families were captious.*

[Peasant, aged 79]: *Many disputes arose from competition for water. Some powerful families might move the waterwheel of other's away,...It was difficult for poor people to win the case in court, where the officials were corrupt.*

[Peasant, aged 72]: *Some people got their heads hurt and ended up bleeding. Usually, villagers asked for help from the village heads. However, the heads might be afraid of some big families as well…*

[Peasant, aged 76]: *In the past, the struggle for water might lead to death…*

It can be seen that getting water for irrigation was a spontaneous action. There were no

regulations for water allocation; water use just depended on self-discipline and compromise. Sometimes, powerful peasants bullied weaker ones over water allocation. Peasants even died over water use as some peasants considered water use in the farming season as important as lives.

The following extract is taken from an oral history interview where the peasant discussed the serious outcomes of current struggles over water.

[Peasant, aged 76]: *There were similar cases recently. In 2006, two people died in the struggle for water. In 2001, a water shortage led to violent competition for water. Some people of the lower reach took the pump in the upper reach away. A person of the upper reach committed suicide by poisoning. Then some people were killed by people from the upper reach.*

According to the archives (GHRC, 1938, archives NO.: 26-09-003-01), the Peiyuan Project went quickly and ended in August 1936. On the one hand, water nearly filled the river and flowed smoothly. The goal of water introduction from the Peiyuan River to the Anfengtang Pond had been achieved. On the other hand, it brought the risk of collapse of the levees to the pond and related rivers. The archives (GHRC, 1938, archives NO.: 26-09-003-01) revealed the fact that in October, the residents had a convention and hoped to start construction of the dykes for the pond and rivers early. However, the villagers who possessed polder land worried that the increase of the pond's dykes would lead to an increase of the water levels in the pond. They hoped to discharge part of the water to protect the polder lands, and wanted to dredge up the central trench, dig out the discharging channel and build a sluice linking the channel and Huashui Trench to help discharge floodwater (GHRC, 1938, archives NO.: 26-09-003-01). In November 1936, the Guide Huai River Committee wrote to the Construction Bureau of Anhui Province to entrust it to recruit labourers for the construction of dykes for the Anfengtang Pond and the associated rivers (*ibid*).

In May, villagers hoped the irrigation could start quickly after the end of the project.

However, in August, they hoped to carry out construction of dykes. The change of their requirements depended on the condition of the farming. They hoped that the project could go forward on behalf of the interests of the farming season and cultivation: it could help to alleviate drought or avoid floods, so that the Anfengtang Pond River could help them to get rid of famine and other threats to their survival. Local villagers hoped that their desires and public opinion would affect the decisions of the Huai River Committee. However, the archives (GHRC, 1938, archives NO.: 26-09-003-01) indicated that the Guide Huai River Committee was not always influenced by the desires of the villagers and did not provide proper explanations. According to the archives (GHRC, 1938, archives NO.: 26-09-003-01), the construction of the first phase of the Anfengtang Pond Project had produced a big deficit. Therefore, whether there would be a following project depended on the outcome of the bargaining within the Anfengtang Pond Area, Shou County, the Huai River Basin and Central Government as a result of competition between the budget for water conservation and competition from other industries. However, no letter or document had been used to show those bargaining processes to communities around the Anfengtang Pond.

In spring 1937, the Anfengtang Pond Dykes Office was set up in Zhengyangguan Town, Shou County, by the Water conservation Engineering Division. It was declared that the construction of the second phase of the Anfengtang Pond Project would start soon and it was expected to end in three months, *i.e*. from 1 April to 30 June, but the Anfengtang Pond Dykes Office would be kept for a little bit longer. It was proposed to build the dykes of the associated rivers firstly, and then the dykes of the Anfengtang Pond. The amount of workers needed would be determined in advance by the Anfengtang Pond Dykes Office, and then county government was responsible for recruiting the labourers, organising workers' teams and forwarding the list of team directors and their corresponding sections of the dykes to the Anfengtang Pond Dykes Office for convenient management. The management of labourers and site security was done by the worksite representatives and administrators appointed by the county government. Tools and accommodation were provided by the labourers themselves (GHRC, 1938,

archives NO.: 26-09-003-01).

Analysis of the archival data (GHRC, 1938, archives NO.: 26-09-003-01) revealed that the budget for the second phase of the Anfengtang Pond Project was 30,000 Yuan. It included the fee to make up the deficit of the first phase of the Anfengtang Pond Project, the management pre-arrangement fee, payment for the impression of earth and the earthworks fee. If a natural disaster or unforeseeable incident happened and delayed the project and produced an overdraft, the overdraft could be compensated for from the management pre-arrangement fee. If the pre-arrangement fee was not enough, county government was responsible for deducting some money from the payable earth compensation fee and using it as a subsidy for the overdraft. The Anfengtang Pond Dykes Office was responsible for guiding the construction, supervision, verification and payment of disbursement, if necessary, with the assistance of the county government. The builder was responsible for providing information on the finished sections and asking for verification. If the staff of the Anfengtang Pond Dykes Office found a defect in the construction, reconstruction or fixing was required. The compensation fee for earthwork was paid in four instalments. According to the rate of progress, the head of the labourers' team was required to provide the official reception. A 10% prepayment was made when all workers enrolled and then a 30% payment was made after the workers finished 50% of the project. The third payment (40%) happened when the whole construction was finished. Finally, after the project passed the verification by the Guide Huai River Committee and provincial Government, the remaining part of the compensation was paid off (GHRC, 1938, archives NO.: 26-09-003-01).

According to the archives (GHRC, 1938, archives NO.: 26-09-003-01), the Anfengtang Pond Dykes Office was in charge of the finance, technical supervision and verification of the second phase of the Anfengtang Pond Project. County government was responsible for managing the labourers. Every worker paid for the expenditure of work and daily life himself. If the work was delayed or paused, even because of natural causes,

the workers could not get any payment for the extra time and might be charged a management fee from the payment due. This might have helped to give all parties equal responsibility, as well as preventing them from passing the buck to each other, reducing corruption, helping to relieve disputes between county government and the Anfengtang Pond Dykes Office and relieving financial pressures upon local and central governments. However, it was bad for the interests of the workers. In fact, most labourers were the victims of disaster and were in danger of not surviving. Initial aims for the relief work project were: to help victims live through the disaster by joining up the construction of infrastructure; to better peasants' lives through the improvement of infrastructure; and to prevent or decrease the occurrence of natural or man-made disasters. The short- and long-term aims were to serve the peasants or public better. However, in the second phase of the project, some money, which should have been provided by the government, was deducted from the labourers' payments.

However, the archives (GHRC, 1938, archives NO.: 26-09-003-01) revealed that the start-up of the second phase of the project encountered objections from the peasants in the Anfengtang Pond area. On 18 March 1937, the Guide Huai River Committee received a letter from peasants including Dengwu Li. They said that as water consumers, they were obliged to attend the construction of the dykes of the Anfengtang Pond and the relevant rivers. However, it was the time of spring ploughing, which needed much water: the start of the construction would discharge the stored water and then no water would be available for irrigation for a long time. They argued that this year's cultivation and harvest were crucial to their survival as they had suffered consecutive famines. If the irrigation was delayed, life would be in danger. Additionally, they mentioned that the national highway was under construction and had recruited most able-bodied men, so that it was hard to recruit the required labour. They suggested postponing the start of the project to the slack farming season after autumn (GHRC, 1938, archives NO.: 26-09-003-01). However, the Guide Huai River Committee declined the peasants' requests and insisted on the scheduled plan (*ibid*).

On 5 April 1937, which was four days later than the start of the project, the Guide Huai River Committee received a letter from Liaobai Huang, a member of the gentry from the Anfengtang Pond area. He confirmed that what Dengwu Li said was the truth. He suggested one possible way was to build a dam at the entrance to block the water from the Peiyuan River and then this would guarantee the project. However, it was the rainy season during spring and summer at that time. Plenty of water flowed down from the mountains. Owing to the high altitude of the water sources, it was not feasible to build a dam to block the water nor reasonable to dig a channel to introduce the water. So, he suggested postponing the construction to the dry season after autumn. What Liaobai suggested was not just about postponing the construction. It showed a countryside gentleman's good sensitivity to state events. When he read the *Anhui News*, he saw news that the Guide Huai River Committee would carry out the building of the sluice project around Sun Temple. He then suggested firstly carrying out the sluice project. He also pointed out that the area to the east of Anfengtang Pond was 10 km in length and was high in altitude. The levees in that area could be maintained first, as no water storage was available there (GHRC, 1938, archives NO.: 26-09-003-01). However, these suggestions were also rejected. The Guide Huai River Committee and the Construction Bureau of Anhui Province thought the scheduled construction of the second phase of the project would not interfere with irrigation and hoped that the local communities would not become distracted by it any further (*ibid*).

The archives (GHRC, 1938, archives NO.: 26-09-003-01) indicated that once the requests of the peasants and gentry had been declined, the recruitment and construction of the second phase of the project were undertaken according to schedule. They also illustrate that the concerns of the peasants were justified as the project did not move smoothly. It had been raining from early April until the middle of May. When the government organised the construction of roads, setting up the telephone lines and training able-bodied men, the people in the Anfengtang Pond area were requested to join it. After the start of the dykes' construction project, the government urged all adult men and women to join. Some workers even came from far away with food and

firewood from home yet much more labour was needed. However, shortage of money meant that the low payment for several days of work might not cover one day's accommodation. The severe weather, tough work and the very low payments eroded the enthusiasm and power of the labourers, and then led to delays to the project. The work done in the first month was just one quarter of the initial expectations (GHRC, 1938, archives NO.: 26-09-003-01).

The river dykes project went slowly. According to the initial proposal, the pond dykes project should have started after the end of the river project. However, several peasants, including Xinshan Wang, wrote to and telegraphed the Guide Huai River Committee to ask a pause in the pond project on the 4th and 6th May, respectively. They pointed out that "the earth of the pond needed to be dredged up for maintenance; however, it was waterlogged. If the water was discharged at that time, none would be available for irrigation. If the earth around the pond was used to increase the pond levees, it might not even be possible for three people to move one cubic meter of earth per day, as the earth was wet and of bad quality. Furthermore, if the pond were not dredged, more and more of the dykes would be in the mud and the original plan of constructing dykes to prevent flooding might not be achieved. Also, as spring and summer were rainy seasons which would interfere with the progress of construction, they would waste a lot of money" (GHRC, 1938, archives NO.: 26-09-003-01). Furthermore, villagers had just suffered a disaster and felt tired and weak and if they were required to continue with the construction, they would be exhausted. The villagers were very busy cultivating in the farming season and if they were required to build pond dykes, 32,800 acres might be in danger of poor harvest and hundreds of thousands of victims would have to live on almost nothing. The gentry thought that the villagers were panicky about the construction and suggested cultivating the land firstly and then starting the construction of the dykes in autumn (GHRC, 1938, archives NO.: 26-09-003-01).

The Water Conservation Engineering Division rejected the gentry's request to pause construction with the reason being that construction of the rivers dykes could be

finished quickly. They said they would arrange a proper time for the construction of the dykes for the pond and that it would not interfere with farming (GHRC, 1938, archives NO.: 26-09-003-01). The Guide Huai River Committee thought that the villagers were positive about the construction of the roads and telephone system, but rebuked them for not being active in the construction of the water conservation and not undertaking their duty to serve their hometown. The Guide Huai River Committee thought that the present season was a reasonable time for the construction as the days were long but the nights were short, and the weather recently fine. In autumn and winter, the frequent snow would freeze the earth and inconvenience the work, making construction unstable. The Guide Huai River Committee pointed out that the villagers benefited most from the construction and wondered why they would not make a few sacrifices to obtain greater benefits in the future. Under the guide of the upper organisations, the Anfengtang Dykes' Office was required to carry out the construction on condition that it did not interfere with the farming (GHRC, 1938, archives NO.: 26-09-003-01). What the Guide Huai River Committee argued was not completely unreasonable as it was not a good idea to postpone the construction of the dykes until after autumn. 2000 years ago, there were records that earth in autumn had a relatively high water content and a daily increase in humidity. In winter, meanwhile, it was hard to conduct earth work in freezing weather and, moreover, the soil water content was not uniform and so it was hard to impress (Guan, no date. The *Guanzi*)[4].

The archives (GHRC, 1938, Archives NO.: 26-09-003-01) indicated the project continued at the insistence of those managing it. June was coming and the second round of wheat began to tassel, and the rice seeds had sprouted. The busy farming season would begin in late June. On 17 June, the Guide Huai River Committee received a letter from Liaobai Huang, a member of the Anfengtang Pond Committee. The letter showed his familiarity with agricultural activities and countryside life as usual. Liaobai Huang

[4]The *Guanzi*
The *Guanzi* is an encyclopedic compilation of Chinese philosophical materials named after the 7th century BCE philosopher Guan Zhong, Prime Minister to Duke Huan of Qi. http://en.wikipedia.org/wiki/Guanzi_(text)

pointed out that it had been fine recently and labourers worked hard on the work, but that construction would not be completed in a short time and would conflict with activity in the farming season (GHRC, 1938, Archives NO.: 26-09-003-01). In addition, Liaobai Huang showed his understanding and compassion towards the central government. He expressed his opinion in humility that enforced recruitment might bring a delay or pause to the project and waste money, as the villagers had meagre knowledge and paid little attention to water conservation. He suggested assigning engineers or experts to build sluices in the farming season (GHRC, 1938, archives NO.: 26-09-003-01). Furthermore, the Construction Bureau hoped to postpone construction until after 1 October owing to the difficulty in earthwork and said it would cut down the expenses as well (*ibid*).

Analysis of the archival data (GHRC, 1938, archives NO.: 26-09-003-01) revealed that on 19 July 1937, together with the NEC, the Guide Huai River Committee issued a permit to pause construction. The archives (GHRC, 1938, archives NO.: 26-09-003-01) indicate three possible reasons for this: namely that the construction of the dykes of the relevant rivers had nearly finished, the finance of the project was in difficulty and the local communities and provincial organisations had proposed a similar request. It was not necessary for the central government to be in an opposite position to the groups that had a direct interest in the project. As for central government, it was an advisable option to believe in the feedback from local government as the status of the Anfengtang Pond did not have such a big impact on the whole country. The construction of the pond's dykes began on 28 October and 57,000 cubic metres of earth had been removed by late December when the invading armies were approaching the work fields. The project was forced to pause but still needed work on another 2500 cubic metres of earth (GHRC, 1938, archives NO.: 26-09-003-01).

Since May 1936, when the project started, to the end of 1937, villagers' actions to chase the government to either start construction or postpone it were out of consideration for the farming season. Their concern for farming time indicated their confidence in the

farming experience.

The Chinese Almanac is one document in which peasants' experiences are expressed with characters or symbols. This example is taken from an interview where a peasant was questioned about the farming season:

Interviewer: *How do you know the farming time?*

[Peasant, aged 73]: *Cultivation is arranged according to the lunar calendar. Every family uses the Chinese Almanac to guide cultivation as well…*

The *lunar calendar* provides guidelines for peasants' agricultural production and life and as the aim of constructing water conservation structures is to improve agricultural production, and thus the rural economy and the living standards of the peasants, it is better for such construction to respect the farming seasons. Over that period of 1.5 years, it can be seen that peasants' expectations, suggestions and discontent were linked with the farming seasons.

China has a long tradition of paying attention to the farming season and regulations which emphasise "not breaching the farming season" in all eras. In many cases, the meaning of 'farming' was expressed as 'timing' (Qing and Yang, 2006, p130). The archives (GHRC, 1938, archives NO.: 26-09-003-01) indicated that in the farming season, the government was not encouraged to arrange construction, and even marriages or funerals might be cancelled or postponed. Wang (2014) indicated that commercial activities or other activities not related to agriculture were not permitted and many activities were required to give way to agricultural activities in the farming season. A book (named *Lüshi Chunqiu*)[5] edited by the prime minister of the Qin Dynasty, the first united feudal dynasty, pointed out (Lv, no date) that to build large-scale water conservation projects in the farming season required a great deal of labour and risked famine and invasion from neighbouring countries. A popular saying in

[5] *Lüshi Chunqiu* is an encyclopedic Chinese classic text compiled around 239 BC under the patronage of the Qin Dynasty Chancellor Lü Buwei.

legend was, ‘there were only 49 busy days in a single year, one busy day’s work was for nine days’ food’ (Wang, 1981). It implied that the farming season was very important for peasants and that most activities gave way to agricultural production. With this in mind, it is important to ask when is an appropriate time to build water conservation structures in the undeveloped countryside? Another important ancient book pointed out that the lunar calendar for spring (around 20 days later than the solar calendar) was the proper time for such construction (Anon, no date. The *Guanzi*). This is because spring is a relatively dry season with low soil water content, mild weather and a slack season for farming. Moreover, there were many available potherbs in that season.

Analysis of the archival data (GHRC, 1938, archives NO.: 26-09-003-01) revealed that even though the suggestions from the peasants were reasonable, it was unfair to criticise the government for bureaucracy or arbitrary decisions as concerns for organising water conservation were sometimes not consistent with the interests of the peasants. Normally, the decision of the Guide Huai River Committee was based on water conservation in the Huai River Basin, and even water conservation of the whole country. One possible reason for the Guide Huai River Committee’s insistence on the project was that there was competition with other departments. For example, if communication and highway departments could finish their projects on schedule, the water conservation department might be criticised by central government owing to delays. Furthermore, if the project could not be finished on schedule, it might have been interfered with by the Second Sino–Japanese War. Whilst it might seem reasonable that the government criticised peasants for their shortsighted view, there should also have been some consideration by the government for the attention that peasants needed to pay to crop cultivation activities which represented life and survival for them. If the peasants had a bad harvest owing to delays in the farming season and could not live, how could they consider sustainable development?

Archives (GHRC, 1938, archives NO.: 26-09-003-01) highlights how the key to making the interests of villagers consistent with those of the state was to maintain the balance

between the harvest of this year and that of every year in the future, or to provide proper compensation. The balance might be achieved easily if the state had ample reserve materials for compensation and if peasants had savings of food or money. The peasants would join in the construction organised by the government if they had no worries about famine. However, the peasantry had lost their trust in the government owing to the severe shortage of wages for their labour. Therefore, for their own survival, they had to ensure they were available during key farming periods. It should be pointed out that even though the peasants had protested about the timing of water conservation, they had not organised strikes and even though there were several pauses, the project ultimately moved towards its aims. There were two reasons for this situation, one was the urgency from the government, and the other was the peasants' sacrifices for the future of the Anfengtang Pond, even if the sacrifices were accompanied by complaints.

On 7 July 1937, the Marco Polo Bridge Incident happened (also known as the Lugouqiao Incident)**.** After the military conflict dated 7 July, Japan started its large-scale invasion into China. The Japanese army seized part of Jiangsu and Anhui Provinces, and nearly a quarter of China experienced serious conditions (Su, 1940). There were 130 million peasants and 8 million farming cattle in the occupied area. Agricultural production in the occupied area went down greatly in 1938. Then, the construction of the Anfengtang Pond projects paused. Until 1940, the Anfengtang Pond Committee was re-established. The committee included two sections: the engineering department and the general office. Specific technicians were arranged to monitor the water levels (EBTWCAP, 1995) but no official maintenance was conducted during the period between the beginning of the Sino–Japanese War and 1940 (*ibid*). It was clear that all the irrigation during that time benefited from the Anfengtang Pond project and peasants' work and sacrifices in the project.

6.8 Disputes from the wasteland reclamation,

Zhuang et al (2005) investigated the evolution of paddy fields over a long period in

ancient China. They investigated the impact of the surrounding paddy fields on the wider ecological environment, arguing that the over-cultivation of the surrounding paddy fields led to the destruction of the original hydrogeological environment. Similar consequences frequently resulted from the reclaiming of wasteland in the Anfengtang Pond area during the era of the ROC and reflect the delicate balance between environmental quality, food production, and human livelihoods that represents a longstanding concern of real importance in environmental history.

The Anfengtang Pond area had suffered from shortage of farmlands since the Ming Dynasty (EBTWCAP, 1995). Analysis of the archival data (APC, 1948, archives NO.: 06-27-802-2027) revealed that the serious drought in the summer and autumn of 1941 made water storage in the Anfengtang Pond much less than normal and the south part was exposed. People were looking for new places for farmlands and frequently carried out wasteland reclamation. The archives (ibid) indicated that there were controversial opinions on wasteland reclamation. Zhengshen Lu and Daoming Huangpu wrote a joint letter to ask for the reclamation of wasteland to change it into fields for cultivation with the reason that the exposed field looked like wasteland. Zhengqiu Zhu, an engineer from the Construction Bureau of Anhui Province, and Shizhen Zhu (this person was also involved in Section 6.6 *Defalcation and turbulence*), the director of the Technical Division of Shou County, were assigned to carry out a field inspection. They thought that rice cultivation in Anfengtang Pond would compete with water for land and harm the Guide Huai River Project.

The archives (APC, 1948, archives NO.: 06-27-802-2027) indicated that in summer 1944, a serious drought occurred again. Tongfang Zhao, an associate director of the Land and Food Division in Shou County, wanted to reclaim wasteland in Anfengtang Pond and handed in his proposal '*Plan of wasteland reclamation in Anfengtang Pond*' to Jingqiu Gui, the director of the Finance Department for Anhui Province. Xianglin Ding, from the Bureau of Civil Affairs of Anhui Province, was appointed by the provincial government to carry out an investigation in Shou County. Xianglin Ding

went to Shou County by sedan chair and it happened to rain. He went back to the centre of the county on the same day. At that time, there happened to be a joint convention by gentry and county officials in Shou County. In the convention, Huanan Wang, a member of the gentry, addressed the circumstances of Anfengtang Pond and his reasons for objecting to wasteland reclamation. The outcomes of the investigation by Ding (1945) were reported by *Anhui News* on 9 January, and 20 February 1945 respectively. It was reported (Ding, February, 1945) that many channels had been silted up, exposing over 3,293 acres of land, the amount of private reclamation land was over 1,647 acres and that that the Bureau of Civil Affairs of Anhui Province would set up a state-owned Wasteland Division responsible for sorting out state-owned wasteland in the areas of the Anfengtang Pond, Wabu Lake and Luopi Pond. As for the reports, Xianglin Ding then wrote to the gentry of the Anfengtang area and said that (APC, 1948, archives NO.: 06-27-802-2027): taking the interests of villagers involved in private reclamation and the truth of reclamation into account, people were required to register reclaimed land and pay land rent and not be allowed to give up the cultivation of reclaimed lands optionally. Registration was a short-term action to change the private reclaimed wasteland into public assets and to increase production in wartime and the future of this wasteland reclamation would be discussed again once the Guide Huai River Project restarted. According to the reports and letters, it was indicated that the Bureau of Civil Affairs had two reasons to sort out problems regarding the Anfengtang Pond: to remove disputes, which affected local security and social morality, and to show solicitude to the people involved in wasteland reclamation. It seemed reasonable and showed the government's willingness to help people. Actually, the private reclamation of a public lake broke the regulations and should have been punished. However, at that time it was exempt from punishment and was commiserated. What the government did actually harmed the interest of villagers who strictly followed the rules. The possible reasons for the actions of the government might have been that it would cost too much labour and finance to change the private reclamation completely; it was already an accomplished fact and in addition, the rental income benefited the government greatly.

The archives (APC, 1948, archives NO.: 06-27-802-2027) indicated that local residents in the area of Anfengtang Pond were not satisfied with the outcome of the investigation and the decision for wasteland reclamation. Afterwards, people including Liaobai Huang sent several letters to the Huai River Committee. Based on the considerations of history, present circumstances and interests from various sides, they provided objections to what the Bureau of Civil Affairs did.

Analysis of the archival data (APC, 1948, archives NO.: 06-27-802-2027) revealed that Liaobai Huang et al argued that after the construction of the dividing channel, neither private reclamation nor dispute happened for nearly 200 years so there was no use in doing reclamation. They also wrote that "the condition of Anfengtang Pond depended on seasons. In spring, Anfengtang Pond normally contained a huge amount of water. In the case of heavy rain, it would be full quickly. In the middle of autumn, when the autumn harvest had finished, most of the bottom of the pond was exposed owing to the huge usage of water prior to harvest. This indicates that Ding did not know the full circumstances of the Anfengtang Pound, but just noticed its situation in autumn. Additionally, the area of the Anfengtang Pond had been 9,225 acres, which was measured by the Guide Huai River Committee. If Ding's suggestion to carry out reclamation on the exposed land was followed, the Anfengtang Pond would lose half of its size. Moreover, the Anfengtang Pond was critical to the lives of local residents as it supplied water to lands for thousands of families. Tongfang Zhao together with Ding duped their superiors and said that wasteland reclamation would enhance production without harming water conservation. A strange thing was that the county government duped the provincial government as well" (APC, 1948, archives NO.: 06-27-802-2027). Furthermore, the provincial government arranged for the Bureau of Civil Affairs to set up the Wasteland Management Division, but did not arrange for the staff of the Department of Water conservation to carry out an investigation. Most wastelands of Shou County were in enemy-occupied areas, which was out of the Wasteland Management Division's control. Liaobai Huang and other gentry accused Ding and Zhao of seeking private interests from the wasteland reclamation and claimed that their

actions had hampered agricultural water conservation directly, and affected the *Guide Huai River Project* indirectly. They should have been investigated and punished in terms of water conservation laws.

Archives (APC, 1948, archives NO.: 06-27-802-2027) indicated that Liaobai suggested issuing funding to improve the condition of the Anfengtang Pond, as it was an important reservoir in the upper reach of the Huai and had a role in water storage and irrigation. If the heights of the dykes and levees of Anfengtang Pond were increased by 2 meters, the bed of the pond would not be exposed anymore and two thirds of the land in the whole county would benefit from it. If wasteland reclamation had been allowed and rent from it had been paid to the government, more and more peasants would have carried out cultivation on exposed land in the time of water shortages and discharged water from Anfengtang Pond in secret in the rainy season to protect their land in the pond. This would have meant that all the improvement to Anfengtang Pond that had been achieved by the Guide Huai River Committee and villagers would be destroyed and the third-phase project would be in trouble (*ibid*).

Who should take the responsibility? Archives (APC, 1948, archives NO.: 06-27-802-2027) indicated that their 'answers' were based on long- and short-term interests. 1945 was the last year of the Second Sino–Japanese War. On 24 January 1945, the Japanese occupied Guangdong–Hankou Railway. On 28 January 1945, the reunion ceremony of the Chinese Expeditionary Force and Allied Powers was held in Wan Ding, Yunnan Province. On 4 February 1945, the Yalta Conference was held by the heads of the United States, the United Kingdom and the Soviet Union. Huge military expenditure put finances in difficulty (Zhu and Dai, 2006).

According to the archives (APC, 1948, archives NO.: 06-27-802-2027), although development of the Anfengtang Pond would bring economic interest, the benefits from it would not occur in a short time. However, wasteland reclamation could quickly increase fiscal revenue. Even though the Anhui Provincial Government did not deny the risk that reclamation would result in degeneration of the environment, harm to

irrigation and long-term loss to villagers and government, it preferred to solve its current financial difficulties.

The archives (APC, 1948, archives NO.: 06-27-802-2027) indicated that on 20 March, gentry around Anfengtang Pond received a response from the Guide Huai River Committee, who had made the decision to stop wasteland reclamation. These members of the gentry then organised a convention and one week's diffusion of the news regarding the prohibition of wasteland reclamation. The peasants around Anfengtang Pond considered Anfengtang Pond as a source of life and treated the approval letter from Guide Huai River Committee as a decree from God, and were very excited at the news. However, the provincial government had not yet withdrawn the issued notice regarding wasteland reclamation (APC, 1948, archives NO.: 06-27-802-2027). On 24 March, Anhui Provincial government sent a letter to the Guide Huai River Committee and restated the reasons provided by Zhao to carry out the wasteland cultivation (*ibid*). On 1 May 1945, it was written in a joint official document by the Construction Bureau and Water Conservation Bureau that after the war the Guide Huai River Committee should organise the Anfengtang Pond Maintenance Project. At the time, it was not feasible to issue money to this third-stage project owing to financial difficulties. Therefore, the Wasteland Management Division was arranged to collect rent from the wasteland provisionally and manage the reclamation land back into Anfengtang Pond in the future (APC, 1948, archives NO.: 06-27-802-2027). Anhui Province government hoped that the villagers would not mention it again. It was indicated that the proposals regarding Anfengtang Pond should observe war-time production. Increasing income was the first task and water conservation construction should give way to war (*ibid*). As far as the government was concerned, it was not important whether Zhao and Ding's statements were true or not. What was important was the result that wasteland reclamation of their proposal had met the government's desires. Then, the corresponding Wasteland Management Division of Shou County was set up in Baoyiji (*ibid*).

Analysis of the archival data (APC, 1948, archives NO.: 06-27-802-2027) revealed that in order to solve the problem whereby water conservation was destroyed owing to wasteland reclamation, representatives elected by villagers around Anfengtang Pond went to the state-owned Wasteland Division to complain. The state-owned Wasteland Division said that rent from the wasteland had been used for education projects. The villagers argued that education was relevant for people's wisdom, while water conservation was relevant for people's lives; neither had priority over the other. Representatives asked the state-owned Wasteland Division to publicly investigate the disorder with the county government and other organisations, and to show the outcome and the truth to the public. Xuangui Wu, a technician of the state-owned Wasteland Division, rejected requests by representatives and said he just worked according to the instructions of the state-owned Wasteland Division, rather than those of the county government or other organisations. Villagers thought that Xuangui Wu was not a reasonable fellow and resorted to approaching the county government. They were still rejected. Liaobai Huang, a 73 year old gentleman, thought that the county government and officials from other local organisations were tyrants, while the central government did not notice. He could not help crying when he wrote to the Guide Huai River Committee. The Guide Huai River Committee wrote back that the people carrying out the investigation in the upper reach of Huai River would come to investigate it.

The outcome of the investigation by the Guide Huai River Committee is unknown but wasteland reclamation was stopped 2 months later. The archives (APC, 1948, archives NO.: 06-27-802-2027) indicated that on 13 October 1945, the Anhui provincial government telegraphed the Guide Huai Committee explaining that because of the victory of the anti-Japanese war, recovery work would start, and that Anfengtang Pond would be managed by Shou County as the Wasteland Management Division had been cancelled. However, villagers around Anfengtang Pond wrote to the Guide Huai River Committee on 27 October and again on 27 November hoping to stop wasteland reclamation and start the maintenance Project (APC, 1948, archives NO.: 06-27-802-2027). The Guide Huai Committee agreed to their requirements and said it had been on

the list for their Recovery Plan (*ibid*). The villagers felt that this news had taken too long to reach them.

On 3 August 1946, Chiang Kai-shek (October 31, 1887–April 5, 1975), who was a 20th-entury Chinese political and military leader, issued ordinances to forbid wasteland reclamation again and let the Levees Recovery Engineering Bureau of the Huai River Basin arrange for the Water Conservation Engineering Division of Anhui Province to measure Anfengtang Pond. The measurement was aborted soon after it commenced as civil war broke out, and the measurement engineers were engaged to pave the roads. Afterwards, some proposals were put forward regarding the issue of silting up. However, the proposals were not put into effect as the Water Conservation Engineering Division of Anhui Province thought a new channel needed to be dug. To achieve this plenty of farming land would have to be destroyed and the earth work would be huge.

Analysis of the archival data (WCEDAP, 1948, archives NO.: 13-360-1246) revealed that in 1947, a message that the Anfengtang Pond would be silted up to produce 2,471 acres of land was diffused among residents. In response, members of the gentry in the area wrote to the Water Conservation Ministry to object to the proposal. Their objection achieved its goal and the proposal was not adopted (*ibid*). The wasteland reclamation of the Anfengtang Pond ended after October 1949 when the People's Republic of China was established.

The archives (WCEDAP, 1948, archives NO.: 13-360-1246) indicate that Wasteland reclamation in the Anfengtang Pond area experienced a long history. The size of the Anfengtang Pond had decreased by half after several incidents of wasteland reclamation in the Ming and Qing Dynasties (*ibid*). In the ROC era, wasteland reclamation was proposed again several times and villagers around Anfengtang Pond had a long history of opposing this. The main reason for the recurrence of wasteland reclamation proposals came from the interests of some landowners and bureaucrats who wanted to seize land through wasteland reclamation. Some villagers who already held a small piece of wasteland wanted to hold more with the help of both landlords' and bureaucrats' powers.

These villagers were always appointed as representatives by landowners and bureaucrats to fabricate public opinion for governments, for example to persuade the government that carrying out wasteland reclamation improved the lives of villagers. It was clear that wasteland cultivation was another version of private wasteland reclamation. In other words, registered users wanted to become landowners in this way.

In reality, nobody was able to achieve good agricultural harvests from wasteland reclamation. Over 658,978 acres of land had benefited from Anfengtang Pond in the past and in 1947, the amount of benefited land was just around 32,948 acres (WCEDAP, 1948, archives NO.: 13-360-1246).

Though silting up is unavoidable for every river and pond, wasteland reclamation would have brought serious damage to Anfengtang Pond, which villages depended on for water. If part of Anfengtang Pond was reclaimed, the water available for irrigation would be less, which would cut the amount of land that benefited from the pond. Moreover, the levees would be vulnerable to the rainy or flood season and might collapse. On the other hand, nearly all the land would be short of water in the dry season. That is to say, Anfengtang Pond would not work well for irrigation or flood control anymore.

Analysis of the archival data (WCEDAP, 1948, archives NO.: 13-360-1246) showed that wasteland reclamation would also have resulted in the reduction of water storage capacity and an increase in the water level. Once heavy rain happened, polder land would be the first sacrifice. Polder land was formed by silted soil, which was suitable to plant rice and was characterized by low lying fields enclosed by dykes and along the levees of Anfengtang Pond. Many villagers near polder land just lived on it (*ibid*) and considered it as a unique source of life. As polder land was lower lying than the water level of Anfengtang Pond in the flood season and lower even than the normal water level, it was highly susceptible to flooding with heavy rain threatening to destroy the dykes and levees as well as causing damage to normal land as well (WCEDAP, 1948, archives NO.: 13-360-1246).

Wasteland reclamation caused loss to the polder land and Anfengtang Pond. Consequently, the relationship between the peasants of the polder land and other villagers got worse. Eventually, the peasants lost the polder land, and the peasants on common land found it difficult to survive.

The peasants on reclaimed wasteland became cultivators of new polder land and also suffered from wasteland reclamation. The only people who benefited from the wasteland reclamation were landowners and bureaucrats. Wasteland reclamation did not bring increased income from crops, but had an influence on other incomes. Sideline production resources such as fish, livestock and trees were relevant to the lives of most villagers. Experts from the Construction Bureau had suggested to plant aquatic trees in the shoal area (WCEDAP, 1948, archives NO.: 13-360-1246).

The income from sideline production was more than that from cultivation. Wasteland reclamation threatened this type of sideline production and resulted in a loss of income, and made the production structure too simple to resist disaster or turbulence in the food market.

The benefit of wasteland reclamation made more and more people join the wasteland reclamation which caused Anfengtang Pond to be gradually shrink. Then the low-lying shores of the pond were changed into cultivation fields. Two factors made this a possible consequence (Zhuang, 2005). One was the exigent desire of those advocators of wasteland reclamation. The other was the case of polder land in Zhejiang Province, which could be used as a reference. The main feature of polder land was that it competed with water for land. It was agreed by most researchers (Ba, 1997; Wang, 2006) that the polder land helped to increase agricultural production. On the other hand, polder land harmed the natural river system, increased the risk of flooding, simplified diversity of the hydrobios, and destroyed the everglade environment. Once wasteland reclamation occurred, the following reasons made it impossible to ‘change wasteland fields back into pond’ (Liang and Gu, 2006; Guo and Gong, 2011). Firstly, some people would not give up the benefit from wasteland reclamation and the government would need to

spend much money to recover it and construct new water conservation facilities. As it is very difficult to change the natural environment, local residents' objections to wasteland reclamation made on the grounds of sustainable development of the community economy and agriculture were well justified.

Wasteland reclamation was speculative and normally happened in the period when big historical events were involved (Chen, 2009). In 1940, part of Shou County was seized by Japan. In 1941, it was proposed by Daoming Huangpu to carry out private wasteland reclamation (EBTWCAP, 1995). In 1942, Daoming Huangpu proposed carrying out wasteland reclamation again. In 1944, and 1945, the Second Sino–Japanese War was severe and was close to its end. However, Xinaglin Ding again proposed wasteland cultivation (APC, 1948, archives NO.: 06-27-802-2027). In 1947, the circumstances of the Nationalist–Communist Civil War changed. Kuomintang's troops were in the defensive stages and some people proposed the wasteland reclamation again (WCEDAP, 1948, archives NO.: 13-360-1246).

This illustrates how plans for large-scale wasteland reclamation tended to arise with historic change. Analysis of the archival data (WCEDAP, 1948, archives NO.: 13-360-1246) revealed that villagers around Anfengtang Pond thought that the change of regime would not bring a change to their styles of production and lives. They just focused on cultivation, irrigation, harvesting and water conservation. However, many landlords and officials became speculators who intended to seize and collect land and make their fortune with social change. However, the government concerned itself greatly with the general situation and thought the interests of peasants should give way to military expenditure. The behaviours of different groups or classes in their attempts at wasteland reclamation indicated their responses to these big changes. With a view to maintaining the ecological environment and sustainable development, wasteland reclamation was opposed on the grounds that it would harm the development of Anfengtang Pond communities and affect villagers' overall interests. This indicates that villagers around Anfengtang Pond held a more modern scientific opinion of agricultural

production at that time. Their opinions came from their experience of cultivation over thousands of years.

Additionally, in the eyes of the people there, Anfengtang Pond was not just a physical object as described above. It was deified, as reflected in the following oral history examples:

[Peasant, aged 72]: *Some tales revealed the strangeness of the Anfengtang Pond. In some years, it produced much grass. In some years, it produced lotus. It produced water chestnut in some years. It was said that the maximum amount of water chestnuts a single person could get from the pond was just 8 litres per day.*

[Peasant, aged 76]: *There had been a town in the area of the current Anfengtang Pond. In the town, there was a stone lion. A beggar jinni had predicted that when the eye of the stone lion got red, a flood would happen. Children from the elementary school believed this and observed the eyes every day. One day, some children painted its eyes using a coloured pen, as they were impatient. Soon, many people believed that the beggar's words were true, so they started to move home. Once they had left the town, the flood rose up…Part of the current Anfengtang Town was the Guodian Town in the past.*

6.9 Discussion and conclusion

The seven stories told in this chapter have depicted different aspects of Anfengtang Pond and its community during the period of the ROC. It is very difficult to determine what has happened to individuals and groups in times of frequent wars and disasters, when Chinese traditions were still popular but western science, technology and ideas were beginning to penetrate. However, what is apparent is that many traditional beliefs and ideas persisted among many local communities during the period of the ROC. Examples include a tendency to personify, sanctify, and entrust their hopes to their government, which was aloof from them. The strict observation of the farming system

was also important as it was something trustworthy they could rely on in turbulent times. In addition, whilst many intellectuals increasingly recognised western ideas, they still used traditional approaches and customs to influence ordinary people and the government. While on the one hand, the gentry acted as representatives of the old community, they were also the people who introduced the new ideas and were responsible for communication with the government in matters relating to the wider community interest.

In short, Anfengtang Community not only had various kind of conflicts, but also compromises. However, the depression of the rural economy and the termination of water conservation owing to the international situation was a real problem for the Anfengtang Community.

Echoing Arthur's (1986) work which used law as a starting point for examining relationships between resources and economics related to fisheries, water conservation in China highlights how regime changes had an impact upon culture and led to different understandings of the law. These differences and conflicts were reflected clearly in the disputes for water rights in the management of Anfengtang Pond. At the same time, intersections between politics, technology, market demand and the natural environment in the Anfengtang Pond echo Everett's (1994) work on the operation of power behind the evolution of the landscape. Water conservation is an important aspect of Chinese government and can be viewed as a means of examining the political desires of different levels of government at different times.

The history of Anfengtang Pond in the era of the ROC is complex and fluctuant. Both collaboration and conflict happened between gentry and villagers. It was a history in which regular separation or collaboration happened between the strangers and the local residents owing to their interests. It was a history in which the engineers were looking for a balance between technology and money and in which peasants considered both the Anfengtang Pond and the farming season as equivalent to their lives. It was a history that was subject to wider global events as the Anfengtang Pond Community took part

in social reform actively or accepted social change passively.

Throughout the history of China, people are educated to restrain ‘greed’ and ‘curiosity’ (Wu, 2009). One fundamental reason for such restraint is the shortage of resources. People must control their desires, observe the fundamental regulations of the community and obey the overall collective management of resources so that limited resources can be used properly and efficiently. The shortage of resources and people’s inability to control them created a fear of change. As peasants in China possessed few resources, they were unable to withstand risk. As a single person was unable to withstand risk, it was natural for peasants to work together and emphasise the obeying of customs, communities and governments. Throughout the disputes regarding Anfengtang Pond, the difficult experiences associated with the construction of the pond was actually a process withstanding risk in the face of scant resources.

Chapter 7: Locally and Internationally – Lotus Polder in the ROC era (1912-1949) and the Wang Jingwei Reign (1940-1945)

7.1 Introduction

The Huai River is considered a segment of the north-south boundary of China. The post-disaster relief work in the Huai River Basin, and the proposals, execution and administration of projects related to the Anfengtang Pond have been investigated in previous chapters. Detailed descriptions, distinct features, and the behaviours and opinions of people from different classes were reflected in those region-based investigations. Those descriptions and opinions have provided many perspectives and starting points for historical examination, bringing the story to life and helping us to thoroughly examine life in those regions at a grassroots level, with great historical care. However, the Huai River Basin is just one part of China, and it has its geographical and cultural constraints. To provide a broader analysis of water conservation in China in the ROC era, it is therefore important to undertake a cross-regional study, by which regional features/individuality can be compared to other regions and examined for common themes. Moreover, such studies will clearly reveal the complexity of the historical picture and the causes of key incidents associated with water conservation. Various aspects of history will also be revealed in greater detail, from which some common themes can be identified.

For this cross-regional study, another two cases will be presented. One is the study of the Lotus Polder in the Yangtze River Delta. The other is research on the Jinghui Channel in northwest China which is discussed in the next chapter. Both are currently the subjects of active ongoing research although most of this work is focused on the periods of the Ming or Qing Dynasties. In this study, the investigation will focus on the period following the founding of the ROC, and will study water conservation in the south and north of China and the area along the south-north boundary linking them together.

Studying the Lotus Polder provides insights into China's semi-colonial history, as community-based changes have taken place under the influence and invasion of foreign forces. This study of water conservation in the region provides an interesting lens with which to view such changes. Located on the southeastern coast of China, Lotus Polder was characterised by relatively developed commodity agriculture which created demand for state-of-the-art technology.

The chapter will analyse the consequences of utilizing knowledge, technology and equipment imported from western countries and whether they promoted social progress. It will also analyse the impacts on production, livelihoods and repair of water management structures associated with the Japanese occupation of the Lotus Polder in the 1930s and 1940s. Particular attention is focused on the relationships between the Japanese and local communities in a situation when the power of the legitimate government was bound to overwhelm that of the puppet government and national anti-Japanese sentiment was high. Little previous research has been done on Lotus Polder during the period of the ROC because of the difficulties in acquiring relevant materials and because such work involves the evaluation of the traitors and their regime. Based on a wide range of supporting materials, an interpretation of the history of the Lotus Polder is presented in this chapter. National history and local chronicles are the main resources used to study Lotus Polder's ancient history while information on the international events discussed comes from Archives in the Institute of Modern History and Academia Sinica.

7.2 Managed by local communities: Lotus Polder before the era of the ROC

The beginning of water resource development in the Yangtze River Delta occurred in the late Tang and Song Dynasties. The population of China was over 100 million during the flourishing period of the Northern Song Dynasty (960-1127). The increasing population would benefit from the development of the Yangtze River Delta and the

consequent increase in rice yield this would provide. One way that agricultural production increased in this period was through the reclamation of polder land. In general, research by Chinese scholars has focused on the technological description of Polder land. Japanese research, on the other hand, is generally more concerned with its system of management (Akira, 2008). Polder land usually consists of low-lying paddy fields surrounded by low dykes, within which many minor channels or trenches are present in a crisscross pattern. Consequently this land faces a high risk of flooding during the rainy season. Akira Morita (2008) looked at the Lotus Polder during the Qing Dynasty, examining how the polder dykes were built, how people were organized to remove the excrescent rainwater in the polder, and how the polder land system was managed and maintained. He examined the relationship between water conservation and society in his book *Research on water conservation History in the Qing Dynasty* but did not provide in depth case studies. This chapter seeks to provide a case-study approach to similar issues in the ROC era.

The Lotus Polder, once named Lotus Lake, is a lake located between Wujin County and Jiangyin County that contained a large amount of lotus, as shown in Fig. 7.1. In 317, Officer Zhang organized local people in an attempt to reclaim 1647.5 acres of cropland in Lotus Lake (Akira, 2008). His activity did not achieve the expected goal of changing part of the lake into land. Until the eras of Xuande (1426-1435) and Zhengtong (1436-1449) in the Ming Dynasty (1368-1644), Chen Zhou, the inspector general for the Yangtze River Delta, used government money to organize people for the building of new dykes. This was done to block the incoming water from the river and to drain the lake water for reclamation (Zhang, 1889, Vol. 1). However, due to inefficient management of these polder dykes, the production of the polder land was unstable, such that people still relied mainly on fishing to support themselves. Due to war during the late Ming Dynasty and immigration from the towns, some actions were taken to put the polder land management in order. Afterwards, various social classes emerged due to the unbalanced ownership of the land. In general, the people of the area were steeped in poverty due to a large population and insufficient land (Zhang, 1889, Vol.1 and Vol. 7).

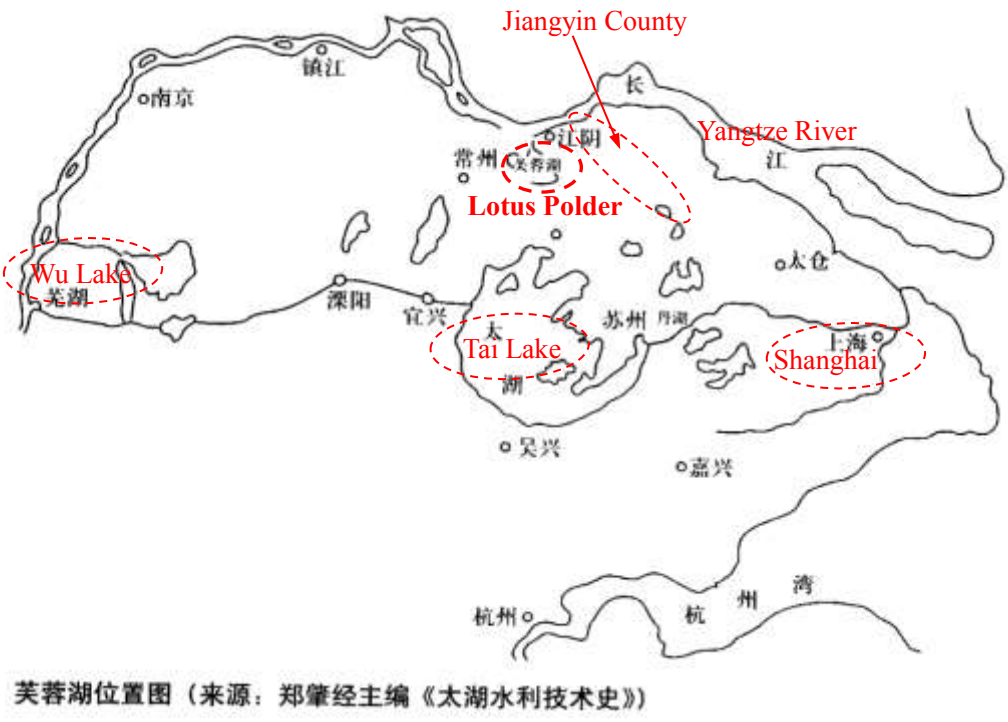


Fig. 7.1: Location of the Lotus Polder (Zheng, 1987)

Whether villages in the area prospered or declined was mainly determined by the occurrence of flooding, and this was largely determined by the condition of the polder dykes (Zhang, 1889, Vol. 7). Until the middle Qing Dynasty, there were nearly 140 villages of various sizes in the Lotus Polder area (Zhang, 1889, Vol. 7). Frequent flooding or drought made villagers very poor. Some villagers with no land ownership, and even small landowners, were put into a situation in which they had to sell their children (Zhang, 1889, Vol. 8). The heavy tax and corruption of local officers made the villagers' lives even worse (*ibid*). Famine made the price of rice increase dramatically (Chuan, 1999). Some villagers therefore had to rely on weaving or fishing in order to survive. By the late Ming to early Qing Dynasties, the dykes on the periphery of Lotus Polder had experienced several collapses that were fixed under the organisation of local governments (Zhang, 1889,, Vol. 1). After the 16th century, because of the absence of

landlords, the maintenance of dykes was organized with reference to the amount of cultivated land rather than the ownership of land. In the down season, villagers spent time fixing the dykes, and were free from performing other services for the country (Zhang, 1889, Vol. 8). They viewed the maintenance of the dykes as their obligation and this circumstance lasted for a long time (*ibid*, Vol. 2).

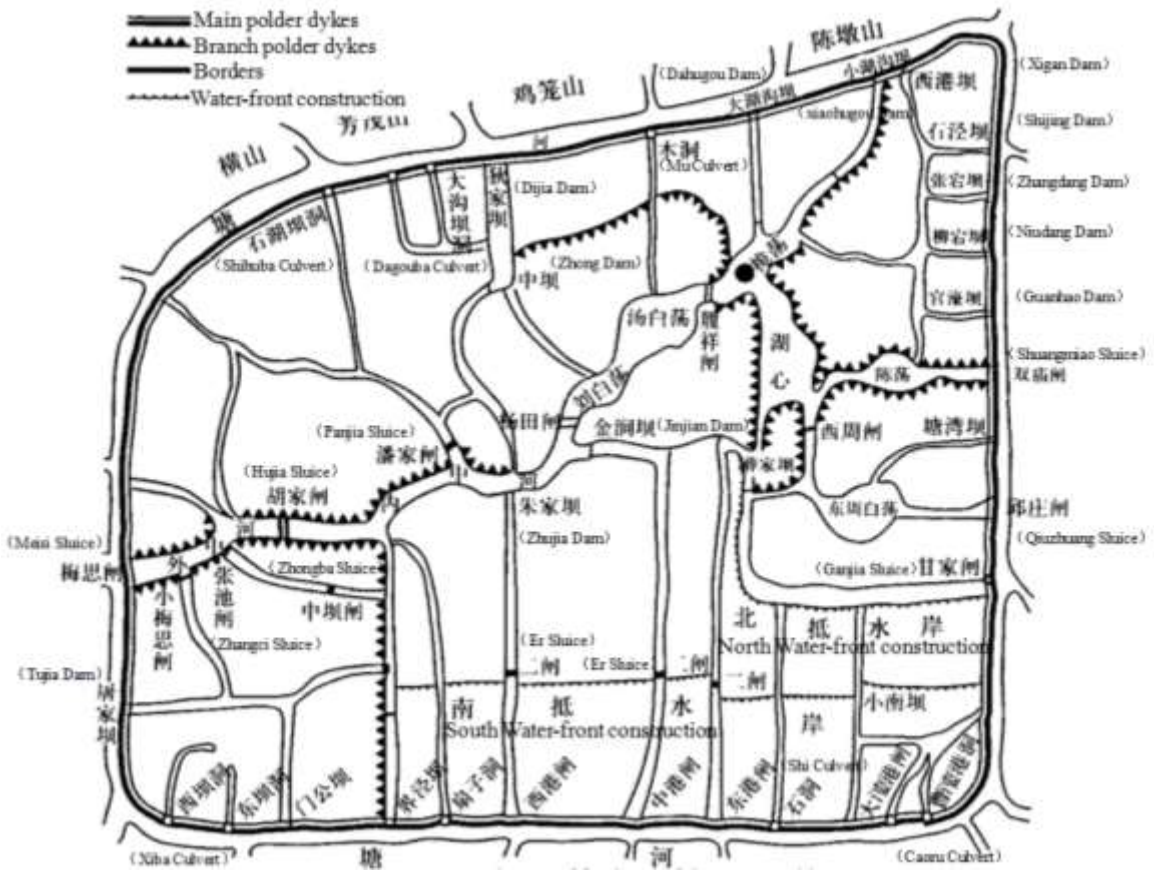


Fig. 7.2: Layout of facilities of the Lotus Polder (Akira, 2008).

However, such management lapsed during the Daoguang reign (1821-1850) in the Qing Dynasty (Zhang, 1889, Vol. 1). In June 1840, the dykes of Lotus Polder suffered flooding and collapsed, causing much of the surrounding area to be submerged. Usually,

villagers around the polder were required to carry out the repairs and pay all associated costs. However, at that time, it was difficult for the victims to undertake such a task, so the county government called on the gentry to offer donations, setting up a Disaster Relief Bureau to collect the donations to repair the dykes (*ibid*, Vol. 2). In 1841, a few members of the gentry with good credit and economic capability were elected to a board charged with allocating contributions and overseeing the project (*ibid*). The board comprised sub-committees, including directors, polder directors and security staff (*ibid*, Vol. 1). In September, the board members came together and set eight rules (*ibid*, Vol. 2) regarding the technological aspects of the water entrance, dykes, culverts (as shown in Fig. 7.2) and management (Zheng, 1987).

Having a board of directors was a practical and efficient way to supervise the project. The policy regarding the election of polder heads improved democracy in the local communities. A regulation stating that each 0.067 hectare of land was required to provide 1 litre of rice to an annual maintenance fund guaranteed the long-term operation of the maintenance. This indicates that water conservation was a key part of the local public infrastructure. A non-governmental unit organized the main work of the operation and the supervision of public infrastructure. The situation of Lotus Polder in the Qing Dynasty indicates that the Lotus Polder community had more local autonomy than before, with the main role of government being to improve or advocate for public services (Zheng, 1987).

7.3 The electrical irrigation & drainage system of Lotus Polder (1912-1932)

Scant research has been done regarding Lotus Polder during the period of the ROC. The reasons for this might be the limited availability of historical documents or political inconvenience due to specific periods of puppet government rule. In this study, I have used as many documents as possible, particularly the archives of the Institute of Modern History to investigate Lotus Polder in the period of the ROC, thereby attempting to

avoid subjective bias.

Analysis of the archival data (FDWR, 1943, Archives NO.: 28-05-02-011-02) revealed that in the era of the ROC, Lotus Polder was located between Wujin County, Wuxi County and Jiangyin County. It was 22.5 km northeast of Wujin County's centre, 20 km north of Wuxi County's centre, and 11.5 km southwest of Jiangyin County's centre. As shown in Fig. 7.3, two-thirds of the Lotus Polder was in Wujin County, while one-third was in Wuxi County. The Lotus Polder area was thirty nine square kilometres in size, or 7,084 acres, excluding river channels and villages. Most villages were located in its northern part. People in the area mainly lived off the land, while a small number of people undertook business in Shanghai or Beijing. No landlord held over 4.9 acres; some villagers owned less than 0.16 acres. Seventy percent of peasants were farmers and worked the lands by themselves. The main products were rice, fish and wheat. Due to the low-lying, pot-shaped topography of the polder land, rainfall often raised the water level outside of the polder higher than it was on the inside, making the water accumulated in the polder difficult to drain. Normally, villagers only had a rice harvest once each year and had a wheat harvest roughly once every ten years (FDWR, 1943, Archives NO.: 28-05-02-011-02). Other produce, like shrimp, crab, water caltrop and lotus root were considered side crops.



Fig. 7.3: Sketch of Lotus Polder and its location with respect to Jiangyin, Wujin and Wuxi Counties (FDWR, 1943, Archives NO.: 28-05-04-053-07)

The archives (FDWR, 1943, Archives NO.: 28-05-02-011-02) indicated some villagers earned an income from fish fry. During the period between March and April, they rowed boats on the Yangtze River to capture fish fry with fine mesh nets and then put them into ponds dug on their own land. The fish fry were fed on yolk or soya milk. Later, the fish fry were fed separately according to their variety and size. Some were screened out – the channa argus, for example. The most popular species were bream, black carp and carp. In May, the fish fry were around 10cm in length and were shipped to the Tai, Dongting and Ling Lakes for sale. One piece of fish fry could sometimes be sold for 4 Yuan (the unit of Chinese currency), and this provided a significant source of income for the villagers. Silk was another important source of income in the Lotus Polder area, and mulberry was planted in the spaces between villages and in the areas around the dykes. Annual production of fresh silkworm cocoons was around 30,000 kg. In the farming off-season, women spent time weaving straw bags, rope, and sandals, which provided another source of income. (FDWR, 1943, Archives NO.: 28-05-02-011-02).

Because the economy of Lotus Polder community relied on the use of the water resources, water conservation was one of the most important subjects for the community. Obtaining money, materials and technologies, using and organising these factors for water conservation and managing water conservation were complex activities that were closely link with domestic and international conditions. As the lands of Lotus Polder belonged to two counties, however, it was difficult to organize the maintenance or repair work. Even though both counties had their own Polder committee, they seldom collaborated with one another due to the large size of the polder; each side just focusing on its own half.

After 1930, Lotus Polder was supervised by the Demonstration Irrigation Management Bureau of Construction Commission. Some brief descriptions of Lotus Polder can be found in the proposal '*Scheme of continued construction of irrigation, drainage system of Lotus Polder*' issued by the bureau. It can be seen that the manual irrigation and drainage system was still in use, even though electrical irrigation and drainage had been

put in place in some areas under the supervision of the government (FDWR, 1933, Archives NO.: 23-21-004-01). All equipment associated with the electrical system were purchased abroad.

In 1930, dry weather made it such that winter wheat was in urgent need of irrigation. The bureau borrowed wood poles, cables, motors, and pumps from the irrigation stations in Wuxi and Wujin Counties. Some villagers provided other drainage and irrigation equipment as well. After one month of installation activity, electrical irrigation began, benefitting roughly 1,647 acres. The villagers were satisfied with the electrical irrigation; however, the extended length and small size of the old cables caused high power loss. In 1931, the planned electrical irrigation area was changed to 823 acres due to power loss and funding problems. Under that plan, the total budget for transformers, switches, wooden poles and copper cable was about 13,000 Yuan. The irrigation could serve two harvests of rice and wheat annually. As a return, the irrigation was paid for at 9.1 Yuan per acre, for a total of around 7,500 Yuan. The profit resulting from the irrigation was 1,500 Yuan, after deduction of the electricity fee (3,078 Yuan), depreciation and interest (1,500) and a general management fee (800 Yuan) (FDWR, 1933, Archives NO.: 23-21-004-01).

On 22nd January 1932, the Irrigation Division of the Construction Commission approved the plan proposed by the Demonstration Irrigation Management Bureau. However, they said it would be difficult to issue cash for the necessary and urgent irrigation construction, and therefore suggested using the Sino-British Boxer Indemnity. They prepared the order list and asked the electricity department to forward it to the Procurement Commission in London and hoped to get the supplies soon. Within the order, the copper cable and transformers cost the most money; around 700 pounds (FDWR, 1933, Archives NO.: 23-21-004-01).

The board of the Sino-British Boxer Indemnity was a specific group charged with

distributing and supervising Boxer Indemnity remissions (Wang, 1957).[1] On 8th April 1931, the board of the Sino-British Boxer Indemnity met for the first time in Nanjing, China. On the same day, the Procurement Committee was set up in London. China paid the indemnity in gold on a rising scale, at 4% interest charge until the debt was amortized on December 31st, 1940. World War I ended in November 1918, as the allies, including members of the United Kingdom, France, United States, and China, defeated the Central Powers. After the Paris Peace Conference, the United Kingdom declared that the indemnity would be refunded in full under the condition that the money would be used to benefit both countries. After several rounds of negotiation, it was agreed between the British and Chinese governments in 1930 to accept the proposal of the board of the Sino-British Boxer Indemnity, whereby all the refunded money would provide funding for railway construction or other production industries, while the interest would be used for culture or education. All the materials needed from overseas countries needed to be dealt with by the Procurement Committee and purchased from the UK (Wang, 1957).

Under the terms of the agreement, some water conservation projects would be funded by the Sino-British Boxer Indemnity. Hsiu-Huan Chou pointed out that the Breach Fixing Project of the Yellow River, the Xijiang River Project in Guangdong Province, the Three Sluices Project of the Huai River, and the dredging of Zhangfu River had all received funding from the Sino-British Boxer Indemnity.[2] However, he did not mention the Lotus Polder irrigation project. According to archival data, the Lotus Polder irrigation project benefited from the indemnity as well. Although the project was small, it had a direct link with the interests of the Lotus Polder communities. Compared with

[1] In 1900, the Eight-Nation Alliance occupied Beijing and looted and pillaged the capital. On September 7th, 1901, the Boxer Protocol was signed between the Qing Empire of China and the Eight-Nation Alliance that had provided military forces (Austria, Hungary, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States) plus Belgium, Spain and the Netherlands. 450 million taels of silver were paid as an indemnity over the course of 39 years from the eight nations involved.

[2] http://www.airitilibrary.com/Publication/alDetailedMesh?DocID=17267331-200812-201002260092-201002260092-1-48，The Businesses Funded by the British's Board of Trustees for the Administration of the Indemnity Funds in China: A Case in Water Conservation and Industry Development, Hsiu-Huan Chou.

the Anfengtang Pond Project, the Lotus Polder irrigation project utilized more advanced technology, received funds from an international organisation, and had drainage and irrigation run by the central government rather than by gentry. As for the interest of the various parties in the project, London got money from the export of materials and technology, the Chinese government received international investment, and the local organisations received money and carried out the construction. Thus, technology changed the management model of the Lotus Polder, decreasing the role of the gentry. As argued by Cosgrove and Petts (1990), the role of the technology is not only determined by the environment and but also depends on the combination of technology, politics, financial conditions, international relations and culture.

7.4 Lotus Polder during the puppet regime led by Wang Jingwei

7.4.1 Japanese permit: survey of Lotus Polder

In 1943, the puppet government led by Wang Jingwei declared war on the UK and US, and joined the Greater East Asia War. Subsequently, this government organised agricultural promotion campaigns in enemy-occupied zones in the central area of China. On 12th Feb 1943, the puppet government issued 'policy guidelines for the economy in war' to improve agricultural techniques, develop water conservation, increase farming land and increase agricultural production of foodstuffs (Qin, 1981). These guidelines suggested the issuance of a proper price policy to protect producers in industry and agriculture, and to encourage reproduction. In October 1942, Shiqun Li, the head of Jiangsu Province, declared his support for the 'production increase movement' and planned to repair the Lotus Polder.

There was about 8,237 acres of land in the Lotus Polder area at the time. The low-lying lands were distributed throughout three counties—Wuxi, Wujin and Jiangyin—but were not governed by a single unified set of regulations. A lack of cooperation among villagers meant that the Lotus Polder area had not been in good condition for many years, and suffered frequent disasters and poor harvests (FDWR, 1943, Archives NO.:

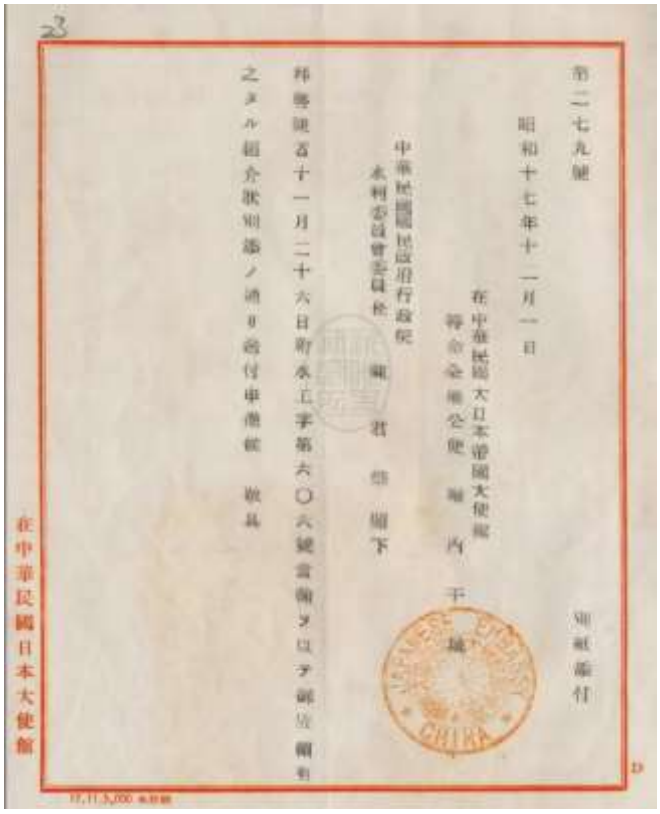
28-05-04-053-07). On 26th November 1942, the Water Conservation Commission arranged for technical staff to conduct a survey of Lotus Polder, and sent a letter to the Japanese Embassy to ask for permission to use instruments for the survey. The survey commenced after receiving the permission letter from the Embassy, shown in Fig. 7.4.

Table 7.1: Instruments and accessories carried by the survey team (*ibid*)

Name of instrument	Quantity		Name of instrument	Quantity
Theodolite	2		Ink	3 (red), 3 (blue)
Dumpy level	2		Blackboard eraser	1
Standard post	10		Abacus	2
Measuring tape	3		Set square	2
Roll ruler	1		Drawing paper	3 reels
Plotter	1		Red paint	3 cans
Curtain	3 meters		Notebooks	12
T-square	2		Canvas bags	3
Axe	2		Rope	30 meters
Drawing board	2		Wooden and bamboo sticks	500

In the early morning of 5th December 1942, the survey team began their trip, arriving in the town of Hengshan at 2pm on 7th December. During the journey, made by car, train and rickshaw, they had experienced inspections and examination by the Japanese army. On 8th December, they met Yifang Hu, the head of Lotus Town and chair of the Lotus Polder Committee. On 10th December, they began the survey. After 1st January 1943, cold weather caused the water in Lotus Polder to freeze, making it difficult to carry out the survey. On 9th January, it became windy, with freezing temperatures, which made it

impossible to continue the survey. After a pause of several days, the survey was completed on 26th February 1943; it had lasted for around eighty days. The completion date was twenty days later than scheduled (FDWR, 1943, Archives NO.: 28-05-04-053-07).



Translation of the letter

Ref: 279
Date: 1st, November, 1942

Stamp: Japanese Embassy, China

Fig. 7.4: The first page of the letter from the Japanese Embassy granting approval for the use of instruments for a survey (FDWR, 1943, Archives NO.: 28-05-04-053-07)

7.4.2 Under management of the Water Conservation Commission: maintenance of Lotus Polder

Lotus Polder was in a low-lying area and vulnerable to flooding. The dyke, sluice,

culvert, water entrance and dock were key to protecting the lives and property of the residents. Normally, small-scale maintenance on the Lotus Polder dykes occurred every three years and large-scale maintenance every five years. Due to the difficult financial situation of the villagers during 1942-1943, only the periphery enclosure had undergone improvement work, as this part only required earth. Villagers had difficulty affording the lime, wood, bricks and stone needed for the sluices, water entrance and brick dykes. Therefore, poor long-term maintenance had led to serious leakage. Many villagers prayed that the dykes would not collapse, but did nothing to fix the leaks. The villagers hoped to get help from the government to pay for all the supplies necessary to the complete repairs (FDWR, 1943, Archives NO.: 28-05-04-053-07).

Three joint meetings of the Lotus Polder members from Wuxi County and Wujin County and the survey team took place in December 1942, January 1943 and February 1943 (FDWR, 1943, Archives NO.: 28-05-04-053-07). It was agreed that a Bank Engineering Bureau would be set up in both counties that would be responsible for maintenance of the dykes. Some members of the gentry were elected as directors. The Bank Engineering Bureau was responsible for calling in the directors of the polders and arranging recruitment. At the same time, a Supervision Division of Lotus Polder was set up to verify work in the field and check that payment was made. The director of the division was a technologist from the Water Conservation Commission. The Bank Engineering Bureau was required to report on the project's progress to the Supervision Division every ten days (*ibid*). If arranged in the farming off-season, construction would take around two months.

Labour for dyke construction was to be offered by the owners of the land that benefitted, and was calculated based on the amount of the land. Except for the cost of stone and brick, the other costs would be shared by the owners of the land that benefitted. Tools such as shovels, dustpans, etc., were provided by the labourers themselves. The labourers were also required to arrange accommodation for themselves (FDWR, 1943, Archives NO.: 28-05-04-053-07).

Budget presented a significant problem for the Lotus Polder project. In 1943, the prices of many items increased, such as for the provisional staff and labour. Since the funding only covered part of the costs of the stone and brick, some material needed to be bought by villagers themselves. These extra costs created a negative attitude among poor villagers towards the Lotus Polder Project. The archives (FDWR, 1943, Archives NO.: 28-05-04-053-07) indicated that the Construction Ministry came to believe that the villagers were short-sighted and lacking in knowledge (*ibid*).

The weather influenced the project's progress. After the project started on 11th March 1943, the area unfortunately experienced rainy weather that made it difficult to drain accumulated water and dig into the earth. Furthermore, a small village population and shortage of able-bodied men in the polder led to slow progress. Some of the villagers had actually gone to other places to make a living. Additionally, the loose earth around the construction led to frequent collapses in rainy weather. Engineers were assigned by the Construction Bureau to carry out an inspection. The engineers hoped that the heads of the town would help the Bank Engineering Bureau to recruit more labourers to tamp earth. However, the Construction Ministry advised that since the construction was just routine maintenance during the farming off-season, only a little extra height and width were necessary and judged tamping to be non-essential. The construction Ministry considered that even though the tamping could quickly achieve solid earth, this required much work; and that if left untamped, the earth would get solid anyway through human and animal's trample and rain penetration over several months (FDWR, 1943, Archives NO.: 28-05-02-011-02).

After 8th April, the weather gradually improved. Good weather should have led to an increase in the number of peasant labourers; however, recruitment progressed slowly as the 'welcome jin party'[3] fell in that period. The Supervision Division therefore concluded that the head of the local area and the director of the local town were not

[3] This was an event for the villagers to pray for happiness. At the party, a statue of the Buddha (also called jin) was carried out from the temple for a parade. Some elderly people were elected to pray for good luck on behalf of the villagers.

taking their duties seriously. As a result, the Supervision Division pressured the Bank Engineering Bureau to recruit more peasant labourers, as scheduled. Moreover, the Supervision Division rebuked engineers from the Construction Bureau for not assisting the project well (by leaving work early, for example). The Supervision Division said even though they had tried their best to move the project forward by themselves, the project had not progressed as planned.

One-month after the beginning of the project, the various parties involved in the project rebuked one other. The Supervision Division belonged to the Water Conservation Commission, provided funds and carried out supervision. As the funds it provided were insufficient, its instructions were not followed well, and all it could do was push the Construction Bureau to recruit labourers quickly. The Construction Bureau was an organisation set up by the local government and gentry together. It organised the labourers to do the construction. As the labourers were themselves required to make up for the shortage of the funds, they were angry with the Supervision Division. However, the Construction Bureau belonged to the Ministry of Construction, which was at the same level as the Water Conservation Commission. Due to some competition between them, the Ministry of Construction and the Water Conservation Commission were sometimes not in harmony. As for the peasants, even though they knew they would benefit from the construction, they still had low enthusiasm, as their poverty made it so that they could not to afford the fee. Compared with the Qing Dynasty, the role of local organisations in the ROC became weaker. Additionally, separation between financial control and management caused the project to progress slowly.

7.4.3 Frequency of issues: steamship and kidnapping

On 24th April, the Shunli Steamship Company located in Wuxi County opened its new navigation channel, through which a steamship would arrive at Jia River, located between Lotus Polder and Majia Polder. Due to the loose soil, the bank was not strong enough to withstand the water waves caused by the steamship. At that time, the polders had just undergone spring maintenance. New earth on the dykes was still loose and

newly applied lime mortar on sluices, water entrances, culverts and docks had not yet hardened. It was recognized that large waves could destroy the whole project and bring collapse to all the dykes of the polders (FDWR, 1943, Archives NO.: 28-05-02-011-02). On 26 April, a meeting of village representatives was held in the ancestral hall to discuss the solution to the steamship's course. Around three hundred were in attendance, and Zhuping Zhang was elected as chairman. The group reached several decisions: a telegram would be sent to the Construction Ministry to ask for help in prohibiting the Shunli Steamship Company from using the waterway, representatives would be assigned to ask the local government to stop the passage of the steamship, and letters would be sent to the steamship company to explain the potential damage. After consulting the officers of the previous Water Conservation Commission, the Construction Ministry sent a letter to the local county government directly asking the government to stop the action of the steamship company (FDWR, 1943, Archives NO.: 28-05-02-011-02). The crisis resulting from the appearance of the steamship indicated that proper communication was lacking amongst the departments of traffic, construction and water conservation. The meeting of local residents and their actions reflected the role of the local organisation to act as a bridge linking different departments and organisations.

The steamship affair revealed the weak coordination within and between departments. Then, a subsequent story of kidnapping indicated that the government was not fulfilling its duty of ensuring local public security seriously during war time. On 10th May, at about 6 pm, five bandits broke into the Bank Engineering Bureau with guns in hand and took Zhuping Zhang, the director of the Bank Engineering Bureau, and four other people away. After being taken to a wheat field, they were interrogated separately. Fenglai Zhou and Shenfu Xu were terrified of being shot. Zhuping Zhang was extorted for a huge sum money. After supplication, they were permitted to go home but were required to provide money before a specific time. Immediately, this event made everybody panicky. In May, armed bandits regularly extorted officials in the Lotus Polder area. Both the head of Xinan Town and the director of Furong Town were

kidnapped. The Construction Ministry asked the Wujin County Government to protect project officials and wanted Jiangsu Province to improve public security (*ibid*).



Fig. 7.5: The scenes of waterfront construction near Shuang Temple, and construction near Jiuqu Bridge in Wujin County (FDWR, 1943, Archives NO.: 28-05-04-053-07)



Fig. 7.6: The scenes of construction on the Shundang Polder waterfront in Wujin County, and construction near Xilan Dock in Wuxi County (FDWR, 1943, Archives NO.: 28-05-04-053-07)

Meanwhile, it was once again a busy time of the farming season, and villagers, hoping to concentrate on farm work, asked the Construction Ministry to postpone the project until the off-season. The Water Conservation Division of the Construction Ministry approved their request. From 30th May to 1st June 1943, interim verification was carried out on the construction. Fig. 7.5 and Fig. 7.6 show some scenes of construction. The construction of sluices, culverts, and dams is shown in Figs. 7.7, 7.8, 7.9, and 7.10. (FDWR, 1943, Archives NO.: 28-05-04-053-07) On 21st June, Tingsong Hu, the head of the measurement team and director of the Supervision Division, returned the certificates issued by the Japanese Embassy and the instruments on the list to the Water Conservation Division of the Ministry of Construction. On 28th June, the Supervision Division of Lotus Polder was dissolved (FDWR, 1943, Archives NO.: 28-05-02-011-02).

In 1943, the Lotus Polder construction was completely under the control of the county governments. Members of the Dykes Committee of Lotus Polder were local gentry. However, they were elected during a convention organised by the government. The Dykes Committee carried out the recruitment. Actually, as the Construction Ministry stated, recruitment was controlled and determined by the county government. Moreover, county government was responsible for the budget, implementation, technical guidance, start, end and verification of the project, and also for rewards and punishments given to labourers. If unexpected events happened—for example, the occurrence of the steamship—the Dykes Committee could ask for help from the government. If the government could not solve the matter, however, the local community was often unprepared to take action as, compared to the Qing Dynasty period (Akira, 2008), they had a far less positive attitude toward the project (Akira, 2008). Archives (FDWR, 1943, Archives NO.: 28-05-02-011-02) indicated that the weakness of the local community mainly stemmed from regular wars, which undermined local organisations. Often these organisations existed in name only and could no longer shoulder important tasks. Compared to the Pond Committee of Anfengtang Pond, the Dykes Committee of Lotus Polder was much weaker. One possible reason was that the Pond Committee of

Anfengtang Pond was under the management of a self-governed regime, while the latter was under the control of a puppet government and consequently did not have a sense of belonging, identification and security.

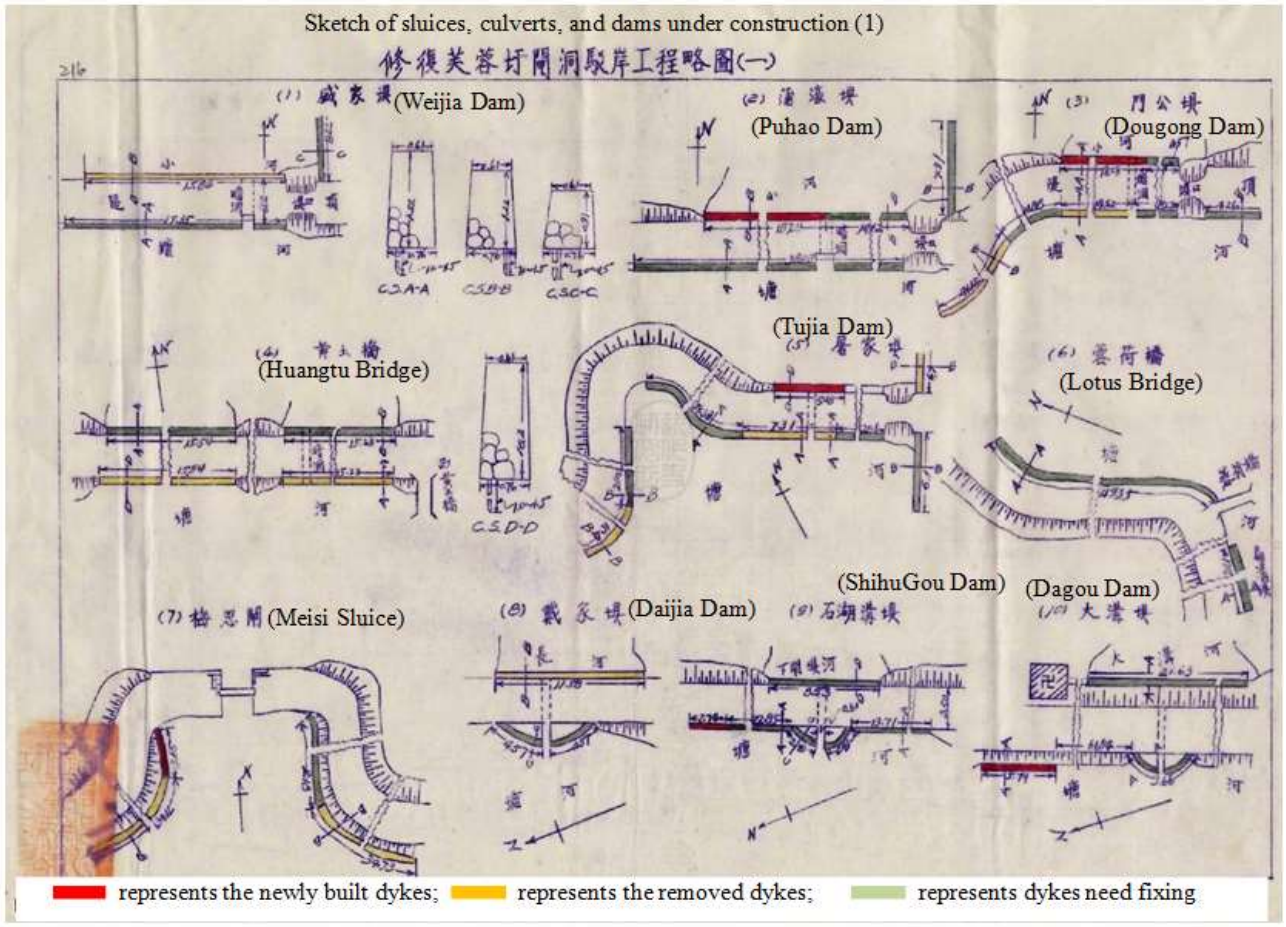


Fig. 7.7: Sketch of sluices, culverts, and dams under construction (1) (FDWR, 1943, Archives NO.: 28-05-04-053-07)

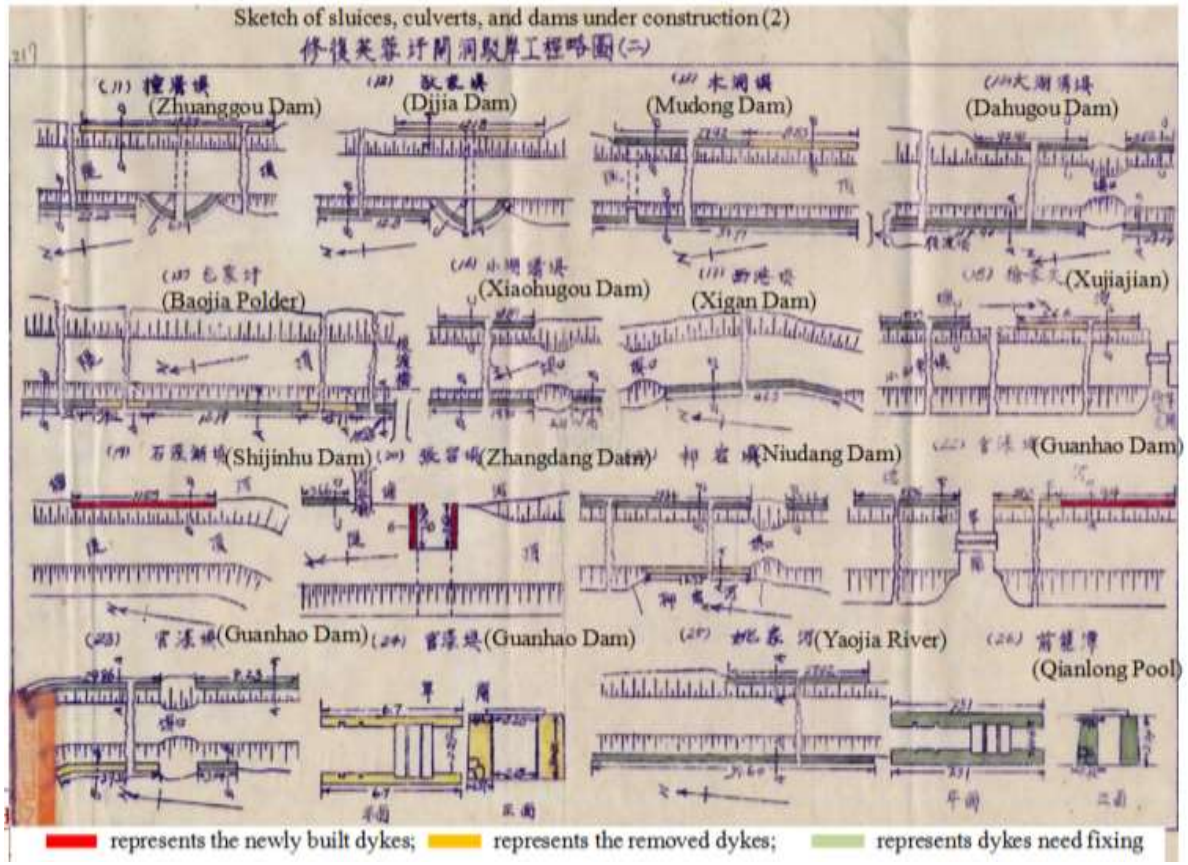


Fig. 7.8: Sketch of sluices, culverts, and dams under construction (2) (FDWR, 1943, Archives NO.: 28-05-04-053-07)

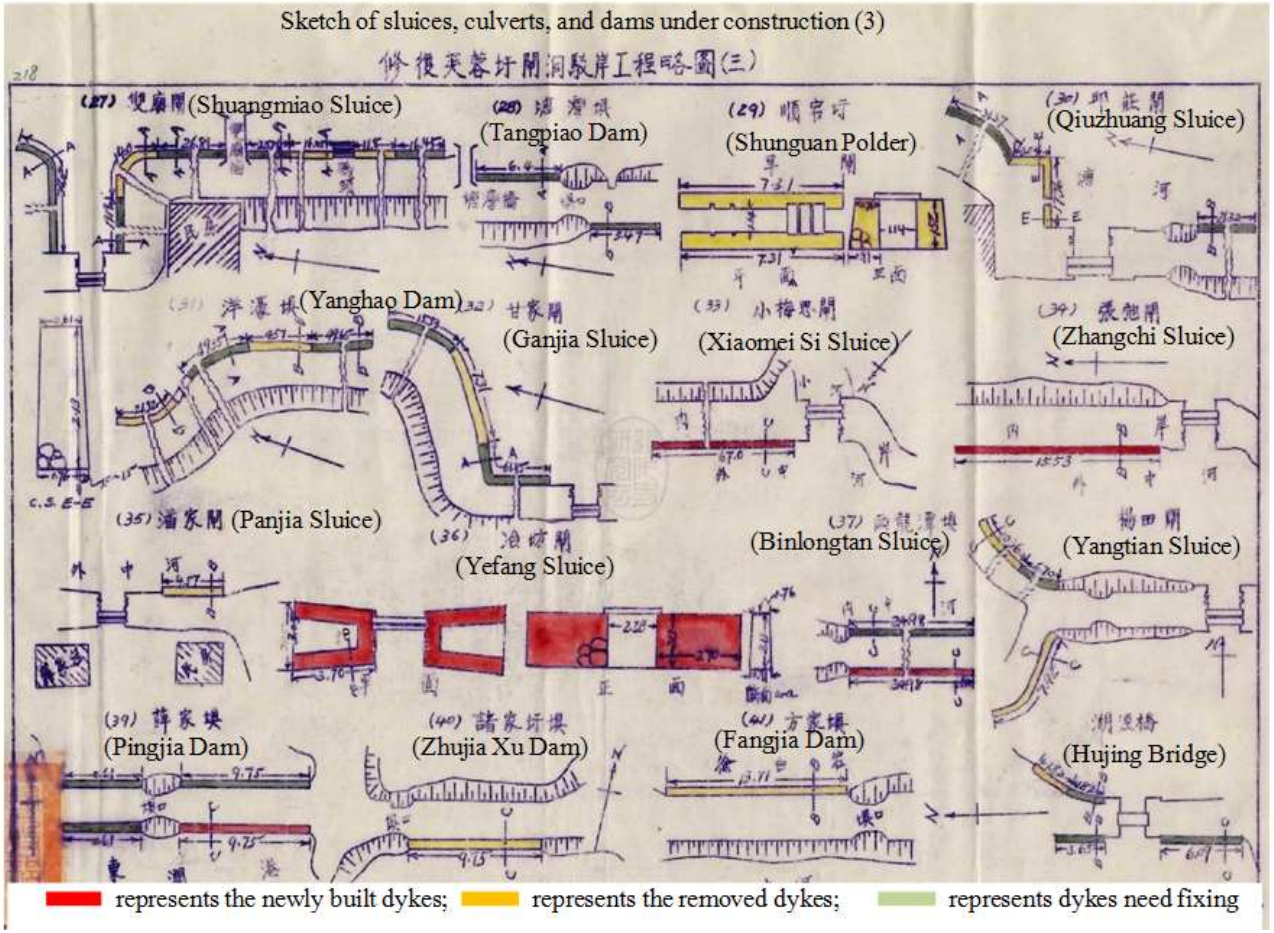


Fig. 7.9: Sketch of sluices, culverts, and dams under construction (3) (FDWR, 1943, Archives NO.: 28-05-04-053-07)

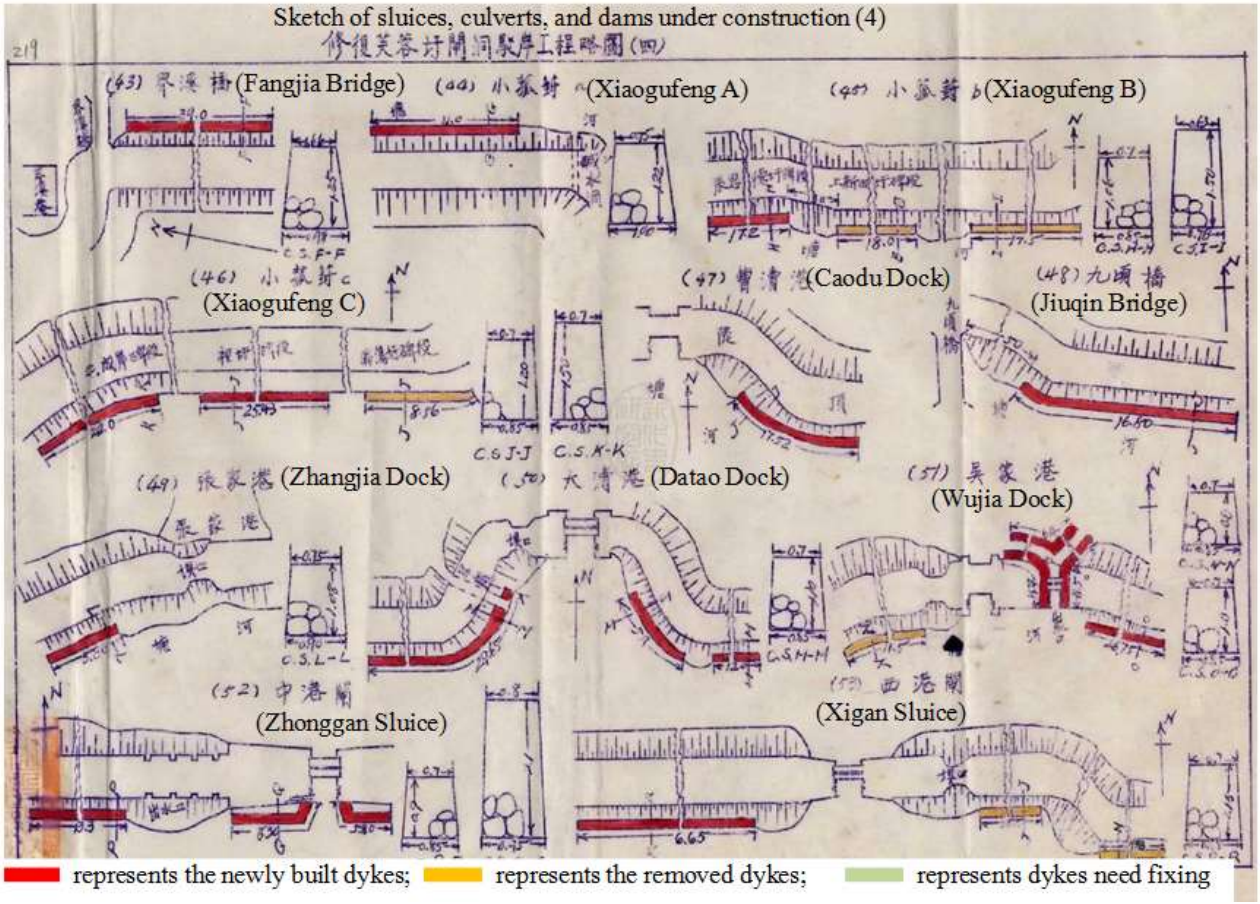


Fig. 7.10: Sketch of sluices, culverts, and dams under construction (4) (FDWR, 1943, Archives NO.: 28-05-04-053-07)

It is noteworthy that when villagers in the Anfengtang Pond area asked to suspend work during the peak farming season, their request was always rejected. With the Lotus Polder project, on the other hand, the government tried its best to meet the requests of local peasants. The spate of kidnappings held up the project, but the real reason for the delay might have been that the puppet government was too weak.When the survey team was requested to gain an approval letter from the Japanese Embassy but were then inspected at the blockade line by Japanese soldiers, the weakness of the puppet government was revealed. This meant the Lotus Polder project would not go smoothly.

7.4.4 Electrical irrigation and drainage

In August 1943, a Production Enhancement Committee was created by the Construction Ministry. It was responsible for improving irrigation facilities, enhancing production capabilities and fixing dykes to hold against flooding. Its main projects were ‘dredging of East Tai Lake,’ ‘drainage of Yinshan Lake,’ ‘construction of the Subei Canal, and ‘installation of water pumps in Lotus Polder.’ (MC, 1943, Archives NO.: 2002-31). Archival sources (MC, 1943, Archives NO.: 2002-31) suggest that using manual irrigation (manual water lifting for example) would have cost much time and achieved little as extra holes would be needed along the polder banks, which would affect the safety of the banks. The use of diesel engines to drain the water - even though there were one hundred sets of motors with between 10 – 12 horsepower - was difficult as the pumps were not under good management, and diesel was insufficient. The survey team had planned to find four or five good locations to install electric water pumps, suggesting that the pumps be run by a governmental organization. They proposed to get electricity from Qieshu Yan Electricity Plant nearby. However, the plan was never put into effect (FDWR, 1943, Archives NO.: 28-05-02-011-02). In October 1943, Lotus Polder suffered flooding and an insect infestation at the same time. The water accumulated in the polder was several meters in depth. All the heads of town and gentry in the Lotus Polder area asked the government to install electrical motors to perform pumping. In the spring of 1944, the head of Jiangsu Province wrote to the Construction Ministry, hoping they would soon provide money and arrange the installation of electrical motors.

By 1931, funded by the Sino-British Boxer Indemnity, electricity-driven irrigation and

drainage was being used in Lotus Polder. At that time, motor-driven irrigation and drainage had an excellent reputation. However, over the 14 years between 1931 and 1944, the technology had not spread due to the regular wars and poor economy, which left central and local governments without the proper funds and materials to support the diffusion of the technology.

7.5. Influence of foreign powers: review of Lotus Polder in the ROC era

This section is focused on the ROC era (1912-1949) and the Wang Jingwei Reign (1940-1945). In the first period, the United of Kingdom took advantage of the *Boxer Indemnity* to introduce their industrial products into China. The second period was controlled by the puppet government. The main motives by both UK and Japan during these times was to develop their own economies through the invasion of China's economy. However, there was a difference between their plans.

The UK provided electrical equipment and auxiliary facilities. Although these were of high quality, the frequently changing regimes were unwilling to pay for the equipment due to its very high price. Under this circumstance, the situation in the Lotus Polder echoes that described by Theodore W. Schultz, winner of the Nobel Economics Prize: namely that when a developed country 'introduces equipment to the developing country, it will bring little influence to them' (1969). In Lotus Polder, a key reason for the limited success of the new technology was that it was not widely adopted and didn't change the means of production. On the one hand, the new irrigation and drainage equipment did have some practical significance and gave local people some understanding of western technology. It also gave them tangible access to things from the outside world that had potential to accelerate the development of the community. On the other hand, it was obvious that the Lotus Lake Community was unprepared for the reforms in mechanization and electrification that occurred during the ROC era. During the Pacific War, Lotus Lake was occupied by the enemy and controlled by the puppet government of Wang Jingwei. Lotus Lake construction activities were therefore not just a domestic or regional affair, but something more closely associated with the international situation. It echoed Worster's (1992) emphasis on the interlinkages between water conservation and international conditions.

Prior to the Pacific War, Japan applied a unified/overall policy regarding agriculture within China, Manchukuo and Japan. As the agricultural environment of central China was similar to that of Japan, production of rice and silk was discouraged in China in order to avoid competition with Japan (Huang, No date). After the Pacific War, particularly in late 1942, Japan changed its policies towards China, as the war had greatly increased Japan's need for food supplies. Japan did not want to manage the economies of the seized areas directly; what it needed was offered by the Wang Regime, which seized property from the Chinese people. Japan also urged enhancement of foodstuffs (ESDSDCG, 1943). In 1943, the Construction & Inspection Commission of Greater East Asia declared that the rice Japan needed should be provided by China and Manchukuo (Anon, 1943, JECC). At the same time, the Wang Regime called on people to increase agricultural production. In 1944, the Wang Regime achieved its maximum wasteland reclamation, 730 acres in total (CCEY, 1944, Archives NO.:2012-416). However, *Shanghai News* published a comment stating that, in summary, the outcomes of the year's agricultural production promotion campaigns were much worse than expected, such as in the production of rice, wheat and cotton (Min, 1944). The main causes for this were a shortage of agricultural labourers（EYWR，1944, Archives NO.: 2002-25), a decrease in high quality land due to military construction (Chun, 1944), low production enthusiasm on the part of peasants (Lin, 1944), and anti-Japanese sentiment (Anon, 1944).

Due to the dearth of archival material for this period, it is hard to determine how much benefit water conservation brought to Lotus Lake. Objectively speaking, it was useful to improve banks and dykes, although Wang Jinwei's Government was clearly interested in Lotus Lake because of the economic benefits water conservation would bring.

7.6 Discussion and conclusion

The condition of the Lotus Polder in the era of the ROC has been investigated in this chapter, helping to close the knowledge gap about this area for this period. The reason for the gap in research on this area at this time is two-fold. As Lotus Polder was an enemy-occupied zone run by the Wang Jingwei regime, few documents are available. Moreover, due to various concerns regarding national sentiment, little research has been

done on this regime, making it difficult to do a proper assessment of the puppet regime. Lotus Polder is located in the Yangtze River Delta, which was the first capitalist economic area in China. Compared to the rest of China, this area had a more developed economy and broader international connections and therefore forms an indispensable aspect of research on water conservation in the ROC era. One feature of the government in that era was its weak control of local communities which meant that it was unable to lead local gentry to invest in or manage the Lotus Polder. As such, the government had to involve itself directly in many affairs of the Lotus Polder.

Lotus Polder was also affected by international circumstances and foreign interference. The Sino-British Boxer Indemnity invested in the electrical irrigation project in Lotus Polder, which helped the UK export its products and industry. In order to overcome the shortage of food during the Pacific War and preserve its strengths in agriculture, Japan advanced a production promotion movement in the enemy-occupied zones. The 'kidnapping event' during the construction of the Lotus Polder revealed the messy situation present during war time while the steamship reflected the penetration of western products into a traditional community. Lotus Polder was unable to prevent the penetration of international factors.

Key differences between Lotus Polder and Anfengtang Pond in the ROC era reflected the greater power of government and local gentry in the latter. Construction and wasteland reclamation there are also reflected the response of government and the local people to international society and events although relatively speaking, foreign powers caused much more impact to the Lotus Polder projects.

Echoing the work of Bell and Roberts (1990) on water resource politics and management in the colonial era and the impacts of western technology, research on Lotus polder illustrates how histories of water conservation provide a good platform for understanding global geopolitics and colonial relations. China was a semi-colony in the ROC era and the Lotus Polder projects described in this chapter reflect wider international relations with Western countries and Japan. Nevertheless, the important roles of local communities and elites in Lotus Polder cannot be ignored as their actions and thoughts at the time were not very different from those in the period of complete independence; possibly due to the fact that the Chinese people were still the direct rulers

at that time.

Chapter 8: Western influence – Investigation of Jinghui Channel in Shaanxi Province during 1932–1948

8.1 Introduction

Jinghui Channel is a well-known water conservation project in northwest China. A number of researchers (Ye, 1991; Cao, 2011) attached great importance to its initial establishment 2,000 years ago, while others (Li, 2004) were committed to exploring its management during the late Qing Dynasty. Meanwhile, Bian (2006) examined issues of water rights there during the period of the ROC. However, few researchers focused on how western equipment influenced people's lives and production during the period of the ROC. Through examining the origin, management and the innovation of Jinghui Channel and relevant industries during that period, this chapter will elaborate on the influence of western science, technology and ideas on Jinghui Channel. At the same time, the co-existence of Chinese traditions will be highlighted drawing on the work of Will and Lamouroux (2010). The main channel of Jinhui Channel was controlled by the government, but smaller structures were managed by the local community. Western technologies were largely employed in the operation management of big projects while those serving everyday water consumption largely followed traditional patterns.

As was the case for the Anfengtang Pond and Lotus Lake projects, the technology and methods of the west and east were combined in Jinghui Channel during the period of the ROC. This combination was widespread and largely of positive significance. As stated in the literature review, the key differences were found in the technology used rather than in structural aspects of Chinese water conservation. The main problem concerning water management in North Anhui Province was the frequent dramatic occurrence of flooding or drought in the Huai basin, creating concern about both irrigation and drainage. In Lotus Polder the key problem was drainage; however, in the north of China, effective irrigation was a bigger priority. As stated in the *Irrigation*

System of Zhengbai Channel in Shaanxi Province in the Late Monarchy by Pierre. Etienne Will (1995), the cost of repairing the Zhengbai Channel in the seventeenth and eighteenth centuries surpassed its potential benefit (Will, 1995). This chapter reveals what the government, technicians, officials and the community did regarding the repair of the Zhengbai Channel in the twentieth century.

For the study of Jinghui Channel, some national history sources (Sima, no date and Ban, 1962), local chronicles, project reports and archives are used. Project reports were written by provincial and national engineers. These reports have been accepted widely by scholars (see, for example Bian, 2006). Additionally, research for this chapter draws on archives from the Institute of Modern History and Academia Sinica plus survey reports written by teachers who were organised by the government (Kang, 2011).

8.2 Brief history (246BC–1932) of Jinghui Channel

This section provides a brief history of the Jinghui Channel beginning with the activity of introducing water from the Jing River for irrigation in the Warring States period (403BC–201BC). In 246BC, State Qin assigned Zheng Guo, a hydrologic engineer, to dig Jing River, which started at the Gukou entrance, merged with the Ye River, the Qing River and the Ju River, and then entered the Luo River. It was also called Zheng Guo Channel. Historically, the river gained a great reputation: 'irrigation of 45,000 hectares had been achieved by Zheng Guo Channel; no famine happened from drought again after its construction' (Sima, no date). In 97AD, a chancellor called Mr. Bai was appointed to reconstruct Zheng Guo Channel, as parts of the dykes and dam had been damaged, resulting in major leakages. He extended the channel entrance 100km east, and made a channel to pass through Yueyang and merge with the Wei River. After that time, the Jing River was called Zheng-Bai Channel (Ban, 1962). From the Han Dynasty to the Ming Dynasty, the channel entrance was moved several times due to damage to the dykes. The movement of the channel entrance enabled it to obtain more

spring water from the mountains; hence its upper reach experienced several changes of name—for example, Fengli Channel in the Song Dynasty, Envoy Wang Channel in the Yuan Dynasty, and Guanghui Channel and Tongji Channel in the Ming Dynasty. However, the lower reach changed little. In the Qing Dynasty, the channel experienced damage to dykes a number of times. Then, in 1737, a dam was constructed on the Jing River, near the entrance of the Dalong Mountain. At that time, the main source for the channel was spring water from mountains and the capacity of the channel was 700 hectares. Extra silting and poor maintenance in the Qing Dynasty brought capacity down to around 200 hectares (Hu, 2007).

In 1912, Xiren Guo[1], who was appointed as director of the Water Conservation Bureau in 1917, met Yizhi Li in his travels across Europe. Yizhi Li worked in the hydrological engineering college of Nanjing after he finished his studies in Germany. Li talked with Guo about the good policies and facilities of water conservation in Germany and the Netherlands and they also discussed the recovery of China's water conservation (Liu, 1989). In 1920, the area to the north of the Wei River experienced severe drought. Local gentry proposed reconstruction of the Jing River. In 1922, Yizhi Li was appointed as the head of the Hydrology Bureau of Shaanxi Province. He organised the inspection team to survey the terrain of several counties, and planned to borrow money to introduce water from the Jing River to the counties to the north of the Wei River. The instruments and labour expenses in the survey were funded (15,000 Yuan) by the China International Famine Relief Commission (CIFRC), which was established in 1921. The mission of the CIFRC was to help China's government and associations to conduct relief. However, the water introduction project failed due to the wars (CIFRC, 1923).

The North Wei River plain frequently experienced serious drought from 1928 to 1929.

[1]Xiren Guo (1881～1923), born in Lintong, Shaanxi Province. He joined the organization of Xi'an Uprising on 22 October 1911. In Autumn 1917, he was appointed as director of the Water Conservation Branch Bureau of Shaanxi Province. In 1918, he was appointed as the director of the Provincial Education Bureau. In 1920, he resigned as director of the Water Conservation Branch Bureau.

In 1930, Shaanxi Province suffered the most serious famine (Anon 1929). Most people left home, villages were left desolated, and theft and banditry were regular occurrences. Yizhi Li was then appointed head of the Construction Bureau. He started relief according to the plan made in 1922, and discussed it with the CIFRC. From July to August 1930, some people, including an American called Peike, were assigned by the CIFRC to carry out an inspection in Jinyang and Shanyuan counties of Shaanxi Province. They called in technical experts from China and the USA to prepare together a plan for the construction. It was agreed that the CIFRC would take charge of the water introduction project in the upper reach and the Shaanxi Province government would oversee construction of the water delivery project in the lower reach (Yang, 2003). The start of the Jinghui Channel was designed in the upper reaches of the Guanghui Channel (Kang, 2011).

Water from the Jing River was introduced through Fen County. Figures 8.1 (Anon, 1947) and 8.2 (MBSP, 1947) show the upper reach of the Jinghui Channel. A cement dam was built over the Jing River. A big culvert was dug in the mountainside to connect the Ming Channel. At the entrance of the culvert, a main sluice was built. An affiliated culvert was built as a spare. The old channel would be broadened. Modifications were needed to remove the sharp bend of the river course. (Anon, 1947).

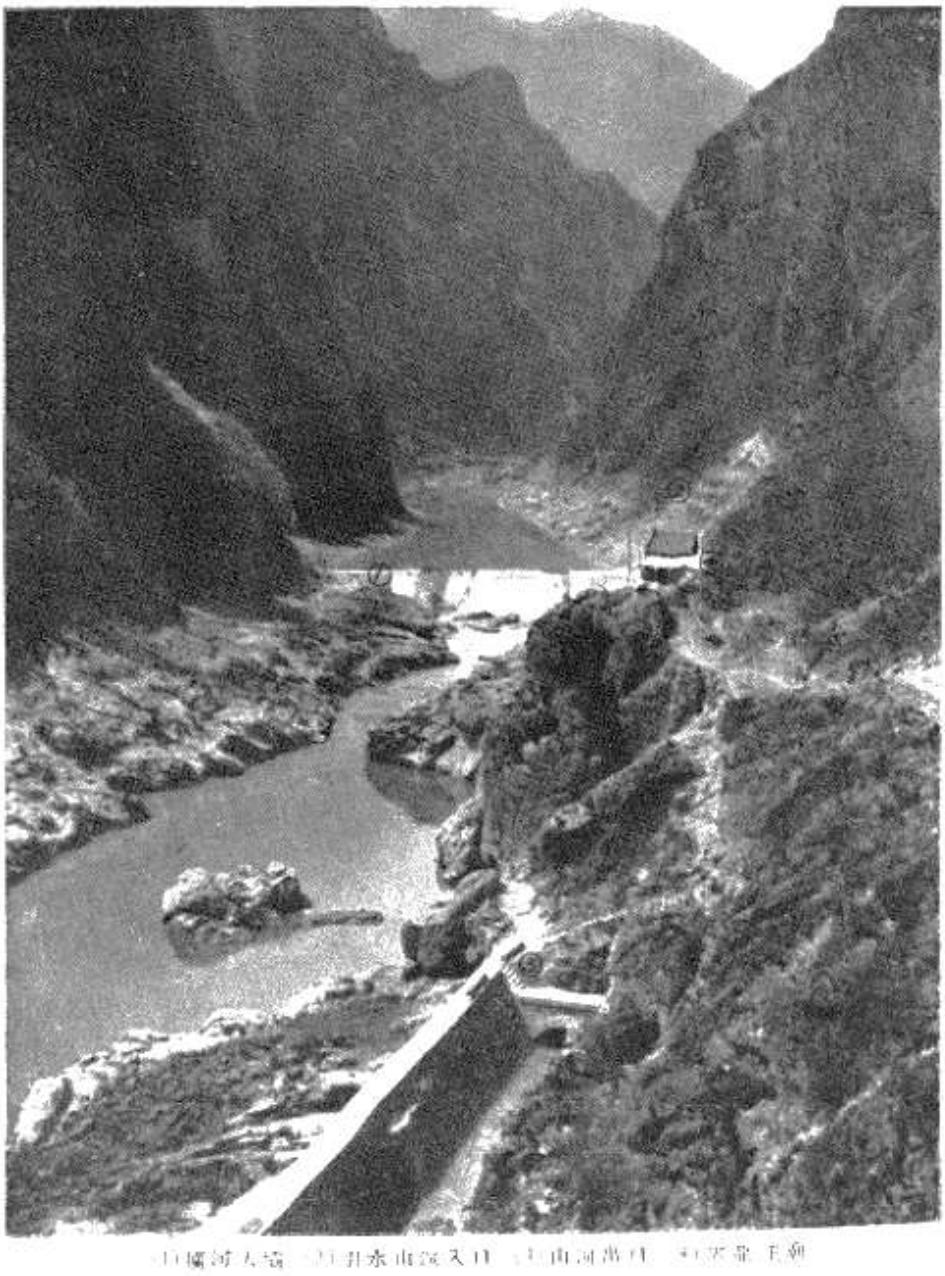


Fig. 8.1: The site of the water-introduction project in the upper reach (Anon, 1947)

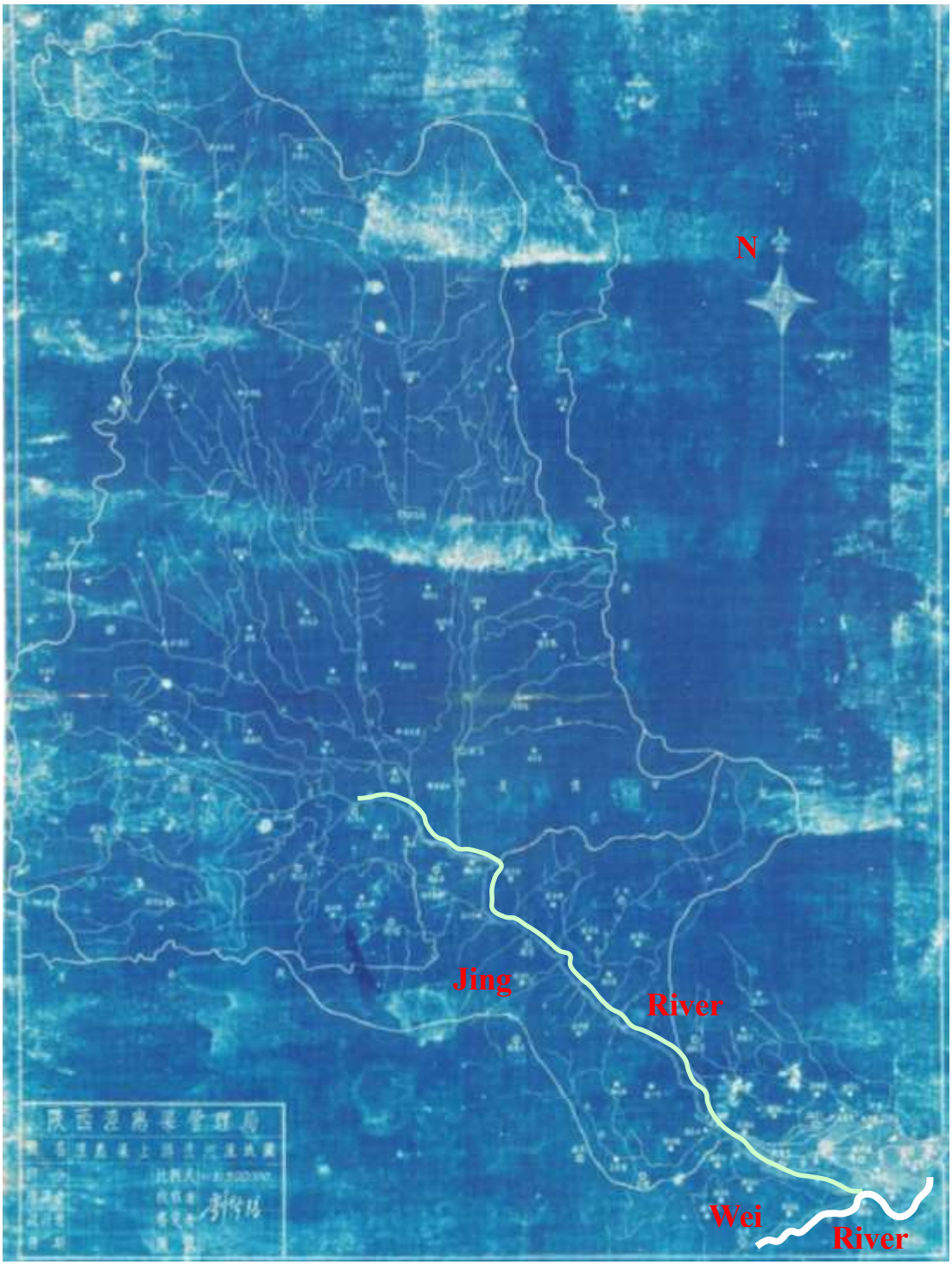


Fig. 8.2: Jing River basin, the upper reach of Jinghui Channel (MBSP, 1947)

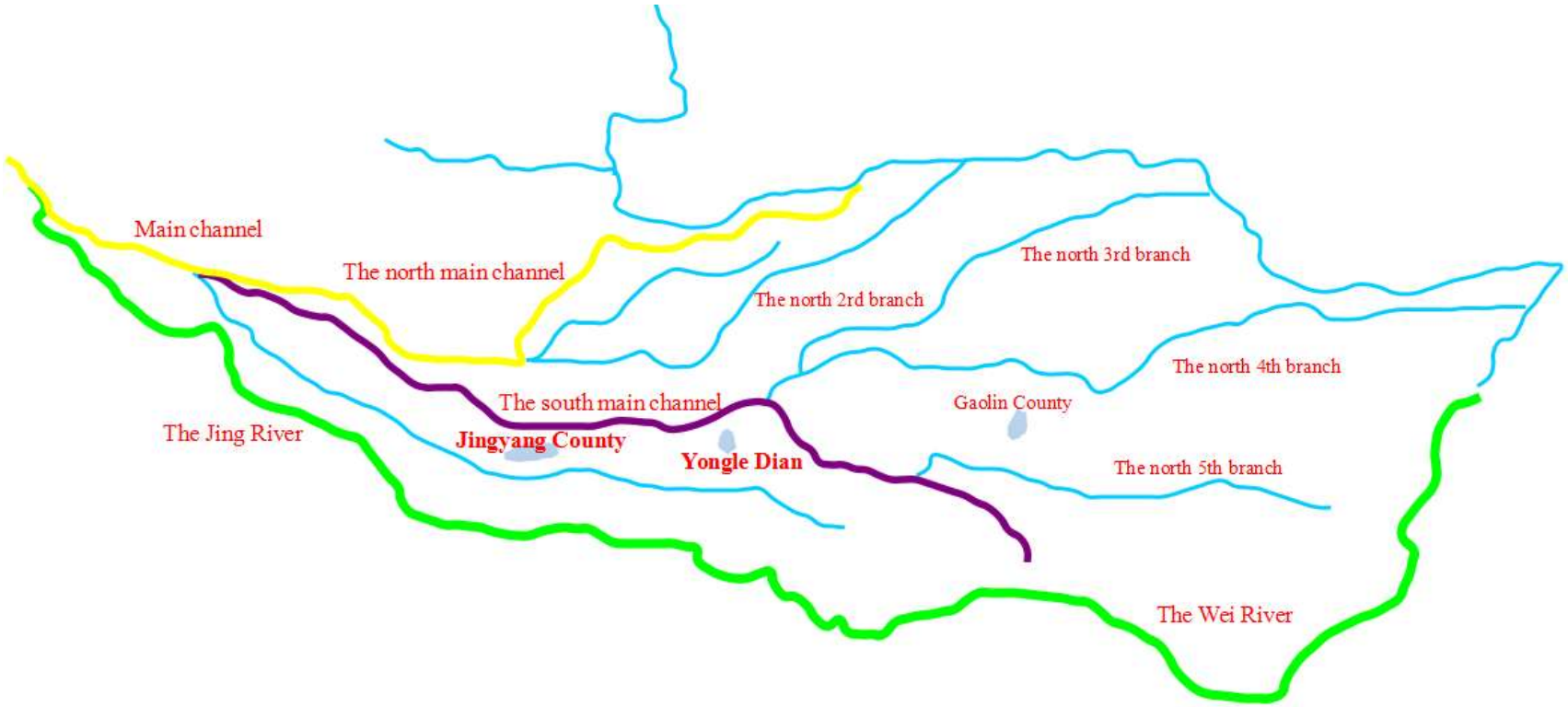


Fig. 8.3: Sketch of the irrigation system of Jinghui Channel (MBSP, 1947)

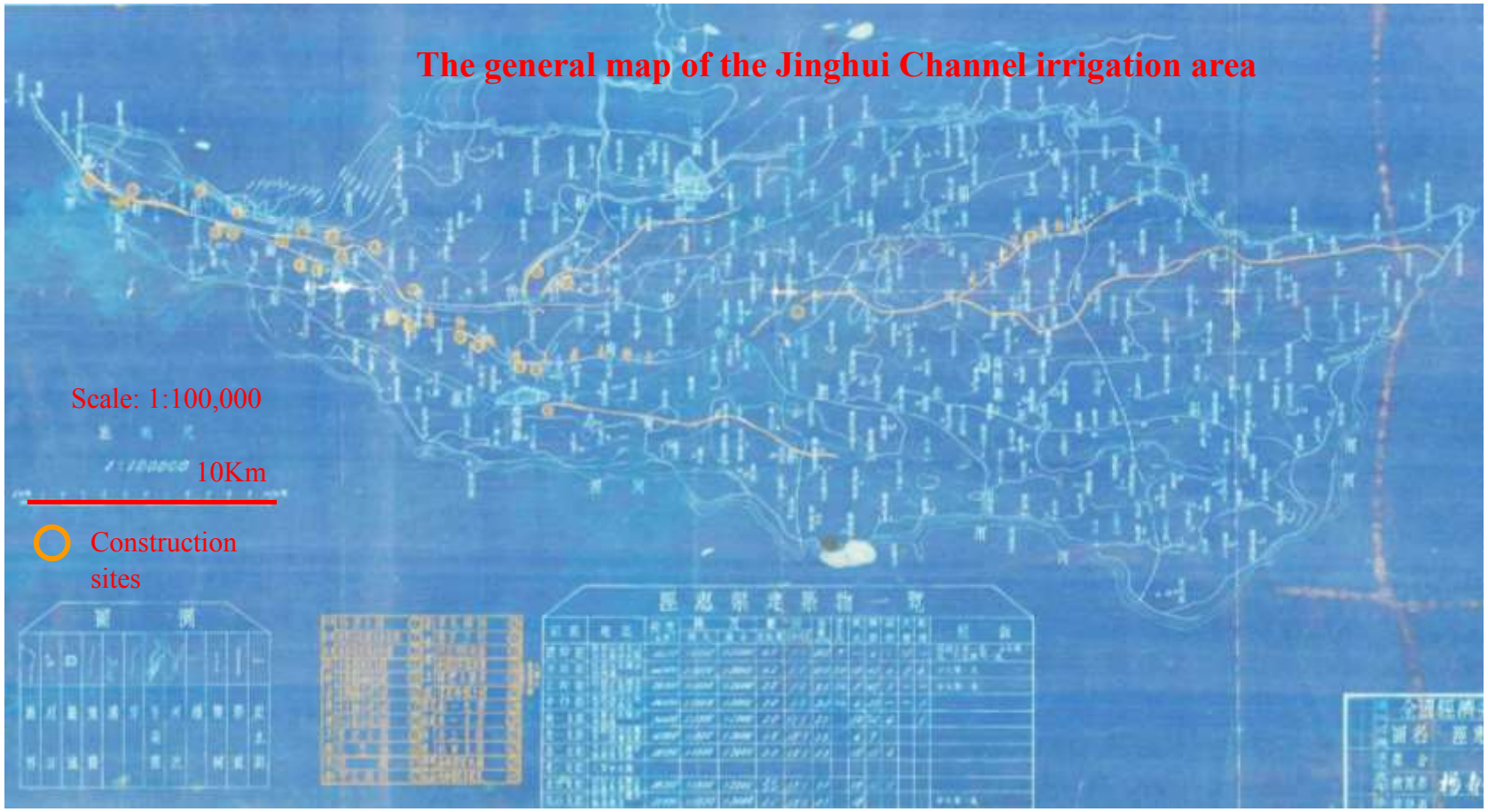


Fig. 8.4: Construction sites of the Jinghui Channel Project (MBSP, 1947)

Analysis of the archival data (MBSP, 1947) revealed that the irrigation area of Jinghui Channel was narrow and long in the west. There was a highland adjoining the north end of the irrigation area. The south end of the irrigation area linked with the Jing River. It was sixty kilometres in length from the east to the west end; the middle part was twenty kilometres in width. Terrain in the north part was 75 metres higher than that of the south part. There were three key branch channels linked with the main channel. The North Channel and its tributaries were responsible for the irrigation of the north part, which was high in altitude. The south channel and its relevant tributaries provided water for the east flat area. The Jing River was another main water source for the west area. The irrigation area (shown in Fig. 8.3) covered the land in Liquan, Jingyang, Shanyuan, Gaolin and Lintong counties (MBSP, 1947) and was 124,711 acres in size. The relevant construction of the above irrigation system was called the water delivery project (Anon, 1947). Construction sites of the above projects are shown in Fig. 8.4. Several landscapes of Jinghui Channel are shown in Figs 8.5–8.9.

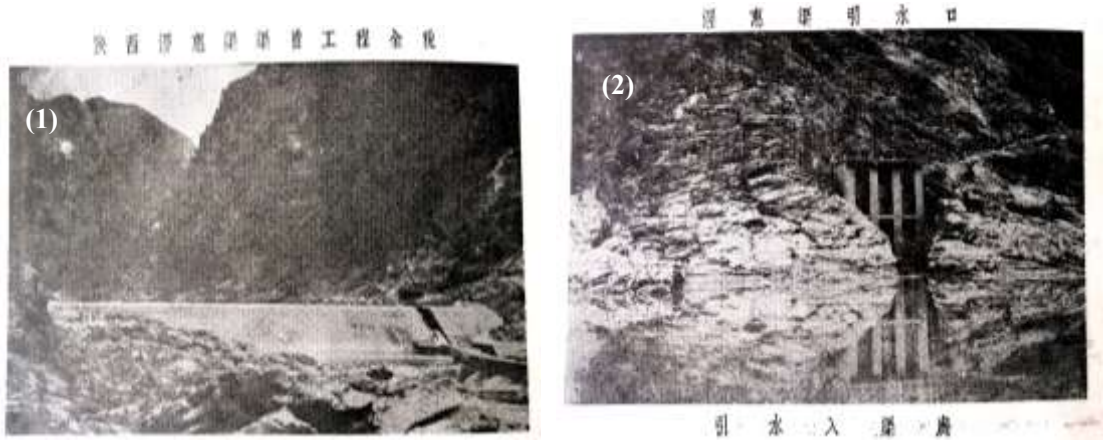


Fig. 8.5: The upper terminal (1); and an entrance of the Jinghui Channel Project (2) (Anon, 1947)



Fig. 8.6: A gate on a tributary of the Jinghui Channel (Anon, 1947)

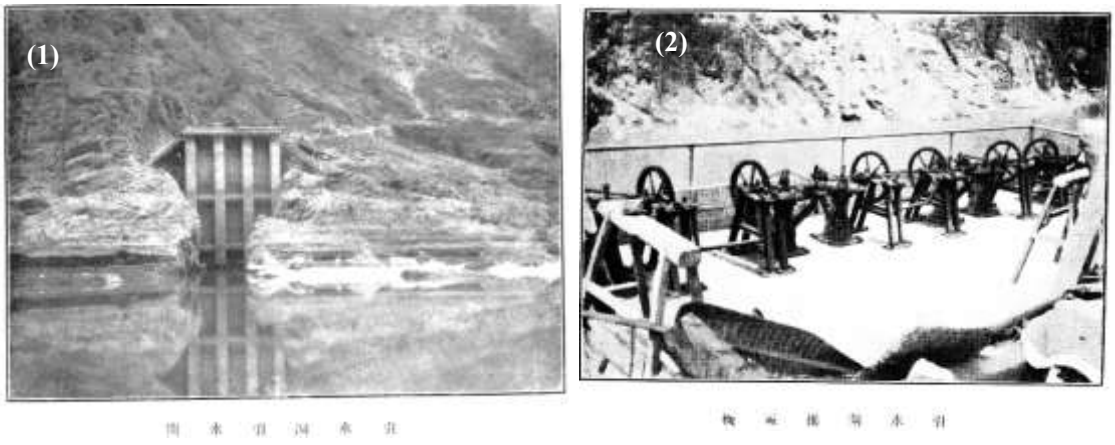


Fig. 8.7: A sluice on a culvert of the Jinghui Channel Project (1); and an operating machine of the water introduction sluice (2) (*ibid*)

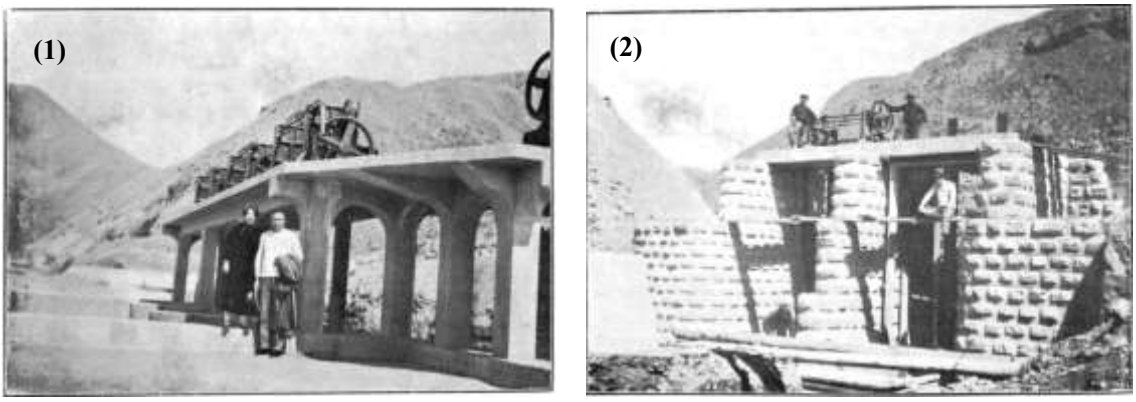


Fig. 8.8: The sluices near Longwang Temple (1); and the sluices on Zhaojia Bridge (2) (Anon, 1947)

Anon (1932) indicated the start of the projects had been scheduled prior to autumn 1930. Due to the political change in Shaanxi Province, the start date was postponed to October 1930. In October 1930, workers were arranged to cut the bow of the river in its upper reach and straighten it. The winter was so severe that the work went slowly due to the soil being frozen. In May, the number of labourers decreased dramatically due to the busy farming season. In August, workers gradually began to come back. After a short period, most of the workers returned home again for the autumn harvest and farming (Anon, 1932). Echoing the situation in the Anfengtang Pond area, it is clear from the number of labourers on the projects that their progress had close links with the farming season. In the spring of 1932, the Channel pivotal project was completed—the key main channel, the south, the north and the third main channel. On 6th April 1932, a ceremony was held to commemorate the start of irrigation, and the water conservation there was named Jinghui Channel by the provincial Government (Ye, 1991). Construction in the lower reach also began. The Water Conservation Construction Division Shaanxi Province organised villagers to dig sub-branches for irrigation. Even the sub-branch routes were designed and assigned by engineers but many peasants were worried that water would be blocked off in the upper area and

refused to dig sub-branches until they saw that the water had been delivered to neighbouring villages and was nearly available for their irrigation. Some peasants dug branches of their own, thereby breaking the channel network designed by engineers and interfering with the project by prioritising their own interests. Such cases normally occurred in the lower reach due to the shortage of water in the northwest. Additionally, many peasants had gone to other places to live because of the severe drought. Even when they came back home to plant wheat, they left again soon afterwards, with the intention of returning the next summer for the wheat harvest. This shortage of labour caused the project to progress slowly (JCMB, 1934).

Anon (1932) indicated that at the beginning of the project, in October 1930, only a small amount of the land was cultivated, most houses were empty and cattle were seldom seen. However, in May 1932, there were many lands under cultivation, livestock could be seen everywhere and incidences of theft decreased dramatically (Anon, 1932). This suggests that the construction of the Jinghui Channel changed the production and lives of the local community dramatically.



Fig. 8.9: Scene of farm land in irrigation area of Jinghui Channel (Anon, 1947)

8.3 Case study in Yongle Dian Town: brief investigation into agriculture in Jinghui irrigation area

Haifeng Li, a Christian who bought 494 acres of land at a very low price, established the Northwest Agriculture and Industry Improvement Association (NAIIA) with ten other Christians in 1932 when Jinghui Channel started irrigation. Together with the College of Agriculture, University of Nanking, the NAIIA set up the Huayuan Industrial Survey Association, which organised surveys in Shaanxi Province in August 1932 (HISA, 1934). The following is an investigation of the survey in Yongle Dian and related circumstances of the Jinghui Channel irrigation area in 1932 based on reports by Huanyuan Industrial Survey Association (HISA, 1933; HISA, 1934).



Fig. 8.10: Peasants in Yongle Dian town (HISA, 1933)

Land held by the NAIIA was distributed between Tongyuan Town in Gaolin County and Yongle Dian Town in Jingyang County. The land was around ten kilometres from east to west, and five kilometres from south to north. Most of it was still cultivated by the previous owner. The rent of the land was around ten percent of the harvest. Due to the consecutive famines, most cultivators could not pay the rent. The NAIIA planned to take back all its land, reorganise it and then rent the land to agricultural labourers. The NAIIA would also lend money to them (HISA, 1933).

Yongle Dian town was located in Jingyang county and was ten kilometres east of the centre of Jingyang county. It was ten kilometres south of Shanyuan county and fifteen kilometres west of Gaolin county (shown in Fig. 8.3). Areas around Yongle Dian town were flat. Most land was formed from alluvial deposits and did not have deep or narrow trenches or terraces. The main soil was loess with a little humus, which had medium fertility and was not very permeable. There were few ponds or trenches, and most of the land was dry, with the groundwater lying quite deep underground. In the north of Yongle Dian town, it was up to thirty metres deep. It was difficult to drill wells for irrigation. Only in areas near rivers were there some wells and irrigation. It was felt that if irrigation could be made available for areas far away from the rivers, agricultural production would increase dramatically (HISA, 1933).

In Gaolin, there was a Roman Catholic Church where an aerograph had been set up for over ten years to record the weather (HISA, 1933). According to the records of the Construction Bureau, Shaanxi Province, average precipitation for every six years was around 413.33mm. The weather in that area was dry and suffered drought frequently. In terms of the geographical and weather conditions, the critical issue for agriculture in Yongle Dian was irrigation (*ibid*). Furthermore, the condition of the irrigation of that area was representative of the Jinghui Channel area more generally.

One benefit of the irrigation was the old channels. There were strict regulations regarding irrigation due to limited quantities of available water. Prestigious elders were assigned to manage the irrigation. A special committee called the Intermediation

Commission was set up to resolve disputes. The allocation of the water use was according to the heads of the family. However, the record of the heads of the families had not been updated for many years. Due to births and deaths, there were big differences in the water usage of families. Some land was irrigated once a month, some once every few months, some only once a year. Additionally, there was an inscription on a stele to show the open time of each channel. Time was calculated through burning incense (HISA, 1933). When time was up, the sluice had to be closed.

The second way was to use water from wells for irrigation, which was popular in the southern area of Yongle Dian town. Groundwater in the southern part of the town was shallow, which was a different situation from that of the north area. Human power or livestock could be used to draw water from wells. A winch, as shown in Fig. 8.11 and 8.12, was widely used to lift water from wells. In this way, one person could irrigate land of 0.165 acres per day. In this way, land of 1–1.2 acres could be irrigated per day. Generally, each well could supply water for 2.47 acres. Due to the limited capacity, water from wells was used for the irrigation of economic crops—for example, vegetable, fruits or flowers (HISA, 1933).



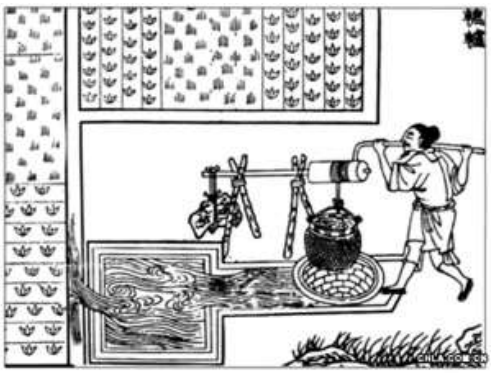


Fig. 8.11: A winch used to lift water from wells[2] Fig. 8.12: Drawing of a winch[3]

[2]http://www.ycwb.com/ePaper/ycwb/html/2009-05/31/content_510486.htm .
[3]http://elib.lib.tsinghua.edu.cn/techlibrary/image/imageware/more/agriculture/29.jpg

Irrigation by well was inefficient and not all places were suitable for digging wells, so the introduction of water from the Jing River for irrigation was considered the right method. Construction of Jinghui Channel started in the winter of 1930. The first phase of the project ended in May 1932, when the main channels could be used to deliver water. In August 1932, a third of the land area could receive irrigation. It was reported by the inspection that after the construction of branches, nearly all the land (494.2 acres) of the CIFRC could be irrigated (HISA, 1933).

The investigators from Huayuan Industrial Survey Association not only examined the weather, geographical conditions, irrigation methods and policies; it was also found there were three kinds of crop in that area: winter crops, spring crops and summer crops. In order to find an effective irrigation policy, they examined the water demand and proper irrigation time of different crops, as shown in the Tables 8.1 and 8.2.

Table 8.1: Water demand and proper irrigation time for various crops (HISA, 1933)

	Winter crops	Spring crops	Summer crops.
	wheat, beans	cotton, hemp	sorghum, corn, rape
Planting time	September	April	July
Harvest time	April	July	September

Table 8.2: Water demand of crops in north area to Wei River (HISA, 1933)

	Wheat	Corn	Millet
Water demand in depth (m)	0.5	0.67	0.37

On 20th April 1933, the Cotton Production and Marketing Cooperative was set up by the Construction Bureau, the NAIIA and the University of Nanking together, and located in Yongle Dian in the Jinghui Channel irrigation area. The main task of the cooperative was to improve varieties of cotton and promote the cooperative market (HISA 1934).

The Yongle Dian land belonged to Christians, who were possibly influenced by western thoughts. Among all western ideas, science was the most acceptable one for the Chinese at that time. Both the examination of the irrigation system and the use of new seeds indicated that the owners of the Yongle Dian tried to manage land and agriculture with scientific methods.

In conclusion, Yongle Dian town represents a microcosm of the Jinghui Channel irrigation area, although it had its own unique features. The land there was owned by a Christian organisation, the China International Famine Relief Commission (CIFRC). All the peasants there rented land to cultivate. Researchers from the University of Nanking had investigated the area using methodologies of meteorology, geology and geography. They tried to improve irrigation and introduce new technology into agricultural practices. The first reason to choose Yongle Dian as a case study here was its representativeness: Yongle Dian was a town comprising several villages in the Jinghui Channel area. Analysis of the report by HISA (1933) revealed that in August 1933, the villages there were relatively close and were representative of the larger area. The main documentary source for most previous studies was local chronicles. Even though these are often vivid in detail, they are not always precise. Furthermore, local chronicles normally covered a county at least, and sometimes even covered a whole province, so they often did not have detailed descriptions of specific villages in the Jinghui Channel area. The survey and inspection by the University of Nanking, on the other hand, was an academic endeavour, and therefore more reliable (Zheng, 2001). Additionally, water use policy in the Jinghui Channel area was a hot topic for research. In general, researchers have focused on the details of the policies and the several

disputes regarding water use. Even though water ownership could be ascertained from their discussion, little investigation has been carried out into daily agricultural irrigation. Yongle Dian was a typical area where central government, local government, scientists, technical officials, local gentry and Christians came together to carry out improvements in agricultural policies and techniques. Such cooperation was another aspect of its representativeness. The model of Yongle Dian meant water conservation and agriculture in China had started a new era—i.e. through the action of various powers, they needed new modes of production and life, like the change of Lotus Polder discussed in the previous chapter. Such changes happened across the whole country, both in attitudes or practice. Echoing the work of Coats (2013) on drinking water, agricultural irrigation and management, and the relationships between humans, rivers, nature, and society, research on Yongle Dian in Jinghui Channel area illustrates how histories of water conservation provide a good platform for understanding human impact on agricultural irrigation and vice versa.

8.4 Management and maintenance during 1932–1947

Yongle Dian town represents a microcosm of the Jinghui Channel irrigation area in 1932. The completion of the first-phase project of Jinghui Channel in 1932 created potential to provide irrigation for over 16,474 acres of land. However, when the second-phase project regarding the construction of branches started, difficulty with financing meant that the project was in trouble. In 1933, the CIFRC obtained 89,305.42 Yuan through fundraising to support a relief work project for construction of branches on Jinghui Channel. The construction team, organised by the CIFRC, arrived in Shaanxi Province in April. However, the project experienced a short delay as an American engineer and a Chinese one were kidnapped, but the project continued after their successful rescue (CIFRC, 2009). All construction of branches in the lower reach was completed by the end of 1934, and the irrigation area was extended to cover Liquan, Jingyang, Shanyuan, Gaolin and Lintong counties. In the same year, the Management Bureau of Jinghui Canal was established in Jingyang county. Nine

representative offices were set up in the irrigation area to help with management (Anon, 1947).

At the initial location of Jinghui Channel, the Zhangjiashan Representative Office set and controlled the main sluice and was responsible for hydrographic surveys. All the other representative offices controlled sluices (shown in Fig. 8.13) of branches and managed irrigation and related activities. Each branch had several sections. For every section, there was a prestigious elder who managed gates of the branch. Normally, several villages shared one gate. Each village had a channel representative, who was elected by villagers and was responsible for the allocation of water. Furthermore, he was managed by the Management Bureau of Jinghui Channel, and helped to resolve disputes regarding water use. In total, there were 35 official staff, ten surveyors, 67 prestigious elders and 1,800 channel representatives in the Jinghui Channel irrigation area. Most people observed the regulations, with the exception that some people built gates without permits. Normally, those people were punished by having to provide brick, lime and labour for maintenance of sluices or bridges (Anon, 1947).

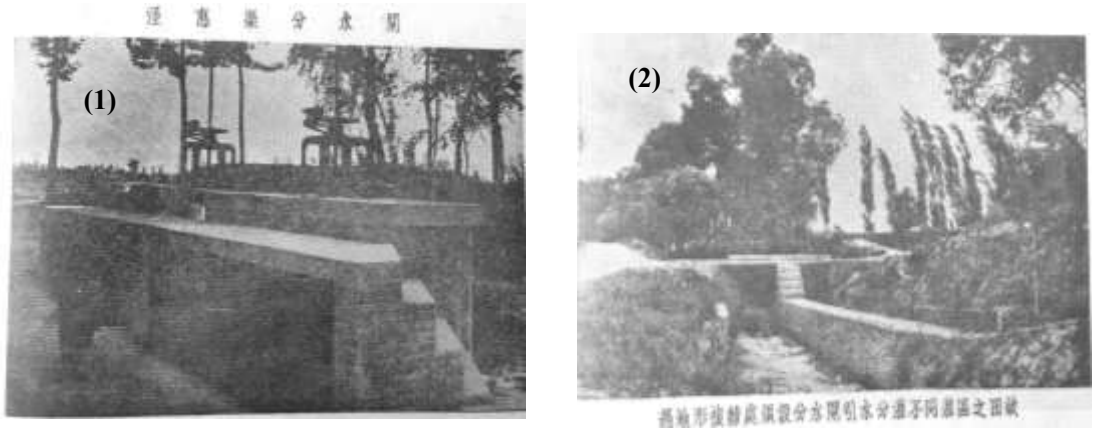


Fig. 8.13： A sluice to divide water (1) and a sluice applied in complex terrain (2) to divide water (Anon, 1947)

Conditions surrounding farming seasons and the Jing River needed to be considered. Normally, the period between April and May was the proper time to plant cotton. However, there was always a shortage of water in that period. Regarding this issue, peasants in the lower reach area were instructed to carry out irrigation in March when the available water was plentiful, and irrigation in the upper reach area was carried out in April. The period between 15th June and 15th September was normally the flood season. In that period, the Jing River frequently experienced flooding and the sand content of the water was up to fifty percent. It was known that when sand content was over fifteen percent, a channel had a high probability of being silted up, so, if sand content was high, irrigation was suspended. In terms of the suspension time, the irrigation period might be extended. The period from December to January was the time to irrigate wheat seedlings, but the cold weather at that time might freeze the water, so workers were organised to break the ice in the channel. If temperatures went down dramatically, sluices were closed (Anon, 1947).

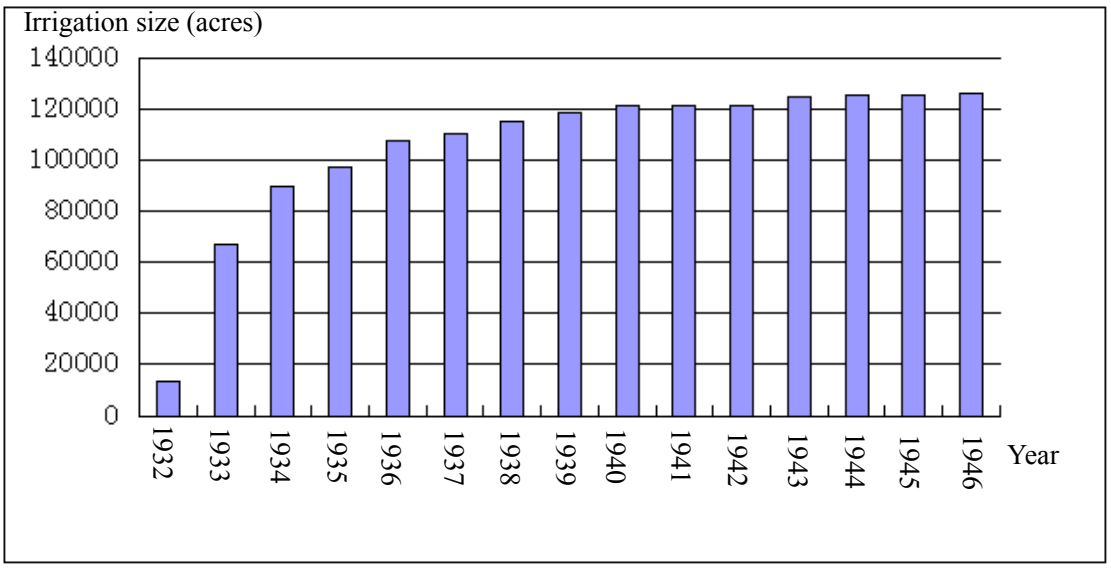


Fig. 8.14: The irrigation size of Jinghui Channel 1932–1946 (Anon, 1947)

The irrigation size of Jinghui Channel from 1932 to 1946 can be seen in Fig. 8.14.

The cost of irrigation was charged annually according to land size. Initially, the owner of the land was charged three Yuan per acre. After 1934, the irrigation price was divided into three levels according to the amount of water the land received: the greater the amount of water, the higher the fee, as shown in Table 8.3. (Because of depreciation in currency, big differences exist within the prices for different years.)

The total length of the main channel and branches was around 125km. Daily maintenance was necessary. Fences were used to protect the bank in places (Anon, 1947). In order to protect other banks, afforestation was encouraged. Regulations for plantations in the Jinghui Channel area were established in 1933. Poplars or willow were popular along sub-branches. Until the end of 1947, there were 200,000 willow trees in the Jinghui Channel area. The trees not only protected the banks, but were also a good source of side-line income for agriculture (Anon, 1947).

Table 8.3: The prices of irrigation of land at different levels in various years (Anon, 1947)

		Price of Level 1 （Yuan/Acre）	Price of Level 2 （Yuan/Acre）	Price of Level 3 （Yuan/Acre）
1934-1939		3	1.8	0.6
1940		6	3	1.2
1941		15	9	3
1942		30	18	6
1943		270	180	90
1944		810	540	240
1945	Cotton land	2,160	1,500	540
	Wheat land	1,656	1,080	540
1946		21,000	12,600	4,200

Maintenance was essential to any building. When construction of Jinghui Channel started, it happened to be a famine year. It was difficult to obtain materials. Concrete was only used in parts of the construction in the upper reach and culverts were constructed using bricks from deserted temples. Therefore, annual maintenance was necessary. In order to improve irrigation efficiency, after 1935, when the main channel and branches had been completed, over 200 gates were repaired every year. In 1947, over 2,300 gates had been repaired. Besides the usual maintenance, annual key maintenance—such as improvement of sluices and courses, etc. of Jinghui Channel—was also carried out. (Anon, 1947).

The Management Bureau of Jinghui Channel was a unit on behalf of the government and responsible for the organisation of big projects. However, local non-government entities carried out daily management and maintenance, together with the Management Bureau of Jinghui Channel. This demonstrated that construction of a big water conservation project could not run smoothly without financial support from the government, and that operation of a big water conservation project could not carry on without the assistance of local residents. Taking advantage of all forces was a key to Chinese big water conservancies which had worked for thousands of years. Echoing Marks' argument about the important role played by government in water conservation (2006) and Hurley's (1995) emphasis on different environmental attitudes by people from various classes, research on management and maintenance of Jinghui Channel illustrates how histories of water conservation provide a good platform for understanding social structure and relationships between governments, resources, and various classes.

8.5 Agricultural experiments and small-scale industry from 1937 to 1949

Jinghui Channel projects improved irrigation conditions and were helpful to the improvement of agriculture there. Anon (1947) revealed that there were several

noteworthy experiments in the Jinghui Channel area. After irrigation work started on the channel, several agricultural demonstration farms were set up one after the other—for example, Gate Entrance Farm, Northwest Farming Proving Ground, Jingyang Farm, Northwest Agricultural Engineering Improvement Farm, Gaolin Crops Breeding Farm and Wang Village Cotton Improvement Farm.

Additionally, many efforts were made in irrigation experiments to find proper irrigation amounts and timing. The experiments started in June 1937 and were carried out on cotton and wheat crops. Land was divided into many sections which were irrigated with different water amounts at various times. The results of these experiments showed that the most economical water amount was ten centimetres in depth each time. From sowing to harvest, it was best to irrigate wheat three times: during the sowing period (normally in September), in the dormancy period (December) and in the growth period (March–April). As far as cotton was concerned, the main irrigation period was between July and August, except for irrigation during the sowing period (April–May). As July and August were within the flood season, irrigation amounts were variable. Normally, irrigation was appropriate every twenty days (Anon, 1947).

Additionally, several varieties of crop were introduced, bred and distributed. Trials and experiments showed that No.4 Si introduced from the USA, was the ideal cotton variety for the Jinghui Channel area. After 1937, it was distributed quickly. After each harvest of cotton and wheat, routine surveys were carried out on the production and plantation areas in the entire zone of the Jinghui Channel. In 1946, the cultivation area was up to 115,321 acres, and production value was over 35,000 million Yuan (Anon, 1947).

The increase in agricultural products such as cotton and wheat promoted the development of relevant processing industries in the irrigation area. Power was an important consideration for factories. There had been many machines using water as power in the past—for example, water-powered trip-hammers (for husking rice) and

water mills. Water mills were widely used to grind wheat, extract oil from seeds, pound paper pulp and grind china clay, etc. *A Compendium of Water Conservation History in China* by Hanyuan Yao points out that even though the management of the Zhen-Bai Channel was strict, the irrigation area there had been steadily decreasing, as there were so many water driven pestles—water mills which consumed significant quantities of water along the channel—even though there were supposed to be restrictions in place. So far, no available paper has been found regarding the application of hydraulics, except in irrigation, in water conservation in the Jinghui area in the period of the ROC. But this does not mean that there was no industry in the Jinghui Channel area. Along Jinghui Channel, there were many waterfalls at the locations where its branches were linked. The waterfall could be used as power for a small-scale industry. To ensure proper and effective use of water, regulations for water use in the hydraulic industry were issued by the Water Conservation Bureau, Shaanxi Province, in 1947. Administrative management, layout and environmental conservation were involved in the regulations. A permit was requested prior to the use of water by industries. Every application for water use in industry required construction plans and relevant documents, and then needed to be checked to make sure no interference would occur to agricultural irrigation. No industrial construction was allowed to be over the main channel or branch, or to change channel course. Industrial wastewater was required to be discharged back into the original channel under the condition that the wastewater did not affect water quality. Wastewater was not allowed to flow into other channels or to be left to go out of control. It was illegal for a factory to build private gates to control water flow or to cut or block a water source (WCBSP, 1948). It was difficult to know how effective execution of the regulations was due to the limited available historical documents. However, the following example indicates that there were small factories driven by water.

Table 8.4: The statistics of factories in the countryside in Jinghui Channel (Anon, 1948).

Counties	Number of factories		
	Flourmill	Cotton ginning mill	Oil extraction mill
Jingyang		1	35
Sanyuan	2	1	11
Gaoling			62
Lintong			9
Total	**2**	**2**	**117**

There were five or six factories which obtained industry water use permits in the Jinghui Channel irrigation area (Anon, 1948). By 1948, every factory except Jingyang Cotton Ginning Mill had gone out of business, one after the other, due to poor management. There were two mills in the factory (ibid). These mills could grind 880kg of wheat and produce 739kg of flour every 24 hours. Extracting oil from seeds was a complex procedure. For every 24 hours, the factory could treat 2,400kg of cottonseed. The number of workdays each year was determined by the harvest. The mills could grind wheat every day; however, the ginning just happened in the cotton harvest season, normally for three months. From the harvest date until the following May, oil could be extracted from cottonseed. Outside this period, it was not suitable to carry out oil extraction from cottonseed, as the quality of the seed worsened. The operation of the factories was affected by the condition of the Jinghui Channel. When the water had high sand content, the Channel underwent maintenance in the slack farming season: Jinghui Channel always experienced several days' closure. In such cases, a diesel engine was normally used. Sometimes charcoal was burned to power the mill. The expenditure of Jingyang Cotton Ginning Mill is shown in Table 8.5.

It is difficult to evaluate its precise effect on the economy and the natural and social

environment of the Jinghui Channel area. In any case, the appearance of the factory was an exciting event after the Second Sino-Japanese War and the Chinese Civil War. Even though the factories only produced items of limited types, had only simple facilities, and used water force directly which was constrained by natural conditions, the factories still showed some features of modern industry—for example, the unification of milling flour, cotton ginning and oil extraction, and use of the diesel engine.

Table 8.5: Expenditure at Jingyang Cotton Ginning Mill (Anon, 1948)

Items	Expenditure (Million Yuan)	Note
Payment and accommodation	288	There were 40 labourers; Each one cost 0.6 million monthly.
Feeding stuff of livestock	40	
Cotton oil	120	Used for cooking and lighting
Charcoal	21	
Others	50	Maintenance of machines and others

The appearance of the factory implied that technology played a role in villages in internal provinces of China. Additionally, it satisfied Yizhi Li's desire that technology-driven water conservation should benefit more people (COSP, 1988). In February 1938, Yizhi Li fell ill from constant overwork and suffered cholecystitis as well. In the last hours of his life, he still thought about water conservation. Even as he lay in hospital unable to speak, he was concerned with the dyke construction in

Jinghui Channel and wrote the word ‘dykes’ to his colleagues who visited him. In his will, he expressed his wish that the management of the rivers should be governed by scientific methods; asserted that water transportation, hydropower and flood control needed further investigation to gradually make them a reality; proclaimed that efforts were needed to protect the achieved irrigation system in the province; and, as far as the uncompleted water conservation projects were concerned, he hoped that people would try their best to complete them quickly (COSP, 1988).

8.6 Gentry, foreign powers, technology, engineering and peasant labourers: reflections on Anfengtang Pond, Lotus Polder and Jinghui Channel

There have been many studies concerning Jinghui Channel and Yizhi Li, most of which are concerned with the water ownership and Yizhi Li’s achievement in water conservation (Liu, 2013). Here, Jinghui Channel has been used as a case study to examine the construction management and the daily status of the irrigation area in the north of China to compare it with Anfengtang Pond, Lotus Polder and relief work in the Huai River basin. This study not only illustrates the differences between water conservancies in the middle, the south and the north of China, but the comparisons are also good for complementing and explaining each other and can highlight common features and reveal active factors in water conservancies at that time. In the Anfengtang Pond project, the work of the local gentry was not negligible, but played an important role in negotiation. However, the efforts of gentry in the Anfengtang Pond project should not be overestimated, as the overall project was under the management of the state. Comparatively, local gentry played a weaker role in the Lotus Polder and Jinghui Channel projects. The Lotus Polder project was controlled by the puppet regime, and foreign powers also played an important role, while the work of local gentry was mainly to carry out coordination and negotiation between the government and residents. It was difficult for local residents to support the

construction of Jinghui Channel due to serious drought from 1928 to 1930. Yizhi Li, a powerful technical officer, was capable of coordinating various parties, including foreign, religious, governmental and military powers. The gentry there just helped with management after the completion of the project, but were not the key force during construction. However, in the Qing Dynasty, the gentry also carried out the organisation and execution of the Lotus Polder project. Comparative research on Anfengtang Pond, Lotus Polder and Jinghui Channel revealed that local gentry's roles in water conservation changed with time, natural conditions and social background. This echoed emphasis by Coats (2013), McNeill (2007) and Hughes (2016) on the dynamic mutual relations between people and nature.

The electrical drainage and irrigation supported by the Sino-British Boxer Indemnity in the Lotus Polder projects and the CIFRC in this chapter are noteworthy events. The former was organised by the state; the CIFRC was an NGO. For the first-phase project of the Jinghui Channel project, the CIFRC had offered 536,635.12 Yuan, while Shaanxi Province provided just 52,000 Yuan. The main design of Jinghui Channel was carried out by American engineers. A portable compactor and drill were bought over from the USA. Electrical instruments for the drainage and irrigation of Lotus Polder were purchased from London. Even the overseas purchase was required by regulations, or was for the purpose of protecting industrial monopolization by the UK: all those imported instruments had promoted the development of water conservation in China, and benefitted the public. Due to limited historical documents, it is difficult to carry out a comprehensive evaluation on Lotus Polder during the Wang puppet regime, but foreign factors clearly played a prominent role in Chinese water conservation, both positive and negative. These findings echo Will's (1998) argument that environment, technology, economics, society and political factors lost their balance and caused the cost of environmental repairs to surpass their potential benefits.

8.7 Discussion and conclusion

Science and technology played an important role in the construction and management of Jinghui Channel. Daily water use and the maintenance of Jinghui Channel were designed in terms of scientific investigation of the human-land relationships, rather than, as in the past, determined by the number of household members. The land-water relationship was also considered in the design. The production and promotion of crops such as cotton benefitted greatly from the breeding and distribution of new varieties. It is noteworthy that such scientific activities were not spontaneous among villagers, but on the whole were organised by the state. Liu (2007) argues that the state-led food and cotton systems played a positive role in the development of production but did not satisfactorily meet the commodity and productivity laws of a modern society.

Engineers have already been mentioned in the fourth chapter, and they played helpful roles in water conservation projects, as mentioned in the chapters 5 and 6. The reason for this might come from their wish, as intellectuals, 'to cultivate themselves, put family in order, govern the state, and pacify the world.'[4] The democratic, scientific spirit arising from the May Fourth Movement may also have helped to give them the desire to serve the country with science and technology, even in war time. These engineers showed both persistence and an ability to compromise, but their attitudes could not determine the future of projects. The projects were controlled by the government and determined by finance.

[4] This phrase is taken from the Great Learning section of the ancient classic *Book of Rites* which is a core text of the Confucian canon

Chapter 9: Conclusions and further studies

9.1 Research findings

This thesis has dealt with the relationship between water conservation and grass-roots society in the ROC era, especially focusing on the areas around the upper reaches of the Huai River. Chapter 2, provides a brief review of literature on the environmental history of the US, the UK, and China. In broad terms, environmental history in the US developed out of environmentalism with American historians paying more attention to their own country's features, with an important emphasis on the idea of wilderness. British environmental history is strongly linked with traditions from local history, historical ecology and historical geography. Again it was encouraged by the concern of environmentalists especially over the loss of hedgerows and ancient woodlands brought about by agricultural modernisation in the mid twentieth century. Research into Chinese environmental history goes back well into the past, although it was only in 2000 that the term 'environmental history' appeared formally in China (Bao, 2004). Elvin (2004, p. xxi) stressed that the vast size and scale of China and its wealth of written historical evidence made it a special and particular case: 'China has an unusually long record which allows tentative answers to many questions that are hard to answer for other areas'.

Chapter 2 goes on to critically review the history of water conservation and its related disciplines in China and globally. It is argued that many current researchers have preferred to investigate big events related to well-known water conservation projects; neglecting smaller, but more ordinary ones (See for example Li 2004 and Xing 2006). There has also been a tendency to focus on North China in the period prior to 1911 while the South-North border of China was paid little attention, particularly in the period of the ROC.

These are identified as gaps in the literature that this thesis seeks to fill through its emphasis on villagers, village chiefs and county heads working within water conservation and management projects within the South-North border within the ROC era. Building on Evenden's (2004) emphasis that epic events can begin with the most commonplace incidents, an important message conveyed by my thesis is that these small incidents can be discovered through the careful interpretation of local documents.

The methodologies used in the thesis are discussed in Chapter 3. I used a wide range of sources and materials including archival sources, government statistics and oral histories. A range of national historical materials were used to construct a broad, in-depth historical background. Adequate first-hand materials, such as local archives were utilized. Oral history was used to reveal local and strongly human-related historical stories associated with water. Community-based fieldwork was also an important data source for this thesis. Fieldwork was very important is cross checking, complementing and confirming, or otherwise, evidence from published sources. The two regional studies of Jinghui Channel and Lotus Polder illustrate how a cross-regional study can provide a broad analysis of water conservation in China in the ROC era.

Chapter 4 is the first of the five main empirical chapters. It examined the flooding of the Huai River and its causes, and discussed the relief work project in 1931. Analysis of a range of historical materials including regulations and laws, local customs, engineers' notes, and meeting notes revealed that the flooding of the Huai River in 1931 resulted from both human-related and natural factors. Attention was paid to the construction of water conservation systems to allow the recovery of agricultural production. The provision of refugee relief was also considered and it was found that relief work has played an important role in water conservation systems. This is the first time that peoples' lives on work sites, local dyke protection organisations, and labour services during the relief work project have been examined. In the early

twentieth century, grassroots society in China was relatively stable and focused on hard work to avoid famine. However, engineers had been affected by western science and concept of equality and acted as educators and pioneers. The labourers, for their part, seemed to be forced to accept help from the engineers. The work site was like a microcosm of wider society in which the upper class changed over time, while labourers' lives remained more static. However, common points still existed between them and both engineers and labourers were the main actors in the construction of water conservation systems. This chapter showed the importance of making use of archival documents, photographs and maps to uncover forgotten stories of the relationship between western science and local knowledge in the conservation of water. It shows how water conservation outcomes could be 'co-produced' by these very different understandings of nature and society and echoes Simmons' (1993) argument that environment comprises materials including water, animals, plants and terrain, and that culture encompasses beliefs, knowledge, and technology.

Chapter 5 examined the relief work and regional disputes related to water conservation of the Huai River Basin after 1931. In addition, the issues of water conservation were understood from the perspective of land policies. A significant goal of the relief work was to fix or improve destroyed water conservation structures and help to recover post-flooding social order and economics. Detailed analysis revealed that an improper land policy was the key cause of the seriousness of the disaster. The extreme convergence of land made grass roots society so poor that the peasants could not get through the disaster by themselves. The poverty of the grass-roots society there brought about government financial shortages, and in turn, the government found it hard to organise the relief. However, the relief work projects could not solve the key issue: extreme convergence of land. Therefore, relief work plans were unable to solve water conservation problems completely. Essentially, the relief work project was a short-term activity. The key solution to the problem of water conservation lay in the balance between population and land, the harmony between cultivation and environment, and regular maintenance of water conservation infrastructure. Many

social classes and processes were found to be involved in the post-flood construction and relief work. Due to different interests, local officials, central commissioners, landowners, and ordinary people were involved in the disputes. The core of all of the disputes regarding water conservation were related to different economic interests. This chapter demonstrates how the environmental history of the period can only be understood in the context of knowledge of conflicting power relations, property rights, water rights and antiquated yet entrenched and powerful patterns of landownership. These findings echo the work of Marks (2005) and Sadao (1966) who argued that policies of the land were an important subject of environmental history.

Chapter 6 examined the Anfengtang Pond during the period of ROC. Owing to issues of water management, water usage, construction and maintenance of water conservation, a series of scenes of competition, conflict, compromise and collaboration between officials, gentry, peasants and local organisations were observed based on archives, fieldwork investigations and interviews with people, local chronicles and newspaper. This chapter also examined the politics, economics, military, culture, law and customs behind these episodes, and tried to explore the interactions between natural resources and social resources. The seven stories told in Chapter 6 depicted different aspects of Anfengtang Pond and its community during the period of ROC, when Chinese traditions were still popular but western science, technology, and ideas were beginning to penetrate. However, what is apparent is that many traditional beliefs and ideas persisted among water conservation during the period of the ROC. These findings echo Bao's (2004) argument that China was basically an agricultural society in which the relationship between humans and the environment didn't change much. This chapter demonstrates the importance of understanding long held traditions and the subtle interplay between these and 'modern' knowledge about effective water conservation and management.

The last two empirical chapters dealt with two regional case studies in the Yangtze River Delta, and northwest China. Chapter 7 examined the Lotus Polder between 1912

and 1949. Chapter 8 examined the Jinghui Channel during 1932–1948. These chapters illustrate how a cross-regional study can provide a broader analysis of water conservation in China in the ROC era. Moreover, such studies help to reveal the complexity of the historical picture and the causes of key incidents. Chapter 7 analysed the consequences of utilising knowledge, technology and equipment imported from western countries and whether they promoted social progress. The power of the government and local gentry were reflected in Lotus Polder and Anfengtang Pond during the ROC era, although relatively speaking, foreign powers had a much greater impact on the Lotus Polder projects. Through examining the origin, management, and innovation of the Jinghui Channel and relevant industries during that period, Chapter 8 explored the influence of government, western science, technology and ideas on Jinghui Channel. The main channel of Jinghui Channel was controlled by the government, but smaller tributaries were managed by the local community. Science and technology played an important role in the construction and management of Jinghui Channel, while those serving the needs of everyday water consumption largely followed traditional practices. Engineers played helpful roles in projects, but their attitudes could not determine the future of these projects as they were controlled by the government and determined by finance. These findings reflect the work of Cosgrove and Petts (1990) who argue that the ways in which technology affects water conservation depends on the combination of politics, financial conditions, international relations, and culture.

9.2 Key themes

Key themes running through the thesis include the effects of land-use policies, the economic situation and national finance, wars, traditions, and western factors related to water conservation. These will be discussed in turn below.

- **Land use policies**

With regard to land use policies**,** the irrigation capacity of the Huai and other rivers in

the north, and middle China experienced a significant decrease (EBCNHM, 1957) and agriculture was in great decline. Policy and technology had a major influence on this with the former having a significant impact on how and when different technologies were put into use. To some extent, the construction of water conservation structures is a type of technological investment. Thus, the benefit returned from that investment should be taken into account by the investors, who are most likely to be the landlords. However, the landlords possessing large amounts of land could not possibly afford the investment needed to improve water conservation on all of their land. The financial incentives for such investment were further reduced by extremely low food prices and by the fact that any benefits of improving water conservation structures would be shared by the public.

Landlords were not completely responsible for the disastrous consequences associated with the disrepair of the water conservation structures. As landlords tended to live in cities to avoid wars and the poorer living conditions associated with village life, they did not have a good understanding of agricultural practices and village life. This negatively affected the quality of management and farming and caused landlords to lose motivation to maintain and construct water conservation measures. Land rent was high at that time. The small subsidy from contributing to the construction of water conservation schemes could not alleviate peasants from very poor conditions (EBCNHM, 1957). As a result, peasants simply put little effort into conservation construction. On the other hand, many landlords failed to meet their obligations in the maintenance of water projects making it difficult to get satisfactory results in agricultural production. The situation was made worse by the complicated and cumbersome ownership system which was resistant to innovation and effective water conservation.

- **The economic situation and national finance**.

During the 1930s, the world economy experienced the Great Depression, which had a very significant impact on China. With this economic depression in foreign markets,

capital could not be invested in domestic agriculture. Meanwhile, the price of agricultural products dropped, which created losses for both peasants and landlords. The return on investment in agriculture seriously decreased. The investment in water conservation was not cost-effective in the short term, when the price of agricultural products in China and overseas decreased. One consequence was the lack of effective maintenance of water conservation structures and the money invested in these was always short, even though China was based on agriculture and ordinary people asked for funds. Water-control was recognized to be a work of central importance for the Chinese government but the funds were not made available. Neither the Northern Warlords nor the Nanjing Regime could lead the economy of China effectively. The limited income of the government was largely spent on the troops, other expenditure of civil war, or repaying the capital and interest on loans borrowed domestically or overseas rather than on water conservation infrastructure. After 1931, the main problems associated with long-term relief projects in the reaches of the Huai (ARC, 1931) and with repairs to Anfengtang Pond (EBTWCAP, 1995) and Jinghui Channel (HISA, 1933), were about access to money. This was often difficult due to the low priority given to investment in such projects relative to repaying loans or spending money on troops to maintain the administration of the government.

- **War**

The first half of the 20th century was dominated by the effects of wars which consumed money as well as people and can lead, slowing or even reversing development. To some extent, war took away development potential as it restricted investment in people and technology. Specifically the Marco Polo Bridge Incident on 7 July 1937 paused the construction of the Anfengtang Pond projects. In the areas occupied by the Japanese army and Puppet Government, they controlled the local economy in various ways. The Japanese army controlled the silk production of Wuxi County and Suzhou County using bandits to assist them. This increased the amount of banditry in Lotus Polder and technicians were kidnapped frequently (Anon, 1939).

The Japanese army and Puppet Government issued plenty of currency notes, which were used by them to buy legal tender. Part of the notes was used as payment for labourers. However, the currency notes depreciated quickly (Anon, 1939). All these actions had a significant effect on production and the lives of local residents. The effect of the war was reflected also in the flooding. The Huanyuan Ferry incident was the direct cause of the flooding of 1938. War often stopped the construction of water conservation and sometimes led to huge damage.

Sometimes, however, war stimulated the development of local water conservation even though development aimed to serve the war. Compared with that of 1937, agricultural production for the whole country declined in 1938 (ACB, 1939). However, some people suggested reclaiming wasteland in the 'rear areas', far from the front line to promote higher production. The Jinghui Channel area was a 'rear area' for the Chinese army. This is the reason why money and technology were continually invested in the Jinghui Channel area. That investment brought more land, new species and higher production. In addition, human-made products were in great demand, because products from overseas could not be transported to China under the economic blockade during war-time. Consumption of more domestic-made raw materials encouraged private or homemade workshops to unite together. The government established a supply network for the raw material, sales and capital, in order to develop domestic markets and stimulate production. For example, cotton plantations and processing in Yongle Dian town in Jinghui Channel, and flour milling and oil extraction using water power were key beneficiaries.

- **Cultural traditions and Western influences**

The most important element in any industry was human capital. Something in common could be found between the workers on the site of the project in the upper reach of the Huai River, and people in Anfengtang Pond, in Lotus Lake or in Jinghui Channel. All of them thought for themselves firstly, yet they were cooperative. They would take care to avoid personal losses, yet they also considered the fortune of the

community and the country. This fits in with the view of Schultz (1969) who argued that it was not true that traditional agricultural peasants did not know how to allocate the resources, as resources were well allocated by them under certain circumstances. The first thing they thought to do was to save their private property, as private property was excluded in the state protection policy. They also knew they needed to follow the farming season, as even slight changes could bring extreme calamity. However, they frequently could not afford the high costs of repairs to water conservation systems.

When reforms were made, they usually brought changes to on traditional agriculture. Engineers were involved in all types of water conservation and management projects including in disaster relief, research, design or construction and were often associated with the introduction of western technology and ideas. As they believed in using science and technology to serve the country, they tried their best to educate local people and officials and also to conduct scientific experiments at any opportunity. Without their contribution, surrounding communities would still have changed, of course, but arguably much more slowly. Secondly, most of the period from the 19th century to the early 20th century was subject to invasions and anti-invasions. The invasions caused damage to the economy and the deaths of many people. Many foreign countries tried to develop interests in China for their own benefit, which forced people to accept the penetration of new technology at the same time. However, the research findings show how local traditions and modern ideas from the west co-existed together. Indeed, changes to traditions were much slower than those for technology and, as claimed by Finnane (1998) the preservation of customs is usually easier and more longstanding than the preservation of terrain (1998).

Water conservation in the study areas represent a microcosm of China in that the history of water conservation mirrored the history of relationships between water and human beings. The thesis argues that the answer to the question ‘Who was in charge of water conservation?’ is a combination of various factors: engineers, labourers,

gentry, technology, economy, politics, culture, natural conditions, foreign powers, war, etc. Inevitably though, specific factors took greater and lesser roles in water conservation in different regions and time periods.

9.3 Further research

Although the research presented here is limited spatially and temporally, it nevertheless helps to highlight areas for further analysis. These include:

- **A more gendered analysis of water conservation**

One key limitation affecting this study was that available research materials focused primarily on male water conservation stakeholders thereby providing an incomplete story of water conservation during the early 1900s in China. As Finnane's (1998) work shows, a more gendered analysis of water conservation can add an important additional dimension to understandings of water conservation and it would be useful to develop such analyses for water conservation research in the ROC era. Although most people involved in water conservation were men, women nevertheless played an important role in the construction. As mentioned in the relief work projects in the Huai River Basin, the wives and daughters of labourers delivered food to them and some worked on the site. In terms of oral history of the Anfengtang Pond, it was apparent that women – even those with bound feet – had joined the projects. Some archival sources (GHRC, 1938, archives NO.: 26-09-003-01) contained information on the relationship between women and water conservation construction revealing varying levels of support for such projects amongst different women. To understand these subtle and complex psychological elements behind the seemingly dialectical opinions, further work on the archives and more interviews would be interesting and valuable.

- **A broader temporal analysis**

The period covered in the thesis is 1930-1949 but further research to extend this time frame would be valuable in terms of reflecting wider developments in 20th century

China. A large quantity of archival data on water conservation in the north of Anhui Province is available for the period 1949-1980 and have not yet been used for research. Available data include descriptions of education for peasant labourers, the life and working conditions of the work-sites, accidents on the work-site and pensions, construction of irrigation systems, dissension of water use, water allocation, rewards to female peasant labourers and the influence of the Soviet Union in the construction of water conservation projects. There would be great value in undertaking future research on these archives to provide greater continuity of knowledge regarding the development of water conservation and regulations relating to it in the study area. During the period of 1949-1980, China experienced several remarkable events such as the Great Leap Forward, three years (1958-1962) of the Great Chinese Famine, and the Cultural Revolution, so further investigation of water conservation construction in those periods would bring new understanding to these unusual events.

- **A broader spatial analysis**

The studies in the thesis focused on the areas in the north of Anhui Province, along the border between the geographically defined north China and South China. However, the transition between the north and south is a zone rather than a thin line, so there is scope for further investigation of a wider range of areas within this zone. Firstly, the study could be extended to cover more areas along the boundary between South China and North China. The Qinling Mountains and Huai River are geographic symbols of the boundary. The areas along the boundary include plains, hills, towns, villages, rice lands and wheat fields. Different nations and various customs exist along the boundary. Up to now, studies on those areas have been scarce. The present study has focused on the areas of the Yangtze delta and Northwest China, but paid little attention to the boundary areas. From west to east, several representative regions along the boundary could be chosen for investigation. Secondly, there is scope to compare the history of water conservation across the whole country to allow a deeper, broader and more thorough investigation based on local chronicles and archives.

- **Interdisciplinary research and complementary methodological approaches**

An important research topic associated with agricultural history is that of agricultural tools and technologies which, through studies of mechanics, anthropology and sociology, help to inform work on water conservation. With respect to irrigation, for example, the analysis of different scales of systems using different technologies (e.g. electrical and manual irrigation) could enrich the history of water conservation. As mentioned in previous chapters, to some extent, the status of water wells was a symbol for living standards. During my 2008 fieldwork, I collected historical documents about water wells in the north of Anhui Province in the 1960s. In my interview with Professor Jianxiong Ge (Fudan University, 2008), a scholar in historical geography, we discussed the possibility using species as a way into studying the general history of agriculture.

Besides historical documents, oral interviews were an important source of data for the thesis but time constraints meant that these could only be conducted in one area. The collection of oral histories to a larger number of villages would help to reveal differences in respondents' memories and experiences of water conservation in areas with different terrain and culture. In collaboration with a scholar of the Centre of Huai River Research, the value of undertaking fieldwork in several villages at the entrances of tributary rivers to the Huai River was discussed. These villages were greatly affected by the Huai River and it was proposed to extend the research undertaken for this thesis through an investigation of daily life work there using audio and video interviews over a period of three years.

The above-mentioned studies are multidisciplinary and it is widely agreed that environmental history is indeed a multidisciplinary subject, which requires methodologies and insights from a range of physical and social sciences (Donald, 2008; Hornborg and McNeill, 2007; Bao, 2004). This thesis relied mainly on historical documents, interview transcripts and oral histories, and a qualitative analysis methodology. Quantitative methodologies have been used in order to analyse refugee

populations, cost of construction, food prices, and scientific experiments. The further application of quantitative methodologies, geographical information systems (GIS), remote sensing technology, spore-pollen and deposits and C14 radiocarbon dating would supplement the written material analysis and fieldwork, and provide a good basis for further research.

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