

# **Indigenous Knowledge and Land Use Planning**

An Example from a Mountainous Region in Rural Northern China

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## Introduction

"To know you do not know is best. Not to know that you know is a flaw."

*Lao -Tzu: Te-Tao Ching, 4th Century B.C., translated by Hendricks (1989)*

The idea of doing research on indigenous knowledge in China was born in 1985, when I spent several months in a village in North China to study local approaches and the implementation of ecological agriculture (*shengtai nongye*). With the support of the Beijing Municipal Institute of Environmental Protection, the people in the village had developed several activities to carry out ecologically sound agriculture. They used less pesticides, the application of biogas was integrated into the farming cycle, and they had developed new ways of animal raising and new patterns of cropping.

I talked to many persons who helped to design this concept of ecological farming: scientists, local decision-makers and farmers. All of them proudly said: "We have overcome traditional agriculture and developed a modern way of farming." When I asked for the ancient ways of Chinese farming that have been written down for two thousand years, they always answered, that these methods were no longer valid in these modern times. When I walked through the fields, I tried to find the methods that King (1911) described at the beginning of this century, but I hardly could find them.

From 1990 to 1994, I worked at the Beijing Agricultural University at the Center for Integrated Agricultural Development (CIAD) as an adviser for rural development. Together with my Chinese colleagues, we developed methods and concepts for a sustainable participatory development in the Chinese countryside. When we carried out surveys about the efficiency of the Chinese Agricultural Extension Service, we found out that many farmers did not need the official services, because **they knew already**. **Knowing** means that they developed ways and means to acquire agricultural knowledge, i.e. asking friends and relatives, using agricultural books and magazines, forming informal networks to share knowledge. They also innovated new agricultural techniques and adjusted traditional knowledge according to their needs.

When we talked to the official decision makers, however, a different picture was given to us. The dominant view was the perception of ignorant people who needed directives by the government. Consequently, until 1992, the Chinese administration ordered the farmers what to grow and how to manage their responsibility<sup>1</sup> fields. We discovered that through this a lot of farmers' knowledge was destroyed.

Therefore, in 1993, my Chinese colleagues and I started researching on the knowledge of farmers, having the following objectives.

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<sup>1</sup> Responsibility fields are those fields that are distributed to the farm families in a village and that can be cultivated under the responsibility of the farmers.

<sup>2</sup> This article, first published by The Economist in 1995, later was cited in 120 articles about China in

- to get an overview about the activities which are already carried out by various institutions in the field of traditional farming systems,
- to find out which kinds of traditional farming are still carried out and relevant for the rural population,
- to get more information about traditional knowledge systems in order to write a proper research design.

We carried out surveys in villages in the Provinces of *Yunnan*, *Gansu* and *Hebei*. The results are documented in Chinese as part of the overall documentation of CIAD. The findings of these surveys indicated that there is a lot of indigenous knowledge and its application that can still be seen today. They also indicated that there is a need for an adapted, sustainable concept of land management which takes the needs of the farmers into the center.

At the same time, the World Watch Institute in Washington D.C. published an article written by Lester Brown about the decreasing grain production in China (Brown 1994). This article was subsequently discussed worldwide and in China<sup>2</sup>. The discussion also raised the question if China has enough land resources which only need to be properly managed in order to produce sufficient grain. This was in contrast to my experience at then of the 1980s when it was hardly possible to "officially" discuss issues of land tenure and land use planning.

My own research on indigenous knowledge shifted then towards a topic that, in the mid-1990s, became more and more relevant for both planners and local farmers: develop adapted and sustainable methods for land use planning in rural China.

Therefore, I have selected this topic for my research to obtain a Ph.D. at the Technical University in Berlin: "Land Use Planning and Indigenous Knowledge".

Consequently, this research aims at analyzing land management approaches that take the knowledge of land users into account. The research also considers concepts that are discussed in the context of the present debate in international development. Therefore, it does not only integrate academic research but also the practical experience in development projects.

Part I analyses the need for the integration of indigenous knowledge into planning concepts. Chapter 1 provides a problem statement about the present approaches in PR China, focusing on the period 1990 - 1997, in land use planning/land management<sup>3</sup>. The problems of environmental degradation in PR China increasingly endanger the food

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<sup>2</sup> This article, first published by The Economist in 1995, later was cited in 120 articles about China in English newspapers and journals.

<sup>3</sup> The Chinese term *tudi guanli* means land administration., it can also be translated as land management or land use planning. It reflects, however, the different approaches of planning/administration.

security of its population. The arable land has been steadily decreasing and degrading. The diminishing water resources cannot longer provide drinking water facilities for one quarter of the urban as well as the rural population. Moreover, income generating facilities for rural farm families have decreased, too. Therefore, an increasing number of rural people out-migrate to urban centers. Farm production is mainly carried out by the remaining old people and/or neglected, because it is not longer economically viable. Consequently, indigenous knowledge has been losing its importance. The causes of this development are mainly the unclear legal situation of land tenure, the weakness of institutions concerned with land management and the top-down orientation of planning institutions.

Chapter 2 discusses the worldwide failure of scientific and other approaches for a sustainable development and the destruction of indigenous knowledge systems. Present definitions of indigenous knowledge and its links to power, gender, the actors concerned and to land use planning are assessed.

The historical dimension and the development of indigenous knowledge systems in China are described in Chapter 3. This includes traditional cultivation techniques and ancient visions of nature as well as the promotion of "ideological" knowledge during the Maoist period and the present perception of indigenous knowledge.

Part II presents the findings of the case study in a mountainous village in Northern China. Participatory appraisal techniques allowed a documentation of the views of the land users themselves. The different actors in land use planning in the village were identified and their knowledge assessed. From 1993 to 1997, the changes of the land use in the village were observed. The findings correspond with the problems described for rural China as a whole: Decreasing arable land, shortage of water resources and a deconstruction of indigenous knowledge. However, farmers were capable to do their own innovations if their own livelihood is endangered. These endogenous innovations can be considered as part of indigenous knowledge.

The finalizing conclusions in Part III connect the problem statement of Part I with the findings in the village and describes how the indigenous knowledge of the land users can be integrated into land use planning approaches.

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## **Deutsche Zusammenfassung**

### **Indigenes Wissen und Landnutzungsplanung am Beispiel eines Dorfes in Nordchina**

#### **1. Probleme der Landnutzungsplanung im heutigen China**

Die Planung der Landnutzung in der Volksrepublik China der neunziger Jahre ist nach der erfolgreichen Einführung des Familienverantwortlichkeitssystems mit Problemen konfrontiert, die eine nachhaltige Bewirtschaftung der ländlichen Ressourcen und damit eine ausreichende Nahrungsmittelversorgung der immer noch wachsenden Bevölkerung gefährden. Das bebaubare Land hat seit der Gründung der VR China im Jahre 1949 etwa um 10 % abgenommen, während die Bevölkerung um 100 % gewachsen ist, so dass 1996 nur noch 0,08 ha kultivierbare Fläche pro Kopf zur Verfügung stehen. Die für das Landmanagement wichtigen Ressourcen Boden und Wasser sind in den letzten Jahren nicht nur knapper geworden, sondern sind auch zunehmend verschmutzt bzw. degradiert. Erosion und Desertifizierung bedrohen mehr als 40 % der bebaubaren Landfläche. Die zunehmende Wasserknappheit in Nordchina verursacht Versorgungskrisen in großen Städten, aber auch auf dem Land. Es wird geschätzt, dass ein Viertel der Bauern in China nicht genügend Wasser für Feldbewässerung und Trinkwasserversorgung zur Verfügung hat.

Die sich verschlechternden Möglichkeiten für die Bauernfamilien, landwirtschaftliche Aktivitäten als Haupteinnahmequelle zu nutzen, haben vor allem in Gebieten, die mit geringen Möglichkeiten zur Entwicklung nicht-landwirtschaftlicher Einkommensquellen ausgestattet sind, zu einer Verarmung der Landbevölkerung geführt. Die Mitte der neunziger Jahre eingeführten Erleichterungen des Aufenthaltsrechts führten wiederum dazu, dass Millionen verarmter Bauern nun in den Städten nach Arbeit suchen. Die zurückbleibenden Familienangehörigen, meist Alte, Frauen und Kinder, haben kaum noch Interesse und Möglichkeiten, die Landbewirtschaftung zu intensivieren und nachhaltig zu verbessern. Dadurch liegen in vielen Gebieten Felder brach, die zwar landwirtschaftlich genutzt werden könnten, aber von den in den Dörfern/vor Ort gebliebenen Familienangehörigen nicht bewirtschaftet werden können.

Die Gründe für diese Probleme Chinas im ländlichen Raum liegen vor allem in den folgenden Bereichen:

- **Die rechtliche Situation der Landbesitzverhältnisse ist ungeklärt.** Im ländlichen Raum gehört der Boden zwar de jure den Kollektiven, diese wurden aber nach der Einführung des Familienverantwortlichkeitssystems aufgelöst und haben keinen klar definierten Rechtsnachfolger. Die Bauernfamilien können das Land zwar nutzen, aber die Entscheidungen über die Nutzungsdauer und Nutzungsart werden nach wie

vor von lokalen Kadern gefällt. Wie groß die Entscheidungsbefugnis der einzelnen Bauernfamilien ist, ist von Region zu Region, oft sogar von Gemeinde zu Gemeinde sehr unterschiedlich. Generell haben in Gebieten im Osten und Süden, die industriell weiterentwickelt sind und in denen die Landwirtschaft eine geringere Rolle spielt, lokale Entscheidungsträger weniger Einfluss auf Maßnahmen im Bereich der Landnutzung und –bewirtschaftung. Die durchgeführte Fallstudie in einem Dorf in Nordchina zeigt jedoch, dass hier Entscheidungen lokaler Kader noch ein sehr großes Gewicht haben. Oft wird die von ihnen vertretene Politik kurzfristig geändert. So wurde z.B. innerhalb von fünf Jahren zweimal angeordnet, die Bewirtschaftung von Obstbäumen im Dorf von individuellem Management zu kollektiven Management zu verändern. Das Vertragsland des Dorfes Liudu wird laut Unterlagen des Dorfkomitees alle drei bis fünf Jahre neu verteilt, um die Landgröße an die veränderten Familiengröße anzupassen. Es ist dabei für die Bauernfamilien nicht klar, ob sie dasselbe Stück Land nach dieser Frist weiter bewirtschaften dürfen. So führen die rechtlichen und planerischen Unsicherheiten zu Prozessen, die durch Korruption und beliebige Machtausübung lokaler Entscheidungsträger geprägt sind. Die individuellen Landnutzer/-innen empfinden diese Prozesse als willkürlich und sind verunsichert, denn sie sehen für sich keine Einflussmöglichkeiten, die Anordnungen der Machthaber zu beeinflussen. Somit haben sie nur noch wenig Interesse an einer nachhaltigen Landbewirtschaftung.

- **Die Zuständigkeiten der mit Landnutzungsplanung befassten Behörden sind nicht geklärt.** Die staatliche Institution für Landmanagement (SLA), die 1986 gegründet wurde, ist eine Behörde, die sich Aufgaben der Landnutzungsplanung mit anderen Fachministerien teilen muss. Das Forstministerium (SFA) ist z.B. für Landnutzungsplanung in Berg- und Waldgebieten verantwortlich, das Landwirtschaftsministerium ist für die ökologische Zonierung und Versteigerung von Grenzertragsflächen, das Bauministerium für Flächennutzungsplanung in Städten und das Ministerium für Wasserkontrolle für die Planung von Wasserflächen zuständig. Dabei kommt es zu Überlappungen, bei denen dann zwei oder mehr Institutionen für ein bestimmtes Gebiet zuständig sind, bei landwirtschaftlich genutzten Bergregionen oder bei Agroforstsystemen sind z.B. sowohl das Landwirtschafts- als auch das Forstministerium für die Landnutzungsplanung zuständig. Beide Institutionen verfolgen dabei unterschiedlichen Konzepte.

Auf nationaler Ebene werden durch diese Fachministerien Quoten für Landflächen, die den verschiedenen Nutzungsarten zugeschrieben werden sollen, an den Staatsrat gegeben; dieser leitet sie an die Provinzbehörden der SLA weiter. Die regionalen und lokalen Landnutzungsplanungsbehörden sind nun dafür verantwortlich, Landnutzungskarten und –pläne zu erstellen. Sie müssen dabei zwischen nationalen Quoten und lokalen Interessen und Bedürfnissen vermitteln. Diese Aufgabe wird von

vielen lokalen Mitarbeiter/-innen als unlösbar eingestuft. Außerdem verfügen die Behörden über nicht ausreichend qualifiziertes Personal, das nicht in der Lage ist, angepasste Landnutzungspläne zu erarbeiten.

- **Bauern und Bäuerinnen werden an Entscheidungen im Bereich Landnutzungsplanung nicht beteiligt.** In den chinesischen Planungsabläufen ist eine Beteiligung der lokalen Nutzer/-innen nicht vorgesehen. Die einzige Möglichkeit, lokale Politik zu beeinflussen, besteht zur Zeit darin, an den Wahlen für die Dorfkomitees teilzunehmen. Aber auch durch dieses Instrument werden alte Machtstrukturen meist nicht beseitigt. Deshalb befinden sich die chinesischen Bauern und Bäuerinnen in der Situation, die für sie oft willkürlichen Anordnungen der lokalen Kader zu befolgen oder Nischen zu finden, in denen Strategien für ein besseres (Über)leben entwickelt werden können. Dazu gehören z.B. die Entwicklung nicht-landwirtschaftlicher Einkommensmöglichkeiten oder auch Migration in die größeren Ballungszentren. Beides kann dazu führen, dass die Landbewirtschaftung vernachlässigt oder gar aufgegeben wird.

## 2. Die Vernachlässigung von indigenem Wissen in Entwicklungsansätzen

Ein weiteres Problem im Bereich Ressourcenmanagement und Landnutzungsplanung ist, dass weltweit und auch in China die Konzepte vor allem naturwissenschaftlich-technische oder ideologische Grundlagen haben. Es wird davon ausgegangen, dass Planer/-innen und Wissenschaftler/-innen ein an Universitäten entwickeltes und damit überlegenes Wissen haben, und dieses Wissen an die "unwissenden" Landnutzer/-innen weitergegeben werden muss. Scheitern diese Entwicklungsansätze, liegt es an der "Unfähigkeit der Bauern/Bäuerinnen", diese Methoden richtig anzuwenden. Die lokalen Wissenssysteme werden bei diesen Konzepten nicht berücksichtigt, oft sogar zerstört. In China bildete sich während der kollektiven Phase (Anfang der fünfziger bis Mitte der achtziger Jahre) ein Wissenssystem heraus, das sich weder an Naturwissenschaft und Technik noch an lokalem oder indigenem Wissen orientierte, sondern vor allem der kommunistischen Ideologie zu dienen hatte. Es wird deshalb in der Arbeit ideologisches Wissen genannt. Dazu gehört z. B. die Anordnung der chinesischen Führungsspitze während der Kulturrevolution, überall Getreide anzupflanzen, auch wenn die natürlichen Bedingungen dies eigentlich nicht zuließen. Hier wurden die chinesischen Bauern und Bäuerinnen mit einem "Wissen" konfrontiert, das weder auf Wissenschaft noch auf lokalem Know-how basierte.

Die Misserfolge der technologisch-orientierten Ansätze, z.B. das Scheitern der Grünen Revolution in vielen Teilen der Welt führte in den 80er Jahren zu einem Paradigmenwechsel, mit dem Konzepte aktuell wurden, die explizit das Wissen der Landnutzer/-innen in den Mittelpunkt des Planungsprozesses stellen (indigenes Wissen, lokales Wissen, Bauernwissen). Das Konzept von "Indigenous Technical Knowledge" stellt die Nützlich-

keit von lokalen Produktionstechniken heraus, während der Ansatz "Indigenous Knowledge Systems" versucht, lokales Wissen in einen Zusammenhang zu bringen, der kulturelle und institutionelle Aspekte sowie das Management von Wissen miteinbezieht. Der von Robert Chambers vertretene "Farmer First"-Ansatz vertritt die Ansicht, dass Bauernwissen allen anderen Wissenssystemen übergeordnet ist und deshalb die größte Rolle im Entwicklungsprozess spielt.

Die vorliegende Arbeit folgt zwei in den letzten Jahren entwickelten Vorgehensweisen zum Umgang mit indigenem Wissen: der "Leiden Ethnosystems Perspective" und dem akteursorientierten Ansatz.

Die Definition von indigenem Wissen hat dabei drei Komponenten: die historische Dimension, also Erforschung von geschichtlichen Prozessen, die zu der heutigen Situation geführt haben; die Untersuchung von Sichtweisen der beteiligten Akteure; und die Analyse, wie dieses Wissen außerhalb von wissenschaftlichen und ideologischen Institutionen entwickelt wurde.

Die Akteure werden dabei differenziert in Hinblick auf ihre gesellschaftliche Stellung und die Relevanz ihres Wissens. Indigenes Wissen in dieser Arbeit beinhaltet deshalb das vorhandene Wissen der an der Landnutzungsplanung beteiligten Akteure sowie indigener Techniken der Landbewirtschaftung, die nicht durch offizielle Institutionen transportiert wurden und die in der Region bereits vor 1949 angewendet wurden (historische Komponente). Wichtig ist hierbei, dass das indigene Wissen nicht als per se gut und nützlich eingestuft wird, wie es teilweise in den früheren Untersuchungen über lokales Wissen geschah. Vielmehr wird untersucht, welche Relevanz das heute vorhandene indigene Wissen für Ressourcenmanagement und Landnutzungsplanung im heutigen China hat.

Die historische Komponente des indigenen Wissens ist in China seit etwa zwei Jahrtausenden gut dokumentiert - im Gegensatz zu den meisten afrikanischen und südasiatischen Gesellschaften. Bis zum Beginn des 20. Jahrhunderts hatten sich viele Landnutzungstechniken kaum verändert und versetzten die chinesischen Bauern und Bäuerinnen in die Lage, dem knappen Gut Boden vergleichsweise hohe Erträge abzugewinnen. In den Zeiten der kollektiven Landbewirtschaftung von 1958 bis 1978 wurde jedoch zentral verordnet, wie das Land zu nutzen sei und welche Kulturfrüchte anzubauen waren. Dies galt auch für Fälle, wo die lokalen Bedingungen diese Nutzung gar nicht zuließen. Dadurch gerieten viele der traditionellen Methoden in Vergessenheit.

Mit der wirtschaftlichen Liberalisierung in den 80er Jahren erhielten die lokalen Entscheidungsträger und Landnutzer/-innen zwar einen größeren Einfluss auf die Planung der lokalen Ressourcen; sie setzen nun aber andere Prioritäten, wie z.B die Erschließung nicht-landwirtschaftlicher Einkommensmöglichkeiten. Deshalb wird das im Hinblick auf Landbewirtschaftung vorhandene indigene Wissen immer weniger angewendet.

Der offizielle chinesische landwirtschaftliche Beratungsdienst setzt seit Mitte der achtziger Jahre explizit auf Konzepte, die Wissenschaft und Technik propagandieren (*tuiguang* = durch Druck verbreiten) und traditionelle Denkweisen verdrängen sollen. Dadurch sowie durch die oben erwähnten Rechtsunsicherheiten wird ein Prozess, bei dem das indigene Wissen immer mehr in Vergessenheit gerät, beschleunigt.

### 3. Die Feldforschung: Lokales Wissen in einem nordchinesischen Bergdorf

Im Rahmen dieser Arbeit wurde von 1993 bis 1997 in dem Bergdorf *Liudu* an der Grenze zwischen dem administrativen Gebiet *Beijings* zur Provinz *Hebei* eine Feldforschung mit partizipativen Erhebungsmethoden durchgeführt, bei der untersucht werden sollte, welche Formen von indigenem Wissen vorhanden sind, welche Rolle sie für die Landnutzungsplanung spielen können und wer die beteiligten Akteure sind.

Dabei wurden die folgenden historischen Wissensbestände gefunden, die heute noch angewendet werden und die für eine dörfliche Landnutzungsplanung relevant sein können:

- landwirtschaftliche Techniken, die eine optimale Raumausnutzung ermöglichen, z. B. Mischkulturen und Agroforstsysteme, werden nach wie vor angewendet,
- geomantische Leitlinien (*feng shui*) werden als Indikatoren für Landnutzungsentscheidungen genutzt,
- die Prinzipien von *yin* und *yang* werden auf landwirtschaftliche Flächen angewendet und die Nutzung entsprechend ausgerichtet,
- die Dimensionen von Landverteilung entsprechend der legalistischen und konfuzianischen Auffassung von entweder Landkonzentration oder egalistischer Landverteilung sind in den Denkansätzen der Entscheidungsträger nach wie vor vorhanden.

Es wurden außerdem lokale Akteure identifiziert, die im Management und Transport von indigenem Wissen eine besondere Rolle spielen:

- lokale Expert/-innen (*xiangtu rencai*) als Träger und Übermittler von traditionellem Wissen im Bereich Landbewirtschaftung. Sie ergänzen und ersetzen teilweise den staatlichen Beratungsdienst,
- der Geomantikexperte (*feng shui shifu*). Er wurde vor der Kulturrevolution und wird nun wieder verstärkt von der Dorfbevölkerung konsultiert, um Ratschläge bei der Anlage von neuen Wohn- und Nutzgebäuden und dem Standort von Grabanlagen zu geben,
- lokale Innovator/-innen, die neue Techniken der Landbewirtschaftung entwickeln, ohne dass diese durch offizielle Beratungsdienste initiiert wurden,

- lokale Institutionen, z.B. das Dorfkomitee, das von den Dorfbewohner/-innen als ihre wichtigste Institution angesehen wird. Die Institution "Dorfkomitee" wurde zwar in der kollektiven Zeit gegründet, kann nun aber relativ frei gewählt werden und fällt wichtige Entscheidungen im Bereich der dörflichen Landnutzungsplanung,
- Bauern und Bäuerinnen, die ihren Geschlechterrollen entsprechend die Landbewirtschaftung durchführen. Alle Informanten und Informantinnen gaben an, dass sie ihr landwirtschaftliches Wissen zum größten Teil mit ihren Verwandten und Nachbarn austauschen und nicht durch den offiziellen Beratungsdienst erhalten.

Die Erhebungen haben allerdings gezeigt, dass die historischen Wissenssysteme und ihre Träger auch nach der Auflösung des kollektiven Bewirtschaftungssystems weiterhin an Bedeutung verloren haben. Z.B. konnte beim letzten Feldaufenthalt 1997 beobachtet werden, dass Mischfruchtssysteme und die Prinzipien von *yin* und *yang* kaum noch angewendet werden. Sie wurden hauptsächlich im traditionellen Trockenfeldbau eingesetzt, und die Bearbeitung dieser Felder wird von der Dorfbevölkerung als zu mühsam und ineffektiv angesehen, weil sich einerseits die dort angebauten Produkte nicht vermarkten lassen und andererseits genügend Lebensmittel auf lokalen Märkten zu teilweise subventionierten Preisen gekauft werden können. Das Interesse richtet sich deshalb nun auf nicht-landwirtschaftliche Einkommensmöglichkeiten.

Es ist deshalb schwierig einzuschätzen, inwieweit das indigene Wissen zu einer nachhaltigen Landnutzung beitragen kann, da sie in den Augen der lokalen Bevölkerung immer mehr an Bedeutung verliert. Außerdem sind die Gegenwartsprobleme im Bereich Ressourcenmanagement so massiv, z. B. die Wasser- und Bodenverschmutzung durch Industrieemissionen und Agrochemikalien, dass historische Ansätze hier keine Lösung bieten können.

Es wurde jedoch festgestellt, dass Bauern und Bäuerinnen in der Lage sind, neue Landbewirtschaftungsstrategien zu entwickeln, wenn sie merken, dass ihre Lebensumwelt z.B. durch die Verknappung natürlicher Ressourcen unmittelbar bedroht ist und ihre bisherigen Wirtschaftsweisen keine Perspektiven mehr bieten. Dabei spielten die naturwissenschaftlich-technisch und ideologisch geprägten Institutionen wie z. B. der offizielle landwirtschaftliche Beratungsdienst oder andere staatliche Institutionen keine Rolle. Es handelt sich also um endogene Innovationen.

#### **4. Schlussfolgerungen**

Es wird deshalb vorgeschlagen, dass die Definition von indigenem Wissen erweitert wird um die Komponente der Fähigkeit zu Innovationen, die Antworten auf die Gegenwartsprobleme beinhalten. Dabei werden die entsprechenden Lösungsansätze von den Betroffenen selbst entwickelt, die entsprechenden Planungsinstitutionen können dann aber die Fortführung und Umsetzung der Ansätze unterstützen. Gegebenenfalls werden sie erweitert und

verbessert; z. B. kann die Verbesserung trockenheitsresistenter Getreidesorten in Forschungslaboren durchgeführt werden, wenn sie auf Experimenten der Bauern beruht und diese an der Fortführung der Entwicklung beteiligt werden.

Im Bereich Landnutzungsplanung können neue Ideen der Landnutzer/-innen aufgegriffen und in einen übergeordneten Planungszusammenhang gebracht werden. Dabei bietet das Instrument der Geographischen Informationssysteme (GIS), ursprünglich ein rein technisches Instrument, Möglichkeiten, die Landnutzer/-innen in den Planungsdialog miteinzubeziehen. Dazu wurde ein Konzept entwickelt, das eine Integration von wissenschaftlich-technischem Wissen und indigenem Wissen in der Landnutzungsplanung ermöglicht. Gegliedert in 15 Schritte wird eine Planung dargelegt, die zwei Feldaufenthalte, bei denen partizipative Methoden angewendet werden, den Dialog mit den entsprechenden Planungsbehörden, partizipative Planungsaktivitäten auf höheren Ebenen, die Einbettung der partizipativ erhobenen Informationen in ein GIS, Vorschläge für die Implementierung sowie partizipative Monitoringaktivitäten beinhaltet. Die Schwerpunkte liegen dabei auf der Einschätzung des spezifischen Wissens der unterschiedlichen Akteure, der Verbesserung von schwachen Schnittstellen der beteiligten Institutionen und der Konzentration auf die spezifischen Probleme der Landnutzungsplanung in China.

## Table of Contents

### PART I: THE NEED FOR INTEGRATING INDIGENOUS KNOWLEDGE

<b>1</b>	<b>Problem Statement</b>	<b>1</b>
<b>1.1</b>	<b>Problems of Rural Land Management in PR China</b>	<b>1</b>
1.1.1	Decrease of Arable Land	
1.1.2	Soil Degradation	4
1.1.3	Decreasing Water Resources	6
1.1.4	Poverty and Migration	8
<b>1.2</b>	<b>Legal Insecurity as a Principal Cause for for an Unsustainable Land Management</b>	<b>9</b>
1.2.1	Legal Situation and Institutions	10
1.2.2	Implementation at Local Levels	13
1.2.3	Forms of Land Tenure in Rural Areas	14
1.2.4	Problems of the Present Land Tenure System	16
1.2.5	Planning Procedures and Institutional Weaknesses	19
1.2.6	Decision Making at the Local Level	20
<b>1.3</b>	<b>Recent Discussions on Land Management and Land Tenure in China</b>	<b>22</b>
<b>2.</b>	<b>Indigenous Knowledge Systems</b>	<b>26</b>
<b>2.1</b>	<b>The Problems of High Technology in Development Approaches</b>	<b>26</b>
<b>2.2</b>	<b>Considering Indigenous Knowledge</b>	<b>28</b>
<b>2.3</b>	<b>What is Indigenous Knowledge?</b>	<b>33</b>
2.3.1	The Approach of Indigenous Technical Knowledge	36
2.3.2	The Approach of Indigenous Knowledge Systems	37
2.3.3	The Leiden Ethnosystems Perspective	38
2.3.4	The Actor-Oriented Approach	39
<b>2.4</b>	<b>Indigenous Knowledge and Power</b>	<b>40</b>
2.4.1	Hierarchy Within Knowledge Systems	40
2.4.2	Intellectual Property Rights	41

<b>2.5</b>	<b>Indigenous Knowledge and Gender</b>	<b>43</b>
2.5.1	Gender Roles in Knowledge Management	43
2.5.2	The Gender Bias	45
<b>2.6</b>	<b>The Role of Institutions as Actors in the Knowledge Process</b>	<b>47</b>
2.6.1	Governments and State Institutions	47
2.6.2	Local Level Organizations	48
2.6.3	Indigenous Knowledge and Development Organizations	51
<b>2.7</b>	<b>Concepts of Land Use Planning with Regard to Indigenous Knowledge</b>	<b>53</b>
<b>2.8</b>	<b>The Definition of Indigenous Knowledge of this Thesis</b>	<b>56</b>
<b>3</b>	<b>The Historical Dimension in China</b>	<b>57</b>
<b>3.1</b>	<b>The Historical Dimension of Land and Water Management</b>	<b>57</b>
3.1.1	Regionalization of Agriculture	58
3.1.2	Crop Cultivation and Field Systems	60
3.1.3	Irrigation	66
3.1.4	Agricultural Policy and Land Tenure	68
3.1.5	The Farmers' Livelihood	71
3.1.5.1	Influence of State and Society	71
3.1.5.2	Clan, Kinship and Family	71
<b>3.2</b>	<b>Knowledge Management</b>	<b>73</b>
<b>3.3</b>	<b>Chinese Visions of Nature and the Concept of <i>Feng Shui</i> as Part of the Historical Dimension</b>	<b>7</b>
<b>3.4</b>	<b>After Liberation: Promoting Ideological Knowledge</b>	<b>80</b>
<b>3.5</b>	<b>The Present Perception of Indigenous Knowledge</b>	<b>73</b>

<p><b>PART II: THE PARTICIPANTS' VIEW: LOCAL KNOWLEDGE IN LIUDU</b></p>
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<b>1</b>	<b>The Research Site</b>	<b>88</b>
1.1	Location of the Research Site	88
1.2	Reasons for the Selection of the Research Site	92

<b>2. Methodology</b>	<b>93</b>
<b>2.1 Methodology of the Assessment of Indigenous Knowledge in the Research Area</b>	<b>93</b>
2.1.1 The Participants View: Participatory Rural Appraisal	94
2.1.2 The Development of Maps	95
2.1.3 The Hidden Agenda	96
2.1.4 Assessment of Methodology	98
<b>3 Farming Systems in Liudu</b>	<b>100</b>
<b>3.1 Cropping Systems</b>	<b>100</b>
3.1.1 Irrigated Farmland	101
3.1.2 Rainfed Farmland	102
3.1.3 Agroforestry	104
3.1.4 Home Gardens	105
3.1.5 Paddy Fields	106
3.1.6 Summary of Cropping Systems	107
<b>3.2 Pest Management and Application of Fertilizers</b>	<b>110</b>
<b>3.3 Animal Production System</b>	<b>110</b>
<b>3.4 Indigenous Knowledge in the Farming System</b>	<b>111</b>
3.4.1 Mixed Cropping Patterns	111
3.4.2 Grafting of Persimmon Trees	112
3.4.3 Collecting and Preserving Wild Greens	113
<b>4 Cash Income and Off-farm Activities</b>	<b>117</b>
<b>5 Land Tenure</b>	<b>120</b>
<b>6 Changes of Land Use from 1993 to 1997</b>	<b>125</b>
6.1 Land Use in 1993	125
6.2 Land Use in 1995	128
6.3 Land Use in 1997	132
6.4 Land Use Planning Process	134
<b>7 Land Use Options in the Villagers' Eyes and Decision Making of Farmers</b>	<b>141</b>
<b>8 Land Use and Indigenous Knowledge</b>	<b>146</b>
<b>9 Whose Knowledge Counts: Actors and Beneficiaries</b>	<b>151</b>

<b>9.1</b>	<b>Mr. Wang Yufu - the Local Expert (<i>Xiangturencai</i>)</b>	<b>151</b>
<b>9.2</b>	<b>The <i>Feng Shui</i> Expert</b>	<b>152</b>
<b>9.3</b>	<b>Innovative Villagers</b>	<b>155</b>
<b>9.4</b>	<b>Ordinary Female and Male Farmers</b>	<b>158</b>
<b>9.5</b>	<b>Village Leaders</b>	<b>162</b>
<b>9.6</b>	<b>Local Institutions</b>	<b>165</b>
<b>10</b>	<b>The Communication and Extension Process</b>	<b>167</b>
10.1	The Official Extension Service as a Knowledge Agent	167
10.2	The Meaning of Relationships and Mutual Help	168
<b>11</b>	<b>The Main Problems in <i>Liudu</i> Concerning Land Use</b>	<b>1171</b>

## **PART III: CONCLUSIONS**

<b>1</b>	<b>Connecting Findings and Problems</b>	<b>175</b>
1.1	Environmental Degradation	175
1.2	Migration	176
1.3	Unclear Land Tenure	176
1.4	Institutional Constraints	177
<b>2</b>	<b>The Role of Indigenous Knowledge in Land Management</b>	<b>179</b>
2.1	What is the Relationship that People Have to their Knowledge?	182
2.2	Which Kind of Knowledge is Needed and by Whom?	183
<b>3</b>	<b>Shortcomings and Limits of Indigenous Knowledge</b>	<b>183</b>
<b>4</b>	<b>How can Integrating Indigenous Knowledge Contribute to a Sustainable Land Management?</b>	<b>184</b>
<b>5</b>	<b>Steps of a Participatory Land Use Planning and the Interaction of Indigenous Knowledge and Modern Technology</b>	<b>185</b>

<b>6</b>	<b>Concluding Remarks</b>	<b>195</b>
	<b>Annex</b>	<b>196</b>
<b>1</b>	<b>Important Agricultural Innovations in Chinese History</b>	<b>197</b>
<b>2</b>	<b>Resource Persons</b>	<b>199</b>
<b>3</b>	<b>Interview Guide-line for the Research in Liudu</b>	<b>200</b>
<b>4</b>	<b>Answers to Interviews in August 1993</b>	<b>201</b>
<b>5</b>	<b>List of Participatory Rural Appraisal Techniques</b>	<b>202</b>
	<b>References</b>	<b>204</b>

**List of Charts**

Chart 1: Increase of irrigated land irrigated land	6
Chart 2: Institutional arrangement of the State Land Administration	12
Chart 3: Levels of Decision making and Activities (Uphoff 1993: 5)	49
Chart 4: Household income of informants 1993	118
Chart 5: Cultivated contract land per household 1993	122
Chart 6: Contract trees per household 1993	122
Chart 7: Decision making process on land use for Liudu	136
Chart 8: Daily activity profile	161
Chart 9: Institution analysis made by leaders	165
Chart 10: Institutions in Liudu drawn by Mr. Wang	166

**List of Maps**

Map 1: Agricultural areas of China	60
Map 2: Residential map of Sibeichai (Hebei)	73
Map 3: Location of Liudu	90
Map 5: Land use in Liudu 1993	127
Map 6: Land use in Liudu in 1995	131
Map 7: Land Use in Liudu in 1997	133
Map 8: Land use and indigenous knowledge in Liudu	148
Map 9: Scattered Land Plots in Liudu	173

**List of Photos**

Photo 1: Ridge farming in Liudu August 1997	61
Photo 2: A pigsty in Hebei October 1992	63
Photo 3: Irrigation in Liudu in April 1994	66
Photo 4: Paternoster irrigation in Hebei 1998	67
Photo 5: Irrigation well in Liudu	68
Photo 6: A rural clan house in Jiangxi Province with political slogans	82
Photo 7: Heavenly harmony: Traditional gods and Mao Zedong side by side	85
Photo 8: Studying aerial photos (April 1994)	91
Photo 9: Aerial photo of Liudu, taken in 1989	91
Photo 10: Looking on Liudu towards south-west (October 1993)	92
Photo 11: Irrigated farmland (April 1994)	102
Photo 12: Rainfed fields (October 1994)	103
Photo 13: Rainfed agroforestry with persimmons (April 1994)	104
Photo 14: Irrigated agroforestry with persimmon and prickly ash (October 1995)	105
Photo 15: Home garden (September 1997)	106
Photo 16: Paddy fields on reclamation land (October 1995)	107
Photo 17: Maize and kidney beans intercropping system (August 1997)	112
Photo 18: Mr. Wang Yufu and a persimmon tree he has grafted.	113

Photo 19: Classified forest (October 1995)	125
Photo 20: Land encased for the use of tourism (October 1995)	130
Photo 21: A valley with yangpo and yinpo (October 1993)	149
Photo 22: The Feng shui Master (center) in his house (April 1994)	154
Photo 23: The traditional division of labor in the fields (October 1993)	160

## List of Pictures

Picture 1: Han model of a pigsty and toilet	63
Picture 2: Irrigation during the Han dynasty	66
Picture 3: Paternoster irrigation in Han Dynasty	67
Picture 4: Irrigation well during the Ming Dynasty	68
Picture 5: Fragmentation of crop land which belongs to the families of <i>Taitou</i>	70
Picture 6: Recycling of traditional structures	84
Picture 7: Characteristics of rainfed fields on slopes, according to Wang Yufu	149
Picture 8: The ideal <i>feng shui</i> of a village	150

## List of Tables

Table 1: Changes of arable land 1964-1994	2
Table 2: Major causes of arable land degradation in China, 1996	5
Table 3: Land use scale per household and land transfers 1984-90	17
Table 4: Productively merging indigenous and scientific knowledge systems	29
Table 5: Current knowledge system characteristics	33
Table 6: Various definitions for knowledge understood opposite to scientific knowledge	37
Table 7: Agricultural calendar for the cropping systems in <i>Liudu</i>	100
Table 8: List of crops in Liudu according to cropping systems	107
Table 9: Comments regarding major land use systems	141
Table 10: Factors influencing decision making of male farmers for growing winter wheat	142
Table 11: Goals of village leaders	164
Table 12: Categories of actors in the land use planning process	185
Table 13: Example of organization from field results to GIS layers	191
Table 14: Proposed format of a village development plan	193

## Abbreviations

AKIS	Agricultural Knowledge and Information System
CATEC	County Agricultural Technology Extension Center
CIAD	Center for Integrated Agricultural Development (at Beijing Agricultural University)
CIKARD	Center for Indigenous Knowledge for Agriculture and Rural Development
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trijo (International Maize and Wheat Improvement Centre)
CIP	Centro Internacional de Papa (International Potato Centre)
FAO	Food and Agriculture Organization of the United Nations
FSR	Farming Systems Research
GATT	General Agreement on Tariffs and Trade
GIS	Geo-information Systems
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
ha	Hectare
HYV	High Yield Variety
IIED	International Institute for Environment and Development
IKS	Indigenous Knowledge Systems
ILEIA	Centre for Research and Information Exchange in Ecologically Sound Agriculture
IRRI	International Rice Research Institute
ISNAR	International Service for National Agricultural Research
IUCN	International Union for Conservation of Nature
kg	Kilogram
kWh	Kilo Watt Hour
LEAD	Leiden Ethnosystems and Development Program
MAB	Man and Biosphere Program of the United Nations
NGO	Non-government organization
NPC	National Party Congress
OECD	Organization for Economic Co-operation and Development
PAN	Pesticides Action Network
PAR	Participatory Action Research
PR	Peoples' Republic
PRA	Rapid Rural Appraisal
PTD	Participatory Technology Development
RMB	Yuan Renminbi (in March 1998, 100 DM were equal to 450 RMB)
RRA	Participatory Rural Appraisal

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SLA	State Land Administration of PR China
sqkm	Squarekilometre
sqm	Squaremetre
UN	United Nations
UNCED	United Nations Conference on Environmental Development
UNEP	United Nations Environmental Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
USDA	United States Department of Agriculture
USDA	United States Department of Agriculture
WWF	World Wide Fund for Nature

**Chinese Glossary**

Dadui	Brigade
Fen	Here: 0.1 mu, 66.7 sqm
Danwei	Working Unit (sometimes used by villagers for an institution)
Feng Shui	Wind and water, Chinese Geomancy
Fulian	All China Women's Federation
Gongsi	Company
Guanxi	Relationships
Handi	Rainfed farmland
Jin	0.5 kg
Mao	1.1 RMB
Mu	1/15 ha
Luopan	Chinese Geomancy
Pai Mai	Auction
Putonghua	Mandarin Chinese
Qi	Cosmic breath
Tudi guanli	Land management, land administration
Wu wei	Principle of doing nothing, actionless
Xiaodui	Production team, now often called xiaozu
Xiangturencai	Local expert
Yin, yang	Two opposing forces in Chinese cosmology

## **PART I: THE NEED FOR INTEGRATING INDIGENOUS KNOWLEDGE**

### **1 Problem Statement**

#### **1.1 Problems of Rural Land Management in PR China**

At the beginning of the 1990s, rural land management in PR China had to face a historical legacy of environmental destruction, the decrease of cultivated land and the need to produce food for a growing population with diminishing natural resources.

After 1949, the communist government implemented a policy that put emphasis on the industrialization and transformation of an agrarian into a relatively highly industrialized country. On the one hand, this has led to an increase of productivity of the industrial and agrarian sector, on the other hand it has also accelerated the destruction of natural resources: pollution and over-exploitation of soil, water and air are the results (Betke 1998, Betke and K uchler 1987, Edmonds 1994, Janz 1987, Smil 1993). The economic liberalization in the 1980s has not improved the environmental situation, though a decentralized policy has enabled local decision makers and farmers to implement a locally adapted land management. But the increasing growth of local industries and the subsequent demands of local consumers has consequently enlarged the pressure on natural resources.

The following chapters do not repeat a description of China's environmental degradation as the above mentioned sources provide already an excellent analysis. Instead, a short introduction about rural problems in the 1990s that relate to land use planning is given.

##### **1.1.1 Decrease of Arable Land**

Since the founding of PR China, agricultural land has been declining despite of massive land reclamation programs. Official figures indicate an annual net loss of 520,000 ha arable land between 1957 and 1987 (State Land Administration, according to Smil 1993: 56) the FAO Production Statistics (FAOSTAT 1996) has slightly smaller figures. Smil (1993) and Brown (1995: 55ff) predict a similar or even higher annual loss for the next thirty years.

Table 1: Changes of arable land in PR China, 1964-1994

	1964	1974	1984	1994
Arable land (in 1000 ha)	102,688	99,284	95,404	92,016
Arable land per capita (in ha)	0.14	0.11	0.09	0.08
Annual loss 1964-1974 (in 1000 ha)		340		
Annual loss 1974-1984 (in 1000 ha)			380	
Annual loss 1984-1994 (in 1000 ha)				340
Total loss 1964-1994 (in 1000 ha)				10,172

Source: FAOSTAT Database Results (1996)

The table indicates an average annual loss of 340,000 ha. There are no significant changes in the amount of losses before and after the introduction of the household responsibility system. In contrast, Smil (1993: 142) gives figures for a peak in 1985 with almost 1 million ha. Ash and Edmonds (1998: 838 pp) claim an average shrinkage of 500,000 ha between 1981 and 1986. Both sources, FAOSTAT Database Results (1998) and Ash and Edmonds (1998: 838) say, that the trend of a net loss in arable land was halted in 1994, 1995 and 1996, due to the impact of governmental policies to promote grain production and associated efforts to halt serious loss of agricultural land due to rapid industrialization and urbanization. Most of the land reclamation programs, however, were carried out in Heilongjiang, Inner Mongolia and *Xinjiang*, whereas most of the other provinces still face serious net losses. In 1999, however, the newly founded Ministry of Land and Resources admitted that there was a net loss of arable land in 1997 of 135,330 ha and in 1998 of 200,000 ha. (Liu Yinglang 1999).

The total loss of more than 10 million ha from 1964 to 1994 arable land forms app. 10% of the total arable area. The picture looks even more dramatic for the per capita ratios: from 1964 to 1994 the per capita arable land decreased by 43% due to the increase of the population and the decrease of arable land.

There has been a long academic debate about the real area under cultivation in China. In 1989, an official of the State Land Administration admitted that, according to an official land survey, the actual area under cultivation is 20-30% higher than originally reported (Smil 1993: 54). Other figures even estimate a gap of 40-50% (Betke and K uchler 1987: 91). However, all sources indicate an annual loss of cultivated land in absolute numbers as well as per capita. Brown (1995: 61) quotes for 1995 an average of 0.075 ha grainland per capita according to an USDA<sup>4</sup> census and predicts a further decrease to 0.035 ha in 2030. The FAO Production Yearbook 1994 counts an area of 0.08 ha of arable land per capita

<sup>4</sup> USDA = United States Department of Agriculture.

(without permanent crops).

The causes of the shrinking cropland are the following.

- **Conversion into non-agricultural uses.** This includes urban expansion, urban and rural housing, transportation links and construction of infrastructure like paths and ditches, urban and rural industrialization, and tourism<sup>5</sup>. With the improvement of the living standards of Chinese peasants in many areas, their demand for living space, recreation and individual transportation is expanding, too.
- **Abandonment of marginal land.** Due to declining soil productivity, decreasing water availability for irrigation and small plots with no economies of scale, farmers tend to leave marginal land in permanent fallow. This trend is accelerated by the growing non-agricultural income generating activities, i. e., in village and township enterprises, which enable the peasants to buy subsidized food in the market.
- **Decrease of multiple cropping.** With the increase of non-farm activities, farmers sometimes abandon the labor-intensive traditional multiple cropping fields. This is in contrast to government efforts to increase the multiple cropping index and so increase the totally sown area. This policy aims at cultivating the same field twice (in Northern China) or even three time a year instead of three times in two years. This has led to an over-exploitation of soil and groundwater resources in many regions of China.
- **Natural disasters.** In 1991, the proportion of arable land loss resulting from natural disasters was almost 25%. In 1998, with the serious floods in Southern China the percentage might be even higher, however, the long-term impact of natural disasters has not yet been assessed (Ash and Edmonds 1998: 348).

In 1994, Lester Brown initiated a world-wide discussion on the shrinking farmland in China. In his article on the World Watch Magazine (Brown 1994) and his subsequent book (Brown 1995), he points out that a growing population and an increasing consumption of meat will lead to a massive demand for grain which cannot be met by China alone (1994: 12). Moreover, he adds, the ongoing industrialization causes a further disappearing of cropland and over-exploitation of resources such as water which is needed for irrigation. Using the development of Japan, South Korea and Taiwan as references, he predicts that by 2030, China will have to import an amount of grain that is higher than the present grain production output of the United States (Brown 1994: 17).

Brown (1995: 64) concludes that

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<sup>5</sup> Though officially hotels and tourist resorts cannot be built on agricultural land, Chinese government institutions open "training centers" in scenic places of rural China in order to avoid bureaucratic hurdles (The Economist July 24, 1997, quoting Beijing Evening News and pers. comm. Chen Yong 1997). In Liudu, the number of "training centers" has increased from one in 1992 to four in 1997.

"...this seemingly inevitable loss of land is not so much a matter of land use policy as it is a function of population density relative to cropland..."

I do not agree with this statement. With my research, I will show that improper and unsustainable land management in the Chinese countryside is the result of unstable and unsystematic policy and the uncertainties in its implementation at the local level. Therefore, farmers' motivation to improve their farming activities and to apply their indigenous knowledge is not promoted. Moreover, the below described problems of erosion and salinization/alkalinization are also due to an improper and non-sustainable land management. Therefore, there is a need to develop concepts and to implement activities for land use planning at national and local levels.

### **1.1.2 Soil Degradation**

In general, soil degradation comprises two aspects: soil erosion and the declining of soil quality (decreasing soil fertility, salinization and alkalization). Since the case study village of Liudu only faces minor problems with decreasing soil fertility, these problems are only shortly mentioned here. They are, however, serious problems in the rest of China (Betke and K uchler 1987, Smil 1993, Cai Yunlong 1990, Edmonds 1994), with the most affected area in the Loess Plateau of the Huanghe Valley. Edmonds (1994: 62) quotes Chinese sources that China has the most serious soil erosion problem in the world. According to Chinese definitions, the eroded surface has increased from 1.16 million sq km in the 1950s and 1.8 million sq km in the 1980s to 3.67 million sq km in 1993 (Betke and K uchler 1987: 90f, Edmonds 1994: 63), an area far larger than the amount of arable land and in 1993 almost 40% of the total arable land. Estimates in 1996 even talk about 8.3 million sq km or 60% of the total arable area (Ash and Edmonds 1998: 360), depending on the estimates for the arable land.

In addition, 197,000 sq km are desertified lands, of which 65,000 sq km have been desertified in the period of 1949-1980. A further 158,000 sq km are undergoing desertification (Edmonds 1994: 63, Cai Yunlong 1990: 340f).

The major causes of erosion in China are deforestation, slope cultivation, overgrazing, inappropriate agricultural land use, and poorly managed urban/industrial land use including communication. Chinese statistics say that erosion has become more serious since the mid-1980s despite intensified soil conservation efforts (Ash and Edmonds 1998: 860). The following table shows the major causes of soil degradation in 1996 as they were presented on the fifth conference of the China Council for International Cooperation on Environment and Development in Shanghai 1996. It clearly shows that erosion is the biggest cause, followed by desertification. Pollution contributes 12% and salinization-alkalinization more than 7% to land degradation.

Table 2: Major causes of arable land degradation in China, 1996

Category	Area (sq km)	Per cent
Erosion	4 million	48.1
Arid land degradation (desertification)	1.5 million	18.0
Salinization-alkalization and water-logging	0.6 million	7.3
Pollution	1 million	12.0
Other	1.2 million	14.6
<b>Total</b>	<b>8.32 million</b>	<b>100.0</b>

Source: Ash and Edmonds (1998: 860, modified)

### 1.1.3 Decreasing Water Resources

The increasing water shortage Northern China's rural and urban areas is one of the most serious problems. The case study area of Liudu also faces serious constraints in crop cultivation due to the depletion of ground water resources.

The spatial distribution of water in China shows significant differences between North and South. The 500-mm isohyet running from Heilongjiang to the border to Myanmar separates the dry northern and north-western part the more humid coastal areas and the Southwest. The case study area is near Beijing and has an average annual precipitation of 480 mm. Summer rains contribute 60-70% to the annual rainfall.

Fresh water availability also varies with time and location. The South has 82% of the total volume of water, but 36% of the cultivated areas, North and Northeastern China have to use 9% of the water resources for 40% of the cultivated area. At present, the average per capita fresh water reserve in China is only 2,500 cubic meters (China's Agenda 21 1994). It is estimated that by the 2000 the level will be decreasing to 2,200 cubic meters Edmonds (1994: 118).

According to Smil (1993: 44), in the 1950s, Beijing's groundwater table was five meters below the surface, but today it has decreased to a depth of 50 meters. Edmonds (1994: 116) also estimates that in the North China Plain the groundwater table has been decreasing at an average of one to two meters per year. 70% of the known water resources in North China are already being tapped and the potential for further exploitation is limited. Some rivers in Northern China are completely dried up during the dry winter period, i.e. the Huang River, and the Hai and Luan Rivers in the area of this study have only very limited water reserves.

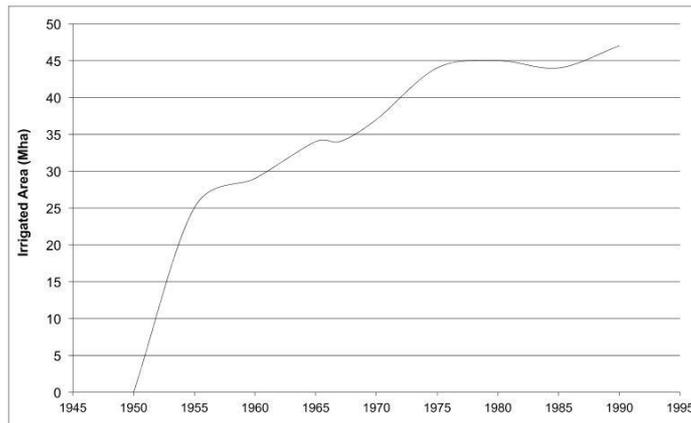


Chart 1: Increase of irrigated land in Mha (based on Smil 1993: 45)

The main cause for the decreasing water resources is agricultural irrigation. It is estimated that 84% of China's water use is spent for irrigation, comprising an area of 45% of China's total farmland (Smil 1993: 44). Chart 1 shows that in the 1950s, the share of irrigated farmland was only 16%, in 1965 it has already increased to 35%. Another reason was the introduction of two harvests per year instead of the traditional three harvests in two years.

The shortage of water is worsened by the ineffective use of water. Edmonds (1994: 115) writes that China produces the same amount of grain with 66% more water than developed countries. It is estimated that 60% of the irrigation water is squandered due to evaporation and percolation. Current land management practices do not yet consider the scarcity of water. There is almost no awareness about sustainable use of water. In the countryside, there are unrealistically low water prices (which are seldom collected) and the use of water is not metered individually (see case study of Liudu). In my interviews in Northern China from 1990 to 1996 all local decision makers and farmers complained about decreasing water resources, but very few were aware about the ineffectiveness of their irrigation systems. In many cases (grain, oilseeds, cotton) farmers have to follow production quotas and cannot decide if irrigation of crops is sustainable or not. In the cities and factories meters are often broken or unread (Edmonds 1994: 117). Beijing utilizes more than 4,000 million tons of water annually, mainly from exploiting groundwater resources. In dry years Beijing has almost no water reserves and after the most serious drought in 1981 there was no water in reservoirs and lakes even in the rainy season.

The effects of water shortage in the countryside can be perceived by the farmers who have difficulties to grow rice even in traditional rice-growing areas. Smil (1993: 47) writes that one quarter of Shanxi's irrigated fields do not have sufficient water and 10% of the province's peasants face serious drinking water shortages. Near big cities, urban and agricultural needs compete. Edmonds (1994: 117) describes the case of Shunyi near Beijing. Farmers had to stop to use water from the *Miyun* Reservoir because this had to be

used as drinking water for the capital. Impacts of the water shortage and the mismanagement of water resources are the above mentioned salinization and alkalization of the soil and the increase of the siltation in the rivers.

Another aspect is that the quality of the irrigation water has decreased, especially in the suburban areas, where water flows untreated into rivers, in addition to the washed away fertilizers and pesticides from agriculture. In 1996, 78% of river sections near cities are polluted and unfit for use as drinking water (Vermeer 1998: 968). In 1984, 10,4% of all rivers in China had water unsuitable for irrigation, a number that is steadily increasing (Nickum 1998: 887).

The answers of Chinese planners to the decreasing quantity and quality of water resources are mainly efforts to transfer large amount of waters from rural into urban areas. In the 1980s, water was diverted from the Luan River in order to improve the water supply of *Tianjin*. Other big projects were carried out for *Tangshan*, *Dalian*, and many places in Inner Mongolia and *Shanxi* (Edmonds 1994). Thousands of villages and millions of farmers are directly affected by this policy. It has also a potential impact on the future life of the people in Liudu.

At the local level, efforts have been made to line irrigation channels with bricks and cement, and other water saving technologies have been tried. They have had little effect. Among village leaders and villagers, no concepts exist how to protect water resources, and how to adapt agricultural production to a situation with decreasing resources. The official extension service had often focused on modern, but not adapted irrigated farming systems and therefore contributed to the over-exploitation of water resources.

In the future, at the local level, concepts have to be developed to save water for irrigation such as calculating the amount of water used and installing of water saving devices. In addition, new drought resistant varieties should be tested. Here the agricultural universities and research institutes have already done some research and they should now cooperate with the local levels.

It is the task of planning at a higher level to consider the need of an economically and ecologically adapted agriculture. The tendency in China at the beginning of the 90s is definitely to generate income through off-farm activities. Even though producer prices are still subsidized, the income from agricultural production is still low. Resources like water are increasingly depleted both by agricultural and industrial production. On the other hand, China needs to feed its increasing population. This dilemma cannot be solved at the local level, it is an overall planning task. However, world-wide experience has shown that even planning at higher levels cannot be successful and sustainable if problems, potentials and needs of local levels are not being considered.

In order to develop an agriculture that can meet the needs of the population, indigenous knowledge at the local level has to be taken into account and has to be improved, since it has been neglected for such a long time.

#### 1.1.4 Poverty and Migration

In this chapter, I will not analyze the general patterns of migration in current China, but will instead shortly describe the implications of migration at the local level concerning land management and the effects on the development of local knowledge.

The Chinese government had long prevented a rural exodus by imposing strict registration laws for all urban and rural inhabitants. This, together with a still growing rural population, has led to an overpopulation with few income earning opportunities in the countryside. The scarce land resources could not provide food and income for the rural people. The facilitation of getting an – at least temporary – urban residence and work permit (*hukou*) and the ease of travel restrictions motivated millions of rural inhabitants to look for better living conditions in the cities. It is estimated that there are between 70 and 100 million migrant workers in China (Stein 1995, quoting statistics from the Chinese Ministry of Agriculture and media estimates).

Surveys carried out by CIAD (CIAD 1994b) indicate that mainly the men migrate seasonally or permanently to earn money. Only a few unmarried young girls go out to serve in restaurants or work as baby sitters. In the case study villages in *Hebei* Province the percentage of male migration from the total male labor force between 18 and 60 years ranged between 30% and 74%. Within this range about 10% is permanent migration, 90% is seasonal. The different kinds of migration have different impacts on rural women and the way land is managed.

**Impacts of permanent migration.** In this case, the income is relatively high and its source more stable. Because of the limited size of the contracted land, wives, elderly people and children can manage the farming without hiring labor even during the seasons of intense work. Often, such kind of households will not contract idle mountain land due to the lack of labor. However, a few better-off households contract additional waste land to carry out specialized crop production. The contract land can be managed by hired labor.

**Impacts of seasonal migration.** Because the source of this kind of income is not stable, the remaining family members always try to put more work into the farm and use every opportunity to earn additional money. They undertake all the daily tasks of the land management, having the men earning off-farm income. Women and children may take over additional income generating activities in the village, if possible.

**Impacts of daily migration (commuting).** The impacts are similar to those of seasonal migration, but often the out-migrating men can take over agricultural tasks when they come home from work and during weekends.

All three patterns of migration have influenced the labor distribution by gender in the rural areas. Women take now over more activities in managing the fields. Some sources say that this has led to a decrease of land management because women cannot take over heavy tasks (Zhu Ling and Zhang Yongyi 1993: 448). Others indicate that migration should be encouraged because in degraded and overpopulated areas it helps to improve environmental management (Zhou Weiwen 1995: 109, Zhou Xiao 1996: 131 pp.).

Concerning the application of indigenous knowledge, migration hinders people to use their agricultural knowledge because the out-migrating family members often do not transfer their knowledge to the remaining people. Surveys indicate that only one percent of the wives acquired their agricultural knowledge from their husbands (Janz 1993: 9). Some authors (Stein 1995, Zhou Xiao 1996: 137 pp), however, see migration as a necessary by-product of progress. Zhou Xiao develops in her book the hypothesis that farmers, and not institutions and national policies have always been the motor of changes in rural China. She sees migrant peasants as main innovators of private business and, therefore, of wealth. In some villages migration is promoted as "the most important means of generating income and eradicating poverty" (Croll and Ping 1997: 131). Therefore, if farmers' innovations are included in the development of indigenous knowledge, they are an important element of knowledge management. According to Zhou Xiao, peasant's migration promotes the development of innovations. Betke (1998 b: 105), however, sees the "power of the farmers" still narrowed by the power of local decision makers, thus the agencies of the state government.

Zhou Xiao's conclusions mainly concern the non-agricultural sector and can therefore not provide evidence to integrating peasants' innovations into sustainable land management. Croll and Ping (1997: 135), in contrast, conclude from a recently done study on migration and agriculture that one reason for out-migration was scarcity of land per capita and land quality, but that farmers were migrating out rather than taking advantage of any opportunities to increase the size of land holdings and to develop innovations concerning land management. If farming households had to continue crop cultivation, they had to develop off-farm income generating activities and/or to migrate to earn cash to subsidize agriculture. Sometimes agriculture has become a supplementary side-line activity.

Therefore, it is difficult to predict how poverty and migration influence the possibilities of the development of a sustainable land management in China. The remaining population in the countryside has to be provided with better living conditions and more income generating facilities. These can be both in the sector of non-agricultural activities and rural industries, and in intensifying and improving the land management.

## **1.2 Legal Insecurity as a Principal Cause for Unsustainable Land Management**

The problems described above are often the results of an arbitrary legal situation

concerning land use and land rights still reflecting a transition from a system of collective and state ownership of land towards a privately managed system. The situation of land tenure in China is very complex and it is difficult to make a general statement for the following reasons.

- the situation is so dynamic that laws and regulations as well as the actual implementation change quickly,
- the de facto decision making about land use rights is extremely decentralized. Thus, there might be different forms in every county or even village,
- there is only few academic literature on China's land management systems available to the English-speaking world<sup>6</sup>. Most of the available articles focus on the urban real estate market or on the more progressive areas in Guangdong (Lai 1995, Zhang and Makeham 1992).

The following description is based on assessing publications on the legal situation (Chen Fu et al 1986; Dong 1996; He 1995; Hu Wei 1997, Huang 1995; Lai 1995) of land tenure, on interviews with resource persons who are involved in land management and on my research in the research area for this thesis.

### 1.2.1. Legal Situation and Institutions

In December 1988, the Seventh National People's Congress approved the revised "Land Administration Law of the People's Republic of China" of 1986<sup>7</sup>. This law legalized the "household responsibility system" (*jiating lianchan chengbao*) which had been developed in many regions of China at the beginning of the 1980s. The system of collective agricultural production was abolished and each family was entitled to certain plots of land. Though various regulations and instructions have been issued since then, this law still forms the basis for the **rural** land tenure system. The following articles are relevant for rural land tenure.

"Article 6. Land in the urban areas of cities shall be owned by the whole people, namely owned by the state.

Land in rural and suburban areas shall be owned by collectives...; house sites and private plots of cropland and hilly land shall also be owned by collectives.

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<sup>6</sup> According to Chen Fu et al. (1997: 45), there are, however, heated debates inside the country which as for the beginning of the 1990s have been partly documented in Chinese publications.

<sup>7</sup> The official Chinese translation talks about "land administration" whereas Ross 1988 quotes another translation that uses the term "land management".

Article 8. Collective-owned land shall belong lawfully to peasant collectives of a village and shall be operated and managed by agricultural economic organizations such as village agricultural producers' cooperatives or villagers' committees...

Article 12. Land owned by collectives and state-owned land used by units under ownership by the whole people or under collective ownership may be operated under a contract by collectives or individuals for agricultural, forestry, livestock and fishery production"

These articles clearly state that rural land is owned by the collectives (*dadui*), the unit of production above the production team (*xiaodui*) during the time of the Peoples' Communes.

In 1991, regulations for the implementation of this law and the relevant regulations on granting and transferring the right to the use of state-owned land in cities and towns were issued.

The laws and regulations include the legislative innovation of (transferable) "land use rights" of individuals and collectives and inalienable "land ownership" by the state. The State Land Administration, founded in 1987, is entitled to "sell" land use rights and use this money as their budget (pers. comm. Zhang 1996).

The State Land Administration (SLA) is responsible for the implementation of the Land Administration Law. It has the following tasks.

- to contribute to the formulation and implementation of government policies, laws and administrative regulations;
- to collect national land use maps, examine land use maps at provincial level, and publish annual national land use plans;
- to assume responsibility for cadastral management, statistics and registration at national level;
- to facilitate and register land use once it has been approved by the State Council;
- to monitor land use in all towns and provinces and balance urban and rural land use claims;
- to investigate illegal land use in rural and urban areas and mediate in land use disputes;
- to be active in the fields of public relations, education, science and technology, and foster links with institutions abroad" (quoted after DSE 1989);
- to survey land resources and design general land use plans in urban and rural areas;
- to supervise land use patterns and land quality changes, and to protect land resources from degradation (Qu Futian et al 1995: 196f).

The SLA<sup>8</sup> is divided into institutional units and administrative departments and offices. The institutional units work under economic conditions, some of them have been transferred into semi-private companies. The China Land Surveying and Planning Institute and the China Real Estate Consulting and Appraisal Center take over planning assignments in urban construction areas and free trade development zones. Clients are companies that want to invest in the respective areas. Within the departments the Department of Land Use Planning is the main body for **rural** land use planning and should take over the above mentioned tasks. The Department of Cadastral Management and the Department of Land Management for Construction are responsible for urban areas.

The SLA has also offices at provincial and county levels and officially has the task to carry out local land use planning. In reality, however, this mandate is often neglected, since other line ministries such as agriculture and forestry carry out their own land use planning.

This means that the SLA has only a limited competence because decisions on land use are taken by many departments. In urban areas, the land administration is now controlled by the urban construction administrative bureau (Qu Futian et al. 1995: 197). In the countryside, the Agricultural Zoning Bureau (*nongye quhua bangongshi*), a line agency of the Ministry of Agriculture, deals with land use planning, too. Originally, it was only responsible for the implementation of the Basic Farmland Protection Regulation, passed in 1994, but now it also takes over land use planning assignments (pers. comm. He Xiping Oct. 1995). The Basic Farmland Protection Regulation, passed in 1994, requires the designation of basic farmland protection districts at the township level and prohibits any conversion of land in those districts to other uses. It also requires that a quota of farmland preservation should be determined first and then allocated to lower-level governments in the five-level administrative chain (the state, province, city, county and township). Other agricultural organizations conduct activities in rural real estate management and land dispute treatment. Classified forest land is separately planned by line agencies of the State Forest Administration. The Ministry of Water Resources is responsible for the planning of waters, the Ministry of Interior and the Ministry of Construction carry out regional and urban planning.

Laws and regulations do not give clear pictures of clarifying or integrating responsibilities. Even worse, the government has cut the budgets for most of the agencies at national and local levels. Therefore, many have been transferred into commercial companies (*gongsi*) for surveying and mapping, for agricultural planning, etc. They all can take over land use planning activities in order to raise funds which resulted in conflicts between the

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<sup>8</sup> In March 1998, the Ninth People's Congress decided to merge the SLA, the Ministry of Mining and the Ministry of Forestry into a new Ministry of Natural Resources (pers. comm. Yan Tailai Sept. 1998). This research was completed in 1997, and therefore the information on the SLA only displays the period until September 1997.

departments concerned (Cai Yunlong 1990: 342, pers. comm. Xie Jingrong Oct. 1995 and own observations).

In order to address these problems, in April 1998, the State Land Administration (together with the Ministry of Geology and Mineral Resources, the State Bureau of Surveying and Mapping, and the National Bureau of Oceanography) was transferred into the Ministry of Land and Natural Resources. One of its first activities was to revise the Land Management Law. It was put into effect on January 1<sup>st</sup>, 1999. The new law emphasizes the protection of farmland. 80% of the total farmland should be protected and construction of non-agricultural projects on these lands should require permission of the State Council (Liu Yinglang October 1998). The law also includes regulations to extend the period of land use contracts for individual farmers to 30 years.

### 1.2.2 Implementation at Local Levels

After abolishing the collective production system in 1983, the political and social functions of the communes (*gongshe*) were transferred to the local government of the townships (*xiang*). At the village level, the village committee (*cun weihui*) was put in charge of the tasks of the former brigades (*dadui*) (variations and unclear responsibilities see below).

The village committee is thus responsible for the distribution of the collectively owned land to the individual farm households. This can take many forms. In general, the size of land given to each family is dependent on the land resources of the village and on the number of family members. He Daofeng (1992: 5)<sup>9</sup> found in his survey that 70% of all villages distributed the land according to the number of family members, and 25% according to the labor in the family, the rest had other forms.<sup>10</sup>

Officially, farmers do not have to pay lease for their plots, but they have several obligations: quota deliveries to the government, agricultural taxes and village community charges. In reality, however, monetary charges are often not paid. Thümmel (1995: 141) gives the example of a survey in Zhejiang Province where 50% of the land was leased without payment and for the remaining land only 78% of the fees were really paid. This situation corresponds with my own observations in the research area. A reason is that many local decision makers - being themselves members of the village community - do not charge farmers in order to avoid unrest among farmers.

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<sup>9</sup> He presents data gained through a nationwide questionnaire survey about changes of the rural land system of 253 villages, carried out from 1981 to 1983. The findings might be outdated now, but they are here used to show certain tendencies.

<sup>10</sup> Only 0.2% of the all sample villages and 0.3 % of the total cultivated land remained collectively cultivated mainly near big cities, like in Shunyi, a suburb county of Beijing (Chen Fu et al. 1997: 16f).

In many regions, the size of the plots contracted to the farm families is sufficient to meet subsistence needs (Croll 1994: 99). In Hebei, the average size of a family farm is 3-4 mu<sup>11</sup> (Avenarius 1994: 35 and my own investigations 1990-1996). In 80% of the villages in PR China land quality is considered during distribution: fertile, medium and poor land is distributed equally (He Daofeng 1992: 8). This is also the case in the survey site of *Liudu*.

In order to keep pace with changes in the household composition (births, deaths, marriage of daughters<sup>12</sup> to other villages, out-migration for education or work, non-agricultural activities), the land can be redistributed every 3 to 15 years. The period can vary from village to village. The case study village of *Liudu* redistributes every three to five years. Avenarius (1994: 35) talks about 15 years for the vicinity of Beijing: Judd (1994: 28) quotes that there is no definite period for the North China villages she has surveyed. He Daofeng (1992: 9) says that more than 30% of the villages have no regulation about this procedure, of the remaining part, only 50% had written them down.

The land is contracted to the family, but mostly under the control of the husband/father which leads to the fact that daughters who marry outside the family (*cong fu ju*, the common system in China) may not have any land (Judd 1994: 34). After the woman has married, she has to move to her husband's family. She loses the access to land in her own village, but will be landless until the next redistribution of land in the new village.

If a married women lives in an extended family, decisions on how to use the contracted land are made by her father-in-law who is considered the head of the family. In the nuclear families, access and control over the land is more commonly shared. If a women is divorced, she has to return to her old village and has again to go through a period of landlessness until the next redistribution takes place (Li Zongmin 1995: 22).

### 1.2.3 Forms of Land Tenure in Rural Areas

At present, at least seven main patterns of rural land tenure which are partly overlapping can be identified (pers. comm. He Xiping 1995).

**Contract Land Use Rights** (*cheng bao tudi shi yong quan*). This system is the most common and is applied in many communities (in 48% of all villages in China, according to Chen Fu et al. [1997: 19]). The village committee contracts the land to the individual families, rent has to be paid in cash or kind. Within this system, some villages have adopted the "two-field-system" (*liang tian zhi*). The land is divided into two parts, into the "grain field" which is cultivated in order to meet the family's subsistence (grain) needs (*kouliang tian*). The "responsibility" field (*ziren tian*) or contract field (*chengbao tian*) is

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<sup>11</sup> 1 mu = 1/15 ha or 666,66 sq.m

<sup>12</sup> Traditionally, a married son remains with his family.

contracted per capita to fulfill the villages' agricultural tax and state purchase (Zhang and Makeham, 1992: 141, Xie Jingrong 1996: 15). Surplus gained from these fields can be individually marketed.

**Land Use Rights under Self-management (*ziliu di*)**<sup>13</sup>. The self-managed land is a residue of the collective system, when farmers were allowed to cultivate small plots to supplement the diet. Products can be cultivated, consumed and marketed by the farmers' own decision. This land is a subsistence field (homegarden), sublet freely and is not redistributed and remains with the families. The ownership, however, is still with the collective. Self-managed land is mainly located near houses or in places that are not easy to access. Sometimes farmers cultivate land near roads and paths. Though this is not officially permitted, the village committee usually tolerates this.

**Land Use Right by Four Wasteland Auction (*sihuang paimai*)**. This systems allows the cultivation of fallow and wasteland ("four wastes" refer to barren hills and slopes, fallow land, unused water surface area, unused banks or beaches). Waste land has to be classified by the land administration institution, a minimum price has to be fixed and the auction has to be conducted under democratic and public conditions by the village leader. The leasing household makes a contract with the village/collective for a limited time and pays lease. This system is promoted in Western China and *Shandong* (Xie Jingrong 1996: 16). In the case study village of Liudu waste land has been reclaimed by several farmers and is used for cultivation or fish ponds. In 1997, rainfed land was also auctioned to farmers.

**Land Use Rights by Shareholding (*gufen hezuo zhi*)**. This system has been developed as an example in *Guangdong (Nanhai)*. In this case, all farmers in the village are entitled to get a share of land without any payment. After land evaluation and taxation, the land is allocated to each family, however, there is no physical distribution of the land. Farmers return their land use rights to the administrative village, but remain as shareholders. The land can be managed by a collective or group of specialized farmers, who have received the land in a bidding process (Chen Fu et al. 1997: 21f). This system is seen as a first step towards a systematic land use planning process at the village level. It entitles a planning and land management authority (the administrative village) that can carry out a balanced planning for agricultural and non-agricultural uses. Though it is not common in the case study area, several cadres and farmers expressed their wish to work with a shareholding approach.

**Land Use Rights for Specialized Households or Small Farms (*xiao nongchang*)**. This system is applied in "developed" areas where more than 70% of the population works in non-farm activities like in *Shunyi* County near Beijing. The people who work in industry

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<sup>13</sup> Note: *Tian* is the word for field or land in North China, whereas *di* is more commonly used in South China. Both have the same meaning.

transfer their land to the specialized households who may produce according to market demands (e.g. vegetables).

**Land Use Rights under Long Term Rent** (*shuzu*). The State Land Administration has started a pilot program for long term land use rights in remote areas (mainly in *Shaanxi, Ningxia, Guizhou*). Here, the land use rights may be obtained for a period of 15-50 years, and they can be transferred and inherited (pers. comm. Xie Jingrong 1995). Land should not be reallocated according to demographic changes. In some cases the farm managing right may be transferred against a compensation of a corresponding value.

**Land Use Rights in State Farms** (*guoying nongchang*). In state farms, the land belongs to the state, production and marketing is handled by the State Farm Administration of the Ministry of Agriculture.

However, if a village owns **forest** (*linye*) land, this land has to follow the legal system of the forestry administration. It is mainly located on slopes and is therefore called mountainland (*shan*). This means, concerning tenure, that forest land is treated differently from arable land. Ye Jinzhong (1996: 35 pp) has identified three major forms of forestry tenure.

- **self-managed mountain land** (*ziliushan*): similar to private plots in the agricultural land tenure system, farmers managing this type usually enjoy rights similar to private ownership and comparatively stable tenure rights,
- **contract mountainland** (*chengbaoshan*), where the landownership and usufruct remains with the collective. The collective has a contract with an individual farm household about the usufruct for this plot of land. Farmers can use forests resource such as collective fuel wood and grass,
- **state and collective forestry farms** (*jiti jinying* or *guoying linchang*): tenure, ownership and usufruct belongs to the state or collective.

#### 1.2.4 Problems of the Present Land Tenure System

The following problems due to the unclear and complex land tenure situation can be stated.

**Land fragmentation.** The unsystematic process of redistributing land has led to the situation that the contracted arable land per family is divided into several tiny plots. Zhang and Makeham (1992) quote a Chinese nationwide survey of 1986 which showed that a farm household, on average, contracted 9.2 mu of land which was fragmented into 9 parcels. Hu Wei (1997: 178) writes that in 1993 Chinese farm households have an average of 8.4 mu which is dispersed over 9.7 plots. The case study village shows a similar picture: the average contracted land per household of 1.6 mu is fragmented into 6.5 plots. Farming on these scattered land parcels causes many difficulties to farmers and reduces their motivation for a sustainable land use. If fields are too small, machine equipment cannot be

used to produce economies of scale. Hu Wei (1997: 178) quotes figures that the degree of mechanization fell from 41.3% in 1980 to 35.5% in 1988. He follows that

"..as a consequence, although the responsibility system has stimulated agriculture per unit of land the fragmentation of cultivated land has reduced the efficiency of agriculture." (Hu Wei 1997: 179)

The following table, however, shows that especially in Central China, there is a slow tendency towards lands concentration, having a land transfer rate of 6.3% for whole China in 1994. The table also shows a slowly decreasing number of plots.

Table 3: Land use scale per household and land transfers 1984-90

Area	Average land area (mu)				Average no. of land plots				Transfer rate (%)			
	1984	1986	1988	1990	1984	1986	1988	1990	1984	1986	1988	1990
Whole country	8.35	9.2	9.3	8.0	9.7	9.0	8.3	7.8	1.4	3.6	4.3	6.3
East	N/A.	6.5	6.0	6.0	N/A.	9.4	8.3	7.6	N/A.	N/A.	6.7	1.7
Central	N/A.	11.9	11.8	9.8	N/A.	8.0	7.8	7.3	N/A.	N/A.	4.2	10.2
West	N/A.	10.2	10.7	8.8	N/A.	9.8	9.4	9.2	N/A.	N/A.	1.9	2.3

Source: (Central Policy Research Division of Ministry of Agriculture, Beijing 1992, quoted in Qu Futian et al. 1995)

**Shortage of land.** Very often the initially equitable distribution of land could not follow the changes in the number of family members, because village resources do not provide sufficient land. Thus, there can be poor families within a village who have not allocated enough land to meet subsistence needs (Croll 1994: 99).

**Uncertainty about land use rights and legal uncertainty** . If land use rights for contract land are allocated for a short time – less than ten years – the farmers have no motivation for applying their indigenous knowledge in order to secure a sustainable land use. On the opposite, farmers may blindly follow the orders of the extension service, especially for grain, cotton and oil seeds<sup>14</sup>. Moreover, farmers expressed their uncertainty about their land use rights in general (Huang Qinghe 1992: 10). On the other hand, village leaders formulated their insecurity about managing the conflict promoting either "equalizing land use rights" or a dynamic adjustment of changes of population and activities (He Daofeng 1992: 53 pp and my own interviews). This reflects the Chinese history of a conflicting legislation of "equal land distribution" and "land concentrations to facilitate economies of scale". At higher levels, discussions on land reform reflect this dilemma of trade-off between social equality or equity and economic efficiency.

The complex and unclear picture of the laws and regulations is reflected at the county,

<sup>14</sup> At the beginning of the 1990s, the government still controlled the cultivation and marketing of these crops. In 1992, this policy was abandoned which led to an enormous decrease of grain production. Since then, policies have been changing between controlling and leaving production to market forces (The Economist, May 4th, 1996).

township and village level. Qu Futian (1995: 200) writes that laws and regulations are even in conflict with each other. In my interviews with the decision makers and planners of the different institutions concerned, I often found contradicting statements. One example is the transfer of land use rights from one person or family who has the contract with the collective to another land user. Many publications say that since 1992 rural land use rights can be transferred (Zhang and Makeham 1992: 141, Xie Jingrong 1996: 12), many local decision makers, however, told me that land use rights **cannot** be transferred. Other sources (e.g. Thümmel 1995: 93 pp) say that there is no central legislation that makes clear if land can be transferred or not. He Daofeng (1992: 9) says that 54% of the surveyed villages allowed peasants to sublet land freely. Nearly 20% of the villages had **not** made any regulation whether land can be transferred if somebody leaves the village. Liu Shouying (1992: 16) writes that in his case study in *Hunan* Province neither land users nor local decision makers knew whether they can transfer land.

Thümmel (1995: 113) writes that in many villages in his research area in *Zhejiang* contracts between the local cadres and the farmers concerning land use right are not written down. Cadres sometimes needed more than six years to issue the contracts in order not to lose control over the land.

The ambiguous land use rights have led to a considerable confusion among the farmers. A survey carried out in four provinces showed that 48% of the farmers think that the land owner is the state, 33% think the collective is the landowner, and 19% think the individual farmer is the landowner (Qu Futian 1995: 200)<sup>15</sup>. Hu Wei's research of 1995 (1997: 181) which proved that contracts are not obeyed in practice, by both farmers who fail to fulfill quotas and by the authorities who arbitrarily raise quotas or increase collective requirements. In his survey, 69% of the farmers in *Shenmu* County, *Shaanxi*, and 87% of farmers in *Changping* County, *Hebei*, (including cadres at grassroots level) are concerned about policy variations.

**Unclear responsibilities of implementing bodies.** The Land Management Law states that rural land is owned by the collectives. It is not defined which specific collective organization should be the real owner of the land. Qu Futian (1995: 200) estimates that 71.8% of the village committees or villagers' groups act as landowners, while in 22.4% the land is controlled by the village economic cooperatives, in 2.9% by the Village Party branch and in 2.9% by others.

This ownership ambiguity often leads to a non-sustainable and uncertain land policy at the local level. Many local cadres take advantage of this unclear situation and see themselves as the representatives of the collectives. They often use farmland in a way that violates the

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<sup>15</sup> One reason for this perception might be that in many regions farmers do not pay any fees for the land lease and therefore consider land as their own property.

regulations (Cheng Yuk-Shing 1995: 57) and ensures them a personal benefit (this is also the case in Liudu).

**Separation of tenure rights for forest and arable land.** The separation of land use rights and forest use rights may lead to the complicated situation that trees of a particular plot may "belong" to a different family than the land they are growing on. This hinders both families to apply useful and sustainable soil improving measures.

In summary, land users in present day China face several obstacles and uncertainties which have led to a short-term behavior of farmers concerning land management. In order to maximize immediate benefits from the temporarily used land before an anticipated change takes place, farmers have been over-exploiting the soil and had no incentives for long-term, sustainable cultivation methods. Moreover, under these conditions, less fertile land is left fallow rather than improved. Thus, farmers have no interest in using their knowledge to enhance land management. On the contrary, the present land distribution system leads to a decrease and destruction of local knowledge about locally suitable farming methods.

The redistribution of collective land inevitably led to an extreme fragmentation of farmland. If the plots are too small and scattered, farmland can no longer provide a stable source of income and/or subsistence for the farmer. Farmers consider farming as a "side-line" activity and do not put much emphasis on maintaining and/or increasing agricultural productivity.

Land disputes between local cadres or business men and the villagers often lead to a disadvantaged situation of the small scale farmers. According to Hu Wei (1996:57) local cadres often use the farmland in a way that violates the regulations laid down by higher level authorities. Local farmers have had no ways of influencing or preventing these activities.

### 1.2.5 Planning Procedures and Institutional Weaknesses

Since its foundation in 1987, SLA has had the task to develop land use planning maps for each province<sup>16</sup>. Within this procedure, the SLA but also other relevant line agencies and the provincial governments propose the percentage of land use for agriculture, forest, transport, fruit trees, water services, residential uses, grassland and industry for each province to the State Council. These quotas are transferred to the Provincial Bureaus of Land Management. These bureaus then order the prefecture and/or county bureaus to develop land use (planning) maps. These maps are usually drawn in a scale of 1: 10,000 and include two stages: a current map (*xianzhuang tu*) and a planning map (*guihua tu*). The current map is based on the land classification survey which has been carried out from 1987-1992 by the land administration agencies. It also includes settlements and industrial

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<sup>16</sup> This task should be accomplished by the end of the second five-year plan in 1998 (pers. comm. Chen Yong 1997).

areas. The land use plans should be updated every three to five years. The planning maps encompass a detailed report where planning targets until the year 2000 are envisaged.

Though it was officially claimed that the land classification and planning procedures were completed in 1992 and updated in 1997, the available maps and reports often do neither provide reliable state-of-the-art data nor do they adequately address future problem solutions (Knapp 1992: 65). Many of the responsible officers in the land administration bureaus are not qualified enough, they have not received the specific training that is necessary to carry out an adapted land use planning. Moreover, they have to deal with given quotas from above and local interests. Local decision makers often prefer the development of local industries whereas quotas issued by departments of the national level have to ensure a stable food production and issue larger quotas for agricultural areas. In my talks with the members of SLA at national level in 1997, they admitted that the process is top-down oriented and does not allow the participation of land users. They see this as one drawback in developing sustainable land use planning.

The land use planning process is a mixture of a central socialist planning and weak means of a decentralization process. The State Council issues quotas for rural land use, the local planning agencies are assigned to work out their own plans. Here again many agencies participate. This often leads to an arbitrary process of planning: institutions may enforce their own interests, which might even hinder a sustainable land management.

This may be illustrated by the example of the transfer of land and the change of land use. De jure land use changes have to be permitted by the SLA and its bureaus<sup>17</sup>. De facto this does not often happen. Thümmel (1995: 134) describes the case of a village in Guangdong. Local cadres sold 600 mu of the 1000 mu of village (collective) land to a hotel and recreation development company. The County Land Administration Bureau permitted the sale of only 300 mu. The land administration law and local regulations, however, define, that the bureau is only entitled to permit the expropriation of 3 mu. Journalists investigated the case, but local decision makers did not take action because "this is a common approach in *Guangdong*". A very similar case happened in the case study village of *Liudu*.

The introduction of new tenure rights (e.g. land auctions), which is related to the right of land transfers, is not under the responsibility of the SLA, but carried out by the Ministry of Agriculture. Again, there are two different agencies dealing with the same issue.

### 1.2.6 Decision Making at the Local Level

The county and township levels are important levels for rural land use planning. Aspects like land rent, sale and land use are decided here. The village (collective) has to request

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<sup>17</sup> 3-10 mu change by the Land Administration County Bureau, 10-1000 mu by the Land Administration Provincial Department and more than 1000 mu by the SLA itself (pers. comm. He Xiping Oct. 1995).

authorization from the Land Management Bureau at County level whether land can be transferred to non-agricultural use or not. Many decisions such as land distribution and adjustments are made at the village level, by the village committee. Though all Chinese villages are subject to the same set of guidelines for institutional arrangements for land issued by the Central Government, the institutional settings at the local level can vary according to the region and economic status of the region.

Individual Farmers cannot participate in use planning. Land transfers (when possible) and planting decisions are still controlled by the village leaders. Planting quotas for grain, cotton and oil seed production are given at the national level and the village leaders have the responsibility to ensure their implementation. Rozelle (1994: 113 pp) writes that in nearly half of the villages in China the village leaders see themselves as responsible for planting decisions. Especially in the so-called "unified management" (*tongyi jingying*) which is practiced in more than 50% of the villages in Eastern China individual farmers have a low decision making power. In this system, individual families have to merge either a part of or the whole contract land. Then the village committee decides what has to be grown in these fields. Orders can be enforced by denying access to the collective's agricultural equipment. Consequently, individual farmers do not have a choice over how to manage their land (i.e. what to grow, how to grow and where to grow).

The village leaders are the main implementers of the rural policy in the villages, with an almost unrestricted power. They belong to the two most important institutions in the village: the village committee and the local branch of the Communist Party. According to Rozelle (1994) and to my research in *Liudu*, the village leaders have a unique position within the village community: sometimes they are leaders of the Communist Party, but they are also often intermediaries of the villagers and can have a broad knowledge of agricultural production and land management. Sometimes they feel closer to the farmers because they are themselves farmers and not politicians. They have to balance the interests of the higher authorities and the township officials with those of their own community members in the fields of education, social welfare, family planning, health, communication and transport, protection of the natural environment and land use planning (Zhu Ling and Jiang Zhongyi 1993: 444). On the other hand, they are in the position to gain personal benefits from the income generating activities in the villages, because they still see themselves as representatives of the "collectives" (an example is given in the case study). There are many reported cases of the misuse of power by local cadres. Corruption is often associated with the allocation of income generating activities, i.e. fruit cultivation, fish rising, poultry production.

The village committee that comprises three to seven people is the most important organization in the village and is responsible for decisions on land use. As for 1998, 80% of the villages have elected their own chiefs and village committees. Elections include (1) direct nomination of candidates by villagers; (2) contested election of villagers' committee

members; (3) anonymous voting; and (4) open count of votes (Li Liangjiang 2003: 653). Many Chinese planners see this as a slow but steady process of democratization (Li Ou pers. comm. Sept. 1998). This perception may be shown by this quotation of a local decision maker.

"Villagers have a much better notion of village talent than the higher authorities. If you allow the county government to choose a stupid idiot of a village chief, the whole economy will be ruined". (Zhang Chengfu, a Chinese civil servant, quoted in *The Economist* Nov. 1996: 26).

However, the real power of the village committees varies from region to region. Surveys in Southern China (Janz 1998) have revealed that in Hubei Province the main decision making power on land management is with the production teams (members are ordinary farmers). In Zhejiang Province, where farming has become a "side-line" activity due to the high industrialization, the village committee does hardly interfere in cropping decisions, most of them are made by the farm families themselves. In Jiangxi Province, most of the village committees do not interfere in decisions on land management.

In Northern China, especially in the mountainous and hilly areas, new political structures have more slowly emerged and the remains of the old system are still powerful. Almost every village has a Communist Party secretary who is seen as a strong person by the villagers, even if he or she is not a competent individual. All major decisions can be made by him/her.

### 1.3 Recent Discussions on Land Management and Land Tenure in China

Initially, the introduction of the household responsibility system in the early 1980s, has been analyzed by many Chinese and Western authors (e.g. Leeming 1993, Burns 1988, Kojima 1988) and was perceived as a story of successful reintroduction of the market economy. Issues of land tenure and land use planning, however, have only been openly discussed since the mid-1990s<sup>18</sup>.

Hu Wei (1997: 175) concludes:

"... that positive impacts of the reformed land tenure on the agricultural growth have been over-addressed and the negative impacts on the agricultural environment have been overlooked. ... More importantly, since land and capital ownership rights have always been a controversial area (private ownership in particular) in ideology, theory and politics, researchers in China have tended not to get involved with this issue."

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<sup>18</sup> In 1990, when I started to work as an agricultural advisor in China, I could not discuss land tenure problems with local decision makers. They told me "This is not necessary, since all land belongs to the state."

Recent articles and speeches by high political authorities show, however, that at national planning levels there is an increasing concern about the current problems of land tenure and land use planning, especially about the decrease of agricultural land and the increase of non-agricultural uses<sup>19</sup>. The State Council has designated special regions for the experimentation of rural reforms, including several new land tenure systems. The Ministry of Agriculture admitted in a recently published study on poverty, land abandonment and rural institutions that

"The fundamental issue is the setup of China's rural farmland systems centers on ambiguity in the definition of land ownership rights. Despite stipulations on the Constitution and Land Management Law, specifying that rural land is owned by the collective, it is unclear which of the "three levels of ownership" - people's communes, production brigades and production groups- is referred to... In fact, such issues as egalitarian occupation of land, scattered land.., instability in farmland contracts and lack of circulation or efficiency have all resulted from an ambiguous land ownership." (PR China 1997: 1)

At policy level, speeches and study papers address the danger of shortages in food supply and the conversion of agricultural land (speeches held by Li Peng in March 1996 and Jiang Zemin in June 1997<sup>20</sup>). In April 1997, the State Council published a Study Paper (*xuexi cankao ziliao*) that provides guidelines to avoid the misuse of arable land. It stresses the following points.

- developing macro guidelines for land use planning and protection of arable land,
- restricting land for construction use,
- controlling the size of cities and towns,
- improving the management of collective land (including the development of village land use plans),
- improving the management of state owned land,
- establishing supervision and monitoring activities for land use at the provincial level.

This Study Paper was later transferred into a new Land Administration Law which was put into effect on January 1<sup>st</sup>, 1999.

In 1998, Chinese English newspapers published several articles that openly criticized the misuse of agricultural land (for example China Daily June 24, 1998: "3,8 million illegal

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<sup>19</sup> These articles are only partly an answer to Lester Brown's book (1995) (among them Han Jun 1995), but they might reflect a growing awareness of Chinese planners on environmental problems and on food security.

<sup>20</sup> In contrast to these warning voices, there are still official statements that state the optimism of Chinese planners and researchers: "I am an optimist. China has no great problems ahead. Definitely no famine. That could occur only if Party Secretary Mao Zedong should rise up from his grave." (Song Guoqing of Beijing University's Center for Economic research quoted in World Press Review 1996).

land cases found nationwide") and consequently demanded a stricter law enforcement of the new land management law<sup>21</sup>. However, it has to be studied in practice, to which extent the new law can solve the problems in land use planning in China.

At the research level, articles focus on environmental protection, land lease, commercial land use and the reform of the tenurial system. Here the following possibilities are discussed.

- Nationalization of rural farmland. Although peasants would not be land owners, life-long tenancy would be granted and farmers could buy, sell, mortgage and inherit land use rights.
- Private and individual ownership. This would give a full ownership to the individual farm families.
- A system of mixed ownership.
- Improvement of the existing collective ownership. Keeping the existing public ownership and enhancing the clarity of property rights.

Most of the authors (Qu Futian et al. 1995, Hu Wei 1997, Chen Fu et al. 1997, PR China 1997, SLA 1997) vote for the last option, because Chinese planners still have difficulties to bring private ownership policy in line with Marxist ideas. Most of the farmers themselves also do not want private ownership. Chen Fu et al. (1997: 8) quote results of a rural survey where almost 80% of all farmers do not want a private ownership. Nationalization is not considered as viable because

"..., its disadvantages lie in the high costs of organizing the land management, let alone the doubtful effectiveness of such state macroeconomic control, considering the cost of land circulation under the state and the difficulties in information feedback, supervision and incentives for the farmers." (PR China 1997: 1)

The reform of the collective ownership should have the following components.

- increasing the duration of land tenure to 50 years and above, not exceeding the life expectancy of the community members, including the right of leasing land,
- establishing clear land contracts, including the obligation to pay rent,
- establishing a rational price system for agricultural products in order to stipulate agricultural production, including penalties for those who leave land fallow or cause a decrease of arable land.<sup>22</sup>

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<sup>21</sup> For example, China Daily June 24, 1998: "Sustainable Use Promoted", September 26, 1998: "Revised law strengthens the supervision of land use".

<sup>22</sup> In September 1998, a revised form of the Land Management Law was approved by the State Council. In this law, the usufruct rights of land tenure were extended to 50 years.

In order to improve the procedures of land use planning, it is discussed that on the one hand the government should reduce administrative interventions such as imposing the form of land management (for example by individual families, by the whole village, by cooperatives) (PR China 1997: 3). On the other hand, a legislative control on land exchange and land management should be established, so that the change of farmland into non-agricultural purposes can be supervised. This should be the result of a discussion process between the representatives of a village and government institutions. Furthermore, the farmland rent and lease contract should be supervised so that the rent is used for long-term investments to improve the land management system. Furthermore, it is proposed to put exchange and transfer of land use rights on a legal basis.

It can be concluded that a debate about a land reform in China has started, but it has not been implemented in many places, because researchers and planners have not yet decided how far government interventions should go. Some support a strong state control, in order to impose strong control on the misuse of land, others promote less intervention in order to allow a more dynamic and adapted development. The needs of the land users themselves are seldom discussed. In contrast to the introduction of the household responsibility system which was carried out nationwide within some years, a new land reform will take many years and have various aspect as mentioned above.

## **2. Indigenous Knowledge Systems**

### **2.1 The Problems of High Technology in Development Approaches**

At present, worldwide environmental and development concerns are raising questions whether the focus on high technology is incapable of promoting development as promised or has even destroyed sustainable local and indigenous concepts of development. Consequently, science has been criticized, because it did not deliver the expected results. Chemical pest controls do not work as expected, new hybrid varieties do not meet the farmers' needs and require too many natural resources and thus contribute to the destruction of nature.

Since the last decades of the nineteenth century, the scientific world view has become the dominant perspective in both developed and developing countries. In agriculture, this takes the form of assuming that technology and knowledge is mainly generated in research laboratories. The farmers then have to adopt and apply these technologies. The academization of agriculture has led to the view that the expert knew more than the farmer, and that therefore the communication flow was from the expert to the farmer (Kloppenburger 1991: 529 pp). Emphasis has been given to the "Transfer of Technology-Model" (see Rosenberg 1970: 550). This model says that technology has to be brought from the centers of knowledge (like scientific research laboratories in the West or in the capitals) to the "ignorant and backward" farmers. This model has an implied pro-innovation bias, i.e. an assumption that the technology developed was inherently beneficial. Its non-adoption could be blamed on the resistance to change by farmers or the inadequacy of delivery strategies. The T&V (Training and Visit) extension system is based on this assumption and has been introduced into more than 40 countries with support from the World Bank (critique on the T&V system see Röling and Engel 1989).

The reason for the worldwide influence of science and technology was the fact that it was closely linked with development. Alvares (1992: 221f) describes - from his own Indian culture's viewpoint - that development was desired because it was associated with science. In turn, science was desired because it made development possible. The relationship can be traced back to the industrial revolution when it was first established between science and industry.

The Green Revolution is based on scientific results mainly developed in International Agricultural Research Centers. It has led to an increase in per capita food production of 7% in the developing countries and of over 27 % in Asia since the mid-sixties (Conway and Barbier 1990: 20). This is usually taken as an indicator for its success.

The results of a science and technology biased development have been associated, however, with significant improvement of social equity, economic stability, ecological sustainability and the solution of social problems. The failure to meet these expectations has been recognized by the scientists themselves. Many agricultural scientists acknowledge a "mild crisis" because knowledge derived by modern science has not worked out as expected when applied in the real world (Norgaard 1987: 21).

The reductionistic views of modern, high-technology-oriented scientific approaches have led to an ignorance regarding the wider context of a sustainable development. Natural and social systems are seen as too complex to study and therefore broken down into pieces. Consequently, change influences only parts of the systems and attention is not paid to the influence on the other parts of the system. Moreover, scientists in their isolation of research laboratories have lost contact with their original objectives of what they are trying to accomplish. According to Kloppenburg (1991: 530f), science elaborated and institutionalized in laboratories has lost touch with indigenous knowledge and everyday experiences.

One of the best documented conflicts of modern agricultural science and local knowledge is the "Scientific Potato" in Peru. Salas (1994: 57ff) describes the International Potato Center (CIP) as part of the system of International Agricultural Research Centers (IARCs). CIP's mandate is to collect genetic resources of the potato, and experiment with it. Its aim is to develop the "ideal potato" that is free of nematodes, insects, fungi, bacteria and viruses, etc. This "ideal potato" can only be created in the laboratories under artificial conditions and controlled by senior scientists. Farmers' knowledge is not considered. However, potatoes have reportedly existed in Peru for 9000 years. More than 400 selected, domesticated and improved varieties exist. Salas concludes that this kind of Western science has not significantly improved life in the Andes. On the contrary, it has worsened the major problems of society and threatens one of the most valuable resources: the original solutions derived from local knowledge: The assumption of the CIP was that local varieties can only achieve a yield of 5 to 7 t per hectare. In reality, though, the average is 10 t, sometimes even 25 t (van der Ploeg 1995: 222). The "scientific potato" seeds were given to the farmers for free and, thus, farmers preferred those to their local varieties. Through the adoption of this gift, the genetic stock normally conserved by farmers, has been eroded. To grow the varieties developed in the laboratories, the farmers needed credits, which were handed out in kind such as fertilizers and pesticides. Farmers are now unable to continue with their local cultivars and therefore placed in a position that makes it impossible for them to reproduce their indigenous knowledge.

Sikana (1994: 80ff) analyzes the correlation between the local soil types defined by the farmers and the national technical soil series in Zambia. Farmers and scientists used different criteria to categorize soil. Farmers are most interested in features of the topsoil, as these influence important management decisions. Soil scientists base their categories on

elaborate chemical and physical analyzes of the sub-soil. They are less interested in the topsoil because they seek consistency and reliability. Looking at the topsoil, farmers can recognize various local soils in an area where the technical system indicates only one soil type based on features of the sub-soil. The farmers' system of categorizing soils is oriented towards practice and are more accurate in smaller scale, whereas a scientific approach operates from a model of universal models such as soil and climate types. In mountainous and hilly regions, land and soil structures are too small to be recognized by a purely scientific approach. They might be more suitable in more homogenous and plain areas. Therefore, scientific standardized models have often failed to develop locally adapted solutions to problems especially in hilly areas with a scattered land use structure.

Murdoch (1994:127) concludes that "Scientific knowledge, with its universal laws, "enables knowledge at a distance," lending it its power. It can reduce numerous elements to one universal law, at the top of the epistemological hierarchy. Local knowledge, at the other end of the spectrum, is marked by description, making it less universal, and thus politically less 'powerful'.

The two examples show that the interface between farmers and scientists and also between farmers and extension agents (as being reliant only on scientific research results) are often incompatible because they have different goals, approaches and methods. Van der Ploeg (1995: 216ff) follows that the impact of this incapability is a systematic creation of ignorance in this interface. The technicians expect the farmers to react in one certain way according to their model. The farmers, however, have very particular requests to the agents which those cannot answer. Consequently, the gap between scientifically generated extension messages and farmers' specific needs is widening.

The epistemological differences between high technology and science and indigenous knowledge have led to a challenging conflict and have caused a potentially fruitful new way of thinking. The various answers to this challenge will be discussed in the next chapter.

## **2.2 Considering Indigenous Knowledge**

Answering the criticisms of science and development concepts, many philosophers, anthropologists, ethnologists and practitioners have developed approaches that give more emphasis to indigenous knowledge systems. Science is now seen as just one way among many others of knowing the world. Farmers' knowledge has to be brought back into the development process.

Many approaches focus on blending "Western" science and "traditional" knowledge. The Agroecology Approach (Altieri 1987, Norgaard 1987), for example, challenges the Western way of thinking by studying agricultural systems that have evolved over centuries,

in which people are actively involved. They see how people interact in these systems and learn about important relationships through farmers' explanations of why they farm as they do. Gynecologists use knowledge from Western agricultural science to help them to understand agroecosystems, but they see them as complex systems that have evolved with people as part of a unique process. In the agroecological approach, the term "traditional knowledge" is often used and therefore refers to knowledge that has a strong historical perspective.

DeWalt (1994: 124) favors a more balanced approach: that neither agricultural scientists nor the indigenous knowledge of farmers can solve the challenging problems, but advantage should be taken from both approaches. Both systems are seen as complementary sources of wisdom. The results of scientific knowledge systems must ultimately be incorporated. Resource utilization should not completely exclude external inputs, but ways should be found to minimize them. Table 4 summarizes DeWalt's approach of merging the two systems.

*Table 4: Productively merging indigenous and scientific knowledge systems  
(after DeWalt 1994: 124)*

<b>Means used to study phenomena</b>	Holistic and general Mixture of observation and experimentation Mutable mobiles
<b>Resource utilization characteristics</b>	Dependent on local resources with moderate mixture of exotic and external resources Low input with addition of minimal critical inputs Land intensive Labor demanding but not exploiting Risk adverse (to climate and market) Flexible adaptive strategies
<b>Outputs</b>	High productivity for labor and energy input Culturally compatible Food security and comfortable level of living Sustainable with high population densities Regenerative

DeWalt's concept, however, fails to answer important questions such as "Who decides what is flexible, sustainable, culturally adapted?" If the answers again are given by researchers and scientists, or even by local and regional leaders or better-off farmers, then this approach could lead to the same problems and failures as a purely scientific system. Moreover, general statements such as "land intensive" and "labor demanding" do not reflect local or regional variations. Land intensive resource utilization, for example, is not suitable for most parts of China. Labor demanding techniques may not be suitable for sparsely populated regions of Africa. Thrupp (1989: 20f), answering these concepts, argues that "using" and "scientizing" indigenous knowledge in terms of formal Western methods is inappropriate and opposes the interests of local people. In contrast, integrating indigenous knowledge should aim at the empowerment of local people, and thus, using

*their* terms, systems and methods. This means to support a diversity of knowledge systems and of "sciences" of many cultures, which have varying values and purposes.

Other approaches see the integration of the different systems at another level. Redclift (1991: 36) identifies three dimensions of sustainable development: economic, political, and epistemological. Here is the "knowledge about knowledge" explicitly integrated into a new development approach. Furthermore, Redclift connects all three dimensions with knowledge. According to Murdoch (1994: 127), the political dimension, for example, is concerned with power and there is also a relationship between knowledge and power. Murdoch follows that a coevolutionary model has to be developed whereby natural, cultural, and economic systems have evolved of mutual dependencies. In this model, indigenous knowledge is taken seriously. "Sustainable knowledge must be a mixture -- of the social, the scientific, the local, the technical, the natural, and perhaps even the magical [knowledge] -- that refuses *a priori* to privilege science." (Murdoch 1994: 129).

Many approaches that seek to develop methods for a sustainable development have searched answers to the above mentioned interface of ignorance. They have also taken into account that both scientific and indigenous knowledge systems are complex and specialized systems. All people who participate in research and development are seen as actors in the process of sustainable development. Using an actor-oriented approach, these researchers attempt to "get inside" the development process to understand how external intervention agencies influence and are influenced by local cultural systems.

Scoones and Thompson (1994) assess in their book "Beyond Farmer First" the current approaches in the period after the populist approach, commonly known as the "farmer first perspective". The populist perspective sees the starting point of development as an active and equitable partnership between rural people, researchers and extension agents. Outsiders are viewed as catalysts or facilitators of the open exchange of ideas and information between various interest groups. The authors criticize, however, that the "attempt to blend or integrate local knowledge into existing scientific procedures falsely assumes that rural peoples' knowledge is an easily definable body or stock of knowledge ready for extraction and incorporation. However, local knowledge, like scientific knowledge, is always manifold, discontinuous and dispersed...". They also see the danger of devaluing local knowledge by "scientizing" (Scoones and Thompson 1994: 20).

Therefore, Scoones and Thompson promote a "farmer first and beyond perspective" that incorporates a socio-politically differentiated view of development - where factors such as gender, ethnicity, class, and religion play important roles. Farmers are *not* a homogenous group and the virtues of traditional agriculture are *not* romanticized. Local knowledge is not always sustainable knowledge (Murdoch 1994: 125). Instead, emphasis is given to the various actors, their roles and styles of investigations, and the respective interfaces.

In the "farmer first and beyond" perspective, the following questions for research gain importance:

1. How do cultural, economic and political relationships and differences affect the generation, innovation and transmission of knowledge? How do we know what we know?
2. What is the relationship that people have to their knowledge? How is local knowledge generated? How is knowledge shared and transmitted?
3. Which kind of knowledge is needed and by whom? What is the relationship between knowledge and power?
4. Do researchers actually need to know all that they seek? Why? Should only researchers be given the responsibility to produce knowledge and recommendations?
5. What is transfer of knowledge aiming at?
6. How should knowledge be managed as an interface management? Who are the actors in knowledge management?

My thesis follows in many parts this farmer first and beyond perspective as it tries to find answers for the above mentioned questions. The reasons are the following.

- The approach is practical and pragmatic. Since the research for this thesis was often associated with practical development work, it was necessary to incorporate practical success and failure stories into research.
- The de-mythologizing of indigenous knowledge gives room to discuss new concepts of integrating local knowledge into the development concepts with national, regional and local actors in the development process.
- Seeing development as a complex process with local and regional variations, actors and interfaces opens the view for a differentiated research perspective.
- This perspective requires the extensive use of participatory approaches such as Farming Systems Research (FSR), Rapid Rural Appraisal (RRA), Participatory Rural Appraisal (PRA), Action-Research-Learning-Cycles, etc. During my work as an advisor in China, my Chinese colleagues, Chinese farmers and I have adapted and developed many participatory tools for their application in the Chinese rural context.

Other approaches that have influenced my research are discussed in the next chapters.

In order to summarize the main characteristics of the different knowledge systems, Table 5 shows the differences of research and action in some approaches. The second column shows a system that is dominated by the scientific view. The main steps such as knowledge generation and extension are taken by scientists, thus by "outsiders". The farmers - "insiders" - are seen as beneficiaries, as people who have to receive and apply the useful knowledge of the scientists. The third column explains a system of indigenous knowledge where farmers, scientists and extension workers collaborate as consultants and clients.

Farmers and their knowledge are seen as having an equal value as those of scientists. The "Farmer first and last" approach clearly puts the farmers in the center of all activities, solutions are almost solely developed in the communities. The system "Beyond farmer first", however, sees farmers and scientists as actors in a constant dialogue process.

The main differences of the systems can be seen in the process, in the flow of knowledge and in the changes of role of insiders and outsiders. The conventional scientific approach has clearly defined objectives by the scientists. Systems that integrate indigenous knowledge vary from seeing the knowledge flow from farmers to scientists to a uniform expression of communities towards constant dialoguing and negotiation. Consequently, the roles change from outsiders as knowledge generators to acting as facilitators. This change requires an understanding not only of *what* local people do and want, i.e. techniques, crops and activities, but also of *why* they use particular practices, and why they do know the?, i.e. these principles and knowledge systems. Consequently, the roles of farmers change from being beneficiaries to collaborators and *active* participants in the development process.

Table 5: Current knowledge system characteristics

	Scientific knowledge systems/	Indigenous knowledge systems/ traditional ecological knowledge	Farmers first	Beyond farmers first
Research priorities	set by scientists	set by farmers and scientists	uniform and systematized knowledge of farmers and communities is available and can be used for prioritizing	goals have to be negotiated between participating actors, taking power and access to resources and knowledge into account
Knowledge flow/process	from scientists to scientist, from scientists to advisers, from advisers to farmers	from farmers to scientists, from farmers to farmers	farmers' communities develop consensus solutions to identified problems	bridging, facilitation, negotiation and conflict mediation between different interest groups
Means used to study phenomena	experiments abstracted from the applied, context; specialized, partial	recorded through oral tradition, through observation and hands-on experiments	positivist, hard-systems research (RRA, FSR, etc.)	post-positivist, soft-system learning and action research (PRA, PTD, PAR) process learning, dialoguing, negotiation, empowerment
Roles of "insider"	beneficiary	client and professional colleague	reactive respondent, passive participant	creative investigator and analyst, <i>active</i> participant
Roles of "outsider"	generator of technology	consultant and collaborator	invisible information collector, documenter of knowledge, planner of interventions, manager of implementations, more recently: facilitator, initiator, catalyst	facilitator, initiator, catalysts, provider of occasions, visible actor in process learning and action
Non-adoption of innovations	failure of farmers to learn from the scientists	contract of collaboration was not carried out in an adapted way	farmers not enough involved in designed solutions and planned outcomes	process of learning and action not yet finished
Evaluation	by scientists	by farmers	through participation of farmers	by all actors

Sources: DeWalt 1994, Johnson 1992, Scoones and Thompson 1994

### 2.3 What is Indigenous Knowledge?

The question "What is indigenous knowledge?" reveals that there are many terms that explain similar approaches with many differences. Internationally most commonly used are the expressions "indigenous knowledge" and "local knowledge". (The German terms are mainly "Indigenes Wissen" or "Lokales Wissen").

Antweiler (1995: 20ff) writes that all terms have to be seen in a political context. Before 1960, the expression *indigenous* was used similar to local, native or informal. In the 1960s

and 1970s, when populist worldviews arose and political ideas and activities were often intended to represent ordinary people's needs and wishes, this term became a description for non-Western, non-scientific, and specific to certain ethnic groups, for example for Latin American Indians or small ethnic groups in South-East Asia. Antweiler concludes that this has led to a marginalization of this knowledge. He argues that Western people have also a similar kind of everyday knowledge and he therefore promotes the term "*local knowledge*".

Other authors associate the term *indigenous* with "tradition-based" or backwards (Thrupp 1989a, Menzies 1994, Scoones and Thompson 1994). In addition, "indigenous technical knowledge" is seen as too technology oriented and as not considering the *cultural knowledge*. These authors suggest to use the term *local knowledge* or *rural peoples' knowledge*.

The terms *traditional* or *traditional ecological knowledge* are mainly used by agroecologists (Altieri, Norgaard) or by ethno-ecologists as Berlin and Johnson. However, in their definitions, they use this term also in a broader sense with emphasis on the body of knowledge built up by a group of people through generations of living in close contact with nature

In this thesis, I have mainly used the English term *indigenous* for the translation of the Chinese word *jinyici* ( ), because the agricultural knowledge of peasants in China has not always been only local and therefore local knowledge would not be an appropriate term. In many cases farmer knowledge has had regional or even cosmic aspects. In some parts, when I describe the specific knowledge of the people in the case study village I use the term *local (xiangtu)*, because this knowledge is then a specific knowledge of this specific location.

Table 6 shows some of the most common terms and definitions of indigenous knowledge. The following chapters describe some of the approaches in detail, because they have influenced my research work.

Table 6: Various definitions for knowledge understood opposite to scientific knowledge

Term	Definition/Description/Explanation	Source
Cultural Knowledge	<i>Cultural knowledge</i> is distributed throughout a population in ways related to a number of factors, associated at least with a person's sex and age, social status and role, kinship affiliation, personal experience and basic intelligence	Berlin 1992 p 199
Endogenous Knowledge	<i>Endogenous knowledge</i> may be defined as a preponderance of internal or local elements, which combined into a coherent model, constitutes the point for interpretation, evaluation and selection of those external elements to be integrated, so as to enhance, consolidate and/or strengthen the set of internal elements.	Van der Ploeg and Long 1994 p 1

Term	Definition/Description/Explanation	Source
Ethnobotanical Knowledge Systems	<p><i>Ethnobotany</i> is the study of relationships between people and plants; and the study of the past and present interrelations of primitive or aboriginal human societies; and the study and evaluation of the knowledge of plant life and the environment that influence life, customs, beliefs and history of people.</p> <p><i>Ethnobotanical knowledge</i> can be used to improve rural livelihoods, especially in marginal areas, by providing the basis for integrating useful native plants and low-input technologies into modernization packages that meet rural needs. However, ethnobotanical knowledge systems are currently associated with the lowest socio-economic classes - tribal peoples and peasant farmers.</p>	<p>Given and Harris 1994 p 1</p> <p>Alcorn 1995 p 1</p>
Indigenous Knowledge	<p><i>Indigenous knowledge</i> is knowledge which is unique to a local area, culture, or society, passed down from one generation to the next, usually by oral tradition.</p> <p><i>Indigenous knowledge</i> - the local knowledge that is unique to a given culture or society - contrasts with the international knowledge systems which are generated through the global network of universities and research institutes. Indigenous knowledge is important as it forms the information base for a society which facilitates communication and decision making.</p>	<p>Norem et al. 1989 p 92</p> <p>Warren 1991 p 50</p>
Indigenous Knowledge Systems (IKS)	<p><i>Indigenous Knowledge Systems</i> are consistent and coherent sets of cognitions and technologies, including their underlying cosmologies, which have slowly evolved by trial and error of generations of farmers who had to live by the results.</p> <p>The added value of studying indigenous knowledge derives from the utilization of that knowledge in designing technology for agricultural development</p>	Röling and Engel 1989 p 102
Local Knowledge	<p>The <i>local</i> or indigenous knowledge of a farming population living in a specific area is derived from the local people's past farming experience, both that handed down from previous generations and that of the present generation...</p> <p>DeWalt prefers to use the term <i>local knowledge systems</i> rather than indigenous knowledge systems. The reason is that the term "indigenous knowledge" carries connotations of "native people's ideas and beliefs" and of "traditional knowledge". All people, irrespective whether they are indigenous to a given area have developed understandings of the world that are based on their observations of their immediate surroundings...</p>	<p>Reijntjes 1992 p 36</p> <p>DeWalt 1994 p 129</p>
Native Knowledge	<p><i>Native knowledge</i> is what one knows as a consequence of being constituted into one's culture, be it explicit, self-aware knowledge or, implicit, more deeply embedded knowledge. It is more than information. It includes not only the information we have stored in our minds, but also the conceptual and interactional means we have for acting upon, manipulating, creating, altering, affecting and transforming that information.</p>	Read and Behrens 1989 p 108
Sustainable Knowledge	<p><i>Sustainable knowledge</i> must be a mixture - of the social, the scientific, the local, the technical, the natural and perhaps even the magical (knowledge) - that refuses <i>a priori</i> to privilege science. It is to begin to speak of the local and the general, the natural and the social, Western and non-Western cultures in the same way.</p>	Murdoch 1994 p129
Traditional Ecological Knowledge (TEK)	<p>TEK to mean the knowledge and insights acquired through extensive observation of an area or a species. This may include knowledge passed down in an oral tradition, or shared among users of a resource. It includes an intimate detailed knowledge of plants, animals, and natural phenomena, the development and use of appropriate technologies for hunting, fishing, trapping, agriculture, and forestry, and a holistic knowledge or "world view" which parallels the scientific discipline of ecology.</p>	Huntington 2000 p 1270
Traditional Knowledge	<p>Traditional may mean behavior and practices developed or emergent from within a community or which may have been acquired by the community through diffusion but which evolved as the dominant indigenous behavior of humans who inhabit the site. Traditional is fluid in that what might be traditional at a particular space or time may be an innovation elsewhere, or a modernity in some other time.</p>	Malayang 1992 p 2

### 2.3.1 The Approach of Indigenous Technical Knowledge

In the 1970s, populist scholars tried to develop an answer to problems of institutionally organized science and technology (see Thompson 1994: 58, Blaikie 2000: 1004). The original focus of the populists was on indigenous technical knowledge (ITK). ITK refers to knowledge about agricultural production, ethno-botanical knowledge, a detailed knowledge of multipurpose utilization of plants, and other forms of empirical knowledge such as tool-making. Later, this approach was criticized as too narrowly interpreted and too technically (to agricultural production techniques) oriented.

The rural population is no longer seen as adapters of technology but as innovators that are capable to generate their own knowledge. Chambers and Howes (1980: 324) write that an important difference lies in the way in which phenomena are observed and ordered. For the research and analysis of indigenous knowledge, the populists use methods that have been developed within the "Farming Systems Research" approach (FSR). FSR aims at researching structures and systems of the local population. The results form the basis for the developing of future (project) activities. Indigenous knowledge is seen as a resource that can be used for the formulation of hypotheses which may then be referred "upwards" for refinement and specific testing.

Bentley (1989) may serve as an example for the traditional populist approach by describing indigenous technical knowledge in Honduras: the knowledge of plants. He has researched in detail what farmers know about plants, insects, and plant pathology. He compares farmers' knowledge with science and concludes that peasant farmers can classify a maize plant's growth into about as many stages as scientists. But they know less about insects because they have only one term for 25 species and they have not grasped the insect metamorphosis. He argues that farmers have to be put in touch with modern science in order to close these information gaps. Bentley admits that agricultural knowledge is unevenly distributed, but he lacks researching about questions whether the scientific knowledge would be useful for the farmers and on how farmer knowledge is generated, used and transmitted in its context.

Consequently, others (Thrupp 1989 b: 139, Hobart 1995: 4) argue that the term ITK refers mainly to technical skills of the rural population and that non-technical insights, wisdom, ideas, perceptions and innovative capabilities are not sufficiently taken into account. Thrupp also points out, that some projects using FSR methods have not been successful in strengthening and facilitating indigenous knowledge.

The ITK approach must be seen in its time as one of the first answers to the hitherto dominating scientific world view. However, it is now facing challenges and questions that go beyond the "use of indigenous knowledge". The *cultural* dimension has been gaining importance. It is suggested that a promising way to build people's own capacities to

strengthen their knowledge is a way to *empowerment*. Supporting and expanding their *own* knowledge systems may help them to gain control about their own development.

### 2.3.2 The Approach of Indigenous Knowledge Systems

Indigenous knowledge systems (IKS) is a concept that is more comprehensive than ITK. It was developed by the Leiden Anthropological Institute and the Technology and Change Program/CIKARD in Iowa/USA<sup>23</sup>. IKS is an approach that facilitates bringing together social scientists and natural scientists in order to collaborate in a multidisciplinary team. The IKS approach gives special emphasis to the interface between indigenous knowledge and the management of agricultural research, technology development, extension and knowledge utilization.

Röling and Engel (1989: 101ff) state that policy, research, technology development, extension and farmers should be considered as components of an institutional system, the Agricultural Knowledge and Information System (AKIS). AKIS should bring together two conflicting paradigms: technology transfer and IKS as a source for technology development. In order to close the gap of the interface, it is suggested to establish a knowledge management system. This knowledge management faces several challenges.

- bringing institutions together,
- articulating in systems and process-oriented,
- understanding the functions within the system,
- giving emphasis on interface management,
- balancing the power of interventions and utilization,
- managing the resource flow.

Röling's concepts and ideas are still based on the "utilization" of indigenous knowledge, therefore, farmers are seen as contributors to the knowledge system, though the importance of indigenous knowledge *systems* has been recognized. Slikkerveer (pers. com. 1995) pointed out that in recent discussions this has been changed towards "integrating" indigenous knowledge in order to balance the influence of the various actors. The IKS concept focuses still on *agricultural* knowledge that can be used for extension. Other aspects of knowledge such as cultural beliefs and myths that may influence the decisions of people are not deeply discussed.

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<sup>23</sup> The Leiden Institute and the Center for Indigenous Knowledge for Agriculture and Rural Development (CIKARD) are especially dealing with networking for indigenous knowledge. They have published studies in Technology and Change (Warren 1989, Titilola 1991, Titilola and Marsden 1995) and are also co-publishing the "Indigenous Knowledge and Development Monitor" in collaboration with research institutes in many parts of the world.

However, in more recent history, there has been an evolving relationship between anthropology and other disciplines concerned with development. IKS now is perceived in a broader context with many aspects that are considered to be important for the development process. Titilola/Marsden (1995: 499) discovered that a number of topics have become dominant in development discussion with a focus on indigenous knowledge systems.

- participation and decentralization of decision making,
- facilitation of non-governmental approaches,
- a focus on poorer and disadvantaged parts of the population,
- putting gender on the agenda.

The above mentioned aspects indicate that the context of discussing indigenous knowledge has been broadened towards many aspects of development. It is reflected in the variety of articles in recent publications (e.g. Warren et al. 1995, see also the *Indigenous Knowledge and Science Monitor*).

### 2.3.3 The Leiden Ethnosystems Perspective

In 1986, the *Leiden Ethnosystems and Development Programme (LEAD)* has been established at the Institute of Cultural and Social Studies of Leiden University in the Netherlands. The concept of this program aims at researching, analyzing and integrating ethno-specific systems<sup>24</sup>.

Ethnosystems are seen as indigenous knowledge systems and practices based on long experiences of the people, including dimensions such as education and socialization, medicine, agriculture and horticulture, animal husbandry, artisan skills, ecological knowledge, and kinship and social structures.

The concept of ethnosystems enlarges the perspective of understanding cultures and allows to analyze the cognitive and behavioral components of the respective community in a holistic way. Thus, the study of ethnosystems has the following aspects.

- the historical analysis of the respective community and its natural, cultural and social setting,
- the culture-specific background,
- the holistic approach including the various sub-systems of indigenous knowledge and practices,
- a dynamic assessment of culture aiming at integrating "Western" and "non-Western" approaches,

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<sup>24</sup> The information in this chapter is compiled from Leaky and Slikkerveer (1991), Slikkerveer and Dechering (1995) and Slikkerveer (pers. com. 1995).

- a pragmatic and realistic view towards the development process instead of a normative western-inspired one.

Consequently, this approach is structured into three dimensions.

- *the participants' view* is concerned with the people's own, subjective perception of their knowledge, environment, development process and indigenous decision-making systems. It represents an important and valuable component of the ethnosystem and links up with an *emic* view of culture from within with an *etic* view from outside,
- *the historical dimension* takes into account that each culture is based on indigenous knowledge and production techniques which have been evolved through centuries, in interaction with outsiders' influence (such as colonialists, merchants, missionaries, scientists, etc.). Highlighting the dynamic of origins and development processes helps to understand the present situation.
- *the regional comparison* is the addition to the participants' view. It aims at developing a comparative study of ethnosystems with emphasis on the field of ethnological study in its regional and historical context.

The LEAD-approach is deeply rooted in the decade-long experience of anthropological studies at the Leiden Institute. Studies have been undertaken in linguistics, patterns of social organization, kinship classifications, artisans, agriculture and irrigation.

For my research, I have taken the structure of the three dimensions promoted by this approach and have put them in relation to the context of Northern China and land use planning.

### 2.3.4 The Actor-Oriented Approach

The evolvement of an actor-oriented approach is an answer to the crisis of Western science that has been mentioned above. In this concept, knowledge is being seen as a process and knowledge systems are seen as formed by various *actors* and *networks* through which certain kinds of technical and social information are communicated and negotiated.

Scoones and Thompson (1994: 27) say that the guiding phrase in this approach is *the analysis of difference*. Knowledge is variable, discontinuous and not equally distributed and is, thus, a product of interaction and dialogue between different actors. Actors are not only insiders (farmers) and outsiders (researchers, extension agents, members of the development administrations, etc.), but these groups are heterogeneous within themselves. Farmers can be male or female, poor, middle, rich, old or young, powerful or less powerful, etc. All actors are involved in different knowledge networks. The linkages (or lack of them) of these networks have been the object of many anthropological studies (e. g. Long 1989). According to Seur (1992: 118), an actor-oriented approach is an ideal way of

understanding processes of social change because it is through actions that actors help to produce, reproduce and manage their knowledge.

The investigation of the following questions helps to understand the process.

1. Who knows and whose knowledge counts?
2. Who has access to and control of resources and processes?
3. What are adapted and participatory methods and techniques to enable the actors to establish their research and extension priorities?
4. What does this mean for change in and of institutions and development policies?

The actor-oriented approach requires a new definition of participation which aims at *empowerment*. Pretty (1995: 6) has identified seven types of participation, which are manipulative participation, passive participation, participation by consultation, participation for material incentives, functional participation, interactive participation and self-mobilization. *Interactive participation* is the sixth level of participation and is defined as

"The actors participate in joint analysis, development of action plans and formation and strengthening of local institutions... This process involves interdisciplinary methodologies that seek multiple perspectives and make use of systemic and structured learning processes. As groups take control over local decisions and determine how available resources are used, so that they have a stake in maintaining resources and/or practices."

This view takes into account that all views of the actors should have the same value and are embedded in a constant process of negotiation and dialogue. This dialogue can also include an intercultural exchange. It has to be acknowledged that all actors have knowledge that is subjective within their social context.

In my opinion, this is a pragmatic approach to the current problems of development policy, because it allows a view on the development and knowledge process that is not dominated by one side. For my research, I have used many aspects of this concept. I have identified the different actors in the process of indigenous knowledge in China and in the case study village and I have assessed their role and the role of their knowledge in the land management process.

## **2.4 Indigenous Knowledge and Power**

### **2.4.1 Hierarchy Within Knowledge Systems**

Hierarchy within any society or community is reflected in the knowledge systems of people. The knowledge of an actor having a higher status can be considered as more important as the knowledge of an actor with a lower status. In many social structures this

applies particularly to gender relations. If women are having a lower status, their knowledge is seen as inferior or even non-existing. Other examples can be found in Western/Non-Western people's knowledge or knowledge of scientists and farmers. Within a community it can be related to age, caste or class. The lower actors are associated with less or no knowledge. Power relations manifest this hierarchy of knowledge; they might differ, however, within the social stratification or from one culture to another.

Chafetz (1990: 75) points out that the important questions are: What constitutes the basis of superior power to maintain the status quo, and how are superior power resources acquired? How is power used to maintain the status quo, and under which conditions can this inequity be reduced?

Another aspect of the relationship of knowledge and hierarchy is the "hidden transcript or agenda" (Scoones and Thompson 1994: 27). It describes how power influences almost all public encounters between resource-poor and resource-rich (and between subordinates and authority). A considerable part of the full transcript - people's beliefs, ideas, values, opinions - is not revealed openly. The usual tendency for the subservient is to show only what is considered to be safe or what is meant to be expected by the authorities. The greater the disparity in power between two individuals or groups, the greater the proportion that is likely to be concealed.

#### **2.4.2 Intellectual Property Rights**

The international debate about Intellectual Property Rights (IPR) shows the emerging awareness of the relationship of indigenous knowledge and power. For thousand of years, genetic material has been collected by local communities, later by colonizers, botanists and scientists. Over the last 20 years, germplasm has been systematically collected and stored in "genebanks". There has been much debate over the "ownership" of these collections as well as the safety of the material, the development of national and international laws restricting the availability of germplasm. Genetic resources are often incorrectly referred to as the "raw material" or "common heritage" for biotechnology, whereas in reality they are the products of the intellectual, cultural and environmental contributions of local innovators, both men and women (see discussions in Shiva 1992, 1995; Rural Advancement Foundation International, of PAN Asia and the Pacific 1994, UN Commission/Gender Working Group 1995).

ECOSOC (Economic and Social Council of the United Nations) has carried out a study on the protection of the cultural and intellectual property of indigenous peoples and stated:

"The distinction between cultural and indigenous property is from indigenous people's viewpoint, an artificial one and not very useful. Industrialized societies tend to distinguish between art and science, or between creative inspiration and logical analysis. Indigenous peoples regard all products of the human mind and heart as interrelate,.. the relationships between people and their land, their kinship

with the other living creatures that share their land, and with the spirit of the world..." (quoted in Appleton et al. 1995: 75).

In 1993, the International Year for the World's Indigenous Peoples was declared; it led to the International Decade for the World's Indigenous Peoples (1995-2005). A working group has elaborated a draft declaration which, however, has no binding character but raises the awareness for the importance of indigenous knowledge:

"..indigenous peoples are entitled to the recognition of the full ownership, control, and protection of cultural and intellectual property. They have the right to special measures to control, develop and protect their sciences, technologies and cultural manifestation, including human and other genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literature, designs and visual and performing arts." (quoted in Appleton et al. 1995: 76).

Two examples may serve to improve the understanding of the value of Third World germplasm and the contribution of rural communities. The Rural Advancement Foundation International has compiled a list of 100 instances where local knowledge has made a contribution to agriculture, food processing or pharmaceutical development in the North.

One of these cases is the use of the Neem tree which has been developed and refined for thousands of years in South-East Asia and Africa. Private companies in India have now patented bio-insecticides from the Neem tree. The firms estimate the global market for their products could reach US \$ 50 million per year. The local innovators do not benefit.

Another example concerns farmer-bred cotton varieties from Peru and Colombia containing natural colors of browns and violets have been further developed and patented in the United States. US breeders admit that their invention is not "new" but argue that they have done considerable work to commercialize the varieties. Now it is illegal to grow these varieties in Peru and, consequently, many local varieties have disappeared.

These examples show that the reality is influenced by international trade and worldwide benefits of transnational companies and neglects or exploits the local knowledge of peasants. Shiva (1993, 1995) sees the IPR (Intellectual Property Rights) concept within the GATT<sup>25</sup> as another instrument that will dispossess rural people, especially women, of their power, control and knowledge, because they are only seen as *individual and private* rights and not as local knowledge of a community. This excludes all kinds of knowledge, ideas, and innovations that take place in the intellectual commons, in the villages among farmers, in forests among tribal peoples and even in universities among scientists. Therefore, Shiva concludes, they are in favor of transnational corporations and not of local communities. A boundary of creativity and knowledge has been set up and treats Southern farmers and local ethnic groups as engaging in unthinking and repetitive processes. This boundary

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<sup>25</sup> GATT = General Agreement between Tariffs and Trade in 1995 transformed into the WTO- World Trade Organization

takes only "industrial" production as true production and does not consider regenerative and creative processes as true knowledge (Shiva 1993, p 172).

Another limitation is that IPR are recognized only when knowledge and innovation generate profit, not when they meet social and ecological needs. Moreover, they have to be "trade-related" on international markets. Most innovations by local farmers are for domestic or local use, not for international markets. Consequently, IPR will increase the benefits for transnational companies and, on the other hand, lead to a decrease of local biodiversity.

## 2.5 Indigenous Knowledge and Gender

"Gender" describes socially defined roles of men and women in society. The classification can be enlarged towards the roles of younger and elder members of the society. This chapter analyzes the *differences* of the knowledge of women and men. However, since women's roles and knowledge is often unknown by men and underestimated, in this chapter more emphasis is given to women's knowledge.

Indigenous knowledge is possessed by men and women in different ways. In land management<sup>26</sup>, some tasks are typically performed by women, some crops grown by women and some decisions are made by women, some types of knowledge are the domain of women. Women and men have developed overall knowledge systems that are influenced by gender differences and gender roles in the overall system.

### 2.5.1 Gender Roles in Knowledge Management

Based on their roles in the rural life, women and men have different roles in the management of knowledge and in the development and application of indigenous knowledge. Some types of knowledge have to be seen together: both female and male knowledge systems are needed to understand a particular dimension of agricultural production or a certain decision-making process. Other types of knowledge are shared by all members of a community but differently applied. Again others are only possessed by a certain gender.

Norem et. al. (1989: 93) have identified four ways to think about gender differences in knowledge systems.

#### 1. *Women and men may have different knowledge about different things*

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<sup>26</sup> Since this research focuses on land management, this chapter describes gender roles in land and resource management. However, gender differences in indigenous knowledge systems are not limited to agricultural production. Women have manifold responsibilities for the family's nutrition and reproductive tasks as well as for storage and medical practices.

This applies often in the pattern of *shared tasks*. In Northern China, both genders are responsible for planting wheat; men and women go to the fields at the same time. Men do the plowing and hoeing, and women apply fertilizers and put the seeds in the soil. Consequently, women know more about seed custody (as in many parts of the world, Shiva 1993: 167). Men know more about the quality of soil and soil management. Both kinds of knowledge are complementary, meaning it is necessary to apply all knowledge to grow wheat successfully.

#### *2. Women and men may have different knowledge about similar things*

Some types of knowledge are specifically held by men or women and consider their different domain of tasks. In many societies, men are responsible for activities further away from the homestead, often for hunting as in many African societies. Women are responsible for growing vegetables and staple food in their homegardens. Therefore, women have been especially innovative in breeding seeds for vegetables and flowers that grow around the houses (Mumford 1967: 172). In some societies, elders have profound wisdom about medicinal plants, seed sources, valuable crop species, or natural resource constraints. Specific knowledge about the use of medicinal plants may be held only by midwives, traditional healers and "local experts".

#### *3. Women and men may have different ways of organizing knowledge*

People organize their knowledge and wisdom so that it is useful in their daily lives. For example, both women and men may have a certain knowledge about a certain crop, but they may have a different system about the classification of these crops. They organize it differently according to its potential use and according their tasks for that use. Men may know more about a crop's suitability for a certain soil type or climate, where as women may know more about their nutritional value and cooking characteristics. Therefore, since evidence exists about the different types of knowledge in each group, questions of differences in organization, including different classifications and typologies, should be addressed in research and development.

#### *4. Women and men may have different ways of sharing and transferring knowledge*

The transfer of knowledge plays an important role in many development activities, and within this, emphasis is put on agricultural extension and "transfer of technology". Very often extension services failed to address the needs of women, because it tended to be oriented towards male, better-off farmers. Very often men can participate in village meetings and can leave the house/village more easily than women and therefore better participate in extension activities. In contrast, women more often shared their knowledge with their relatives, neighbors or close friends.

Knowledge is often managed within groups that are organized along gender, kinship, class or age. Many groups have an informal character, for example, informal knowledge exchange within neighborhoods. When women farmers in Burkina Faso were surveyed

about their technical knowledge and awareness about the extension service, 40 % had some knowledge about modern crops and livestock production. Female relatives and neighbors were the source of information for most of these women, nearly one third had learned it from the extension service and only one percent had heard of the technologies from their husbands (Saito and Spurling 1992: 18). Development planners (and many of my male interview partners in China), however, have assumed that information given to male farmers will be passed along to other farming members of the family. This does not often happen. Experience indicates that agricultural knowledge acquired by men, unless they themselves will benefit, often does not "trickle across" to women in the family.

### **2.5.2 The Gender Bias**

Researchers have often been unaware about the gender dimension of indigenous knowledge and, thus, ignored the knowledge of women. This is due to their biased focus on land-owning male farmers, neglecting other members of the rural communities. Recent publications, addressing gender, are mainly written by female authors (Thrupp 1989a and b, Awa 1989, Norem et al. 1989, Shiva and Mies 1993, Nazarena-Sandova 1994, Davies 1994, Asian Institute of Technology 1995, Appleton et. al. 1995). Moreover, women's and men's knowledge is differently perceived within a society and by themselves. Very often, women tend to underestimate their own knowledge and its function within the community.

Male researchers research about men, male extension workers share their knowledge mainly with male farmers. Appleton et. al. (1995: 57) describe research carried out by male biologists about women's homestead gardens in India. The scientists revealed that they believed the homesteaders used space inefficiently, that the plants were planted randomly, and that trees were grown only for a single purpose. The validity of these assumptions was then tested by a team of women scientists working through maps of homesteads with local women. They discovered a complex system of planning, indicating order in apparent disorder. The female scientists concluded that greater emphasis had to be given to women's knowledge and practices and not just regard them as exploited workers for post-harvest chores, because the women had a specialists knowledge concerning their homestead.

Even within participatory appraisal methods like PRA gender biases can appear. In his earlier publications Robert Chambers does not give gender differentiated recommendations concerning PRA tools. Mosse (1993), a male anthropologist, has done some research on gender during two PRA exercises in India. He found out that women were not as intensely included as men. The reasons were the following.

- The PRA team comprised more men than women, thus, had easier access to men,
- PRA exercises often took place in public domains that are not (easily) accessible for women. Women are sometimes too shy to speak in public and/or have too many household chores to participate in supplementary activities.

- Many PRA tools comprise visualization techniques such as mapping and diagramming that need at least minimum writing skills. However, more women (especially the poor) are illiterate and cannot participate in drawing and writing exercises.
- Women were sometimes explicitly excluded by local men.

My own experience with PRA exercises indicates that the gender bias can be connected with a social bias. All PRA team members tend to communicate with men and richer women. Poor women are often excluded because they are difficult to reach (they may live on the outskirts of the community) and because they are more hesitant to talk so openly about their own knowledge and skills<sup>27</sup>.

Neglecting women's knowledge and skills results in stereotypes of women that still form the basis for planning and extension. According to Awa (1989: 5), men hold several interconnected stereotypes:

- Women do not make significant contributions to agriculture (because they are mainly responsible for reproductive tasks).
- Women are always tied down with household chores and children.
- Women are shy and difficult to reach.
- Women are difficult to gather at one point even if their interests converge.
- Women are not progressive in dealing with innovations.

The consequence is a growing resistance to the empowerment of women, because many men see their authority endangered once women have become "empowered". Moreover, the women themselves believe in these stereotypes and restrain themselves from achieving control over their lives and their environment. "Learned helplessness" (Seligman quoted in Awa 1989: 6) is an approach to explain why some people resign themselves to fate and become helpless. When people experience that they have no influence on what happens to them, they learn to perceive themselves as helpless. They will stop responding to outside events and challenges, because they experienced out that responding is useless. This often leads to anxiety and depression. Many women have made this experience and therefore consider the stereotypes mentioned above as valid for themselves.

Successful participatory development approaches have to take into account that male gender stereotypes are a question of addressing power distances in a society. Since women are the chief food growers in the Third World and are a source of indigenous knowledge, their views and knowledge have to be consulted for any development activity. Therefore, gender has to play a major role during the integration of indigenous knowledge into land management and land use planning.

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<sup>27</sup> For example, when we tried to analyze aerial photos with village women in China, they told us to go to the men "because they are responsible for this". After some time, however, and a careful explanation about what we wanted to do, we could enter into a fruitful dialogue.

## **2.6 The Role of Institutions as Actors in the Knowledge Process**

Institutions and organizations play an important role in the management of knowledge. According to Uphoff (1992: 4), an institution is a complex of norms and behaviors that persists over time by serving some socially valued purposes, while an organization is a structure of recognized and accepted roles. Institutions can be organizations and vice versa.

Institutions and organizations as actors deal with hierarchy and power. In their "hidden agenda" they might promote indigenous knowledge or neglect or even destroy local knowledge (see below). Interfaces exist between each of the organizations' elements and between the organizations themselves. These interfaces are vulnerable, caused by conflicting power domains and ineffective linkage mechanisms. Interface management of all relevant institutions has become a crucial task in knowledge management, because many fractures of the interface between institutions and land users are caused by conflicting power domains (Röling and Engel 1989: 105).

Moreover, science and technology as well as indigenous knowledge can be seen as local resources for a sustainable organizational development (Sülzer 1996: 35). Interest in the organization and management of indigenous knowledge has increased and it is researched how it can provide a basis for community-level decision-making. Institutions are seen as important for mobilizing resources and regulating their use with respect to provide a sustainable base for productive activities (Blunt and Warren 1996: xiii).

Some authors (Uphoff 1984: 239f, Pretty and Chambers 1994: 184ff, Chambers 1997: 226ff, Bebbington 1991: 22) therefore promote institutional changes and new institutional settings that support a sustainable development that includes the knowledge of **all** actors. Proposals comprise commitments with continuity, networking, learning by doing, flexibility and encouragement of grass-root staff. Emphasis is put on new institutional frameworks that enable a dialogue to provide organizational points where the knowledge systems can meet. Both farmers and technical researchers have to be active in the critique and recognition of each other's knowledge, in order to develop complementarities and field for further joint research.

### **2.6.1 Governments and State Institutions**

In many developing countries, government institutions are centrally organized and intervene at the local level through their line agencies. Government agencies are perceived as rather distant and centralized bureaucracies. Their services haven often been equipped and trained to communicate from top of the system downwards to farmers, rather than stimulating grassroots activities (Bakema 1994: 9). Moreover, they face several institutional constraints, that hinder them to work efficiently. These limits are debt burdens, structural adjustment, low revenue and budget deficits. At the institutional level, inflexible management generates inefficient activities based on centrally determined

criteria. Field agencies focus on meeting physical and measurable goals such as increasing crop production and neglect farmers' participation (Pretty and Chambers 1994). Examples are institutions for research and development, extension and training, and credit supply. In forest extension, extension workers are often trained to enforce forest codes and, therefore, cannot actively promote the participation and empowerment of farmers.

In the agricultural sector, there is a general bias towards crop production, that hinders the integration of other sectors of rural development. Furthermore, government agencies are organized according to sectors such as crop production, livestock, agricultural mechanization, etc., which does not enable their staff to promote an integrated approach.

The organizational setting of government institutions therefore often does not facilitate the integration of indigenous knowledge. Moreover, it enhances neglecting and destroying local level initiatives that may promote local knowledge, because government institutions often focus on scientific, sectoral knowledge. For example, in the 1960s and 1970s, many strong, independent farmers' unions were incorporated in national or regional marketing boards. This had led to neutralizing their potential for acting as sources of empowerment and self reliance. In other cases, traditional management structures and common laws and regulations were wiped away by modern jurisdiction. This legal dualism enables the misuse of resources by those who have power and relations to manipulate the system (according to Bakema 1994: 10).

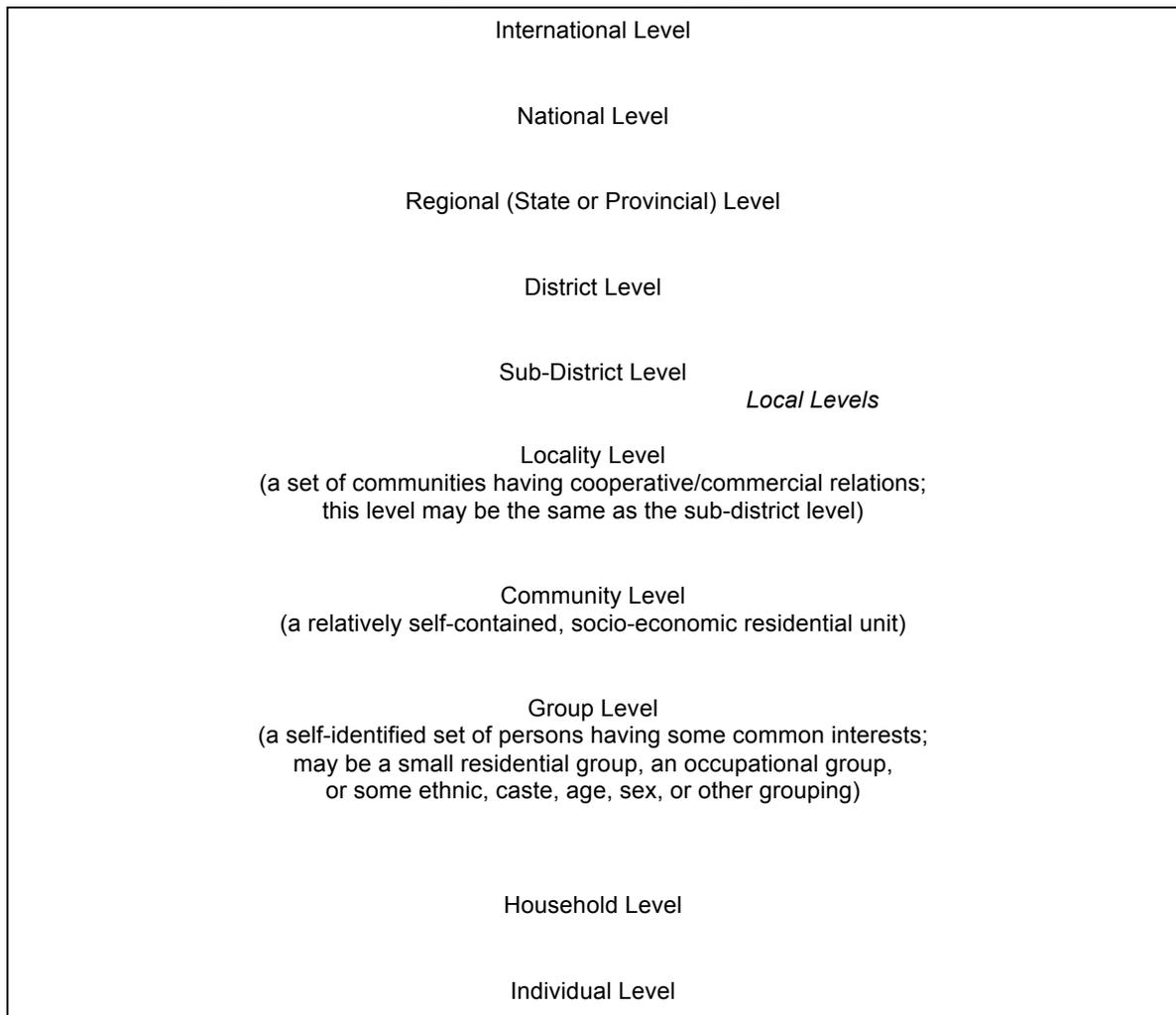
### **2.6.2 Local Level Organizations**

Local organizations can be based on traditional settings or have been derived from spontaneous and time-limited initiatives. Many communities have traditionally had local organizations that managed natural resources such as land and water rights distribution. Very often important decisions are made by village assemblies or meetings of local leaders (Bakema 1994: 9). Local organizations are an important means to organize, disseminate and manage indigenous knowledge. They can act as intermediaries in rural development and promote the active participation of the local population (Esma and Uphoff 1984: 15ff) as well as the development of indigenous knowledge.

Indigenous organizations are considered as a subset of the larger category of local organizations. The term "indigenous organization" is mainly used for local-level institutions with an organizational base that is considered as endogenous, in contrast to exogenous, to the community. Exogenous organizations are mainly established through external forces such as church groups, boy and girls scouts, trade union branches, etc. (Blunt and Warren 1996: xiv). Indigenous organizations can comprise community development planning organizations, hometown associations, traditional councils, traditional credit unions. Almost always their aims include development activities, they make use of and manage indigenous knowledge and local innovations.

In order to clarify the definition of "local", Uphoff (1986: 11) has developed the following schedule. According to his definition, three levels should be regarded as local: *localities*, that have kinship, marketing or other connections, *communities* or villages or small towns, and *groups* that have common interests and frequent and intense interpersonal relationships (see chart 3).

Chart 3: Levels of Decision making and Activities (Uphoff 1992a: 5)



The following types of local groups are especially important in the management of indigenous knowledge.

- cooperatives based on traditional groups (for example for distributing land and organizing land tenure) to apply knowledge,
- community development groups (e.g. for hill resource management or local infrastructure activities) to utilize knowledge,

- farmer experimental and village research groups to increase and improve knowledge,
- farmer-to-farmer extension groups to share and improve knowledge,
- private businesses to utilize knowledge to gain (monetary) benefits.

(Sources: Uphoff 1986, Savanije and Huisman 1991, Bakema 1994, Pretty and Chambers 1994)

Bebbington (1991: 18ff) has researched on the role of indigenous farmer organizations in Ecuador and the management of indigenous agricultural knowledge. In these organizations, members see their knowledge not simply as a means of controlling and planning their environment, "but as an element in a cultural system whose status at any time depends on the indigenous/peasant groups' socio-political and economic relations with the dominant sector of the society" (Bebbington 1991: 21). Most of the groups delimit themselves from the activities of the extension agents which they see as "cultural aggression" and "instruments of manipulation by the Hispanic society". Indigenous knowledge is understood

- "as a body of technical knowledge for managing the environment,
- as a means for understanding one's own ethnicity differentiating oneself from the rest of society,
- as an object for a process of critical reflection in which indigenous farmers think about why they have the indigenous agricultural knowledge they have, why it means to them what it does means, how and why it has changed and how far it ought to be changed." (Bebbington 1991: 21)

Indigenous organizations do not necessarily have an anarchic structure. On the contrary, Blunt and Warren (1996) conclude from their compilation of cases of women's organizations, ethnic associations, traditional religious groups, and other local organizations that all have a surprisingly formalized set of organizational structure. These included elections of officers, regularly scheduled meetings, written records and fee structures for members. Li Xiaoyun et al. (1996: 222f) describe that in China formalized structures as the former collectives are now used for an organizational set-up based on friendship and kinship. Furthermore, the activities of the local groups promoted the team-building among farmers while establishing income generating opportunities.

In many development programs strong local-level institutions are now envisaged for village land management, capable of managing the natural resources of the local environment, assuming that indigenous knowledge of the villagers can be integrated into the development by working through local level institutions.

### **2.6.3 Indigenous Knowledge and Development Organizations**

Though many international and bilateral development organizations still base their programs and projects on an approach that is oriented towards Western science and technology, several activities have been carried out that document a paradigm shift, how to better incorporate indigenous people and their knowledge into natural resource management and conservation programs (Davis and Ebbe 1995: 11). Instead of "planning from above" or "top-down", a "bottom-up" approach has been developed, which involves the local participants and their knowledge in decision-making. Van Ufford (1995: 137), however, explains the dangers of knowledge and ignorance even in development projects that propagate the bottom-up approach. His example of an irrigation project in Indonesia indicates that the local organizations involved did not really represent the peasants and their indigenous knowledge. Still the project was presented as a success story of local participation. Development officers ignored the reason for the failure, that the linkages between the different groups of actors were problematic.

Since 1990, the World Bank has carried out several studies and held conferences focusing on indigenous people, poverty and participation, mainly in Latin America (Warren 1991, Davis 1993, Davis and Ebbe 1995 and the Worldbank's internet pages). Though attempts were made to include indicators relevant to indigenous knowledge into planning and evaluation, actual implementation is relatively low.

The framework of Agenda 21 as formulated at UNCED (United Nations Conference on Environmental Development), in Rio de Janeiro in 1992, now coordinated by the United Nations Commission on Sustainable Development and implemented through national and local authorities recommends that when adopting integrated management systems, particularly for the management of natural resources, traditional or indigenous methods should be studied and considered wherever they have proved effective. Additionally, it recommends.

- integrating indigenous knowledge related to forests, forest lands, rangeland and natural vegetation into research activities on desertification and drought;
- compiling, analyzing and publishing information on indigenous environmental and developmental knowledge and assisting communities that possess such knowledge to benefit from it; and
- initiating and maintaining on-farm and off-farm programs to collect and record indigenous knowledge.

For the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) its expertise regarding local knowledge lies in hiring and training qualified local staff in technical cooperation projects. However, until the 1990s it had not yet been realized that in many projects and programmes it is also necessary to promote indigenous knowledge and to discover the need for local innovation in order to make project activities more sustainable.

Since then, GTZ has been promoting the assignment of local and international facilitators who have a socio-cultural competence and who are able to integrate indigenous and local knowledge into the development process. In addition, GTZ promotes the development of participatory approaches such as PRA in order to support local development approaches and local knowledge (Kievelitz 1995: 54). In order to achieve this, GTZ has recently carried out several projects that have been aiming at the development of increasing the socio-cultural competence of advisers and consultants<sup>28</sup>.

International agricultural research centers, in particular CIMMYT, CIP, IRRI and ISNAR<sup>29</sup> have started to incorporate indigenous knowledge in research and development strategies. They have provided a foundation for a systematic incorporation of knowledge on natural resources into international research efforts that aim at maintaining biodiversity and developing flexible varieties for higher productivity (Titilola and Marsden 1995: 503).

In contrast to the big multi- and bilateral donor organizations, several smaller and non-governmental organizations explicitly aim at the promotion of indigenous knowledge. Among them are the Center for Indigenous Knowledge for Agriculture and Rural Development (CIKARD), founded in 1987 at Iowa State University/USA, the Leiden Ethnosystems And Development Program (LEAD), established in 1986 at the Institute of Cultural and Social Studies of Leiden University/The Netherlands, CIRAN, a network for indigenous knowledge, publishing the "Indigenous Knowledge and Development Monitor".

Other organizations carry out larger programs for supporting indigenous people and knowledge. IUCN in collaboration with WWF, UNEP, FAO has published the World Conservation strategy, including a specific perspective on traditional knowledge and development. The International Institute for Environment and Development (IIED) in Great Britain and the Information Center for Low External Input and Sustainable Agriculture (ILEIA) in the Netherlands, mainly develop participatory methods that enhance the local knowledge of farmers. The Man and Biosphere (MAB) Program of the UNESCO focuses on traditional resource use.<sup>30</sup>

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<sup>28</sup> Such as "pilot project for self-help promotion in natural resource management and "socio cultural advisory work", see also Pfander 1995.

<sup>29</sup> abbreviations see introduction

<sup>30</sup> For an assessment of the approaches on indigenous knowledge of the different organizations and programs, see Warren et al. 1995: 426-487, United Nations Commission Gender Working Group 1995: 68-79, Antweiler 1995: 33-45.

## 2.7 Concepts of Land Use Planning with Regard to Indigenous Knowledge

According to a FAO Publication "land use planning is the systematic assessment of land and water potential, alternatives for land use and economic and social conditions in order to select and adopt the best land use options." (FAO 1993: 1). Within this framework, two schools of planning have evolved: one that aim at generating and applying new technologies in order to sustain the future of the **land**; and one that aims at developing the future of the **land users** and put emphasis on rural household objectives and constraints (Fresco et al 1994: 395). The first concept focuses mainly on science and technology. Most of the common approaches in land use planning in developing as well as in the industrial countries follow this approach. They do not include a true interaction of actors throughout the process of planning and implementation. Handbooks and case studies describe a collection of data that are necessary for land evaluation and land use planning, including ecological and economic factors. The human factor is often mentioned as collecting "socio economic" data (for examples see Driessen and Koniln 1992, Steiner and van Lier 1984, van Kooten 1993, Fresco 1994a<sup>31</sup>).

Recent publications indicate a shift towards the latter concept and put emphasis on the integration of the land users and their indigenous knowledge. The FAO in its guidelines for land use planning (1993) emphasizes that the integration of "perceived needs, local problems and **local knowledge** of land use opportunities" should be integrated in local land use plans, district land use plans and national land use plans.

"'Bottom-up' planning is initiated at the local level and involves active participation by the local community. The experience and **local knowledge** of the land users and local technical staff are mobilized to identify development priorities and to draw up and implement plans." (FAO 1993: 6f)

GTZ has developed a similar definition of land use planning that puts decision making of actors in the center:

"Land use planning in technical cooperation is an iterative process that is based on the dialogue of all actors. It aims at making decisions for a sustainable use of land in rural areas and includes the facilitation of the respective implementation activities." (GTZ 1995: 5, translated by K. Janz)

This approach allows a more flexible development and application of land use planning, because the planning process has to be carried out by all actors. Moreover, it includes the implementation of the plans, which should be done by the local people themselves.

A closer look into practical experiences shows, however, that many implementation activities do not follow a people-centered approach but are still mainly based on technical

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<sup>31</sup> This compilation tries to focus on integration knowledge for land use options, however, the editor admits that the majority of the case studies do not sufficiently take the needs of land users into account.

and scientific inputs and top-down approaches (Brinkmann 1994: 11ff, Dalal-Clayton and Dent 1993: 31). An example is the Bangladesh Flood Action Plan, coordinated by the World Bank and other donors, launched in 1990. Though it was promoted as an integrated effort of local peoples and technical knowledge, the focus was only on flood control and has not considered the historical experience in Bangladesh concerning water management; the people concerned could not effectively participate and the project lacked reliable baseline data (Dalal-Clayton and Dent 1993: 31).

It can be concluded that, in reality, the reorientation of land use planning strategies towards the integration of indigenous knowledge and intermediate technologies faces the following problems.

- Institutions concerning land use planning are still top-down oriented and have a paternalistic behavior. Institutional staff refuse to change institutional settings and behaviors, because they fear the loss of their power. They do not integrate indigenous knowledge in their plans.
- The coordination between sectoral agencies concerned with land use planning is often difficult and does not allow of a comprehensive approach to integrate indigenous knowledge.
- Local level agencies do not consider the real needs of the land users and their indigenous knowledge as important.
- Documents that put emphasis on the integration of indigenous knowledge are often only read, but not used and acted upon. The World Bank, for example has published excellent reports on indigenous knowledge (World Bank 1992, 1995), but in most of the projects the top-down, technology-driven Training & Visit Approach is used which does not consider local knowledge.

In some countries like Canada and New Zealand approaches have been developed that put the *knowledge* of the land users into the center and aim at the empowerment of the local people (very often these are indigenous people: native American or the Maories respectively). Aberley (1993b: 71ff) describes the case of British Columbia where planners and citizens' groups developed maps for a sustainable land use in a joint process. Methods had been developed to gather data and to present maps in a form that were understood and accepted by both planners and ordinary people. The outcome was an atlas that is a valuable aid in "home learning" and will be used as an "organizing tool useful in focusing bioregional intent into action".

Allen (1995: 1ff) writes about a New Zealand way to sustainability: integrating local and scientific knowledge through an evolutionary research approach to support land management decision-making. The approach takes research, extension and users as components of one information system. Farmers and scientists together have developed a

"framework that is able to capture the existing knowledge, both scientific and local, held within the community. The information must be structured and presented in a form that allows users ready and direct access to the knowledge base as a decision-making and learning aid. The process also has to allow for new knowledge to be added as it becomes available and it must recognize and address the multiple social perspectives that characterize rangeland environments throughout the world".  
(Allen 1995: 3)

This concept comprises three challenges.

- to share existing knowledge of both the community and science,
- to develop processes which allow the sharing and evaluation of the information,
- to encourage a new "learning environment" that allows to share existing **and** new knowledge.

These successful examples focus on the integration of both scientific and local knowledge. Real participation does not mean the mere consultation of beneficiaries but real involvement of all actors. An important prerequisite for this approach is the change of attitudes, creating new learning environment and behavioral changes in and of institutes that deal with land use planning. The new agenda of participatory land use planning and the integration of indigenous knowledge incorporates existing knowledge – formal and informal – and potential combinations of environmental circumstances and socio-cultural and economic situations.

## 2.8 The Definition of Indigenous Knowledge in the Context of this Thesis

For the specific context of research about land use and resource management in a village in a mountainous area in Northern China I have developed the following definition:

**Indigenous knowledge** is the knowledge that the farmers have at present in Northern China about their land use and natural resource management.

This includes questions as management of knowledge, changes of knowledge, innovations made by farmers, failures and opportunities (participants' view).

and

it is knowledge that has been generated over generations. Moreover, it has already been present and used in the region concerned before 1949<sup>32</sup> (historical dimension).

It is knowledge that exists outside the official extension service and is not extended by its agents (thus distinguishing it from scientific and ideological knowledge).

In order to illustrate this knowledge system, the following chapters describe the historical dimension, scientific knowledge in China and the participants' view with the village of *Liudu*.

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<sup>32</sup> 1949 is a landmark in Chinese history: The Communist regime came into power and developed almost immediately a system of extension and land management that completely changed the pattern of Chinese agriculture and therefore had a tremendous influence on the traditional knowledge.

### **3 The Historical Dimension in China**

#### **3.1 The Historical Dimension of Land and Water Management**

The historical dimension encompasses the historical assessment of a society in its natural, cultural and social context. This includes the dynamics of origins and development processes which have led to the present situation. Indigenous Knowledge Systems have their roots in the historical changes of their respective societies. People act according to their knowledge which has been generated over generations.

Unlike in Africa, where contemporary-oriented approaches have led to the impression of "people without history" (Slikkerveer pers. comm. 1995), China's agricultural history is well documented by both Chinese and Western scholars. According to Bray (1984: 47), more than 500 agricultural works have been written in China until the Qing Dynasty.

In the 20th century, English language sources are available that assess the historical dimension of the Chinese agrarian development. Needham, Bray (1984) have explored the field of agriculture and science and technology. Anderson (1989), Hsu (1980), Golas (1980) and Perkins (1969) describe agricultural techniques and government policies in certain dynasties. Elvin (1973), Chao (1986), Gernet (1982), Huang (1985), and Alvares (1980) have investigated the reasons for stagnation of agricultural technology development. Others (Hsu 1982, Temple 1991, Zhao Songqiao 1994) write chapters of "historical background" as introductions or chapters of their monographs. Buck (1937) delivers statistical data and agricultural zoning approaches of China in the 1930s.

More sociological oriented studies cover mainly periods of later imperial or republican times before 1949 e.g. Duara 1988, Fei Xiaotong 1947, Freedman 1979, Gamble 1963, Holland 1938, et al..

However, most of them do not take into account the generation, innovation, preservation and transfer of knowledge. Authors either take it for granted that knowledge was spread among farmers and scientists because progress was so evident, or they focus on investigating the material culture which is easier to probe. An exemption is Brook (1982), focusing on the spread of rice cultivation, and, to a certain, extent Elvin (1973) and Bray (1982), showing the Chinese contributions to Europe's agricultural development.

Moreover, few studies focus on farmers' views. On the contrary, farmers are seen as adopters of technology, or as obstacles. China's agricultural progress is seen as the merit of government policy, not of farmers' innovations (Bray 1980). Large quantities of official sources, elite writings and, for more recent times, many elite's biographies in local gazettes (see Brook 1982, Huang 1985) describe the view of a certain class at their time. For the

Qing Dynasty, some modern ethnographic methods have been used to study peasants' life during this period (Gang 1993, Huang, 1985 and 1990).

Ancient Chinese value systems, such as mythology and cosmology (for example the system of *yin* and *yang*), and the concept of *feng shui* as part of indigenous knowledge systems are hardly taken into account in most of the works. An exception is Menzies (1994).

In this thesis, I do not want to reconsider the findings of these studies that have been carried out by studying primary Chinese sources. My focus is on assessing the sources<sup>33</sup> available in English concerning the following questions.

- Which were the main ancient innovations by Chinese scientists and farmers concerning land management in Northern China and how were they handled? Are they still applied today?
- Within the historical dimension, how did cultural, economic and political relationships affect the generation and transmission of agricultural knowledge?
- Who were the main actors in this process?
- Which kind of historical knowledge has been generated in North China that has influenced today's farmers' land management in the hilly and mountainous areas of Northern China?
- What are Chinese visions of nature and value systems?

Annex 1 shows a compilation of major innovations that are important for land management and relevant government policies of the respective dynasties. They are described in the following chapters.

### 3.1.1 Regionalization of Agriculture

Within the overall framework of a general climate rhythm (dry cold winters, hot humid summers in the North; cool humid winters and hot humid summers in the South), Chinese agriculture has always shown a distinct regionalization resulting from varying local natural conditions. This is a decisive precondition for the evolution of a wide range of local indigenous knowledge systems.

The cropping systems described in the next chapters applied mainly for the cultivated areas. Yet China has always had also large grasslands in the Northwest where different concepts of agriculture have been developed focusing on animal husbandry. In Han Chinese agriculture, however, animal husbandry and forestry are not seen as an integral

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<sup>33</sup> I would like to point out that most of the sources show differences or sometimes even contradictions concerning the introduction of crops and farming techniques, etc. In this thesis, I take those statements as a basis that are at least confirmed in a second study.

part of agriculture<sup>34</sup>. Since the 5th century BC, the cultivation of food and fiber crops was emphasized in Central and Southern China, animal husbandry in the Northwest, and fisheries in the East (Yu Youtai 1987: 26 pp). The major reason was the scarcity of land so that animals could only be fed by waste material (i.e. pigs).

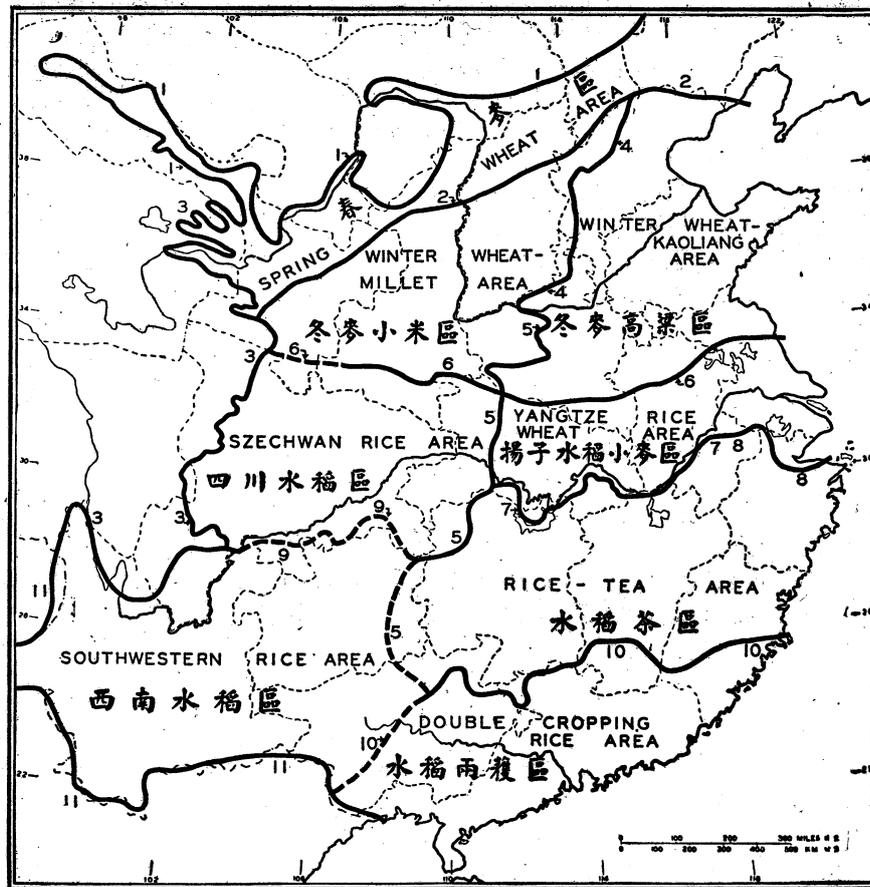
Another regional difference is the layout of fields. In Northern China, the main part of the cropping system is formed by rainfed fields (*handi*), whereas Southern Chinese agriculture is principally irrigated (*tian*) (Bray 1984: 101f).

In his pioneering survey of 168 villages in pre-modern China, Buck (1937: 27) has identified eight agricultural regions: spring wheat, winter wheat/millet, winter wheat/*gaoliang*<sup>35</sup> in the North, and Yangzi rice/wheat, rice/tea, Sichuan rice, double cropping rice, and Southwestern rice in the South. Buck's classification of agricultural regions is still seen as a basic data collection for agriculture in China. According to Buck's classification, the case study village *Liudu* is located in the winter wheat/*gaoliang* region (see Map 1). Differences in the agricultural indigenous knowledge have been developed according to the regions. In the next chapters, I will focus on historical developments of the winter wheat/*gaoliang* region, because the research area is located in this region.

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<sup>34</sup> In the case study village, animals do not play a major role.

<sup>35</sup> *gaoliang* = sorghum



Map 1: Agricultural areas of China (Source: Buck: 1937: 27)

### 3.1.2 Crop Cultivation and Field Systems

The beginning of intensified crop farming can be dated back to the third century BC, when the Qin dynasty was established after a long period of war. The rulers of the Qin and the following Han dynasties put special emphasis on the development of new cultivation methods that made full use of the land resources. One technique was the so-called ridge farming (*mu quan*) developed in North China. The soil was tilled that it produced ridges and furrows, so that excess water could drain but roots were protected against drought. During the Han Dynasty, ridge farming was further developed (*dai tian*). Ridge farming is still applied in the 20th century. It was described by King (King 1911: 128) when he traveled through Manchuria and is still used in the case study village *Liudu*.



Photo 1: Ridge farming in Liudu August 1997

Broomcorn millet (*shu*) and sorghum (*gaoliang*) are seen as indigenous to China. Wheat (*xiao mai*) and barley (*da mai*) were introduced from the Near East (Bray 1984: 459), but widely cultivated since the 8th century BC. During this time wheat comprised 50 % of the staple food in China. Predominant crops during this time were also beans (*dou*), cabbage (*cai*), melons (*gua*), mulberry (*sang*) and hemp (*ma*). Sources differ, if rice (*dao*) is indigenous to China or if it was introduced from India, however, it was cultivated as early as around 3000 BC (Hsu 1982: 113).

During the Han dynasty (206 BC - 220 AD) agricultural patterns that had previously evolved locally were extended over wide areas. Well-planned arrangements of planting replaced the previous broadcasting techniques; multicropping systems were gradually developed; rotations of crops and the application of manure made multiple cultivation possible.

Crop rotation, intercropping and grafting were well known (Hsu Cho-yun 1980: 100, Bray 1984: 432). Farm implements were improved, especially the plow (moldboard plow), used either with oxen or with persons.

Between the eighth and twelfth century AD, China's agriculture faced a profound transformation and revolution. Better milling machinery led to the widespread replacement of millet by wheat in the North (Elvin 1973: 115). Another change was the introduction of

the early ripening Champa rice from Indochina in the eleventh century AD. Together with improved paddy rice production it made double or even triple cropping possible in China's southern rice areas. Champa rice is also relatively drought resistant and could therefore be grown in areas with marginal conditions, so it could also be cultivated in the Northern areas. Farmers improved and created new rice strains, so most of the older varieties of the eighth century had disappeared (Hsu 1982).

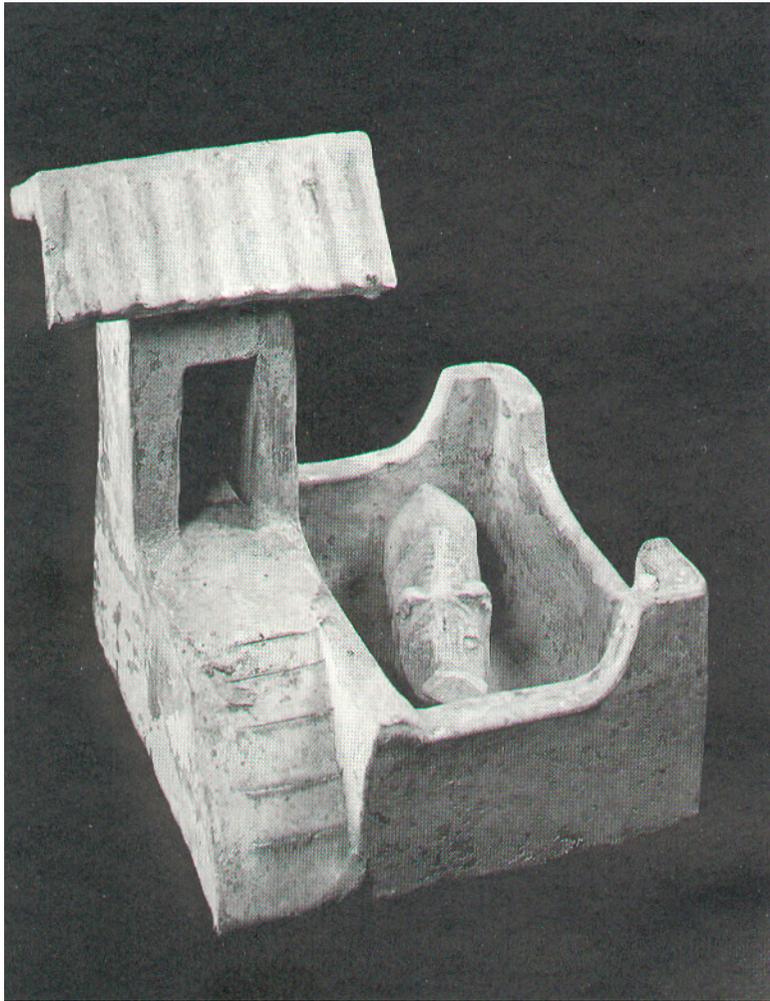
The plow was modified for the use in wetfield farming because the wet soil in the South required less power than the hard, dry soil in the North. Sometimes, when farmers did not have enough capital to buy draft animals, plows were drawn by men. The seed-drill of the Han was improved so that it could plow and sow four furrows at the same time. (Elvin 1973: 118f). Organic fertilizing was improved. Nightsoil and mud were the usual fertilizers, lime was also applied.

"A manure house is always built by the side of a farmer's dwelling... Under the manure house a deep pit is excavated and lined with bricks or glazed tiles so that the manure can not seep away. Sweepings, clinker, winnowed husks, broken stalks and fallen leaves are gathered and burnt, after which they are enriched with liquid manure and made into a compost heap." (Chen Fu's Agricultural Treatise 1149 AD, quoted in Elvin 1973: 119)

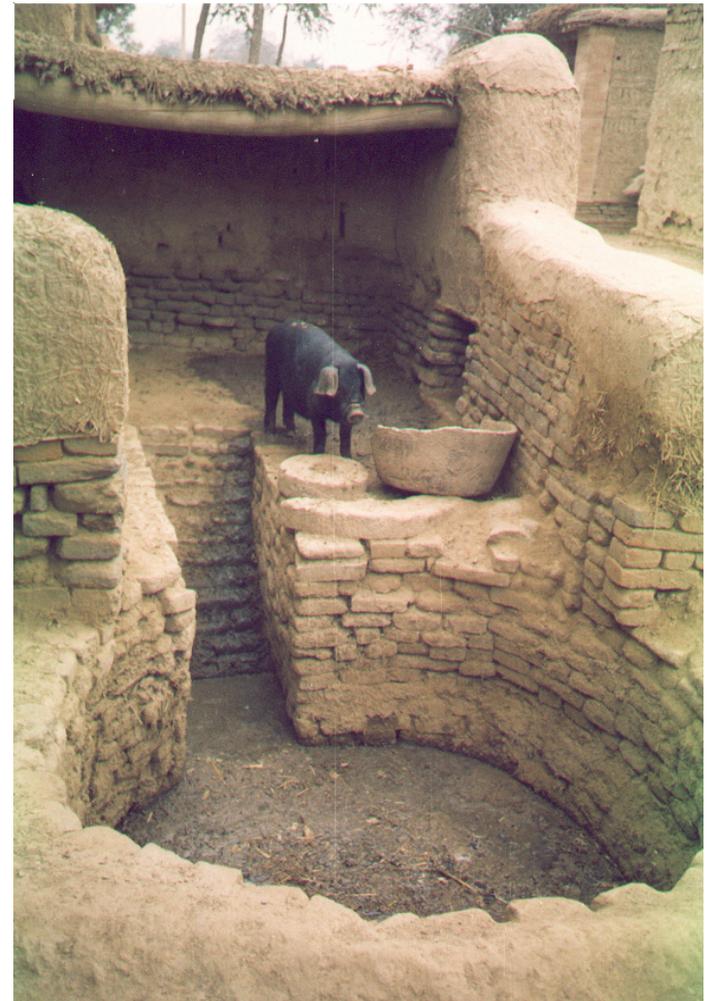
Photo 2 and Picture 1 show a toilet that is combined with a pigsty. The principle originates from the Han dynasty. Both human and animal nightsoil (*fen*)<sup>36</sup> are collected in the deeper part of the pigsty, start a fermentation process and are then used as manure.

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<sup>36</sup> Chinese farmers do not distinguish between human and animal nightsoil, both are called *fen*.



*Picture 1: Han model of a pigsty and toilet (Bräutigam 1989: 46)*



*Photo 2: A pigsty in Hebei October 1992*

has not yet explicitly focused activities of promoting indigenous knowledge. For GTZ By the thirteenth century AD, China had "probably the most sophisticated agriculture in the world" (Elvin 1973: 312). This was mainly due to four aspects.

- new crop varieties,
- better soil management,
- better irrigation and water control networks, trade and specialization of farming which led farmers away from subsistence agriculture to commercial, sometimes even export oriented farming (cotton, sugar cane, fruit-trees were grown on a large scale in suitable areas) (Elvin 1973: 312ff).

After the thirteenth century the pace of agricultural innovations slowed down. However, during the Ming Dynasty (1368 - 1644 AD), the cultivated area of paddy rice, tea, sugar cane, and sugar beets increased (Zhao 1994: 62) and existing improved farming techniques and practices were transferred from prospering regions in the South to North China. Even in the North, cropping patterns changed towards double cropping of rice, or double cropping of rice or millet or sorghum with wheat or barley (Perkins 1969: 41ff). Another double cropping pattern that is still used in the 20th century is the rotation of winter wheat or barley followed in the summer by millet, rice or corn. This pattern is also still applied in the case study village *Liudu* (winter wheat followed by corn). The spread of rice cultivation into today's area of *Hebei* Province began during the second half of the 16th century (Brook 1982: 659). In the seventeenth century, rice yields could reach 300 jin/mu<sup>37</sup> (2.25 t/ha), a figure that is even high by today's standards (world average in 1982: 2.3 t/ha) (Hsu 1982: 82).

In the sixteenth century, four major crops from America were introduced into China and led to a change of cropping patterns and increase of yields: peanuts, corn, tobacco, and sweet potatoes. All were first planted in southern regions such as *Guangdong*, *Fujian*, the lower and central *Chang Jiang* area, and *Sichuan*. Corn was most probably introduced to China before 1511 AD - only 20 years after Columbus discovered America. Since China had a strong fleet in those years, corn is supposed to be introduced by sea and not via India (Sun 1987: 234). In the 19th and 20th century, these crops were transferred to North China, including *Hebei*. Irish potatoes were introduced in the 17th century.

An important step in the development during this time was the separation of agricultural (first sector) and industrial production (second sector). Moreover, parts of the agricultural production were commercialized and a commodity economy developed. In the *Chang Jiang* Delta, silk and cotton industries appeared (Zhao Songqiao 1994: 62). In the seventeenth century, the lower *Chang Jiang* area became a rice-deficient area, because farmers shifted to producing mulberry leaves (for silk worms), cotton and other non-food

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<sup>37</sup> 1 jin = 1/2 kg, mu = 1/15 ha

crops. American cotton varieties were introduced in the nineteenth century and have since then been mainly produced in *Shandong, Henan* and *Hebei*; for further processing cotton was then transported to Central and South China (Lardy 1983: 7).

The time from the Opium War (1840) to the founding of the People's Republic of China was a period of struggle between exogenous values, technologies and systems (coming from Europe, Japan, Manchuria, Korea and the USA) and the preservation of ancient Chinese value systems. Since many foreigners traveled and worked in China, agriculture and rural structures are well documented by Non-Chinese and overseas Chinese scholars (Brook 1982, Buck 1937, Duara 1988, Forsythe 1971, Freedman 1970 and 1979, Gamble 1954 and 1963, Holland 1938, Huang 1985, Lang 1946, Lee and Chin 1929, Myers 1979, Perkins 1969, Potter and 1987, Smith 1994, Stross 1986, Tao 1928, Tawney 1932, Young 1930). We can regard this as a period of struggle between different knowledge systems.

The railroad development and improved communication facilities after 1885 promoted a further specialized agricultural production. American cotton varieties replaced the Chinese hemp within a few decades and, after 1917, Virginia-type tobacco was introduced and spread in China. After 1914, corn and potatoes played a major role in the double cropping system. Improved seed selection with modern experimental farms and scientific seed development replaced the traditional seed selection already in the 1920s and 1930s (Perkins 1969: 51).

Buck's survey indicates that many households have developed complex cropping systems with a specialized production (mainly located in Southern China) (Buck 1937). Lardy (1983: 11) criticizes that Buck's study excluded areas that were less market-oriented and less easily accessible; this is, however, a common problem with many rural studies. King (1911: 130) describes that farmers sowed cotton in wheat fields two weeks before wheat was harvested in order to use time efficiently. In the 1990s, I have seen this technique during my field surveys in cotton-growing areas. In the field study village, farmers put corn seeds into the soil one week before winter wheat is harvested in June. King (1911: 267) also describes double cropping with green manure (*medicago denticulata*) between winter wheat and cotton.

Many sources say that though agricultural production was highly commercialized in the traditional core areas, the ordinary farmers of the vast rural periphery could live just above or even below the subsistence level (e.g. Lardy 1983: 12). Reasons for poverty were - besides natural disasters and political instability the feudal land system and unequal land distribution which will be described later. However, by 1957, Chinese average grain yields were equal to those of Japan, and double or triple of those of India and Thailand (Perkins 1969: 52).

### 3.1.3 Irrigation

Irrigation, water control and drainage has always played an important role in the history of agriculture in China; in many regions crop production was only possible through a sophisticated irrigation system. Moreover, success or failure in water control (*shui li*) were decisive for the rise and fall of many dynasties.

Besides large water control projects, farmers developed and used implements for moving water, for both irrigation and drainage of the local land. The counterbalance bucket or the "well-sweep" can still be found in China (see Picture 2 and Photo 3). The paternoster irrigation, developed during the Ming Dynasty, can also be found today (see Picture 3 and Photo 4).

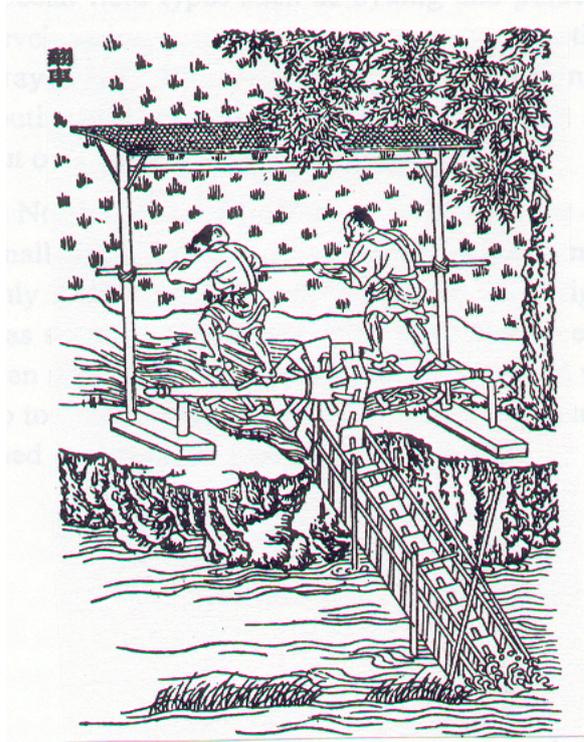
In North China, irrigation was more a matter of the individual farm, involving thousands of small wells, because rivers become very small or even dry out during winter. In *Hebei*, only 7 % of the total cultivated area was irrigated before 1949. A typical well at that time was seven to ten meters deep, the water level being 5 meters below the surface. Five or six men needed a week to build this brick-lined well, which could provide irrigation water for up to 20 mu (Huang 1985: 56). In the case study village, this type of traditional well is still used for irrigation (see Picture 4 and Photo 5)).



Picture 2: Irrigation during the Han Dynasty (Source: Böttger 1987: 52)



Photo 3: Irrigation in Liudu in April 1994



*Picture 3: Paternoster irrigation in Han Dynasty (Source: Böttger 1987: 53)*



*Photo 4: Paternoster irrigation in Hebei 1998*



Picture 4: Irrigation well during the Ming dynasty (Source: *Chin. Agricultural Museum* (1989: 283))

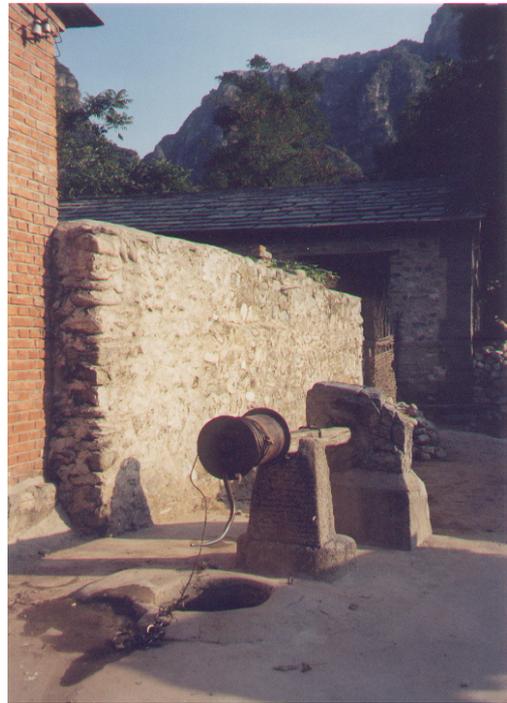


Photo 5: Irrigation well in Liudu (September 1997)

During my studies in rural China from 1985 to 1998, I could observe that this kind of irrigation equipment retains its importance. Today (the decreasing availability of) water is one of the most stressing problems in rural North China. Recent government policies focused on the enlargement of irrigated fields, in order to reach a certain independence from often unreliable precipitation. Furthermore, irrigation permits two harvests per year. Large irrigation facilities can only be used by large farming units like state farms. Therefore, small-scale farmers have to rely on their traditional equipment, because this has proven to be suitable for their specific situation: It is easy to produce or already available (made of wood or stone), easy to handle, labor-intensive (since all rural areas have a labor surplus) and is, since plots are small, economically the most viable solution.

### 3.1.4 Agricultural Policy and Land Tenure

Land distribution in Chinese history has been a constant struggle of government intervention, private or feudal land concentration versus common ownership and equitable distribution, and lineage and religious commitments of the farmers and tenants. The results of this process can still be seen today: Land tenure is one of the most stressing problems of the case study village *Liudu* and reflects these historical dimensions.

Classical theories of land tenure can be divided into two categories that correspond with the schools of "Legalism" and "Confucianism". These two conflicting approaches are still existing today and are reflected in the recent discussions on land use rights.

The legalist thinking aimed at maximizing agricultural outputs and having as much land as possible under cultivation. Legalists put emphasis on private ownership, free disposal of land and complex land tax systems. In the fourth century BC, the legalist economist Li Gui stressed "maximizing land and labor" which for him meant ensuring conditions to encourage people to cultivate land. His disciple Yang Shang refined this policy and promoted the private ownership of land. Later, he was accused of initiating the process of concentrating the land in the hands of a powerful gentry (Crowell 1979: 305).

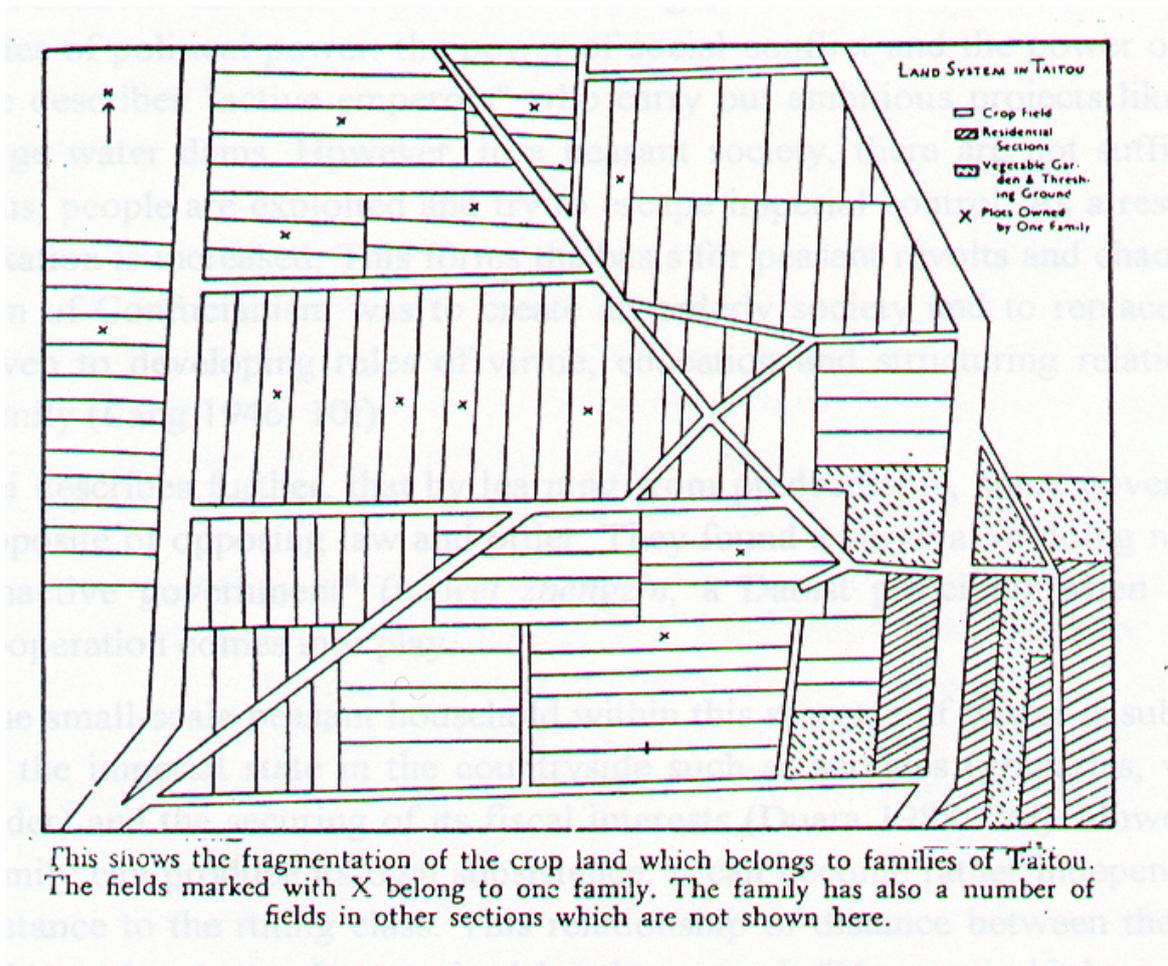
The Confucians, in contrast, promoted the state as the only owner of land, an equal land distribution system and fixed tax according to agricultural yields. The famous "well-field system" (*jing tian*) which was initiated during the Zhou period (around 300 BC) and later further promoted during the Han dynasty (202 BC to 220 AD) illustrates the concept of this philosophy. The well-field system got its name from the Chinese character "a well" (*jing*, 井). The eight outer squares were assigned to individual families whereas the center square (public field *gong tian*) was cultivated commonly, supposedly for the benefit of the feudal lord (Zhao Songqiao 1994: 53). Bray (1984: 103) quotes Leeming (1980) who has discovered that this type of equal land distribution can still be seen in the layout of modern Chinese fields<sup>38</sup>, however, some sources doubt whether it has ever existed (Bray 1984: 101, Crowell 1979: 317).

Lineage has also played an important role in common land ownership. Freedman (1979: 391) and Potter (1970: 122) have analyzed land ownership and segmentation patterns within the Chinese lineage system. They found that ancestral property is determined by the nature of the internal segmentations of Chinese lineages. Until today, villages and their land are often organized according to clans, which finds its expression in the appearance of the same family name within one village<sup>39</sup>.

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<sup>38</sup> At the beginning of the 20th century, the well-field system served again as a model for revolutionary land reforms. Moreover, the "family responsibility system" introduced in the 1980s, after years of communist collectivism, also assigns equal portions of land according to the number of persons in a family and is also referring to the ancient well-field system.

<sup>39</sup> In the case study village 80 % of the families have one of the family names: Wang or Li



Picture 5: Fragmentation of crop land which belongs to the families of Taitou (Source: Yang 1945: 15)

Another influencing factor for the distribution of land is the partible inheritance (*fenjia*)<sup>40</sup>. It has led to a fragmentation of land plots and to the fact that many farmers more and more have to turn to non-farming income-generating activities<sup>41</sup>, because the small plots do not deliver enough yields for maintaining a family (Wakefield 1998: 198). Yang (1945: 14f) writes in his study about *Taitou* Village in *Shandong* that the *Pan* families in the village tried hard to keep their large fields from being broken up, but the increasing number of their descendants made this impossible, and finally most of the small fields were divided into even smaller pieces (see Picture 5). The map shows an even more fragmented situation

<sup>40</sup> *Fenjia* means the distribution of land among all sons. In Northern Europe, in contrast, land was mainly inherited to the eldest son in order to prevent fragmentation

<sup>41</sup> Again, fragmentation is a common problem of the case study village. The average 5 mu are divided into up 8 plots!

in Liudu 1997, because it located in a mountainous region, where landholdings are smaller in general (see map 9).

### **3.1.5 The Farmers' Livelihood**

This chapter is based upon surveys that have been made in rural North China in the 19th and 20th century. Emphasis is given to those conditions for peasant families that still influence farmers' life today.

#### *3.1.5.1 Influence of State and Society*

The social structure of the Chinese Empire faced two basic contradictions. On the one hand, the peasants had to support the state and the ruling class by paying taxes and/or providing their labor force. In the later Qing Dynasty, in some regions, land was accumulated in the hands of feudal landlords. These landlords were powerful enough to refuse to pay taxes to the central government (Lang 1946: 4). This, in turn, led to a weakening of the government which resulted in agrarian crises, many peasant rebellions, changes of dynasties and a growing influence of foreign forces.

Consequently, new dynasties usually started by developing new concepts of distributing land among the peasants, thus solving the agrarian crisis and strengthening the state and government administration. Fei Xiaotong (1947: 108 pp) sees a contradiction as the two sides of political power: the power of social conflict and the power of social cooperation. He describes "active emperors" who carry out ambitious projects like building cities and large water dams. In a peasant society, resources often are insufficient and, thus, people are exploited and try to escape imperial control. As a result, state control and taxation is increased. This forms the basis for peasant revolts and chaos. Consequently, the aim of Confucianism was to create an orderly society and to replace chaos. Emphasis is given to developing rules of virtue, education and structuring relationships of state and family (Lang 1946: 10f).

Fei describes further, that by learning from predecessors, some governments then did the opposite of imposing law and order: They ruled by doing nothing, becoming an "inactive government" (*wuwei zhengzhi*, a Daoist principle), when the power of social cooperation comes into play.

The small-scale peasant household within this struggle of power is subject to the functions of the imperial state in the countryside such as services (granaries, waterworks, law and order) and the securing of fiscal interests (Duara 1988: 26f). When a peasant family can produce its own subsistence, it can become rather independent and create a far distance to the ruling class. This relationship of distance between the government and its subjects has been characterized by the proverb "Heaven is high and the emperor is far away" (*tian gao huang di yuan*).

Even today, this distance to government institutions can be observed in the case study village of Liudu. For example, on the one hand, farmers nearly completely depend on the distribution of land by local authorities. On the other hand, however, some farmers take over fallow land and create their own business even without obeying government rules. Authors like Xiao Zhou (1996) see the increasing rate of migration as an indicator of a growing distance to the government, because by migrating farmers withdraw from the influence of state authorities in their hometowns. Also at the local level, government laws and regulations are often disobeyed by the people often leading to corrupt behavior. In order to combat this kind of "chaos" and corruption, the Chinese government tries to implement stronger measures that then can lead to an oppression of all local initiatives. This shows again the contradiction between the two sides of political power.

### 3.1.5.2 *Clan, Kinship and Family*

According to Fei Xiaotong (1947: 83), the pattern formed by different social relationships (*shehui guanxi*) in the Chinese rural society and social circles was more important than other patterns and more important than in Western societies. One of the most common groups in Chinese society was the extended family (*da jiating*). Fei also identifies the small lineage (*xiao jiazhu*) as the basic unit of Chinese society. A clan (*zu*) is a number of lineages (*shizu*) sharing the same surname. Lang (1946: 19f) quotes that her informants in North China considered the following categories as members of their kin:

- parents,
- brothers and their families,
- paternal uncles and their families,
- married sisters,
- paternal aunts,
- maternal grandmothers.

Kinship provides its members with social orientation and acts as a transitional grouping between the family and the village or larger social/political units, uniting them in some ways and bringing them into conflict in others. It also serves as a pool for sharing agricultural and other knowledge. The members have a range of moral obligations towards each other including respect for the elders but also act as an "employment agency" when it comes to bringing clan members into influential position in the bureaucracy.

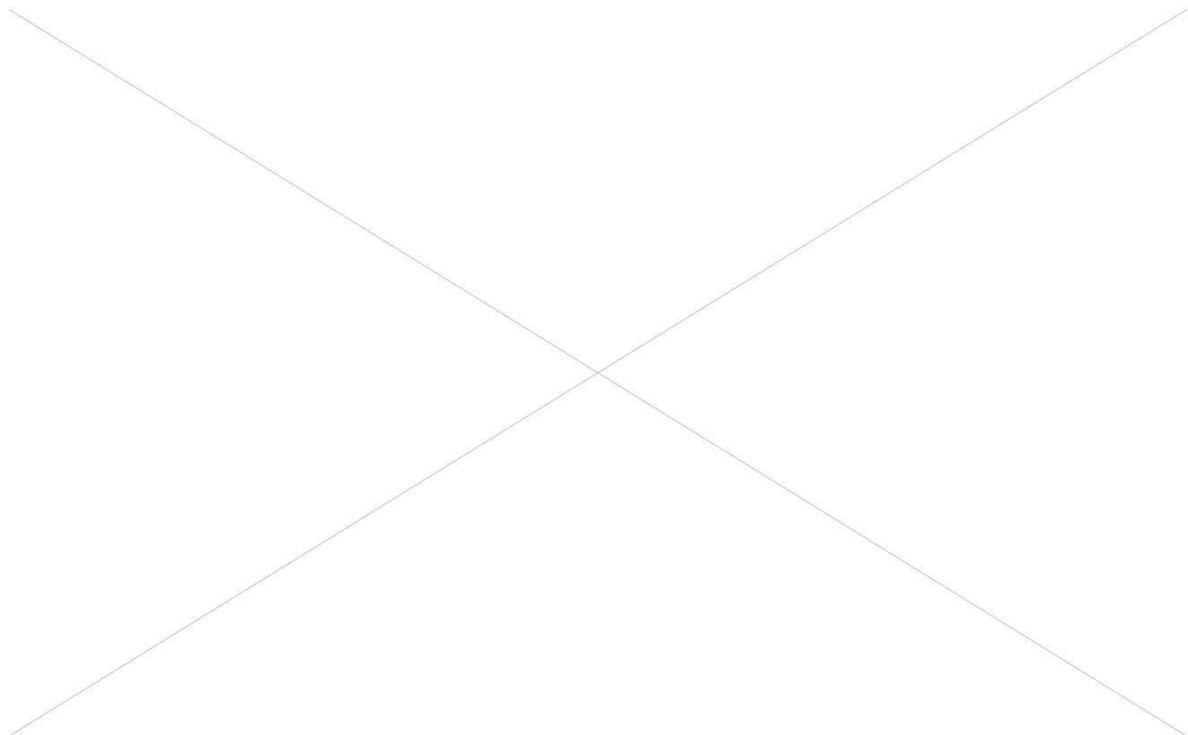
However, Lang's informants did not consider kinship as the determining factor for relationships among the villagers, but friendship with neighbors or friendship with relatives<sup>42</sup>. She also did not find evidence of financial dealings among relatives, because relatives are obliged to get better conditions and therefore could soon be ruinous. Fei

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<sup>42</sup> This coincides with findings in the case study village where most of the informants said that their exchange knowledge with their friends and neighbors.

Xiaotong (1947: 125) confirms this hypothesis by describing rotating credit associations (*qianhui*) as organizational patterns and not as those of families.

Duara (1988: 101 pp) has identified that kinship influences the territorial layout and the political administration in his case study villages in *Hebei* Province in North China. In some villages, the residences of members of the same kinships coincided with the location of the residences of their relatives (see map 2; he arrows indicate the households whose doorways do not open out onto a street occupied by another dominating surname). This is also the case in Liudu.



*Map 2: Residential map of Sibeichai (Hebei). Source: Duara (1988: 106)*

Most of the social and anthropological studies on Chinese kinship and relations that cover the early 20th century come to the conclusion that the importance of clan and kinship relations has decreased and that other forms of relations or connections such as work units gain importance. However, the importance of being a member of one family - even a nucleus one - remains valid until today. For example, the units of the production teams in a village (*xiaodui*) often follow the lines of family and kinship.

### **3.2 Knowledge Management**

This chapter focuses on the management of knowledge during imperial and republican times, putting emphasis on trends that still influence the present situation and present

perceptions of actors. Knowledge management in the context of this thesis consists of the development of agricultural knowledge (innovation), its spread (extension) and its actual implementation. Since the Warring State Period, (475-221 BC) both government administrators and scholars became important actors in managing and developing agrarian technology and the so called "agriculturalist" school became so popular that it entered many states and private academies (Shih Shenghan 1959:45). Even later, the government with its administrators remained the most important actor in the management of agricultural knowledge.

The first agricultural extension manual, the famous *Fan Shengzhi Shu*, compiled and written by Fan Shengzhi in the first century BC, was issued by the government. Fan describes details of

- the basic principles of farming,
- choice of date and varieties for sowing,
- treating the seeds,
- cultivation of certain crop plants,
- harvesting,
- seeds, selection and storage,
- cultivation in shallow pits.

(quoted in Shih Shenghan 1959 pp 3-41).

During the Han dynasty (206 BC - 220 AD) the government was strongly committed to agricultural research and extension, aiming at improving agricultural methods and expanding the agricultural area (Bray 1984: 587). The government also provided peasant farmers with seed-grain, tools and draft animals. Government controlled experimentation led to the development of the pit cultivation. Yields were compared and recorded (Anderson 1989: 143). In most of the sources, however, one cannot find how the farmers who developed these innovations and used them, reacted and acted. Only Tang (1979: 5) writes that "veteran farmers" played a major role in developing superior seed varieties. Moreover, local farmers were chosen for their skills and experiences and formed the imperial equivalent of a rural extension officer: *nong shi* (agricultural master). They were not only responsible for the instruction and extension of new technologies but also for the organization of mutual aid (Bray 1984: 598).

Emperors of the Song Dynasty (960-1279) further developed and systematized agricultural research and extension. The term *tuiguang* (extension) was used for the first time by Song officials and is still used today (Delman 1991: 68)<sup>43</sup>. Besides the above mentioned government interests in increasing agricultural production, another reason for the

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<sup>43</sup> *Tuiguang* means "push and spread" and shows the perception of the Chinese extension approach until today: that technologies have to be spread by using force and that the management of knowledge has to be top-down oriented.

development of a sophisticated extension system was the Confucianists' dedication to education that: Not only the availability of a certain technology assures its adoption, but also efforts of making the farmers aware of more efficient agricultural practices (Golas 1980: 310).

Agricultural books and treatises<sup>44</sup> reflect the achievements of ancient Chinese agriculture, but were hardly a means to reach the farmers who were often illiterate. Therefore, during the Song dynasty, practical extension methods were developed that promoted the spread of agricultural technology. Woodblock printing, invented in the 9th century, illustrated many agricultural treatises. It is still today an important tool in describing rural issues (Stafford 1995: 31). In less advanced areas, officials had pictures showing how to farm painted on government office walls, they also issued leaflets and wrote verses and essays on agriculture (Elvin 1973: 115). Local people were trained to work as extension workers, technologies were tested under local conditions and with local farmers, and farmers could extensively observe demonstration fields before adopting a new technique (Delman 1991: 69).

Some sources indicate that the interface between scientists and farmers was not as distinct as today: Jia Sixie who wrote *Qi Min Yao Shu*, completed in 544 AD, was personally involved in farming, participated in actual farm work and learned from experienced old peasants. He took peasants' proverbs seriously and developed scientific agricultural recommendation from them (Zhong 1984: 296). The *Chen Fu Nong Shu* (Agricultural Treatise of Chen Fu), completed in 1149 AD, is based on what the author himself has learned from farming:

"I have myself farmed in the Western Hills, and am acquainted with the principles of farming... My books contain more than mere abstract knowledge. Only if one has really trod the ground, and is capable of doing something oneself, should one dare to write explanations for the instructions of others." (Chen Fu in his preface, quoted in Elvin 1973: 116).

Brook (1982: 684) describes the spread of paddy rice technology from Southern to Northern China in the 18th century. Besides the official instruction by county magistrates, a common method was to bring southerners north and have them disseminate their agricultural skills by instruction or by example. This method is today known as farmer-to-farmer extension and has proven to be very successful in participatory technology development.

There has been a long debate why and how technological innovation slowed down after the Song (Perkins 1969: 52, Bray 1984: 90ff, Elvin 1973: 12, Little 1989: 105-144). However, agricultural production increased - mainly by intensifying existing methods and by

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<sup>44</sup> I do not want to repeat here the discussion and analysis of Chinese ancient books on agriculture. There are many authors who did this in a sophisticated way (Bray 1984: 47-85, Elvin 1973: 114-129, Anderson 1989, Fan Chuyu 1987:292-314, and others).

increasing areas of arable land. There is evidence that as for the 14<sup>th</sup> century outsiders and foreigners as well as technology imported from other regions of the world led the pace of technology development in China. This also initiated a process of knowledge exchange between Europe and China. In 1658, French Jesuits sent a scientific mission to China in order to study geography, flora and fauna and food production. Later the Jesuit mission brought a lot of agricultural books to France. They also enabled Chinese students to study in Europe (Bray 1984: 568f). In 1577, the Jesuit priest Matteo Ricci traveled from Italy to China to bring Christian faith and Western thoughts to Ming dynasty China. He studied the Chinese language and developed a methodology to spread European knowledge in China (Spence 1985: 5). Ricci produced a larger number of maps, put together from both Western and Chinese sources. The German Jesuit Adam Schall continued the dialogue between Chinese and Western sciences, including assessing Chinese agriculture and cartography.

At the end of the 19<sup>th</sup> and beginning of the 20<sup>th</sup> century, efforts were made by the Qing government to introduce Western technology as part of the "self-strengthening" process (*yangwu*); in order to support the declining empire (Hsu 1982: 24) with the doctrine "Chinese learning as the fundamental structure, Western learning for practical use (Fairbank 2006: 217). Agricultural schools and private agricultural associations were established and Japanese and American scientists taught and propagated new agricultural knowledge. The Mantetsu Survey was carried out between 1935 and 1942 commissioned by the South Manchurian Railway Company. In the North China Plain, villages were selected and villagers were interviewed on the topics of village management, land ownership, land sale and purchase, tenancy, water control, land deeds, tax, credit and trade, and kinship. The survey is one of the most precise and detailed sources of information available on pre-revolution *Hebei-Shandong* (Huang 1985: 34ff).

American scientists and missionaries (such as John Lossing Buck) also developed extension systems and supported the foundation of farmers' organizations, heavily influenced by American and Christian viewpoints. These included a self-help principle, recognizing the importance of having farmers to take an active role in helping themselves and forming extension bureaus from the bottom (Stross 1986: 170f). Other American scientists had different views about the Chinese farmers. Griffing who promoted the introduction of American cotton varieties in the 1920s wrote about Chinese farmers:

"There is the problem of the farmer himself. Although in every country the farmer represents the most conservative element, here his habits are fixed by centuries of custom. He obeys the mandate of the rural deities rather than the printed advice of experiment station experts which he cannot read." (Stross 1986: 129).

This remark shows that on the one hand American scientists devoted themselves to promote and stipulate the Chinese agriculture of that time, but on the other hand, followed the Western and scientific worldview which did not take the knowledge of the farmers into account. This opinion may have caused a destruction of indigenous knowledge before the Communist takeover, later however, its influence was not as broad as that of the

communist administration. The ideas of farmers being backward and ignorant can still be seen today among Chinese agricultural scientists and extension agents.

The role of foreigners in China's technology and knowledge development has been controversially discussed. On the one hand China needed exogenous influence to overcome the "equilibrium trap" of technology development, on the other hand, foreigners have been blamed for the failure of economic development before 1949, especially for the impoverishment of certain sectors of the population (Dernberger 1975: 47).

### 3.3 Chinese Visions of Nature and the Concept of *Feng Shui* as Part of the Historical Dimension

Chinese ancient value systems are strongly influenced by the view that everything changes and all nature emerges from the actions of the cosmic forces *yin* and *yang* that are seen as opposing and complementary. *Yin* is attributed to earth, autumn, winter, night, small states, inaction, contracting, woman, being controlled etc., whereas *yang* refers to heaven, spring, summer, day, big states, action stretching, men, controlling people (Smith 1994: 132). Findings in the case study village of *Liudu* indicate that farmers still classify the layout of their traditional fields according to the principle of *yin* and *yang*. Seasonal changes in vegetation are related to *yin* and *yang*, and trees are classified according to "shade tolerant" (*yin*) and "shade intolerant" (*yang*).

*Yin* and *yang* continuously interact to produce the so-called five elements: wood, fire, earth, metal and water. These elements, in various combinations under various circumstances, transform to *qi*, a material force that is embedded in all living and dead things. It can also be translated as "vital force" or "vital power". *Qi* in Chinese philosophy conceptualizes the basic structure and function of the cosmos and does not make an analytical distinction between spirit and matter (Callicott and Ames 1989: 69). Cao and Zhang (1997: 34) noted in their survey of a *Han* village in *Yunnan* that local people felt confident because they enjoyed the harmony of *qi* between people and nature and were therefore dedicated to protect forests on the hills surrounding their village. The five elements have to be in harmonious order "then the four seasons run their course" (Book of Changes quoted in Smith 1994: 132).

The Daoists are concerned with laws governing the whole of nature. Special emphasis is given to the concept of *wu wei* ("actionless") - humans should not try to interfere with the natural flow of the world. Following the way (*dao*) one sees that the world is constantly changing and that in nature death is inevitable.

Some Western ecologists and philosophers have romanticized these visions as being harmonious and non-destructive to nature, based on the above mentioned cosmic

equilibrium of *qi* and the *wu wei* principle as promoting the conservation of the natural environment<sup>45</sup>. This is in direct contradiction to the obvious destruction of nature and the physical evidence of the serious environmental degradation which has occurred in China for centuries. Menzies points out that imperial scientists as well as artists and poets were well aware of ecological problems such as deforestation and thus

"...were trying to reconstruct an idealized version of something they felt had been lost, rather than responding to a living landscape. More fundamentally, and of more universal significance, the gap between ideal and actuality in the treatment of the environment demonstrates... that we must 'recognize inconsistency and paradox as characteristic of human existence'". (Menzies 1994: 33).

This view is in line what Clunas (1996: 12ff) writes about Chinese gardens. He states that imperial gardens were not only "an expression of artistic ideas and conceptions that have emerged from an intimate feeling for nature" but also a place of peace and projected dreams, the embodiment of the philosophy of life.

The Concept of *Feng shui* describes another interaction with nature. It means "wind and water" and has often been translated into English as "geomancy"<sup>46</sup>. It describes the layout of living and dead humans' settlements in relationship to the physical surroundings and the cosmic *qi* (air, gas, energy). *Qi* in the universe influences everything. In the human body, *qi* influences strength and health. In nature, *qi* is related to growth, regeneration and coordination of the natural forces. The rhythm of the seasons means that *qi* functions. A deserted and destroyed landscape and unhappy inhabitants indicate the absence of *qi*. *Feng shui* aims at balancing *qi*.

If houses, fields and tombs are not properly adjusted, the inhabitants and their descendants may suffer from poverty and unhappiness. A good *feng shui* site has positive impact on human life, i.e., a turtle-shaped scenery indicates longevity for the people living there, a dragon-shaped area will deliver spirit and energy. People can improve the *feng shui* in order to receive the benefits of a better *qi*. For this, people usually consult a *feng shui* specialist who suggests the ideal layout of houses, fields and tombs. Planting trees can also enhance the *feng shui*. Sub-categories of *feng shui* are *tianshi* (heavenly time for certain events or activities)<sup>47</sup>, *dili* (geographical advantage) and *renhe* (human harmony).

In geomancy, *yin* and *yang* sites are often considered for burial sites. *yin* is dark, feminine, and absorbent while *yang* is bright, masculine and powerful. However, for farmers, *yin* and *yang* are also important for their traditional fields. It describes the soil texture and the

<sup>45</sup> Examples are Goodman (1980: 79) who points out that the *wu wei* principle is promoting the use of passive solar energy, and Enzensberger (1973: 40) who said that the careful utilization of natural resources is rooted in the millenium-old Chinese culture and that China therefore has the best ecological strategies in the world.

<sup>46</sup> Other translations are topomancy, topographical siting, siting, astro-ecology, mystical ecology (Knapp 1992: 37).

<sup>47</sup> In my interviews in *Liudu*, farmers used this term for expressing the management of their rainfed fields.

direction to the sun and therefore helps the farmers to make decisions on how to cultivate the land.

Needham (1984, Vol. 4 Part I: 359) writes that *feng shui* has influenced most of the ancient Chinese settlements. Ancient Chinese classics describe cosmic but also topographic factors that should be considered concerning the planned siting of villages and towns and thus laid the foundation for a systematic landscape planning (Knapp 1992: 37).

In PR China, *feng shui* and its application have been stigmatized as superstition, especially during the cultural revolution, and have no longer played a role in town and country planning. Graves, clan houses, shrines and altars were destroyed. The *feng shui* experts could no longer openly practice. As a consequence, people educated during the cultural revolution know very little or have no interest in "the old traditions".

In Singapore, Hong Kong, Taiwan and other Chinese dominated areas, however, planners and inhabitants until today consult the *feng shui* expert before construction and other business activities. There is some evidence that this tradition has found its revival in the rural areas of PR China among the generation that was born after the reform and opening. Bruun (1996: 50) describes that most of the pre-revolution *feng shui* practitioners now continue to carry out their business with mainly unchanged techniques and similar objectives as before. Cao and Zhang (1997: 34) describe that in their case study village the villagers are well aware of *feng shui*, especially how it contributes to the conservation of trees and forests. In 1993, a Chinese land use planner in Shanghai told me that she has an increasing number of requests from overseas Chinese who want to be buried in their motherland. She puts them in touch with local *feng shui* experts (pers. comm. Wu Weiling 1993).

Lippmann (1992: 123) has researched on the application of *feng shui* principles for landscape planning in Germany. He concludes that the concept of *feng shui* cannot serve as a basis for landscape planning, because it does not comprise participatory planning approaches and the solution of ecological problems. I do not agree with this statement. If participatory planning takes the view of the participants, e.g. the land users, into account, their perception of harmony and nature which is manifested in *feng shui* has to be considered. Bruun (1996: 49) even writes that *feng shui* was often used to oppose state regulations or outside influences. Moreover, the category of *dili* contains ecological features such as taking shelter from wind, the availability of water and the danger of inundations and can therefore be an important element of landscape planning and also land use planning.

However, it has still to be empirically proven to which extent and if the concept of *feng shui* can contribute to the solution of the pressing environmental problems in present PR China. Since an open attitude towards and the revival of such traditions has only taken place for a few years, we might have to wait until we can research these phenomena with a sufficient data basis.

### 3.4 After Liberation: Promoting Ideological Knowledge<sup>48</sup>

After 1949, the management of (agricultural) knowledge was mainly influenced by Marxist philosophy and by the ideology of Mao Zedong. Mao saw himself as a populist being convinced of the wisdom and knowledge of ordinary people. His concern focused in particular on the Chinese peasantry, more than 80 % of the population, the so-called "power of the masses". The vehicles of the mass-line approach were campaigns (*yundong*), class struggle (*douzheng*) and the issue of egalitarianism (Lieberthal 1995: 64f).

Mao Zedong made several statements on the evolvement and perfection of human knowledge. He insisted that social practice alone can increase human knowledge and this alone can enable people to acquire perceptual experience from the objective world:

"Knowledge begins with practice, and theoretical knowledge is acquired through practice and must then return to practice. The active function of knowledge manifests itself not only in the active leap from perceptual to rational knowledge, but - and this is more important — it must manifest itself in the leap from rational knowledge to revolutionary practice." (Selected Works of Mao Zedong 1965 Vol. 1 p 304)

Based on his knowledge of the Soviet system, on his experience in rural China during his revolutionary activities and on the fact, that the biggest part of China's population were (and still are) farmers, Mao put agriculture first on the agenda of economic construction. By this, he wanted to solve the most important problems of food insecurity and scarcity of raw materials (Selected Works of Mao Zedong 1965 Vol. 1 p 142). In order to support this goal, a state system for promoting and developing agricultural knowledge was established: an agricultural extension system. Within a few years the number of agricultural extension stations, the major change agencies of rural development, increased from 10 in 1950 to 16,466 in 1956 (Delman 1991: 77). Moreover, demonstration farms, fields and plots were installed. The underlying approach was to emphasize mass-participation, self-reliance and indigenous, scientific and technological development. Information should flow freely from research to farm and vice versa (Delman 1991: 79).

Delman (Delman 1991: 80) writes in his thesis that peasants were encouraged to be active partners in the innovation process and peasant innovation should be an integral part of the agricultural science, because it could be based on past practices with a new understanding. Scientists should closely work with farmers and so scientists had to recognize farmers' innovations, and work with them to test and adopt innovations to the local environment.

This ideology of integrating the farmers' view into a new model of agriculture seemed to be perfect to build a new relationship between farmers and scientists and thus creating a favorable environment for the sustainable management of indigenous knowledge. In

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<sup>48</sup> The term "ideological knowledge" is used here because the knowledge developed and extended during this time was neither scientific nor local or indigenous.

practice, however, a different picture emerged. First, the politics of mass line failed, because local officials did not accurately report the views of the peasants, for they feared that those would criticize their work. Moreover, there were no objective means to report through each level of the bureaucratic hierarchy (work unit, township/commune, county, city, prefecture, province and national level). This had led to the tragic conclusion in 1960-1961, that the agricultural output was much smaller than officially reported and in consequence, the agricultural taxes collected in grain were much too high and farmers starved to death before the leaders realized what happened (Lieberthal 1995: 65).

Second, and more important, the above-mentioned "participation of the masses" was mainly used to impose government policy, which, on top, suffered from a certain degree of discontinuity, and **not** to really encourage farmers to express their ideas and their own innovations. Leeming (1985: 10) reports from a village in Zhejiang where people planted fruits, melons and vegetables on their private plots and marketed them themselves. Then they were accused of capitalism, and they lost interest in the whole economy of the village, their incomes fell "and the villagers became very depressed". Another example is the rejection and suppression of the knowledge of *feng shui* as superstition, the prohibition of any religious activities and the use of traditional buildings, because all this was considered to be "old thinking" (*jiu sixiang*) and needed to be eradicated. The photo below shows the destruction of a clan house in a village in Jiangxi Province with political graffiti. Inside, the ancient proverbs have been overwritten with revolutionary slogans. Villagers said that the clan houses were used for village meetings during the cultural revolution, but now they are used again to worship the ancestors.



Photo 6: A rural clan house in Jiangxi Province with political slogans (September 1998)

Government policy from 1949 to 1978 was characterized by the slogans "Taking grain as the key link (*yi liang wei gang*)" and by local and regional self-reliance (*zili gengsheng*). Even though the Communist regime had carried out a land reform in 1950-1952, at that time the farmers were still able to make their own decisions on cropping patterns and levels of input use. From 1953 to 1957, quotas for agricultural production were issued, but farmers were still allowed to market surplus products (Blecher and Wang 1994: 67). The collectivization and the introduction of peoples communes in 1957/1958 were effective means for the government to force farmers to follow its cropping plans. During the Great Leap Forward (1958-1961), specific cultivation plans were imposed by the central government in order to produce sufficient grain, whereas other crops were neglected. This, however, did not lead to an increase in grain production (Blecher and Wang 1994: 70). Farmers had now no or little decision making power and possibilities to use and develop their own agricultural knowledge. During the cultural revolution, the production of grain was forced even in areas with unsuitable conditions in order to strengthen the local self-reliance. This has led to directives that had neither scientific nor indigenous or local foundations: For example, farmers were forced to plant their (grain) crops as densely as possible. This did not even lead to a higher agricultural production (Murdoch 1994: 128).

From 1965 to 1971, grain production was forced by three methods: by extending the arable area, by raising the multiple cropping index, and by substituting crops for grain. Later the intensification of grain production was even more propagated (Blecher and Wang 1994:

75). This was done by the central government through issuing cropping targets (i.e. the area under cultivation), and not output targets. As a result, crop production was carried out on land that might not at all be suitable for this kind of production. However, it was easier for officials to proof whether their orders had been followed. All this has led to farming patterns that were not adapted to local conditions and to the evolvement of environmental problems such as soil degradation and water scarcity.

The fundamental characteristics of this ideology were based on assumptions about the need to replace the traditional cultural values, practices and knowledge system by an ideological knowledge system. This has led to a destruction of local knowledge of farmers on how to manage their land.

### **3.5 The Present Perception of Indigenous Knowledge**

The introduction of the family responsibility system at the beginning of the 1980s gave the farmers more decision-making power concerning land cultivation. Though quotas for grain, cotton and oilseed remained until 1992, farmers could otherwise grow what they want to grow and have been allowed to sell their surplus on rural markets.

Politicians have corrected their "past mistakes" and created conditions that enable an "upsurge" (*rechao*) in rural development, as claimed during the Third Plenary Session of the 11th Central Committee of the Chinese Communist Party in 1978 (Knapp 1992: 63). These corrections aimed at the diversification of the Chinese economic structure and, thus, also at substituting the agricultural system based on grain by a diversified one. The ideological dogma of promoting grain for self-reliance was now abandoned and the cultivation of different cash crops has been promoted.

Since then, the importance of science and technology has been exclusively propagated: "Relying on science and technology to strengthen the economic position in agriculture (*yikao kexue jishu zengqiang nongye jingji diwei*)" has been the slogan since then (Du Runsheng 1995: 136). Du further points out that the farmers now have to be convinced to use scientific methods based on economic laws for crop cultivation.

"The farmers must look to the scientific and technological circles to help them to imagine things that are beyond their imagination and achieve things they [otherwise] cannot manage. (Du Runsheng 1995: 143)

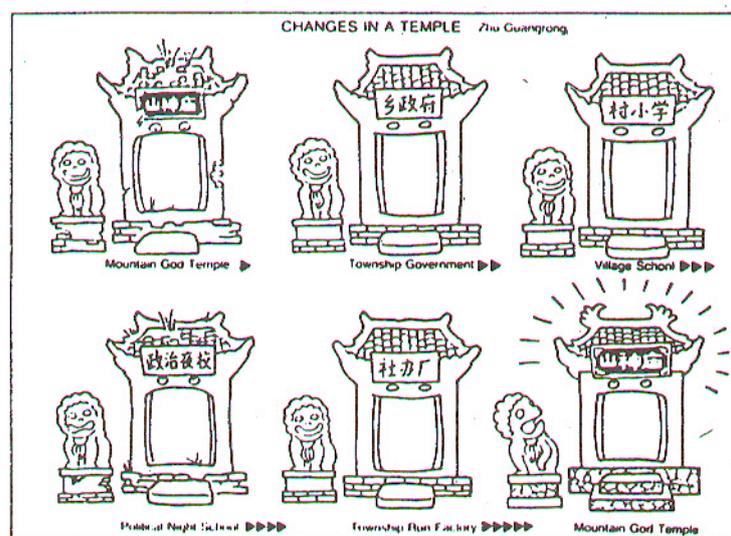
This is an indication of leaving Mao's ideology that theoretical knowledge has to begin with practice. This modern view now clearly states that indigenous knowledge and experience of farmers are not worth of being integrated into promoting agricultural technologies and into the modern agricultural extension system in China.

Other authors (e.g. Cai Yunlong 1990: 337) emphasize that the efficiency of land use should be increased and traditional agriculture should be transformed. Traditional agriculture here means the Chinese historical dimension before collectivization. Howard

(1994: 2) has noted in his studies on indigenous knowledge in British Columbia/Canada and *Yunnan*/China that both the scientific model of the Western world and the ideological model of development in China have failed to consider indigenous knowledge in their development approaches.

Despite the ideological divide that separated [Western and socialist views], there were important parallels between .. them .. Both argued for a broad transformation of culture to facilitate the emergence of modernized peoples no longer fettered by traditional ways of thinking and relating to one another. They felt that only such a transformed population would be able to function efficiently within a modern context of industrialization, wage labour, commercial agriculture, and rationalized structures of authority in workplaces and government bureaucracies. Howard (1994: 1)

Nevertheless, there are tendencies that show a revival of the acceptance of indigenous approaches in China. First, in rural areas, concepts such as *feng shui* are now more openly used (Bruun 1994, Cao and Zhang 1997). Stafford (1995: 29f) writes that "China now could return to tradition while simultaneously embracing the modern world". He describes traditional customs that are still or again practiced in PR China such as celebrating the Chinese New Year, wedding celebrations, using the lunar calendar and worshipping the old gods. Stafford points out, that these traditions have not been static, but adapted to the present situation, for example the celebration of 100 days after a child is born (*manzhousui*) has gained importance after the introduction of the one child policy. Knapp (1992: 75ff) describes the ambiguity of tradition and innovation: Tradition in China does not at all mean an "eternal standstill", but rather a transition to the modern world. Stafford shows that the "recycling" of traditional buildings has even been a source for jokes as seen in picture 6.



Picture 6: Recycling of traditional structures. Source: Beijing Review May 1989, quoted in Knapp 1992: 69

The clan houses shown in the previous chapter have undergone a recent revival: People have started using them again for worshipping and placed an altar in one of the houses. During my own surveys in Chinese rural areas I observed the increasing importance of traditional features such as local temples and worshipping places for the traditional gods (see Photo below).



Photo 7: *Heavenly harmony: Traditional gods and Mao Zedong side by side for the happiness of the house (Jiangxi, September 1998)*

It has to be noted, however, that the resurgence of old traditions and practices may have negative effects on the development of society., e.g. the discrimination of certain population groups: During my work at the Beijing Agricultural University from 1990 to 1994, the limited access to employment opportunities for university graduates revealed a "new" traditional thinking towards women. In the past, every college or university graduate could be sure to get a position within the system, regardless of gender. However, some years ago, this system has been abolished and graduates have to apply for positions themselves. This has led to a disadvantageous situation for women, since there is a bias towards hiring male employees. This may indicate that the traditional perception of women having more family responsibilities and therefore not being able to fully devote themselves to their work has gained more importance again.

Some Chinese scholars follow an approach that tries to combine science and technology with an indigenous knowledge systems concept. It is mainly the scientists at universities

and research institutes who are concerned about the environmental problems in China and who seek solutions. They now consider the value of traditional agriculture in China for the solution of the present problems in agriculture and land management (Li Zhengfang 1994: 295f, Cheng Xu 1992: 1133), different from the approaches in the 1980s that focused solely on modern science and technology (Janz 1987: 10). Pei Shengji, a Chinese professor who has carried out several studies in *Yunnan*, has expressed his special concern that indigenous knowledge is in danger of being lost and his conviction that "new" bioresources can be found from traditional knowledge (Pei 1991: 22).

In April 1994, I organized a symposium on Indigenous Knowledge Systems and Rural Development Systems in China and invited Chinese and Western scientists who did research on traditional agriculture.<sup>49</sup> Some professors of Beijing Agricultural University (now called China Agricultural University) researched on the history of Chinese agriculture, on traditional veterinary medicine in China, and on indigenous knowledge and sustainability. During the symposium, the participants emphasized the importance of indigenous knowledge for the rural development in China in order to make the agricultural production more sustainable, and to consider ecological aspects in land management. They provided examples of traditional soil improving measures, traditional veterinary medicine as well as indigenous knowledge and natural resource management in China.

The Center for Agricultural Development (CIAD) at the China Agricultural University set up field research stations in Hebei Province with the aim of carrying out applied agricultural research and development. In order to draw on the farmers' wealth of knowledge and experience, the researchers encouraged peasants to participate in the development of technologies for grain and animal production. The researchers mainly used participatory methods. This resulted in both the development of sustainable techniques and in the development of a suitable methodology for extension workers. The findings are integrated in both Farmers' Field schools in Hebei Province and in formal and informal training programmes and applied research activities at the China Agricultural University.

In 1995, the Center for Biodiversity and Indigenous Knowledge (CBIK), a domestic nongovernmental organization (NGO) was founded in Kunming, China. CBIK considers not only "ethnic groups" in China as "indigenous" but also a specific relationship between people and place". This relationship includes knowledge of local institutions, which CBIK defines as resource access and land-use practices. CBIK's main emphasis is the relevance of indigenous knowledge and innovations related to resource governance and management at community and watershed levels.

To conclude, the present perception of indigenous knowledge in PR China is overlaid by the common achievements of the seemingly successful economic growth resulting in the increasing wealth of the people. Scientists and planners who seek an alternative

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<sup>49</sup> The results are summarized in CIAD 1994a.

development that integrates the participation and knowledge of the people can be found. But as with raising concerns on the environmental destruction, their views are seldom considered by official decision makers (see Betke 1998: 354).

## PART II: THE PARTICIPANTS' VIEW: LOCAL KNOWLEDGE IN LIUDU

### 1 The Research Site

#### 1.1 Location of the Research Site

*Liudu* Village belongs to the Township of *Shidu* which is located in the District of *Fangshan*, 100 km south-west of *Beijing*, on the border to *Hebei* Province with a latitude of 39.4 N and a longitude of 115.4 N. It is a mountainous area with lime stone rocks between 150 and 400 m above the sea level. The main soils are chromic cambisols, calcic cambisols and lithosols, with an average top soil layer of 30 cm (Zhang 1990 and pers. comm).

"*Shidu*" means ten ferries and refers to the bridges (former ferries) that cross the *Juma* river. The villages are located on the banks of the river and are named according to the numbers of the bridges (*yi-to shi-du*).

The area belongs to the continental climate zone with cold, dry winters, hot, humid summers (Dwa according to the Koeppen classification) and to the winter heat/sorghum area according to the classification of Buck (Buck 1937: 27). Between 1975 and 1989 the average annual precipitation in *Shidu* was 477.7 mm. Winter (October to January) is the dry season (21 mm rainfall), spring (February to May) is dry, too (60 mm), the highest precipitation occurs between June and September (424 mm). Water is the limiting factor for crop production, because in the planting and growing period rainfall is very low. Average temperatures range from 1.6 centigrade in January till 26.2 centigrade in July.

The whole area of *Shidu* Township comprises 213 sqkm and 21 villages, the population is 14,000 inhabitants, the population density is 506 inhabitants per sqkm. The area of arable land is 9500 *mu* (634 ha), of which 8400 *mu* (560 ha) is used for crop production. Among these, 3400 *mu* (227 ha) are irrigated land. Fruit orchards, forest and vegetable production cover 1000 *mu* (67 ha) (Source: pers. comm. Mr. Li Tingyue (July 1993). Irrigated fields allow two annual harvests of winter wheat and maize or only rice. In rainfed fields only one annual harvest is possible.

*Liudu* Village, in the center of the *Juma* river valley served as the research basis where most interviews and investigations were done.

The village is located in the center of *Shidu* township. Its fields and houses are situated at the northern banks of the *Juma* river (see aerial photo). The aerial photo shows the *Juma*

River in the Southern part, most of the village buildings in the center and the steep, partly terraced mountain slopes. The railway bridges cross the northern part of the village.

In 1993, the village had 782 inhabitants and 270 families, i.e. an average of 2,9 persons per family. The families are grouped into seven production teams (*xiaodui*).<sup>50</sup> The areas of arable land covers 520 *mu* (35 ha), of which 200 *mu* (13 ha) are irrigated. With less than 0.7 *mu* arable land and 0.2 *mu* irrigated land per capita it is below the average of Hebei Province (1.8 *mu* per capita [China Agriculture Yearbook 1994]).

The whole township of *Shidu* is a newly developed tourist area because it can be easily reached from *Beijing* by car and it has a nice scenery of waters, forest and mountains. This has created new income generating possibilities for the population in the area. Many villages have established small guesthouses, restaurants and recreation facilities. *Liudu's* neighboring village, *Qidu*, has already many farm-stay guesthouses and even a theme park. In 1993, *Liudu* has started several tourist activities such as horse renting, opening family-run hotels and restaurants. In 1995, 70 *mu* of the most fertile land in the village were assigned to build a hotel complex.

The average precipitation is not precariously low but is subject to wide fluctuations, in both amount and time. Droughts in April and May are especially serious and cause crop failure. Until 1966, irrigation was uncommon in *Liudu* and most of the crops were grown in rainfed fields. At that time, water was carried by donkeys to near fields from the *Juma* River. One harvest per year or three harvests in two years were possible. The risk of crop failure urged farmers to grow a wide variety of crops, like winter wheat, barley, sorghum, millet, cabbage, peanuts, different varieties of beans, sweet potatoes and Irish potatoes, etc.

With the introduction of electricity in 1966, electric pumps were installed to irrigate fields, and consequently, new (hybrid) varieties of winter wheat were introduced and made two harvests per year feasible. However, the variety of crops decreased (winter wheat and maize with some cabbage and beans). The amount of water used for irrigation was bigger than the supply from the river and wells. This has led to a decreasing ground water table (app. 0.3 m per annum) and the drying up of the small river that crosses *Liudu* and leads into the *Juma* River. People say that 10 to 15 years ago this river had water, but it is now dried out throughout the years due to overuse of irrigation water and especially dry years since 1989.

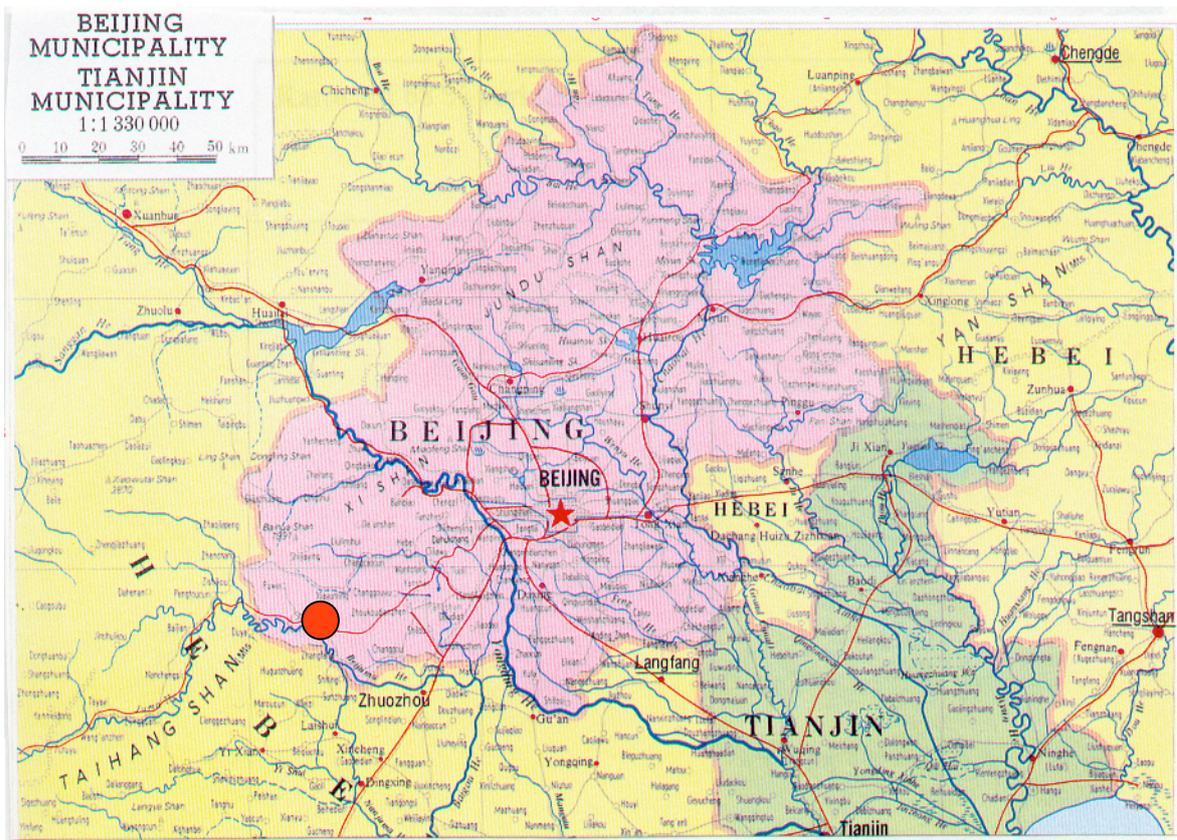
The awareness of decreasing water resources among the leaders and population is relatively low since nobody has to pay for the amount of water used. The only indicator for water shortage is the increasing fee for electricity used by the pumps. Wheat is irrigated 6-7 times and maize 3-4 times per season. To irrigate 1 *mu* of land, electricity for pumping

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<sup>50</sup> During the collective management of the land, production teams replaced the family units as the basic unit of farming. Now these production teams consist of several families in a village and still form the unit for official extension and land management.

needs 1 kWh (the amount of water is not metered). The price for 1 kWh has increased from 2.5 *mao*<sup>51</sup> to 3 *mao* in 1992. Farmers felt the increased prices and consequently left irrigated fields fallow or turned them into rainfed fields.

Map 3 shows the location of *Liudu*. The pink area is the administrative area of *Beijing*, the yellow area is *Hebei* Province. The distance to Beijing city center is approximately 120 km.

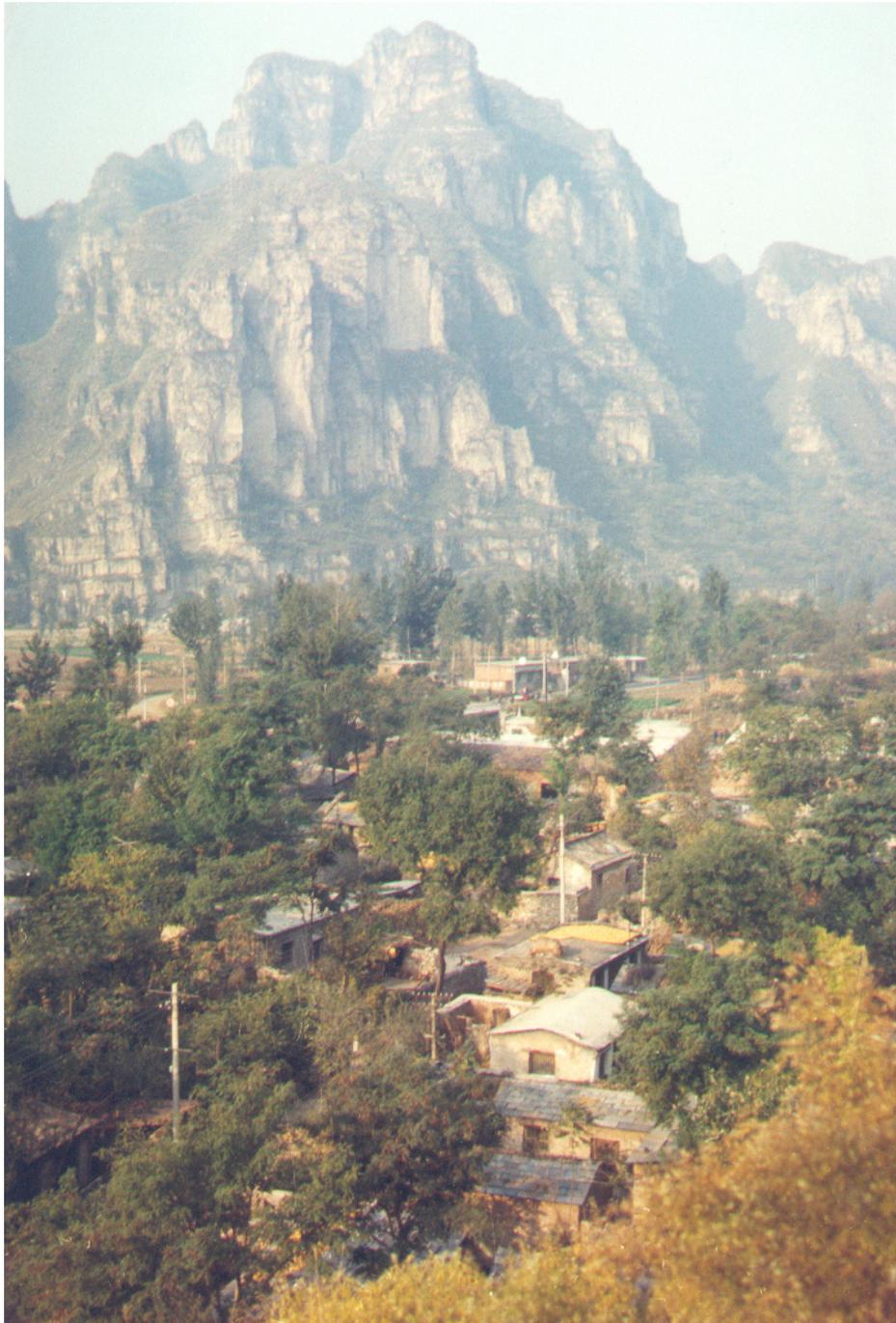


Map 3: Location of *Liudu* (Source: Atlas of PR China 1989)

<sup>51</sup> 1 *mao* = 0.1 RMB



*Photo 9: Aerial photo of Liudu, taken in 1989*



*Photo 10: Looking on Liudu towards south-west (October 1993)*

## **1.2 Reasons for the Selection of the Research Site**

According to the definition of indigenous knowledge of this research as given in chapter I. 2.8 it is the knowledge that farmers have at present about their land use and natural

resource management. To conduct my research on indigenous knowledge in China I needed a site where my informants would be open and capable of telling me their views about these topics. That is why I selected a location I would have access to being a researcher from Beijing Agricultural University, because people trusted this institution. I had earlier started to do some similar research in Yunnan Province but soon found out that many informants did not want to answer my question, especially those who belonged to other ethnic groups, because I was coming from Beijing which was related to the knowledge dominating Han-Chinese group. In the whole township of *Shidu*, however, China Agricultural University is well known and my research permit opened many doors.

Since indigenous knowledge has a historical dimension, I needed to find an area where people still use at least some traditional methods for cultivating and managing their land. In area of *Shidu*, two major farming systems can be found in a very close distance: the "modern" type of agriculture with irrigation, two crops per year and high yield varieties. This type is mainly located near the banks of the river. The second, "traditional" farming system has been found in the area for centuries. *Shidu* is located in the mountains and comprises fruit trees and rainfed agriculture (*handi*). The existence of these two systems made it possible to study the development of land management with regard to indigenous knowledge and to assess options for improvement through the eyes of the land users.

Though the region has some special characteristics like the steep mountains, it can be seen as a typical mountainous northern Chinese township, taking natural and social conditions into account. The vicinity to *Beijing* provides a relatively good infrastructure and off-farm income generating facilities. Therefore, the tendency towards decreasing importance of land cultivation, which had been occurred in North China for many years, could also be observed in *Shidu*.

## 2 Methodology

### 2.1 Methodology of the Assessment of Indigenous Knowledge in the Research Area

During my work as a GTZ-adviser at China Agricultural University from 1990 to 1995, it was my task to develop participatory agricultural advisory systems together with the scientists at the university, the extension workers of the local extension station in Hebei Province and the farmers in our pilot villages. We found that the techniques developed by the scientists will only be used by the farmers in a sustainable way, if the farmers themselves (= the final users of the techniques) participated in the development of these techniques and if their knowledge was integrated to the greatest possible extent. We tested and developed a set of participatory methods (*canyushi fangfa*). These methods are based

on PRA, RRA and farming systems research and were then especially adapted to the conditions in rural North China (a description of selected techniques see Annex 4).

### 2.1.1 The Participants' View: Participatory Rural Appraisal

Several approaches of participatory action and research were combined to carry out research in the case study area. The most important were the Leiden Ethnosystems Approach (Leakey and Slikkerveer 1991), the Actor-Oriented Approach (Scoones and Thompson 1994) and the participatory methodology that was developed when I worked at the CIAD.

For discussing options for land use with the farmers, I used a three-step-approach. First, I asked a series of questions, which were designed to make participants verbalize their choice of land use. These questions were discussed during a village meeting in 1994, and groups of male and female farmers separately made their analyses of problems and the potential of the land use systems. Second, a group of villagers carried out several transect walks through the village and then discussed the land use systems they came across in the transects. Third, I discussed with groups of farmers what they knew about their land and visualized it in a map (see 8). I did not go into a detailed planning process, because this would be beyond the objectives of academic research.

The whole field research comprised the following steps.

The first field visits were carried out between July and October 1993 with the aim to assess the existing land use and knowledge systems in the area. In addition to the existing farming systems and other forms of land use in the area, the communication and extension systems and the decision-making of farmers and local leaders were examined. The methods used were guideline interviews, transect walks and informal talks (interview guideline see annex). The informants were 30 male and female poor, middle and rich farmers<sup>52</sup>, local experts, village leaders, decision makers of the Forestry Department, the Science and Technology Station and the Agricultural Bureau in *Shidu*.

The second field visit took place in April 1994. This time, the focus was on the assessment of the indigenous knowledge systems in *Liudu*. It had the following objectives.

- to find out the perception of problems and potentials of the existing land use and its historical changes in *Liudu*.
- to examine the role of indigenous knowledge in land use planning,
- to look for specific cases on indigenous knowledge in *Liudu*,

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<sup>52</sup> For the definition of status, I followed the definition that was given to me by the villagers: in 1993 a poor household had an income of less than 2000 RMB/year, middle households had between 2000 and 4500 RMB, and rich households earned more than 4500 RMB/year (the highest income among my informants was 7800 RMB/year).

- to assess specific cases like village organization and knowledge of old farmers considering the specific experience of men and women in relation to land management and non-agricultural activities.

Methods used were village meetings, semi-structured interviews, group discussions, mapping, participatory aerial photo interpretation, well being analysis, transects, informal talks<sup>53</sup>. The informants were male and female farmers of *Liudu*, local experts, local decision makers.

During the third field visit in October 1995 the possibilities for integrating indigenous knowledge into land use planning were evaluated. The land use planning process was analyzed, the actors and beneficiaries in this process were identified, land use options in the eyes of the villagers were assessed, and institutions in *Liudu* that are relevant for land use planning were investigated. The methods applied were Venn diagrams, mapping, biographical interviews, reading aerial photos, decision trees on land use options, semi-structured interviews, transect walks, informal talks. Informants were young and old male and female farmers, the *feng shui* expert, the local expert, innovative farmers, village leaders, the director of the agricultural office of the township.

During the last field visit in August 1997 the results of the first visits were discussed with the informants. The maps based on the information acquired were presented to the inhabitants and discussed with them. Their remarks and proposal for changes were then again incorporated in the maps.

Between the field visits, I spent several weekends in *Liudu*, having informal talks with peasants and village leaders and doing participant observation which also provided valuable information and led to a closer and more familiar relationship with the villagers.

### 2.1.2 The Development of Maps

In land use planning, spatial information that is visualized in maps plays a major role. Conventional research usually uses aerial photos and maps and does the interpretation at the computer. My research, however, aims at putting emphasis on the participants' view. The participants are the people of *Liudu*. I have therefore developed a certain procedure that allowed a participatory development of maps:

#### Step One: Discussing Aerial Photos

During all my visits in *Liudu*, I used two black and white aerial photos, taken in 1989, with a scale of 1: 8,000. During the interviews, the photos formed a background for discussions and I asked my informants to identify certain land use features and characteristics that they

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<sup>53</sup> This visit was part of a workshop on "Indigenous Knowledge Systems and Rural Development in China" which I carried out at the CIAD. Workshop participants were CIAD staff and students from Beijing Agricultural University.

saw in relation to their land. For the indigenous knowledge map, for example, I asked specific questions like "Where is the *feng shui* good, where is it bad?" When the interviewees had time after the interview we went into the fields and tried to verify what they had identified in the photo. I also asked questions that have a historic aspect, like "Since when has the river been drying out?" or "Since when are the mountains bald?"

### **Step Two: Drawing Maps and Diagrams with Informants**

Then I selected certain informants whom I individually asked to draw sketches or a transect of their village. In addition, I asked a number of questions on land use or indigenous knowledge that they could integrate into their maps.

### **Step Three: Integrating Local Knowledge into a GIS**

The next step was to integrate the findings on these issues into a GIS, using the software ArcView 3.0a. The information put into the GIS were scanned aerial photos of the region and a preliminary interpretation. Then I developed several layers that showed the findings I made in the field. Layers included boundaries, fields and gardens, wasteland, buildings, ownership conflicts, *feng shui*, soil quality, etc. Attribute data were added to the layers. I finally printed five maps: land use in the years 1993, 1995, 1997, an indigenous knowledge map and a map showing scattered land plots at a scale of 1:8,000.

### **Step Four: Verifying processed results**

The maps were then brought back to *Liudu* and discussed with the people. In village meetings and individual interviews they could make their suggestions and corrections. This enabled the participants to improve the maps again and these final maps were made available to the inhabitants of *Liudu*.

#### **2.1.3 The Hidden Agenda**

The hidden agenda describes the relationship of power in the encounters between people of different social strata, i. e. between the resource-rich and the resource-poor, between authority and the subordinate, and between the researcher and the informant (Scoones/Thompson 1994). Therefore, all responses of the interviewees have to be seen in this context. Informants may not respond openly or may direct their answers towards what they think the researcher wants to hear.

During the research in the case study village I was considered and acknowledged as a researcher of the Beijing Agricultural University (since 1995 it is called China Agricultural University). As China's key agricultural university it is well known among farmers and local decision makers, because many seeds developed by the university bear its name (*nongda*). I had an official research permit which opened many doors. Rural China is still quite closed for foreign researchers, and often they are not allowed to live in the villages. With this official permit, however, and with the agreement of the village leaders I could stay in the village guest house and with the families as long as I wanted.

My role as a researcher was significantly different from the role I played as a GTZ-adviser in the villages. Then, especially local cadres realized that I could bring money and "projects" to their villages. Thus, they were eager to make a good impression and tried to hide any shortcomings. It was always difficult to stay overnight in a village and in many cases village leaders accompanied me from morning till night, offering big meals and gifts which I could hardly bear. As a researcher, the atmosphere was much more relaxed and open. People knew they could expect nothing but having a good time together and sharing views and opinions. All my informants talked to me openly and friendly. Sometimes, during interviews, a roles reversal took place. Informants started asking **me** questions like: How many children do you have? How much money do you earn? How do you grow fruit trees in your country? I also brought pictures of my family and about agriculture in Germany and talked to them, trying to answer their questions. During the fourth visit, the local cadre of the Chinese Women's Association (*fulian*) urged us (my female research assistant and me) to stay in her house, because she always wanted to have a daughter<sup>54</sup> (she only had two grown-up sons). So we enjoyed doing housework, preparing meals together and chatting with each other. These activities can be considered as an attempt by me as the researcher to overcome the objectivistic assumption of conventional research and make myself part of the process.

Moreover, this participatory approach should facilitate the villagers to plan, implement and evaluate their own activities. This is contradictory to carrying out conventional academic field research. When I discussed possibilities and potentials of land use with my informants, we could therefore not go beyond a problem statement, because I did not have the resources to support and facilitate further activities. Consequently, the research of this thesis has to remain reductionistic and could not enter an action-research-learning cycle, as it could have been in connection with a development project. The only interaction we could offer was to invite the people of *Liudu* to participate in CIAD's annual Farmers' Day, where several hundred farmers of *Hebei* Province come together and can exchange ideas, and discuss problems and opportunities. Some inhabitants of *Liudu* attended those meetings and enjoyed sharing their experience with other farmers.

I have tried to overcome a positivist approach and let the participants speak themselves whenever possible. In the following chapters, the views expressed by some of the informants are shown in boxes. Though sometimes their statements may not seem to be logical from a scientific viewpoint they nevertheless show a part of *their* reality, ideas and problems.

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<sup>54</sup> Her wish shows a desire that I found with many rural women: They preferred to have daughters rather than sons. This is in contrast to public opinions and many surveys that say that rural people favor sons. I suspect this only reflects the wishes of men.

### 2.1.4 Assessment of Methodology

The process of merging two concepts - GIS and PRA - required adapting both tools to specific needs. The use of participatory tools had to focus on discussing indigenous knowledge that had strong spatial aspects in order to make it visible in the maps. GIS had to be applied in a simple, adapted way, so that the results could be understood by the villagers.

In many interviews, maps were sketched in order to discuss the historical development of natural resources. Old people were asked to draw maps of the situation of the village when they moved into the region - there had been many more trees and more water than today. Other maps indicated the present pattern of land use.

The participatory analysis of the aerial photo was very successful. It enabled the people to locate and explain the environmental situation of the village. It did not matter that the aerial photos were more than eight years old, people easily told me what and how much had changed since then. They especially enjoyed identifying their own houses on the photo.

The most important questions during the application of participatory tools - such as interviews and diagrams - were always **Where ?** and **Since when ?** so that the findings had historical, as well as spatial aspects, which could be included in the GIS.

However, processing the results of my field work and making them visible on the maps was not easy. First, the scale of the maps drawn by the villagers was not accurate. The distances indicated varied and did not always reflect reality. Again, the scanned aerial photo helped to establish the right scale. It was also decided to create less exact layers than for conventional topographic maps, because emphasis was given to the **villagers' view** of their environment. Here the methods of PRA provided to be an excellent basis: village boundaries or the importance of *feng shui* cannot easily be discovered by conventional research and interpretation methods, but through transect walks and in-depth focused interviews, a lot of facts, problems and opportunities were revealed.

Second, it was discovered that a lot more information had been gathered than could be put into a digital format, because information that is not related to spatial aspects is difficult to visualize. Hot links<sup>55</sup> on land allocation procedures, land scarcity and preferences of crops can be created. However, these links do not appear on the plotted maps and are thus not visible for the villagers and were therefore only used to a limited extend.

Third, a detailed analysis of attribute data was not possible due to limitations of equipment. To develop linkages and conclusions much more time would have been needed in both the field and at the computer.

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<sup>55</sup> Hot links are features in ArcView that connect a written text to a location on the map.

When the final maps were presented to the people in *Liudu*, it was again surprising how well they could identify both natural and man-made features and how well they could understand the themes, especially when they watched the maps in the fields. They easily identified their houses and other marks like mountains, schools, rivers, public buildings etc., and they also understood the meaning of thematic maps, such as soil maps for example. They liked bright colors, because it made maps easier to conceive, whereas a conventional cartographer might have chosen more subdued colors.

The following photo shows a study of aerial photos with an old farmer in *Liudu*. He could easily identify the features on the photos and then talked about the historical development of resources. Since the event took place in front of a shop in *Liudu*, other villagers became curious and joined the discussion.



*Photo 8: Studying aerial photos in Liudu (April 1994)*

### 3. Farming Systems in Liudu

A farming system is a combination of crops, livestock and trees, managed in diverse spatial and temporal arrangements, subject to biophysical and socio-economic conditions, managed to satisfy rural households' objectives and priorities (Tripathi 1992: 3). The crop productions activities of a farm or village constitute its cropping systems.

#### 3.1 Cropping Systems

Informants in Liudu identified seven cropping systems:

- irrigated farmland,
- rainfed farmland,
- terraced rainfed farmland,
- agroforestry,
- irrigated agroforestry,
- paddy fields,
- home gardens.

Most of the irrigated fields are located south of the road, near the river. Rainfed fields are north of the village, in the valleys between slopes. Terraced fields can be found on the slopes of the mountains. Home gardens are located in the north-eastern part of the village and also near the wasteland of the river banks.

Table 7: Agricultural calendar for the cropping system in Liudu acc. to the lunar calendar

Month/ Cropping System	1	2	3	4	5	6	7	8	9	10	11	12
irrigated		plough- ing	irrigation	weeding fertilizing	irrigation ploughin g sow maize	spraying	harvest wheat  weeding	irrigation	fertilizing	ploughin g harvest	sow wheat	
rainfed			sowing	sowing	weeding	weeding	harvest	harvest				
terraced rainfed			removing stones, repairing		sowing	weeding		harvest			removing stones, repairing	
Rainfed agroforestry			sowing	sowing	weeing	fertilizing	weeding	harvest	harvest		tree clipping	
Irrigated agroforestry			irrigation	weeding	irrigation		weeding	harvest	harvest		tree clipping	
paddy			ploughing	sowing trans- planting	weeding	spraying	weeding	harvest				
home garden		sowing			weeding	fertilizing		harvest	harvest	harvest		

### 3.1.1 Irrigated Farmland

Irrigated farmland is located in the south-western part of the village, closed to the river. The land can be watered by the water of the *Juma* river and comprises 200 *mu*. In 1966, irrigation became possible when the railroad from *Beijing* to *Yuanping* (*Shanxi* Province) was constructed and the region was supplied with electricity. Electric pumps were installed and could be used for pumping irrigation water. Irrigation is done by pumping water either from the river or from wells to the fields. Farmers remember that the fields north of the village were irrigated until 20 years ago, but were then re-transferred to rainfed land, because electricity for pumping became too expensive.

Dominating crops are winter wheat and summer maize, intercropped with beans and vegetables (cabbage). Two harvests per year are possible, and the average yields are 180 kg/*mu* (2.7 t/ha) for wheat and 240 kg/*mu* (3.6 t/ha) for maize (in *Hebei* the average yield of wheat is 234 kg/*mu* (3.5 t/ha) and for maize is 340 kg/*mu* (5.1 t/ha)).

In the irrigated fields, different intercropping patterns can be found. In one pattern, in early May, when the winter wheat has reached a certain height, maize is sown between the rows. After harvesting the winter wheat in early June, the maize has already grown for forty days, thus its yields are higher than those of summer maize (250-330 kg/*mu*). In early May farmers sow soybeans at every fifth row of wheat and make use of the nitrogen fixation of the legumes. In another cropping pattern, kidney beans are sown at every fourth maize plant, and the kidney beans could use the structure of the maize plants to grow. All intercropping patterns require more labor and cannot be cultivated if machinery is used. However, this is not seen as a problem by farmers since agricultural machinery is not used in *Liudu*.



Photo 11: Irrigated farmland (April 1994)

The irrigated farmland has always been a topic in the official extension service which worked in the area until 1993. The tasks of providing information on cropping patterns, on fertilizer application and of providing seeds were carried out by the Agricultural Technology Station in *Shidu* and farmers were forced to grow wheat on these fields. After 1993, farmers continued to cultivate the fields in the same way, but in 1995 they abandoned some fields due to lack of water.

### 3.1.2 Rainfed Farmland

North of the road, the land is rainfed (*handi*). Fields on the slopes are terraced. These terraces were established in the 1960s and were, after 1966, irrigated, too. During the collective system the plain land in this area was irrigated, but under the private management farmers consider the electricity costs (for pumping) too high and returned to rainfed agriculture which can be seen as an indigenous system, because, according to the farmers, the official extension service has not addressed this system. My talks at the Agricultural extension Station in *Shidu* confirmed this. Crops are grain such as spring maize (*Yedan 13*, *Yedan 4 Nongda 60*, *Chendan 1* varieties), red and white sorghum, millet

like broomcorn (*shuzi*) and different varieties of beans (*jiadou*, *ludou*, *caidou*, *dadou*), peanuts, and potatoes in a mixed cropping pattern. Only one harvest per year is possible.

In 1993, each family of my interviewees had contracted 1 *mu* rainfed fields on average. In 1995, however, many informants had abandoned the rainfed land and left it fallow; they said there is not enough water and the work on the fields is too tiring.

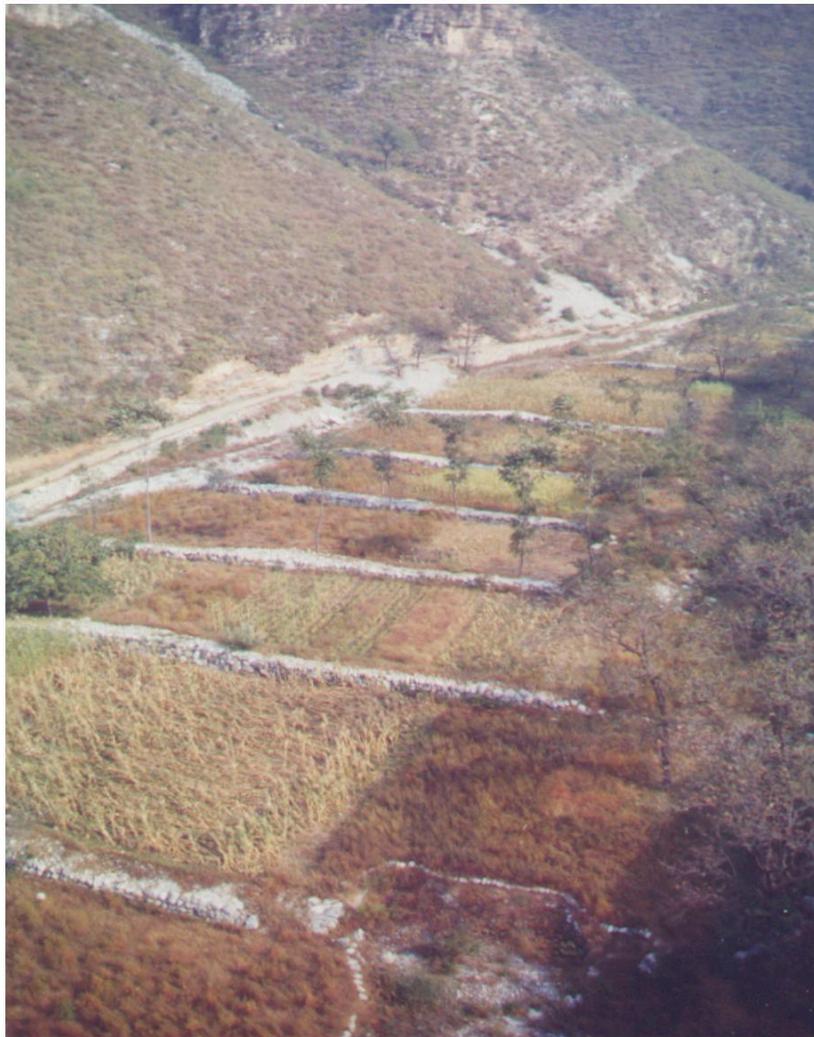


Photo 12: Rainfed fields (October 1994)

Box 1: The Participants View: About handi fields, Mr. Wang Yufu<sup>56</sup>, August 1993

On *handi* fields we completely rely on heaven. That is why they are so difficult to manage....

We have a saying: Farmers fertilize *handi* fields with their sufferings...

This  
state  
ment

<sup>56</sup> To protect the privacy of the villagers and interviewees, I altered the names of the people of the case study village.

shows that people in the village perceive the *handi* fields as something that is influenced by outside forces that they can hardly influence themselves. Other farmers said, they have to manage these fields, because they belong to their traditional lives as farmers though cultivating is seen as an arduous work.

### 3.1.3 Agroforestry

There are two agroforestry systems in *Liudu*: the indigenous agroforestry system which has long been practiced within the context of the traditional agricultural system and had been described in several ancient books (for example the *Chi Men Yao Shu*, 6th century, see Shih 1962: 54 pp) and rainfed agroforestry (*nongliny*) which can be found in the northern part of the village. Main fruit trees are persimmon (*Diospyros kaki*) and prickly ash (*Zanthoxylum bugeanum*). Others, but of minor importance, are walnut (*Juglans regia*), Jujube (*Zizyphus jujuba*), pear and hawthorn (*Crataegus pinnatifida*)



Photo 13: Rainfed agroforestry with persimmons (April 1994)

Below the trees the same crops as in other rainfed fields are grown. Persimmon and prickly ash trees are included in the contract system which means that they are redistributed and do not permanently belong to one family. In addition, they do not belong to the same family

as the land they are grown on (see below). In 1993, each family had 11 persimmon trees and 19 prickly ash trees on average.

Another agroforestry system (*nonglin jianzuo*) is irrigated and is located in the southwestern part of the village which is considered to be the most fertile land. It includes persimmon, prickly ash, hawthorn and wheat. Sometimes farmers undercrop the trees with Chinese cabbage. In 1983, the official extension service started to promote a modern agroforestry system with hawthorn and wheat as the main crops. Farmers were not satisfied with this simple system and have also planted other crops such as maize and vegetables.



Photo 14: Irrigated agroforestry with persimmon and prickly ash (October 1995)

### 3.1.4 Home gardens

Each family has 100 sqm home garden (*ziliudi*) on average. These gardens are not included in the redistribution of land and always remain with the same family. Therefore farmers put much more emphasis on maintaining soil fertility on these plots. Nearly all organic manure is applied in the home gardens which led to the fact that the organic matter and fertility of the soil is much higher than in the other plots. The vegetables grown are potatoes, sweet potatoes, beans, cabbage, radish, rape, and ginger. These products are used

for subsistence. There is a small vegetable market in the village, however, products sold there are imported from other places.



*Photo 15: Home garden (September 1997)*

### **3.1.5 Paddy Fields**

In 1993, *Liudu* had only 30 *mu* rice fields, but neighboring villages have much more due to better access to water. In 1995, some farmers have reclaimed wasteland near the river and grow paddy for subsistence. In 1996, these fields were partly inundated and left uncultivated in subsequent years.





System Name of crop			Irrigated Fields	Rainfed Fields	Irrigated Agro- forestry	Rainfed Agro- forestry	Paddy Fields	Home- gardens	Mountain land
renqing cai	wild green								
suziye	black nettle	ballota L.							
xiangri- kui	sunflower	helianthus annuus							
yecai	wild greens								

It can be clearly seen that the rainfed fields have a bigger variety of crops, both in farmland and in agroforestry, but most of the plants are not grown in high numbers. Vegetables are mainly grown in home gardens, but also in the rainfed agroforestry system. Paddy does not play a major role in the farming system, but since 1993 farmers have increased the paddy area and grow different varieties of rice.

Until 1993, the official extension service (carried out by the Agricultural Technology Station in *Shidu*) advised the farmers what to grow in the irrigated farmland and in the irrigated agroforestry system. Rainfed systems were not included, because the technologies provided by the extension system mainly aimed at increasing grain production. This can only be reached on irrigated land, for example through introducing hybrid varieties that need a lot of fertilizer and water.

The rainfed system includes more crops that are indigenous to China, including at least ten different varieties of beans. The irrigated fields also have some traditional elements like ridge farming which has been used in China for 2000 years. Irrigated hybrid wheat and hybrid maize with two harvests per year were introduced after 1966.

Farmers perceive irrigated fields as "something they have to do" with higher yields but as expensive (due to high electricity costs for pumping). Rainfed farming is considered as arduous and not efficient. Farmers cultivate rainfed fields because they need a variety of crops for subsistence. In 1995, however, a significant number of informants had given up rainfed farming (see below).

In home gardens, a lot of vegetables are grown and used for subsistence. Plots are small, but (women) farmers put a lot of emphasis on maintaining soil fertility and applying indigenous pest management such as burning cereal residues to combat worms and using infusions of hemp to fight fungal infections. In the interviews, they did not see home gardens as part of their fields, but when asked, they said they regard them as very important for their nutrition.

### 3.2 Pest Management and Application of Fertilizer

Chemical pest management is mainly carried out on wheat in the irrigated system and on fruit trees. All informants said that they do not consider pests as a major problem and said they apply pesticides twice a year on wheat.

Organic manure<sup>57</sup> is mainly applied in the home gardens. In the irrigated fields pig manure and chemical fertilizer (approx. 30 % is pig night soil, the rest is nitrogen and ammonium bicarbonate) are applied twice a year (mid-May and in September). Application varies from 40 to 200 kg per *mu* for N and from 2,5 to 50 kg per *mu* for ammonium bicarbonate. The high level of variations indicates an insecurity of the farmers about how to apply agrochemicals.

At present, there is no advisory system concerning the use of chemical fertilizer and pesticides. Until 1992, this information and the inputs themselves were provided by the Production Means Company (*shengzi gongsi*) in *Shidu*. As for 1993, this service was privatized and information concerning the use of external inputs is provided by private traders. Farmers of *Liudu* have to go to shops in *Shidu* Township to purchase the fertilizer and pesticides. Since they do not feel the need of many inputs of this kind, they do this only occasionally.

In the interviews, especially old farmers said that they know a lot of different types of organic manure, but they do not apply them. One reason is the abundance of many animals that produce enough manure, the other is the short period of usufruct rights in the contract fields. The farmers know that organic manure has a long-term impact and do not consider it as useful to increase soil fertility for a possible successor on the land. Almost all produced organic manure is applied in home gardens. Many informants said that the vegetables grown there have a much better taste than those grown on the modern fields.

### 3.3 Animal Production System

Animal husbandry does not play a major role in *Liudu*. On average, each family keeps 6-7 chicken for egg production and for slaughtering on holidays. Most of the families have one pig, which is mainly kept for getting manure for the home gardens and sometimes is sold at holidays. Pigs are fed with maize grown in the rainfed system. Some farmers try to grow rabbits and very few have a donkey or a horse. Donkeys and horses are hired to tourists and thus a major source of income.

In 1995, some female farmers were looking for new income sources and started to raise cattle and goats. Otherwise, no ruminants are kept in *Liudu*.

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<sup>57</sup> Informants quoted the following kinds of organic manure; *you're* = manure, *dufei* = compost, *xiatufei* = sandy soil and pig nightsoil, *cufei* = thick nightsoil, *xifei* = liquid nightsoil, *jifen* = chicken nightsoil, *yafen* = duck nightsoil, *niufen* = cattle nightsoil, *renfen* = human nightsoil.

### 3.4 Indigenous Knowledge in the Farming System

According to the definition of indigenous knowledge given in Part I, indigenous knowledge is not included in the official extension service, but it is knowledge that has been developed and managed by the local people themselves. Since the irrigated systems are heavily influenced by the extension system, it can be concluded that indigenous knowledge is mainly applied in rainfed fields. In 1997, a lot of farmers had given up farming in rainfed fields, because it was considered as too arduous and other income generating activities were more attractive. This, in turn, has led to a deterioration of indigenous knowledge. It has also led to a decreasing number of varieties grown and possibly to an extinction of traditional crops. In 1997, for example, I could hardly find buckwheat and broomcorn millet in the rainfed fields. Farmers told me that they do not longer see a reason to do the arduous cultivation and that they can buy these crops in the market if they want.

#### 3.4.1 Mixed Cropping Patterns

Though many ancient agricultural books indicate that Chinese farmers have been developing sophisticated rotation systems (see Bray 1984: 58, 251, 518, and Shih 1962: 44), I could not find any indigenous rotation system in *Liudu*. Farmers said that they do not like rotation because the soil is not moist enough in the rainfed fields. They could not give me any other information on this. In the irrigated fields a rotation is carried out between maize and wheat, however, this was introduced by the agricultural extension system.

Intercropping has also been practiced in China for centuries. Shih Shenghan (1959: 52) writes.

"The interlacing plot system is by nature the most intensive utilization of ground. Therefore how to obtain the maximal number of plants in a unit area of land, yet eliminate the ill-effect of overcrowding, and to avoid temporary vacancy as possible are the problem to be solved...In China, this practice certainly started much earlier than the 6th century. We have seen that many of them were recommended by Fang Sheng Chih..."

I have identified three indigenous intercropping systems of which two are applied in the irrigated farmland, but are not included in official extension messages. The first intercropping is wheat and soybeans, and the second is maize and kidney-beans. Both are used in the irrigated land. Farmers said that both crops benefit from each other: The wheat and maize grow better because of the nitrogen-fixation and the legumes are protected by the other crops. Informants who knew these cropping systems and applied it said that they have obtained this knowledge from their fathers and mothers.

The third intercropping system is applied in the rainfed farmland and agroforestry. It comprises four to ten crops of which the most important are beans (several varieties), grain (millet, sorghum), maize, and trees. Old farmers said that the crops below the trees

improve the growth of the fruits. Young farmers, however, did not know much about this system.



Photo 17: Maize and kidney beans intercropping system  
(August 1997)

### 3.4.2 Grafting of Persimmon Trees

Grafting of trees is an indigenous wisdom in China. It is already described in detail in the "*Chin Yao Shu*" which was compiled in the 6th century AD. The following description of grafting of persimmon trees is given:

"Persimmons: Transplant the seedlings. Failing that, take a branch and graft it on *Diospyros lotus* in the same manner as for pears.." (Shih Shenghan 1962: 57)

This traditional knowledge has been existing in *Liudu* for generations. In the village, two or three people are responsible for grafting of trees. One of them, Mr. Wang Yufu, 60 years old, is called *shift* (master) or *xiangtu rencai* (local talented person, here translated into local expert). In addition, he has a broad knowledge about all agricultural activities. People in the village consider him as a source of knowledge and ask him sometimes for advice. Mr. Wang received his knowledge from his father. In addition, he attended a training

course on tree grafting in the early sixties. After the persimmon trees had been growing for two years, they need to be grafted. Pear or lotusplum serve as the basis for the trees.



*Photo 18: Mr. Wang Yufu and a persimmon tree he has grafted (April 1994).*

### **3.4.3 Collecting and Preserving Wild Greens**

The processing and preservation of garden vegetables and wild greens is a traditional activity in rural China, mainly carried out by women, children, old and handicapped people. Preservation techniques comprise storage of fruits and vegetables in pits, soya-hydrolysate conserves, drying with or without salt, and pickles.

In *Liudu*, older women go into the mountains (bush) in summer to collect edible wild greens (*kediba*, *reqing cai*, *suziye*, *xiangchun*, *yecai*), some of which are eaten during the summer season, others are preserved like pickles and eaten in winter. The young women do not collect wild herbs anymore.

Herbs and bushes were used to a lesser extent for medicine, basket making, chop-stick making, etc. However, knowledge on these techniques is only possessed by some old people and is no longer applied, because the above-named items can now easily be bought in the village shops.

In order to summarize the findings concerning the farming system in *Liudu*, the following box reflects the view of a farmer.

Box 2: *The Participant's View: The farmer's situation seen by Mr. Li Bingying, 73 years old, July 1993*

My name is Li Bingying. I was born in this village. Before the liberation, I was a soldier and fought against the *Guomindang*. I have five children; they all have gone away to *Huirou* and *Shidu*; the government took them away. Only my daughter in law comes here from time to time and looks after me and my wife.

Our main income comes from fruit trees, but it is not much, because I belong to a production team which has trees with lower yields. So I earn only 100 RMB from persimmon trees and 100 RMB from prickly ash trees per year. In addition, I get a pension of 55 RMB per month, because I was a soldier.

We have 1.2 *mu* land, of which 0.5 is irrigated. All our land belongs to the village. It depends on the production teams, how often land is redistributed: three, five or ten years. In our production team, we redistribute every five years. I think this is not so good, because I never know which land we get next time.

We grow winter wheat, maize and beans. We do not make any rotation, because of the dry climate, but we have some mixed cropping in our *handi* fields. Our yields are 700-800 *jin* wheat and 500 *jin* maize, beans are just for subsistence.

Until last year, I used 150 kg industrial fertilizer, but now the government does not give us fertilizer and seeds. So I only used 1000 *jin* manure from my pigs, but the yield was low. Before, the winter wheat grew very well, especially under the fruit trees. Now fertilizer and seeds have changed, they are worse than before.

I don't need to do much pest management, there were only some *yingchun* and *yachun* last year. I used some organic pesticide with herbs from the bush, so it wasn't a big problem.

Animals are not so important for us, we have just six chicken and one pig for our subsistence.

Our fields are not big, so we can manage the land quite well. During harvest and planting time, my wife helps me, the children come, and the neighbors help each other.

I don't have any big problems. I am a farmer and I can manage my land. I only hope that my son will come back one time, but he doesn't know much about farming. He also lost the right to use the land here in our village. So when I die, the house will belong to him, but not the land.

Yes, I know, that the extension service has changed. We don't get any seeds and fertilizer now, we have to buy them. But for advice, I don't need their advice anyway. I learned from my father how to manage the land and if I have problems, I can ask my neighbors. I learned a lot from the other farmers, so I don't need to think a lot about my own fields.

I don't really know how to improve the farming system. Maybe I should try to grow some walnut, there are some successful cases in our village.....

The interview reflects a rather typical opinion of an old farmer in *Liudu*: He is quite confident about his knowledge (no felt need for official extension), but he has no definite ideas how to improve his situation. However, Chinese farmers have hardly ever been asked to reflect their own situation and to provide ideas for the improvement of future activities. Therefore, it is difficult for most of them to express their thoughts. Based on my experience as an agricultural adviser in China, however, I learned that after a time of cooperation and facilitation, many of them could express precise ideas for their development.

Mr. Li clearly states that he does not need the official extension service and prefers to rely on the agricultural knowledge obtained from his father. If he has problems, he would ask his friends and neighbors. All other informants said that they either prefer neighbors' and friends' information. This can be seen as an indicator of the inefficiency of the extension system, both in terms of messages and methods.

He indicates that fruit trees are his main income source, which contradicts his information on other income (his pension is bigger). I suppose that he gave the wrong amount RMB for cash from fruit trees, but in many other interviews I was given the information that fruit-trees provide the biggest part of cash income, although in fact other sources (pension, off-farm work, remittance from children who live in the cities and send money home) are bigger. Most people still see themselves mainly as farmers and think first of what their land provides them.

Mr. Li is quite clear about the land tenure situation and expresses his dissatisfaction, like almost all other informants. He knows the amount of chemical fertilizer quite well. The amount of manure might be too high, because it is not measurable, he just wanted to say that he uses a lot.

He is quite satisfied with his overall situation, but he feels sad that his children left and are no longer interested in agriculture. All old informants expressed their concern, that in this way a lot of agricultural knowledge is being lost. This was confirmed by my research in the following years: The agricultural knowledge used by the older people was displaced by activities in tourism and economic development, which were mainly carried out by young people.

His expression "the government took my children away" again reflects his ideas about the government, but shows on the same time that he feels that he cannot do anything about it. This is a typical dialectic thought found with many old farmers: On the one hand he is convinced that his own knowledge is superior to than that of the government, and on the other hand he is almost fatalistically following government orders.

#### 4 Cash Income and Off-farm Activities

Questions on the income situation were included in the guideline interview in August 1993. The criteria for samples were poor, middle, rich and male and female farmers. The definition for these categories is given in chapter 2.1.1. I am aware that farmers might not have revealed the exact figures, sometimes because they were afraid of telling me the whole amount, sometime, because they did not have account books about their income and simply forgot some items. The comparison with the Chinese statistics here only shows a certain trend: that there is a large variation among the village households and that the cash income is higher than in other areas of Hebei Province and this is most probably because of the vicinity to Beijing.

In 1993, the average annual income per household among my informants was 3350 RMB which is less than in other places in the vicinity of *Beijing* (Beijing 1993: 6000 RMB, *Hebei* Province 1993: 2500 RMB [China Agriculture Yearbook, 1994]). On average, the yield of persimmons contributes 800 RMB (24 %) to this amount. Other tree-crops such as prickly ash (as a spice and oil fruit) and walnut also provide cash. Income from other agricultural crops is negligible. They are grown for subsistence. Thus, off-farm income accounts for the biggest part of annual household income.

Chart 4 shows the distribution of household income in *Liudu* among the interviewees. It ranges between 300 RMB and 7,800 RMB. The highest income from fruit trees has household no. 14 (2,260 RMB), a village leader who could allot the best fruit trees to his family. Household no. 25 did not indicate its annual income. Households no. 12 and 15 did not want to reveal their total income. Only for two households fruit trees are the main source of income.

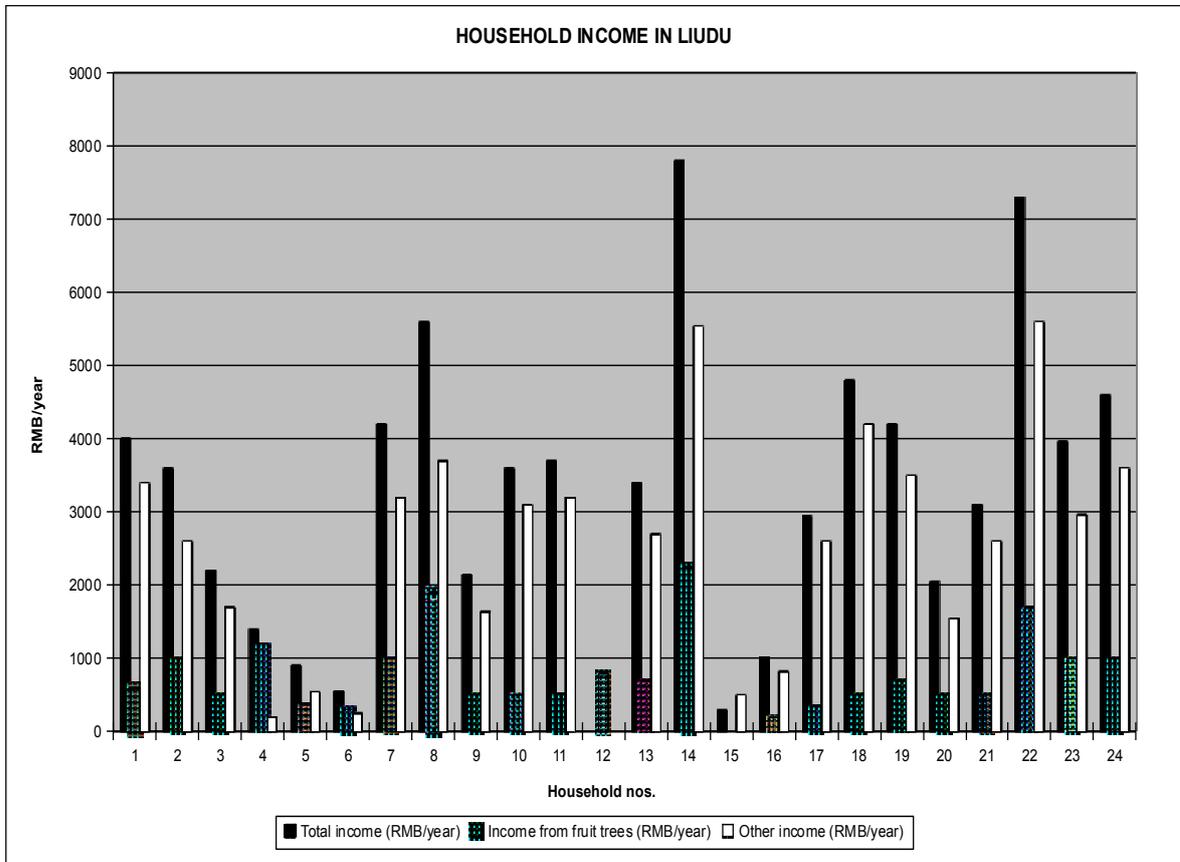


Chart 4: Household income of informants 1993

In 1993, 60-70 % of all families had one person who temporarily left the village to earn money e. g., in coal mining, construction, marketing of products in *Shidu* Township. Here, in *Shidu* Town 21 rural enterprises, 13 small hydroelectric power stations, four food processing plants and one coal mine provide work mainly on a day labor basis. Most of the migrants are young men, some of them married, whose earnings contribute the bigger part to the family income. In 1995, the number of families with at least one member out-migrating has increased to 80 %.

95 % of the young men earn income from non-agricultural occupations, and only 20 % of all families completely depend on agricultural production. Their main income are persimmons (in good years up to 1000 RMB per year).

Some old men receive a pension from the government of about 700 RMB a year, because they fought as soldiers in the Japanese war.

Some farmers entered the tourist business by letting horses to tourists who come from *Beijing* on weekends. For them, this is the biggest income source (5000 - 7000 RMB per year).

There is a tendency in *Liudu* towards an increasing income from off-farm activities like in many regions China at the beginning of the 1990s. Moreover, producing winter wheat becomes increasingly expensive due to high input costs such as for electricity, seeds and fertilizer. Producing own wheat is more expensive than buying it at the market where prices are still subsidized (October 1993: 2 RMB per kg produced, 1.3 RMB per kg wheat bought in the market).

*Box 3: The Participants' View: Mrs. Liu Fuxia, 30 years old, on off-farm income, October 1995*

My name is Liu Fuxia and I am 30 years old. I have one daughter. We have two mu of land, one mu is irrigated where we grow wheat and maize. We have some fruit trees and last year we harvested 2000 *jin* persimmons, 30-40 *jin* of prickly ash and some *jin* walnuts.

Last year, the village committee took away 0.3 mu of our land. For this, we get 100 RMB per year. The land was used for tourism, they built boat renting and swimming facilities. But I would prefer to grow crops instead of getting the money. On the other hand, tourism provides a big chance for making money in our village.

From March to November, my husband and I work as day laborers and do construction work. My husband gets 15 RMB and I get 13 RMB per day for the same work (*she laughed when I asked why and said: The officials say that women cannot work as hard as men but in fact we do. Like in agriculture, old men say we make the decisions and the women just have to follow. But I know it is different*).

The income from our construction work is now our main income source. In fact, I think, in the future we will only live from non-agricultural income. My husband and I have thought of going away and work in the city. I have heard of a steel making factory in *Beijing* where we could go, or we go to *Fangshan* and come back every month. But it seems that only graduated girls get a good job in the city. That is why I spend a lot of money for the education of my daughter.

On the other hand, if we stop farming, we will lose our food security and will not have enough to eat. And we will always remain farmers.

*Four other women came in and started a discussion on farming and non-agricultural income.*

*Woman 1:* Farming doesn't play a big role in our lives now. All irrigated fields were taken away for tourism and now nobody cultivates the rainfed fields.

*Woman 2:* Fortunately we still produce enough wheat for eating, but we have to buy rice.

*Woman 3:* If you buy wheat, it is cheaper than producing it on the fields. Growing wheat costs us 1 RMB, but when we go to the market, we can get it for 6 to 7 *mao* (0.65 RMB). If there were more working possibilities in our village, I would like to work as a day laborer.

*Woman 2:* But we are still farmers, and it is our life to cultivate the land. If I had the choice, I would like to keep the land instead of giving it away for tourism or construction.

*Other women:* Yes.

Mrs. Liu represents an open and innovative village woman. At the age of 30, she is old enough to have gathered experience in farming and, at the same time, young enough to keep pace with economic changes. She expressed in her statement that she considers being a farmer as very important but on the other hand, is also willing to take the opportunity to earn money as a day laborer. Her fields are well managed, her house is neatly arranged and during village meetings, she took over moderation tasks and wrote ideas on cards. Unlike elder women, she shares field work and housework with her husband. Yet she expresses her concerns regarding the necessity to continue managing the fields, which does not provide sufficient income, and the need to look for off-farm work. For a long time, the family had done both, especially since fields are very small, but now they have experienced the arbitrary land and tree management (see below) of the village committee. For this reason many of the villagers think that working in the cities is the only option their children have to make a living. (This was the opinion of many of my other female informants; many old men expressed the wish that their children should return to the village).

The other women joining the discussion show the diverging opinions within the whole village population: On the one hand they are acknowledging the advantages of off-farm income possibilities and realize that these will provide chances in the future. On the other hand, at present, they are being aware of the necessity of continuing farming and ensuring food production. This discussion reflects the debate and dilemma of China's rural development planners at the beginning of the nineties: increasing the living standards of the rural and urban population through increasing non-agricultural activities and at the same time maintaining grain production to feed a growing number of people.

## 5 Land Tenure

The land tenure system in *Liudu* follows the principle of allocating land use rights through contracting (*cheng bao tudi shi yong quan zhuan rang*), according to which every family has contracted a certain area of land that comprises both irrigated and rainfed land. Until 1992, the official extension system ordered the farmers what to grow on their contract fields in *Liudu*. Later, this policy had not been longer applied and farmers could now decide on their own what to grow on their fields. In addition, every family cultivates a small area of some hundred square meters as home gardens (*ziliu di*). On these fields, farmers have always been able to decide what and how to grow.

All land and trees except the home gardens in *Liudu* are redistributed every three to five years.<sup>58</sup> The criteria for the acreage of contract land is the number of family members. This is in direct contradiction to the actual family planning policy, where one or two children

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<sup>58</sup> This is a relatively short period. Avenarius (1994: 35) mentions 15 years for villages in the vicinity of Beijing. My own surveys in *Hebei* indicate a period of 5-10 years.

are recommended. Though the pattern of redistribution of land is usually decided upon at the village level, the implementation of the (re)distribution of land is carried out by the production team. This has led to an unequal tenure in terms of distribution frequency, quantity and quality of land.

Printed regulations containing criteria for distribution and cadastral registers do not exist. The production team leaders have handwritten notes about how much and which land/trees can be used by whom. Each family has a handwritten paper sheet that explains how much and which land can be used by them. If somebody out-migrates seasonally, he or she keeps his/her land in the village which is managed by other family members.

Chart 5 shows the distribution of land *Liudu* among the informants. The average household has contracted 1,6 mu land, of which 1 mu is irrigated land which is scattered into 7-8 plots. Thus, the area contracted is much smaller than the average of *Hebei* Province which is 5 mu (China Agriculture Yearbook 1994: 302) and 3-4 mu for villages in *Beijing* (Avenarius 1994: 35). Farmers are not obliged to pay rent for their land. In addition, each household has 0,1 mu home garden. Quotas for grain and oilseeds (*sanguo gou*) were given up in 1992, because land tenants mainly produce for subsistence.

The chart also shows that land is not evenly distributed. As mentioned earlier, households with more members have a larger amount of land: household no. 14 and no. 22 comprise six family members, and all above two mu have four family members. A single old man who does not farm anymore but gets a pension from the army lives in household no. 15.

Differentiation goes also along membership of production teams. Household no. 1, for example has seven family members, but belongs to a production team with less availability of land. Younger families cultivate more land, whereas old people who have no children living in the village do less farming.

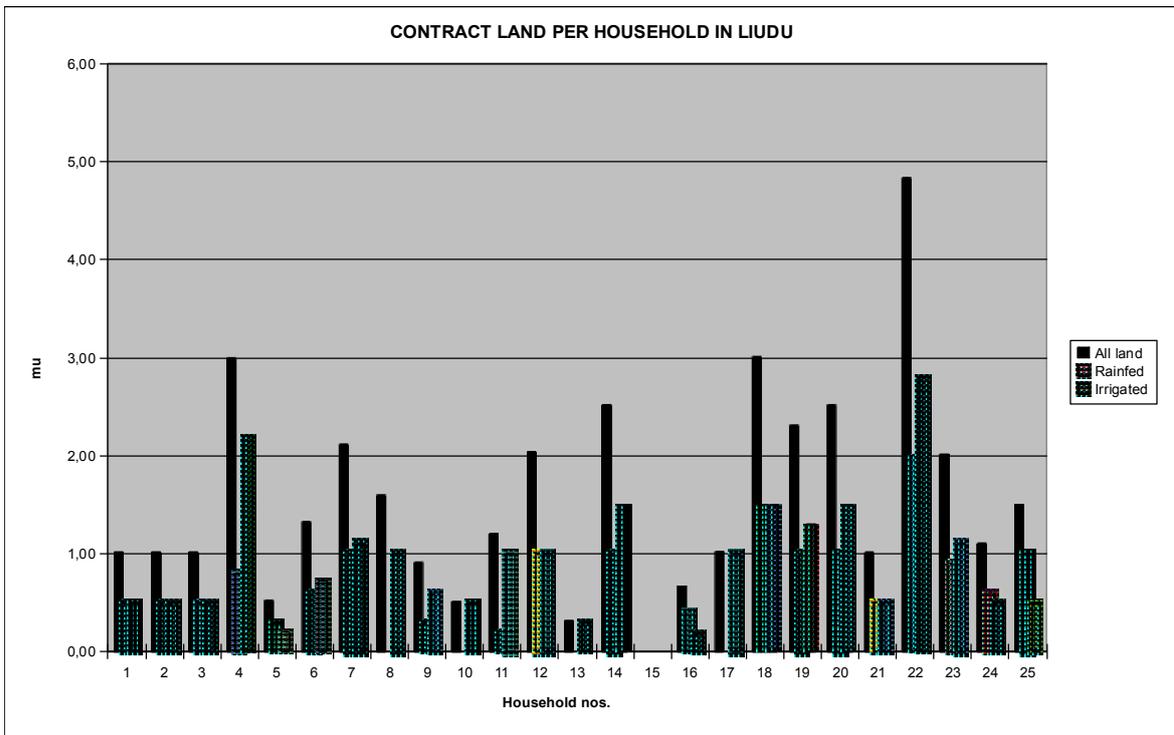


Chart 5: Cultivated contract land per household 1993

Chart 6 shows the distribution of persimmon and prickly ash trees per household. Trees are distributed according to the number of family members, too, but contract trees are not located on the contract land of one family. On average, every family has 19 prickly ash trees and 11 persimmon trees. Chart 6: Contract trees per household in Liudu 1993

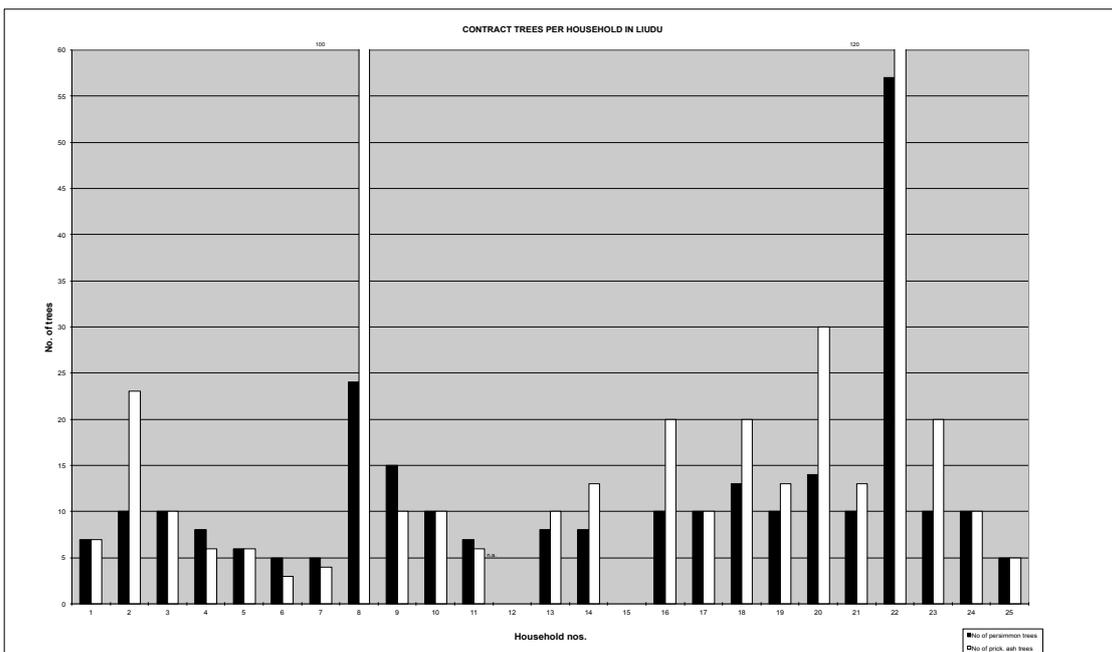


Chart 6: Contract trees per household in Liudu 1993

Both land and trees are not evenly distributed and the distribution follows arbitrary orders by the village committee. This can be illustrated by the management of persimmon trees from 1993 to 1995. Favorable weather conditions in 1993 led to a high yield of fruits. The members of the village committee, considering themselves as the representatives of the "collective" and therefore as the owners of land and trees, decided to take the persimmon trees from the farmers and put them under collective management. The income from marketing these fruits was only divided among the members of the village committee. However, of the seven production teams within the village, only six had to handover their trees, the other two teams had a good (kinship) relationship with the village committee members and could keep their trees and manage them individually. The trees under collective management had not been well managed and hardly bore any fruits, thus, in 1995, the trees were redistributed again to farm families who had to cope with these mis-managed trees. Thümmel (1995) describes similar cases for land management, with the management and planning of land use following a similar, arbitrary process.

*Box 4: The Participants' View: Mrs. Wang Yufen, 48 years old, on the management of fruit trees, October 1995*

Two years ago, they took away our persimmon trees. The village leaders said they were badly managed. I think this is not true, we had a bumper harvest at that time. And now, after they have treated them for two years, they are nearly destroyed. And nobody talks about this. So we have to suffer from the activities of the village leaders.

This statement describes that the villagers do not agree with the decisions made by the village committee. On the contrary, the actions are seen as disadvantageous for the development of the village. The remark "and nobody talks about this" is not true according to statements of my other interview partners. In October 1995, almost everybody talked about the management of fruit trees and of the corrupt management by the village committee. The sentence may express that "it is not worth to talk about this" and that there is no hope to improve the management of the trees. At that time, many informants indicated that they did no longer have any income from the fruit trees, in contrast to their statements in 1993. This shows that the villagers no longer had a perception of "ownership" of the fruit trees which in earlier years were by many of them considered as their main source of income.

*Box 5: The Participants' View: Mr. Wang Fengxiang, 48 years old, party leader of Liudu, on land tenure, October 1995*

Land distribution has become very complicated nowadays. We have to follow many regulations from above. They say we should become rich. That is why we want to develop tourism. Now we have to distribute the land according to the needs of tourism, too. That is why we think trees should be collectively managed. Then the village becomes rich more quickly.

Yes, I know, agriculture doesn't play a big role any more. Farmers don't use manure on responsibility fields because the contract times are too short.

I have no idea how to organize a sustainable land management. If longer lease periods would be introduced, the whole land should be newly divided, because the quality of the land is different and every family has to get an equal share. This is too complicated. I cannot do this. That's why the farmers want to have the short leasing periods.

The statement of the party leader reveals his insecurity on how to deal with the land tenure problem, mainly because he did not receive clear orders from above. All other village leaders shared his opinion: The conflict between using the land effectively ("we have to become rich" and the equal distribution among all farm families reflects the millennium-old conflict in Chinese history: between the legalists who wanted to maximize outputs of the land and the confucianists who promoted an equal distribution of land. All leaders said that farmers preferred to have a short leasing period but this view was never confirmed by farmer informants.

This statement also shows that village leaders see themselves between fulfilling government orders and considering farmers' interests. Sometimes, they see both as contradictory and they are not able to make decisions that suit both.

## 6 Changes of Land Use from 1993 to 1997

### 6.1 Land Use in 1993

Map 5 shows the land use in *Liudu* in 1993. The biggest part of the village is mountainland with steep slopes of more than 25 degrees. This land is not used for farming, except some terraced rainfed farmland.

The mountains of *Liudu* comprise also an area which is classified as forest. However, I could not find many trees in the area neither on the aerial photo nor in situ. Many informants said, that only hardly accessible areas deep in the mountains, were still arborous. The official of the *Shidu* Forestry Station said that this area is under the administration of his office and that in 1990 and in 1993 the office organized the reforestation with populus and larix. However, the afforestation activities were not followed up and thus the inhabitants of *Liudu* illegally cut the trees and use the land for agriculture since they see a larger benefit in farming. Photo 19 shows the sign for forest ("Mountain closure area. Grazing, reclaiming wasteland, firewood collection are strictly prohibited"). However, the land is used for growing maize.



Photo 19: Classified forest (October 1995)

All irrigated land is located south of the main road. A lot of wasteland (*shibiandi*) can be found on the banks of the river which can be reclaimed by individual farmers for agricultural purposes. The soil is sandy and stony, however, some farmers have started to grow paddy rice on these plots..

The rainfed land is located north of the river. Some irrigation ditches lead to these fields, but are no longer used. Some fields were abandoned several years ago.

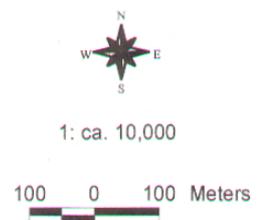
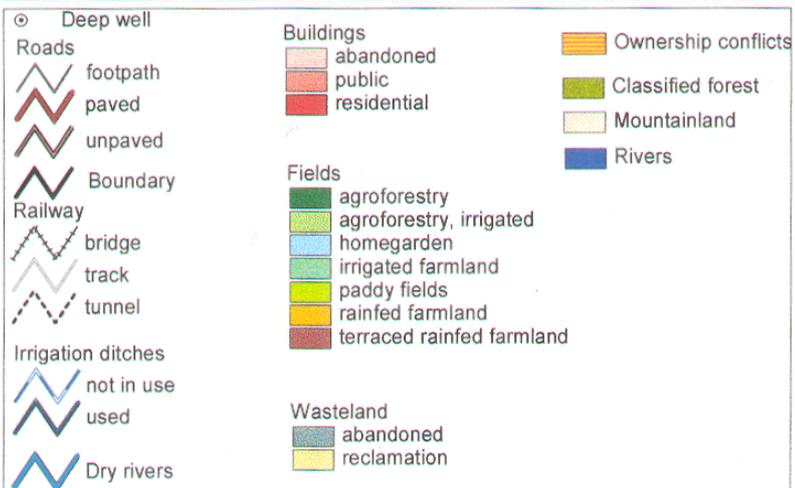
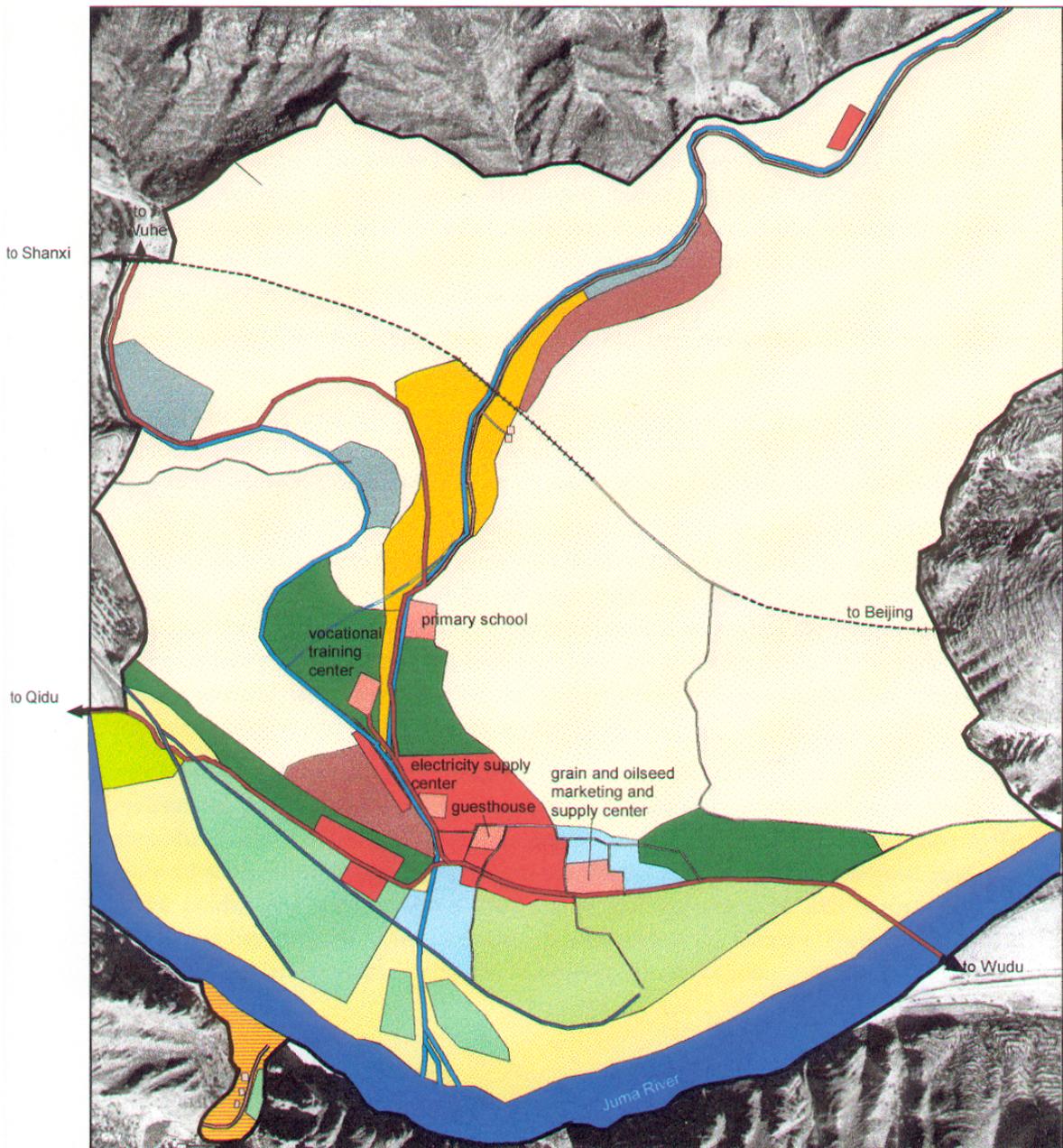
Some residential houses are still located on the road north of the village. They form an isolated production team and have mostly rainfed fields. The buildings in the southern exclave are used as restaurants. The main village is situated north and south of the road with . Home gardens near the residential areas.

Ownership conflicts with the neighboring village of *Qidu* have occurred in the area south of the river. Neither the village leaders nor the villagers themselves know clearly to which village this land actually belongs. During our transect walks with the villagers, this fact was confirmed by my informants. Later, when I talked to the villager leaders, they told me that at the beginning of every year they negotiate with the village leaders of *Qidu* on how to use the land in the coming year.

The village boundaries follow the area of a small watershed except in the northern part. The boundaries shown here reflect the information given to me by the farmers and the village leaders. Since no cadastral information is written down, it was difficult to find out which institution was responsible for setting up these boundaries.

The maps are based on discussions with the village informants and reflect their personal view. It shows that the farmers of *Liudu* are not interested in mountainland and that is why the mountainland is not differentiated further.

MAP 5: LAND USE IN LIUDU 1993



Compiled by: K. Janz 1997  
 Based on an aerial photo interpretation and on discussions with farmers of Liudu in 1993 and 1994  
 Product does not meet geodetic requirements

## **6.2 Land Use in 1995**

In 1995, two major changes had taken in comparison to 1993 (see Map 6).

Most of the rainfed farmland had been at least partly abandoned because farming was considered as too arduous. 40 mu of the irrigated farmland had been converted into non-agricultural use. The land was leased for 40 years to a company from *Fangshan City* that planned to build a hotel and recreation complex on this land.

Some of the farmers have abandoned their rainfed fields, but used them for cattle or goat grazing instead.

In addition, all houses which are not located near the road (in the mountains and in the southern exclave) were abandoned due to bad infrastructure. The irrigated fields in the southern part were abandoned because of decrease of soil fertility and the fact that fertilizer has to be bought privately.

In the western part of the village, some wasteland had been reclaimed by a single family in order to establish fish ponds and recreation facilities. Tourists can go fishing in the fishponds for cash. In the eastern part, wasteland was taken over by some families to grow paddy. Some other wasteland was taken over by the village committee which established boat renting facilities and a swimming pool as a contribution to the development of tourism.

The change of land use from 1993 to 1995 shows the strong tendency towards non-agricultural use of land (tourism, recreation, fishpond) and, to a lesser extent, towards a specialized use of land (paddy rice or animal husbandry). Since 1994, the land under cultivation has steadily decreased. One reason is that non-agricultural activities like tourism or rural enterprises have become more economically attractive to the farmers than farming on non-irrigated fields. Another reason was that even fertile irrigated land is now planned to be used for tourism.

Box 6: The Participant's View: Mrs. Li Fuping, 48, on land use, October 1995

My name is Li Fuping and I am 48 years old. I have three children. My two sons have left the village and work outside. My daughter goes to school in *Shidu*. My husband works in a training center and comes home every evening. He earns 200-300 RMB per month. Eight years, he had been a village leader here and his father, too.

We have 2 mu land of which 6 *fen* are irrigated and there we grow wheat and maize. In our rainfed fields, the maize didn't grow well and that is why we stopped cultivating. But now I have reclaimed one mu land down at the river. There, I grow rice. My sister in *Qidu* (*the next village*) told me how to do this, because there they have been growing rice for a long time. I am very happy about this because I harvested 500 *jin* and now I don't need to buy rice.

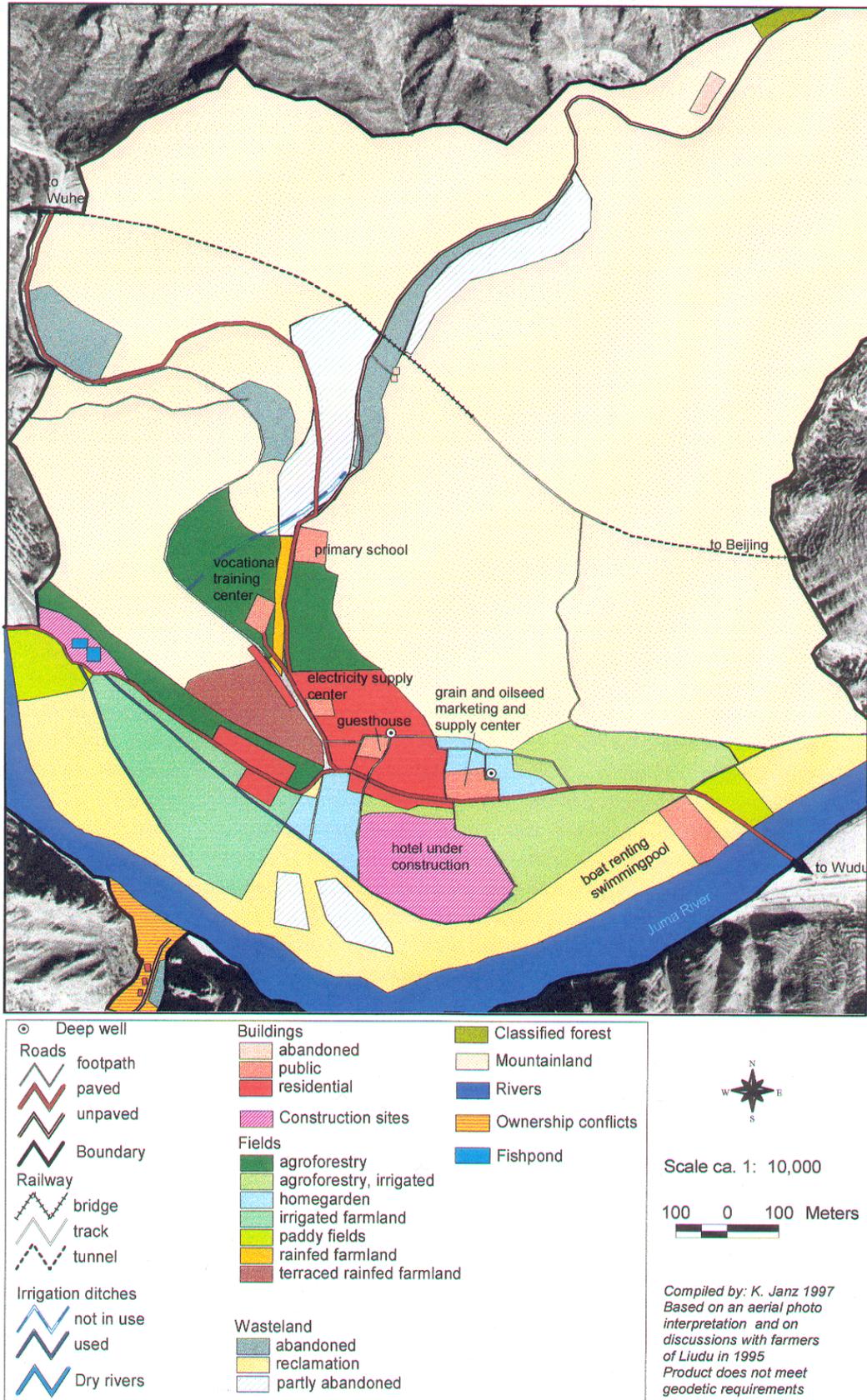
The government took away part of our land to build a hotel. In general I think it is good to develop tourism because it will bring money to our village. But, if I had the choice, I would never sell the land, because we always need something to eat. We all feel very heartbroken that our most fertile land was occupied. If I had enough cash, I would have bought the land from the government. It is always safer to have land, even it is only for raising pigs. If we don't earn much money, we still can use the nightsoil as manure....

Mrs. Li also expressed the conflict between the official slogan that *Liudu* has to become rich by the development of tourism and their own feeling of being the manager of the land. This shows that she still considers herself rather as a farmer though farming might be less attractive than other income earning activities. Farming and land cultivation is related to feelings ("we feel heartbroken") and esteemed higher than earning more money. She is one of the few people in the village who has tried a new way of rice farming and is therefore an innovator. She also wants to invest in the land - a view only few other informants, mainly women of her age, expressed. Especially, younger male farmers said that they prefer to leave the land. However, Mrs. Li's statement shows that there are farmers who, first, understand the conflict between continuing food production and other economic activities and, second, express a definite interest in farming. In my interviews with local decision makers this was often denied. They said that farmers are no longer interested in growing grain. This shows that leaders often do not see and/or consider the views of farmers and it is especially women who do not have no official channel to express their needs. The (mainly male) leaders might have certain ways to discuss the development of the village with male friends and relatives, but this does not reflect the perception of all members of the community.



*Photo 20: Fertile land fenced for hotel construction (October 1995),  
(see construction sites on map 6)*

MAP 6: LAND USE IN LIUDU 1995



### 6.3 Land Use in 1997

In 1997, even stronger tendencies towards non-agricultural use of land could be observed (see Map 7). Farming has become less important for the inhabitants, not only because they have got other local income opportunities, but also because many young men and women have migrated to *Fangshan* or *Beijing*. They transfer the money back to their parents and secure a higher living standard for the whole family.

The land which was transferred to an outside company for building a hotel in 1994 has been abandoned because in 1996 the government stopped the construction of hotels in the countryside (pers. comm. SLA September 1997). Now, the most fertile land of the village lies fallow. Moreover, the village had transferred or "sold" another piece of land (45 mu) to the *Beijing* Department of Highway Management (*Beijing gonglu guanliju*) which also plans to set up a hotel but has not yet started the construction, because the construction of the hotel was not yet permitted.

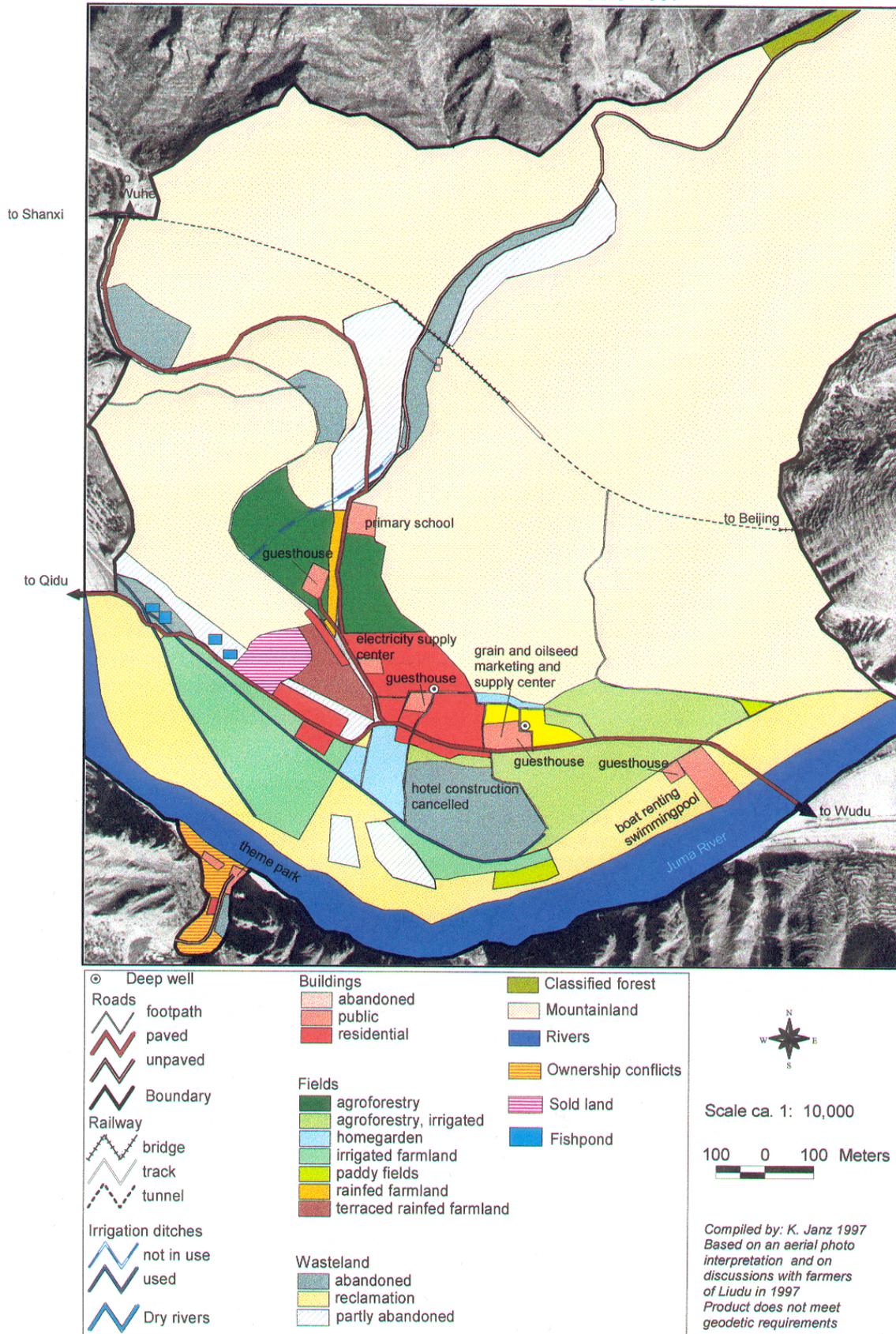
Despite the government's order prohibiting the use of land for tourism, the village has put a lot of emphasis on the development of this sector. The training center was transformed into a guesthouse and two additional guesthouses were established. In the southern exclave, *Liudu* has created a theme park though land ownership is not clear. The nearby restaurants are managed by people of the neighboring *Qidu* Village.

The fields that were reclaimed near the river had been flooded in 1996 and were then abandoned. Therefore, paddy land has decreased.

The field survey was carried out just two weeks before the meeting of the Communist Party's Congress in September 1997 during which the privatization of state properties was discussed intensively. The village leaders therefore expected a major decision on the future land tenure system. The village committee had already made some decisions on changing the land tenure system in *Liudu* and had started to introduce an auction (*pai mai*) system for the rainfed farmland and for fruit trees. This system was still not well established when I visited the village in August 1997 and detailed regulations had not been issued. Villagers indicated that they were not interested purchasing rainfed land by auction, because the land is not fertile enough, but in getting fruit trees.

MAP 7: LAND USE IN LIUDU 1997

121



Box 7: *The Participants' View: Mrs. Li Jinshao, 48 years old, on land tenure and land auction, in August 1997*

Actually, the farmers don't want to sell the land (*for tourist use*) because they know that they don't get the money. We know that land is a long term investment but money is not sustainable. However, our land is not enough and we need to buy food. We are lucky that we can get some money from our children who work outside the village.

I hate *pai mai*. It is only for rich people, but ordinary people like us cannot benefit from it. And the system is not very sophisticated: even after auctioning, people don't own the land.

Our present land tenure system is not good either. Our communication is not so good. People have become selfish and so don't care about land and tree management. Much land and many trees are destroyed because of the bad management. The redistribution period is too short and the land is too scattered. One big plot would be better. In our *xiaodui* we have started to put land plots together but it is difficult because of the fertile and infertile land.

I know the collective system was not good either but in the future we have to develop something new, but I don't know what. We old people are not asked nowadays.

Mrs. Li is an illiterate farmer who has given a more in-depth analysis than the village leaders I spoke to. In a long discussion she talked about the advantages and disadvantages of different land management systems. Again issues concerning the land are related to feelings ("I hate *pai mai*"). Moreover, she is aware of the most important disadvantages of the land auction: Neither does it solve the problems of land scarcity nor the unclear legal situation. Comparing the "old" collective and the present system she notices that both are not suitable for the present situation. One of the biggest shortcomings of the present land tenure is the fragmentation of land lots. Her idea that big land plots are better coincides with the view of many Chinese planners that only larger units of land and business can make land use more efficient.

Though she provides some ideas on how to solve the problem, she feels that she herself has nothing to say, because nobody had asked her before - a typical low self esteem for a rural woman. The sentence "we old people are not asked nowadays" was confirmed by other old informants.

#### 6.4 Land Use Planning Process in Liudu

Officially, the State Land Administration (SLA) at the county or district level is responsible for the land use planning in the rural areas. The Land Management Bureau in *Fangshan* has the mandate to prepare land use maps and to initiate a planning process at the district level. At the time of my interviews, these maps and documents had not been officially approved and were therefore not accessible. In the land use planning process

below district level, here in the township of *Shidu*, various line agencies such as agriculture, forestry, land management and animal husbandry all have the mandate for certain decisions on land use. The agricultural technology station, for example, is responsible for irrigated and rainfed farmland and for the management of fruit trees (*shuiguo*), whereas the forestry station is responsible for the land use on hills and for the management of nut trees (*ganguo*).

The process of the management of land use in *Liudu* can be illustrated by the case of converting a part of land from agricultural use into non-agricultural use: here, establishing a hotel complex. Chart 7 shows the decision making process for a change of land use and land tenure. In the case of *Liudu*, in 1994, a request from outside the village to use part of *Liudu*'s land to establish a hotel complex<sup>59</sup> was made to the township land management station (*gongshe*<sup>60</sup> *tudi guanli zhan*) in *Shidu*. The township bureau has to forward the request to the district level and is then obliged to follow the orders given by the upper administrative levels.

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<sup>59</sup> This request can also be made at the district level, depending on the relationship between the persons.

<sup>60</sup> In *Liudu*, all my informations used the term "*gongshe*=commune", in other areas of China, the term *xiang* is used for the township level.

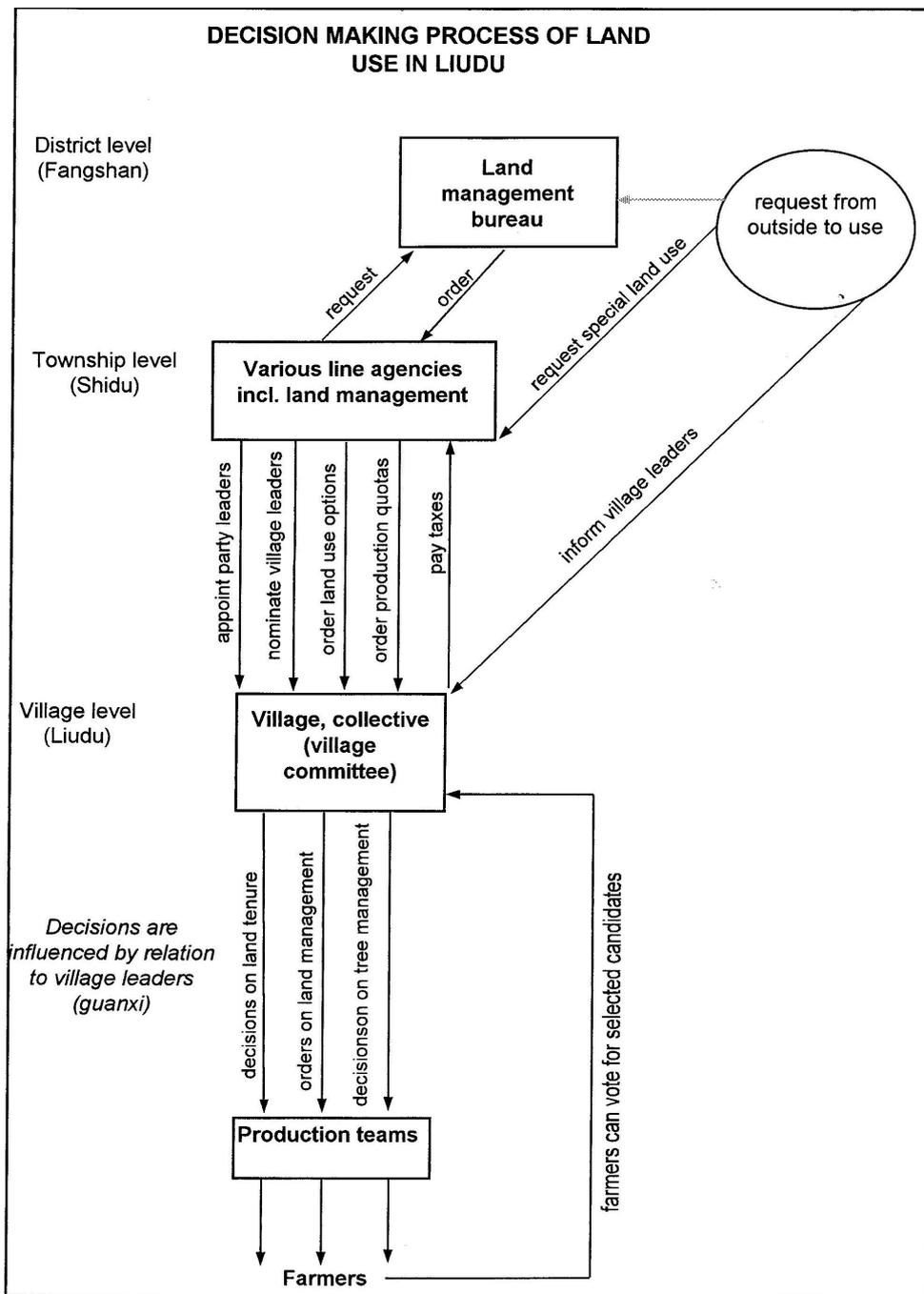


Chart 7: Decision making process of changing the land use for Liudu

The various line agencies<sup>61</sup> at township level give order concerning land use options, and production quotas to the village committee, which, in turn, transfers them to the farmers. The village leaders can decide about land and tree tenure<sup>62</sup>. They are informed of the outside request for land use change. Village leaders in *Liudu* said that they theoretically had a right to reject the request but would never do this.

The main land use contract is negotiated between the outside company and the land management station at the township level. The land management station receives a certain amount of money from the outside organization and transfers part of the money to the village. Officially, farmers who had to give up their land, should receive a fee for the land lease of about 700 RMB per *mu*, however, in 1995 farmers told me that they only received a small amount of money (between 80 and 200 RMB, regardless of the size of land).

The whole planning process is top-down oriented and farmers cannot influence decision making on land use planning in their village. The only formal way of influencing policies are the elections of the village committee that are being held every three to five years. All men and women above 18 years are eligible to vote in the village elections. If the village leaders perform well in the eyes of the villagers, they can stay in power for a long time. In *Liudu*, however, the village leaders changed twice between 1992 and 1997 because "they did not know enough about farming" (according to farmers).

Informal channels for influencing local policies depend on the relationships (*guanxi*) between villagers and members of the village committee. These are based on kinship and/or on affiliation to certain production teams. If farmers have a good relationship with the leaders, less trees or land might be taken away from them (see above).

The decentralization of the planning policy in China has given room to a larger decision-making power to local leaders. But local leaders are often not yet able to use their power in a way that local rural development can benefit from it. In addition, overall national goals like food production or quotas for agricultural land use often contradict the local objectives of "making farmers rich" which can mainly be achieved by non-agricultural production.

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<sup>61</sup> such as Bureau of Interior, Agricultural Technology Station, Forestry Station, the Party township organization.

<sup>62</sup> Tenure always means the decision on the distribution of usufruct rights.

Box 8: *The Participants' View: Mr. Wang Yude, village leader, on land use planning, October 1995*

My name is Wang Yude and I am one of the village leaders. My family has five members, but the children have left the village and go to university.

My family has 2-3 mu of land which is all irrigated. We have left the rainfed fields, because they are of no use for us. All rainfed fields are abandoned now.

In 1965, we reclaimed the land south-west of the road. We moved the soil down from the school.

In the 1970s, the government promoted mountain area development and built a water pipeline into the mountains. Farmers received some subsidies. But we use the mountainland to collect herbs, mushrooms and scorpions. In the 1980s, we thought that we could distribute the mountainland to the farmers, but the production conditions are not so good. Electricity for pumping water has become too expensive and so we haven't done irrigation in the mountains. Now 1 kW costs 3 *mao*, but three years ago it was only 2.5 *mao*. The water itself is free for the farmers and I have no overview how much water we use.

Last year we reclaimed land on the wasteland near the tourist area, because water access is easy.

We have planned to use all land south of the road for tourism and later, we can also use the land north and east in the village. I think tourism is good for our village because it provides employment opportunities for the people. I don't worry about food security.

Take the example of the *Dongfeng* Company. They paid 40,000 RMB per mu to the land management bureau in *Shidu*, our village gets 10,000 RMB, and the farmers will get 700 RMB lease per year. The lease contract will last for the next 40 years.

The mountain area is forest area and we do afforestation (*I said I never saw any forest when I went to the mountains and showed him aerial photos where we could not see trees on the slopes*).

No, no we have an afforestation area because the government told us so.

Mr. Wang is a typical old cadre who sees his tasks in implementing government policy. However, he is not sufficiently informed on the use of important resources such as water. He expresses that he fully agrees with using fertile land for non-agricultural use, because he thinks that this is government policy. He only sees benefits in developing tourism and gives a much less detailed analysis of the land use planning process than the two female farmers of Box 6 and 7.

His family was able to contract a relatively big piece of land though his children have left the village. His impression that all rainfed fields are abandoned is not true but shows a tendency perceived by many other villagers. The example of the non-existent forest shows that his interpretation of reality and not the obvious facts is what is expected from him by the upper levels of the administration.

*Box 9: The Participants' View: Mr. Guo Guanren, township official for land management, on land use planning, October 1995*

This is a mountain area and has special development conditions, for example for family planning. Investors have to be attracted, to bring money and development to the area.

The township development company knows the details of the national policy and they have to transfer it to the village committees.

We have a development plan that the whole area should become a tourist area until the year 2000. And the plan says to develop cotton...

Mr. Guo repeats official slogans and at the same time admits that he does not know any details of the national policy, but his superior agency does. He sees his own task as an interface agent only in transferring government orders to the farmers. Obviously, he does not reflect on whether the orders make sense for the villagers or benefit the village. The land in *Shidu* is not at all suitable for cotton cultivation. Nevertheless, he quotes government instructions for the North China Plain to promote cotton cultivation, even though it is ecologically and economically not sound.<sup>63</sup>

Therefore, he represents a kind of cadre that is typical for post-reform China. Having been assigned to his post during collective times, he is now being confronted with new tasks he cannot fulfill: to implement the "socialist market economy". He can say the right sentences ("investors... have to bring money") and refer to Deng Xiaoping's slogan "to become rich is glorious". But Mr. Guo neither knows how to implement a policy that enables people to get rich nor does he have the capabilities to develop a suitable and sustainable local land use policy, though this is his official task.

Mr. Guo was one of the view informants who refused to talk to me at first. He showed his uncertainty by being reluctant to answer my questions and would not say more than the above mentioned sentences. After that, he told me that he was busy and I had to leave his office.

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<sup>63</sup> In 1998, the Chinese administration admitted that pests endanger large fields of cotton and its cultivation is no longer possible in the North China Plain.

*Box 10: The Participants' View: Voices of farmers about using land for tourism, October 1995*

...I think reclaiming land for tourism was illegal....(an old man)  
...I don't care about tourism, because the land belongs to others...(a young woman)  
...So much land is used for tourism now, we will become beggars...(a young man)  
...We only got 60 RMB compensation for the first part of this year...(a young woman)  
...Only the leaders have benefits from tourism, but not the farmers...(a middle aged man)  
...We just have to do what the leaders say. The outsiders bought the fertile land for the price of slope land... (a young man)  
...Officially, we get 800 RMB/mu lease from the company, but we never saw any money...(a middle aged women)  
...I think this is not a sustainable policy, because some day we will not have enough food...(a middle aged women)  
...I think tourism is good for our village...(a young women)  
...Some people in the village didn't agree on giving away their land, but they didn't have a choice...(an old man)

Most of the farmers also see the disadvantages of concentrating on tourism and feel very unhappy about it. Many of them are not informed about the procedure of "selling" land. The suspicion that the land lease was illegal, is not justified because the transfer of an area of 40 mu was permitted by the Land Management Station at Township level. In this case the agency in *Shidu* Township was one of the main actors in the sale of land use rights. It is, however, illegal, not to pay the correct amount of compensation to the farmers and this is realized by most of them.

Other voices express an undifferentiated view towards the land use policy that is almost fatalistic ("we didn't have a choice, I don't care"). Some other informants said *meiyou banfa* (what can we do). On the other hand, most villagers feel that focusing on using land mainly for tourism is not sustainable, though it might bring more money to the village. Many farmers realize that agricultural production does not provide them enough cash income and that they have to look for other income sources, but when I came back in September 1997, the villagers had not received much benefits from the development of tourism – except for some possibilities to work as a day laborer.

## 7. Land Use Options in the Villagers' Eyes and Decision Making of Farmers

The following table shows a summary of the comments the villagers made regarding land use options in *Liudu*. The categories and (cropping) systems were set by the farmers themselves.

Table 9: Comments regarding major land use systems

Major category	Specific system	Problems		Potential	
		women	men	women	men
Land use		women	men	women	men
Fields	irrigated farmland	upper soil is dry, lower soil is wet, bad quality of chemical fertilizer, decrease of soil fertility, electricity fees too expensive	not enough water, bad quality of seeds and fertilizer, land use contract period too short	provides staple food (wheat), village leaders should promote lower prices for electricity and equipment	provides staple food
	rainfed farmland	not enough nightsoil, not enough grain for feeding pigs, work is arduous	rainfed fields are not cultivated anymore	find drought resistant varieties, develop animal husbandry (cattle)	no comment
	agro-forestry	no comments	not enough water, pests, conflict between animal husbandry and agroforestry, land and trees do not belong to the same family	fruits provide income	fruits provide income increase apricots because adapted to drought
	paddy fields	yield is low	no comment	fields provide additional food, irrigation is easy	no comment
Mountain-land (bush)		difficult to access, lack of water, low fertility, afraid to go there	difficult to access	herbs, mushrooms and scorpions can be collected, build canals	herbs, mushrooms and scorpions can be collected
Tourism		area is not suitable for tourism, fertile land is occupied by tourism, farmers do not get lease, official administration does not pay attention to agriculture	fertile land is occupied by tourism, farmers do not get lease, only few people benefit from tourism	provides income, develop shareholding system	provides income
Waste-land	abandoned	no comment	all rainfed fields are abandoned	no comment	could be used for tourism
	re-claimed	many stones, bad soil	no comment	can be used for paddy	no comment
Infra-structure		infrastructure is bad for tourism	infrastructure is good	improve infrastructure	use infrastructure for developing rural industry

Table 9 shows that men care more about the agroforestry system, because they are responsible for the management of trees, whereas women are more responsible for the fields, including paddy. Both, female and male farmers worry about tourism. But women expressed several times that they would support a shareholding system so that many villagers can benefit from developing tourism and a specialized agriculture. Men made more suggestions regarding policy. They criticized that land and trees do not belong to the same family and that the land use contract time is too short. Men also complained that many peasants have lost interest in farming and forestry. The mountainland is not seen as wasteland but as an area that can provide additional food. Women complained that the government puts emphasis on promoting non-agricultural activities, whereas many of them, especially middle-aged women are interested in improving farming.

In October 1993, the time of sowing winter wheat, farmers were questioned about their decision-making on cultivating wheat (see table 9). For the second time<sup>64</sup>, they could make their decisions independent from the official extension service. The growing of winter wheat was taken as an indicator for the decision-making on how to manage the land, because wheat production is more expensive than buying it in the market. Therefore, growing wheat is not an economically sound decision. According to the findings, 20 % of the farmers stopped cultivating winter wheat. Half of these were young men who concentrated instead on off-farm income generating activities.

Table 10: Factors influencing decision making of male farmers for growing winter wheat (October 1993)

Young farmers (below 30)	Old farmers
want to use outside possibilities for working	tradition (we are farmers and we have always grown food and that is why we continue even though it is not efficient)
other young people also leave the village	
low income from agriculture	irrigation is cheaper if the field is near the irrigation station, that is why we want to continue there
trust in the new development (industrialization)	no trust in the new development
willingness to take risks	fear of food security
no other possibilities for jobs	
land use system (the same fields are only cultivated for three years)	land use system is more or less reliable

Young male farmers found many reasons not to cultivate wheat. They said that they would only grow wheat if there were no other possibilities to earn money. Young people have a stronger confidence in an economically-oriented development where individuals have a greater choice to go into non-farm business. Older farmers do not trust the government,

<sup>64</sup> Since 1992, farmers in *Shidu* did not need to fulfill official quotas for producing grain.

because they have experienced many policy changes in their lives. Traditional thinking and food security play major roles in why they continue to grow wheat.

Box 11 shows a visualized form to discuss land use options: A transect walk through *Liudu* taken with a group of villagers (five men above 50 years of age and three women around 30 years of age) in October 1995. The group walk led from the *Juma* River to the mountains. During the walk of several hours, and use categories, problems and possible solutions were discussed. Afterwards the transect chart was drawn by the villagers, using their own categories.

The categories of land use, crops, animals, problems and solutions were given to the group by the interviewer. The farmers developed five major categories: mountains (*shan*), slopes (*dui*), ditch (*gou*) the plain (*pingdi*) and the water (*shui*). They related mountainland to the rainfed agroforestry system (traditional) and plain to the irrigated farmland (modern). In the official classification given by the Land Management Bureau for this area, mountainland is considered as wasteland. For the farmers, however, the mountains are still a valuable source of food and timber. Collecting wild greens in the mountains is an activity carried out by many village women. Some villagers expressed that they wish to irrigate the mountainland ("build canals"). This was promoted by the government in the 1960s, when electricity was supplied to the village. However, this has not proven to be economically and ecologically viable, because electricity costs for pumping the water to the mountains would be too high.

The farmer category of slopes mainly refers to the rainfed agroforestry system. Again the farmers think that water scarcity can be overcome by increasing irrigation through reducing electricity prices. They do not express ideas of cultivating more drought-resistant plants, though some are already included in the traditional system. Most farmers think that the yields are too low and not reliable.

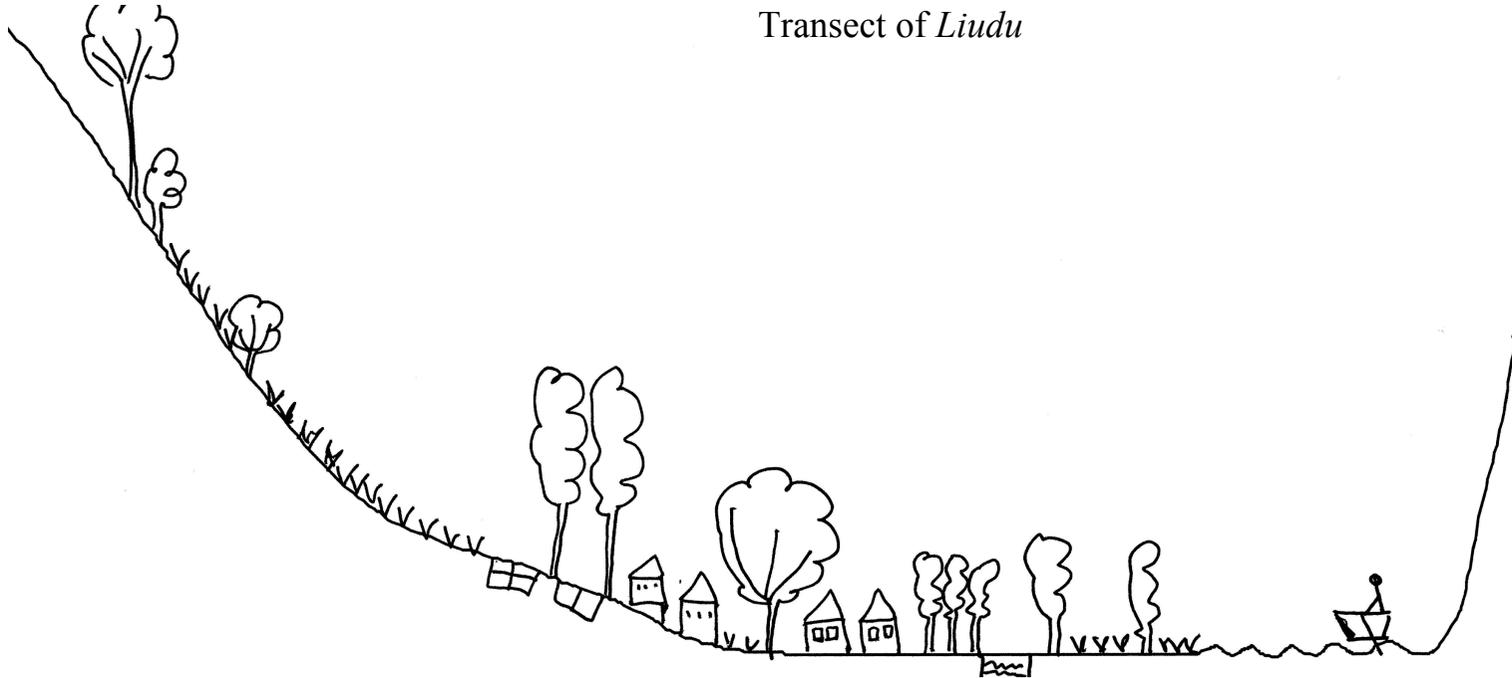
Interestingly, modern agroforestry is not considered as important. Some of the informants said that they do not care about agroforestry because their land is located elsewhere, others mentioned that the irrigated agroforestry had been promoted by the official extension system and they do not know how to improve it.

They made a critical assessment of letting land for tourism activities, but as they see the necessity of off-farm income, they propose a shareholding system. Shareholding (*gufen hezuo zhi*), a system presently developed in *Guangdong* Province, in order to develop a better land management system (see Part I). Many *Liudu* farmers have heard of this system and think it is suitable for their land management purposes, too.

All inhabitants of *Liudu* said that the *Juma* River is the border to *Hebei* Province. However, according to official documents and the topographic map, this is not true, the border is further south. It can be seen as an indicator that official boundaries, considered as

very important by many planners, are perceived differently by the local people. This also applies to boundaries between villages, e.g. the boundary between *Liudu* and the neighboring *Qidu* is not clearly defined

## Transect of *Liudu*



category	mountains	slope	residential	plain	water
land use	afforestation, agroforestry, fallow, black soil	terraced fields, afforestation, app. 10 houses	afforestation, wasteland, home gardens, houses	plantation, buildings, tourism	boundary to <i>Hebei</i> small tourist site
crops	persimmon, prickly ash, timber trees, beans, wild green	persimmon, prickly ash, timber trees, beans vegetables	some vegetables, persimmon, prickly ash, hawthorn	wheat, rice, maize, vegetables, trees	
animals	mountain chicken, goats, squirrels, rabbits	pigs, chicken, sheep, donkeys, ducks	pigs, chicken, sheep, donkeys, ducks		
problems	lack of water, high electricity costs, poor infrastructure, low fertile land abandoned	end of electricity end of drinking water pipe not enough water for irrigation		land is occupied by tourism, rent is not enough to buy food, farmers do not get land occupation fee	
solutions	build canals, provide equipment	make electricity cheaper to use pumps for water		share benefits every year (shareholder)	

Box 11: The Participants' view: Transect of *Liudu*, drawn by a group of male and female farmers, on Oct. 11, 1995 transcribed by Karin Janz

## 8. Land Use and Indigenous Knowledge

Map 8 shows an attempt to put information on indigenous knowledge into a spatial dimension, whereas Map 5 to Map 7 show the land use based on an aerial photo interpretation and on discussions with farmers. The indigenous knowledge map, however, only shows the views of different inhabitants of *Liudu*. The most significant differences to a conventional land use map are the following.

Mountainland is called bush (*chai*) and perceived as a source of food and fuel, thus not being useless land. This has already been indicated in the previous chapter when farmers expressed their views on land use options. Rainfed fields follow an indigenous taxonomy of *yin* and *yang*, which are the Chinese traditional categories of the cosmic forces in nature. Related to geographical terms, *yin* refers to the southern slope (*nanpo*) and *yang* refers to a northern slope (*beipo*). Irrigated fields are considered as "modern" fields and could therefore not be classified by *yin* and *yang*. Villagers, though, know very well which fields are more and which ones are less fertile, for example, the farmers of *Liudu* consider the soil south and north east of the road as the most fertile. However, neither the indigenous taxonomy nor soil fertility assessment have ever been considered for village land use planning. On the contrary, in 1994, the fields south of the road were leased to construct a hotel complex, and the fields north-east of the road are also planned to be designated for tourism.

Furthermore, the map shows the good and bad *feng shui* places of *Liudu*. A good *feng shui* place should have a good *qi* and should be located between two mountains, not too near to the river. According to the *feng shui* expert of *Liudu*, most of the buildings in *Liudu* have a bad *feng shui*, because they are located too close to the river. He recommended that buildings should be constructed on a high ground. This makes sense, because areas near a river are easily flooded. All houses in *Liudu* that have a good *feng shui* are located on high ground and the good *feng shui* place in the fertile fields is related to a slightly higher location of these fields than the area on the river banks. The place in the eastern part of the village has a good *feng shui*, too. It is used by the local businessman who runs fishpond facilities and consulted the *feng shui* expert before establishing his business.

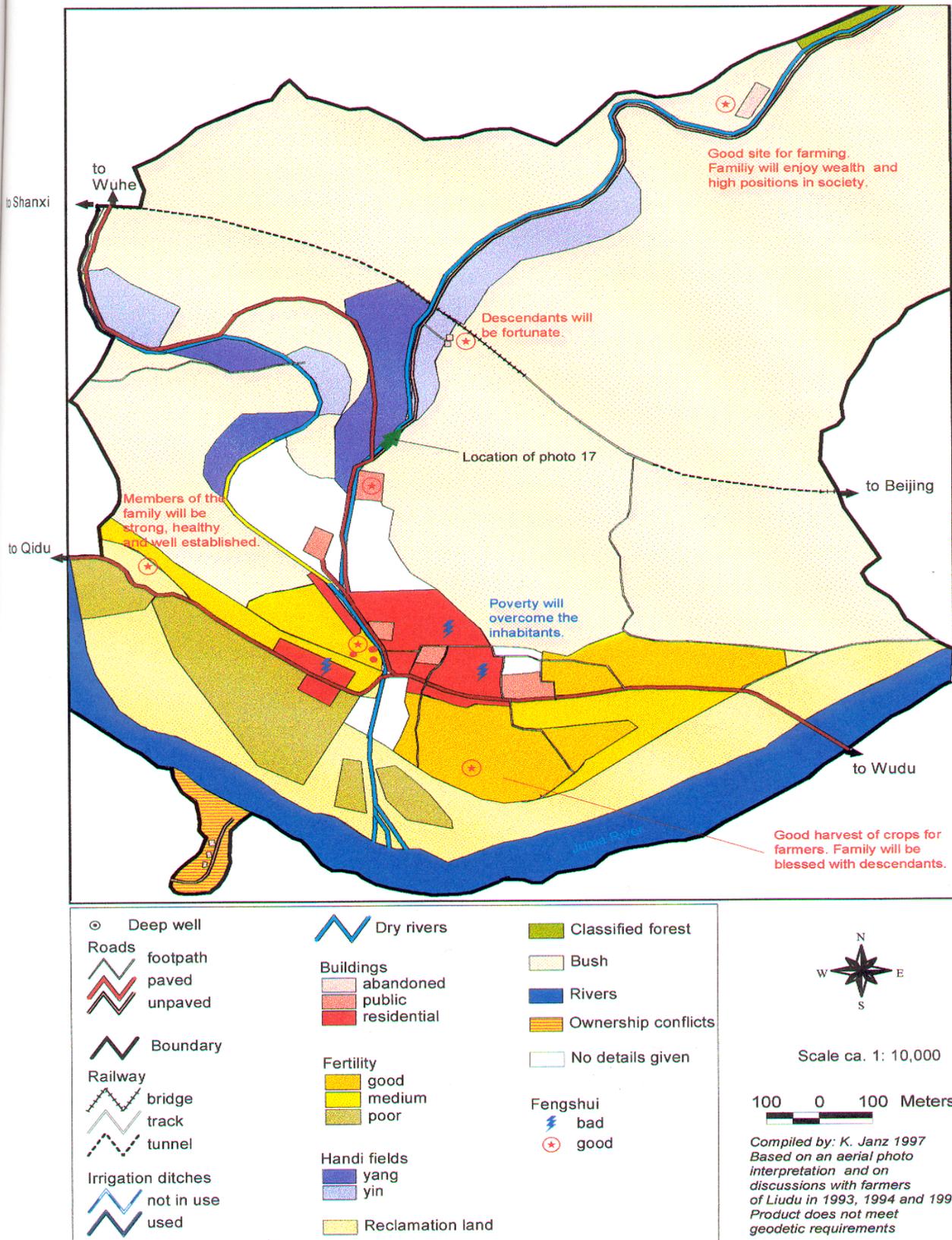
If the house is located in a place with a favorable *feng shui*, the inhabitants will receive good harvests and many children. Having many children is still perceived as a blessing despite the efforts of the Chinese administration to reduce the number of children to one or two. Most of the families in *Liudu* have two children.

According to the *feng shui* expert, the present location of the village has a bad *feng shui*, whereas the abandoned old houses in the mountains have a good *feng shui*. The old houses were built before 1949 and therefore constructed with the help of the *feng shui* man, whereas the houses near the road were built in the 1950s and 1960s. The decision on the

location of those houses was made by the village committee which did not consider any *feng shui* principles. In 1997, I could observe a light resurgence of consulting the *feng shui* expert, sometimes for the location of a new house, business place or tomb, but more often for a construction layout of a new house.

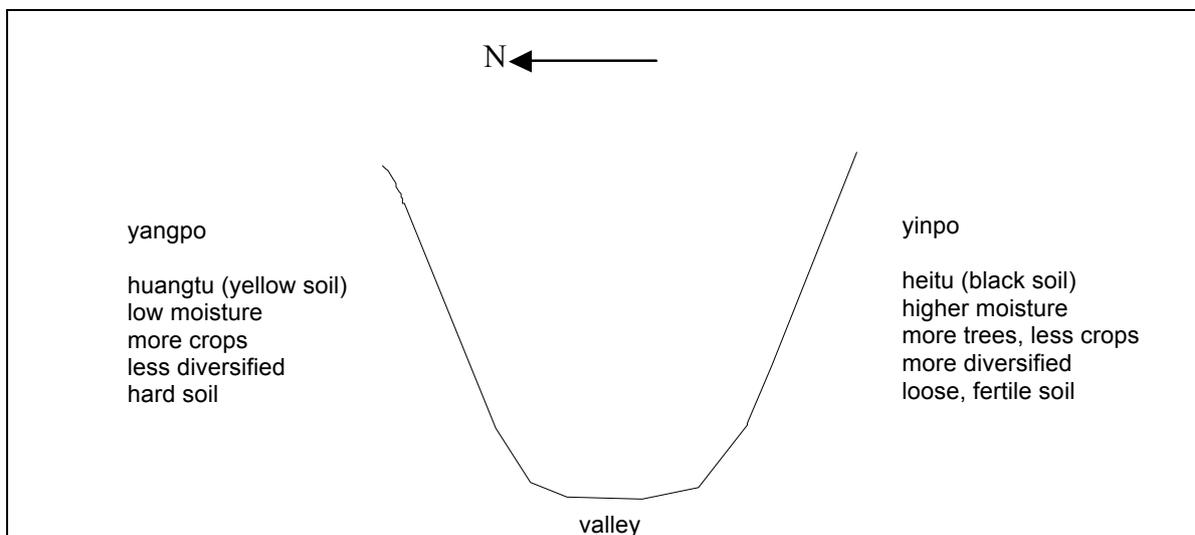
MAP 8: LAND USE AND INDIGENOUS KNOWLEDGE

134



Picture 7 shows the indigenous taxonomy, explained by the local expert. The photo below shows the view of a valley with *yinpo* on the right and *yangpo* on the left. The location and direction of the photo is given in Map 8. Usually *yinpo* is the southern slope and *yangpo* is the northern slope of a valley. It can therefore be seen as an indigenous extension of the geographical terms. In addition to the ecological descriptions given below, farmers associated dark, feminine and absorbent to *yin* and bright, masculine and powerful to *yang*. The layout of all traditional handi fields follow the indigenous classification of *yin* and *yang*.

Picture 7: Characteristics of rainfed fields on slopes, according to Wang Yufu



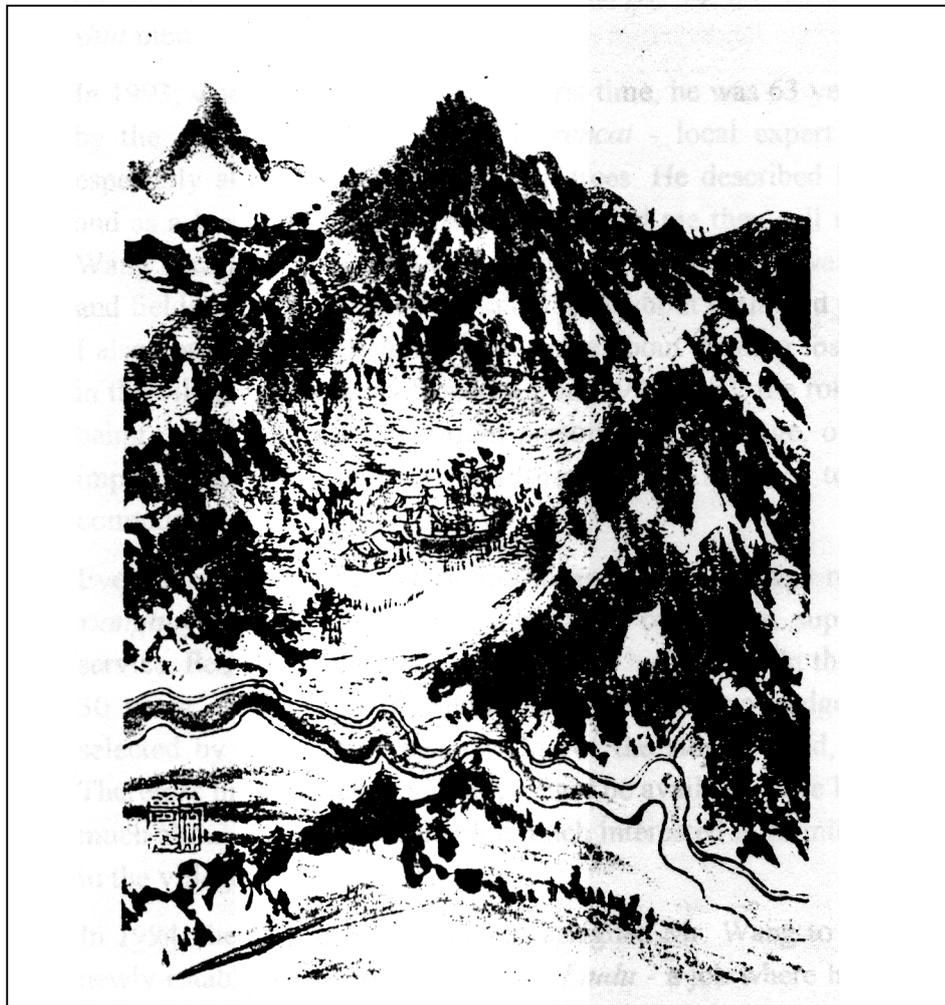
The photo shows that the left slope is less humid and has less trees, whereas on the right side some persimmon trees of the rainfed agroforestry system can be seen.



Photo 21: The valley north of the river with *yangpo* and *yinpo* (October 1993)

Picture 8 shows an ideal *feng shui* environment for a building complex, because the houses are not located near the river, but in a valley between a *yang* mountain on the left and a *yin* hilly site on the right, where they thus will be surrounded by a good *qi*. It is believed that blessings are transmitted from the north to the south as good cosmic breath comes down the slope this way. The mountain in the north protects the site from evil influences.

This is exactly the layout of the old houses in *Liudu*, the last of which was abandoned in 1994. As mentioned earlier, the modern part of the village which has a bad *feng shui* was mainly built after 1949.



Picture 8: The ideal *feng shui* of a village (Source Lip 1984: 48)

## 9. Whose Knowledge Counts: Actors and Beneficiaries

The identification of main actors in the process of knowledge management is an important step towards a participatory land management process. All actors have knowledge that is subjective within their social context. Within *Liudu*, I have identified the following categories of actors that play a major role in the management of knowledge: Local experts, the *feng shui* expert, innovative villagers, ordinary female and male farmers, village leaders, and institutions. They are described in the next chapters.

### 9.1 Mr. Wang Yufu - the Local Expert (*Xiangtu rencai*)

Local experts (*xiangtu rencai*) are persons who have a special knowledge, often generated over generations. Within the village society, they are consulted by the inhabitants for their special knowledge. Local experts often develop and increase their knowledge by different means, as exchanging ideas among each other and/or consulting the official services. For *Liudu*, I have selected two examples of local experts: the local grafting expert and the *feng shui* men.

In 1993, when I met Mr. Wang the first time, he was 63 years old. He was introduced to me by the other villagers as a *xiangtu rencai* - local expert who knows a lot about plants, especially about grafting persimmon trees. He described himself as the grafting specialist and as a local adviser ("When farmers need me they call me.") In the following years, Mr. Wang became one of my most important informants. I walked with him through mountains and fields and he explained his knowledge about both wild plants and cultivated crops. Later, I also could observe how his knowledge about farming lost its importance for the daily live in the village. During my research from 1993-1997, the role of Mr. Wang has changed from being one of the most important persons in the village, in owning the knowledge that was important to produce food and therefore to survive, to an ordinary member of the community.

Even during the collective period in agriculture he was regularly consulted. In the 1980s, *xiangtu rencai* like Mr. Wang substituted or at least supplemented the official extension service. People paid visits to him and asked for his advice. At that time, Mr. Wang had three male 30 years old students who had been selected by the village leaders whom he taught the knowledge of grafting. Later, two of the students have left the village, the third student died. Therefore Mr. Wang's knowledge will no longer be available once he is dead. His son does not know much about agriculture and is not much interested in farming-like many other young people in the village.

In 1994, the village committee has assigned Mr. Wang to work as a night watchman in the newly established swimming area of *Liudu* - a job where he can never apply his

agricultural knowledge. He has been taken his job seriously but in the following years I could observe that he realized the decreasing importance for such kind of knowledge and had himself resigned from being agricultural expert in the village.

His knowledge has become less important, because people focus on non-agricultural activities. Now business opportunities and migrant activities have gained considerable importance. In 1997, the first farmers, however, were able to acquire usufruct rights for rainfed land through auctioning. During my field visit in September 1997 they had not started cultivating these fields, but they indicated that they are interested in putting emphasis on rainfed farming on this land. At this point, the knowledge of Mr. Wang might in high demand again, especially because the official extension service with its focus on irrigated farming does not have reliable concepts for these fields.

*Box 12: The Participants' View: Mr. Wang Yufu, 67 years old, on his knowledge, on August 29, 1997*

I know that I have told you a lot about plants, about the *yin* and *yang* of slopes and about grafting. But actually now you are the only one who asks. Agriculture is no longer important in this village, but tourism.

The leaders plan to use all fertile land for tourism. Only we old people worry about food security, but what can farmers do when the leaders say so.

I have to be satisfied because I have this job in the tourist area and I can earn my living, but I have the feeling that I am beginning to forget about agriculture.

Mr. Wang is aware that he owns a valuable resource – knowledge. Earlier, in 1994, he indicated that according to his opinion, farmers should continue farming on both rainfed and irrigated fields, because they complement each other. In 1997, at the time of this statement, he had realized that other activities like tourism have become more important for the village. Though he expresses his sadness about this development he fulfills his new role because the village leaders told him to do so. His view is almost fatalistic ("What can farmers do when the leaders say so?", "I am beginning to forget"). On the other hand he also realizes that the development of tourism provides at least some income opportunities for many people in the village. I have found these two statements with many of my informants in the village. On the one hand, people still feel as farmers, on the other hand they realize that at least this kind of small scale farming does not provide much wealth in the future. The development of tourism and other non-agricultural activities, however, is not yet seen as a sustainable way for the future, but as a short-term source of income.

## 9.2 The *Feng Shui* Expert

Visiting and interviewing the *feng shui* expert, Mr. Li Bingyun, needed a longer preparation. The first times I visited *Liudu*, he refused to see me. It was obvious that he

knows a lot about *feng shui* but he was quite reluctant to talk to me. Later he explained that during the cultural revolution his house was destroyed and all his books were taken away and that he is still afraid of the village leaders and people from outside the village.

Only in 1995, when I had my third field visit and stayed with his niece, we went to see him together. His niece acted as a mediator between us outsiders and him. Mr. Li was at that time 84 years old.

When I visited him the next time, in 1997, I gave him a *luopan* (geomantic compass) which I had bought in *Beijing*. He was very impressed and then started to talk more openly. I could discuss the indigenous knowledge map with him and he indicated places of good and bad *feng shui* in the village (see Picture 8).

Mr. Li learned the *feng shui* business from his father. During the Maoist Period, he did not participate in collective (agricultural) activities and hardly dared to leave his house, only supported by some relatives. He was forced to move to another house which, according to him had a bad *feng shui*. His instruments such as the *luopan* and books were taken away from him and he could only save some of his manuals and calendars when the Red Guards searched his house. This is an example of how indigenous knowledge was destroyed during the cultural revolution and has not recovered until now.

When consulted, the *feng shui* man inspects the site and location of a house or tomb and consults his compass, books and traditional calendars. He assesses the harmony of *qi* between people and nature and requests other data like the dates of birth of the owners and inhabitants. Then he identifies the elements and the layout of the surrounding landscape and recommends the location and direction of certain features of houses and/or tombs.

*Feng shui* has been completely neglected in the official village planning from the collective period until now. The layout of fields, houses and tombs were made by the village committee. However, as for 1995, I observed a slight increase in the number of consultancies. People in the village who had become wealthy and could thus afford to build a new house, had consulted the *feng shui* man, as has the man who started to establish fish ponds. Also some tombs have been established in good *feng shui* places, but on fertile land. Even though this is still illegal I could observe this in many Chinese villages in the 1990s. For the establishment of these tombs, the *feng shui* man had always been consulted.

It is difficult to assess the role of *feng shui* for the future village layout. The *Liudu feng shui* master is old and he does not have a designated successor. All over China *feng shui* has gained importance (see Bruun 1996). Official planners in the Land Administration Bureau in *Beijing* told me that they hire *feng shui* specialists because their knowledge is requested by Overseas Chinese from Taiwan, Hong Kong and Singapore, where usually all buildings are designed after a consultation of a *feng shui* man. (pers. comm. Yin Weiping September 1997). Sometimes rich Overseas Chinese wish to be buried in their (rural)

hometown in PR China in a tomb that has a good *feng shui*. Though the Chinese planners do not believe themselves in *feng shui*, they see it as a source of income for their institution, because the Overseas Chinese are willing to pay well for a good *feng shui* tomb. For the rural environment, Cao and Zhang (1997: 34) give an account of a village in *Yunnan* where farmers have their own ideas on *feng shui* though the village has not a special *feng shui* expert. The farmers' views especially focus on how trees and forestry contribute to their local *feng shui* and are thus important for the protection of natural resources. The concept comprises a landscape that is in harmony with *qi*, conservation ideas because natural resources are important for the human *qi*, productivity of forests because it can improve the living conditions of the local community and sustainability because villagers want to enjoy a good life in their homes and villages.

Taking these tendencies into account, *feng shui* and the owners of the respective knowledge maybe more important in the future, even if rural activities do no longer focus on agricultural production. In *Liudu*, it long-term observation and research would be necessary to confirm this hypothesis.



Photo 22: The *feng shui* master (center) in his house (April 1994)

Box 13: The Participants' View: Mr. Li Bingyun, 84 years old, on his knowledge of *feng shui*, on October 12, 1995

You asked me about *feng shui*! But you don't know anything! You see, you have to study *feng shui* below 30 and I can see that you are much older.

Yes, the door is very important, because it leads the *qi* of the mountains and rivers. But I don't tell you more because you don't understand anyway.

All my instruments and books were taken away during the cultural revolution. How can I work without my instruments! But I can tell that the whole village down at the river has a bad *feng shui*, because the river is too near. But nowadays the village leaders have to decide where to build the houses. So you better go and ask them!

The statement shows his reluctance to talk openly about his knowledge. It is not only fear of being too open to people from outside the village but also the conviction that others do not understand anyway that keeps him from sharing the knowledge with the researchers. This observation has also been made by Bruun (1996: 53) in his case study village in Sichuan: "The geomancer is usually supposed to guard a body of secret knowledge, which he is unwilling to pass on, unless to members of his own household."

Even when I gave him a *luopan* (geomantic compass) and expressed that I had read something about it, he did not go into details with his explanations. Only when I started using some visualizing methods such as the indigenous knowledge map he explained some of the *feng shui* places to me. He described the aspects of *qi* to me while we walked through his and also some neighboring homesteads.

On the one hand, he still mourned the loss of his books, on the other hand he indicated that he relies more on experience and intuition ("I can explain to you the whole village.."). He really hated the village committee and even started shouting when we talked about them. The recent actions of the committee concerning the management of fruit trees confirmed his view that they were selfish and ignorant people.

He did not himself talk about the people who consulted him. This may indicate the confidential nature of his advisory service. However, almost all the informants knew about the activities of the *feng shui* man and were well informed about his activities.

### 9.3 Innovative Villagers

Innovative villagers are persons who have put special emphasis in developing different techniques that can improve their living conditions. They have augmented their knowledge without help of official services and have often taken special risks when they tried new methods. Sometimes innovative villagers were very successful and could increase their income, sometimes innovations were only attempts to preventing poverty. Within the village society successful innovators can play a role of local advisers, when successful.

Sometimes, however, they may attract the jealousy of the other inhabitants, then holding back their special knowledge and carry out their own activities without much contact to their neighbors.

I have identified several farmers who have developed a specific knowledge that helped them to improve their living standard. The majority were women. In the last years, men have had more opportunities to work outside the village whereas women stay at home. Women therefore were more in need to develop their own production means.

Mrs. Li Fuyan decided at the age of 48 to start keeping cattle though nobody else in the village had ever done so. She felt that neither her rainfed fields (1 *mu*) nor the irrigated fields (0.5 *mu*) could provide sufficient yields to provide the family with cash income. The persimmon trees which provided cash for the family before they had been taken away by the village committee and part of their irrigated land was taken away for hotel construction (see photo 20). Mrs. Li (and not her husband) therefore decided to borrow 1000 RMB from two different relatives to buy four cows. After half a year, two of the cows had their first two calves and Mrs. Li could sell two of the cows. Meanwhile, selling cows has become her main source of income. She has advised another family to start cattle raising, too.

*Box 14: The Participants' View: Mrs. Li Fuyan, 50 years old, on her innovation of cattle growing, Oct. 15, 1995*

When I started with my cattle, I had no idea how to do it. I only knew that I cannot migrate because I am too old. Then I asked the traders who came here and sold the cows to me. They told me something about cattle growing. I also asked my relatives who live in other villages.

I borrowed money from my relatives because I was not sure if I can ever repay it. But now I have paid everything back and I already made some profit. I can sell the cattle when I need the money.

I have told another family to start cattle growing and now we can share our knowledge. When we have problems we sit together and talk about it. We even don't need a veterinary. When we want to have calves, we just ask the traders to bring us a bull. My cows had already four calves.

You see, it is like this: young people lose their face when they raise cattle, middle aged people can go for construction and we old people rely on cattle...

Another farmer, Mr. Mu Yuzong, 38 years old, has started to build fishponds in 1994 on land that had been wasteland before. He acquired his knowledge by reading books, and through his working experience. Before he started his own business, he worked as an advisor for fishponds in another county. He then borrowed 200,000 RMB from a group of friends and relatives (see chapter on mutual help) and established fishponds for tourists, a restaurant and a small guesthouse. For the construction and the management he has hired

eight village men and women for 7 RMB per day and has become the biggest business man and employer in *Liudu*.

*Box 15: The Participants' View: Mr. Mu Yuzong, 38 years old, on his knowledge and village politics, October 1995*

I am very skilled and experienced and therefore I started to do my own business. And now I am so successful that the village leaders asked me to join the village committee. But I don't want to go into politics. I want to become rich. In fact, I think the people in the village committee don't have much capacity...

Both examples show that village people are capable to carry out their own innovations, especially if they see economic benefits. In both cases the people developed their special knowledge without the government extension service and without official loans or other external resources. Both informants stated that they prefer to borrow money from relatives and friends and not from official banks.

In the case of cattle raising, private traders provided necessary information. Since traders have an economic interest to sell cattle, they provided useful and practical information. In the case of the fishponds, the owner acquired the necessary knowledge from different sources and added by his own experience. All villagers that have undertaken a certain amount of innovation enjoy a good reputation within the village, and may even serve as a role model. Some informants, though, added that they admired innovative people but never could do it themselves. In both cases other villagers benefited from the innovative activities. Mrs. Li is happy to share her new knowledge with (female) friends and neighbors. Mr. Mu provided opportunities for day laborers when his site was constructed and now in his facilities. He pays average similar fees to those in the region. He was asked to become a member of the village committee, because people think that then the whole village could benefit from his skills, but he refused because he does not see any advantage for himself in doing so.

Since it is rather the male villagers who migrate to other places, the remaining women are more open to develop certain innovations, especially, if they feel the need to create new sources of income. Particularly elder women prefer to improve farming and animal husbandry activities (cattle raising is an answer to the decreasing resources of the irrigated land, because cattle can be kept on wasteland). Other female innovators developed new varieties of rice or drought resistant plants. Women also more often shared their newly acquired knowledge with friends than men. However, they do not extend the information to people they do not consider as close friends and relatives, thus, the knowledge remains within a certain network.

At present, the political environment in rural China provides at least enough room for this kind of activities, because it is in line with Deng Xiaoping's policy allowing people to

become wealthy. Very often, however, local advisers and leaders are not capable enough to actively promote and stipulate farmers' innovations. On the contrary, they might take advantage of their position and keep necessary knowledge and resources to themselves, as in the case of the persimmon trees in *Liudu*.

Concerning the concept of indigenous knowledge, the development of innovations was originally not included in the definition. The field research, however, has shown that innovations are an important factor in the management of knowledge within the village. Therefore the term "indigenous knowledge" is extended towards encompassing skills and capacities of local people to develop innovations without official help that improve their own living conditions.

#### 9.4 Ordinary Female and Male Farmers

In my surveys, I differentiated farmer informants according to status (rich, middle, poor), age and gender. The results show differences among these groups in applying their knowledge in land management and farming.

Generally, both men and women are involved in farming and non-farming activities in *Liudu*, but labor division between men and women is quite clear. For crop production, it depends on the type of the farming activities, the requirements for tools and the physical conditions of the person. For example, land is mainly prepared by men while planting is conducted by men and women together: The man holds the drill and sows the seeds while the woman spreads fertilizer, covers up and steps on the soil. Weeding in summer needs big hoes with a long handle so it is usually done by men. In fruit tree management pruning, flowering and fruit thinning requires climbing the trees, therefore it is mainly performed by men. In animal raising, women take care of pigs and chicken. The labor divisions mentioned above concern on-farm activities only. More than 70% of households in *Liudu* have husbands seasonally migrating. Then many woman farmers carry out more agricultural activities and even introduce their own innovations to improve farming, e.g. rice growing, animal husbandry, etc. In some cases the husbands come back home and join the farming during the planting and harvesting seasons.

The housework is still mainly done by women (see chart 8). Women are responsible for cooking, washing, caring for children and old people. Sometimes women participate in non-farm activities, i.e. construction work, even in this case, women carry out the same amount of field work as their husbands.

In decision-making, rural women play more and more important roles. Since at present, most rural families are nuclear families and wife and husband have common interests, the decisions are often made by both partners. If the husband is not at home, the wife can make decide on routine issues while the men usually decide on durable goods (larger farm

machinery, tools and housing). Women are responsible for children's education and taking care of the whole family. The dimension and extent of women's participation in decision-making also depends on the woman's qualification, non-farm activities of the family and the specific decision to be made. If the wife has a higher education than her husband, she may take over a lot of decisions including those on larger goods. Therefore, in addition to their reproductive cores, women carry out as much productive activities as their husbands. There are no female-headed households in *Liudu* since no husband out-migrates permanently.

It can be concluded that, in general, men and women have equal access to farm inputs. Sometimes women have only a limited access to official training in the township, extension and credit facilities. Applications for credits are made by the head of the household which is usually the husband, credits are also transferred to the husband. Although man and women have an equal status by law, the society very often neglects the importance of women. For example, usually men attend training courses for agricultural technologies at the township level, even if the women do most of the farming work. Women, in contrast, acquire their knowledge from (female) friends and relatives.

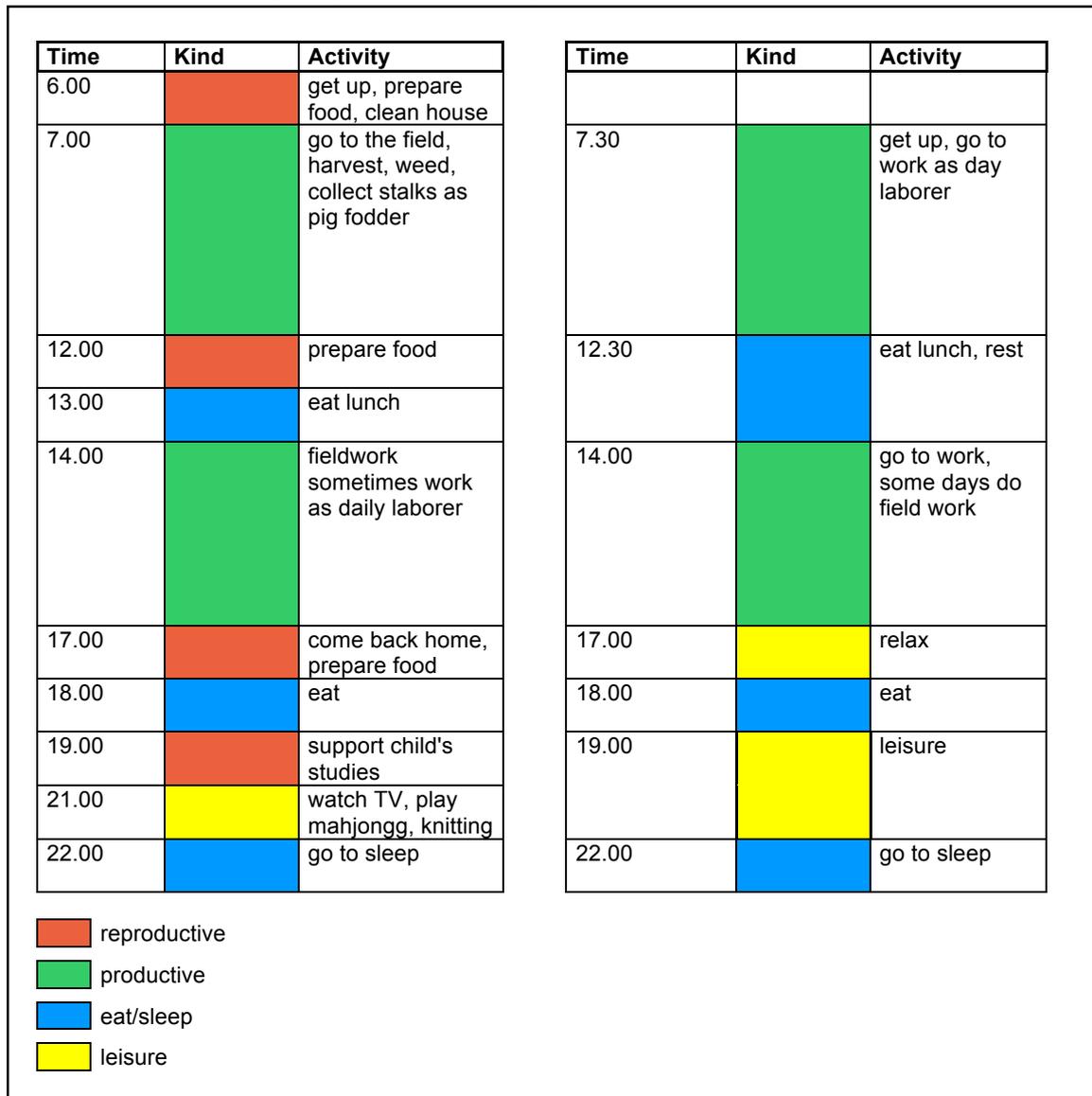
According to their different tasks in agricultural production, women and men have a different knowledge and a different perception about problems of land management. Usually these perceptions and experiences are not exchanged among men and women. During a village meeting in April 1994, both sexes expressed their surprise that the opposite sex has such different views.

Photo 23 shows the traditional labor division of the sexes: both men and women work at the same time in the fields, but have different tasks: men do the preparation of the soil, women do sowing .



*Photo 23: The traditional division of labor in the fields  
(October 1993)*

Chart 8: Daily activity profile for September of Mrs. Liu Fuxia, 30 years old, and her husband, Mr. Li Youzong, 34 years old, middle farmers (drawn on Oct. 12, 1995)



woman

Chart 8 shows a typical day of a middle aged couple in *Liudu*. The information was provided by the wife and husband themselves. Women get up earlier, because they are responsible for reproductive tasks such as food preparation and children's education. In the morning, most men now carry out non-agricultural activities either inside or outside the village. Women still see themselves as farmers and therefore devote more time to farming activities (the whole morning). Therefore, they are also more interested in developing innovations in the agricultural sector (see previous chapter). In the afternoon, both men and women can carry out activities in the field. In the evening, most men have leisure time which they use to talk to their male friends and neighbors. Though they see this themselves

as free time it is a time of exchange of information and knowledge with others and form can therefore be considered an important part of the knowledge management. Women put much more emphasis on the formal education of their child. They supervise the homework, purchase the necessary study material and allocate financial resources for school fees. Women themselves feel a higher necessity than men that both girls and boys receive school education. Furthermore, they take the opportunity to improve their own knowledge by supervising the children's schooling activities.

### 9.5 Village Leaders

Local leaders are important actors in the interface management. Members of higher levels of the administrative hierarchy transfer their knowledge and information to the village leaders who in turn can transfer it to the farmers and/or use it to gain personal benefits.

The village committee comprises three persons: the village director, the local representative of the Communist Party and the local representative of the All China Women's Federation (*Fulian*) who is the only woman in the committee<sup>65</sup>. People in the village also consider the Party Secretary as a village leader. Party leaders are appointed by the township party branch and the *Fulian* leader is appointed by her organization at township level. The village director is elected in elections that take place every three years, the last elections held in 1993 and in 1996. The old village director was not re-elected in 1993 because, according to the villagers, he was not "capable enough" to lead the village. His successor, though, was re-elected in 1996. Villagers expect from their leaders that they do not only give them political guidance but also provide them with specific knowledge on farming or rural enterprises.

In contrast to Rozelle (1994: 113) who writes that the final goal of the village leaders is the desire to improve the welfare of the entire village, village leaders in *Liudu* can be described as being incapable to mediate between political orders from above and the villagers' needs. The example of the mismanagement of persimmons showed that obtaining personal benefits was their most important goal. Furthermore, the village director had never shown specific interest nor knowledge in the discussions about land management. None of the village leaders attended the village meetings we carried out in 1994 (whilst more than 40 "ordinary" farmers attended).

Village leaders also could not present own ideas for development, but quoted general development statements of the upper levels of the administration. In 1997, I asked the village director what he sees as the biggest potential for development in *Liudu* and he answered that the village should develop tourism, introduce the long term land contract

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<sup>65</sup> According to my working experience in rural China this applies to most of the village committees: they have only one female member, and she is the *Fulian* cadre.

system, and improve forestry and agroforestry, and not only agriculture. This is a repetition of the slogans coined by the Chinese rural development planners in the 1990s. The biggest problem he mentioned was that he had to follow the orders from the township. Thus, village leaders feel that they do not have much freedom to develop and implement their own ideas and decisions. Since the present weak village leaders cannot provide a specific knowledge<sup>66</sup>, a laissez-faire atmosphere in the village has emerged. If somebody wants to set up a small business or reclaim land, he or she will not face many obstacles from the leaders<sup>67</sup>. On the other hand, villagers still expect leadership and a sense of responsibilities from their leaders which those cannot provide. Most of my informants said that they consider the local leaders as weak, but still saw themselves as ranking considerably lower in the village hierarchy and therefore not being entitled to express own ideas. In my interviews, however, many of them (including old, illiterate women) delivered an excellent analysis of present problems and showed that their knowledge is more profound than that of the village leaders.

Table 11 gives an overview of village leaders' goals. It indicates that if local industries and income generating activities are developed by the leaders, they will be promoted by their superiors. On the other hand, they have to consider the villagers' needs and therefore need to maintain a good relationship with the villagers. Improving agroforestry and irrigated agricultural production are clearly related to an improvement of the own status, since it is one of the above mentioned development goals. The benefits of fruit tree production are also seen as a source of own benefits (see above). Since tourism and the local industries are non-agricultural activities that should "make the people rich", village leaders who can prove that village land has been used for tourist purposes, will increase their status. This policy has led to an increase of tourist guesthouses (often called "training center – *peixun zhongxin*") in the Chinese countryside, in *Liudu* the number has grown from one in 1993 to four in 1997. In order to reduce the excess use of fertile land, the Chinese government does no longer permit the establishment of hotels in rural areas. The village leaders now see themselves between two conflicting government directions: promote or discourage tourism? Many informants expressed this contradiction in their statements (see Box 10).

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<sup>66</sup> This includes the *fulian* leader whose only activity is to record child deliveries in the village.

<sup>67</sup> This also applies for my own research. It was never difficult for me stay with farm families and I could talk about everything I wanted.

Table 11: Goals of village leaders (based on Rozelle (1994), adapted to own findings)

Related to	Goals	Indicators
Agroforestry (fruit trees)	increase own status	fruit production
Agriculture	receive promotion, maintain job security	grain yields (hybrid varieties)
Tourism	increase status, receive promotion	land converted to tourist use
Local industry	higher budget for own investments, personal profits	profits from locals industries off-farm employment rate
Family Planning	increase status	low number of deliveries
Village production teams	good relationship	united decisions
Villagers	commitments to villagers	increase income through farm and off-farm activities

In *Liudu*, the *Fulian* leader is de facto solely responsible for monitoring child deliveries; in other areas the *Fulian* cadres also take over assignments for the general promotion of women, including agricultural extension. Like the other village leaders she finds herself in a conflicting role: Orders from above clearly state that only one child is allowed<sup>68</sup>, and, on the other side, she is confronted with understandable desires of the farmers to have more children as old-age security.

The last two rows of Table 10 refer to the village leaders' relationship with the villagers. Since production teams form important groups for decisions on e.g. land tenure and agricultural production, a good relationship to them has to be maintained. Concerning village inhabitants, close kinship and friendship ties make local welfare an important goal.

The above mentioned conflicting roles of the village leaders influence the management of knowledge in the village. Since their roles are not clearly defined, village leaders have less influence on the knowledge and corresponding decisions of the villagers. The leaders put their interest in balancing interests from below and from above and often lose their orientation during this process. Many farmers said that they would expect agricultural and other advice from their leaders, but hardly get it. Village leaders do not play a dominant role in knowledge management, but with decisions like the management of persimmon trees they indirectly control the application of knowledge. Therefore, indigenous knowledge is neither directly destroyed nor promoted by the activities of the village leaders in *Liudu*. Given their mandate and power they could have a much bigger impact on knowledge management in villages, especially since the village committee is considered as the most important village institution by both leaders and villagers (see below).

<sup>68</sup> In rural areas this is generally eased by allowing a second "try" if the first-born child is a girl.

### 9.6 Local Institutions

Local institutions provide the framework for local interface management. In *Liudu*, the identified local organizations are not based on traditional settings, but on the line agencies of government institutions. They comprise local level branches of the different line agencies (agriculture, forestry), government administration, organization of the Communist Party, army, mass organizations (youth, women), cooperatives and various government service institutions. The Water and Soil Protection Bureau, represented in many other mountainous areas of Northern China, is not represented in the area.

The charts below show the most important institutions in *Liudu*, drawn by village committee members and production team leaders; the other was drawn by a farmer as a venn diagram. The distance to the center, where the farmers put themselves, indicates the importance of the respective organizations for the informants.

In chart 9, township level organizations are presented as rectangles, village level organizations are drawn as ovals. The most important units are the village committee, the economic cooperative (responsible for marketing agricultural products, substitute the former state owned marketing and supply stations), the production teams, the forestry team and the women's unit. The latter was only mentioned by the *Fulian* cadre, no other female or male cadre indicated any importance. Townships offices of *Fulian* are less important but regularly approached.

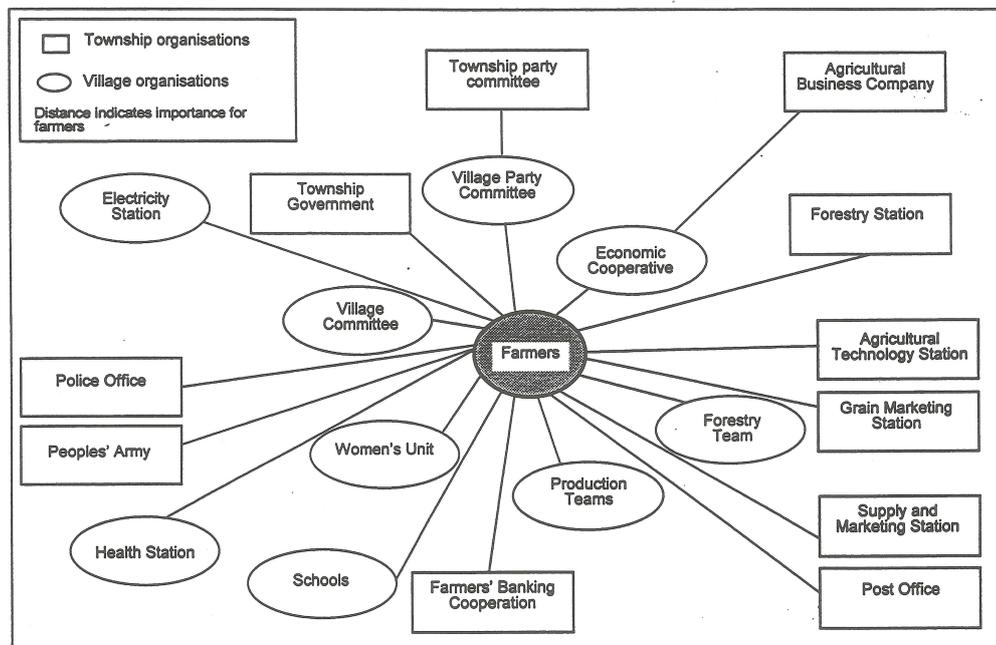


Chart 9: Institution analysis (Venn diagram) made by village leaders and production team leaders (April 1994)

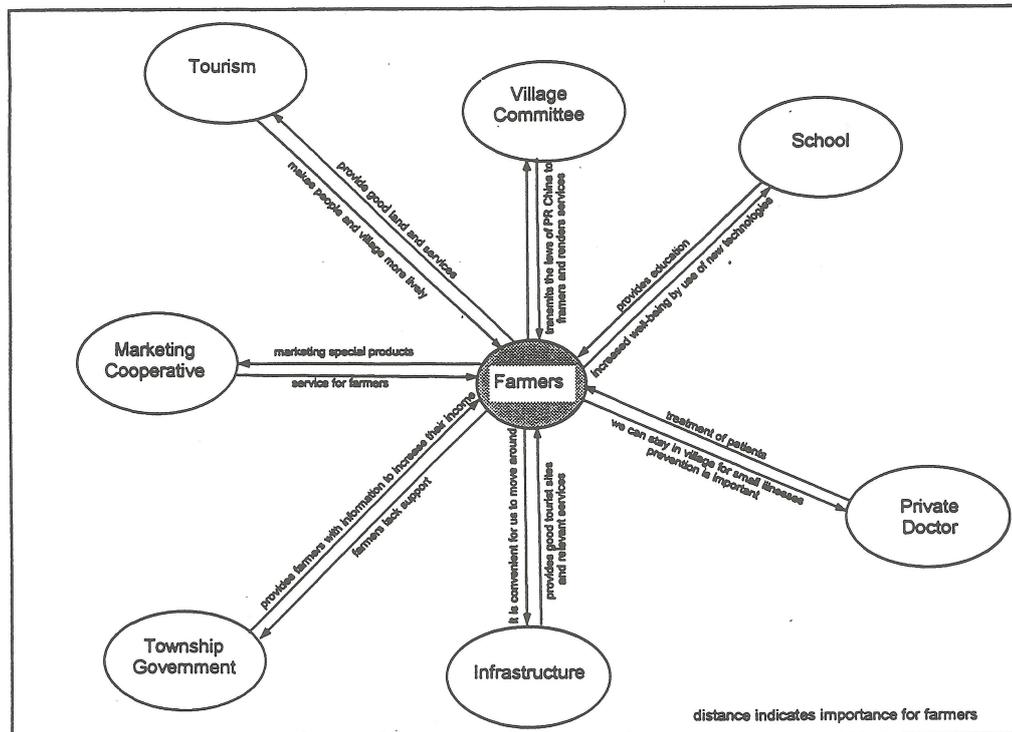


Chart 10: Institutions in Liudu drawn by Mr. Wang, 35 years old, middle farmer (April 1994)

Chart 10 shows a different view by a farmer. The farmer, Mr. Wang, took his diagram home and finished it during the night. Therefore, his remarks might not be always logical, but this is what he wanted to tell about his view of institutions: Tourism and infrastructure are also seen as institutions, because they are perceived as something that provides something. Again the village committee and the marketing cooperative are the most important institutions.

Both charts indicate that the village committee is the most important organization for village life. Informants also expressed that this is the major institution for local land use planning. Since there is no other village level institution (e.g. a line agency of the Land Administration), the village committee could take over more tasks in village planning. At present, however, the village committee in *Liudu* has not the capacities to do this.

The village leaders give more importance to the various local government bodies than the farmers, because most of the local leaders are part of the government or party organization themselves.

Besides the village committee, the Agricultural Technology Station at township level (only mentioned by leaders) is important for the management of knowledge concerning land management and land use planning. The tasks of the extension service are described below.

## 10 The Communication and Extension Process

### 10.1 The Official Extension Service as a Knowledge Agent

After the introduction of the household responsibility system, the Ministry of Agriculture has established County Agricultural Technology Extension Centers (*xian nongye jishu tuiguang zhongxin*) and Agricultural Technology Stations at township level. These centers have two functions:

- to provide agricultural knowledge to farmers (*nongye jishu tuiguang* = push and spread agricultural technology),
- to provide social services to the farming community (Yang Yinghui 1993: 25).

The responsible Agricultural Technology Station for *Liudu* is located in *Shidu*. The Forestry Bureau in *Shidu* is the responsible agency for agroforestry matters and the management of nut trees. Until 1992, the Agricultural Technology Station was responsible for ensuring that farmers fulfilled their grain quotas and for the supply of agricultural inputs. One important extension message was the introduction of high yield varieties (HYV). However, according to the extension worker of the *Shidu* Agricultural Technology Station, farmers did not adopt the wheat HYV because they dislike the taste. They returned to the old wheat variety called *Baimaya* which is also more drought resistant. Another extension message, the introduction of green manure below fruit trees, was also not successful because farmers found it too arduous.

In 1993, the Extension Service Stations in China should have been shifted from an administrative and instructional to a motivational or service oriented organization (the name in *Shidu* was changed from extension station - *nongye tuiguang ting* to agricultural technology company - *nongye jishu gongsi*). Extension should now be carried out on the basis of a contract between extension agency and farmers. The extension agencies should be responsible for technical guidance, input supply and sometimes marketing of yields. After harvest, farmers should pay a service fee to the extension agencies according to the contract.

In practice, however, extension workers are often not qualified to take over their new assignments. As for 1993, the farmers in *Liudu* have had no functioning extension service of this kind. Only at the township level, the *Shidu* extension service had organized training in agricultural technologies and had established demonstration fields with new rice and wheat varieties on irrigated fields. The above mentioned example of hybrid grain varieties shows that the extension service does not offer technologies that farmers really need. A service and market orientated extension service cannot be provided by the staff members, because they are used to work under a conventional top-down approach that aimed at

transferring extension messages from above. Extension officers have not been trained in new extension methods and messages and are therefore incapable to fulfill their new tasks.

All informants in *Liudu* said that they receive most of their agricultural knowledge from neighbors, friends and relatives. Some of them said they also learned something from "the government"; some of them also read books and leaflets which they bought in the township. Most of them talk to their neighbors during their work in the fields and discuss common activities and problems. A woman whose husband is a migrant worker told us that she tried to grow rice which is not very common in *Liudu*, but her sister in the neighboring village had told her how to do it and even let some irrigated fields to her. She never even thought of approaching the official extension service. This tendency increased until my last field visit in 1997.

The role of the extension system was a dominating one, even after the introduction of the so-called family responsibility system. It has always focused on the development of modern, irrigated agriculture to produce more staple food such as wheat and/or rice. The contents of extension messages have been developed at research institutes and agricultural universities ("Science and Technology must be used for Agricultural Production" Du Runsheng 1995: 136). The knowledge and experience of farmers is not considered by the extension system.

Furthermore, the development of rainfed farmland has not been promoted by the extension service which has also led to ignoring and even destructing traditional and indigenous knowledge.

As for 1993, the influence of the official extension system has decreased due to the above mentioned reasons. This, in turn, has led to more freedom in the farmers' decision-making and to the need of developing their own innovations. It has, though, not yet led to a "revival" of indigenous knowledge for the rainfed fields, because the importance of these fields in general has decreased due to alternative income options. If in the future villagers want to focus on developing rainfed land which they have auctioned, they might need both the exchange of knowledge among themselves and an institutionalized advisory system to approach to support them. The messages of this extension system should then consider both adapted scientific and indigenous methods.

## **10.2 The Relevance of Relationships and Mutual Help**

Since the official extension service is so weak, intra- and inter-village relationships (*guanxi*) and mutual help become more important for the management of knowledge. *Guanxi* have always played a major role in Chinese society and much has been written about them (Fei Xiaotong 1947, Croll 1994: 166ff). *Guanxi* describes the mutual

relationship between two or more parties and includes a complex of obligations for both sides.

We can identify five types of relationships that are important in the management of knowledge. These comprise relationships

- with real and close relatives,
- with broader relatives (kinship),
- with friends, neighbors that can be approached for help,
- within the production team (*xiaodui*),
- with official persons that have to be kept benevolent (*ren* ).

The first category is almost always approached for every-day affairs, including those of land management. Couples normally work together in the fields and very often parents and grandparents live in the same house, so and can easily share problems and ideas can easily be shared.

The second category can play a minor role, but can become important when it comes to decisions on important village affairs, for example the distribution of land and trees. When the persimmon trees were brought under collective management in 1993, those farmers could keep their trees that had kinship relations with the village leaders.

Category three and four may overlap because close friend and neighbors are organized in the same production team. Here, many decisions on land management are jointly made and discussed. Therefore this category ranks second in having the strongest ties after category 1.

Category four can also include people that are outside the village, for example local decision makers and distant relatives. Fei Xiaotong (1947: 74) writes that *ren* ( ) is an equivalent of benevolence and within the Chinese social pattern it is a compilation of all the ethical qualities of private and personal relationships brought into the broader context of *tianxia* (everything under heaven). The villagers in *Liudu* considered relationships to village leaders and to the decision makers in the township as relations that they have to maintain with their due hierarchical distance.

*Box 16: The Participants' View: Mu Fuxia, 32 years old, on politicians, in August 1997*

The government doesn't care about agriculture and is not able to develop a unified land policy. They carry out an unfair policy. But what can we do? We are only farmers. We have to do what they tell us. The only thing we can do is to maintain a good relationship so that they care for us like a father.

This village woman uses an expression which was often used when my informants talked about leaders, teachers or even extension workers: They should treat us like parents. This term includes a caring, if not affectionate component – they should never leave us alone – but also an element of recognized authority – we have to do what they tell us. This is related to the fifth category (*ren*), too. Mrs. Mu also expresses the need for a good relationship among the villagers which is connected to the search of harmony. This perception leads to an attitude that is, on the one hand, obedient to the leaders but, on the other hand, developing own niches to live in harmony with other villagers.

The following example can illustrate the complexity of *guanxi* that is necessary to establish a business. Mr. Mu Yuzhong who was mentioned above developed the innovation of fishponds in *Liudu*. For the establishment of the ponds he received an interest-free loan of RMB 200,000 from six different friends and relatives. Two are relatives who live in the district capital of *Fangshan*, two are local politicians from the township and two are former colleagues, one lives in the village, the other lives outside the village. All of them can now use the fishpond facilities free of charge. Moreover, they are obliged to bring other "friends" that use the facilities as paying clients. This means, they have to use their *guanxi*-network in order to improve the business of their friend and thus have their loan paid back earlier. Relatives, in contrast, are obliged to help (with money) but also can use the facilities free of charge. Here the mutual help can become a burden for both sides, also because it is generally not fixed if and when the loan has to be repaid. However, all "donors" participate in the profit of the business.

Therefore, a network of *guanxi* is necessary when innovations are developed and carried out. All participants in the network contribute financial means and their specific knowledge and skills. In turn, all of them expect their share of the benefits. *Guanxi* are an important tool in the management of indigenous knowledge, because they are often informal and without official and scientific assistance.

In discussions with planners and researchers, I often heard the statement that the importance of mutual help in a rural setting is decreasing, because farming has become an individualized activity. This observation can be confirmed by my research in *Liudu*. Except the above mentioned cases of innovations and the accidental exchange of knowledge concerning farming, I did not find many cases of mutual help. People were sometimes reluctant to cooperate with other people, because, according to them, they had been forced to do so for a too long time during the collective period.

*Guanxi* concerning the relationship to political cadres and other decision makers, however, have not lost their significance. It is still important to keep the right relationship to the right persons, in case one might need their help. This, for example, might have been the motivation for the village committee to "sell" land of *Liudu* to an outside company. First, this established a good and useful relationship to that urban company, second, the upper level branch of the land administration who requested or ordered this land transfer needed

to be pleased. Many of my informants suspected that both the village committee and the township land administration shared the benefits of the land transfer action. In this case, *guanxi* are an instrument of hierarchy and corruption and does not promote a fair flow of knowledge among ordinary villagers.

## **11 The Main Problems in *Liudu* Concerning Land Use**

The frequent redistribution and the subsequent scattering of land leads to a decreased soil fertility since farmers do not see incentives for applying soil improving measures on these fields. They do not know who will manage the land during the next phase and therefore do not put their main emphasis on cultivating these fields. Thus, this has led to a destruction of indigenous knowledge and is dysfunctional for sustainable yields.

One reason for this is that responsibilities for the redistribution process are not clearly defined. The village committee (as the successor of the collective) is *de jure* the landowner and has the right to decide on how to use and how to redistribute the land. *De facto*, however, the responsibility for the redistribution is transferred to the production teams. This has led to a more fragmented process that prevents the village from making joint and useful decisions concerning land management for the entire village.

In my interviews, village leaders told me that they think that the farmers desire a frequent redistribution of land in order to have a "fair" distribution of the land (equal dispersion of good and bad land and trees). The farmers, however, feel that they only have to follow what the village leaders tell them. Many of them would prefer to have more land and concentrate on a larger-scale farming. This indicates again the historical conflict between equal land distribution pattern and the development of economies of scale, as it has been discussed between the schools of Confucians and Legalists for centuries. In the past, a new approach to land tenure often indicated a new dynasty. Even in the PR China, new "eras" have often started with new forms of land ownership: The collectivization of land cultivation was one of the major activities of the communists in the 1950s. In the 1980s, the process of economic reforms gave room a semi-privatization of land ownership and more freedom in decision-making for the farmers. Now, in the 1990s, the Chinese discussion on land tenure focuses on two aspects: Should land be privatized and become an economic commodity, or should the state still influence a fair distribution of this scarce resource?

One impact of the conflicting ideas in land tenure is scattering of land plots as it is shown in Map 9. The three sample families cultivate several land plots which are scattered all over the village land. Li Fuping's family, for example, has usufruct rights for three different types of fields: 1 fen (67 sqm) home garden, 9 fen in two plots (600 sqm) irrigated fields, and 1 mu (660 sqm) in two plots rainfed fields. In addition, they have 5 persimmon trees and 4 prickly ash trees. The two irrigated plots near the main road are

almost 300 m apart, the rainfed plots are in the mountain areas, ca. 600 m north of the main road and the home garden is again in a different location. Their fruit trees are grown on somebody else's land, again more than 1 km away from the irrigated fields.

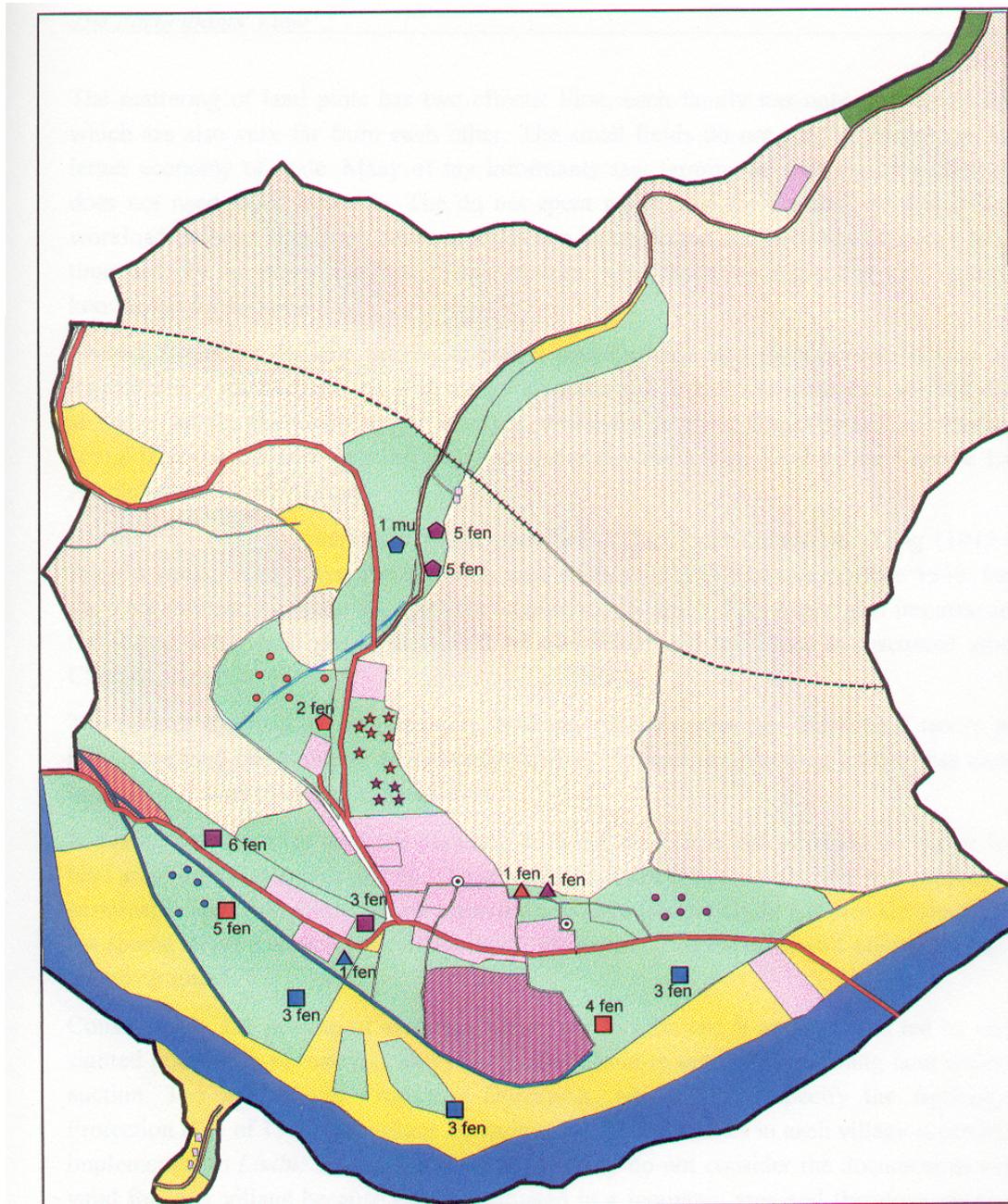
The scattering of land plots has two effects: First, each family has only very small fields which are also very far from each other. The small fields do not provide incentives for aiming at larger economies of scale. Many of my informants saw farming as a necessary activity that does not need much attention. They do not spend much time on farming, so that a higher workload due to long ways between fields can be neglected. Farming has become a leisure time activity in many families. This, in turn, also leads to neglecting the necessary knowledge for farming.

Second, it hinders decision makers to plan a sound village land management. If land is so fragmented, a spatial planning with areas assigned to a certain use cannot be applied. Even at higher levels, the township for example, decisions on an ecologically and economically sound land use become very difficult. Consequently, the lowest level of the Chinese Land Administration is the county.

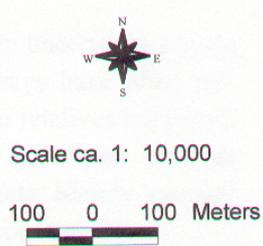
Reasons for land fragmentation might also have a historical dimension. Yang (1945:15) found a similar land fragmentation in his case study village in *Shandong* before 1949. Here, the most influencing factor was partible inheritance (*fengjia*). This might gain importance in the future, when land use rights might be transferred and inherited, as discussed among Chinese planners.

The second cause is the unsystematic land use planning process. Since land tenure also influences land use planning as mentioned above, the land use planning process has almost become a vicious circle at the local level.

MAP 9: SCATTERED LAND PLOTS IN LIUDU



- |  |   |  |
|--|---|--|
| <ul style="list-style-type: none"> <li>⊙ Deep well</li> <li>Roads             <ul style="list-style-type: none"> <li>footpath</li> <li>paved</li> <li>unpaved</li> </ul> </li> <li>Boundary</li> <li>Railway             <ul style="list-style-type: none"> <li>bridge</li> <li>track</li> <li>tunnel</li> </ul> </li> <li>Irrigation ditches             <ul style="list-style-type: none"> <li>not in use</li> <li>used</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>Buildings</li> <li>Construction sites</li> <li>Wasteland</li> <li>Fields</li> <li>Classified forest</li> <li>Mountainland</li> <li>Rivers</li> </ul> | <p><b>Li Fuping's family</b></p> <ul style="list-style-type: none"> <li>▲ homegarden</li> <li>■ irrigated field</li> <li>• persimmon</li> <li>* prickly ash</li> <li>◆ rainfed field</li> </ul>  |
|  |   | <p><b>Liu Fuxia's family</b></p> <ul style="list-style-type: none"> <li>▲ homegarden</li> <li>■ irrigated field</li> <li>• persimmon</li> <li>◆ rainfed field</li> </ul>                         |
|  |   | <p><b>Wang Yufen's family</b></p> <ul style="list-style-type: none"> <li>▲ homegarden</li> <li>■ irrigated field</li> <li>• persimmon</li> <li>* prickly ash</li> <li>◆ rainfed field</li> </ul> |



1 fen = 0.1 mu = 66.7 sqm

Compiled by: K. Janz 1997  
 Based on an aerial photo interpretation and on discussions with farmers of Liudu in 1995 and 1997

In *Liudu*, a concept for land use planning does not exist. It is not provided by higher level land administration agents nor do village leaders know how to develop and implement a sustainable land use policy. In my interviews, village leaders could not provide ideas on the spatial development of the village land. They mainly repeated overall planning goals of the government.

Consequently, the process of assigning areas to a specific use is arbitrary and led by short-sighted goals such as making money by "selling" land to outsiders or bringing land under an auction. The Agricultural Protection Document, which should specify the Basic Farmland Protection Regulation of 1994 and assigns agricultural production zones in each village is not being implemented in *Liudu*. Its regulations prohibit basic farmland conversion to non-agricultural activities and mandated counties and townships to designate the basic farmland protection zones in accordance with provincial farmland preservation plans. Village leaders said that they do not consider the document as being valid for their village because *Liudu* is situated in a mountain area and therefore exempted from establishing agricultural protection zones.

Both, the arbitrary land distribution and planning process have led to an uncertainty among the farmers. Elder farmers only continue farming, because they "always have done so". Others have almost given up farming and rely on income received from relatives who work outside the village. Some try to specialize in certain cultivation techniques such as persimmon farming but they are still hindered by unclear usufruct rights. Mainly younger men and women out-migrate to seize non-agricultural income-generating opportunities.

The indigenous knowledge which was overlaid by "ideological" knowledge during the cultural revolution is further deteriorating through this development. Within the five years I researched in the village I could observe a process of destruction of agricultural knowledge. Many young informants said that they almost forgot what their parents told them about land cultivation and they are also no longer interested in this. Some older informants continue farming, while some others, especially older **men** have taken over other jobs, for example in the tourist sector. Only some elder women expressed their wish to improve their land management by applying their own knowledge (seeBox 6 and 7)

## PART III: CONCLUSIONS

### 1 Connecting Findings and Problems

#### 1.1 Environmental Degradation

The findings of the survey in *Liudu* confirm the problem statements made in Part I: The village faces serious environmental problems such as diminishing water resources and decreasing arable land areas. These problems are felt by villagers and decision-makers, however, they are not perceived as important. For most of the villagers it is more important to develop income generating activities.

However, decreasing water resources are felt through increased electricity prices for water pumps. Many informants said that they observed the decreasing water tables of the public village wells. The person who is responsible for the maintenance of the wells said that he has observed a decrease of 30 cm per year which coincides with official figures for the vicinity of *Beijing* (Edmonds 1994: 118).

Moreover, many farmers have given up farming in rainfed fields, because they consider farming as too arduous and the soil is too dry. Yields are very low in those fields and do not meet the subsistence needs of the population. Therefore, these traditional fields cannot be seen as economically sound alternative to the modern agriculture. However, in terms of ecology they have a potential for improvement. So far, farmers in *Liudu* have not made an attempt to improve farming techniques and crop varieties in these fields. New or improved drought-resistant varieties should be tested. Here the agricultural universities and research institutes have already done some trials and they should now cooperate with the local levels. In collaboration with research institutes, the varieties in the rainfed fields could be improved. Since the official extension service has always put emphasis on irrigated systems, this has not happened until now.

In the future, at the local level, concepts can be developed to save water for irrigation such as calculating the amount of water used and installing of water saving devices. In the 1980s, cities like Beijing have at least partly introduced a water calculation according to the actual consumption (Sternfeld 1997: 224). In rural, areas, however, strategies of Chinese planners still focus on the transfer of large amounts of water from one region to another.

## 1.2 Migration

Especially after 1995, migration has become a major factor in the village life. In 1993, only 60 % of the informants indicated that they have at least one family member seasonally out-migrating. In 1997, almost all families had at least one member that had left the village for work. Most young men migrate permanently or seasonally and work in construction sites or factories in *Fangshan* or *Beijing*. Young, unmarried women go to work in hotels or restaurants in *Shidu*, *Fangshan* or *Beijing* which is 150 km from *Liudu*. This corresponds to the development on many other parts of China, especially in areas that do not provide sufficient income-generating facilities.

Above all, the impact of outmigration is perceived as positive by the villagers, because it means an immediate improvement of their living conditions. Many old farm families could build new houses with the money that was given to them by their out-migrating children. Moreover, these children also can regularly provide them with cash to buy their daily necessities in the village shops.

On the other hand, many informants, especially the elder ones, indicated that they feel that the village has lost important components of its social life. Some expressed, that they expect more than just money from their children, others said that they feel unhappy that their children are no longer interested in farming and that they have less agricultural knowledge than their parents. They observe the subsequent decreasing importance of a farming and land management and worry about a sustainable future.

The increasing rate of migration has definitely accelerated the destruction of indigenous knowledge in *Liudu*. Also, old people as the present source of a rich indigenous knowledge, are not able too pass on their knowledge to the younger generation, so it might be lost after they have passed away. There is only one incentive for young people to remain in the village and to engage in farming: farming has to become economically attractive to them. For this, it is necessary, to clarify the legal situation of land use rights. The first step might be the auctioning of rainfed land which started in 1997. If it is guaranteed that farmers can cultivate these fields for a longer period and with crops of their own choice, part of the village population might stay and contribute to the food security of the region.

## 1.3 Unclear Land Tenure

The problems of land tenure in *Liudu* reflect the situation in many regions of rural North China. The uncertainty of land use rights was one of the biggest concerns of many informants in *Liudu*. Many *Liudu* villagers feel that the redistribution of land and trees every five years is an arbitrary process that mainly benefits the village leaders or those who have special *guanxi* or kinship relations to them. Examples like the system change from

individual to collective management of trees can be found in many other places throughout in China? (e.g. Thümmel 1995: 134, Liu Yinglang, June 1998).

The unsystematic distribution process has led to a fragmentation of land plots (1.6 mu are divided into 6.5 parcels) which is even higher than the Chinese average (8.4 mu are dispersed over 9.7 plots). Some fields comprise an area of only 1 fen (66.7 sqm) of land. The historical roots of land scattering are described by Yang (1945: 15) who has researched in *Taitou* Village in *Shandong* which shows a similar fragmentation as *Liudu* today. In *Taitou* Village, the allotment often goes according to kinship lines, in *Liudu* the distribution is oriented towards the production teams (*xiaodui*) that usually comprise families of one kinship.

The uncertainty about land tenure has created a situation of insecurity and resignation among the farmers. Many of them have given up farming because they do no longer see any benefits in arduous cultivation activities in small and distant fields. They do not know how long they can use their fields and to whom this land will be transferred during the next redistribution process. Therefore, they do not have any incentives to improve the conditions on these plots. Farmers mainly apply their agricultural knowledge on their home garden plots (*ziliudi*). Farming in contract fields is seen as something farmers have to do. Most of the young people below 30 years expressed that they are no longer interested in farming. As a consequence, the indigenous knowledge of the farmers will further lose its importance and will be destroyed.

The Chinese administration has started to openly discuss land tenure issues in the Chinese press, especially since the 9th NPC in March 1998. In September, a new Land Management Law has been issued and was put into effect on January 1st, 1999. This law includes an extension of the period of land use rights for farmers and a special protection of farmers' rights (Bian Hongwei March 1999). Furthermore, the use of arable land resources will be specially controlled (Chapter Four, Land Management Law 1998). Any change of basic farmland has to be permitted by the State Council. In the process of the implementation of this law, the land use contract should be renewed in every village. This incorporates the chance of a better adjustment and combining scattered land plots. The question of ownership, however, has not been altered: The ownership of land in rural areas remains with the collectives. (Chapter Two, Article 8). It is still not defined who or what the collectives really are.

It remains to be seen, whether the institutions concerned will be capable to implement this law. The Ministry of Land and Resources, founded in 1998, is supposed to be more powerful than the former SLA, however, it will need time until the transformation is being carried out also at the local levels. Furthermore, experience has shown that even if laws and regulations are clearly defined and adapted to the specific situation, implementation can be difficult since local levels of administration and the land users themselves may have a certain distance to the ruling power. This has its roots in the historical contradiction of

the Chinese social structure (see Part I, 3.1.5.1). On the one hand, local communities depend on the decisions made by the state, on the other hand, if people feel exploited, they create a distance to the ruling power. This can lead to a more or less open disobedience of rules and regulations or even to corruption. Only if the Chinese planners are able to convince all actors in the implementation process that the new law is for their own benefit, the new law can be successful. However, this requires a certain degree of transparency and participation.

#### 1.4 Institutional Constraints

Institutions concerned with land use planning are not recognized by the villagers. Most of the villagers do not know which institution is responsible for which kind of action concerning land management. Most informants said that the village committee is the body that is most important for land management.

The Land Management Bureau at the township level is responsible for the implementation of the land management law at lower level. However, it was only active during the process of changing the land use from agricultural into tourist land and even this cannot be considered as legal, since a change of use of this size of land should have been decided at a higher level.

Even at the village level, the often contradicting agendas of the different agencies concerned with land use planning become apparent. The Forestry Bureau at the township level also deals with land use planning in *Liudu*, since a large area of the village is classified as forest land. The bureau of the Department of Interior has classified the whole area as mountain land which implies special conditions. For example, the area is not obliged to deliver grain quotas, farm families may have more than one child and the "Farmland Protection Law" does not need to be applied here. The Agricultural Bureau, now transferred into the Agricultural Technology Company deals with management of irrigated field, but it has lost its importance since it was transferred into service-and business orientation in 1992. The water protection bureau, officially responsible for the planning of water surface areas, is not present in *Liudu*.

The new Land Administration Law of 1998 gives more power to the land administration department at and above county level (Chapter Six, Article 66). The bureaus at the county level have the task of supervising and examining the implementation of the law. It is still unclear, however, in how far the staff members of these agencies are capable to deal with this task.

## 2 The Role of Indigenous Knowledge in Land Management

### 2.1 What is the Relationship that People Have to their Knowledge?

The destruction of indigenous knowledge has already started during the cultural revolution. The knowledge that has survived is now only partly used such as the *feng shui* principle. Other elements such as *yin* and *yang* or indigenous cropping patterns are hardly applied anymore. The deterioration of indigenous knowledge could even be observed during the field study period from 1993-1995. The official extension service has never considered the indigenous knowledge of the region but has instead, since 1985, been promoting scientific knowledge that has been centrally developed in Chinese research institutions with the national objective to increase food production by means of high technology.

The definition of indigenous knowledge that was given in Part I, 2.3.1 included farmers' knowledge that has been generated for generations and has been used in the region before 1949. Moreover, it should not have been considered by the official extension service. If we take this definition into account, the indigenous knowledge applied in *Liudu* only comprises a few agricultural production techniques that have been described in the previous chapters:

- mixed cropping patterns,
- grafting of persimmon trees,
- collecting and preserving wild greens.

It also comprehends concepts of nature and land management that are more comprehensive and that go beyond indigenous *technical* knowledge:

- the concept of *feng shui*,
- the concept of *yin* and *yang*,
- a broad understanding of the fertility of soils.

We can conclude that today, these techniques and concepts do not play a major role within the overall farming system that mainly consists of a modern, irrigated agricultural system. Some elder male and female farmers still possess indigenous concepts. These concepts are no longer seen as an adapted answer to the pressing problems of the present: small, scattered plots, population pressure, decreasing natural resources, pollution and an uncertain agricultural and land use policy.

People who have this knowledge are not regarded as important by most villagers and the local decision makers. Local experts are not longer consulted and have no decision-making power. Indigenous knowledge is therefore not transferred to younger generations. Most of the young people in *Liudu* do not find sufficient employment opportunities within

agricultural production and seek work outside the village. Many of them have forgotten how to manage the land of their parents.

The indigenous knowledge of the region has always been a knowledge that existed outside official approaches of extension and agricultural policy. It was never integrated in the modern improvement of farming and could therefore only be transferred through "unofficial" channels, never openly promoted. On the contrary, most modern Chinese concepts for the development of agricultural production and land management aim at delimiting traditions and developing modern, scientific concepts.

Therefore, it could **not** be proven by my research that the indigenous knowledge of the farmers as defined chapter I 2.8 could provide answers to the problems of the present land use planning. This is in contrast to populist or "Farmers First and Last" approaches that sometimes romanticize farmers' knowledge and perceive it as the only source of wisdom. Some populists favor a development promoting an endogenous independent development of the countryside, which in its extreme version rejects any support from western science.

In *Liudu*, however, as well as in most areas of rural China, the environmental problems are either centuries old and have never been solved, such as land distribution, or they are caused by technology-oriented land management (such as water pollution or water scarcity). It is difficult for the farmers to respond to these problems which they perceive as caused by "outside" forces. They have not developed water saving methodologies or experimented with drought-resistant varieties. They do not consider the importance of increasing soil fertility in contract fields and hardly provide ideas for a better distribution of land. Most important, farmers do not consider their own knowledge as important. The underlying reasons being first, that they sometimes do not see the necessity of solving a certain problem, e.g. such as water scarcity where informants mainly complained about high prices for pumping electricity. Second, the fact that the present and past systems never encouraged the use of indigenous knowledge. Therefore, they have a low self-esteem of their knowledge and capacities.

The farmers of *Liudu*, however, have responded in a very specific way when their own needs and livelihood were endangered. For example, when an old farm women realized that she does neither have a chance of out-migrating nor of improving their old farming system, she started a completely new system of raising cattle. The alternative would have been poverty. Due to this reason, many other villagers have developed their own **innovations**. They have analyzed the problems and shortcomings of the present land use planning system and the reasons behind this, in their own way, and have come to the conclusion, that they need to do something completely new. In these cases, the villagers did not approach the official extension service or other official agencies. Their sources of information and knowledge were relatives, friend, neighbors (sometimes from other villages) or private traders.

It is therefore necessary to **enlarge** the definition of indigenous knowledge towards integrating **the capacity and skills of farmers to develop and implement their own innovations**, which are useful and adapted answers to rural problems. These innovations can be based on traditional settings, but not necessarily. They can either be developed by single farmers or through cooperation with other farmers. According to Xiao Zhou (1996) the developments and improvements in Chinese agriculture in the last decades are not primarily the results of policy interventions but mainly of the power of rural people. She concludes that the family responsibility system was established through farmer innovations. Even the present migration flows are the expression of villagers' capacity to secure their own livelihood and sometimes create better living conditions.

Furthermore, in order to find a locally adapted solution to a specific problem, modern scientific knowledge as well as the indigenous knowledge of the respective actors has to be consulted. Neither indigenous knowledge nor scientific knowledge can be regarded as unitary bodies of knowledge. Instead they often represent contrasting, multiple epistemologies produced within particular, socio-cultural and political economic settings. The interaction of indigenous knowledge with current research and extension practice must address fundamental issues of power and needs in development.

Therefore, an approach that aims at developing sustainable concepts for land use planning should integrate both scientific **and** indigenous knowledge. For my research, I used participatory methods to discover the participants' view as well as the scientific instrument of GIS to enter a dialogue between the inhabitants of the village and myself as a researcher. Within an integrated approach, the knowledge of the different actors should interact as much as possible. The scientists and planners have to realize the peasants' capacities for innovation and facilitate their improvement and implementation.

## 2.2 Which Kind of Knowledge is Needed and by Whom?

The land use planning process in *Liudu* has many actors:

- national organizations, such as SLA, sectoral ministries and the Communist Party. They give orders such as production and land use quotas, and determine the framework for the rural land use,
- local level organizations of the national agencies that are the interface between national policy and village level actors, such as the village committee. They have to ensure that the national regulations are implemented,
- local decision makers that serve as intermediaries between the land user and the local organizations,
- the land users themselves that are
  - female and male, young and old farmers,
  - innovative farmers,
  - local experts,
  - members of various family clans,
  - members of the different production teams.

All these actors have a certain knowledge concerning land use planning **and** certain requirements which kind of knowledge might be necessary for this kind of planning. Very often the knowledge requirements of planners and land users do not correspond. Planners and scientists put emphasis on using scientific and technology-oriented problem-solving approaches. They also might have goals that serve higher levels such as regional planning or national food security. Farmers, in contrast, might be more interested in solving problems of their own family, kinship or community such as preventing poverty or making the village wealthy.

The relationship of actors in the land use planning process is defined by hierarchy and power. In the conventional approach of land use planning, the knowledge of planners and scientists is considered as more important than the farmers' knowledge. Moreover, women and men are not evenly represented in decision-making structures; all planning institutions are male dominated. In the village, women are seldom consulted despite having a broad knowledge about plant cultivation and land management.

Therefore, the mainly male planners are not aware of the skills and capacities of local people to develop own strategies. In turn, farmers seldom are aware of the goals and knowledge of the planners.

Within the land use planning process, an approach of examining the question of "Which knowledge is needed?" has to be developed. An example is the concept of *feng shui*. As the

findings in the case study show the use of geomantic methods has increased in recent years. Since feng shui is a traditional knowledge in China, it is part of the indigenous knowledge system in the village. Many villagers consider the knowledge of the *feng shui* expert as helpful for their livelihood. It has to be proven, however, if the concept of feng shui can really contribute to solving problems of environment management and land use planning. This assessment should be an integral part of a participatory planning process.

### 3 Shortcomings and Limits of Indigenous Knowledge

As described above, indigenous knowledge cannot provide the only basis to solve the present problems of environmental management and land use planning. Indigenous knowledge has certain limitations that hinder a development process to cope with new problems before serious environment degradation sets in. There are mainly the following shortcomings.

- A certain kind of knowledge may be possessed by a certain group of people in a community. For example, the knowledge of many village women on how to collect and use wild herbs is not possessed by the men of the same village. Some people may anxiously hide their special knowledge in order to prevent jealousy. This kind of knowledge is mainly orally transmitted and not documented in written sources. Therefore, it can be difficult to share this knowledge with outsiders.
- Many rural people lack analytical skills. Many informants did not understand the underlying reasons for decreasing water resources or decreasing yields in their fields. They could not evaluate which land use strategy might be more successful and sustainable and they were in danger of getting to false conclusions or resigned and gave up to do farming.
- Inhabitants of a community tend to see and plan only their own livelihood, i.e., the well-being of their own family and clan, or the environment of their own community. Very often they are not capable and willing to act in a larger context, for example to consider the needs of the next village, of the whole watershed or township. This may lead to contradicting and conflicting interests between the different communities, for example with regard to the use of surface water, building of dams or the use of forests.

A new approach of land use planning should include the facilitation between different kinds of knowledge and also the balance of shortcomings of the different knowledge systems. This means that the views of planners and scientists should be extended towards the views of the other actors, including that of farmers. It also means that the knowledge of rural people should be enhanced towards more analytical skills and a regional context.

The concept of a participatory land use planning process which will be described below therefore puts emphasis on making the different types of knowledge visible, on

strengthening the analytical skills of the villagers and the enlargement of the planning area above the village level, i.e., to watershed, township or even county level.

#### **4 How can Integrating Indigenous Knowledge Contribute to a Sustainable Land Management?**

Indigenous knowledge can help to establish a sustainable land use planning concept if this concept has the following characteristics:

- **actor orientation:** knowledge is generated, developed and adapted by different actors in the planning process. They include male and female land users, local experts, innovative farmers, village leaders, local and regional decision makers, extension workers and scientists. All have different views, knowledge and capacities regarding developing innovations to improve their own situation. During the planning process it has to be ensured that all their views are taken into account, assessed and modified, if necessary.
- **interface orientation:** the agents of knowledge in the Chinese land use planning process are institutions such as the Land Management Bureau or, at the local level, the village committee. These institutions cannot yet perform their tasks to facilitate the integration of the knowledge of the above mentioned actors. Thus, strategies have to be developed that put interface management in the focus of planning. This includes the creation and improvement of necessary institutions.
- **problem orientation:** the problems of land use planning in China have been described above. As has been shown the existing indigenous knowledge alone is not the key to solve these problems. However, it might contribute to other aspects of rural life such as developing adapted messages for rural extension and can also serve as a basis for innovations made by farmers, scientists, planners and other knowledge agents such as extension workers. The problem orientation, however, has to be embedded in a holistic approach that includes various sub-systems of indigenous knowledge and practices. It can also include the integration of modern, scientific techniques such as Geographical Information Systems (GIS), if the problem solution does require this.
- **area orientation:** problems, actors as well as knowledge have a culture-specific background that has to be considered when sustainable land use planning approaches are developed and implemented. This research has been carried out in North China. Findings in Southern or Western China might be considerably different.

The area orientation has to be seen in relation to interface orientation. Interfaces here being the offices of national institutions at the local level. For land use planning and natural resource management, the national level has to develop certain guidelines and laws. These should consider two basic principles:

- they should provide a nation-wide basic framework for planning in order to achieve national goals such as ensuring food production and to prevent uncertainty and arbitrariness,
- they should integrate local level approaches into national planning (bottom-up flow).

## 5 Steps of a Participatory Land Use Planning and the Interaction of Indigenous Knowledge and Modern Technology

The following steps propose an approach for development projects working in rural land use planning in China. Therefore, they put emphasis on a combination of expert knowledge on land use planning and natural resource management (steps 1, 2, 8, 12, 13, 15) and indigenous knowledge of land users (steps 7, 9, 10, 11, 14, 15). Furthermore, it promotes the integration of participatory approaches and GIS. Steps 5, 8 and 12 focus on the elaboration of adapted GIS layers.

All steps should be carried out by a land use planning team. Ideally, the team consists of national experts of the respective project (technicians, sociologists), members of the Land Management Administration at the county level and foreign advisers, if necessary.

### Step 1: Identification of actors

The first step aims at assessing the persons and institutions that are relevant for the land use planning process. The land use planning team prepares a list of relevant actors in the project area.

Table 11 shows a collection of actors in process. The actors are divided into insiders (the land users themselves) and outsiders (scientists, field workers, managers from national and international organizations, etc.). The land users themselves can be subdivided by activities, by ownership and by the management unit. This table serves as an example to show how many and what kind of actors can be involved in the process. It has, however, to be adapted to each special case (e.g. in China, there are usually no individual landowners).

Table 11: Categories of actors in the process of land use planning

Categories of land users (insiders)	Actors	Categories of outsiders	Actors
<i>Land users by activity</i>	producers gatherers hunters herders farmers(large/small, paid/unpaid) farmworkers processors market vendors consumers	<i>International Organizations</i>	managers officers donors creditors development advisors volunteers scientists

Land users by rights of access and ownership	owner (state, group, individual, <i>de jure</i> or <i>de facto</i> ) tenant (rent paid) user by permission or exchange agreement continuous regular occasional squatters, poachers (illegal users, occupants)	<i>National Organizations</i>	law issuers senior managers planners scientists officers field workers (at various administrative levels, male or female)
<i>Land users by management unit/unit of analysis</i>	individuals or household sub-groups (women, men, children, age-group members) households (managed by men, women, small/large, young/old, rich/poor) communities and community groups (families, clans, self-help groups, indigenous organizations) companies and cooperatives administrative units (states, districts, villages, neighborhoods)	<i>Others</i>	missionaries merchants military men explorers migrants

Sources: Slocum et al. 1995, Chambers 1994, Jiggins 1989

**Step 2            Assessing existing planning approaches, and expert knowledge on land use planning**

During this step, the relevant line agencies should be approached by the team and their ongoing concepts of land use planning should be analyzed.

Furthermore, secondary sources should be studied (e.g. other projects in the region, model regions of the Chinese government, etc.). In some cases, Chinese universities assisted the line agencies in carrying out land use planning. In this case, the scientists involved should be consulted, too.

**Step 3:            Selection of area of intervention**

The criteria for selection of the area should allow a balanced development of a land use planning approach and should avoid biases (e.g. remote/central location, rich/poor areas).

Criteria could be:

- willingness of local authorities and line agencies to participate in project activities and openness towards a participatory approach, open local leadership,
- awareness of environmental problems among local leaders and villagers,
- interest and felt need of the local population to participate in land use planning,
- the starting point could be a central location. The extension should then be in a more remote area, since these areas are often neglected by the planners.
- availability of aerial photos,

In the international discussion on land use planning, opinions differ considerably about the suitable unit for planning. For a long time, geographers and ecologists thought that watersheds were the optimal planning area. Experience has shown, however, that participation of the local population and local leaders works better when boundaries and units are defined through the administration (village, township, and county) or even traditional settings, because responsibilities are clearer defined than in the geographical unit of a watershed<sup>69</sup>.

Working in pilot villages is a good entry point. In order to have a bigger impact of the planning activities, the area should then be extended towards whole watersheds or townships. For this, the integration of participatory approaches into a GIS forms a good basis for discussion with the planners in the line agencies.

#### **Step 4: Defining the purpose, establishing research topics and questions**

This step has two aspects: the first aspect is the definition for the team of the overall purpose of the land use planning process. For example the purpose can be to elaborate and implement a participatory, sustainable concept of land use planning, that take both villagers' knowledge and expert knowledge on natural resource management into account.

The second aspect is the research design for the first field survey. This should be done before going to the field. In order to avoid huge data amounts, the data and information collected in the field should be related to the topics of land use planning and indigenous knowledge.

Land use planning deals with spatial data. It is therefore important that the data and information collected have a spatial aspect (important questions: Where? Why? Since when?).

In order to learn about the problems of the villagers concerning their environment, the following topics should be included.

- **Land Tenure**

- village and/or watershed boundaries
- land scarcity, scattered land plots
- ownership/user rights, ownership conflicts
- distribution of land
- percentage of HH with persons who have no land allocated since rural reform
- last time of adjustment

- **Land Use**

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<sup>69</sup> For discussions on the planning unit in land use planning see the GTZ publication on land use planning (GTZ 1995), the FAO guidelines on land use planning (FAO 1993), and Dalal-Clayton and Dent (1993).

settlements (public/residential)  
agricultural activities  
land and water resources (irrigated, rainfed, agroforestry, paddy, upland, mountain, water surface)  
animal husbandry  
fuel wood  
fruit production  
forestry  
water availability  
local/indigenous knowledge about land use  
identification of land management units

- **Soil degradation**

soil erosion  
decrease of soil fertility and productivity  
areas of deforestation

- **Communication and extension**

activities of the official extension service?  
extension messages  
transfer and sources of knowledge  
communication channels?  
limits, secrets, taboos  
innovations

- **Villagers' needs and problems**

definition of the problems, needs and objectives of land use as perceived by the villagers  
problem and solution analysis with the villagers  
moderation of a common problem statement

### **Step 5: Logistic preparations**

After the decision about the area has been made and the purpose is defined, an aerial photo of the region has to be made available. Using aerial photos serves two purposes:

1. as a basis for discussion in the village. By using aerial photos during mapping exercises, for example, the geographical reference is easier to be made and the maps can be easily integrated in to a GIS,

2. as a basis for digitization. Once the photo is scanned, digitization is easier than with the digitization tablet.

The photo can be in black and white and have the scale of 1: 25,000 or 1: 10,000. A photo of the scale of 1: 25,000 might be more advantageous because the whole watershed/township can be displayed on one page and complicated geo-referenced correction can be avoided. It can be easily enlarged either by photomechanical means or, once scanned, through digital means. If an outdated or old photo is easier and cheaper to buy, it may also be used. In this case, though, emphasis has to be put on updating and changes during field surveys.

Then aerial photo has to be scanned and saved as a TIFF-format. In ArcView, it can be loaded as a feature (=pixel). It is advisable to make a preliminary aerial photo interpretation on screen before going to the field. This means that features like roads, rivers, lakes and residential areas are already digitized according to the aerial photo.

It should be mentioned here that the logistic preparations of course also include such questions as accommodation and food in the countryside.

#### **Step 6: Methodological preparations**

The first survey in the village has the objective to understand the villagers' perception of their environment and to discuss the land use options they see.

Taking this objective into account, PRA techniques should be carefully selected, preferring those that encompass a spatial dimension.

The following PRA techniques have proven to be valuable in this context.

- checking secondary sources (including data and existing plans of line agencies and local decision makers, discussion with local authorities),
- collecting socio-economic data on population (numbers, age and sex structure, population trends and distribution), employment and income, production and trends, infrastructure,
- participatory mapping, using aerial photos (most important),
- transects (important and useful),
- mobility maps,
- village meetings,
- timelines, seasonal calendars,
- ranking,
- semi-structured interviews with an interview guideline,
- focus group interviews,
- observation,
- aerial photo interpretation.

In order to make the integration into the GIS easier, aerial photos can be used for all techniques, e.g. during interviews.

It is crucial for a participatory planning approach that the views of all actors are being taken into account. Since a village is NOT a homogeneous group, the second important issue to decide on is the selection of informants.-

Informants can be:

- village leaders,
- male and female farmers (note: village maps should be drawn separately by men and women, then the sub-groups should discuss their different views with each other. If the team discovers that women are disadvantaged and have different needs, then separate activities have to be carried out for women),
- inhabitants of all sub-villages (there is a danger that remote sub-villages are neglected),
- young people (since environment concerns the future, it might be advisable to go into schools, and have some group interviews with school children),
- old people (can talk about the environmental degradation during the last decades),
- shop owners/business people,
- local experts (e.g. people that have a special agricultural knowledge),
- teachers, nurses,
- formal and informal village groups.

#### **Step 7: First field survey**

The field survey has the following objectives:

- to get an overview about resources, land use patterns and environmental problems,
- to identify indigenous knowledge concerning land use planning,
- to carry out ground verification for the GIS,
- to develop land use options in the villagers' eyes.

To cover all aspects, the first field survey should have a duration of 3-4 days.

#### **Step 8: Reflection of the field survey and integrating findings into a GIS**

The field survey should be evaluated considering the following questions:

- How did the PRA techniques work? Did they deliver the expected results?
- Which changes have to be made for future activities?
- Which problems occurred?
- What are the results?

The next step is to decide on a possible layer organization in the GIS according to the main topics dealt with during the field work and how the field work results can be prepared for

the GIS. Then the data need to be organized for the integration into the GIS. Simple, but useful GIS analyses should be done, taking the scanned aerial photo as a basis. The field work results are digitized as points, lines and polygons. Attribute information like topographic names or additional information on the main issues investigated can be inserted. Data bases are to be set up including spatial data base and attribute data base.

However, a lot of information gathered cannot be presented in points, lines and polygons, or even attribute data. ArcView has the possibility to integrate so-called "hot links" into the map: text files with verbal description can be linked to certain locations.

The following table shows how field information gathered by participatory methods can be organized and prepared for a GIS. The left column contains the topics set for the first survey design, the second column indicates the PRA techniques used in order to acquire the respective information. The third column shows the step towards the GIS: Are the data spatial (polygons, lines or points) or attribute data within the GIS? The last column shows the kind of layers of the spatial information.

Table 13: Example of information organization from field results to GIS layers

Topic	PRA technique	Kind of data	Layer
villager/watershed/township boundaries	sketch map, aerial photo	spatial	polygon
land scarcity, transfer of land	interview, ranking	attribute	- / -
land distribution	interview	attribute	- / -
settlements incl. homes, public buildings	maps, historical maps, aerial photos	spatial	points, polygon
eroded areas	transparency, interview ranking	spatial attribute	polygon
livestock no. location	ranking interview, sketch map	attribute spatial	?
wood fuel trees: - abundance, protected	sketch map, historical maps sketch map	spatial spatial spatial	lines points points
villagers' indigenous knowledge	interviews, sketch map	text file spatial	hot link polygon
water availability	sketch map, ranking	spatial, attribute	lines, points
cultivated land	sketch map, aerial photo, historical ranking	spatial, attribute	polygon
homegardens ( <i>ziliudi</i> )	sketch map	spatial	polygon polygon
fertility of soil	sketch map, interview, ranking	spatial, attribute	polygon
current land use	sketch maps, interviews	attribute, spatial	polygon
land management units	sketch maps, interviews	attribute, spatial	polygon
land use options of the villagers	sketch maps, interviews	attribute, spatial	polygon

**Step 9: Repeat steps 5–6 for all villages to be covered in the area**

As mentioned above, villagers tend to see only their own livelihood or community. Land use planning, however has to be also seen in a regional or national context. In China, the next geographical unit would be a watershed, the next administrative unit would be the township. It is therefore necessary to carry out the village land use planning process in all villages of a watershed/township.

**Step 10: Discussions of field findings at watershed/township level**

During this process, emphasis has to be put on the coordination and mediation of possible conflicting needs of the villages and also on the ecological condition of the whole watershed/township. Another important question at that level is the assessment of the questions: "Which knowledge is needed?" and "Whose knowledge counts?". If villagers, for example, consider it as important, that their indigenous knowledge on *feng shui* has to be integrated, but technology-oriented planners want to neglect this, a careful mediation is needed to clarify if it is necessary to integrate *feng shui* principles or not.

The task of mediation is to be performed by the land use planning team. Here, a change of role: from planner to moderator and facilitator takes place.

In many countries positive experiences with watershed based land use planning have been made, in India for example a "watershed development committee" was founded at this stage. In China, however, the watershed does not form an administrative unit and villagers have an especially close relation to their "own" village (*danwei*). Moreover, according to my experience, villagers are no longer interested in participating in too many committees since this had been over-emphasized during the socialist period.

One possibility to solve this problem is that representatives of other villages in a larger area participate in the planning workshop of the respective other village. They should actively integrate the needs, ideas and indigenous knowledge of their own village. Then "watershed/township development workshops" can be organized. During these workshops, members of the villages and of the line agencies can participate and discuss and evaluate the village and watershed development and land use plans. If the participants of these workshops wish to continue working on this issue, then the establishment of watershed committees can be considered.

**Step 11 Second field survey**

The second field survey has the following objectives:

- to present and discuss the GIS-maps and reports with the villagers,
- to shortly present the land use options and indigenous knowledge of neighboring villages,
- to gather additional information, if necessary,

- to establish a village development plan.

It should have a duration of two to three days.

During the second survey PRA techniques such as village meetings, sub-village meetings and individual interviews can be used.

For the village development plan, the measures proposed and decided upon need to be ranked. During the ranking process the land use planners have the task to mediate between different interest and user groups. If, for example, women are disadvantaged, the facilitators have the task to assist women to express their needs, if they are in line with the land use planning policy. Conflicting interests between villages in the watershed also need to be considered, e.g. if one villages wants to build a dam, but this means less water availability in the next village.

Moreover, the activities proposed by the villagers should not have the character of a "shopping list". Using participatory approaches, however, means to increase the self-capability of the land users. That is why during PRA activities the question should be raised: "Who is responsible for solving this problem?" The villagers will discover that there are many problems they can solve themselves. The village development plan should include the column "Who is responsible for implementing this activity?" and also provide a basis for future monitoring activities.

Table 14: Proposed format of a village development plan

Activity	Objective	Expected Benefits for whom (men/women etc.)	Funded by whom	Implemented by whom	Implemented from...to...	Criteria for success (indicator)

This village development plan is the result of a longer discussion. It should not only be decided on in one village meeting. Interviews can be carried out with individuals, in order to get the views of people who usually do not participate in meetings (women, poor people, remote sub-villages). If necessary, the land use planning team has to return to the village, after the villagers have discussed the plan and decided on it among themselves. For the final village development plan, special emphasis has to be put on

- ranking (what is most important, what should be done first),
- the realization that not everything desired can be implemented (because of the limited scope and budget of the project, because of the needs of other villages in the watershed, because of ecological conditions in the watershed),
- that the needs of all groups of villagers are reflected,
- that no group (esp. women) is disadvantaged when activities are implemented.

**Step 12: Refining results of the second field survey and the watershed/township development plan**

The land use planning team modifies maps, reports and plans according to the findings of the second field survey. The village development plans have to be coordinated so they then can be incorporated into a watershed/township development plan.

**Step 13: Discussion with line agencies**

The outputs of this planning procedure can now be presented to a broader audience (members of government departments, staff of other projects, regional and local decision makers). If possible and desired, members of villages can participate in this discussion.

Moreover, special arrangements with single line agencies can be made. It should be discussed to which extent they will participate in the implementation of the village development plans (e.g. afforestation activities).

If necessary, the plan can be submitted to the relevant institutions for approval.

**Step 14 Implementation of the village development plans**

The village development plans are coordinated and refined at the watershed/township level. They have to be implemented at the village level, according to the procedure and responsibilities decided.

**Step 15: Participatory monitoring**

After approximately six months after implementation has started, monitoring activities both at village as well as at watershed/township level should be carried out. Again, PRA techniques can be applied (such as matrix ranking and scoring, village meetings, interviews).

Emphasis should be given to self-evaluation by the villagers. This means that they should set the criteria and indicators for the success of the activities and watch their achievement (see village development plan).

**Step 16: Evaluation and replanning**

After the monitoring activities, both planners and villagers have to discuss which steps and methods were appropriate and which not. The plans, maps and methods have to be changed, if necessary. Then steps 8 to 15 should be repeated with the revised plans/maps, so that the land use planning process becomes a planning-action-learning cycle.

## **6 Concluding Remarks**

The procedures presented in Part III, chapter 5 propose a concept that integrates indigenous knowledge and expert knowledge for local land use planning. However, if indigenous knowledge should play a more important role in the overall development process, it is necessary that institutions such as planning agencies, extension service institutions, universities and research institutes undergo a profound change in their institutional setting. They should be able to work more decentralized, more flexible, more adapted to the context and learn in an iterative process. Pretty and Chambers (1994: 187) write that it is necessary to create a new professionalism that comprises participatory approaches and methods, an interactive learning environment and the institutional support and context. To assess this for rural China would go beyond the work of this research.

**ANNEX**

## 1 Important Agricultural Innovations in Chinese History

Year	Dynasty	Innovation	Land Policy
app. 4000-1000 BC		slash and burn agriculture dominating farming villages established in the Wei and Yellow River valleys millet, wheat, beans, cabbage and melon cultivated	
2000-1800 BC	Xia	first agricultural draining measures beginning of sericulture	
10th century BC		introduction of hoeing and plowing, fertilizing, irrigation and land reclamation first cultivation of sorghum, buckwheat	
9th century BC		terrace cultivation	
7-4th century BC	Spring and Autumn Period	declining of "well-field" farming system (explanation see Zhao) use of iron plow drawn by oxen	private land-ownership into existence
6th century BC		row cultivation of crops introduction of iron plow	
594 BC			the state of Lu collects land tax for the first time
4th century BC	Warring States	regionalization of agriculture introduction of ridge farming and crop rotations insights on soil classification, irrigation and crop cultivation published improvement of irrigation construction	private land-ownership established landlords become power base
3rd century BC	Warring States	introduction of rice (earlier according to other sources)	
250 BC	Qin	Li Bing constructs an irrigation system in Sichuan to reclaim the Red Basin for agricultural production	
2nd century BC	Han	first "Green Revolution": intensive farming, intercropping, multiple cropping and bed culture developed first written evidence of soy bean introduction of viniculture from the Middle East sheep and pig raising gain importance use of multi-tube seed drill development of pit cultivation	first big peasant revolt government took independent peasant farm as production unit for base of its tax system emperor Wudi orders an irrigation program for over a million acres of arable land large estates growing (at the end of Han)
100 BC	Han	grafting of fruit trees intercropping well known	issued an government extension manual by Fan Shengzhi first government controlled agricultural experiments
4th century AD		Buddhist monks bring tea from India	
589-618 AD	Sui		adopting the "land equalization" system
618-907 AD	Tang	introduction of poppy from Persia development of paddy rice wide use of crook plow irrigation widely spread	adoption of a similar "land equalization" system tea as a cash crop established in South China
10th century AD	Northern Song	double-cropping of paddy rice Champa rice strain imported from Vietnam and	private land transactions became common

		spread in China	rising of large estates
1129-1279 AD	Southern Song	irrigation wheels widely used planting of cotton, sugar cane and tea on large scale concept of constant renewal of soil fertility introduced	land reclamation in mountainous and coastal areas
1279-1368 AD	Yuan		invasion of Mongols
<b>Year</b>	<b>Dynasty</b>	<b>Innovation</b>	<b>Land Policy</b>
1368-1644 AD	Ming	commercial paddy rice production hardly new innovations in China, but starting a knowledge exchange with Europe	introduction of an administrative hierarchy:
17th century AD	Ming	introduction of winterwheat, introduction of maize, peanuts, potatoes, tobacco from America specialized silk and cotton industries in the Chang Jiang Delta spread of rice to Hebei on a large scale	cotton cultivation ordered by the state
1628 - 1644 AD	Ming		peasant revolts
1644-1840	Early and Middle Qing	commercialized agriculture, textile production	reclamation of farmland laid waste during civil wars

Sources: Anderson (1989), Böttger (1987), Bray (1984), Golas (1980), Temple (1991), Yu (1987), Zhao (1994)

sources differ, i.e. tea: some say cultivation already in 200 AD, others later

## 2 Resource Persons

**Mrs. Prof. He Xiping**, College of Agricultural Economics, China Agricultural University, Beijing (on Oct. 18, 1995)

**Mr. Zhang Weiping**, National Bureau of Surveying and Mapping, Beijing (Oct. 1996)

**Ms. Yin Weiping**, State Land Administration, Department of Land Use Planning (Sept. 1997)

**Mr. Chen Yong**, State Land Administration, Department of Land Use Planning (Sept. 1997)

**Mr. Li Tingyue**, Department of Agriculture, Forestry and Animal Husbandry in *Shidu* (July 1993)

**Mrs. Xian Che**, Bureau of Forestry in *Shidu* (July 1993)

**Dr. Li Ou**, Vice Director of CIAD, Beijing, (September 1998)

**Dr. J. L. Slikkerveer**, Director Cultural and Social Studies, University of Leiden, The Netherlands (April 1995)

**and 55 farmers of *Liudu***

### **3 Interview Guide-line for the Research in Liudu**

(July-October 1993)

#### **1. General**

Name of Village

Location

Name of interviewee

Gender

Number of family members

Major income source

#### **2. Farming system**

How many mu?

Land tenure system

Which kind of fields (garden-farming, big/small fields)?

Which crops/yield?

Cropping pattern (mixed, pure, rotation, agroforestry)

Homegarden

Cash income from which crop/field?

Animals

Pest management

Fertilizer, what means to improve soil fertility

Other activities in agriculture

Other activities beside agriculture

In the family: who is responsible for what (husband, wife, children)?

What is the main problem in agriculture?

#### **3. Communication and extension**

Interviewee approached by official extension service?

If yes, extension messages

How is the knowledge transferred (parents to children, friends neighbors) ?

Which channels?

Limits or secrets?

Do farmers develop their own innovations, which and how?



## 5 List of participatory rural appraisal techniques

Name of Techniques	Description	Result	Subjects
Semi-structured Interview	one of the three basic instruments of PRA; the facilitator interviews individuals about a topic one requirement is to respect the rules of dialogue (open questions, give feedback, respect the person and ideas, explain what you are doing)	a testimony which can be translated into graphics	all topics, especially related to the experience of the interviewee and his/her history (changes in life)
Group discussions	group discussions are facilitated in a way that revitalize the knowledge of the people	Summary of discussions	all topics, but especially for the analysis of the situation and for the planning of development actions
Participant observation	old technique of anthropologists: the facilitator lives in the community and participates in the daily life including manual work and festivities	The observations help the facilitator to learn more about the local people and land use.	Daily life, agricultural production, labor, land use systems, crops...all kinds of practices.
Mapping	Villagers draw a map of their village, the land use, ecological zones, the actors, conflicts, problems, resources. Maps also can be modeled with soil and plants on the ground.		Natural resources, infrastructure, social organization, historical changes.
Reading of aerial photos	The aerial photos are studied together with a group of villagers analyzing the situation, the changes of the situation, the boundaries of the village, land use systems.	Summary of problems and potentials related to land-use and resources.	Land use systems, infrastructure, boundaries, ecological zones, historical changes (if the photos are rather old). Starting point for discussions also.
Transects Walk and drawing	Small groups of villagers and team members walk from one side to the other in the village. Afterwards a transect is drawn including all observations using symbols.		General situation of the village, houses and fields, crops and vegetation, range lands. Social organization. Also for historical changes.
Calendars and Cycles	Villagers sketch the annual agricultural cycles, or festivity calendar including all relevant information.		agriculture, labor force, use of input, differentiation of crops, market prices, climatic changes, family occupations, external labor, illnesses.
Daily Life	Villagers sketch their daily activities. The diagrams are compared between different villagers (men and women)		daily life
Life Histories (historical diagrams)	Old persons are interviewed and the information about their life		historical changes, innovations in agricultural or social systems; individual feeling about life.

	is visualized in a graphic.		
Chapatti Diagrams	Villagers (1-5) are asked to determine the importance and the presence of institutions and functions in the village.		Interaction between village people and institutions or authorities (even public servants)
Matrix Ranking	Experienced persons are asked about crops, animals, trees or medicinal herbs and their respective use, prioritizing them.		Crops, trees, animals, herbs, food, products, functions. Problems, solutions, new varieties, future plans and activities.
Drawings	Villagers draw their village, their fields, crops. They also can draw concepts or feelings.		Past, present and future. What does well-being mean to me? Values like family, men and women relations, neighborhood, development.
Role Play	Villagers perform the interaction between different people or show the problems they face.	Acting as a mirror of reality and to see the perception of the people.	Exploring the subjective perception of the people about behavior, culture, interrelations, communication styles.
Taxonomies - Visualized	Villagers make a hierarchy of vegetation, trees, crops, products, determining the cultural classification.	Visualized taxonomy, which shows the cultural terms of certain crops or plants and the corresponding classification.	People's knowledge and wisdom, which is culturally bound. How do people classify climate, nature, plants, animals, people, concepts, terms. It is based on the specific language (beware of bias).
Wealth-ranking	Villagers prioritize the economic situation of the villagers to establish the conditions of beneficial survival strategies.	List of different social status showing the reasons for poverty	Income, commodities, professions and economic-social differentiation in a village.

Source: CIAD 1994a

**REFERENCES**

- ABERLEY, D.:** „Boundaries of Home. Mapping for Local Empowerment“. Gabriola Island, BC, Canada, 1993a
- ABERLEY, D.:** "How to Map your Bioregion: A Primer for Community Activities. " In: **ABERLEY, D.:** „Boundaries of Home. Mapping for Local Empowerment“. Gabriola Island, BC, Canada, 1993b
- AGRAWAL, B.:** "A Field of One's Own. Gender and Land Rights in South Asia". Cambridge, 1994
- ALCORN, J.B.:** "Ethnobotanical Knowledge Systems - A Resource for Meeting Rural Development Goals." In: **WARREN, D.M., SLIKKERVEER, L.J., BROKENSHA, D.:** "The Cultural Dimension of Development. Indigenous Knowledge Systems." IT Publications, 1995
- ALLEN, W.J.:** "Farmers and Scientists Working Together to Achieve More Sustainable Land Management." Conference Paper presented at the 1995 North American Farming Systems Research-Extension Symposium. Ames, Iowa, 5-8 November, 1995
- ALLEN, W.J., BOSCH, O.H.J., GIBSON, R.G.:** "Developing Knowledge-Based Tools to Support Land Management Decision-Making". SAL, Christchurch 1995
- ALTIERI, M.A.:** "Agroecology. The Scientific Basis of Alternative Agriculture". Boulder, London, 1987
- ALVARES, C.:** "Homo Faber. Technology and Culture in India, China and the West From 1500 to the Present Day." The Hague, 1980
- ALVARES, C.:** "Science". In: **SACHS, W.:** "Development Dictionary. A Guide to Knowledge as Power". London, 1992
- ALVAREZ, B., and GOMEZ, H.:** "Laying the Foundation. The Institutions of Knowledge in Developing Countries." IDRC Ottawa, 1994
- AMLER, B.:** "Landnutzungsplanung für Entwicklungsländer. Methoden der Standorteignungsbewertung und Landnutzungsplanung für den ländlichen Raum in Entwicklungsländern." In: Landschaftsentwicklung und Umweltforschung. Schriftenreihe des Fachbereichs Landschaftsentwicklung der TU Berlin. Nr. 85, 1992
- ANDERSON, E.N.:** "The First Green Revolution: Chinese Agriculture in the Han Dynasty". In: Gladwin, C. and Truman, K. (Ed.): "Food and Farm, Current Debates and Policies, Monographs in Economic Anthropology, No. 7. Lanham/New York/London, 1989, pp 135-151
- ANTWEILER, C.:** "Lokales Wissen - kulturell verortetes Wissen. Grundlagen und Anwendungsproblematik." In: **HONERLA, S., SCHRÖDER, P.:** "Lokales Wissen und Entwicklung. Zur Relevanz kulturspezifischen Wissens für

- Entwicklungsprozesse. Beiträge der Local-Knowledge-Tagung." Saarbrücken, Germany, 1995, pp 19-52
- APFFEL-MARGLIN, F.**, and **MARGLIN S.** (eds.): "Decolonizing Knowledge. From Development to Dialogue." A study Prepared for the World Institute for Development Economics Research of the United Nations University. Oxford, 1996
- APPLETON, H.**, **FERNANDEZ, M.E.**, **HILL, C.L.M.**, **QUIROZ, C.**: "Claiming and Using Indigenous Knowledge". In: **UNITED NATIONS COMMISSION** on Science and Technology Development, Gender Working Group: "Missing Links. Gender Equity in Science and Technology for Development". IRDRC, Ottawa, Canada, 1995
- ARRIGO, L.G.**: "Landownership Concentration in China. The Buck Survey Revisited." In: *Modern China*, Vol. 12 No. 3, July, 1986, pp. 259-356. Newbury Park, 1986
- ASH, R.F.**, and **EDMONDS, R.L.**: "China's Land Resources, Environment and Agricultural Production." In: *The China Quarterly*, 156, December, 1998. London, 1998
- ASIAN INSTITUTE OF TECHNOLOGY**: "Indigenous Women's Knowledge in Health Care and Water Management. Workshop Report." Bangkok, 1995
- ATRAN, S.**: "Cognitive Foundations of Natural History. Towards an Anthropology of Science." Cambridge USA, 1990
- AVENARIUS, Christine**: "Gemüsebauern in Peking. Eine Feldforschung zum aktuellen Wandel der stadtnahen Landwirtschaft". Magisterarbeit an der Philosophischen Fakultät der Universität zu Köln, Fach Völkerkunde, 1994
- AWA, N.**: "Underutilization of Women's Indigenous Knowledge in Agricultural and Rural Development Programs; The Effect of Stereotypes." In: **WARREN, D.M.**, **SLIKKERVEER, L.J.**, **TITILOLA, S.O.** (eds.): "Indigenous Knowledge Systems: Implications for Agriculture and International Development". Studies in Technology and Social Change, No. 11. Iowa, 1989, pp 3-10
- AXINN, N.**: "Agricultural Extension for Women Farmers in Southeast Asia". Background Paper of the World Bank, Washington DC, 1990
- BAKEMA, R.J.**: "Local Level Institutional Development for Sustainable Land Use". Issues in Environmental Management. KIT, Den Hague, 1994
- BEBBINGTON, A.**: "Indigenous Agricultural Knowledge Systems, human interests, and critical analysis ". In: *Agriculture and Human Values*. Vol. VIII, nos. 1 and 2. Dordrecht, 1991 pp 14-24
- BENTLEY, J.W.**: "What Farmers Don't Know Can't Help Them: The Strengths and Weaknesses of Indigenous Technical Knowledge in Honduras". In: *Agriculture and Human Values* - Summer 1989 Vol. III. pp. 25-31, Dordrecht 1989
- BERKES, F.**: "Traditional Ecological Knowledge in Perspective". In: **INGLIS, J.T.**: "Traditional Ecological Knowledge - Concepts and Cases". IDRS, Ottawa, Canada, 1993
- BERLIN, B.**: "Ethnobiological Classification. Principles of categorization of plants and animals in traditional societies". Princeton, 1992

- BETKE, D.:** "Von Katzen und Drachen. Sozialistische Marktwirtschaft und Umwelt in China". In: **SCHUCHER, G.:** "Asien zwischen Ökonomie und Ökologie - Wirtschaftswunder ohne Grenzen?" Hamburg, 1998 pp 83-111
- BETKE, D., KÜCHLER, J.:** "Shortage of Land Resources as a Factor in Development: the Example of the People's Republic of China." In: **GLÄSER, B.:** "Learning from China? Development and Environment in Third World Countries." London, 1987, pp 85-104
- BIAN Hongwei:** "Amendments to ensure farmers' land-use rights". In: *China Daily* March 15, 1999
- BIGGELAAR C.** "Farming Systems Development: Synthesizing Indigenous and Scientific Knowledge Systems". In: *Agriculture and Human Values*, 8 1-2, Dordrecht 1991, pp 25-36.
- BLAIKIE, P.:** "Development, Post, Anti- and Populist: A critical Review". In: *Environment and Planning, Volume 32*, London, 2000, pp 1033-1050
- BLECHER, M., WANG Shaogang:** "The Political Economy of Cropping in Maoist and Dengist China: Hebei Province and Shulu County, 1949-90." In: *China Quarterly*. London, March, 1994 pp 63-98
- BLUNT, P., WARREN, M.:** "Indigenous Organizations and Development." London, 1996
- BRINKMAN, R.:** "Recent Development in Land Use Planning, with Special Reference to FAO." In: **FRESCO, L, STROOSNIJDER, J.B.** and van **KEULEN, H.**(ed.): "The Future of the Land. Mobilizing and Integrating Knowledge for Land Use Options." Wageningen, , 1994b pp 13-21
- BÖTTGER, W.:** "Kultur im alten China." Leipzig, Jena, Berlin, 1988
- BRÄUTIGAM, H. (ed.):** "Schätze Chinas in Museen der DDR. Kunsthandwerk und Kunst aus vier Jahrtausenden". Leipzig, 1989
- BRAY, F.:** "Agricultural Technology and Agrarian Change in Han China." Cambridge, 1980
- BRAY, F.:** "The Chinese Contribution to Europe's Agricultural Revolution: A Technology Transformed." In: **LI Guohao et al.**(ed.): "Explorations in the History of Science and Technology in China". Shanghai, PR China, 1982, pp 597-637
- BRAY, F.:** "Agriculture". In: **NEEDHAM, J.** "Science and Civilization in China". Cambridge, Vol. 6, Part II, 1984
- BRAY, F.:** "The Rice Economies. Technology and Development in Asia." Berkeley, 1986
- BRAY, F.:** "Technology and Gender. Fabrics of Power in Late Imperial China." London, 1997
- BROEKHUYSE, J.:** "Traditional and Modern Institutions." In: **SAVENIJE, H., HUIJSMAN, A.:** "Making Haste Slowly. Strengthening Local Environmental Management in Agricultural Development". KIT Amsterdam, The Netherlands, 1991, pp 61-73
- BROKENSHA, D., WARREN, D.M., WERNER, O.**(ed.): "Indigenous Knowledge Systems and Development", Washington D.C., 1980

- BROOK, T.:** "The Spread of Rice Cultivation into the Hebei Region in the Ming and Qing". In: **LI Guohao et al. (eds.):** "Explorations in the History of Science and Technology in China". Shanghai, PR China, 1982, pp 659-685
- BROWN, L.R.:** "Who Will Feed China?" In: *World Watch Magazine Sept./Oct., 1994*. Washington, D.C. USA, 1994, pp 10-19
- BROWN, L.R.:** "Who Will Feed China? Wake-Up Call for a Small Planet". The Worldwatch Environmental Alert Series. New York, London, 1995
- BRUUN, O.:** "The Feng Shui Resurgence in China". In: *The China Journal*, No. 36, July, Sydney 1996, pp 46-65
- BUCK, J.L.:** "Land Utilization in China. A study of 16,786 farms in 168 localities, and 38,256 farm families in twenty-two provinces in China, 1929-1933", Shanghai, 1937
- BUCK, J.L.:** "Food and Agriculture in Communist China". Stanford, CA, USA, 1966
- BURNS, J.P.:** "Political Participation in Rural China". Berkeley and Los Angeles, USA, 1988
- CAI Yunlong:** "Land Use and Management in PR China. Problems and Strategies" In: *Land Use Policy*. London, October, 1990 pp 331-351
- CALKINS, P. et al. (ed.):** "Rural Development in Taiwan and China". Boulder, USA, 1992
- CALLICOTT, B.C., AMES, R.T. (eds.):** "Nature in Asian Traditions of Thought. Essays in Environmental Philosophy." New York, USA, 1989
- CANNON, T., JENKINS, A.:** "The Geography of Contemporary China. The Impact of Deng Xiaoping's Decade." London, 1990
- CAO Guangxia, ZHANG Lianmin:** "Innovative Forest Management by the Local Community in Dongda Village, Yunnan Province." In: *Forest, Trees and People Newsletter* No. 34 Uppsala, Sweden, Sept., 1997 pp 32-38
- CHAMBERS, R.:** "Rural Appraisal: Rapid, Relaxed and Participatory. IDS Discussion Paper No. 311. London, 1992
- CHAMBERS, R.:** "All Power Deceives". In: *IDS Bulletin*, Vol. 25, No. 2, London, 1994, pp 14-26
- CHAMBERS, R.:** "Whose Reality Counts? Putting the First Last." London, 1997
- CHAMBERS, R. PACEY, A., THRUPP, L.A.:** „Farmer First: Farmer Innovation and Agricultural Research.“ London, 1989
- CHAMBERS, R., and HOWES, M.:** "Indigenous Technical Knowledge: Analysis, Implications and Issues. ". In: **BROKENSHA, D., WARREN, D.M., WERNER, O. (ed.):** "Indigenous Knowledge Systems and Development" University Press of America, Washington D.C., 1980 pp 323-334
- CHANDLER, P.:** "The Indigenous Knowledge of Ecological Processes Among Peasants in the Peoples' Republic of China". In: *Agriculture and Human Values*. Vol. VIII, nos. 1 and 2. Dordrecht 1991, pp 59-66

- CHAO** Kang: "Man and Land in Chinese History. An Economic Analysis." Stanford, CA USA, 1986
- CHAFETZ**, J.S.: "Gender Equity: An Integrated Theory of Stability and Change." London, Great Britain, 1990
- CHEN** Fu, **DAVIS**, J., **WANG** Liming: "Current Issues in China's Land Reforms". *Centre For Rural Studies, Working Paper No. 1/97, Belfast, 1997, pp 1-28*
- CHENG** Xu, **HAN** Xunru, **TAYLOR**, D.G.: "Sustainable Agricultural Development in China" In: *World Development* Vol. 20, No. 88 1992, pp. 1127-1144,
- CHENG** Yuk-Shing, **TSANG** Shu-ki: "Agricultural Land Reform in a Mixed System: The Chinese Experience of 1984-1994." In: *China Information* Vol. X, No 3 (Winter 1995-1996), Leiden 1996 pp 44-74
- CHINA AGRICULTURAL MUSEUM**: "Chinese Agricultural History". Beijing, 1989
- CHINA AGRICULTURE YEARBOOK 1993**. Beijing, 1994
- CHINA DAILY**: "Agriculture Priorities Outlined". Beijing, October 16, 1995
- CHINA DAILY**: "3.8 million illegal land cases found nationwide". Beijing June 24, 1998
- CHINA DAILY**: "Sustainable Use Promoted" Beijing, June 24, 1998
- CHINA DAILY**: " Revised law strengthens the supervision of land use" Beijing, September 25, 1998
- CIAD**: „Indigenous Knowledge Systems and Rural Development Systems in China“. Workshop Proceedings. Beijing/PR China, 1994a (unpubl.)
- CIAD**: "The Role of Women in Rural Development. A Case Study in Hebei." Beijing, 1994b (unpubl.)
- CIAD**: "Project Appraisal for Forest Development in Yanqing County". Beijing, 1994c (unpubl.)
- CLOUD**, K: "Women's Productivity in Agricultural Systems: Considerations for Project Design." In: **OVERHOLT** et al.: "Gender Roles in Development Projects: A Case Book", West Harford, Conn., 1985 pp 27-35
- CLUNAS**, C.: "Fruitful Sites. Garden Culture in Ming Dynasty China." Durham, 1996
- COHEN**, M: "Cultural and Political Inventions in Modern China: The Case of the Chinese "Peasant". In: TU Weiming (ed.): "China in Transformation," Cambridge, 1994, pp 151-169
- COMPTON**, J.L.: "Strategies and Methods for the Access, Integration and Utilization of Indigenous Knowledge in Agriculture and Rural Development". In: **WARREN**, D. M., **SLIKKERVEER**, L.J., **TITILOLA**, S.O. (eds.): "Indigenous Knowledge Systems: Implications for Agriculture and International Development Studies in Technology and Social Change, No. 11. Iowa, 1989, pp 21-30
- CONROY**, C., **LITVINOFF**, M.: "The Greening of Aid. Sustainable Livelihoods in Practice." Earthscan, London, 1988
- CONWAY**, G. and **BARBIER**, E.B. "After The Green Revolution." London, Great Britain, 1990

- CRESSEY, G.B.:** "China's Geographic Foundations. A Survey of the Land and Its People" New York and London, 1934
- CROLL, E.:** "From Heaven to Earth. Images and Experiences of Development in China." London, Great Britain and New York, 1994
- CROLL, E.:** "The Negotiation of Knowledge and Ignorance in China's Development Strategy." In: **HOBART, M.** (ed.) "An Anthropological Critique of Development." London, UK, and New York, 1995, pp 161-178
- CROLL, E., PARKIN, D.:** "Bush Base: Forest Farm. Culture, Environment and Development" New York, 1992
- CROLL, E., PING Huang:** "Migration For and Against Agriculture in Eight Chinese Villages." In: *The China Quarterly*, No. 194, London 1997, pp 128-146
- CROWELL, W.G.:** "Government Land Policies and Systems in Early Imperial China." Ph. D. Thesis at the University of Washington, Seattle, 1979
- DALAL-CLAYTON, B. and DENT, D.:** "Surveys, Plans and People. A review of Land Resource Information and its Use in Developing Countries." London, 1993
- DAVIES, S.:** "Introduction: Information, Knowledge and Power." In: *IDS Bulletin*, Vol. 25, No. 2, London, 1994, pp 1-13
- DAVIS, S.H. (ed.):** "Indigenous Views of Land and the Environment". World Bank Discussion Papers, No. 188. Washington D.C., 1993
- DAVIS, S.H., EBBE, K. (eds.):** "Traditional Knowledge and Sustainable Development." Proceedings of a Conference held at the World Bank, Washington, D.C. September 27-28, 1993. "Environmentally Sustainable Development Proceedings Series No.4. Washington D.C., 1995
- DELMAN, Jørgen:** "Agricultural Extension in Renshou County, China. A Case Study of Bureaucratic Intervention for Agricultural Innovation and Change", Ph.D. Thesis, Copenhagen, 1991
- DENG, Gang:** "Development Versus Stagnation. Technological Continuity And Agricultural Progress in Pre-Modern China." *Contributions in Economics and Economic History*, Number 141, Westport, CN, 1993
- DEPARTMENT of Sociology and Social Work, Yenching University, Peping, China (pup.):** "Ching Ho: a Sociological Analysis. The Report of a Preliminary Survey of the Town of Ching Ho, Hopei, North China." Beijing 1930
- DERNBERGER, R.F.:** "The Role of the Foreigner in China's Economic Development 1840-1949". In: **PERKINS, D. H.** (ed.): "China's Modern Economy in Historical Perspective." Stanford, CA, USA, 1975, pp 19-47
- DEUTSCHE GESELLSCHAFT FÜR TECHNISCHE ZUSAMMENARBEIT (GTZ)**  
(publ): "Landnutzungsplanung: Strategien, Instrumente, Methoden". Wiesbaden 1995
- DEWALT, B.R.:** "Using Indigenous Knowledge to Improve Agriculture and Natural Resource Management". In: *Human Organization*, Vol. 53, No 2. London, 1994, pp 123-131

- DONG** Xiaoyuan: "The Two Tier Tenure System and Sustained Economic Growth in Post-1978 Rural China." In: *World Development*, Vol. 24, No. 5, 1996, pp 915-928
- DRIESEN**, P.M., **KONILN**, N.T.: "Land-use Systems Analysis". Wageningen, The Netherlands, 1992
- DSE** (Deutsche Stiftung für Internationale Entwicklung): "Annual Report 1988". Bonn, 1989
- DU** Runsheng: "Reform and Development in Rural China". London, 1995
- DUARA**, P.: "Culture, Power and the State. Rural North China 1900 - 1942". Stanford, USA, 1988
- EDMONDS**, R.L.: "Patterns of China's Lost Harmony. A Survey of the Country's Environmental Degradation and Protection." London and New York, 1994
- ELVIN**, M.: "The Pattern of the Chinese Past. A Social and Economic Interpretation". Stanford, 1973
- ELVIN**, M.: "The Environmental Legacy of Imperial China". In: *The China Quarterly*, 156, December 1998. London, 1998, pp 733-756
- ENZENSBERGER**, H.M.: "Zur Kritik der ökologischen Ökologie". In *Kursbuch* 33 Berlin 1973, p 1-42
- ESCOBAR**, A. "Planning". In: **SACHS**, W.: "Development Dictionary. A Guide to Knowledge as Power". London, 1992, pp 133-145
- ESTERER**, M.: "Chinas natürliche Ordnung und die Maschine". Berlin 1931
- ESMA**, M.J., **UPHOFF**, N.T. "Local Organizations. Intermediaries in Rural Development". London, 1984
- FAIRBANK** J.K.: "China- A New History". Harvard 2006
- FAN** Chuyu: "Some Outstanding Works on Agriculture". In: **INSTITUTE** of the History of Natural Sciences, Chinese Academy of Sciences (ed.): "Ancient China's Technology and Science". China Knowledge Series, Beijing, PR China, 1983 pp 292-304
- FAO**: Soil Conservation. An International Study. Chapter on China pp. 41-92. Rome, 1948
- FAO**: "Guidelines for Land-Use Planning." FAO Development Series No. 1. Rome, Italy, 1993
- FAO**: FAO Production Year book, FAO Statistics No. 125, Rome, 1995
- FAOSTAT** Database Results: "Landuse". <http://apps.org/>, 1996
- FEI** Xiaotong: "From the Soil. The Foundations of Chinese Society" (Translation of the Chinese original 'Xiangtu Zhongguo',) Berkeley, Los Angeles, Oxford, 1947 (reprint 1992)
- FEI** Xiaotong: "Chinese Village Close-up" Beijing, 1983
- FEI** Xiaotong: "Rural Development in China. Prospect and Retrospect." Chicago, 1989

- FELDMAN, S., WELSH, R.** "Feminist Knowledge Claims, Local Knowledge, and Gender Divisions of Agricultural Labor: Constructing a Successor Science" In: *Rural Sociology* 60 (1), 1995, pp. 23-43,
- FLORA, C.B.**: "Reconstructing Agriculture: The Case for Local Knowledge." In: *Rural Sociology Vol. 57, 1*, 1992, pp 93-107
- FORSYTHE, S.A.**: "An American Missionary Community in China, 1895-1905". Harvard East Asian Monographs 43. Cambridge, MA, USA, 1971
- FOUCAULT, M.**: "The Archaeology of Knowledge". New York, USA, 1969
- FREEDMAN, M.**: "Family and Kinship in Chinese Society." Stanford USA, 1970
- FREEDMAN, M.**: "Studies of Chinese Society." Stanford, USA, 1979
- FRESCO, L.**: "Planning for the People and the Land of the Future". In: **FRESCO, L., STROOSNIJDER, J.B. and van KEULEN, H.**(ed.): "The Future of the Land. Mobilizing and Integrating Knowledge for Land Use Options". Wageningen, The Netherlands, 1994, pp 395-398
- FRESCO, L., STROOSNIJDER, J.B. and van KEULEN, H.** (eds.): "The Future of the Land. Mobilizing and Integrating Knowledge for Land Use Options. "Wageningen, The Netherlands, 1994
- FRIEDMAN, E. et al.**: "Chinese Village, Socialist State" New Haven and London, 1991
- GAMBLE, S.D.**: "Ting Hsien: A North China Rural Community". New York, USA, 1954
- GAMBLE, S.D.**: "North China Villages. Social, Political and Economic Activities before 1933", Berkeley, USA, 1963
- GARDNER, G.**: "Shrinking Fields: Cropland Loss in a World of Eight Billion." World Watch Paper 131. Washington, DC, USA, 1996
- GERNET, J.**: "A History of Chinese Civilization" Cambridge, 1982
- GILMARTIN, C.K.**(ed.): "Engendering China. Women, Culture and State. Cambridge, USA, 1994
- GIVEN, D., and HARRIS, W.**: "Techniques and Methods of Ethnobotany As An Aid to the Study, Evaluation, Conservation and Sustainable Use of Biodiversity." Lincoln, New Zealand, 1994
- GLADWIN, C. and TRUMAN, K.** (Ed.): "Food and Farm, Current Debates and Policies, Monographs in Economic Anthropology, No. 7. Lanham/New York/London: 1989
- GLADWIN, C., ZABAWA, R. and ZIMET, D.** " Using Ethnoscience Tools to Understand Farmers' Plans, Goals, Decisions." In: **MATLON, P. et al.** (eds.): "Coming Full Circle. Farmer's participation in the development of technology". International Development Research Center, Ottawa, 1984, pp 27-40
- GLÄSER, B.**: "Learning from China? Development and Environment in Third World countries." London, 1987
- GOETZ, A.M.**: "From Feminist Knowledge to Data for Development: The Bureaucratic Management of Information on Women and Development". In: *IDS Bulletin Vol 25, No 2*, London, 1994, pp 27-36

- GOLAS, P.J.:** "Rural China in the Song." In: *Journal of Asian Studies* Vol. XXXIX, No. 2, February 1980. Ann Arbor, MI, 1980, pp 291-315
- GONZALES, R.M.:** "KBS, GIS and Documenting Indigenous Knowledge." In: *Indigenous Knowledge and Development Monitor*. The Hague, Vol. 3, Issue 1, April, 1995, pp 5-7
- GOODMAN, R.:** "Taoism and Ecology." In: *Environmental Ethics*, Spring, 1980, pp 73-
- HAN Jun:** "China Can Feed Itself" In: *China Review Autumn/Winter* London, 1995, pp 7-21
- HE Daofeng:** "Changes of Rural Land System at Village Level". In: "Transition of China's Rural Land System. Papers from the International Symposium on Rural Land Issues in China 1992". Land Tenure Center Paper 151, Madison 1995, pp 69-105
- HENDRICKS, R.G.:** "Lao-Tzu: Te-Tao Ching. A New Translation Bases on Recently Discovered Ma-Wang-Tui Texts. New York, USA, 1989
- HOBART, M. (ed.)** "An Anthropological Critique of Development." London, UK, and New York, USA, 1993
- HONERLA, S., SCHRÖDER, P.:** "Lokales Wissen und Entwicklung. Zur Relevanz kulturspezifischen Wissens für Entwicklungsprozesse. Beiträge der Local-Knowledge-Tagung." Saarbrücken, Germany, 1995
- HOWARD, P.:** "The Confrontation of Modern and Traditional Knowledge Systems in Development." In: *Canadian Journal of Communication*, Vol. 19, No. 2, Spring 1994
- HSIAO Kung-Chuan:** "Rural China. Imperial Control in the Nineteenth Century." University of Washington, Seattle, USA, 1960
- HSU Cho-yun:** "Han Agriculture. The Formation of Early Chinese Agrarian Economy (206 BC - AD 220)." Seattle, 1980
- HSU, R.C.:** Food for One Billion." Boulder, 1982
- HSUN, Wang Ping:** "Agricultural Resources of China and Japan With a Comparative Survey." Tientsin, Shanghai, 1938
- HU Wei:** "Household Land Tenure Reform in China: Its Impact on Farming, Land Use and Agro-environment." In: *Land Use Policy*, Vol. 14, No. 33, 1997, pp 175-186
- HUANG Shumin:** "The Spiral Road. Change in a Chinese Village Through the Eyes of a Communist Party Leader" Boulder, San Francisco, London, 1989
- HUANG, P.C.C.:** "The Peasant Economy and Social Change in North China". Stanford, 1985
- HUANG, P.C.C.:** "The Peasant Family and Rural Development in the Yangzi Delta, 1350 - 1988". Stanford, 1990
- HUANG Qinghe:** "Review and Current Issues on the Rural Land Policy in China". In: "Transition of China's Rural Land System. Papers from the International Symposium on Rural Land Issues in China 1992". Land Tenure Center Paper 151, Madison, 1995 pp 3-23

- HUIZER, G.:** "Indigenous Knowledge and Popular Spirituality: A Challenge to Developmentalists." IN: **SCHUURMAN** (ed): Current Issues in Development Studies. Global Aspects of Agency and Structure, Nijmegen Studies in Development and Cultural Change Vol 21, Nijmegen, 1994, pp 56-89
- HUNTINGTON, H.P.** "Using Traditional Eco Knowledge in Science: Methods and Applications". In *Ecological Application*, Vol 10, No. Ithaca, 2000, pp1270-1274
- IIED (International Institute for Environment and Development):** "Rural Peoples' Knowledge, Agricultural Research and Extension Practice. Asia Papers." *IIED Research Series*, Vol. 1, No. 3. London, Great Britain, 1993
- ILEIA Newsletter:* "Caring for Our Land." July 1994, Vol. 10, No. 2, Leusden, 1994
- INGLIS, J.T.:** "Traditional Ecological Knowledge - Concepts and Cases". IDRS, Ottawa, 1993
- INSTITUTE** of the History of Natural Sciences, Chinese Academy of Sciences (ed.): "Ancient China's Technology and Science". China Knowledge Series, Beijing, 1987
- JANZ, K.:** "Ökologischer Landbau in der VR China. Allgemeine Konzepte und das Beispieldorf Liu Min Ying, Kreis Daxing ." Berlin, 1987 (unpubl. master thesis)
- JANZ, K.:** "Put the Gender Issue on the Agenda - the Need for Participatory Methods in Land Use Planning." Paper presented at the Workshop "Land Use Planning in the Technical Cooperation", Kandy, 1993
- JANZ, K.:** " Situation Analysis of the systems of Production, Usage and Marketing of Pesticides in the Provinces of Hubei and Zhejiang, PR China, Volume I: Report" Unpubl. GTZ-Report, Eschborn, 1998
- JANZ, K., and WANG Dehai:** "A New Way of Learning. Participatory Training for Rural Development in China."
- JANZ, K., and YE Jingzhong (eds.):** "Towards Organic Farming in China. Challenges for a Sustainable Development.". Proceedings of the First International Symposium on Organic Farming in China. Beijing, PR China, 1994
- JIGGINS, J.:** "An Examination of the Impact of Colonialism in Establishing Negative Values and Attitudes Towards Indigenous Agricultural Knowledge". In: **WARREN, D. M., SLIKKERVEER, L. J., TITILOLA, S. O.** (eds.): "Indigenous Knowledge Systems: Implications for Agriculture and International Development." Studies in Technology and Social Change, No. 11. Iowa, USA, 1989, pp 68-78
- JOHNSON, M. (ed.):** "LORE - Capturing Traditional Environmental Knowledge". Ottawa, Canada, 1992
- JUDD, E.R.** "Gender and Power in Rural North China". Stanford, California, USA, 1994
- KANG, C.** "Man and Land in Chinese History. An Economic Analysis". Stanford 1986
- KIEVELITZ, U.:** "Erfahrungen und Vorgehensweisen der GTZ bei der Einbeziehung von lokalem Wissen". Presented at the Seminar "Local Knowledge: Die Relevanz kulturspezifischer Wissenssysteme für den Entwicklungsprozeß." Bonn, Germany, 1995

- KIM**, Hyung-Chan: "Some Thoughts on Mao Tse-Tung's Views of Man, Society and Human Knowledge." In: *Journal of Thought*, 1972, pp 77-84
- KING**, F.H.: "Farmers of Forty Centuries of Permanent Agriculture in China, Korea and Japan". Madison, 1911
- KLOPPENBURG**, J.: "Social Theory and the Deconstruction of Agricultural Science: Local Knowledge for an Alternative Agriculture." In: *Rural Sociology* Vol. 56, No. 4, 1991, pp 519-548
- KNAPP**, R.G. (ed.): "Chinese Landscapes: The Village as Place." Honolulu, Hawaii, 1992
- KO**, Dorothy: "Teachers of the Inner Chambers: Women and Culture in Seventeenth-Century China." Stanford 1994
- KOJIMA**, R.: „Agricultural Organization: New Forms, New Contradictions.“. In: *The China Quarterly* 116, special issue on „Food and Agriculture in China During the Post-Mao-Era“. Oxford, 1988, pp 706-735
- KOOTEN** van G.C.: "Land Resource Economics and Sustainable Development. Economic Policies and the Common Good." Vancouver, 1993
- LAI** Wai Chung Lawrence: "Land Use Rights Reform in China. Some Theoretical Issues." In: *Land Use Policy*, Vol. 12. No. 4, 1995
- LANG**, O.: "Chinese Family and Society" New Haven, 1946
- LARDY**, N.: "Agriculture in China's Modern Economic Development". Cambridge USA, 1983
- LEAKEY**, R.E., **SLIKKERVEER** L.J.(eds.): "Origins and Development of Agriculture in East Africa: The Ethnosystems Approach to the Study of Early Food Production in Kenya." Studies in Technology and Social Change, No. 19. Ames, 1991
- LEE**, F.C.H., **CHIN**, T.: "Village Families in the Vicinity of Peiping." Peiping (Beijing), China, 1929
- LEEMING**, F.: "Rural China Today." Essex, Great Britain, 1985
- LEEMING**, F.: "The Changing Geography of China." Oxford, Great Britain, 1993
- LI** Guohao et al. (ed.): "Explorations in the History of Science and Technology in China". Shanghai, PR China, 1982
- LI** Liangjiang: "The Empowering Effect of Village Elections in China". In *Asian Survey* XLIII:4, pp 648-662, Berkeley, 2003
- LI** Xiaoyun et al.: ""The role of indigenous organizations in the rural development of China: A case study of a non-farm productive activity." In: **BLUNT**, P., **WARREN**, M.: "Indigenous Organizations and Development." London, 1996, pp 220-227
- LI** Yuning (ed.): "Chinese Women Through Chinese Eyes". New York, London, 1991
- LI** Zhengfang: "Prospect of Organic Agriculture Development in China." In: **NEPA** (ed.) "Highlights of the Summary Reports of Environmental Science and Technology Research in China". Nanjing, PR China, 1994
- LI** Zongmin: "Changes in the Role of Rural Women under the Household Responsibility System: A Case Study of the Impact of Agrarian Reform and Rural Industrialization

- in Gongyao Village, Hebei Province, North China." A Research Paper of the Land Tenure Center Wisconsin, Madison 1995
- LIEBERTHAL, K.:** "Governing China: From Revolution Through Reform". New York/London, 1995
- LIN Yutang:** "Feminist Thought in Ancient China". In: **LI Yuning** (ed.): "Chinese Women Through Chinese Eyes". New York, London, 1991
- LIP, Evelyn:** "Chinese Geomancy." Singapore, 1984
- LIPPMANN, H.-C.:** "Feng-Shui. Chinesische Geomantie als eine Anregung für die Landschaftsplanung in Deutschland?". Unpubl. Diplomarbeit, TU Berlin, 1992
- LITTLE, Daniel:** "Understanding Peasant China, Case Study in the Philosophy of Social Sciences". Yale University Press, 1989
- LIU Yinglang:** "3.8 million illegal land cases found nationwide". In China Daily, June 24, 1998
- LIU Yinglang:** "Land-Use Permit Freeze Ordered" In: China Daily, October 12, 1998
- LIU Yinglang:** "New Rule Control Use of Resources" In: China Daily, February 4, 1999
- LIU Shouying:** "The Change of Property Rights in Mountainous Regions and the Response of Farm Household Behavior". In: "Transition of China's Rural Land System. Papers from the International Symposium on Rural Land Issues in China 1992". Land Tenure Center Paper 151, Madison 1995 pp 155-171
- LIU Zao Tao, FAURE, D. (ed.):** "Unity and Diversity. Local Cultures and Identities in China." Hong Kong, 1996
- LO, C.P.** "Environmental Impact on the Development of Agricultural Technology in China: in the of the Dike-Pond ("Jitang") System of Integrated Agriculture in the Zhujiang Delta of China. In: *Agriculture, Ecosystems and Environment*, No 66, pp 183-195, 1996
- LONG, N. (ed.):** "Encounters at the Interface. A Perspective on Social Discontinuities in Rural Development." Wageningen Sociologische Studies 27, Wageningen, 1989
- LONG, N. and LONG, A. (ed.):** "Battlefields of Knowledge. The Interlocking of Theory and Practice in Social Research and Environment." London and New York, 1992
- LU Yonglong, ZONG Yaoguang:** "Ecological Planning of Land Use: The Central Area of Tianjin, China." In: *Ambio* Vol. 25 No. 6, Stockholm, 1996, pp 421-424
- MA Hong:** "Strive to Improve Our Country's Environmental Protection Work". In: **ROSS, L., SILK, M.A.:** "Environmental Law and Policy in the People's Republic of China". New York, 1987, pp 23-35
- MALAYANG, Ben S.:** A Framework for Understanding Rural Institutions and Traditional Land Management and Use, Summary paper of a Lecture on Institutions and Traditional Land management, Kunming 1992
- MALTON, P., et al. (eds.):** "Coming Full Circle. Farmer's Participation in the Development of Technology". International Development Research Center, Ottawa, 1984

- MAO TSE-TUNG:** "Selected Works of Mao Tse-Tung" Volume 1, Peking 1965
- MARSDEN, D.:** "Indigenous Management and the Management of Indigenous Knowledge." In: **WRIGHT, S.:** "Anthropology of Organizations". New York, 1994 pp 40-54
- MADSEN, R.:** "Morality and Power in a Chinese Village." Berkeley, 1984
- MATHIAS, E.:** "Framework for Enhancing the Use of Indigenous Knowledge". In: *Indigenous Knowledge and Development Monitor, August, 1995*. Den Hague, 1995, pp 11-15
- MAUNDU, P.:** "Methodology for Collecting and Sharing Indigenous Knowledge - a Case Study. In: *Indigenous Knowledge and Development Monitor August 1995*. Den Hague, 1995 pp 3-10
- MCCORKLE, C.:** "Towards a Knowledge of Local Knowledge and Its Importance for Agricultural RD&E". In: *Agriculture and Human Values*" - Vol 4, Summer 1989, pp 4-13
- MENZIES, N.:** "Some Remarks on the Application of Traditional Knowledge in the Rational Utilization of Resources". Paper presented on 2nd International Congress of Ethnobiology, Kunming, China, Oct. 1990
- MENZIES, N.:** "Rural Peoples Knowledge and Sustainable Land Use/Resource Management (Examples from China)." In: **CIAD:** „Indigenous Knowledge Systems and Rural Development Systems in China“. Workshop Proceedings. Beijing, 1994 (unpubl.)
- MENZIES, N.:** "Forest and Land Management in Imperial China". London and New York, 1995
- MIES, M. and SHIVA, V.:** "Ecofeminism". London, 1993
- MILLER, H.L.:** "Science and Dissent in Post-Mao China. The Politics of Knowledge." Seattle, USA, 1996
- MOMBERG, Frank:** "Indigenous Knowledge Systems - Potentials for Social Forestry Development. Resource Management of Land-Dayaks in West Kalimantan." Berlin, 1993
- MONMONIER, M.:** "Mapping it Out. Expository Cartography for the Humanities and Social Sciences." Chicago, 1993
- MOSHER, S.:** "Broken Earth. The Rural Chinese." London, 1983
- MOSSE, D.:** "Authority, Gender and Knowledge Theoretical Reflections on the Practice of Participatory Rural Appraisal". In: *Development and Change 25 (3):* 497–526, London 1995
- MUMFORD, L.:** "The Myth of the Machine. Techniques, Human Development and the Pentagon of Power", Boston, 1967
- MURDOCH, J.:** "Sustainable Knowledge". In: *Geoforum*, Vol. 25, No. 2, London, 1994, pp 115-132,
- MYERS, R.H.:** "The Chinese Peasant Economy. Agricultural Development In Hopei and Shantung, 1890 - 1949". Cambridge, 1970

- NAGEL, G.:** "Planen mit chinesischen Planern. regionale Entwicklungsplanung in Sichuan: Systemrahmen, Konzeption und Erfahrungen". Frankfurt/Main, Germany, 1995
- NAZARENA-SANDOVAL, V.:** "Indigenous Decision-Making in Agriculture: A Reflection of Gender and Socio-Economic Status in the Philippines." In: **WARREN, D.M., SLIKKERVEER, L.J., BROKENSCHA, D.:** "The Cultural Dimension of Development. Indigenous Knowledge Systems." IT Publications, London, 1995, pp 155-173
- NEEDHAM, J** "Science and Civilization in China". Vol. 6, Part II, Section 41 "Biology and Biological Technology - Agriculture", Cambridge, 1984
- NEPA (ed.)** "Highlights of the Summary Reports of Environmental Science and Technology Research in China". Nanjing, 1994
- NICHOLSON, T.:** "Institution Building. Examining the Fit Between Bureaucracies and Indigenous Systems". In: **WRIGHT, S.:** "Anthropology of Organizations". New York, 1994, pp 69-84
- NICKUM, J.E. (ed.):** "Water Management Organization in the People's Republic of China." New York, 1985
- NICKUM, J.E.** "Is China Living on a Water Margin?" In: *The China Quarterly*, 156, December, 1998. London, 1998, pp 880-898
- NOREM, R.H., YODER, R., and MARTIN, Y.:** "Indigenous Agricultural Knowledge and Gender Issues." In: **WARREN, D.M., SLIKKERVEER, L.J., TITILOLA, S.O. (eds.):** "Indigenous Knowledge Systems: Implications for Agriculture and International Development. Studies in Technology and Social Change, No. 11. Ames, 1989 pp 91-100
- NORGAARD, R.B.:** "The Epistemological Basis of Agroecology." In: **ALTIERI, M.A.:** "Agroecology. The Scientific Basis of Alternative Agriculture". Boulder, London, 1987, pp 21-28
- OI, J. C and ROZELLE, S.:** "Elections and power: the locus of decision-making in Chinese villages," *The China Quarterly*, June, 2000. pp513-539.
- OVERHOLT, et al:** "Gender Roles in Development Projects: A Case Book", West Harford, Conn., 1985
- PAN Asia and the Pacific:** "Planting the Future. Women in Agriculture." Penang, Malaysia, 1994
- PEI Shengji** "Ethnobiology: A Potential Contributor to Understanding Development Processes" In: *Entwicklung und Ländlicher Raum* 2/91, 1991, pp 21-23
- PERKINS, D.H.:** "Agricultural Development in China 1368-1968." Edinburgh, 1969
- PERKINS, D.H. (ed.):** "China's Modern Economy in Historical Perspective." Stanford, 1975
- PFANDER, B.:** "Lokales Wissen - Ein Konzept mit vielen Gesichtern. Ein Überblick über Möglichkeiten dessen Einbezugs in die Praxis der Entwicklungszusammenarbeit." Seminararbeit, University of Bern, 1995

- PLOEG**, van der, J., **LONG A.** (eds.): "Born from Within. Practices and Perspectives of Endogenous Rural Development." Van Gorcum, Assen, 1994
- PLOEG**, van der, J.: "Potatoes and Knowledge". In: **HOBART**, M. (ed.) "An Anthropological Critique of Development." London, and New York, 1995, pp 209-227
- PLUMWOOD**, V." Feminism and Ecofeminism. Beyond the Dualistic Assumptions of Women, Men and Nature." In: *The Ecologist*, Vol. 22, No. 1, January/February, London, 1992, pp 8-14
- POTTER**, J.M.: "Land and Lineage in Traditional China." In: **FREEDMAN**, M.: "Family and Kinship in Chinese Society." Stanford, 1970, pp 121-138
- POTTER**, S.H., **POTTER**, J.M.: "China's Peasants. The Anthropology of an Revolution." Cambridge, USA, 1987
- PR CHINA**: "China's Agenda 21. Chapter 14: Conservation and Sustainable Use of Natural Resources." Beijing, 1994
- PR CHINA**, Department of International Cooperation, Ministry of Agriculture: "Options for Further Reform in China's Farmland System". In: "Report of a Pilot Study on Poverty, Land Abandonment and Rural Institutions". FAO Rural Development Division, Rome, 1997
- PR CHINA**: "The Law of Land Administration of the People's Republic of China" August 1998 (Unofficial Translation). In: *China Economic News (No. 41) Oct. 26<sup>th</sup>*, 1998
- PRETTY**, J.: "Participatory Learning for Sustainable Development" In: *World Development*, Vol. 23, No. 8, London, 1995 pp. 1247-1263
- PRETTY**, J., **CHAMBERS**, R.: "Towards a Learning Paradigm; New Professionalism and Institutions for a Sustainable Agriculture". In: **SCOONES**, I., **THOMPSON**, J (eds.): "Beyond Farmer First. Rural People's Knowledge, Agricultural Research and Extension Practice." London, 1994 pp 182-202
- QU** Futian, **HEERINK**, N., **WANG** Wanmao: "Land Administration Reform in China. Its Impact on Land Allocation and Economic Development." In: *Land Use Policy*, Vol. 12, No. 3, 1995, pp 193-203
- QU** Geping, **LI** Jinchang: "Population and the Environment in China". London, 1994
- RAI**, S.M.: "Gender Issues in China: A Survey." In: *China Report* 30: 4 New Delhi, 1994, pp 407-420
- READ**, D.W, **BEHRENS**, C: Modeling Folk Knowledge as Expert Systems. In: *Anthropological Quarterly*, Vol. 62, No. 3, Washington D.C., 1989, pp 107-120
- REDCLIFT**, M.: "The Multiple Dimensions of Sustainable Development." In: *Geography*, 1991, pp 36-42
- REIJNTJES**, C., **HAVERKORT**, B., and **WATERS-BAYER**, A.: Technology Development by Farmers. In: "*Farming for the Future*" ILEIA, Wageningen, 1992, pp. 35 - 54.
- RICHARDS**, P.: "Indigenous Agricultural Revolution. Ecology and food production in West Africa". London, 1985

- RICHARDS, P.:** "Cultivation: Knowledge or Performance?" In: **HOBART, M. (ed.)** "An Anthropological Critique of Development." London, UK, and New York, USA, 1995, pp 61-78
- RICHARDS, P., SLIKKERVEER, L.J., PHILLIPS, A.O.:** "Indigenous Knowledge Systems for Agriculture and Rural Development: The CIRKARD Inaugural Lectures". Studies in Technology and Social Change, No. 13. Ames, 1989
- RITTER, W.:** Wie verhalten sich Wissenschaftler bzw. Experten gegenüber bäuerlichem Wissen und was sind die möglichen Gründe dafür. In: *Zeitschrift der Arbeitsgemeinschaft Entwicklungsethnologie*, Heft 1, 1994, 3. Jg. Köln, 1994 pp 35-40
- RÖLING, N.:** "Communication Support For Sustainable Natural Resource Management". In: *IDS Bulletin* Vol. 25, No. 2 London, 1994, pp 125-133
- RÖLING, N., ENGEL, P.:** "Indigenous Knowledge Systems Management: Utilizing Indigenous Knowledge in Institutional Knowledge Systems." In: **WARREN, D.M., SLIKKERVEER, L.J., TITILOLA, S.O. (eds.):** "Indigenous Knowledge Systems: Implications for Agriculture and International Development." Studies in Technology and Social Change, No. 11. Ames, 1989, pp 101-105
- ROSENBERG, N.:** "Economic Development and the Transfer of Technology. Some Historical Perspectives". In: *Technology and Culture*, Vol. 1, No. 4, Baltimore, 1970, pp 550-575
- ROSS, L.:** "Environmental Policy in China." Bloomington and Indianapolis, 1988
- ROSS, L., SILK, M.A.:** "Environmental Law and Policy in the People's Republic of China". New York, 1987
- ROZELLE, S.:** "Decision Making in China's Rural Economy: The Linkages Between Village Leaders and Farm Households." In: *China Quarterly No 137*. London, March 1994, pp 99-124
- RURAL Advancement Foundation International:** "Conserving Indigenous Knowledge. Integrating Two Systems of Innovation." UNDP, 1994
- SACHS, W.:** "Development Dictionary. A guide to Knowledge as Power". London, 1992
- SAITO, K., SPURLING, D.:** "Developing Agricultural Extension for Women Farmers." World Bank Discussion Papers 156, Washington DC, USA, 1992
- SALAS, M.A.:** "The Technicians only believe in Science and Cannot Read the Sky: The Cultural Dimension of Knowledge Conflict in the Andes." In: **SCOONES, I., THOMPSON, J (eds.):** "Beyond Farmer First. Rural People's Knowledge, Agricultural Research and Extension Practice." London, 1994, pp 57-68
- SAMPLE, V.A. (ed.):** "Remote Sensing and GIS in Ecosystem Management." Washington, D.C., 1994
- SAVENIJE, H., HUIJSMAN, A.:** "Making Haste Slowly. Strengthening Local Environmental Management in Agricultural Development". KIT Amsterdam, 1991
- SCHOENHOFF, D.M.:** "The Barefoot Expert: The Interface of Computerized Knowledge Systems and Indigenous Knowledge Systems." Westport 1993

- SCHRÖDER, P.:** "Lokales Wissen als konstruktives und kritisches Potential für die Entwicklungszusammenarbeit". In: **HONERLA, S., SCHRÖDER, P.:** "Lokales Wissen und Entwicklung. Zur Relevanz kulturspezifischen Wissens für Entwicklungsprozesse. Beiträge der Local-Knowledge-Tagung." Saarbrücken, Germany, 1995
- SCHUCHER, G.:** "Asien zwischen Ökonomie und Ökologie - Wirtschaftswunder ohne Grenzen?" Hamburg, 1998
- SCHUURMAN, F.J. (ed):** Current Issues in Development Studies. Global Aspects of Agency and Structure, Nijmegen Studies in Development and Cultural Change Vol 21, Nymegen 1994, pp 56-89
- SCHWARTZ, B.I.:** "The World of Thoughts in Ancient China." Cambridge, MA, USA, 1985
- SCOONES, I., THOMPSON, J.** "Knowledge, Power and Agriculture – towards a Theoretical understanding" In: **SCOONES, I., THOMPSON, J. (eds.):** "Beyond Farmer First. Rural People's Knowledge, Agricultural Research and Extension Practice." London, 1994, pp 16-32
- SCOONES, I., THOMPSON, J (eds.) (a):** "Beyond Farmer First. Rural People's Knowledge, Agricultural Research and Extension Practice." London, 1994
- SEN, N.C.:** "Rural Economy and Development in China". Beijing, 1990
- SEUR, H.:** "The Engagement of Researchers and Local Actors in the Construction of Case Studies and Research Themes." In: **LONG, N., and LONG, A. (eds.):** "Battlefields of Knowledge. The Interlocking of Theory and Practice in Social Research and Environment." London and New York, 1992, pp 115-146
- SHEN, T.H.:** "Agricultural Resources of China". Ithaca, NY, USA, 1951
- SHIH Shenghan:** "On Fan Sheng Chih Shu, an Agriculturist Book of China". Beijing China, 1959
- SHIH Shenghan:** "A Preliminary Survey of the Book 'Ch'i Min Yao Shu', an Agricultural Encyclopedia of the 6th Century". Beijing, China, 1962
- SHI Yuanchun, CHENG Xu (eds.):** "Integrated Resource Management for Sustainable Agriculture. Proceedings of the International Conference." Beijing, PR China, 1994
- SHIH, J.C.:** "Chinese Rural Society in Transition. A Case Study of the Lake Tai Area, 1368 - 1800". University of California, USA, 1992
- SHIVA, V.:** "Resources" In: **SACHS, W.:** "Development Dictionary. A Guide to Knowledge as Power". London, 1992, pp 206-218
- SHIVA, V.:** "Trading Our Lives Away. An Ecological and Gender Analysis of 'Free Trade' and the WTO". Penang, Malaysia/New Delhi/India, 1995
- SHIVA, V.:** "Women's Indigenous Knowledge and the Conservation of Biodiversity". In: **MIES, M. and SHIVA, V.:** "Ecofeminism". London, 1993, pp 164-175
- SHUE, V.:** "Peasant China in Transition: The Dynamics of Development Toward Socialism, 1949-1956." Berkeley 1980

- SIKANA, P.:** "Indigenous Soil Classification in Northern Zambia". In: **SCOONES, I., THOMPSON, J (eds.):** "Beyond Farmer First. Rural People's Knowledge, Agricultural Research and Extension Practice." London, 1994, pp 80-82
- SLIKKERVEER, L.J., DECHERING, W.:** "LEAD: The Leiden Ethnosystems and Development Programme." In: **WARREN, D.M., SLIKKERVEER, L.J., BROKENSHA, D.:** "The Cultural Dimension of Development. Indigenous Knowledge Systems." IT Publications, London, 1995, pp 435-440
- SLOCUM, R. WICHHART, L., ROCHELEAU, D. THOMAS-SLAYTER, B. (eds.):** "Power, Process and Participation. Tools for Change" London, 1995
- SMIL, V.:** "China's Environmental Crisis. An Inquiry into the Limits of National Development". Armonk, New York, USA, 1993
- SMIL, V.:** "Who Will Feed China?". In: *China Quarterly 143*, September 1995 London, 1995, pp 801-813
- SMITH, R.J.:** "China's Cultural Heritage. The Qing Dynasty, 1644 - 1912." Boulder, USA, 1994
- SONG Zhenghai:** "Water Conservancy Projects and Knowledge of Hydrology". In: **INSTITUTE of the History of Natural Sciences, Chinese Academy of Sciences (ed.):** "Ancient China's Technology and Science". China Knowledge Series, Beijing, PR China, 1987, pp 236-249
- SPENCE, J.:** "The Memory Palace of Matteo Ricci". New York USA, 1985
- STAFFORD, C.:** "The Old Culture in the New China". In: *China Review Autumn/Winter* London, 1995, pp 29-32
- STATE LAND ADMINISTRATION:** Brief Introduction. Beijing, 1996
- STATE LAND ADMINISTRATION:** "*Zhonggong Zhongyang Guowuyuan Guanyu Jinyibu Jiaqin Tudi Guanli Qieshi Baohu Gengdide Tongzhi*". *Xuexi Cankao Ziliao*. (State Council on Further Strengthening of Land Management and Protection of Arable Land". Study Paper. Beijing, 1997
- STEIN, P.:** "China Learns to Like Migrant Workers". In *Dow Jones News* December 1995, The Internet, 1995
- STEINER, F.R., van LIER H.N. (eds.):** "Land Conservation and Development. Example of Land Use Planning Projects and Programs." Amsterdam, 1984
- STERNFELD, E.:** "Beijing: Stadtentwicklung und Wasserwirtschaft. Sozio-ökonomische und ökologische Aspekte der Wasserkrise und Handlungsperspektiven". Berlin, 1997
- STEVENSON, M.G.:** "Indigenous knowledge in Environmental Assessment." In: *Arctic*, Vol. 49, No. 3, Alberta 1996, pp 278-291
- STOVER, L.E.:** "China: an Anthropological Perspective" Pacific Palisades, 1976
- STROSS, R.E.:** "The Stubborn Earth. American Agriculturists on Chinese Soil 1898 - 1937". Berkeley, Los Angeles, London, 1986
- SU Yongge, MILNE, D. (eds.):** "Second International Congress Of Ethnobiology. 'The Challenges of Ethnobiology in the 21st Century'". Abstracts. October 22 - 26, Kunming, China, 1990

- SÜLZER, R.:** "Organisieren und Organisationen verstehen: Wege der internationalen Zusammenarbeit." Opladen, 1996
- SUN Han; WITTWER, S., et al.:** "Feeding a Billion. Frontiers of Chinese Agriculture" East Lansing, USA, 1987
- SUN, P.:** "Land and Water Management in Asia" Economic Development Institute of the World Bank. Policy Seminar Report No. 20 Washington DC, 1989
- TABOR, J., HUTCHINSON, C.:** "Using Indigenous Knowledge, Remote Sensing and GIS for Sustainable Development." In: *Indigenous Knowledge & Development Monitor*, Vol. 2/No. 1, 1994, pp 2-6
- TANG, A.M.:** "China's Agricultural Legacy." In: *Economic and Cultural Change*, 1979, pp. 1-22
- TANG, A.M.:** "Land Policy, Farm Management and Agrarian Reform in China under Socialism". In: *Internationales Asienforum*, Vol. 23 (1992), No. 1-2, 1992, pp. 81-100
- TANG Ivan:** "Dirty water, dying river blocking north's development, delegates claim" In: *South China Morning Post*. March 15, 1999
- TAO, L.K.:** "Livelihood in Peking. An analysis of the budgets of sixty families" Peking, 1928
- TAWNEY, R.H.:** "Land and Labor in China". London, Great Britain, 1932
- TAWNEY, R.H.:** "Agrarian China". New York, USA, 1938
- TEMPLE, R.:** "The Genius of China. 3000 Years of Science, Discovery and Invention." London, 1991
- THOMPSON, J., SCOONES, I.:** "Challenging The Populist Perspective: Rural Peoples' Knowledge, Agricultural Research, And Extension Practice." In: *Agriculture and Human Values* 11(2/3), 1994 pp 58-76,
- TRIPATHI, P. et al.:** "The AFNETA Farming Training Manual: Sourcebook for Alley Farming Research". Ibadan 1992
- THRUPP, L.A.:** "Optimizing Local Knowledge: From Displacement Environmental to Empowerment for Third World People". In: *Agriculture and Human Values*, Vol 6, No 3, 1989a, pp 13-24
- THRUPP, L.A.:** " Legitimizing Local Knowledge: 'Scientizied Packages' or Empowerment for Third World People." In: **WARREN, D.M., SLIKKERVEER, L.J., TITILOLA, S.O.** (eds.): "Indigenous Knowledge Systems: Implications for Agriculture and International Development". Studies in Technology and Social Change, No. 11. Ames, 1989b, pp 138-154
- THÜMMEL, M.:** "Bodenordnung und Immobilienrecht in der Volksrepublik China." Mitteilungen des Instituts für Asienkunde Hamburg, Nummer 255, Hamburg, 1995
- TITILOLA, S.O.** "The Economics of Incorporating Indigenous Systems into Agricultural Development: A Model and Analytical Framework." Studies in Technology and Social Change, No. 17. Ames, 1991

- TITILOLA, S.O., MARSDEN, D.** "Indigenous Knowledge as Reflected in Agricultural and Rural Development." In: **WARREN, D.M., SLIKKERVEER, L.J., BROKENSHA, D.:** "The Cultural Dimension of Development. Indigenous Knowledge Systems." IT Publications, London, 1995
- TU Weiming** (ed.): "China in Transformation," Cambridge, USA, 1994
- UFFORD, van, P.C.:** "Knowledge and Ignorance in the Practices of Development Policy." In: **HOBART, M.** (ed.) "An Anthropological Critique of Development." London, UK, and New York, 1993, pp 135-160
- UNITED NATIONS COMMISSION** on Science and Technology Development, Gender Working Group: "Missing Links. Gender Equity in Science and Technology for Development". IRDRC, Ottawa, Canada, 1995
- UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT:** "Agenda 21, Chapter 14: Promoting Sustainable Agriculture and Rural Development". Rio de Janeiro, 1992
- UNITED NATIONS DEVELOPMENT PROGRAM:** "Benefits of Diversity. An Incentive Towards Sustainable Agriculture". New York, 1992
- UPHOFF, N.:** "Local Institutions Development: An Analytical Sourcebook with Cases". West Hartford, 1986
- UPHOFF, N.:** "Local Institutions and Participation for Sustainable Development." IIED Gatekeeper Series No. 31, London, 1992
- VERMEER, E.B.:** "Industrial Pollution in China and Remedial Policies". In: *The China Quarterly*, 156, December 1998. London, 1998, pp 952-985
- WAKEFIELD, D.:** "Fenjia – Household Division and Inheritance in Qing and Republican China". Hawaii 1998
- WANG, G.:** "Traditional Thinking on Population in China". In: *China Report* 31: 3 New Delhi 1995, pp 331-348
- WANG, Xiyu:** "Case Study on the Chinese Arable Land System - a Comparative Analysis on the Data of Pingdu Municipal County, Wuxi County and Leqing County." In: "Transition of China's Rural Land System. Papers from the International Symposium on Rural Land Issues in China 1992". Land Tenure Center Paper 151, Madison 1995 pp 125-144
- WARREN, D.M., SLIKKERVEER, L.J., BROKENSHA, D.:** "The Cultural Dimension of Development. Indigenous Knowledge Systems." IT Publications, London, Great Britain, 1995
- WARREN, D.M., SLIKKERVEER, L.J., TITILOLA, S.O.** (eds.): "Indigenous Knowledge Systems: Implications for Agriculture and International Development." Studies in Technology and Social Change, No. 11. Iowa, USA, 1989
- WARREN, D.M.:** "Using Indigenous Knowledge in Agricultural Development". World Bank Discussion Papers, No. 127. Washington, 1991
- WEGGEL, Oskar,** "Wem gehört der Boden? Bodenrecht und Bodenreform". In. Das Neue China 3/89. Hamburg, 1989, pp 20-23

- WEI** Hu: "Household Land Tenure Reform in China: Its Impact on Farming Land Use and Agro-Environment." In: *Land Use Policy*, Vol 14, No. 3, London 1997, pp 175-186
- WORLD BANK**: "Marshaling Knowledge for Development". World Bank Policy Research Bulletin, March - April 1992, Vol. 3. No. 2. Washington DC, 1992
- WORLD BANK**: "World Bank Participation Sourcebook". Social Policy and Resettlement Division. Washington DC, USA, 1995
- WORLD PRESS REVIEW**: "China's Rising Grain Consumption Worries Some International Observers". Trough the Internet, 1996
- WRIGHT**, S. (ed.): "Anthropology of Organizations". New York, USA, 1994
- WRIGHT**, S.: "Culture in Anthropology and Organizational Studies". In: **WRIGHT**, S.: "Anthropology of Organizations". New York, USA, 1994, pp 1-34
- WRIGHT**, W.: "Wild Knowledge. Science, Knowledge and Social Life in a Fragile Environment." Minnesota, USA, 1992
- XIE** Jingrong: "On Sustainable Utilization of Land" In: "China Population, Resources and Environment" 1996, Beijing, pp 13-18
- YAN** Yunxiang: "The Flow of Gifts. Reciprocity and Social Network in a Chinese Village." Stanford, 1996
- YANG** Yinghui: "China: Rural Reform and Agricultural Extension. Change in extension Organization and Service Delivery in the Yangzi Delta a Developed Area of China". In: *Rural Extension Bulletin*, December, Reading, 1993, pp 24-28
- YANG**, M.C.: "A Chinese Village. Taitou, Shantung Province." New York, 1945
- YE** Jinzhong: "Promotion of Farmers' Participation in Sustainable Forestry Development in China". M.Sc. Dissertation, Larenstein Agricultural College, 1996
- YOUNG**, C. (ed.): "Ching Ho: A Sociological Analysis. The Report of a Preliminary Survey of the Town of Ching Ho, Hopei, North China. Yenching, Peiping (Beijing), 1930
- YU** Tzong-shian (ed.): "Agricultural Development in China, Japan and Korea". Taipei, 1982
- YU** Youtai: "Agricultural History Over Seven Thousand Years." In: **SUN** Han; **WITTWER**, S. et al.: "Feeding a Billion. Frontiers of Chinese Agriculture" East Lansing, USA, 1987, pp 19-33
- ZHANG** Chunyin, **KONG** Min: "The Price of Land and the Payment of Fees for Land Use in Socialist Economy." In: **ROSS**, L., **SILK**, M. A.: "Environmental Law and Policy in the People's Republic of China". New York, 1987, pp 171-181
- ZHANG** Fengrong: "Soil Map of the Peoples' Republic of China". Revised by the Beijing Agricultural University Working Group on "Land Resources Use Productivity Assessment" and the State Land Administration, Beijing 1990
- ZHANG** Wengfang, **MAKEHAM**, J.: "Recent Developments in the Market for Rural Land Use in China". *Land Economics* 68 (2), Wisconsin, USA, May, 1992, pp 139-162

**ZHAO** Songqiao: "Geography of China. Environment, Resources, Population, and Development". New York, USA, 1994

**ZHONG**, S.Z.: "Ancient China's Scientists". Hong Kong, 1984

**ZHOU** Weiwen: "Water Resources and Development of Women in Arid Regions in Northern China." In: *Natural Resources Forum*, Vol. 20, No. 2, London, 1995, pp 105-109

**ZHOU**, Xiao Kate: "How Farmers Changed China. Power of the People." Oxford, 1996

**ZHU** Ling, **JIANG** Zhongyi: "From Brigade to Village Community: the Land Tenure System and Rural Development in China." In: *Cambridge Journal of Economics*, Vol.17, 1993, pp 441-461