WEILAI and Rural China: Development and application of a multidimensional tool for project planning, monitoring and evaluation

Technical Report[1]

Prepared for the Asia Pacific Division,

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Figure 1: Farmers in XinHua Township – Guangxi, China

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Rome

[1] Executive Summary & Appendices only. Please email, a.cohen@ifad.org, for a copy of the full report.

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Full Report

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Executive Summary

Overview

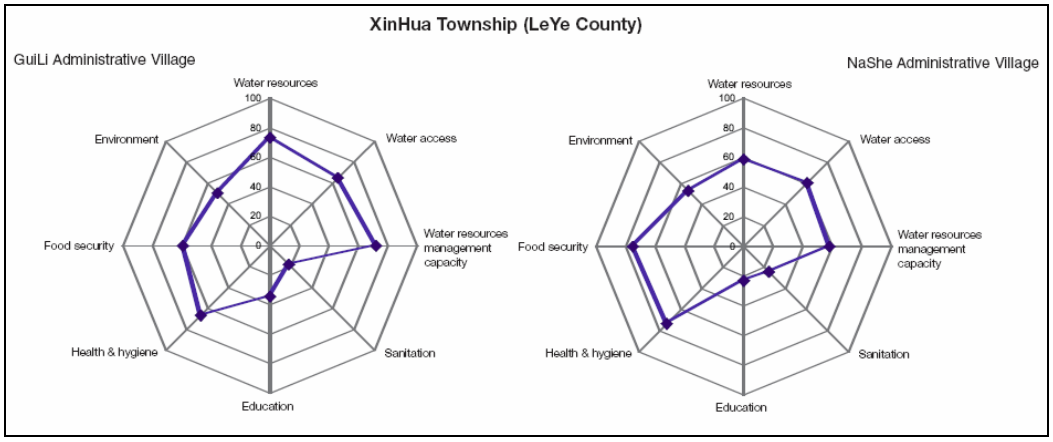
The Water, Economy, Investment, Learning and Assessment Indicator (WEILAI) – which means "future" in Mandarin – is a new tool, developed in China, for the multidimensional assessment of rural poverty. Based on the sustainable livelihoods and basic needs frameworks of poverty alleviation, WEILAI is designed to support the planning, monitoring and evaluation of rural poverty alleviation projects.

Specifically, WEILAI is a thematic indicator: a collection of eight composite indicators that together provide a multidimensional, proxy measure of an area's poverty by assessing key poverty components to identify which sectors are most in need. As the biophysical and socioeconomic impacts of climate change are increasingly felt around the world there is a pressing need for multidimensional tools, such as WEILAI, to support knowledge sharing and planning aimed at bolstering the adaptive capacity of the rural poor. With this framework in mind, WEILAI has a strong focus on water poverty (after Sullivan's Water Poverty Index) since water is central to rural livelihoods, poverty and poverty alleviation, and cross-cuts all of the Millennium Development Goals.

Why WEILAI is needed, and what role it fills

Project monitoring and evaluation are crucial to poverty alleviation efforts, especially since donors, planners, governments and beneficiaries alike want objective data that testify to a given project's performance. WEILAI is designed to support regional planning, monitoring, reporting and evaluation, so that all parties involved have a readily understandable, standardized, visual tool with which to examine the status of a given intervention and/or to make comparisons between interventions. As the graphs below show, WEILAI quickly reveals which sectors may be most in need of further interventions (it can be used for targeting and prioritization as well).

Specifically, WEILAI can be calculated before project implementation (project planning), for the baseline survey and mid-term review (project monitoring), and for the project completion report (project evaluation). The intervals between implementing WEILAI (about three years) allow for the measurement of temporal processes in action across all eight components. However, while WEILAI is a highly useful tool, it, like all indicators, provides only a proxy measure of reality, and thus any policy decisions, planning or interventions based on WEILAI should be preceded by more in-depth examinations of the data upon which WEILAI is based, visits to the field and other tools.



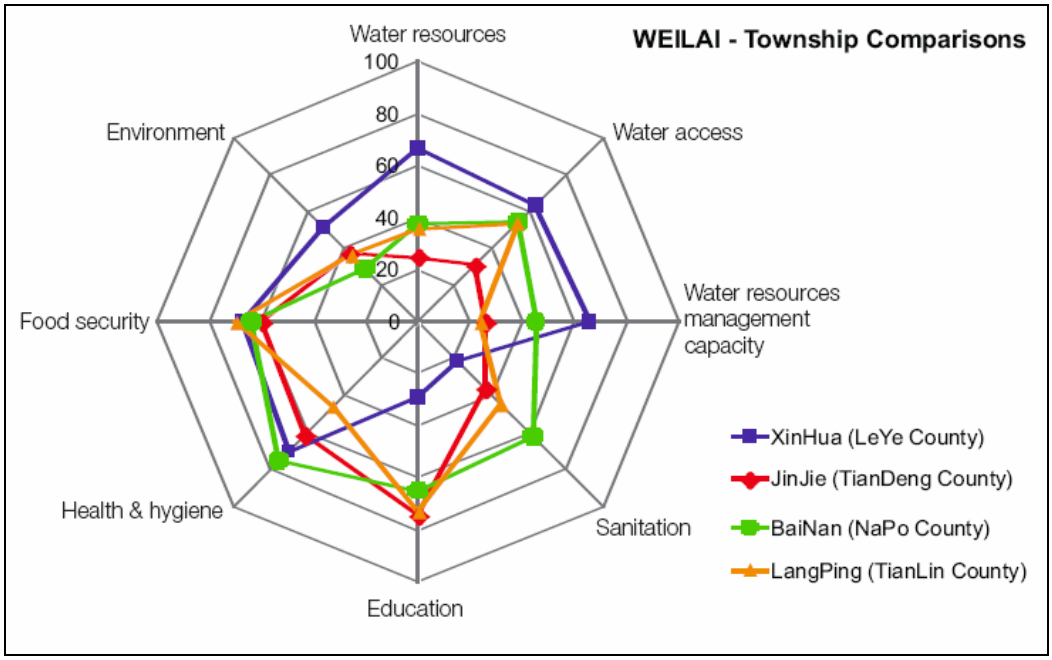
The research context

WEILAI was piloted in 2007 at the site of the IFAD-supported West Guangxi Poverty-Alleviation Project (2002-2008) in south China. Guangxi is typified by karst

topography, and the climate is southsubtropical with droughts in the spring and autumn and floods in the summer. Project participants include 1.3 million people in 260,000 households, living in about 10,600 villages. Calculated from data gathered via 534 household surveys in 71 villages, WEILAI accurately differentiates among administrative regions allowing for the assessment and comparison of administrative regions and townships on WEILAI's eight poverty components.

WEILAI's construction and calculation

Each of WEILAI's eight components (i.e., composite indicators), is in turn based on three subcomponents – which are in turn derived from multiple sources of data (mostly from survey data, but also from interviews and measurements in the field). WEILAI can be implemented via survey and/or with existing data (e.g. census data) depending on the context and data quality and availability. The data collected to calculate WEILAI naturally fall on a variety of scales and are therefore normalized (to a 0- 100 scale) before the subcomponents are calculated and then aggregated (i.e. mathematically combined) using an expert weighting scheme to yield the final WEILAI component values. Data are scaled so that for all subcomponent and component scores 100 is the high, or positive, value. The data from Guangxi were first aggregated from the household level to the Administrative Village level (see previous page), and then to the Township level (see figure below).



Ongoing and future development

The project management offices in Guangxi are using WEILAI for the West Guangxi Poverty-Alleviation Project completion report (to be issued in 2008) and WEILAI has also sparked a great deal of interest and positive feedback both in-house and from other institutions. Specifically, the work has been peer-reviewed by IFAD's Technical Advisory Division and experts at the Food and Agriculture Organization of the United Nations, the World Food Programme and Oxford University. At present, there are plans to further test and develop WEILAI in other parts of rural China in order to fine-tune the methodology, potentially scaling it up for formal incorporation into poverty alleviation project surveys and perhaps eventually elsewhere in Asia and beyond. Specifically, a Thematic Indicator of Rural Poverty (TIRP) could be developed, tested and implemented in Asia.

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Note: All Appendices are presented in English and Chinese. The final versions used during the research (i.e., Appendices II, IV, V and VI) were only in Chinese.

List of Abbreviations & Acronyms

1WR	Water Resources Component
2WA	Water Access Component
3WRMC	Water Resources Management Capacity Component
4S	Sanitation Component
5E	Education Component
6HH	Health & Hygiene Component
7FS	Food Security Component
8E	Environment Component
AV	Administrative Village
CFA	Confirmatory Factor Analysis
EFA	Exploratory Factory Analysis
FA	Factor Analysis
GIS	Geographic Information System
GPS	Global Positioning System
HDI	Human Development Index
HDR	Human Development Report
HH	Household
IFAD	International Fund for Agricultural Development
NV	Natural Village
PMO	Project Management Office
PPME	Project Planning, Monitoring & Evaluation
PSA	Partial-Sensitivity Analysis
RIMS	Results & Impact Management System
SA	Sensitivity Analysis
WB	World Bank
WEILAI	Water, Economy, Investment, Learning & Assessment Indicator
WPI	Water Poverty Index
WRM	Water Resources Management
WSS	Water Supply System
WUG	Water User Group

Currency Equivalents & Measures

USD ($) 1	=	CNY (¥) 8.28	July, 2000
USD ($) 1	=	CNY (¥) 8.24	July, 2005
USD ($) 1	=	CNY (¥) 7.58	July, 2007
CNY (¥) 1	=	USD ($) 0.121	July, 2000
CNY (¥) 1	=	USD ($) 0.121	July, 2005
CNY (¥) 1	=	USD ($) 0.132	July, 2007

1 hectare (ha)	=	15 亩 (*mu*)
1 亩 (*mu*)	=	0.667 hectare (ha)

8. Appendices

Appendix I: Calculating WEILAI

The methodology behind the calculation of WEILAI is based largely on that of the WPI and HDI. Each of the eight main components are in turn composed of at least 3 subcomponents each which in turn are based on at least one source of data each, and in many cases more. Given the variety of data collected and the variety of scales used, all the data was normalized (using a 0-100 scale). Data based on the percentage of HHs who respond in a given fashion lend themselves easily to scaling at 0-100. However, in cases where the collected data is ordinal, values have been assigned as illustrated in the respective tables, and then scaled to a 0-100 scale. For the data which were normalized the following formula was used to calculate the values for each AV:

$$x_i - x_{min} / x_{max} - x_{min}$$

In instances where the scale naturally already has a zero, normalization can be simplified by dividing a given value by the set's high value (the same result achieved by using the formula above). In many cases where a given dataset's high value was not necessarily the best or optimum value achievable the data was amplified by 20% (as was done in the WPI).

The same structure is followed for each of the components below in order to ensure that the calculations behind the final WEILAI scores are as transparent as possible and the rationale for calculating them likewise explicit. The behind-the-scenes calculations of any indicator are often riddled with subjectivity and "expert" judgments made on the part of the person or persons compiling the data. This is unavoidable and one of the central problems with indicators. Given the relatively arbitrariness of indicator calculation every effort was made herein to explain both the calculations involved as well as the rationale behind them. In many instances the specifics of the setting (i.e., rural Guangxi China) dictated the methodology.

For each component a brief description of the component and justification for its inclusion in WEILAI is provided, followed by an overview of the weightings assigned to the subcomponents (and in cases their subcomponents). For each subcomponent the source of the data is first highlighted (whether this is from the questionnaire or data collected in the field) followed by a brief explanation/justification for the inclusion of the subcomponent. Values assigned to survey responses/data are displayed in tables and explained in the text above them, as are the calculations involved for each of the subcomponents and their subcomponents. Weightings are described in the text and listed in the tables. In this write up, *N* is listed only when there is a significant amount of missing data in order to highlight the proportion of HH's who provided valid data for a given item. If *N* is not listed, the reader can assume that none or only some data was missing from the set in question.

1. WATER RESOURCES (1WR)

1WR evaluates the water supply from the HH's primary water source which they use for domestic and limited agricultural use (i.e., close to the HH). 1WR provides an indirect measure of the probable reliability of water supply and water quality the HH uses, as well as a rough gauge of whether water quality is improving or worsening.

One of the strengths of WEILAI is that detailed quantitative data on water resources, such as inflows, outflows to a watershed and abstraction rates are not required, nor are qualitative data such as pH or Biological Oxygen Demand (BOD). While this significantly reduces the cost of calculating WEILAI admittedly important data are left out. Another "failing" of 1WR is that it does not provide a reliable means of assessing the state of groundwater – which can be especially problematic in areas of Karst topography where groundwater is very susceptible to water pollution (Vias et al., 2006). However, adequate water resources data can be roughly gauged based on the type of supply source (for example, the water quality of a spring will most often be higher than that of a pond).

If the WEILAI 1WR indicator reveals potential problems then a more detailed investigation of abstraction and renewal rates as well as water quality data could be implemented. The primary advantage of WEILAI then is that easily obtained data can be used as a proxy for water resources assessment allowing WEILAI to identify hotspots which require more detailed investigation - saving the time and expense of blanket assessments of water resources. This is especially useful where reliable data on water supply, demand and quality do not exist (as in much of the developing world).

Admittedly much of the data on water quality is based on subjective assessments made by the member of the HH surveyed which is why 1WR_1.2 and 1WR_1.3 are given a combined weight of 0.5, the other 0.5 being the value of 1WR_1.1 upon which more reliable assessment can be made (on average).

1.1 Primary HH water source for HH use & limited HH agricultural use

Question asked on survey (#5.1 & #5.2):
What is your HH's main source of gathered water (for all purposes) in the dry season? Dry season source of water_____, Rainy season source of water_____.

During the training sessions survey teams were instructed that if the need for clarification arose in the course of the interview, a "HH's main source of water" was understood to mean the HH's main source of water for domestic and limited agricultural use (i.e., close to the living space). The answers to question #5 were selected from the list of choices below. Each of these choices has been assigned a value from 0-100, 100 being the best score (see the table below). Granted, one could argue for different rankings of these water sources, but based on the field-sites in which the survey was conducted these rankings are viewed as sufficiently accurate for the purpose at hand. Again, the values below are based on the probable quality and reliability of water supply given the type of water source.*

Source	Value	Source	Value
1-Pipe in HH	95	11-River	30
2-Pipe outside HH	90	12-Stream	35
3-Pipe outside HH – shared use	80	13-Water Vender	50
4-Small Dam	30	14-Rainwater	40
5-Borehole (private)	75	15-Protected Tank (private)	70
6-Borehole (public)	70	16-Protected Tank (public)	65
7-Well (private)	65	17-Unprotected Tank (private)	60
8-Well (public)	60	18-Unprotected Tank (public)	55
9-Natural pond	30	19-Public Water Supply System	85
10-Spring	65	20-Other	30

*These values were determined via consultation with other water experts.

Values were calculated for each HH's choice and the mean values for each AV were scaled using 100 as the max value for both Dry and Rainy Season sets and 52.77 and 58.07 respectively as the min values. These scaled values were combined with a 0.7 weight given to the HH water source in the Rainy Season and a 0.3 weight to the HH water source in the Dry Season to yield the final score for 1WR_1.1. These weights are based on the average duration of the Dry Season in the survey area (i.e., from November to January).

AV	Dry Season mean	Rainy Season mean	Dry Scaled	Rainy Scaled	**1WR_1.1 Scaled (0-100)**
weighting	-	-	*0.3*	*0.7*	
MengYang	52.77	61.06	0.00	7.13	**4.99**
PinLi	63.72	63.96	23.19	14.05	**16.79**
GuiLi	92.54	92.54	84.20	82.20	**82.80**
NaShe	80.42	84.58	58.54	63.21	**61.81**
ShangLong	88.70	88.70	76.08	73.06	**73.97**
NongMin	58.07	58.07	11.23	0.00	**3.37**
TangHe	64.54	66.15	24.92	19.27	**20.97**
XiHua	64.03	78.29	23.84	48.21	**40.90**

1.2 HH's subjective assessment of their water quality

Question asked on survey (#9.1 & #9.2):
Generally, what is the quality of the water you gather from your main source?
Dry season_____, Rainy season _____.

This question sought to gauge HH water quality based on the subjective assessments of HH members. Answers were scored on a 1-4 bipolar scale with the values below (the min and max for the scale [0 and 100] were deliberately left out in order to cushion the uncertainty in the responses).

Response	Value
1-Bad	10
2-Poor	30
3-Fair	60
4-Good	90

Values were calculated for each HH's choice and the mean values for each AV were scaled using 100 as the max value for both Dry and Rainy Season sets and 31.67 and 11.39 respectively for the min values. These scaled values were combined with a 0.7 weight to the HH water source in the Rainy Season and a 0.3 weight to the HH water source in the Dry Season to yield the final score for 1WR_1.2 (as in 1WR_1.1).

AV	Dry Season mean	Rainy Season mean	Dry Scaled	Rainy Scaled	**1WR_1.2 Scaled (0-100)**
weighting	-	-	*0.3*	*0.7*	
MengYang	40.85	33.62	20.10	29.61	**26.76**
PinLi	60.37	25.00	46.46	20.47	**28.27**
GuiLi	68.45	70.56	57.38	68.79	**65.36**
NaShe	63.50	64.00	50.69	61.83	**58.49**
ShangLong	59.44	60.00	45.22	57.58	**53.87**
NongMin	33.98	35.78	10.81	31.91	**25.58**
TangHe	57.69	59.08	42.85	56.61	**52.48**
XiHua	25.97	5.69	0.00	0.00	**0.00**

1.3 How water quality has changed in the last five years

Question asked on survey (#10):
How has the quality of available water changed over the last five years?

This subcomponent provides an indication of how the HH's water quality has changed over the last few years. Granted the assessment is a subjective one, but it is assumed that HH members are better able to discern significant changes to the quality of their water over time than they are able to assess their water quality as in 1WR_1.2. Thus, 1WR_1.3 provides a balance to 1WR_1.2. Answer choices were assigned the values below.

Response	**Value**
1-Worse	0
2-Same	50
3-Better	100
4-Don't Know	Not scored

The mean values for each AV were calculated with the values above to provide the scores used for the final 1WR_1.3 scaled scores below.

AV	mean	**1WR_1.3 Scaled (0-100)**
MengYang	33.75	**33.75**
PinLi	52.70	**52.70**
GuiLi	61.97	**61.97**
NaShe	54.17	**54.17**
ShangLong	51.89	**51.89**
NongMin	50.00	**50.00**
TangHe	52.50	**52.50**
XiHua	78.87	**78.87**

WATER RESOURCES FINAL SCORE

Administrative Village		**1.1**		**1.2**		**1.3**		**1WR**
weighting		*0.5*		*0.25*		*0.25*		
	total n	n		n		n		
MengYang	n=47	47	4.99	47	26.76	40	33.75	**17.62**
PinLi	n=82	82	16.79	82	28.27	74	52.70	**28.64**
GuiLi	n=71	71	82.80	71	65.36	71	61.97	**73.23**
NaShe	n=60	60	61.81	60	58.49	60	54.17	**59.07**
ShangLong	n=54	54	73.97	54	53.87	53	51.89	**63.43**
NongMin	n=83	83	3.37	83	25.58	81	50.00	**20.58**
TangHe	n=65	65	20.97	65	52.48	*20*	*[52.50]*	**31.47**
XiHua	n=72	72	40.90	72	0.00	71	78.87	**40.17**

*Due to missing data for 45 of the 65 HHs in TangHe on question #10 the 1WR score for TangHe was calculated using only 1WR 1.1 & 1.2 at 0.66¯ and 0.33¯ weighting respectively (the calculated 1WR score for TangHe with 1.3 included would have been 60.06).

2. WATER ACCESS (2WA)

Even if water is available, and even in great supply (regardless of the type of WR) this alone does not ensure that access to that water is equitable. "[S]ocial and economic barriers to access create conditions of scarcity and water 'poverty', even where water is abundant" (Sullivan and Meigh, 2003, p.526). Throughout the developing world, women and minorities often suffer the most from a lack of equitable access to water. This component seeks to measure the average HH's access to water. Access to water resources can be approximated by assessing the time needed to collect water, which in turn is largely a function of the distance to the water source as well as the time spent doing so (since the time it takes to walk any given distance differs greatly by area/topography).

Subcomponent 2WA_2.3 measures a HH's relative income potential and wealth via two proxies – the percentage of adults who live and work outside the HH (2WA_2.3a) and the value of the HH's key durable goods (2WA_2.3b). This data, rather than readily available GDP data, is used because 2WA_2.3 attempts to measure HH income and wealth by proxy since more traditional measures of income, such as GDP, often do not accurately reflect rural HH incomes (Sullivan, 2006, Streeten, 1981). Moreover, many such constructs do not always measure what they purport to, taking GDP as an example since as Jain (2003) points out, war and environmental plunder contribute to increasing GDP just as cigarette sales do as well.

Even if water is available, and even in great supply (regardless of the type of WR) this alone does not ensure that access to that water is equitable. Throughout the developing world, women and minorities often suffer the most from a lack of equitable access to water. This component seeks to measure the average HH's access to water. Access to water resources can be approximated by assessing the time needed to collect water, which in turn is largely a function of the distance to the water source.

A HH's relative wealth can provide a buffer to temporary water stress and generally also provides a good indicator of access to water resources. This component is primarily based on these two subcomponents, and to a much lesser

extent on a rough assessment of would-be willingness to pay (WTP). However, at present, most communities surveyed do not pay monthly fees for water service provision (or pay very minimal fees).

Given the subjective and hypothetical nature of the data 2WA_1.1 was given a weight of only 0.1 for the 2WR component. Given assorted problems with data collection for #7, and the large amounts of missing data, 2WA_2.2a and 2WA_2.2b have been combined into 2WA_2.2 for the calculation of 2WA in order that their total influence on the final value of 2WA is not too extreme. To achieve this, their combined weight is 0.4 for the 2WA component with 0.3 weight assigned to 2WA_2.2a and 0.1 to 2WA_2.2b. HH wealth is a crucial aspect in determining access to water (and WTP and capacity to pay) which is why 2WA_2.3 was given a total weight of 0.5 (0.2 weight for 2WA_2.3a and 0.3 weight for 2WA_2.3b).

2.1 Is water affordable if HH were required to pay?

Question asked on survey (#6):
If you [were to] pay for water from your main source, do you feel it is [would be*] affordable for your HH? (direct payment only – not maintenance etc.)*

*The Chinese translation of the question (in brackets "[]") asks HH respondents if they were to pay for water would they feel it was affordable whereas the original intention of the question was "if you are currently paying for water, do you feel it is affordable?"

In spite of the error in the translation of this question the data is still useful in assessing the HH's WTP and ability to pay – if only by proxy. In most villages HHs pay a nominal fee to their WUG for the services provided. In those villages in west Guangxi which do pay for piped water to their homes (e.g., most HHs in XinMin AV, TuoKan Township in TianDeng County – site of the Pilot Run) the rates are relatively affordable and most HHs have no trouble paying their monthly water bills. 2WA_2.1 was calculated by finding the percentage of HH respondents (out of those who answered the question) who answer "yes". Thus if 60% responded "yes, it would be affordable" the score for 2WA_2.1 would be 60.

AV	% Yes	**2WA_2.1 Scaled (0-100)**
MengYang	51.06	**51.06**
PinLi	40.24	**40.24**
GuiLi	97.18	**97.18**
NaShe	98.33	**98.33**
ShangLong	16.67	**16.67**
NongMin	7.23	**7.23**
TangHe	38.46	**38.46**
XiHua	100	**100**

2.2a Distance travelled to collect water (one trip)

Question asked on survey (#7.1a, #7.3a):
How long (in minutes and meters) does it take on average for a person to collect water from your main source during a single trip (including time waiting in line)?

Answers to #7 were measured in meters for both the Dry and Rainy Season. In five of the eight villages HH members travelled to collect water on a regular basis. The mean distance travelled for each village was calculated by taking a weighted average of the mean distance travelled in the Dry Season and Rainy Season at 0.3 and 0.7 weighting respectively. Of the five villages the greatest weighted mean distance travelled was 581.03 meters and the minimum 34.15 meters. A 0-100 scale was calculated using 0 as the minimum and 581.03 as the maximum. Each village's weighted mean distance travelled was then converted to this scale and the inverse taken since higher scores reflect shorter distances travelled which indicates the village is in a relatively better position with regard to access to water.

AV	Mean			**2WA_2.2a Scaled (0-100) inverse**
	Dry Season	Rainy Season	Weighted (3:7)	
MengYang	234.89	16.96	82.34	**85.83**
PinLi	1745.91	81.79	581.03	**0**
GuiLi	0	0	0	**100**
NaShe	152.92	47.72	79.28	**86.36**
ShangLong	0	0	0	**100**
NongMin	0	0	0	**100**
TangHe	92.31	9.23	34.15	**94.12**
XiHua	828.06	60.56	290.81	**49.95**

2.2b Time needed to collect water

Question asked on survey (#7.1b, #7.3b):
How long (in minutes and meters) does it take on average for a person to collect water from your main source during a single trip (including time waiting in line)?

Answers to #7 were measured in minutes for both the Dry and Rainy Season. In four of the eight villages HH members spent significant amounts of time collecting water on a regular basis. The mean time spent for each village was calculated by taking a weighted average of the mean time used in the Dry Season and Rainy Season at 0.3 and 0.7 weighting respectively. Of the four villages the greatest weighted mean time used was 6.8 minutes and the minimum 0.20 minutes. However, given the ranges of time spent for the four villages 6.8 minutes was considered to be an outlier and the next highest value, 0.63 minutes, was used to set the 0-100 scale - using 0 as the minimum and 0.63 as the maximum. Each village's weighted mean time used was then converted to this scale and the inverse taken since higher scores reflect less time used to collect water which indicates the village is in a relatively better position with regard to access to water.

AV	Mean			**2WA_2.2b Scaled (0-100) inverse**
	Dry Season	Rainy Season	Weighted (3:7)	
MengYang	0	0.43	0.3	**50.72**
PinLi	12.10	4.52	*6.8*	**0**
GuiLi	0	0	0	**100**
NaShe	1.13	0.42	0.63	**0**
ShangLong	0	0	0	**100**
NongMin	0	0	0	**100**
TangHe	0	0	0	**100**
XiHua	0.07	0.25	0.2	**68.92**

2.3 Non-income based assessment of HH income

2.3a Percentage of adults living and working outside of the HH

Question asked on survey (#1.1 & #1.3):
How many adults normally live in your HH?
How many adults normally live and work outside your HH?

In rural China the wages migrant workers send home to their families often constitute a significant portion of a HH's income. Needless to say, there are pros and cons of HH members living and working outside of the HH, but as far as the effects on income are concerned, it is almost always advantageous financially to the HH if a large proportion of the HH adults work outside of the HH and send money home. 2WA_2.3a attempts to measure this earning potential and was calculated by first determining the total number of adults in the HH (those living in and outside of the HH) and calculating what percentage of the HH adults worked outside the HH. The mean percentage was used for each AV, the highest value being 31.94% and the lowest 1.02%. The high value used for the top of the 0-100 scale is the highest AV value (31.94%) plus 20% (to yield 38.33%).

AV	Mean %	**2WA_2.3a Scaled (0-100)**
MengYang	31.94	**82.88**
PinLi	23.28	**59.66**
GuiLi	3.57	**6.84**
NaShe	1.02	**0.00**
ShangLong	7.30	**16.83**
NongMin	13.84	**34.37**
TangHe	12.87	**31.77**
XiHua	27.35	**70.58**

2.3b HH Wealth assessment based on quantity and type of durable goods HH owns*

Question asked on survey (#30):
How many of the following durable products are used in your HH?

In order to obtain a proxy measure of HH's wealth HH respondents were asked to list the number of durable goods the HH owned from the list below. These quantities were then multiplied by the estimated average values and summed for each HH and then averaged for each AV. Granted, an assessment of each HH's livestock in addition to the durable goods listed below would have provided a more accurate assessment of HH wealth, but given the tendency to underreport livestock holdings the current method was deemed sufficient.

Item	Value	Item	Value	Item	Value
Bicycle (1)	100	Scooter (small) (2)	1000	Scooter (large) (3)	2000
Motorcycle (4)	3500	Car or large motor vehicle (5)	40000	Radio(6)	30
Television (7)	800	Electric fan (8)	30	Washing Machine (9)	700
Electric Rice cooker (10)	90	Refrigerator (11)	1000	Power supply (12)	1200
Telephone (Landline) (16)	60	Mobile Telephone (17)	500	Small grain processing machine (18)	1600

*Approximate 2007 values of HH durable goods in Yuan (CNY ¥) determined via consultation with Guangxi PMO staff and others.

The values above were multiplied by the number of each given durable good and then all the durable good values were summed for each HH. The means of these summed HH durable good values were then calculated for each AV and scaled using the high value of the set (¥6,604.68) plus 20% to yield the high value for scaling (¥7,925.62) and using the sets low value (¥594.89) as the minimum. This provided a good comparative proxy measure of average HH wealth in each AV as show below.

AV	Mean HH wealth	**2WA_2.3b Scaled (0-100)**
MengYang	594.89	**0.00**
PinLi	1184.24	**8.04**
GuiLi	4127.27	**48.19**
NaShe	6604.68	**81.98**
ShangLong	2821.89	**30.38**
NongMin	2120.53	**20.81**
TangHe	3401.31	**38.28**
XiHua	923.44	**4.48**

WATER ACCESS FINAL SCORE

Administrative Village	**2.1**	**2.2**		**2.3**		**2WA**
		a	b	a	b	
weighting	*0.1*	*0.3*	*0.1*	*0.2*	*0.3*	
MengYang	51.06	85.83	50.72	82.88	0.00	**52.50**
PinLi	40.24	0	0	59.66	8.04	**18.37**
GuiLi	97.18	100	100	6.84	48.19	**65.54**
NaShe	98.33	86.36	0	0.00	81.98	**60.34**
ShangLong	16.67	100	100	16.83	30.38	**54.15**
NongMin	7.23	100	100	34.37	20.81	**53.84**
TangHe	38.46	94.12	100	31.77	38.28	**59.92**
XiHua	100	49.95	68.92	70.58	4.48	**47.34**

3. WATER RESOURCES MANAGEMENT CAPACITY (3WRMC)

This component complements 1WR and 2WA by gauging the capacity of HHs to effectively and efficiently manage their water resources - both for HH consumption and agriculture. Even in areas with adequate 1WR and 2WA the way in which this water is used plays a large role in the success of other development/poverty alleviation activities. Water User Associations (or WUGs as they are called in China) should provide the structure and framework needed for improved Water Resources Management (WRM). But organization structure alone is not sufficient for effective WRM, which requires a minimum level of capacity. This capacity in turn is largely determined by level of education and the provision of training programs specifically designed for rural communities to improve their WRM. To be clear, the 3WRMC component indicates nothing about whether or not current WRM practices are efficient or effective, rather it provides a rough indication of an area's current *capacity* for effective WRM – how that capacity manifests itself is something that must be investigated in the field.

The weights for the aggregation of 3WRMCs subcomponents were set to be equal at 1/3 weight each since all three subcomponents are required for effective WRM, though it is true that effective WRM would be especially unlikely without 3WRMC_3.1 and 3WRMC_3.2 were 3WRMC_3.3 to be in place. However, the equal weight assigned to 3WRMC_3.3 highlights the fact that education is a crucial cornerstone to effective, efficient WRM – adult education programs could then be implemented if this subcomponent were seen to be lacking (5E provides a rough measure of how future WRM capacity might or might not be limited).

3.1 Existence of a WUG in the AV and awareness of it

Question asked on survey (#16):
Are you aware of a formal water users group or committee in your village?

WUG's have been shown to be effective means of coordinating improved WRM, but it follows that any given WUG could only function effectively if it was

used (as opposed to simply existing and having members) and if a relatively large portion of its would-be beneficiaries were aware of it.

This subcomponent was calculated by taking the percentage of HH respondents who answered "yes" that they were aware of a WUG in their AV and combining that data with whether or not the village actually had a WUG. This latter data was collected via interviews will village leaders during field visits. In AVs which have a WUG the percentage score of those who were aware of it is the final score, in MengYang the final score was given as ½ of the percentage aware of the WUG since, according to the village leaders, MengYang does not have a WUG. For ShangLong even though 100% of respondents were aware of the WUG according to the village leader it was not being used so ½ the score was taken as the final scaled score.

AV	% Aware of WUG	WUG	**3WRMC_3.1 Scaled (0-100)**
MengYang	13.33	No	***6.67***
PinLi	0	No	**0**
GuiLi	78.57	Yes	**78.57**
NaShe	28.33	Yes	**28.33**
ShangLong	100	(Yes)	***50***
NongMin	92.59	Yes	**92.59**
TangHe	66.15	Yes	**66.15**
XiHua	0	No	**0**

3.2 HH's participation in any type of water management/use program

Question asked on survey (#17):
Has any member of your HH participated in a water use related training program?

If at least one member of a given HH participated in any sort of WRM or water use training program it is likely that the HH's WRM capacity would be bolstered by such training. This component was calculated by taking the percentage of HH members who had participated in any type of WRM or water use training program for any purpose – agricultural, industrial or domestic (though the vast majority of such courses were related to agriculture and irrigation management). The reported values naturally fell on a on a 0-100 scale.

AV	% participated	**3WRMC_3.2 Scaled (0-100)**
MengYang	21.74	**21.74**
PinLi	31.71	**31.71**
GuiLi	68.57	**68.57**
NaShe	85	**85**
ShangLong	18.52	**18.52**
NongMin	7.41	**7.41**
TangHe	41.38	**41.38**
XiHua	0	**0**

3.3a Head of HH's Mandarin speaking ability

Question asked on survey (#2):
Can the head of the HH communicate with others using Mandarin?

In most of rural China people will speak a local dialect which is markedly different from standard Mandarin. In theory, education and all mass media are to be conducted in standard Mandarin and while this is the norm, it is not always the case (especially in poor, rural China). The head of the HH's ability to speak Mandarin provides a proxy measure of their education and contributes to their ability to benefit from information provided about farming practices and WRM techniques. Answers were scored on a 1-4 bipolar scale with the following values.

Response	**Value**
1-No Mandarin	0
2-Yes, with much difficulty	30
3-Yes, Proficient	70
4-Yes, fluent	100

The mean value for each village was scaled using the high score of the set (38.73) plus 20% (to yield 46.48) since the set's high value is of course not the best possible score (70 might have arguably been a better choice for the set's high value).

AV	mean	**3WRMC_3.3a Scaled (0-100)**
MengYang	25.56	**34.59**
PinLi	29.38	**46.53**
GuiLi	38.73	**75.78**
NaShe	34.67	**63.07**
ShangLong	34.26	**61.80**
NongMin	30.72	**50.74**
TangHe	20.48	**18.71**
XiHua	14.49	**0**

3.3b Head of HH's level of education

Question asked on survey (#3.1):
*How many years of formal education did the head of the HH complete?**

This subcomponent looks at the number of years of education, equal to or in excess of one year, for men across all eight AVs. Unfortunately the data on women's education was insufficient for proper analysis – this was in part because many women (and men) had no formal education at all and in larger part because often the HH respondent was a male and was not certain as to the number of years of formal education the female head of the HH had completed. However, while not ideal, the collected data on the male head of the HH's years of formal education provides a useful proxy measure of the capacity for effective WRM. This subcomponent was calculated by taking the mean number of years of education per AV and scaling it on a 0-9 scale. Nine was used because compulsory education in China is nine years (coincidentally, the max value for the set [7.55] plus 20% happens to equal 9.06).

AV	n	Male_ mean years of education	**3WRMC_3.3b Scaled (0-100)**
MengYang	31	6.32	**49.22**
PinLi	62	6.4	**50.11**
GuiLi	65	7.55	**62.89**
NaShe	59	7.25	**59.56**
ShangLong	51	5.94	**45.00**
NongMin	75	5.35	**38.44**
TangHe	20	6.9	**55.67**
XiHua	35	1.89	**0.00**

*Question #3 was asked of both male and female heads of the HH (as was their age), but the education data obtained for female heads of the HH (n=195) was insufficient for proper analysis given the amount of missing data for some AVs. Hence, all data used is for male heads of HH. 25.55% of the data for this question was missing for men which is why *N* is listed above (compared with 63.86% missing data for women).

Education & Age of Head/s of HH	N	Minimum	Maximum	Mean	Std. Deviation
M_Years of Education	398	1.00	16.00	6.08	2.5
M_Age	489	24.00	79.00	42.26	10.15
F_Years of Education	195	1.00	9.00	4.46	1.88
F_Age	236	20.00	70.00	38.50	8.31

WATER RESOURCES MANAGEMENT CAPACITY FINAL SCORE

Administrative Village	**3.1**	**3.2**	**3.3**		**3WRMC**
			a	b	
weighting	*0.33⁻*	*0.33⁻*	*0.16⁻*	*0.16⁻*	
MengYang	6.67	21.74	34.59	49.22	**23.44**
PinLi	0	31.71	46.53	50.11	**26.68**
GuiLi	78.57	68.57	75.78	62.89	**72.16**
NaShe	28.33	85	63.07	59.56	**58.21**
ShangLong	50	18.52	61.80	45.00	**40.64**
NongMin	92.59	7.41	50.74	38.44	**48.20**
TangHe	66.15	41.38	18.71	55.67	**48.24**
XiHua	0	0	0	0.00	**0.00**

4. SANITATION (4S)

Two billion people in rural areas of the developing world live without improved sanitation. "Over half of those without improved sanitation – nearly 1.5 billion people – live in China and India" (UNESCO, 2006, p.221). Improved water supply best serves its beneficiaries when complimented with concomitant improvements to sanitation facilities (Esrey and Habicht, 1986, Checkley et al., 2004).

In a review of 144 studies on the impacts of improved water and sanitation Esrey et al. (1991) found that improved water and sanitation significantly reduced rates of child mortality and diarrhoea morbidity among a variety of other beneficial outcomes.

The actual type of toilet facilities a HH uses (if any) is arguably the best measure of the overall quality of their sanitation (though of course such a generalization is subject to problems). As with water, the presence of quality sanitation alone does not guarantee quality, dignified sanitation. Rather, it is access to that sanitation which (as with WR) is a crucial determinant of an area's overall state of sanitation. The 4S component provides a proxy measure of both. Biogas, a sanitation solution which is increasingly prevalent in rural China, provides multiple benefits to the HH – chief among them are improved sanitation and saved HH labour (for collecting fuel).

The actual type of toilet facilities, if any, a HH uses is the best determinant of the quality of their sanitation and it is for this reason that 4S_4.1 was given a weight of 0.6 in the calculation of the final score for 4S. HH perceptions of their sanitation, though of course subjective, provide a useful counter-measure to the type of facilities in place and just as the existence of adequate water resources does not necessarily mean access to them is adequate, this is also the case for sanitation which is why 4S_4.3 attempts to measure HH's access to sanitation. The latter two subcomponents were given weights of 0.2 each.

4.1 Type of sanitation facilities (if any)

Question asked on survey (#18):
What type of sanitation does your HH use?

The values for a HH's type of sanitation facility have been rated on a 0-10 scale, with 9 being the highest value. Biogas Facilities score the highest due not only to the relatively superior sanitation standards they provide (as compared with traditional latrines) but also due to the other benefits they provide as far as fuel and energy supply and effective, relatively sanitary, waste management and disposal. These values do not reflect judgements of toilet facilities overall worth (since, for example, flush toilets arguably "waste" water) but merely assign value to the facilities' quality as far as providing improved sanitation.

Type of Toilet Facility	Value
1 – No Toilet	0
2 – Open Pit Latrine	2
3 – Traditional Pit Latrine (enclosed)	4
4 - Ventilation Improved Pit Latrine (VIP)	6
5 – Biogas Pit	9
6 – Pour Flush	7
7 – Flush Toilet	8
8 - Other	1

These values were calculated for each AV and the mean value scaled using 9 as the high value. Given the severity of outcomes associated with a complete lack of sanitation facilities (i.e., "no toilet") the percentage of HHs in an AV without a toilet was subtracted from the scaled mean value to yield the final scaled score for 4S_4.1. Admittedly this method calculates and uses the responses from HHs without toilets twice, but again, given the severity of these HH's situation this method of

emphasizing which AVs have high proportions of HHs without *any* sanitation facilities is seen as justifiable in order to draw attention to the problem.

AV	Mean	Scaled mean	% w/o toilet	**4S_4.1 Scaled (0-100)**
MengYang	3.55	39.48	14.89	**24.59**
PinLi	4.63	51.49	18.29	**33.20**
GuiLi	3.66	40.69	49.30	**0.00**
NaShe	3.98	44.26	40.00	**4.26**
ShangLong	4.74	52.67	0.00	**52.67**
NongMin	6.52	72.43	1.23	**71.19**
TangHe	4.15	46.15	0	**46.15**
XiHua	4.00	44.44	0	**44.44**

4.2 HH perceptions of their sanitation

Question asked on survey (#21):
Do you feel your HH's sanitation is satisfactory?

4S_4.2 was calculated by finding the percentage of HH respondents (out of those who answered the question) who answered "yes". Thus if 60% responded "yes", that their current sanitation was "satisfactory", the score for that AV would be 60. Of course, one respondent's definition of "satisfactory" will not be the same as another, but given the number of respondents per AV these subjective differences hopefully balance out.

AV	% Don't Know	% No	% Yes	**4S_4.2 Scaled (0-100)**
MengYang	2.13	95.74	2.13	**2.13**
PinLi	0	58.54	41.46	**41.46**
GuiLi	0	67.61	32.39	**32.39**
NaShe	0	62.71	37.29	**37.29**
ShangLong	0	90.74	9.26	**9.26**
NongMin	0	65.06	34.94	**34.94**
TangHe	4.69	92.19	3.13	**3.13**
XiHua	45.07	54.93	0	**0**

4.3 HHs access to sanitation

Question asked on survey (#19 & #20):
Is the toilet facility located within your HH, yard or compound?
Usually, does your HH share the toilet facility with people outside of your HH?

4S_4.3 was calculated by finding the percentage of HH respondents (out of those who answered the questions) who answered "yes" to #19 and "no" to #20. The final score for the subcomponent was calculated by taking a weighted combination of the two such that #19 was given a weight of 0.65 and #20 a weight of 0.35 based on the relative importance of the information with regard to a HH's quality and access to sanitation (i.e., it's more important that sanitation facilities be located near the HH

than if they are shared with others – based on the local context and knowledge that even those facilities which are shared are not shared by too many people).

AV	#19 % yes	#20 % no	**4S_4.3 Scaled (0-100)**
weighting	*0.65*	*0.35*	
MengYang	82.61	76.09	**80.33**
PinLi	45.68	71.95	**54.87**
GuiLi	45.07	81.69	**57.89**
NaShe	60.34	84.75	**68.88**
ShangLong	90.38	100	**93.75**
NongMin	97.53	98.80	**97.97**
TangHe	98.31	100	**98.90**
XiHua	58.82	100	**73.23**

SANITATION FINAL SCORE

AV	4.1	4.2	4.3	**4S**
weighting	*0.6*	*0.2*	*0.2*	
MengYang	24.59	2.13	80.33	**31.25**
PinLi	33.20	41.46	54.87	**39.19**
GuiLi	0.00	32.39	57.89	**18.06**
NaShe	4.26	37.29	68.88	**23.79**
ShangLong	52.67	9.26	93.75	**52.20**
NongMin	71.19	34.94	97.97	**69.30**
TangHe	46.15	3.13	98.90	**48.10**
XiHua	44.44	0	73.23	**41.31**

5. EDUCATION (5E)

Research (Fan et al., 2002, Fan et al., 2004) has empirically demonstrated the significant returns investments in rural education provide when compared with other social-capacity-building components of poverty alleviation initiatives. Rural incomes are also tied to education and skills. At the top of the rural educational pyramid those who do manage to make it to decent universities often do not return to their rural homes. As the percentage of rural children who are able to attend technical schools, colleges and universities increases this *brain drain* should slow and more money and talent should trickle back to rural areas.

Children's access to education is obviously a key determinant of the quality of education they can obtain. In rural areas poor road quality means that weather is often a determinant of access to education. This is especially the case during the rainy season when children whose HHs are located particularly far away from schools can be effectively bared from an education (especially when the school either lacks the facilities to house students, or the child's family cannot afford the fees for room-and-board). Beyond simply getting to school the quality of education is largely determined by the number of teachers and, importantly, the highest level of training those teachers have achieved. "Education, especially that of women, is strongly

associated with many behaviours and choices that are conducive to good health, even after controlling for income" (Wagstaff, 2002, p.100).

Consequently, the primary weight for 5E was given to 5E_5.1 at 0.6 and 0.2 was the weight assigned to 5E_5.2 and 5E_5.3. (Full-time, government-paid and "casual" (part-time) teachers were considered in calculating 5E_5.2 and 5E_5.3.)

5. 1 Children's access to education

Question asked on survey (#13):
How far do the children in your HH walk to get to school? (in meters)

The further children must walk to school the more unlikely it is that they will always be able to attend school (especially during the rainy season as many HHs reported). New roads make the journey easier, but for those children who walk more than a few kilometres to school this can become a deterrent to regular attendance putting them at a disadvantage compared to their peers who live closer to school. 5E_5.1 provides a clear measure of access to education: those children who live closer to the school have better access than those who live farther away. The mean distance children walked, in meters, was scaled using the high value for the set (2260.19m) plus 20% to provide the high value for the scale (2712.22m) and 0 as the low value since some children regularly live in dormitories. Mean distances were scaled and the inverse value taken since a low score should indicate a longer average distance walked. The percentage of HHs with school-age children is also listed below.

AV	% of HH's w/ school-age children	Mean distance walked (m)	**5E_5.1 Scaled (0-100)**
MengYang	48.94	916.60	**66.2**
PinLi	60.98	622.56	**77.05**
GuiLi	78.87	1703.38	**37.20**
NaShe	71.67	2020.50	**25.5**
ShangLong	70.37	2260.19	**16.67**
NongMin	50.6	273.34	**89.92**
TangHe	55.38	546.92	**79.83**
XiHua	61.11	590.00	**78.25**

5.2 Student/Teacher ratio

Data obtained from field visits and interviews with AV leaders and teachers.

The data for this subcomponent was scaled using 10 students as the low value and 40 students per teacher as the high value for the set (the actual high value was 38.6) since 40 students is already considered too many for one teacher to responsibly manage, and the average classroom in the area can barely accommodate 40 students. The data was scaled and the inverse values taken so that high scores reflect low student to teacher ratios and low scores reflect an inadequate number of teachers given the number of students.

AV	Students per teacher	**5E_5.2 Scaled (0-100)**
MengYang	10	**100.00**
PinLi	19.1	**69.67**
GuiLi	21.7	**61.00**
NaShe	38.6	**4.67**
ShangLong	21.5	**61.67**
NongMin	20.8	**64.00**
TangHe	32	**26.67**
XiHua	17.4	**75.33**

5.3 Teacher's level of training

Data obtained from field visits and interviews with AV leaders and teachers.

Teacher's level of training ranged from a Middle School education through High School, Technical School and, at the best, Junior College. These four levels of teacher training were rated on a 1-4 scale with 4 being the highest (i.e., Junior College = 4). Scores were calculated for each village, averaged by the number of teachers/AV, and the mean value used to calculate the scaled values - in turn using the sets high value (2.55) plus 20% to yield the scale's high value (3.06) and 0.33 as the minimum value.*

AV	No. of Teachers	Summed value	Mean score	**5E_5.3 Scaled (0-100)**
MengYang	7	12.57	1.80	**53.68**
PinLi	19	48.42	2.55	**81.29**
GuiLi	12	4.00	0.33	**0.00**
NaShe	5	6.20	1.24	**33.27**
ShangLong	2	5.00	2.50	**79.52**
NongMin	4	10.00	2.50	**79.52**
TangHe	8	19.00	2.38	**74.93**
XiHua	11	?	?	**-**

*Unfortunately, reliable data for XiHua AV was not available.

EDUCATION FINAL SCORE

AV	5.1	5.2	5.3	**5E**
weighting	*0.6*	*0.2*	*0.2*	
MengYang	66.2	100.00	53.68	**70.46**
PinLi	77.05	69.67	81.29	**76.42**
GuiLi	37.20	61.00	0.00	**34.52**
NaShe	25.5	4.67	33.27	**22.89**
ShangLong	16.67	61.67	79.52	**38.24**
NongMin	89.92	64.00	79.52	**82.66**
TangHe	79.83	26.67	74.93	**68.22**
XiHua	78.25	75.33	-*	**77.37**

*For XiHua 5.3 was excluded from the final score calculation and 5.1 and 5.2 were weighted at 0.7 and 0.3 respectively to calculate the final 5E score.

6. HEALTH & HYGIENE (6HH)

There exists a widespread failure of publicly funded healthcare to reach its indented beneficiaries in most of the developing world (Wagstaff, 2002). Yet, the links between adequate sanitation, health and hygiene are clear – and they also interlink closely with education and HH incomes (i.e., because the less time HH members are ill the more time they have for income generating activities and the more education HH members have the more likely they are to be aware of the links between health and hygiene). The availability of affordable healthcare is a key development and welfare indicator. However, the availability of healthcare alone cannot provide an accurate measure of its use since often poor rural HHs will forgo needed medical treatment or the purchase of medicine due to the expense, and instead treat themselves or seek alternative treatments. As incomes rise, the number of HHs who seek treatment increases as does the number of HHs who take an interest in, and in turn invest in, preventative medical care. Safe hygiene practices in poor rural communities often do not evolve spontaneously and require targeted training programs to highlight both the causal linkages between poor hygiene and poor health, and to inform HHs about what steps they can take to improve their hygiene, and with it their health.

6HH attempts to measure both health and hygiene by assessing the availability of healthcare and its relative affordability. In addition, this component attempts to measure capacity and actual practice with regard to safe hygiene. Hence, half of the total value of 6HH is given to 6HH_6.1 at a weight of 0.5; and given that the practice of good hygiene is more important than the capacity for good hygiene practice, 6HH_6.3 is given a weight of 0.3 and 6HH_6.2 a weight of 0.2.

6.1 Access and affordability of healthcare

6.1a Access to healthcare

Question asked on survey (#24):
Do you feel your HH has satisfactory access to healthcare/clinics?

Data also obtained from field visits and interviews with AV leaders/nurses/doctors.

Given the largely subjective nature of question #24, and the multitude of interpretations the word "satisfactory", 6HH_6.1 was augmented with objective, quantitative data on the number of residents per clinician in each AV. While more and more rural residents have made use of AV clinics in the last few years – especially for preventive medicine – they have other options and may travel to the Township Hospital directly for more serious problems, and attempt to treat less serious ones themselves. The percentage of HHs who responded "yes" to question #24 was given a higher weight (0.7) because in spite of the quantitative data on number of residents per clinician HHs respondents are in the best position to report if their access to healthcare is satisfactory or not. The number of residents per clinician for each AV was calculated and the high value for the set (1868 people) was increased by 20% to provide the high value for the scale (2241.6); the inverse of the scaled number was taken for the final value since it is better to have less people per clinician.

AV	% Yes	People per clinician	People per clinician - scaled	**6HH_6.1a Scaled (0-100)**
weighting	*0.7*	-	*0.3*	
MengYang	27.66	975	66.98	**39.46**
PinLi	75.61	1133.33	58.60	**70.51**
GuiLi	83.10	1868	19.76	**64.10**
NaShe	88.14	880.5	71.97	**83.29**
ShangLong	46.3	350.5	100.00	**62.41**
NongMin	78.31	524.5	90.80	**82.06**
TangHe	59.38	1460	41.33	**53.97**
XiHua	66.2	1500	39.22	**58.10**

6.1b Affordability of healthcare (WTP)

Question asked on survey (#25.1 & #25.2):
For minor health problems, do you feel healthcare is affordable for your HH?
For serious health problems, do you feel healthcare is affordable for your HH?

6HH_6.1b attempted to gauge the relative affordability of available healthcare. The valid percentage of HH respondents who answers "yes" to each question was used as the scaled score. The two were combined with a weight of 0.6 given to #25.1 and a weight of 0.4 to #25.2 given that, of the total frequency of health problems, the majority will be of the "minor" variety.

AV	Minor % Yes	Serious % Yes	**6HH_6.1b Scaled (0-100)**
weighting	*0.6*	*0.4*	
MengYang	100	14.89	**65.96**
PinLi	98.78	0	**59.27**
GuiLi	100	5.63	**62.25**
NaShe	96.61	11.86	**62.71**
ShangLong	100	0	**60.00**
NongMin	98.8	0	**59.28**
TangHe	93.75	1.56	**56.87**
XiHua	36.62	0	**21.97**

6.2 Capacity: Hygiene education

Question asked on survey (#22):
Has any member of your HH participated in a hygiene related training program?

This subcomponent sought to determine whether the capacity for good health and hygiene practices existed. The percentage of HHs in which at least one member of the HH participated in any sort of health or hygiene related program was taken as used as the scaled version since the values naturally fell along a 0-100 scale.

AV	% Yes	**6HH_6.2 Scaled (0-100)**
MengYang	18.18	**18.18**
PinLi	83.54	**83.54**
GuiLi	82.61	**82.61**
NaShe	96.61	**96.61**
ShangLong	77.78	**77.78**
NongMin	42.68	**42.68**
TangHe	46.67	**46.67**
XiHua	0	**0**

6.3 Practice: Health and Hygiene Assessment

Whereas 6HH_6.2 sought to determine if the capacity for effective health and hygiene practices was in place, subcomponent 6HH_6.3 seeks to examine if HH members are actually putting such knowledge into practice.

6.3a Percentage of HHs who treat their drinking water

Question asked on survey (#11):
Do you treat your drinking water (boiling, allowing to settle, filter or chemical treatment)?

Subcomponent 6HH_6.3a is an admittedly general assessment of whether HHs treat their water, since different methods will yield varying degrees of water quality, but the question reveals the percentage of HHs aware that they should treat their water (in any way). 6HH_6.3a was calculated by using the percentage of HH respondents who answer "yes" as the final scaled value.

AV	% Yes	**6HH_6.3a Scaled (0-100)**
MengYang	60	**60**
PinLi	51.85	**51.85**
GuiLi	45.07	**45.07**
NaShe	38.33	**38.33**
ShangLong	100	**100**
NongMin	100	**100**
TangHe	30.77	**30.77**
XiHua	52.86	**52.86**

6.3b Self-report frequency of illness due to drinking water

Question asked on survey (#23):
How many times in the last 12 months has anyone in your family been ill due to contaminated water?

6HH_6.3b is a faulted measure. It is of course not possible for a HH respondent, or anyone for that matter, to know with any degree of surety whether past

illnesses were due to poor water quality or not. However, though this is certainly the case, HH perceptions of the quality of their water and the frequency with which HH members are ill due to poor water quality do provide a very rough proxy of both water quality and, more importantly, of whether or not HHs are taking measures to safeguard against waterborne disease. Since the latter is what 6HH_6.3 attempts to assess, the subjective and unknown nature of the responses is justifiable since the answers provide a proxy measure of good health and hygiene practices. Responses were assigned values on a 0-100 scale with 100 being the best outcome.

Response	**Value**
1- Never	100
2- A few times	50
3- ≥Once a month	15
4- Many times	0
5- Don't Know	Not scored

For most of the AVs surveyed there was minimal missing data for #23 (though TangHe is rather low) so the mean value based on the values listed above was used as the final scale value.

AV	% of *N* with valid responses (i.e., 1-4)	mean value	**6HH_6.3b Scaled (0-100)**
MengYang	93.62	94.04	**94.04**
PinLi	74.39	76.95	**76.95**
GuiLi	100	99.72	**99.72**
NaShe	100	95.5	**95.5**
ShangLong	100	100	**100**
NongMin	98.80	98.92	**98.92**
TangHe	34.92	71.85	**71.85**
XiHua	100	98.19	**98.19**

HEALTH & HYGIENE FINAL SCORE

Administrative Village	**6.1**		**6.2**	**6.3**		**6HH**
	a	b		a	b	
weighting=	*0.3*	*0.2*	*0.2*	*0.2*	*0.1*	
MengYang	39.46	65.96	18.18	60	94.04	**50.07**
PinLi	70.51	59.27	83.54	51.85	76.95	**67.78**
GuiLi	64.10	62.25	82.61	45.07	99.72	**67.19**
NaShe	83.29	62.71	96.61	38.33	95.5	**74.07**
ShangLong	62.41	60.00	77.78	100	100	**76.28**
NongMin	82.06	59.28	42.68	100	98.92	**74.90**
TangHe	53.97	56.87	46.67	30.77	71.85	**50.24**
XiHua	58.10	21.97	0	52.86	98.19	**42.22**

FOOD SECURITY (7FS)

"Agricultural production, although it comprises only 10 percent of the national GDP, is the major source of income for the rural poor. Accordingly, food security remains the primary issue on the political agenda" (UNESCO, 2006, p.510). Food security is essential, and its inclusion as a component needs little if any justification just as the rationalization for a rough assessment of water-security would likewise be superfluous (which is provided by examining the 1WR-2WA-3WRMC components). Briefly then, a region's lack of food security would present a hindrance to their general development. In attempting to measure levels of poverty many organizations use data on malnutrition (Fafchamps, 2003) which highlights the importance of food security for poverty alleviation and as a rough gauge of poverty itself. There are a variety of sophisticated, accurate ways of measuring food security (caloric intake being chief among them) but for the purposes of simplicity and convenience the 7FS component is assessed by examining the area of arable land available to the average HH, whether the HH can afford to sell more produce than it consumes or not and, lastly, an examination of the coping mechanisms one would expect a HH suffering from food quality or quantity deficiencies to exhibit based on the literature (Hoddinott, 1999).

This latter subcomponent, 7FS_7.3, is the most telling of possible food security problems and hence has been weighted at 0.5, with 7FS_7.2 and 7FS_7.1 weighted at 0.2 and 0.3 respectively based on the reliability and likely predictive power of the data.

7.1 Area of arable land HH uses/has access to

Question asked on survey (#4):
What is the area of land your HH uses for agriculture? (in mu)

Data also obtained from field visits and interviews with AV leaders.

This subcomponent assesses the area of arable land available to HHs. The final scaled score for 7FS_7.1 is the weighted combination of the mean area of arable land per AV combined with a measure of what an average estimate of equitable land distribution among HHs "should" be. The mean land area per HH was scaled by taking the high value of the set (6.38 *mu*) and increasing it 20% to provide the high value for the scale (7.66 *mu*) the low value being set at 0 *mu*. The actual mean area of land per HH was subtracted from the expected area per HH (which in turn was calculated by dividing the total arable land in a given AV by the number of HHs) in order to calculate the shortfall from the "ideal" average land allocation.

Given the extreme difference between the expected mean and the actual mean for GuiLi (22.02 *mu*) this figure was considered to be an outlier and the next highest value (5.0 *mu*) was used to set the 0-100 scale instead. The inverse value was taken since a low value ought to indicate a significant divide between the expected average area of land per HH and the actual area of land. Given the liberal calculation of this differential it was only weighted at 0.3 and the actual mean weighted at 0.7.

There are a variety of problems with this type of measurement, foremost being differences in choice of crop/s planted and soil fertility, water availability, farming equipment, etc. However, this still provides a good indicator of food security, though

like all data aggregation the results mask differences among NVs and of course among HHs.

AV	Actual Mean (AM)	Actual Mean Scaled	Expected Mean (EM)	EM - AM	EM - AM Scaled (inverse)	**7FS_7.1 Scaled (0-100)**
weighting	-	*0.7*	-	-	*0.3*	
MengYang	2	26.06	2.20	0.20	95.90	**47.01**
PinLi	2.26	29.58	2.90	0.64	87.28	**46.89**
GuiLi	3.38	44.15	25.40	*22.02*	0.00	**30.91**
NaShe	5.98	78.05	4.10	-1.88	100.00	**84.64**
ShangLong	2.09	27.26	3.70	1.61	67.74	**39.40**
NongMin	2.37	30.93	2.80	0.43	91.35	**49.06**
TangHe	4.1	53.50	9.10	5.00	0.00	**37.45**
XiHua	6.38	83.33	4.50	-1.88	100.00	**88.33**

7.2 HH is a net food consumer or exporter

Question asked on survey (#29)
Does your HH sell more food than it consumes, or consume more food than it sells?

This subcomponent attempted to evaluate if HHs were net food importers or exporters. If a HH is able to sell more of its harvest than it consumes then it is relatively food secure. However, 7FS_7.2 is still a crude measure and thus a poor proxy gauge of food security. The scaled value was calculated by using the high value for the set (55.32%) since if more than half of an AVs HHs can afford to sell more than they consume then it follows that the AV as a whole is probably food secure.

AV	% Sells more	**7FS_7.2 Scaled (0-100)**
MengYang	0	**0**
PinLi	15.38	**27.8**
GuiLi	1.45	**2.62**
NaShe	0	**0**
ShangLong	0	**0**
NongMin	1.2	**2.17**
TangHe	55.32	**100**
XiHua	0	**0**

7.3 HH reliance on coping strategies for food shortage (or potential food shortage)

Question asked on survey (#28.1 & #28.2)
In the last 6 months have you (your HH) eaten food of lower quality than the food you normally prefer to eat?
In the last 6 months have you (your HH) reduced the quantity of food usually served at meals?

In the face of food shortages HHs will exhibit coping strategies to deal with the problem. Such strategies can be divided into those in which the quantity of food is diminished and those in which the quality of food is compromised. 7FS_7.3 attempts to measure the frequency with which HHs have had to employ either strategy. If such frequencies exist this provides a good measure of the extent to which food security problems exist in a given AV. HH respondents chose among the four answer choices below which have been scored such that the top of the scale, and best situation, is a high frequency of "1 – never" whereas "4 – many times" is indicative of serious food shortages or related food supply problems.

Response	**Value**
1- Never	100
2- A few times	50
3- ≥Once a month	15
4- Many times	0

The mean values were calculated for each AV based on the values listed above and the weighted combination of #28.1 and #28.2 was calculated with the higher weight (0.65) being assigned to #28.2 since while malnutrition may result from the prolonged use of inferior foods (e.g., a predominately rice-based diet) insufficient quantities of food are a more severe problem in the short term.

AV	28.1 - quality	28.2 - quantity	**7FS_7.3 Scaled (0-100)**
weighting	*0.35*	*0.65*	
MengYang	100	79.49	**86.67**
PinLi	83.33	82.69	**82.92**
GuiLi	98.55	99.26	**99.01**
NaShe	100	100	**100**
ShangLong	100	100	**100**
NongMin	100	100	**100**
TangHe	88.3	87.23	**87.61**
XiHua	75.81	75.81	**75.81**

FOOD SECURITY FINAL SCORE

AV	7.1	7.2	7.3	**7FS**
weighting	*0.3*	*0.2*	*0.5*	
MengYang	47.01	0	86.67	**57.44**
PinLi	46.89	27.8	82.92	**61.09**
GuiLi	30.91	2.62	99.01	**59.30**
NaShe	84.64	0	100	**75.39**
ShangLong	39.40	0	100	**61.82**
NongMin	49.06	2.17	100	**65.15**
TangHe	37.45	100	87.61	**75.04**
XiHua	88.33	0	75.81	**64.40**

ENVIRONMENT (8E)

"Most rural livelihoods are reliant on the natural resource base at least to some extent…" unfortunately "measuring natural resource sustainability is notoriously difficult" (Scoones, 1998, p.6). This component seeks to measure the extent of environmental degradation around the areas surveyed. High rates of erosion present a significant environmental problem, one compounded by deforestation. Soil erosion in turn diminishes soil quality. The problem is compounded yet again by poor irrigation (drainage) and synthetic fertilizer application management.

Another usefully proxy measure of environmental degradation is fluctuating populations of wildlife. A relative increase in the number of insects in an area is usually indicative of environmental degradation whereas an increase in animals, and/or plants and fungi may indicate that, for example, reforestation efforts are making a positive difference. Of course these measures depend on the context in question as an increase in the population of insects, for example, will not always mean the environment is being degraded.

Given the importance of land erosion to development and poverty alleviation efforts 8E_8.1 was given a weight of 0.5 for the final calculation of 8E and 8E_8.2 and 8E_8.3 weights of 0.25 each.

8.1 Degree of erosion due to environmental deterioration

Question asked on survey (#26)

In the last five years have you noticed erosion/environmental damage on your land?

Gauging the relative levels of soil erosion in an area provides a valuable indicator of the state of the environment – as discussed above. Farmers are in fact in the best position to report on rates of erosion since they are most familiar with their land, and the land in their community generally. Answer choices were assigned values as shown below on a 0-100 scale.

Response	**Value**
1- None	100
2- Some	30
3- A Lot	0
4- Don't Know	Not Scored

The calculated values for each AV were in turn used for the final values for 8E_8.1.

AV	value	std deviation	**8E_8.1 Scaled (0-100)**
MengYang	43.33	29	**43.33**
PinLi	47.5	30.51	**47.5**
GuiLi	65.49	35.25	**65.49**
NaShe	76.27	33.42	**76.27**
ShangLong	30	0	**30**
NongMin	29.64	3.29	**29.64**
TangHe	31.49	10.21	**31.49**
XiHua	30.99	8.31	**30.99**

8.2 Secondary measure of deteriorating environment around HH: Insects

Question asked on survey (#27.1)
Has the population of insects around your village increased or decreased over the last 5 years?

Based on the nature of the area in which the survey was conducted, a growth in the local population of insects is usually a good indicator of environmental degradation. 8E_8.2 attempts to use the subjective assessment of HH respondents to determine the relative increase or decrease in the population of insects in each AV. The inverse value of the percentage of HH respondents who reported an increase over the last 5 years was used as the final scaled value for 8E_8.2.

AV	Valid n	% report increase	**8E_8.2 Scaled (0-100)**
MengYang	25	53.19	**46.81**
PinLi	79	96.34	**3.66**
GuiLi	33	47.83	**52.17**
NaShe	42	71.19	**28.81**
ShangLong	[1]*	[100]	**-**
NongMin	77	92.77	**7.23**
TangHe	50	78.13	**21.88**
XiHua	0**	0	**100**

*In ShangLong there was too much Missing Data for #27.1 (n=53) to use the data.
**In XiHua, 100% of the HH respondents reported a "decrease" for #27.1 (n=70) which is certainly unlikely (statistically) but was double-checked with local officials and staff in Nanning.

8.3 Secondary measure of improved environment around HH

Question asked on survey (#27.2 & #27.3)
Has the population of wild animals around your village increased or decreased over the last 5 years?
Has the population of fungi or wild plants around your village increased or decreased over the last 5 years?

8E_8.3 attempts to use the subjective assessment of HH respondents to determine the relative increase or decrease in the population of wild animals, plants and fungi in each AV. The percentages of HH respondents who reported an increase over the last five years for #27.2 and #27.3 were combined with a higher weight (0.6) given to #27.3 to calculate the final score for the subcomponent since while animal and plant populations may have increased in step, it is more likely that the animal population would be diminished by HH consumption (legal or not) than the plant and fungi populations.

AV	% increase #27.2	% increase #27.3	**8.3 Scaled (0-100)**
weighting	*0.4*	*0.6*	
MengYang	34.04	34.04	**34.04**
PinLi	26.83	47.56	**39.27**
GuiLi	18.31	17.14	**17.61**
NaShe	8.47	44.07	**29.83**
ShangLong	100	100	**100**
NongMin	0	0	**0**
TangHe	56.25	35.94	**44.06**
XiHua	0	1.41	**0.85**

ENVIRONMENT FINAL SCORE

AV	8.1	8.2	8.3	**8E**
weighting	*0.5*	*0.25*	*0.25*	
MengYang	**43.33**	**46.81**	**34.04**	**41.88**
PinLi	**47.5**	**3.66**	**39.27**	**34.48**
GuiLi	**65.49**	**52.17**	**17.61**	**50.19**
NaShe	**76.27**	**28.81**	**29.83**	**52.80**
ShangLong*	**30**	**-**	**100**	**47.50**
NongMin	**29.64**	**7.23**	**0**	**16.63**
TangHe	**31.49**	**21.88**	**44.06**	**32.23**
XiHua	**30.99**	**100**	**0.85**	**40.71**

*The final score for ShangLong was calculated by assigning a weight of 0.75 to 8E 8.1 and 0.25 to 8E 8.3 since the data for 8E 8.2 could not be reliably used.

Appendix II: The WEILAI Questionnaire

WEILAI – QUESTIONNAIRE 调查问卷

INFORMATION TO BE COLLECTED FROM HOUSEHOLD (HH) RESPONDENT

农户调查信息收集

	Surveyor: _____ Time:___:___ - ___:___ Date:___/__/2007 调查人:_____ 时间:___:___ - ___:___ 日期:___/__/2007
	HH Code: _____ Village:_____ Township: _____ County:_____ 农户编号:_____ 村:_____ 乡/镇:_____ 县:_____
	Gender of respondent: Male:__(1) Female__(2) Position in HH:_____ 回答人性别: 男:_____(1) 女: _____(2) 在家中的角色:_____

	1	How many adults and children normally live **in** your HH? 你家里有几个成年人和孩子?	HH respondent consents to survey 农户同意调查 ☐
	1.1	Adult 成人	
	1.2	Children 孩子	
		How many adults and children normally live and work **outside** your HH? 你家里有几个成年人和孩子住在外面或在外打工?（给出数量）	
	1.3	Adult 成人	
	1.4	Children 孩子	
	2	Can the **head of the HH** communicate with others using Mandarin? 该户主能用普通话与别人交流吗？ No Mandarin (1) 不会说普通话(1) ☐ Yes, with much difficulty (2) 会说一点 (2) ☐ Yes - proficient (3) 会说很多(3) ☐ Yes - fluent (4) 流利(4) ☐	
	3	How many years of formal education did the head/s of the HH complete (and what is their age)? 该户主接受过几年的正规学校教育？（户主多大年纪）	
	3.1	Male 男 ☐	Age 年龄 ☐
	3.2	Female 女 ☐	Age 年龄 ☐
	4	What is the area of land your HH uses for agriculture? (in *mu*) 你家有几亩耕地？（以亩为单位） Area (mu) (几亩) ☐	
	5	What is your HH's **main source** of gathered water (for all purposes) in the **dry** season? 在旱季，你家的主要水源是什么？（包括人畜饮/用水、灌溉用水等）	
	5.1	DRY Season source of water 旱季水源 ☐	
		What is your HH's **main source** of gathered water (for all purposes) in the **rainy** season? 在雨季，你家的主要水源是什么？（包括人畜饮/用水、灌溉用水等）	
	5.2	RAINY Season source of water 雨季水源 ☐	

1	Pipe in HH 水管 (室内私用)	2	Pipe outside HH 水管 (露天私用)	3	Pipe outside HH – shared use 水管 (露天公用)	4	Small Dam 小水坝
5	Borehole	6	Borehole	7	Well (private)	8	Well (public)

	(private) 地上凿洞 (私用)		(public) 地上凿洞 (公用)		井(私用)		井 (公用)
9	Natural pond 天然水塘	10	Spring 泉水	11	River 河流	12	Stream 小溪
13	Water Vender 水贩子	14	Rainwater 雨水	15	Protected Tank (private) 有盖水柜(私用)	16	Protected Tank (public) 有盖水柜(公用)
17	Unprotected Tank (private) 无盖水柜(私用)	18	Unprotected Tank (public) 无盖水柜(公用)	19	Public Water supply System 供水系统	20	Other 其它

	6	If you pay for water from your main source, do you feel it is affordable for your HH? (direct payment only – not maintenance etc.) 如果你需要为你家里的主要水源付费，你认为你家有能力付吗？（仅指直接付费，不包括维护费） Yes (1) 是 (1) ☐ No (2) 否 (2) ☐
	7	How long (in minutes and meters) does it take on average for a person to collect water from your main source during a **single trip** (including time waiting in line)? 一人平均**单程**要花多长的路程和时间去取水 (包括排队等待的时间)?
	7.1	DRY Season distance (m) 旱季所花路程（以米为单位） ☐ DRY Season time (min) 旱季所花时间 （以分钟为单位） ☐
	7.2	DRY Season trips **per day** 旱季每天行程时间 ☐
	7.3	RAINY Season distance (m) 雨季所花路程（以米为单位） ☐ RAINY Season time (min) 雨季所花时间 （以分钟为单位） ☐
	7.4	RAINY Season trips **per day** 雨季每天行程时间 ☐
	8	Usually, how many people go to collect water each day, and how much does each person collect (in *dan*)? 你家通常有几个人去取水，每人每天取多少水（以担为单位）
	8.1	Male/s 男 ☐ Quantity collected (*dan*) 水量(以担为单位) ☐
	8.2	Female/s 女 ☐ Quantity collected (*dan*) 水量(以担为单位) ☐
	8.3	Male Child/ren 男孩 ☐ Quantity collected (*dan*) 水量(以担为单位) ☐
	8.4	Female Child/ren 女孩 ☐ Quantity collected (*dan*) 水量(以担为单位) ☐
	9	Generally, what is the quality of the water you gather from your main source? 从水源处取来的水质如何？
	9.1	DRY Season 旱季 Bad (1) 劣质(1) ☐ Poor (2) 不好 (2) ☐ Fair (3) 一般(3) ☐ Good (4) 好 (4) ☐
	9.2	RAINY Season 雨季 Bad (1) 劣质(1) ☐ Poor (2) 不好 (2) ☐ Fair (3) 一般(3) ☐ Good (4) 好 (4) ☐
	10	How has the quality of available water changed over the last five years? 最近 5 年来，你发现水质发生变化了吗？ Worse (1) 变糟 (1) ☐ Same (2) 没变化 (2) ☐ Better (3) 变好 (3) ☐ Don't know (4) 不知道 (4) ☐

	11	Do you treat your drinking water (boiling, allowing to settle, filter or chemical treatment)? 你处理饮用水吗？ (煮开, 让其沉淀, 过滤或化学处理) Yes (1) 是 (1) ☐ No (2) 否 (2) ☐
	12	How reliable is your main water supply? 主要水源供应得到保障吗？
	12.1	DRY Season 旱季: Very reliable (1) 很有保障(1) ☐ Reliable (2) 有保障 (2) ☐; Not reliable (3) 得不到保障(3) ☐ Sometimes dries up completely (4) ☐
	12.2	RAINY Season 雨季: Very reliable (1) 很有保障(1) ☐ Reliable (2) 保障(2) ☐; Not reliable (3) 得不到保障(3) ☐ Sometimes dries up completely (4) ☐
	13	How far do the children in your HH walk to get to school? (in meters) 你家的孩子走路到学校路途有多远？（以米为单位） No school-age children (0) 没有上学的孩子(0) ☐ Distance (m) （几米） ☐
	14.1	Do the school-age children in your HH ever miss school for a few days or weeks to help with chores/work? 你家里的孩子曾经有过暂时辍学而留在家里帮做家务/农活吗？(几天或一周左右) No school-age children (0) 没有上学的孩子(0) ☐ Yes (1) 是 (1) ☐ No (2) 否 (2) ☐
	14.2	If "Yes", this occurs more often in: 如果回答"是"，经常发生在什么季节： Dry Season (1) 旱季 (1) ☐ Rainy Season (2) 雨季 (2) ☐
	15	How many children in your HH dropped out of school before completing 9-year-education? 你家有几个孩子在完成 9 年义务教育之前有过辍学的现象？ Number of children 孩子数量 ☐
	16.1	Are you aware of a formal water users group or committee in your village? 你知不知道你们村里有正式的用水管理协会或水管理小组？ Yes (1) 是 (1) ☐ No (2) 否 (2) ☐
	16.2	If YES, are they **effective** at managing you HH/farming water supply? (i.e., resolving disputes equitably, minimizing waste, maximizing efficiency of use, etc) 如果有，你认为他们在管理农户用水/农业用水供应方面效果如何？（即公正地解决用水争端、使浪费最小化、水利用效率最大化等各方面） Yes (1) 是 (1) ☐ No (2) 否 (2) ☐
	17	Has any member of your HH participated in a **water use** related training program? 你家有人参加过有关水的利用方面的培训项目吗？（如家庭用水、农业用水、灌溉用水等） Yes (1) 是 (1) ☐ No (2) 否 (2) ☐
	18	What type of sanitation does your HH use? 你家使用什么样的厕所设施？

		No toilet (1) 没有厕所设施/野外（1） ☐ Open Pit Latrine (2) 露天坑式厕所（2） ☐ Traditional Pit Latrine (enclosed) (3) 传统的有围墙的茅坑式厕所 (3) ☐ Ventilation Improved Pit Latrine (VIP) (4) 经改善通风良好的旱厕所 (4) ☐ Biogas pit (5) 与沼气池结合的厕所 (5) ☐ Pour flush (6) 人工冲水厕所 (6) ☐ Flush toilet(7) 自动冲水厕所 (7) ☐ Other (8) 其它 (8) ☐
	19	Is the toilet facility located within your HH, yard or compound? 厕所设施建在屋内还是院子内或与屋或与院子建在一起？ Yes (1) 是 (1) ☐ No (2) 否 (2) ☐
	20	Usually, does your HH share the toilet facility with people outside of your HH? 你家与外人一起共用厕所设施吗？ Yes (1) 是 (1) ☐ No (2) 否 (2) ☐
	21	Do you feel your HH's sanitation is satisfactory? 你对家里的厕所设施感到满意吗？ Yes (1) 满意 (1) ☐ No (2) 不满意 (2) ☐ Don't know (3) 不肯定 (3) ☐
	22	Has any member of your HH participated in a hygiene related training program? 你家里有人参加过与卫生意识有关方面的培训项目吗？ Yes (1) 是 (1) ☐ No (2) 否 (2) ☐
	23	How many times in the last **12 months** has anyone in your family been ill due to contaminated water? 在最近的 **12 个月里**，你家里有没有人因为水受污染而生病？ Never (1) 没有 (1) ☐ A few times (2) 有几次 (2) ☐ ≥Once a month (3) ≥ 1 个月一次或一次以上 (3) ☐ Many times (4) 许多次 (4) ☐ Don't know (5) 不肯定 (5) ☐
	24	Do you feel your HH has satisfactory access to healthcare/clinics? 你家对卫生保健/乡卫生所设施及服务的提供感到满意吗？ Yes (1) 是 (1) ☐ No (2) 否 (2) ☐
	25.1	For minor health problems, do you feel healthcare is affordable for your HH? 如果你家人得了小病，看得起病吗？ Yes (1) 是 (1) ☐ No (2) 否 (2) ☐
	25.2	For serious health problems, do you feel healthcare is affordable for your HH? 如果你家人得了大病，看得起病吗？ Yes (1) 是 (1) ☐ No (2) 否 (2) ☐
	26	In the last five years have you noticed erosion/environmental damage on your land? 在最近的 5 年里，你有没有发现家里的耕地受到侵蚀/环境破坏？（包括水灾、化肥和农药等各种因素） None (1) 没有 (1) ☐ Some (2) 有一些 (2) ☐ A lot (3) 很多 (3) ☐ Don't know (4) 不知道 (4) ☐
	27.1	Has the population of insects around your village increased or decreased over the last 5 years? 在最近的 5 年，你们村周围的昆虫数量减少了还是增加了？

		Increased (1) 增加(1) ☐ Decreased (2) 减少 (2) ☐ Don't know (3) 不知道 (3) ☐
	27.2	Has the population of wild animals around your village increased or decreased over the last 5 years? 在最近的 5 年，你们村周围的野生动物的数量减少了还是增加了？ Increased (1) 增加(1) ☐ Decreased (2) 减少 (2) ☐ Don't know (3) 不知道 (3) ☐
	27.3	Has the population of fungi or wild plants around your village increased or decreased over the last 5 years? 在最近的 5 年，你们村周围的菌类植物或野生植物数量减少了还是增加了？ Increased (1) 增加 (1) ☐ Decreased (2) 减少 (2) ☐ Don't know (3) 不知道 (3) ☐
	28.1	In the last 6 months have you (your HH) eaten food of lower quality than the food you normally prefer to eat? 在最近的 6 个月里，你家餐桌上的食物比你们通常吃的食物质量要低劣吗？ Never (1) 没有 (1) ☐ A few times (2) 几次 (2) ☐ ≥Once a month (3) ≥1 个月一次或一次以上(3) ☐ Many times (4) 许多次(4) ☐
	28.2	In the last 6 months have you (your HH) reduced the quantity of food usually served at meals? 在最近的 6 个月里，你家餐桌上的食物数量比以往的要少吗？ Never (1) 没有(1) ☐ A few times (2) 几次 (2) ☐ ≥Once a month (3) ≥1 个月一次或一次以上(3) ☐ Many times (4) 许多次(4) ☐
	29	Does your HH sell more food than it consumes, or consume more food than it sells? 你家出售的粮食比消费的要多呢还是消费的比出售的多？ Sells more (1) 出售多于消费 (1) ☐ Consumes more (2) 消费多于出售 (2) ☐ Don't know (3) 不知道 (3) ☐
	30	How many of the following durable products are used in your HH? 你家使用下列耐用产品吗？

Bicycle 自行车 (1) ☐	Scooter (small) 电动车 (小型) (2) ☐	Scooter (large) 电动车(大型) (3) ☐
Motorcycle 摩托车 (4) ☐	Car or large motor vehicle 小车或大车 (5) ☐	Radio 收音机 (6) ☐
Television 电视 (7) ☐	Electric fan 电风扇 (8) ☐	Washing Machine 洗衣机 (9) ☐
Electric Rice cooker 电饭锅 (10) ☐	Refrigerator 冰箱 (11) ☐	Power supply 供电 (12) ☐
Earth/dung floor 土/粪地板 (13) ☐	Wood/palm/bamboo floor 木板/棕榈/竹子地板 (14) ☐	Finished flooring 水泥或瓷砖地板 (15) ☐
Telephone (Landline) 电话 (16) ☐	Mobile Telephone 手机 (17) ☐	Small grain processing machine 小型碾米机 (18) ☐

Appendix III: Number of HHs Sampled & Confidence Intervals

County:Township	AV	No. of NVs	Population	No. of HHs	No. of HHs sampled	% of HHs sampled	Confidence Interval	
							95%	99%
LeYe:XinHua	NaShe	13	1761	290	60	20.70%	11.29	14.86
LeYe:XinHua	GuiLi	13	1868	366	71	19.40%	10.46	13.76
NaPo:BaiNan	NongMin	9	1049	236	83	35.20%	8.68	11.43
NaPo:BaiNan	ShangLong	7	701	173	54	31.21%	11.09	14.6
TianDeng:JinJie	MengYang	3	~1950	420	47	11.20%	13.49	17.75
TianDeng:JinJie	PinLi	9	3400	~640	82	12.81%	10.11	13.31
TianLin:LangPing	TangHe	20	1460	320	65	20.31%	10.87	14.31
TianLin:LangPing	XiHua	32	1500	343	72	21.00%	10.28	13.53
Totals (averages)		106	11739	2788	534	(21.48%)	(10.78)	(14.19)

County:Township	No. of NVs	Population	No. of HHs	No. of HHs sampled	% of HHs sampled	Confidence Interval	
						95%	99%
LeYe:XinHua	26	3629	656	131	19.97%	7.67	10.09
NaPo:BaiNan	16	1750	409	137	33.50%	6.84	9
TianDeng:JinJie	12	3400	1060	129	12.17%	8.09	10.65
TianLin:LangPing	52	2960	663	137	20.66%	7.46	9.82
Totals (averages)	106	11739	2788	534	(21.57%)	(7.52)	(9.89)
Cumulative Statistics	*106*	*11739*	*2788*	*534*	*19.15%*	*3.81*	*5.02*

Appendix IV: Surveyor Training Session Outline & Handout

Surveyor Training Course - Outline[2]

调查员培训课程 – 内容

1-Initial meeting and introductions between county staff and training team

1- 县项目办人员与培训员共同参与的启动会议和调查介绍

2-Training team explains the general purpose of the research and survey

2-培训员解释本次调查和研究目的

3-The questionnaire is read from beginning to end discussing:

3.1-content

3.2-intention of the questions

3.3-wording and translation

(Surveyors should take notes to assist them with the use of the questionnaire in the field)

3-自始至终朗读问卷，并讨论以下内容：

3.1- 问卷内容

3.2- 调查问题的目的

3.3- 问卷措辞和翻译

（调查员应做笔记，以便到实地做调查时能派上用场）

4-Training team reviews the **in-field survey procedure** which includes these steps:

4- 培训员回顾实地调查步骤，包括：

4.1-Surveyor introduces him/her self and institute working for (e.g., IFAD)

4.1-调查员做自我介绍并说明是为农发（IFAD）做调查

4.2-Surveyor makes sure a suitable person (i.e., an adult of the household [HH]) is available for the survey and willing to participate

4.2- 调查员要确保接受调查的农户（农户家里的成年人）在家并愿意接受调查

4.3-Surveyor reads the consent statement to the interviewee:

4.3- 调查员向被访谈的农户朗读同意接受访谈声明：

4.3.1–if have consent check appropriate box on questionnaire -continue

[2] Based largely on: Sullivan et al. (2002). *Derivation and Testing of the Water Poverty Index Phase 1.* Volume 2 – Technical Appendices I. Center for Ecology and Hydrology.

4.3.1–如果农户同意接受访谈，请核对问卷方框内容，继续

4.3.2–if do not have consent thank the person and leave

4.3.2–如果农户不同意接受访谈，感谢其人，离开

4.4-Conduct the survey

4.4- 开始调查

4.4.1-Ask questions slowly and clearly, repeat if needed – if question is still not understood re-structure the question as little as possible and repeat

4.4.1-问问题时，语速应缓慢而清晰，必要时可以重复 – 如果农户不明白问题的话，可以（尽可能少地变动）重新组织问句结构，并重复该问句

4.4.2-Do not anticipate, or prompt answers from interviewee – be patient

4.4.2-忽催促或暗示访谈者回答问题 –要耐心

4.4.3-Let interviewee settle on an answer before writing the response

4.4.3- 等访谈者确定答案再填写

4.4.4-Remain neutral – no matter what answers are given – do not seem to judge the interviewee in any way

4.4.4-保持中立的态度 – 无论答案是否已给出 –忽以任何方式评判访谈者

4.4.5-Be polite and patient

4.4.5- 要彬彬有礼，有耐心

4.5-Thank the HH member for their participation

4.5- 感谢农户家人参加访谈

NOTES FOR QUESTIONNAIRE

调查问卷注释

#1 – **HH** is defined as a housing unit in which one group of people reside. If children of the HH are not yet married then they are still considered part of the HH (whether they live in the housing unit or not). If children are married and live in the same housing unit then they are considered part of the HH. If, for example, two families share the same housing unit they are considered one HH.

问题 1 – "农户"被定义为一组人居住在一个住宅单元里。如果该农户的孩子未婚，其仍被视为一家人（不论其是否住在同一个住宅单元里）。如果孩子已婚但仍住在同一个住宅单元里，其也被视为一家人。举个例子，如果两家人住在同一个住宅单元里，那么他们就算是一家人。

#2 – The **"head of the HH"** is the adult/s who makes the day to day decisions as well as the important decisions in the HH (usually the husband or wife or both).

问题 2 – "农户户主"指的是在家里有决定权的那个成年人（通常是要么是丈夫，要么是妻子或丈夫和妻子一起做决定）

#13 – If the interviewee uses "li" for distance please convert to "meters".

问卷 13- 如果农户以"里"回答，请调查员转换成"米"

#18 – If the type of sanitation is mixed mark two or more choices or, mark "other (8)" and write a note in the margin.

问题 18 – 如果厕所的类型有两个或两个以上，请勾"其他（8）"或在问卷边上做笔记

#25 – Healthcare is viewed as "affordable" if the fee can be paid in a relatively short period of time with little to no assistance from people outside the HH.

问题 25 –卫生保健"看得起病"指的是如果在短期内没有得到家庭以外的人资助而本身能支付得起看病治病的费用。

#30 – For each durable good write the number of goods owned by the HH in the appropriate blank. If the HH owns other durable goods not listed but of significant value write them down in the margin.

问题 30 – 请在每项耐用产品旁边的方框内写上该农户拥有该产品的数量。如果农户家里拥有其他耐用产品而这里又没列出来且价值不匪的，请在旁边记下。

General Notes:

总注释

-**“Rainy season”** is defined as the annually occurring period of time (at least one month) in which precipitation is at a maximum (in southwest China this is usually from June to September) but there are fluctuations year to year.

-“雨季”指的是每年发生的某个阶段（至少一个月），在此期间雨量最大（在中国南方通常发生在 6-9 月），当然年度与年度之间雨季也有变化的时候。

-Often all questions will have to be translated into local dialect where Mandarin is not the spoken language. When this is done, every effort should be made to stay true to the original version, wording and intention and to use the same translation with each HH.

-由于农村不说普通话，因此所有的问题在实地调查时都将翻译成当地方言。翻译方言的时候要尽量与原句意思、措辞和目的一致，同一个问题对每个农户都要使用相同的翻译语句。

-Please note anything unusual or of particular significance in the margins of the questionnaire.

- 请在问卷旁边记下不寻常的或有意义的信息。

Appendix V: Survey Consent Statement

Consent Statement[3]

Consent:

Hello! My name is _____. We are conducting a survey with IFAD and the Ministry of Finance. This survey will help us in planning and monitoring the impact of project activities. Your participation is voluntary. You can choose not to answer any questions, and you can stop the interview at any time. All of your responses will be confidential. Would you like to ask me anything else about the survey?

Do you agree to participate in this survey?

征求被访者同意：

你好！我叫----------。我们在做一个农发和-------部项目的调查，本调查将有助于我们对项目活动进行规划和对项目活动的影响进行监测。你的参与基于自愿，你可以选择不回答我提问的任何问题，也可以随时终止我的访问/提问，你的所有回答我将给予保密。关于这个调查，你有什么要问我吗？

你是否愿意参与这个调查？

[3] Source: IFAD (2007). Results and Impacts Management System (RIMS). *Part II: Tools for Conducting an Impact Survey.* IFAD: Rome.

Appendix VI: WEILAI Phase II – Data Request Form

Data Request form for Township Data
乡镇基本数据调查表

Township Name 乡/镇名称： xiang/ zhen ming cheng	
Township population 乡/镇的总人口数 xiang / zhen de zong ren kou shu	
Number of **households (HH)** in township 乡/镇的总户数 xiang / zhen de zong hu shu	
Number of Administrative Villages in township 乡/镇的行政村总数 xiang / zhen de xing zheng cun zong shu	
Number of Natural Villages in township 乡/镇的自然屯总数 xiang / zhen de zi ran tun zong shu	
Total area of land in the township (in mu) 乡/镇的总土地面积 (亩) xiang / zhen de zong tu di mian ji (mu)	
Total area of "non-forest arable land" of township (in mu) 乡/镇的总耕地面积（不包括林地面积）(亩) Xiang / zhen de zong geng di mian ji (bu bao kuo lin di mian ji) (mu)	
Including:其中：a. Paddy field （in mu） 水田 （亩） shui tian (mu)	
b.Dry land (in mu) 旱地 （亩） Han di (mu)	
Total area of "forest arable land" of township (in mu) 乡/镇的总林地面积 (亩) Xiang / zhen de zong lin di mian ji(mu)	

COMPONENT 成分 cheng fen	Question/information needed 需要的问题或信息 Xu yao de wen ti huo xin xi	Data 数据 Shu ju		Possible Data Source 数据的可能来源 Shu ju de ken eng lai yuan
WATER RESOURCES 水源 Shui yuan	What are the HH's primary **sources** of water **(where is the water taken from)** for HH water use and for agriculture water use? 农户饮水以及灌溉主要水源？（农户直接取水点） nong hu yin shui yi ji guan gai zhu yao shui yuan (nong hu zhi jie qu shui dian)	For HH water use 饮用水（户） yin yong shui (hu)	For agriculture water use 灌溉水（亩） guan gai shui (mu)	Agriculture survey in 2007 Question 19 & 20 (2007 年农业普查。结合 2007 农业普查 H19,H20 回答。) 2007 nian nong ye pu cha. jie he 2007nian nong ye pu cha H19,H20 hui da)
	Water piped 自来水 zi lai shui			
	Purified water (bucket water) 纯净水（购买的桶装水）chun jing shui (gou mai de tong zhuang shui)			
	Stream 小溪 xiao xi			
	Lake 湖水 hu shui			
	Pond 池塘 chi tang			
	Rain 雨水 yu shui			
	River 河流 he liu			
	Salt water well 咸井水 xian jing shui			
	Freshwater well 淡井水 dan jing shui			
	Spring 泉水 quan shui			
	Pump water 抽水 chou shui			
	reservoir 水库 shui ku			
	others 其他 qi ta			
WATER ACCESS 水的可得性 shui de ke de xing	Approximately what percentage of HHs in the township have water piped directly to their homes? 乡镇农户大概的自来水普及率 Xiang zhen nong hu da gai de zi lai shui pu ji lv	%		2006 County Statistics Yearbook. 2006 年县统计年鉴。 2006 nian xian tong ji nian jian
	What is the net income per HH per year? 年人均纯收入？ Nian ren jun chun shou ru?	RMB 元		……H21 Agriculture survey in 2007 2007 年农业普查。 2007 nian nong ye pu cha.
	> 2750 RMB > 2750 元	persons 人		
	< 680 RMB < 680 元	persons 人		
	680-2750 RMB 680-2750 元	persons 人		

WRM CAPACITY 用水管理小组的能力（yong shui guan li xiao zu de neng li）	How many **Administrative Villages** in township have Water User Groups?每个乡/镇拥有的用水管理小组的村的个数 Mei ge xiang / zhen yong you de yong shui guan li xiao zu de cun de ge shu	Admin. Villages 个	2006 County Statistics Yearbook. 2006 年县统计年鉴。 2006 nian xian tong ji nian jian
SANITATION 厕所卫生（ce suo wei sheng）	What type of sanitation facilities do HHs in the township use – by percent of each type of sanitation facilities? 家庭厕所类型，各种厕所类型的数量占总户数比重 jia ting ce suo lei xing, ge zhong ce suo lei xing de shu liang zhan zong hu shu bi zhong		Agriculture survey in 2007 2007 年农业普查。 2007 nian nong ye pu cha.
	1. Number of HHs using Pour or Flush toilet 1.水冲式 shui chong shi	HHs 户	
	2. Number of HHs using VIP Latrine 2.旱厕 han ce	HHs 户	
	3. Number of HHs using Simple toilet or no toilet 3.简易厕所或无厕所 jian yi ce suo huo wu ce suo	HHs 户	
	4. Number of HHs using Biogas – toilet 与沼气结合的厕所与沼气结合的厕所 Yu zhao qi jie he de ce suo yu zhao qi jie he de ce suo	HHs 户	
EDUCATION 教育水平（jiao yu shui ping）	What is the total number of teachers in the township? 全乡/镇教师总人数 quan zhen jiao shi zong ren shu	persons 人	2006 County Statistics Yearbook. 2006 年县统计年鉴。 2006 nian xian tong ji nian jian
	Including: 其中：casual teachers 代课教师	persons 人	
	What is the total number of students in the township? 全乡/镇学生总人数。 Quan xiang / zhen xue sheng zong ren shu.	persons 人	
	What is the education level of the head of HH? 户主的文化水平 Hu zhu de wen hua shui ping		2006 County Statistics Yearbook. 2006 年县统计年鉴。 2006 nian xian tong ji nian jian
	Illiterate 文盲 wen mang	persons 人	
	Primary school 小学 xiao xue	persons 人	
	Middle school 中学 zhong xue		
		persons	

		人	
	High school 高中 gao zhong	persons 人	
	Junior college 大专及以上 da zhuan ji yi shang	persons 人	
HEALTH & HYGIENE 卫生保健（wei sheng bao jian）	How many hospitals are there in township? 全乡/镇医院的数量 quan xiang /zhen yi yuan de shu liang	persons 人	2006 County Statistics Yearbook. 2006 年县统计年鉴。 2006 nian xian tong ji nian jian
	How many health centers are there in township? 全乡/镇卫生所的数量 quan xiang /zhen wei sheng suo de shu liang	persons 人	
	How many doctors are there in the township? 全乡/镇医生数量 quan xiang /zhen yi sheng shu liang	persons 人	
	How many nurses are there in the township? 全乡/镇护士数量 Quan xiang / zhen hu shi shu liang	persons 人	
	What was the "infant mortality rate" in 2006? 2006 年全乡/镇婴儿死亡率 2006 nian quan xiang /zhen ying er yi wang lv	persons 人	
FOOD SECURITY 粮食安全（liang shi an quan）	What was the total yield of all grain in 2005? (all grains) *2005 年粮食总产量（包括各种粮食） 2005 nian liang shi zong chan liang (bao kuo ge zhong liang shi)	Ton 吨 dun	2005 County Statistics Yearbook. 2005 年县统计年鉴。 2005 nian xian tong ji nian jian
	What was the total yield of all grain in 2006? (all grains) *2006 年粮食总产量 （包括各种粮食） 2006 nian liang shi zong chan liang (bao kuo ge zhong liang shi)	Ton 吨 dun	2006 County Statistics Yearbook. 2006 年县统计年鉴。 2006 nian xian tong ji nian jian
ENVIRON--MENT 环境（huan jing）	What was the total fertilizer consumption? 全乡/镇化肥使用量 Quan xiang / zhen hua fei shi yong liang	Ton 吨 dun	2006 County Statistics Yearbook. 2006 年县统计年鉴。 2006 nian xian tong ji nian jian
	What was the total pesticide consumption? 全乡/镇农药用量 Quan xiang / zhen nong yao yong liang	Ton 吨 dun	

	Area of treatment of soil erosion in2006 2006 年水土流失治理的面积 2006 nian shui tu liu shi zhi li de mian ji	%	

备注 1：2001-2006 年的农业居民人均收入和粮食总产量都要收集，填入下表：
Note1: Please complete the table below by filling in the income and total yield of all grain of agricultural residents:

Year 年份 nian fen	Per income 人均收入（元）ren jun shou ru (RMB)	Total yield of all grain (in ton) 总产量（吨）zong chan liang (dun)
2001		
2002		
2003		
2004		
2005		
2006		

Note 2: For IFAD Project townships, please mark "*" behind the name of the township.
备注 2：若为项目乡镇，请加注"* "在乡镇名称后。

Appendix VII: Conversion of *Dan* to Litres by Township

Conversion chart for Dan to Liters – Guangxi Province
(estimates basted on interviews with village leaders)

Napo County **BaiNan Township**	**1 Dan (担) =** **(1 jin = ~0.5 liters)**	**Conversion to Liters** **1 Dan = ~x liters**
ShangLong	60- 70 jin	**32.5**
NongMin	50-60 jin	**27.5**
TianDeng County **JinJie Township**		
MongYang	80-100 jin	**45**
PinLi	100 jin	**50**
TianLin County **LangPing Township**		
TangHe	100 jin	**50**
XiHua	100 jin	**50**
LeYe County **XinHua Township**		
NaShe	100 jin	**50**
GuiLi	80 jin	**40**