

Social Responses to Environmental Degradation in Northwest Rural China

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Scholarly Abstract

This article joins the debate over factors which affect sustainability in China's rural areas at both the village and individual level. It assesses gender-based differences in response to environmental problems, effects of farmer innovation circles on village sustainability, and development of environmental consciousness. We find that both sexes have low environmental consciousness, but women are more likely to be environmentally aware. Despite an increase in labor from agriculture reforms, women's status does not increase within the family, limiting their ability to act on their environmentalism. Education, income, and age are additional demographic factors related to environmental consciousness. Villagers feel the village is most responsible for environmental protection. The importance of governmental sources of agricultural information was highlighted, as was the impact increasing wealth has on environmental consciousness. In the future women must be vital participants in future sustainability programs, due to high incidence of male migrant city workers, and women's deep connectedness and dependence on the land.

Introduction

China's environment is in dire straits. Seven of the world's ten most polluted cities are in China. Forest cover has been reduced to some 3% of total land area, and up to 80% of major rivers are too polluted to even support fish¹. The impact of this environmental degradation is particularly severe in China's northwestern areas, where rapid desertification and groundwater depletion on already marginal land form a lethal cocktail of environmental stress. Investigators of such situations emphasize the need for locally and culturally specific practices to counter such stresses². Despite this consensus, there is little detailed research on how people in northwestern marginal areas address these stresses. This lack of knowledge precludes a full understanding of how residents in marginal areas of China may deal with ever-increasing levels of environmental degradation.

This study was conducted in an arid stretch of marginal land called the Loess Plateau in northern Shaanxi Province, which typifies the poor marginalized lands of China. This area is characterized by two major, interconnected environmental phenomena: groundwater depletion and desertification. Rampant deforestation has destroyed ground cover and root systems, causing erosion of fertile topsoil and leaving the area vulnerable to the encroachment of the Gobi desert. Water resources, already scarce in an arid environment, have been severely depleted by wasteful irrigation practices and intensive farming of marginal land. Moreover, the people in this region are among the poorest in China. These features mean that northern Shaanxi is a segment of society extremely vulnerable to deleterious changes in the environment.

This research attempts to redress this gap in sociological knowledge of contemporary China by conducting a detailed study of Shaanxi province. Three areas of research were identified in particular that have received little attention by academics that could help address China's environmental problems in both a top-down governmental approach, as well as a bottom-up, citizen-autonomy approach. We addressed gender-based differences in response to environmental problems, the use of informal networks to spread sustainable farming technologies, and what influences the environmental consciousness (EC) of the rural Chinese.

Past Literature on the Rural Chinese Environment

Since the 1990s, scholarship on rural development in reform-era China has taken on five major themes: environment, political economy, political tension, sustainable development, and gender and migration. The rising popularity of the so-called “China threat theory,” which generally views China’s reemergence onto the global spotlight is a danger to the existing balance of power in international relations, has produced a cottage industry of books and articles that, among other things, deal with rural social discontent. The rising number of news reports in the West about China’s environmental woes, and high-profile peasant riots in the past year, has provided further focus towards the future of China’s rural environment^{3,4,5,6,7}. Furthermore, books on rural poverty and environmental damage are rising in popularity in China (sometimes for their sensational and shock value), and have attracted the attention of the central authorities and the international media^{8,9}. Despite the broad spectrum covered by existent literature, much of it does not encompass multiple perspectives in their analysis, and few seriously study the relationship between rural citizens and the environment, rural perceptions of the natural environment, and environmental awareness.

One of the few comprehensive pieces of literature written to date in the West on the Chinese environment is Elizabeth Economy’s *The River Runs Black*. Economy points out that the moral engine behind China’s environmental exploitation began with the millennia-long legacy of Confucian and Legalist principles, which advocated man’s supremacy over the environment, stemming from the power given to the local magistrate to decide on most state matters for localities¹⁰. The resulting conflicts of interests created a rule-of-man culture that often subverted state policy in favor of economic gain, leaving issues of conservation low or off the totem pole. This man-over-nature relationship was radicalized under Mao, who repeatedly declared nature as the enemy of man, and pursued campaigns such as the Great Leap Forward and Cultural Revolution, which dramatically worsened water pollution, land fertility, soil erosion, and deforestation¹¹.

Unfortunately, much of this current literature on the rural environment in China at present are composed through a top-down framework, focusing on central government solutions, grain market reforms, or economic incentives to resolve issues and administrative incompetence^{12,13,14,15,16}. In addition, the passage of the “Three Rurals” (*san nong*) reforms, three major pieces of legislation aimed to reduce the financial burden of peasants and improve

their agricultural production capabilities, have been the focus of many books in China^{8,9}. Press attention on the environment has also reflected the direction of existing literature of recent^{5,17,18,19}. Thomas Bernstein and Xiaobo Lü focus on the financial squeeze on peasants from tax policy and local government fees in rural areas as a primary flashpoint of potentially destabilizing unrest²⁰. They take an economic view of peasant burdens, noting that the greatest tax burden is upon the rural poor, while the rural rich actually enjoy a negative tax rate²¹. Disparities in tax burden, ineffective tax collection, illegal local fees, and general corruption, are directly linked to the largest and most publicized peasant riots in the 1990s²². Though the argument frames the decision-making process of rural peasants around economic incentives, the argument ultimately draws the dominant, almost exclusive, link of peasant happiness with government responsibility and pro-activeness. Studies of Shaanxi province, and other western provinces, under Beijing's Great Western Development Strategy (*Xibu da kaifa*) shows how the government's billions of yuan in investment towards massive public works projects is more of a subsidy program rather than a development plan for rural, impoverished provinces^{23,24}. Yet again, these discussions analyze rural strife through a top-down approach of government policy to the plight of rural residents. This approach ignores the complex dynamism of the lives and environment around rural peasants, akin to the central government's poverty reduction campaigns as simply throwing money at localities without regard to peasants' diverse needs and challenges.

Other studies view the rural environment through the lens of political agitation and peasant discontent. A sizable amount of research has looked into the dynamics of rural protests, primarily caused by pollution or government corruption and incompetence^{20,25,26,27,28,29}. O'Brien and Li's research point toward then peasants' disillusionment with the local government, and now increasingly the central government, is a serious problem in the central government's efforts to maintain Party supremacy and social stability^{27,28}. Ho's study on the "institutional ambiguity" of rural land policy, a legacy of the commune and household responsibility systems, may serve to stir up considerable conflicts as the state pursues to more clearly define property and intellectual rights under the banner of economic development and maturation²⁶. However, the vast majority of such studies on the rural peasantry too often draw an implicit but direct correlation between state intervention and the welfare of peasants.

The United Nations Development Program (UNDP) has also conducted an extensive study on social development in China, with a particular eye towards rural areas and the environment. Like Economy, the UNDP report identified environmental degradation, such as land erosion, water pollution, air pollution, and desertification, as serious potential causes for unrest, and are issues that the government must take immediate and effective action towards in order to maintain social stability and economic growth³⁰. The report provides two main scenarios: the “perilous path” and the “green reform path,” based on whether or not the central government decides to wholeheartedly back sustainable development and a civil society³¹.

On the other hand, scholars who have written on China's sustainable development and environmental policies in rural areas, such as Ellen Judd and Bin Wu, do take care to take a grassroots approach to analyze the role of peasants' initiative and networks in improving their livelihood^{32,33}. Wu's study displayed that farmer initiatives have the capability to organize to share technologies and innovate without state or external intervention, and typically along clan or other traditional ties³³. He challenges the mainstream political approach towards viewing rural development and environmental issues by illustrating the dynamism of China's marginal rural areas that have various issues of poverty, migration, and environmental degradation. China's “classical approach” towards environmental response in the form of poverty reduction programs and extension services alone, he explains, simply does not match up to farmers' needs and challenges³⁴. Overall, ordinary peasants can and do play important roles in resolving environmental problems. Policies centered on state intervention, often are ineffective because they do not address peasants' incentive structures and the complex social and environmental difficulties in many marginal areas.

From this brief survey of major recent literature on rural China, it becomes apparent that most studies have taken a state/institution-first approach in analyzing various rural and environment-related issues, primarily because the state has so thoroughly penetrated society under communist rule. The disjuncture in the various directions of recent Chinese rural and environmental studies thus necessitates a systematic analysis of the identity of the rural Chinese peasant. Furthermore, the existent literature, though extensive on examining the political, economic, and developmental aspects of the Chinese natural environment, fails to seriously consider perceptions on the natural environment and environment consciousness among citizens, especially in rural agricultural areas. A closer look into how Chinese peasants conceptualize the

natural environment, how they interact and relate to this environment, and their awareness of environmental conservation and preservation, are critical to understanding the basis for their social, economic, and political incentive structures in making environment-related decisions. In addition, understanding their views on how external forces, such as the government, agricultural extension services, the media, and NGOs, interact with their lives is crucial to constructing a basic portrait of identity of their roles as peasants and their relation towards the natural environment.

Methodology

Research was conducted over a one and a half month period in June and July 2005. Mizhi County was chosen as the focus of research, after a review of previous literature, because of its access to researchers, and the lack of existing research in the areas of the hypotheses: gender, informal agricultural networks and measures of environmental consciousness.

A survey and interview were designed to measure environmental consciousness and explore the possible existence of Farmer Innovation Circles. Both the survey and the interview also requested demographic indicators to be used in comparison between and within the above factors. Demographic indicators refer to demographics of respondents. This includes information on age, sex, education level, migrant status, and annual household income. The purpose of demographic indicators are to determine the demographic composition of the survey sample population, and also to use in correlation analysis against environmental indicators. Environmental indicators measure the respondent's level of environmental consciousness, as well as how that person perceives responses to environmental change. Environmental indicators include questions regarding changes in environmental quality, personal impacts on the environment, the relative importance of environmental quality, responsibility for environmental quality, and sources of farming adaptation techniques. Environmental consciousness was measured using the following environmental indicators: perception of change in environmental quality (see question 10), perception of personal impact on the environment (see question 14), perception of importance of improving environmental quality to future standard of living(see question 13), satisfaction with environmental conditions in the village (see question 12), and farming adaptation in response to environmental concerns (see question 18).

Interviews were designed to obtain supplemental information to the surveys, including more detailed questions about the environment and the role respondents take in regards to the environment. Interviews were conducted by each researcher alongside graduate students from Shaanxi Normal University, Shaanxi University, and Northwest University. The interview also included questions about women's rights and specific forms of collectivization. The survey and interview questions were also translated from English to Mandarin to enable those taking the survey to respond independently and to accommodate the China-based researchers.

The respondents were usually selected on a convenience sampling basis, with the researchers going door to door in search of families willing to talk or talking with the families

selected by the village leaders. The researchers attempted to separate themselves from village leaders as their presence was expected to create a bias in responses. The time limit on the researchers in the village did not allow for a random sample to be developed and carried out.

Each person or family was given a survey to fill out. Some people encountered were unable to read and write; thus many were administered orally. After the survey was conducted, if there was still time, an interview was also conducted. The surveys were anonymous, but many people still chose to give their name and other identifying information in the interviews. The interviews were conducted by way of a translator, usually a Chinese researcher and responses were recorded by hand. Meals and overnight accommodations in Yangjiagou were arranged with local families who were also interviewed.

Interview teams were formed of 2 researchers: one American and one Chinese. This group formation served two purposes. First, the Chinese researcher acted as translator and was able to develop a rapport with the respondents through shared language. Secondly, the presence of the American researcher oftentimes encouraged people to speak when they were otherwise unwilling. A few respondents that the researchers encountered had been schooled in English and were willing to be interviewed in English. The Chinese researcher could administer surveys orally if a respondent was unable to read, write, or could not otherwise fill out the survey on his or her own. A total of 123 surveys and 36 interviews were administered and collected.

The third phase of research consisted of translation of surveys and interviews into English. This was done in collaboration with Chinese student researchers. The data from surveys and interviews was then coded and entered into Microsoft Excel and SPSS for analysis and tests. Correlation analyses were run between demographic factors responses to questions measuring environmental consciousness (See table 9). Since, in all cases except age, the data was non-normally distributed, correlation analysis was conducted using bi-variate nonparametric analysis. For a regression analysis, Multivariate General Linear model analysis was used to analyze regression and variance for dependent variables (environmental indicators) by factor variables (demographic indicators).

Discussion

The discussion of data collected from this research is split into three sections, reflecting the three focus areas of this research: gender and environment, adaptation in response to environmental change, and EC in rural China. Each section begins with a reiteration of the relevant hypotheses. Data collected from each phase of the research is then discussed, as is interview data. Finally, third section will discuss the hypotheses. Demographic correlation analysis is not discussed separately, but is referred to in the hypothesis discussion session.

Overall, 26 interviews and 123 survey responses were collected at three villages in Mizhi county, northern Shaanxi province, over the course of four days. This data is displayed graphically in a number of tables. Table 1 summarizes the demographics of respondents. Table 2 summarizes significant relationships between gender and environmental indicators. Table 3 offers a display of significant relationships relating to FICs. Table 4 relates sources of information on farming techniques and environmental indicators. Table 5 analyzes the effects of age, education, and income on several environmental indicators. Table 6 contains the results of correlation analyses between environmental indicators. Table 7 summarizes data on factors important to future standard of living. Table 8 summarizes perceptions of who is responsible for environmental quality. Finally, Table 9 presents detailed view of all relationships between demographic and environmental indicators. All tables are set in the Appendix section.

Gender and Environment

Hypothesis

Our hypothesis with regards to gender was based on the idea that female respondents would have a higher EC than males. This is based on a wide variety of literature suggesting that women have a more intimate connection with the environment than men.

- Women will be more likely to rank the environment as first or second most important to their future standard of living, perceive a personal impact on the environment, and changed farming practices in response to environmental conditions.

Demographic Correlation Analysis

Statistical analysis did not reveal any of significance to the hypothesized correlations. Table 2 outlines this analysis. In terms of both correlation and regression analysis, none of the hypothesized correlations were significant. However, one relationship between demographic

factors was discovered. One of the strongest relationships between data sets in this research is that between sex and the importance of increasing income. Females tend to place a greater emphasis on the importance of increasing income in the future. Much research, including that of Ahmad³⁵ and our own interview data, suggests that women typically make many everyday household decisions. This intimate familiarity with economic status may prejudice women to take a more essential view with regards to future income. In addition, migrant labor, which is often, though not exclusively, male, may exaggerate male earnings with respect to females, causing females to perceive a need to earn more by comparison.

Interview Data

Women are often responsible for all work on the farm the entire year except harvest and planting times when the husband and family members come home to help. Women's status has increased a small amount in the village since the agricultural reforms and increased labor, but villagers believe this is only a result of the family appearing wealthier due to family members working in the city. Despite the increase in labor, there was no change in status for women within the family. According to Matthews and Nee³⁶, female family members can lose status because the woman's income becomes smaller in comparison to wages earned by family members in the city despite increased labor.

Hypothesis Discussion

In the case of gender, there is little statistical evidence to suggest that females are more EC than males. Indeed, the only significant correlation involving gender was with the importance of income. Correlation and regression analysis revealed no statistically significant relationships with regards to the hypotheses. On this basis, the null hypothesis that if the respondent is female, the level of EC will be greater is accepted. However, the results of the cross tabulation analysis do point out that EC respondents are more likely to be women. These findings, while not statistically significant, are still valuable for the gender gap they highlight in terms of environmental indicators.

Adaptation to Environmental Changes

Hypothesis

We hypothesized that Farmer Innovation Circles would be revealed through a connection of kin both inside and outside the village. The environmental indicator summary called these

hypotheses into question, but statistical analysis provides a more complex picture. Table 3 summarizes analysis of these hypotheses.

- Respondents who have received information on farming techniques from kin inside the village will be likely to have received information from kin outside the village as well (and vice versa), suggesting participation in FICs
- Respondents who have received information on farming techniques from kin outside or inside the village as part of an FIC will be more likely to adapt their farming practices in response to environmental concerns.

Environmental Indicator Analysis

Satisfaction with environmental conditions in the village shared a fairly strong positive relationship with farming adaptability- those who were unsatisfied with environmental conditions were more likely to change their farming practices as a result of environmental problems. This relationship suggests that farming adaptation may partially be spurred by dissatisfaction with environmental conditions. Given interview responses, however, it seems that most farming adaptation is spurred by government directives.

Farming adaptability and perception of local government concern for the environment demonstrated a negative relationship- the strongest correlation across the survey data (-0.514). Respondents who did not modify their farming practices thought the local government was less concerned about the environment. Many informants reported during interviews that farming adaptability is most likely to be initiated by government directives. The correlation referred to above could reflect the fact that if governments did not issue directives or advice to change farming practices because of the environment, respondents would also report lower concern on the part of the local government towards the environment.

Respondents were no more likely to give more environmentally conscious answers to environmental indicator questions if they were involved in an FIC. Additionally, based on the results of correlation and regression analysis, participation in an FIC was not more likely to lead to adaptation of farming techniques in response to environmental concerns.

Interview Data

Extension services and other avenues of agricultural information varied widely from village to village. The most help was offered to Gauxigou, the model eco-village. The people of Gauxigou believe the government pays attention to their environmental concerns, but responses

were less positive in other villages, where the government was pegged with varying levels of involvement with environmental concerns. There was little evidence of information sharing within villages or between villages.

Hypothesis Discussion

The correlation coefficient for the relationship between receiving farming information from kin inside and outside the village was quite strong, displaying a correlation coefficient of 0.515. This relationship is also highly significant (0.000).

This relationship means that respondents receiving information on farming techniques from kin inside the village also received information on farming techniques from kin outside the village, and vice versa. Such a result is interesting because it suggests a relationship between the sharing of farming techniques between kin inside and outside the village- in other words, it suggests the existence of FICs. The researchers thus accept the hypothesis that if a respondent has received information on farming techniques from kin inside the village, he or she will be likely to have received information from kin outside the village as well (and vice versa).

However, participants in FICs were no more likely to adapt their farming techniques in response to environmental concerns. Additionally, statistical analysis shows no significant relationship between participation in FICs and any measure of environmental consciousness. Additionally, interview responses seem to corroborate this result, with little evidence that FICs led to farming innovation in the survey area. Thus the researchers accept the null hypothesis that participation in FICs has no discernible effect on farming adaptation.

EC in Rural China

Hypothesis

Several hypotheses were formulated with regards to EC. Many of these were dependent on demographic factors such as age and education. The third, however, considered the effect of information sources on the transfer of sustainable farming practices. Please refer to Table 5 for details of relationships between demographic and environmental indicators. The hypotheses are listed again below:

- Respondents who get information on farming techniques from the government will not rank the environment as first or second most important to their future standard of living, perceive a personal impact on the environment, or have changed farming practices in response to environmental conditions. Receiving

information on farming techniques from the government is defined as getting them from any source aside from kin inside or outside the village.

- Respondents who have a higher level of education will be more likely to rank the environment as first or second most important to their future standard of living, perceive a personal impact on the environment, and changed farming practices in response to environmental conditions.
- Respondents older than 61 will be less likely to perceive a personal impact on the environment, and more likely to consider the government as chiefly responsible for the environment.

Environmental Indicator Correlation Analysis

As evidenced in Table 6, several strong correlations were observed between the environmental indicators themselves. One of the more interesting of these is the negative relationship between perceived changes in environmental quality and satisfaction with environmental conditions in the village. As respondents perceived more improvement in environmental conditions, their satisfaction with environmental conditions decreased. This is counterintuitive, yet given the relatively strong correlation coefficient (-0.438) and the high level of significance (0.000), this discrepancy deserves some attention.

Although it would appear that the two environmental indicators are related, it may have appeared to respondents that they were not. For example, “changes in environmental quality” may have been interpreted on a very general, macroscopic scale. “Satisfaction with environmental conditions” may have been taken by respondents to indicate factors more closely related to their everyday lives. If, for example, various catchment ponds have been constructed in a given village, and reforestation projects initiated, a respondent may perceive that the overall environment has increased. However, concern over a hydrologic drought that year may be expressed in dissatisfaction with environmental conditions- conditions being more transient. The more a respondent perceived improvement in the quality of the environment, the less likely he or she was to change farming practices as a result of environmental conditions. This result makes perfect sense; if the environment has improved, there is no need to adapt one’s farming practices.

Similarly, respondents who thought that the environment had improved also ranked the local government’s concern for the environment more highly. This relatively strong relationship

(0.413) conforms with several interview responses to the question of how the environment has changed. Several informants described a positive change because of reforestation programs, and these programs were promoted by local governments. The linkage made by several informants between the government and improving the local environment through reforestation probably finds expression in this strong relationship.

One particularly interesting relationship is that between satisfaction with environmental conditions and perception of personal impact on the environment. Respondents who reported having a personal impact on the environment tended to be more satisfied with environmental conditions. This is an interesting result, as it opens up the possibility that if a respondent was aware of his or her impact on the environment, he or she could adopt more sustainable practices. However, given that there was no significant correlation between personal impact on the environment and a change in farming practices, this interpretation is unsubstantiated by the remainder of the data.

Respondents who were dissatisfied with the environmental conditions in their village ranked local government concern for the environment lower. This result, while intuitive, is interesting for the direct link it suggests between dissatisfaction and placing blame on the local government. As noted by Economy³, there are isolated reports of rural people protesting against local governments on the basis of environmental factors. This result may reflect similar discontent.

Interview Data

Several trends came to light through the comparison of interviews conducted in Mizhi County. First of all, people overwhelmingly believe the environment is getting better. Several explanations were given. The main reason listed was the increase in non-native trees and grasses that the villagers were paid to plant on steep hills by the government. Other reasons included the increase in roads, pressurized tap water, and the fact that their standard of living was increasing. Villagers rarely focused on the actual health of the soil, water, or ecosystem.

Additionally most respondents did not feel their daily life had any impact on the environment. Only one person believed the chemical fertilizer they were applying was bad for the soil and was aware of the degradation it was creating. In Guangzhong, there was some concern over the lack of trash collection, and the negative effects of urbanization. One informant says people do not pay close attention to environmental problems because many of them work in

the city. This is a possible explanation for the apparent distance many richer respondents evidence from the environment. Overall, there was little awareness nor concern for the environment.

Most people have wells, and divert streams for irrigation, or depend on rain. A few people expressed concern about the factories upstream releasing wastewater into the rivers they use to irrigate crops, which sometimes die from the water. One informant from Guangzhong theorizes that chemical plant will contaminate well water, but village officials assured residents the plant will clean its water. Another informant mentioned that the river flowing through their village used to be much deeper and flow much stronger. Today it is reduced to the thinnest trickle.

When asked whether there were better farming methods that could be employed, nearly everyone answered yes. But the methods mentioned almost entirely relied on expensive machines or increased use of chemicals. Only one person mentioned more sustainable methods, but lamented that they were too expensive and time consuming.

One final interesting anecdote is found in that the richest family interviewed, with an income of over 30000 RMB, specifically expressed a great deal of concern in the environment. This contradicts the trend expressed in the correlation analysis which predicted that respondents with higher incomes generally cared less about the environment.

Hypothesis Discussion

One of the few significant correlations involving education was between years of schooling and perception of personal impact on the environment. This relationship has been detailed in the earlier discussion of correlation analysis between demographic and environmental indicators. However, this is the only indicator of EC that demonstrated a significant relationship with years of schooling. The researchers thus, while not accepting the null hypothesis, reject the assertion that education level is a reliable predictor of EC in general.

A separate table, Table 4, details relationships between respondents who received farming information from governmental sources and measures of EC. Those who received information on farming techniques from media were more likely to rank higher the importance of the environment. However, those who received information on farming techniques from governmental sources were unlikely to perceive a personal impact on the environment. Respondents receiving information on farming techniques were no more likely to adapt farming

practices to environmental concerns. Respondents receiving information on farming techniques from government documents and female cadres were no more likely to be EC.

Those receiving information on farming practices from male cadres were, interestingly enough, less likely to adapt farming practices. However, there is no corresponding tendency for those who obtained farming information from female cadres to adapt farming practices in response to environmental concerns. Respondents receiving information from specialists or extension services were similarly less likely to adapt farming practices in response to environmental conditions. In sum, receiving information on farming techniques from governmental sources was not correlated with a lower EC. The researchers thus accept the null hypothesis.

Based on correlation and regression analysis, age was a predictor of perception of personal impact on the environment. Older people were less likely to perceive a personal impact on the environment than younger people. This relationship was confirmed to be significant by both analyses, with a confidence interval of at least 98%. On this basis, the researchers accept the hypothesis that older respondents are less likely to perceive a personal impact on the environment.

Conclusion

Culture and the Environmental Ethos

Western environmentalism is the result of complex intellectual synthesis. It is an ethos that was spawned from several centuries of experience with industrialization, as well as the exploration of vast wilderness areas during the colonial period. China has not had large areas of wilderness for centuries, and has only experienced large-scale industrialization in the past half-century. As researchers, we approached this project with Western biases. Our conception of “environment” is very abstract, and accepts as a precondition a divorce of human and natural interests; those of humans cannot as a matter of course take precedence.

Such a conception does not make adequate accommodation for China's status as a developing nation. Poverty is still the overwhelming concern, and our data reflected its urgency. In the design of our survey, we were possessed of a developed nation bias that assumed being EC would mean placing the environment first. In China, assigning the natural environment such pre-eminence is a rare phenomenon.

Part of the reason for such rarity is that the abstract nature of the English word “environment” is reflected by its Chinese translation. The Western conception of environment is not automatically translated by its Chinese equivalent. Interview informants would often say that the environment had improved because roads had been constructed. In one case, an informant responded that the environment must have gotten better because “my standard of living has gotten better.”

Any conclusions drawn from this research must be rooted in these biases. For the most part, null hypotheses were accepted, suggesting that most of our perception of environment in rural China was incorrect. Many of these perceptions were based on the idea that in certain aspects elements of the Western ideal of environmentalism could be identified in China. This has proven not to be the case. Nonetheless, numerous important and encouraging environmental realities have been evidenced through this research. In the conclusion, these realities will be discussed with a view towards creating conditions for a sustainable future in rural China.

Gender and Environment

We hypothesized that females would be more EC than males. This hypothesis was not borne out by correlation analysis. However, correlation analysis and interview data revealed that

women in fact placed more emphasis on increasing income. Thus, women appear to place primary emphasis on increasing social mobility, a far more tangible goal than “improving the environment.”

Nonetheless, the cross tabulation analysis suggests that women may be more predisposed to environmental concerns than males. In the case of virtually all environmental indicators, women were more likely to give the “environmentally correct” response than males. This suggests that sustainable development efforts may be more effective if they are designed to specifically include or target women.

Our research suggests that women are vital to sustainable development efforts for another reason. The rate of migration in the survey area is tremendous, with some 73% of households having someone working outside the village. Interview data suggests that most of these migrants are male. Several female interview informants noted that their burdens, as well as the number of decisions they make, increased as males left for work. Given this trend, females will likely become more and more important in the implementation of sustainable practices in rural China.

Adaptation to Environmental Changes

Our hypothesis was that non-governmental innovation in the form of FICs would lead to more farming adaptation in response to environmental concerns. We further hypothesized that FICs would be identified by kin-based networks that include relatives both inside and outside the village. Given that respondents who received farming advice from kin in villages also received advice from kin outside villages (though to a lesser extent), there is evidence that farming advice spreads from kin outside the village to kin inside the village, and then throughout the village itself. This in turn may indicate the existence of FICs in Mizhi.

However, it seems that any such FICs do not necessarily lead to farming adaptation in response to environmental concern. Most innovation, environmental or otherwise, is spurred on by government action. This suggests that government may actually be the best conduit through which to spread sustainable farming techniques in rural China. Of all governmental sources of information, media appeared to have the most influence. A majority of respondents reported that they had received information on farming techniques from media sources- the case in which most people had received such information from any source. This result suggests that media-based approaches to spreading sustainable techniques may be most effective.

EC in Rural China

It was hypothesized that, in terms of developing sustainable practices, governmental sources would be less effective. Further, education would be a reliable predictor of concern for the environment, and finally that older respondents would place less emphasis on personal responsibility and impact on the environment. All of these hypotheses were rejected. Governmental sources in fact appear to be more effective in spreading sustainable agricultural practices. Education seems to be a predictor of perception of personal impact on the environment, but not of EC in general. Age seems to be a negative predictor of personal impact on the environment, and a positive predictor of the importance of the environment. There is thus substantial evidence for a “generational gap” in these aspects of environmental consciousness.

In general, there appeared to be a low level of EC. Environment was ranked third in importance overall, behind more tangible factors such as increasing education and income. Few people think that they had a personal impact on the environment. Interestingly however, respondents said that village people had the most responsibility for environmental quality. This suggests a latent capacity for developing sustainable practices, perhaps catalyzed by government action.

One trend evidenced by the environmental indicators was that increasing incomes tended to be associated with increasing distance from environmental concerns. In many cases, this was also related to increasing urbanization. In most cases, high incomes result from economic ties to urban areas. Increasing urbanization also tended to result in less concern for environmental factors. Given that both incomes and urbanization are likely to increase as the pace of China's development continues, people may continue to feel more distanced from immediate environmental concerns.

One clear finding of this research has been that there is little conception of abstract “environmentalism” in the Western sense. Perception of the environment tended to be limited to specific and discrete conditions. Most interview informants thought of the environment in terms of the number of trees or the extent of grass cover, or things like roads. When concern for environmental issues expressed, it was similarly in response to such specifics. One informant talked about how plastic bottles were bad for the environment because they piled up by the roadside. Another was concerned about the effect of chemical fertilizers.

Perhaps most tellingly along these lines, the greatest concern over the environment was expressed where it faced the greatest number of visible threats. Guangzhong village (location 3) is adjacent to Mizhi city, and is the site of a major new chemical plant. Here informants expressed concern at how farmland had been consumed by infrastructure projects, how the river flow had been reduced, and how the chemical plant may affect the quality of shallow well water. It is no coincidence that this rash of environmental concern was collocated with a large number of visible signs of environmental degradation. It seems that only when people come into intimate contact with environmental degradation does it become a concern- there is no intrinsic, abstract sense of environmentalism in the Western sense. This interpretation agrees with Economy's view of Chinese environmentalism being engendered by severe conditions in urban centers.

Sustainable Futures in Rural China

This research offers a number of suggestions for the development of a sustainable future in rural China. The first is that environmental quality cannot be seen as an independent or pre-eminent objective. Pursuit of this ideal requires accommodation of the powerful desire in rural China to increase incomes and urbanize to a large extent. Both of these objectives are in many ways counterproductive to the goal of improving environmental quality. The key is to minimize harm to the environment in the course of inevitable development. This research offers five suggestions to help guide such an effort.

First, data gathered in the course of this investigation suggests that sustainability campaigns be undertaken in response to specific cases of environmental degradation. Efforts at the local level should be concentrated on confronting specific, visible issues such as the buildup of trash along roadsides or the decline in water flow. Our data suggests that this approach would more effectively garner the enthusiasm of the population.

Second, the government should develop a comprehensive plan to spread techniques for sustainable development, both for rural and urban workers. Media should play a key role in the dissemination of these techniques. At the same time, the government should not ignore FICs, and should encourage villagers to spread these techniques by telling their relatives.

Third, in provincial areas sustainability campaigns should be village-based, as respondents invested village people with a high degree of responsibility for the environment. Given this, they may be more likely to participate in village-based programs.

Fourth, it is essential that sustainability campaigns make extensive provision for women. Besides their potential for being more EC than men, women are also gaining importance in rural areas as more men migrate for work. Sustainability campaigns may harness this trend to best use by assigning specific leadership roles to women.

Five, age should be a consideration. Although more research is necessary to determine the exact ways in which age influences the development of sustainable choices, this research suggests that older people may be more disposed to take a long-term view of development. Pilot programs could thus be developed which tap older people for environmental education programs, and their generational wisdom should be sought on major development projects.

Environmentalism in China differs considerably from that of the West. Much of our data has highlighted these differences. Nonetheless, significant potential exists to create the conditions for sustainable development in rural China. In response to concerns at severe environmental degradation in the coastal cities which have been the vanguard of China's modernization, rural development strategies incorporate tenets of sustainable development. By looking past notions of Western environmentalism existing in China, it is possible to discern conditions under which such development may be effectively focused. Rural China may not be possessed of environmentalism in the Western sense, but this does not preclude the possibility of a sustainable future in the fullness of time.

Appendix

Table 1: Summary of Demographic Indicators in Mizhi County, China, July 2005

Demographic Factor	Valid Percentage
<i>Male</i>	45.5
<i>Female</i>	54.5
<i>Family Member Working Outside the Village</i>	73.0
<i>Family Member Not Working Outside the Village</i>	27.0
<i>Age 0-30</i>	16.4
<i>Age 31-60</i>	61.5
<i>Age 60+</i>	22.1
<i>Years of Schooling None</i>	30.5
<i>Years of Schooling 1-9</i>	51.7
<i>Years of Schooling 10+</i>	17.8
<i>Annual Household Income 0-10000 RMB</i>	82.9
<i>Annual Household Income 10001-20000 RMB</i>	13.5
<i>Annual Household Income 20001+ RMB</i>	3.6

Table 2: Relationships Between Gender and Environmental Indicators in Mizhi County, China. July 2005

Hypothesized Correlation	Kendall's tau_b Correlation Coefficient	Kendall's tau_b Significance	N Sample Size	Type III Sum of Squares	df	Mean Square	F	Sig.
<i>Sex*Importance of Environment</i>	-0.089	0.302	123	.006(c)	1	0.006	0.032	0.858
<i>Sex*Personal Impact on Environment</i>	-0.019	0.821	123	.097(d)	1	0.097	0.559	0.457
<i>Sex*Farming Adaptation in Response to Environmental Concerns</i>	0.142	0.129	115	.814(e)	1	0.814	3.342	0.072

Table 3: Relationships between FICs and Environmental Indicators in Mizhi County, China. July 2005

Hypothesized Correlation	Kendall's tau_b Correlation Coefficient	Kendall's tau_b Significance	N Sample Size	Type III Sum of Squares	df	Mean Square	F	Sig.
<i>Farming Adaptation in Response to information from kin inside the village* outside the village</i>	0.515	0	116	n/a	n/a	n/a	n/a	n/a
<i>Farming Adaptation in Response to information from kin inside/outside the village* Farming adaptation</i>	-0.096	0.312	111	0.092	1	0.092	0.354	0.554

Table 4: Relationships Between Sources of Farming Techniques and Environmental Indicators in Mizhi County, China. July 2005

Governmental Source of Farming Techniques	Statistic Information	Farming Adaptation	Importance of Environment	Personal Impact on Environment
<i>Media</i>	Kendall's tau_b Correlation Coefficient	0.088	0.186	0.235
	Kendall's tau_b Significance (2-tailed)	0.357	0.039	0.008
	N Sample Size	111	116	116
<i>Government Documents</i>	Kendall's tau_b Correlation Coefficient	-0.008	0.164	0.111
	Kendall's tau_b Significance (2-tailed)	0.936	0.069	0.213
	N Sample Size	111	116	116
<i>Female Cadres</i>	Kendall's tau_b Correlation Coefficient	-0.108	-0.064	0.055
	Kendall's tau_b Significance (2-tailed)	0.258	0.478	0.536
	N Sample Size	110	115	115
<i>Male Cadres</i>	Kendall's tau_b Correlation Coefficient	-0.405	-0.058	-0.125
	Kendall's tau_b Significance (2-tailed)	0.000	0.521	0.160
	N Sample Size	111	116	116
<i>Specialists/Extension Services</i>	Kendall's tau_b Correlation Coefficient	-0.439	-0.084	-0.048
	Kendall's tau_b Significance (2-tailed)	0.000	0.348	0.588
	N Sample Size	111	116	116

Table 5: Relationships Between Demographic and Environmental Indicators in Mizhi County, China. July 2005

Statistic	Importance of Environment	Personal Impact on Environment	Farming Adaptation in Response to Environment
<i>Age by 10-Year Intervals</i>			
Kendall's tau_b Correlation Coefficient	0.066	-0.109	-0.096
Kendall's tau_b Significance (2-tailed)	0.357	0.128	0.218
Kendall's tau_b (N)	122.000	122.000	114.000
Type III Sum of Squares	1.501	2.447	0.633
Df	6	6	6
Mean Square	0.25	0.408	0.106
F	1.446	2.771	0.394
Significance	0.213	0.019	0.88
<i>Years of Schooling</i>			
Kendall's tau_b Correlation Coefficient	0.031	0.173	0.042
Kendall's tau_b Significance (2-tailed)	0.690	0.026	0.616
Kendall's tau_b (N)	121.000	121.000	113.000
Type III Sum of Squares	0.085	0.242	0.057
Df	2.000	2	2.000
Mean Square	0.042	0.121	0.028
F	0.216	0.659	0.127
Significance	0.807	0.522	0.881
<i>Annual Household Income in 5000 RMB Intervals</i>			
Kendall's tau_b Correlation Coefficient	0.053	-0.074	-0.208
Kendall's tau_b Significance (2-tailed)	0.490	0.340	0.013
Kendall's tau_b (N)	111.000	111.000	103.000
Type III Sum of Squares	0.022	0.247	2.451
Df	1	1	1
Mean Square	0.022	0.247	2.451
F	0.114	1.348	11.032
Significance	0.737	0.251	0.002

Table 6: Detail of All Relationships Between Environmental Indicators in Mizhi County, China. July 2005

Environmental Indicator	Descriptive Statistic	Changes in Environmental Quality	Importance of Environment	Personal Impact on the Environment	Satisfaction with Environmental Conditions in Village	Farming Adaptation	Local Government Concern for Environment
Kendall's tau_b Analysis							
Changes in Environmental Quality	Correlation Coefficient	1.000	0.145	-0.075	-0.438	-0.427	0.413
	Sig. (2-tailed)		0.079	0.359	0.000	0.000	0.000
	N	123	123	123	117	115	123
Importance of Environment	Correlation Coefficient	0.145	1.000	0.008	-0.071	-0.096	0.080
	Sig. (2-tailed)	0.079		0.927	0.427	0.286	0.356
	N	123	123	123	117	115	123
Personal Impact on the Environment	Correlation Coefficient	-0.075	0.008	1.000	0.263	0.036	-0.019
	Sig. (2-tailed)	0.359	0.927		0.003	0.684	0.826
	N	123	123	123	117	115	123
Satisfaction with Environmental Conditions	Correlation Coefficient	-0.438	-0.071	0.263	1.000	0.343	-0.304
	Sig. (2-tailed)	0.000	0.427	0.003		0.000	0.001
	N	117	117	117	117	111	117
Farming Adaptation	Correlation Coefficient	-0.427	-0.096	0.036	0.343	1.000	-0.514
	Sig. (2-tailed)	0.000	0.286	0.684	0.000		0.000
	N	115	115	115	111	115	115
Local Government Concern for Environment	Correlation Coefficient	0.413	0.080	-0.019	-0.304	-0.514	1.000
	Sig. (2-tailed)	0.000	0.356	0.826	0.001	0.000	
	N	123	123	123	117	115	123
Spearman's rho Analysis							
Revised Perception of Changes in Environmental Quality	Correlation Coefficient	1.000	0.122	-0.202	-0.498	-0.526	
	Sig. (2-tailed)		0.179	0.025	0.000	0.000	
	N	123	123	123	117	115	
Revised Perception of Importance of Environment to Future Standard of Living	Correlation Coefficient	0.122	1.000	0.008	-0.074	-0.099	
	Sig. (2-tailed)	0.179		0.932	0.429	0.290	

	N	123	123	123	117	115
Revised Perception of Personal Impact on the Environment	Correlation Coefficient	-0.202	0.008	1.000	0.276	0.038
	Sig. (2-tailed)	0.025	0.932		0.003	0.685
	N	123	123	123	117	115
Satisfaction with Environmental Conditions in Village	Correlation Coefficient	-0.498	-0.074	0.276	1.000	0.345
	Sig. (2-tailed)	0.000	0.429	0.003		0.000
	N	117	117	117	117	111
Have You changed Farming Practices as a result of Environment Problems?	Correlation Coefficient	-0.526	-0.099	0.038	0.345	1.000
	Sig. (2-tailed)	0.000	0.290	0.685	0.000	
	N	115	115	115	111	115

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