

# Participatory Assessment of Resource Use in the Xizhuang Watershed

Yang Yongping<sup>1</sup>, Andreas Wilkes<sup>2</sup>, and Xu Jianchu<sup>1</sup>

<sup>1</sup>Kunming Institute of Botany, Chinese Academy of Sciences

<sup>2</sup>UN Volunteer, Yunnan PRA Network

## Abstract

Local farmers in Xizhuang watershed used participatory assessment to identify many problems in the use and management of natural resources. Almost all residents in the watershed face shortages of drinking and irrigation water to differing degrees. Some potential solutions and alternatives for water resource management were considered. External financial and technical support would be needed for the construction of drinking water supply and water harvesting and irrigation systems. The shortage of farmland is another challenge for local planners. Some farmers hope to develop marginal mountain areas and wastelands for fruit tree orchards and tea gardens to help meet the demands of the rapidly increasing population for food. Other widespread concerns are the stabilisation of existing farmland; the reduction of damage from landslides, floods, and gully and mudflows; the control of soil erosion and improvement of soil fertility; the introduction of high-yield crop varieties; the control of crop pests and diseases; construction or improvement of irrigation systems; and development of agroforestry systems. Off-farm employment is an important source of cash income. PARDYP and other agencies are asked to provide more technical support and assistance for tea garden development and processing, and community forestry management. Capacity building of local institutions and organisations is also of great importance to future development.

## Introduction

The People and Resources Dynamics Project (PARDYP) was set up to improve understanding of the environmental dynamics and the use of resources by local communities in the middle mountains of the HKH region, using five selected watersheds as an example. During the past three years of project implementation in the Xizhuang watershed, near Baoshan in the west of Yunnan Province, China, researchers from different disciplinary backgrounds and institutions have undertaken a series of research activities to provide information about the present situation and to monitor changing processes related to natural resources. Some interesting and significant findings have been obtained relating to resource management in the watershed. However, most of the project activities in the region were designed using a top-down approach. These activities often failed to address such questions as: what do the local people consider are the main resource management problems; what are the constraints, gaps and opportunities in knowledge; and what are the key areas in need of future research? These questions had to be answered to help PARDYP to design the activities for the next phase of the project. For this reason, a group of multidisciplinary

professionals were trained in participatory needs assessment techniques, and a participatory survey was conducted in Xizhuang watershed in August 1998. Special attention was paid to facilitating local people to identify and discuss their problems and constraints regarding resource use and management, and to ascertaining potential opportunities that could contribute to sustainable development and environmental protection.

The Xizhuang watershed is located in the northwest of Banqiao Township, Baoshan City. There are 3 administrative villages in the watershed—Xizhuang, Qingshui, and Lijiasi—each comprising a number of natural villages.

Xizhuang village is situated at the lowest point of the watershed (1,400 masl) 18 kilometres from Baoshan City, with relatively convenient transportation because of its location on the margin of the Baoshan Basin. The total population of Xizhuang is 1,800. Local farmers traditionally manage paddy fields and upland fields and cultivate paddy rice, maize, and wheat. Small-scale fruit orchards are scattered around the village settlement, but there are only small patches of pine forest remaining within the village area. The main challenge for development in Xizhuang village is the limited farmland area for a large population. Almost all households employ extra labourers who come from outside the village.

Qingshui village is located in the middle of Xizhuang watershed (1870 masl), 23 kilometres from Baoshan City and 12 kilometres from Banqiao Township. Its population of 2,414 people traditionally manage upland fields and cultivate maize and wheat. The farmers have larger areas of forest land than do those in Xizhuang.

Lijiasi village is located in the upper reaches of the Xizhuang River, 24 kilometres from Baoshan City and about 2 kilometres from Qingshui village. As in the adjoining Qingshui village, the local farmers mainly cultivate maize and wheat in upland fields. A large area of pine forest has been preserved and managed around this village. Because of the limited amount of farmland available (0.5 *mu* or about 0.03 ha capita), most households have to buy some food grain in the market. Cash for this is raised by selling tea or working outside the village.

## The Participatory Survey

The survey process was divided into three main phases: preparation before fieldwork, field survey and discussions, and information feedback in the field. A three-day workshop was held in Kunming before the fieldwork started. Andreas Wilkes, a UN volunteer with the Yunnan PRA Network, gave a training course on participatory methodologies which was attended by 15 participants. The training focused on the concept of participation and its application in development and research projects. Other aspects covered the facilitator's attitude and behaviour, and the application of certain PRA tools. In the context of the Xizhuang watershed project, the most important outcome of this workshop was that all participants reached a common understanding that the purpose of the participatory assessment was to identify problems, constraints, and possible solutions from the perspective of the local people, rather than to gather baseline data as the researchers had done in the past.

On the first day of the fieldwork, the participants were divided into three groups. All three groups spent a half day in Xizhuang Administrative Village in order to increase their familiarity with the application of participatory tools and facilitation skills in a real-life context. Thereafter, the three groups were assigned to work one each in each of the three administrative villages in the watershed—Xizhuang, Qingshui, and Lijiasi. From the second day onwards, the assessment teams held discussions with different groups of villagers on different topics such as land use, forest resources, water resources, and farming practices. The discussions enabled different groups of villagers to identify key problems and constraints. A variety of PRA tools was used including resource mapping, transect walks, focused discussions, matrix scoring, seasonal calendars, social mapping, and wealth ranking. After two days, the teams returned to Baoshan where they shared their findings and experiences and prepared for a final meeting in each village.

On the fifth day, each group made feedback presentations of their findings to larger groups of residents in each village. The meeting was used to clarify issues with the local farmers and to prioritise the problems and constraints identified by the villagers through a system of matrix scoring or voting. Subsequently, the assessment teams discussed their experiences with PRA and reviewed the strengths and weaknesses of the survey. Details of the participatory assessment exercise are given in Appendix A. The problems identified and prioritised by local farmers are presented in Appendices B, C, and D.

## Findings

The local farmers identified many problems that constrain future development. The local farmers are quite knowledgeable and had already realised that one of the main underlying reasons for resource degradation was the rapid increase in population. In order to meet demands for biomass production and to improve the quality of life of local residents, they have had to expand their cultivation into more marginal areas and develop new forms of livestock husbandry. However, these activities exacerbate environmental degradation processes, which have resulted in intensified soil erosion and even some natural disasters. The local farmers can find the solutions for some problems, but to be fully effective, these solutions need an integrated and systematic watershed approach. In some cases, external support and inputs will be essential. No solutions were suggested for some problems because of the large number of inter-related constraints, and the farmers still have to discover alternatives for these. The problems identified during the participatory survey that are of common concern in the Xizhuang watershed are summarised below.

### *Poor Irrigation and Water Management*

Almost all the residents in Xizhuang watershed are facing water shortages for both drinking and irrigation. Springs are the main source of drinking water in the watershed. Since most villages are located on mountain slopes, the collection of drinking water is a great burden for family members, especially women. For example, the villagers in Ganwangkeng, Xiaozhai of Damaidi, and Wangjia village identified the supply of drinking water as the top

priority since they have to spend a lot of time each day collecting it. In other villages local farmers face water shortages in the dry season and can only obtain muddy water during the monsoon. However, since the construction of drinking water and irrigation systems requires a large investment, the problem is difficult to solve at present. PARDYP is planning to build a drinking water supply system in Ganwangkeng.

Throughout the whole watershed, lack of irrigation water is an important constraint to increasing the yield of agricultural production. In Damaidi, for example, local farmers have to collect water from distant springs to water their maize seedlings every March and April. The local farmers hope that PARDYP and other agencies can help them construct some mini-tank water harvesting systems.

In contrast, in the downstream reaches of the Xizhuang River and in Qingshui village, floods in the rainy season lead to losses of farmland, destruction of crops, and road damage. Local farmers expressed a strong desire to dredge the river and canals, to construct river banks, and to plant trees for flood control.

### *Insufficient Farmland and Poor Soil Fertility*

As a result of the rapid increase in population, there is a shortage of farmland throughout the watershed. At present, the area of farmland per capita is less than 0.07 ha. Farmers in different villages suggested different solutions to the problem. In Xizhuang village, local residents hoped to use a large area of wasteland for agricultural cultivation. The villagers in Wangjia of Lijiasi Administrative Village planned to develop fruit tree plantations on mountain slopes. Both these solutions would need capital and technical support. A significant number of villagers disagreed with these suggestions as they believed that extending cultivation to marginal and steep areas would result in intensive soil erosion and low yields in the absence of significant fertiliser inputs. Other solutions suggested for the shortage of farmland were to stabilise existing cultivated lands through landslide and flood control measures, to increase soil fertility, to develop agroforestry systems, to introduce high-yielding crop cultivars, and to improve local irrigation systems. For some households, off-farm employment is an important alternative means of increasing income and thus alleviating the food shortage.

### *Forest Resource Management*

Most of the pine forest plantations in the middle and upper reaches of the Xizhuang River are well protected and managed through effective locally-established regulations. They provide the villagers with sufficient firewood for their daily lives. At present, some farmers hope to extend the use of grassland areas for livestock husbandry. However, in the downstream of the watershed, for example in Xizhuang village, the local residents face serious shortages of firewood, and hope to install energy-saving stoves and develop community forestry to meet their multiple needs for firewood, fodder, and cash crops (fruit trees). Most barren slopes and wasteland are highly degraded as a result of long-term soil erosion, so that any form of reforestation and afforestation will be difficult and time

consuming. Local farmers expressed strong hopes that PARDYP would support their reforestation initiatives through technical support for nursery development and forest management.

### ***Tea, Plantations and Processing***

Tea is the most significant source of cash income for many villagers in the watershed. The local farmers expressed considerable concern about their tea plantations. The problems that need urgent solution are low production, poor processing techniques, and lack of equipment. Most tea gardens were planted before the 1970s, so new tea varieties and adequate inputs could have a profound impact on the tea yields. Furthermore, the prevalent traditional manual method of tea processing lowers the quality of the tea and limits the market potential. PARDYP is planning a training workshop on tea cultivation and processing in Xizhuang watershed in the coming year. Another option is to establish some tea nurseries and demonstration sites to disseminate to local tea farmers essential information and techniques on breeding and grafting of quality tea varieties, management of tea plantations, and processing of tea.

### ***Pest and Disease Control***

The widespread incidence of pests and disease is an important factor leading to low yields. The farmlands have been managed by individual households since the 1980s, making the control of pests and diseases more difficult than formerly under the collective system. Insecticide and pesticide sprays are largely ineffective as a result of individual decision-making and diverse application techniques. At the same time, many farmers recognised that the use of insecticides and pesticides is associated with environmental pollution, which presents a serious threat to the local livestock husbandry. In Damaidi, for example, local dogs, cats, chickens, and even horses have died because of the extensive use of poisonous pesticides. Many farmers expressed concern about the safe use of insecticides and pesticides. Some essential technical support and training on pest and disease control are urgently needed in the watershed.

### ***Building Up of Local Institutions and Organisations***

Local organisations, particularly at the administrative village level, have played an active and positive role in the use and management of natural resources. For example, Lijiasi Administrative Village has established some effective regulations to encourage the development of community forestry and to control grazing. Local government agencies have also made considerable contributions to education and infrastructure. However, more efforts are needed to improve local institutions and organisations. Many problems which local farmers consider important are closely related to inefficient or ineffective local institutions. Villagers in Ganwangkeng and Xiaozhai of Damaidi complained that local organisations could not implement drinking water and irrigation projects even though they had made some investments. The residents in Xizhuang village accused the village leaders of renting out their community-owned tea garden and eucalyptus plantation to some households, which had

exacerbated local firewood shortages. They were eager to formulate some local regulations for the development and management of the community forest and other common properties. Effective solutions for some problems, such as the pollution from the Xizhuang Cement Factory, the conflict between the Xizhuang and Baoshan Waterworks on drinking water irrigation, and the control of stone/gravel extraction from the Xizhuang watershed, will depend largely upon the efforts and capacities of the existing local organisations.

In conclusion, the participatory assessment survey enabled local residents to identify many existing problems and at the same time encouraged and helped them in the search for potential solutions and alternatives. PARDYP realises that these solutions demand an integrated approach, which is also the view of many local farmers, and special attention will be paid to developing this during the next phase of the project. PARDYP is now planning to use the research findings on water, forestry, and soil resources for environmental rehabilitation and economic development of the watershed. In Phase II, more emphasis will be placed on technical training, such as that related to tea production and processing, water harvesting, and soil fertility improvement, and on the capacity building of local institutions and organisations.

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## Appendix A: Details of the PRA Visit to Xizhuang Watershed

### August 9: Arrival at Baoshan City, stayed at Baoshan Orchid Hotel

**August 10:** In the morning, briefing on the overall background of Xizhuang watershed and introduction to the objectives and progress of PARDYP. Discussion was focused on how to approach farmers, how to tell them openly what PARDYP can and cannot do, and how to avoid raising their expectations. In the afternoon, all the participants visited Xizhuang village and made friends with farmers or made appointments for the next day's PRA exercises.

**August 11:** After the warming-up of the previous afternoon, the three groups easily found the farmers and held discussions to identify problems. Social mapping needed more time, but each group finished resource mapping and seasonal calendars before noon. At lunchtime the participants reflected that most of them had found it difficult to 'hand over the stick to villagers', but that nevertheless it was easy to facilitate farmers to identify and analyse the problems they were facing and to discuss some possible solutions and alternatives. In the afternoon, each group presented their findings in the village, and a meeting was held with the village leaders to report and discuss the problems identified by the farmers.

**August 12:** The three groups were each assigned to a different administrative village area. The group in Xizhuang village continued, using the results of the previous day's exercises as a basis. The farmers were helped to carry out matrix scoring of the problems already identified (see Appendix B). Eleven problems were identified that local farmers saw as of widespread concern in the village. Two further problems were added: village infrastructure construction and pollution from the Xizhuang Cement Factory. The group assigned to Qingshui Administrative Village, led by Ms. Qian Jie, visited Ganwangkeng village, and organised local farmers to identify their main problems by means of resource mapping and social mapping (Appendix C). The four team members sent to Lijiasi Administrative Village visited Wangjia village. Some of the main problems of this village were identified using focused discussions (Appendix D). The team members then used a resource map drawn by the farmers to promote more widespread discussion among the villagers. A primary school teacher and a local medical practitioner were invited as key informants to help understanding of the local education and medical services.

**August 13:** The group in Xizhuang village, used the list of 13 problems to help farmers to carry out problem ranking. Five problems were finally determined to be of relatively greater importance. More farmers and village leaders were invited to discuss possible solutions to these problems. The group in Qingshui Administrative Village visited Qingshui natural village and continued to facilitate farmers to analyse the main problems constraining local development (Appendix C). In Lijiasi Administrative Village, the team members visited the most remote village in Xizhuang watershed, Damaidi natural village. Problems and potential solutions or alternatives were identified and determined by the villagers (Appendix D).

**August 14:** Each group prepared their feedback presentations in the Baoshan Orchid Hotel in the morning. In the afternoon the Xizhuang village group returned to the village to

present their findings and ask farmers to prioritise the problems, taking advantage of the fact that many villagers were meeting in the village temple for a religious ceremony that day. The Qingshui Administrative Village group organised a village meeting attended by over 50 people to prioritise the problems identified.

**August 15:** The group assigned to Lijiasi Administration Village gave a feedback presentation in Wangjia village. After discussion among village representatives on the problems and potential solutions, matrix scoring was used to prioritise the problems.

**August 17:** After the wrap-up of the previous afternoon, the three groups each found the farmers and held discussions to identify problem areas. Each group had a 10:00 AM meeting to discuss the findings and to discuss some possible solutions and alternatives. In the afternoon, each group presented their findings in the village, and a meeting was held with the village leaders to report and discuss the problems identified by the farmers.

**August 18:** The three groups were each assigned to a different administrative village. The group in Xizhuang village conducted a survey of the problems identified by the farmers. The farmers were asked to identify the most serious problems and to discuss some possible solutions and alternatives. In the afternoon, each group presented their findings in the village, and a meeting was held with the village leaders to report and discuss the problems identified by the farmers.

## Appendix B: The problems identified by farmers in Xizhuang Administrative Village

- Serious crop pests and diseases
- How to use existing wasteland
- How to control soil erosion
- How to improve land productivity
- How to increase the sources of cash income
- How to improve village settlement planning
- Heavy burden of fees for education
- Poor medical service
- Less organised social institutions
- Different awareness and perception of natural resources
- How to improve agricultural extension
- How to improve the efficiency of energy-saving stoves
- How to use farmland effectively and improve the local cropping pattern
- How to improve the family education of children due to off-farm employment
- How to deal with serious flood and soil erosion in the Xizhuang River
- Conflicts of land tenure
- How to improve local reforestation
- How to improve local husbandry
- How to improve soil fertility
- How to disseminate information on agroecology
- How to get marketing information for local products
- How to deal with the local firewood shortage
- How can rich farmers help poor farmers

After the first matrix scoring by local farmers, 11 of these problems were determined to be of wide concern in the village and some potential solutions identified. They are listed below. Two further problems were added: how to improve village infrastructure construction and how to control the pollution from the Xizhuang Cement Factory.

- Crop pests and disease control
- Developing the potential of wasteland
- Soil erosion control throughout improved farming systems
- Diversifying the sources of cash income
- Lightening the burden of education
- Solving local firewood shortages by means of promoting the energy-saving stove project
- Solving conflicts of land tenure
- Community-based medical services
- Extension of agricultural technology
- Flood and soil erosion control in the Xizhuang River through planting fruit trees
- Off-farm employment and children's education

- Village infrastructure construction and irrigation system renovation
- Pollution control

The farmers were asked to rank these problems in terms of priority. The following five problems were finally determined by farmer representatives to be the most important problems that needed to be solved.

- Village infrastructure construction, especially road construction within the village and renovation of the irrigation system
- Extension of practical agricultural technology
- Flood and soil erosion control of the Xizhuang river
- Developing non-timber forest products, such as fruit trees, tea, and mulberry
- Improving soil fertility

## Appendix C: The problems identified by farmers in Ganwangkeng and Qingshui, Qingshui Administrative Village

### Ganwangkeng

- Drinking water supply
- Water supply for agricultural irrigation
- Low yields of crops
- Low yields of tea
- Low productivity of farmland
- Landslides
- Floods
- Lack of grasslands for livestock
- Low education
- Road construction

The farmers performed matrix scoring and identified two problems of widespread concern: drinking water supply and road construction. The farmers also expressed a strong desire to improve soil fertility and the yields of maize, wheat, and tea. The supply of irrigation water, agricultural extension, and increasing the amount of grassland were of less importance.

### Qingshui

The above list was supplemented by the following problems highlighted by the farmers in Qingshui natural village.

- Lack of water for agricultural irrigation
- Floods, landslides, and some disasters
- Road damage as a result of river erosion

## Appendix D: The problems identified by farmers in Wangjia and Damaidi, Lijiasi Administrative Village

### Wangjia

- Limited farmland and low soil fertility
- Low productivity of tea gardens and outdated tea cultivars
- Poor techniques for tea processing
- Poor supply of drinking water
- Difficulty in the development of fruit tree plantations
- Serious crop pests and diseases

### Damaidi

The above list was supplemented by the following problems highlighted by the farmers in Damaidi, Lijiasi Administrative Village.

- Land tenure conflicts with other villages
- Low production of crops due to low soil fertility, low temperature, and low sunlight
- Lack of a drinking water supply, especially in Xiaozhai
- Lack of water for agricultural irrigation
- Serious damage by rats and some negative impacts of rat control