

BIODIVERSITY CONSERVATION: STUDIES IN ITS ECONOMICS AND MANAGEMENT, MAINLY IN YUNNAN, CHINA

Working Paper No. 19

**Rapid Rural Appraisal (RRA), Participatory Rural
Appraisal (PRA) and their Application in the Global
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by

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² World Bank Loan Project Management Center, Ministry of Forestry, P.R. China, No. 18 Dong Street, Hepingli, Beijing 100714, P.R. China.

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Research for ACIAR project 40, *Economic impact and rural adjustments to nature conservation (biodiversity) programmes: A case study of Xishuangbanna Dai Autonomous Prefecture, Yunnan, China* is sponsored by the Australian Centre for International Agricultural Research (ACIAR), GPO Box 1571, Canberra, ACT, 2601, Australia. The following is a brief outline of the Project

Rural nature reserves can have negative as well as positive spillovers to the local region and policies need to be implemented to maximise the net economic benefits obtained locally. Thus an 'open' approach to the management and development of nature conservation (biodiversity) programmes is needed. The purpose of this study is to concentrate on these economic interconnections for Xishuangbanna National Nature Reserve and their implications for its management, and for rural economic development in the Xishuangbanna Dai Prefecture but with some comparative analysis for other parts of Yunnan

The Project will involve the following:

1. A relevant review relating to China and developing countries generally.
2. Cost-benefit evaluation of protection of the Reserve and/or assessment by other social evaluation techniques.
3. An examination of the growth and characteristics of tourism in and nearby the Reserve and economic opportunities generated by this will be examined.
4. The economics of pest control involving the Reserve will be considered. This involves the problem of pests straying from and into the Reserve, e.g., elephants.
5. The possibilities for limited commercial or subsistence use of the Reserve will be researched.
6. Financing the management of the Reserve will be examined. This will involve considering current sources of finance and patterns of outlays, by management of the Reserve, economic methods for increasing income from the Reserve and financial problems and issues such as degree of dependence on central funding.
7. Pressure to use the resources of the Reserve comes from nearby populations, and from villagers settled in the Reserve. Ways of coping with this problem will be considered.
8. The political economy of decision-making affecting the Reserve will be outlined.

Commissioned Organization: University of Queensland

Collaborator: Southwest Forestry College, Kunming, Yunnan, China

For more information write to Professor Clem Tisdell, School of Economics, University of Queensland, St. Lucia Campus, Brisbane 4072, Australia or email c.tisdell@economics.uq.edu.au or in China to Associate Professor Zhu Xiang, World Bank Loan Project Management Centre, Ministry of Forestry, Hepingli, Beijing 100714, People's Republic of China.

Rapid Rural Appraisal (RRA), Participatory Rural Appraisal (PRA) and Their Application in the Global Environmental Facility (GEF- B) Program in China³

ABSTRACT

This article, after introducing the concepts, principles and methodology involved, describes the applicability and efficiency of RRA (Rapid Rural Appraisal) and PRA (Participatory Rural Appraisal) in planning, community development as well as community joint-management within protected areas. Steps for the application of PRA and RRA are discussed, the framework and criteria for their application and evaluation are also presented.

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(PRA) and Their Application in the Global Environmental Facility (GEF- B) Program in China

Zhu Xiang

1. General Description of RRA (Rapid Rural Appraisal)

1.1 BASIC CONCEPT OF RRA

RRA (Rapid Rural Appraisal) involves the positive process of obtaining information, making hypotheses, reaching conclusions and updating data within a short time.

1.2 PRINCIPLES FOR RRA

Triangle principle

This principle originated from the stability of triangle in geometry. It helps increase dependability of information. When finished in a hurry, the accuracy of the investigation sample is usually lower than that required in statistics. In order not to influence the dependability of information, RRA collects information from at least three sources. According to this principle, different angles and spaces are to be paid attention to in the investigation.

The triangle principle is reflected mainly in three applications:

- (a) Members in the investigation group must come from different backgrounds to get information from diverse angles. Composition of gender is also important.
- (b) Methodology- different RRA methods are to be used simultaneously.
- (c) Investigation target selection - Usually three targets are selected to study elements which may have large influences on the theme. In special cases, the study the representative sample directly is allowed to save time.

Multi-discipline approach

Rural systems are complicated and involve both natural and social factors. Their investigation involves sciences such as agriculture, forestry, ecology, and horticulture, and social sciences including sociology, anthropology and management. It is impossible for only one researcher with his special area to fully understand the relationship of different factors in the system to propose appropriate ways to improve the situation. Hence it is imperative to establish a multi-disciplined group to promote close cooperation in order to understand the situation quickly and obtain valuable results from the combination of methodologies and techniques coming from multiple disciplines.

Search and repetition

Hypotheses are formulated usually before RRA begins, and relevant material and a timetable are prepared according to the hypotheses to investigate on the theme. However, investigators can reject incorrect hypothesis on the basis of incoming information to devise new hypotheses. This cycle of "hypothesising – testing – rejecting – rehypothecising" forms the core of RRA. The faster an incorrect hypothesis is rejected, the sooner a new hypothesis is closer to reality can be formulated.

Local knowledge

Local knowledge is an important source of understanding the countryside because local peasants have a wide range of knowledge about their environment, such as that relating to soil, topography, seasonality, plants, flora and fauna, etc.

Flexibility and self-judgement principle

It is necessary to make adjustments during the conduct of RRA about the timetable, travel and investigation plan, sub-topics and hypotheses. Besides, the group should make timely and effective decisions according to the goals of investigation, nature of problems, hypothesis, time-availability, its budget and other constraints in order to decide what information is required, accuracy and probability of achieving that accuracy.

1.3 METHODS FOR RRA

RRA makes use of a series of methods, tools and techniques to satisfy its research requirements. Its core is the "semi-structured" method. This involves establishing and using a general framework as an outline for the investigation. Direct observation, target objections, analytical indication map for time and space, measuring tools, conversation outline, key information provider are all applied in this process. The major steps involved are:

Setting up a conceptual framework

The conceptual framework involves setting up hypotheses and models made according to the goals of the project. It provides a way to decide on the scope, type and source of required information, to make clear the targets of RRA and to avoid inefficient work.

Collection and analysis of secondary information

Secondary information consists of the background literature relevant to the subject targeted for investigations. It consists of material such as statistical data, books, records, maps, and photos. The group members involved in RRA should discuss the scope (scope of time, space, and content) of secondary information and list the necessary materials before going on field investigations. Relevant secondary information can include materials on natural geography, climate, social and economic situation, and results of previous surveys. The analysis of secondary information helps in the preliminary selection of key issues to be considered in the targeted research area and assists planning for field work.

Direct observation

Direct observation in the targeted area using preliminary indicators on natural, social and economic aspects provides first impressions of the targeted area and usually reveals some relevant issues. Information may be obtained on biological indicators such as soil erosion, deterioration of grassland, water systems, flora and fauna, types of animals and plants, diversification of plantations, as well as such social and economic indicators as the condition of children, common diseases, type of housing, tools, furniture, toys, churches or temples, and schools.

Semi-structured conversation

Semi-structured conversation is a way to form sub-topics and to arrange questions around these sub-topics during conversation according to the theme and relevant factors. It involves neither a careless chatter without direction nor a formal investigation with a tight investigation schedule, but is located somewhere in between to form the core of RRA.

The principles for semi-structured conversation are: Grasping valuable clues to obtain complete and accurate information and changing questions or the way of conversing flexibly according to unexpected new information arising during the conversation so as to arrive at objective conclusion. Investigators must remain very sensitive in order to detect new information from direct observation or from the answers given by peasants.

Semi-structured conversation is composed of individual conversation and group conversation. Individual conversation is the major way to collect material at the individual household-level. It may be used to investigate one peasant or one family to get detailed information about its productive activity, its social and economic activity and its living standard. Group conversation is used to visit a group with certain common characteristics such as the elderly and women to collect qualitative information.

1.4 APPLICATION SCOPE OF RRA

RRA can be applied to agriculture, forestry, fishing, water management, hygiene, education and other areas, providing effective, timely and detailed information, relevant to matters such as:

- (a) Investigation and analysis of the countryside;
- (b) Project design, implementation, auditing and evaluation;
- (c) Technology development, promotion and transfer;
- (d) Providing information for policy-making;
- (e) Evaluating the influence of a sudden disaster;
- (f) Supplementing and improving other methods.

1.5 THE DEGREE OF THE APPLICATION OF RRA

Although RRA has a wide range of application, its successful use requires such factors as able participants, flexibility of the project and nature of its use to be considered.

- (1) RRA requires skilled and able participants in the investigating group, because the skills and experience of participants in conversation, observation and analysis, their coordination and multi-disciplined outlook are the key to the success of RRA. It cannot be applied successfully if these requirements are not satisfied.
- (2) The use of RRA is efficient for projects which need timely new information and which can be modified quickly. This also requires flexible organisations. But for a project requiring only a final recommendation or involving a detailed working plan that cannot be changed, RRA is not suitable.
- (3) RRA is most useful for projects which need long-term consistent new information rapidly but not for projects which involve a large body of quantitative statistical data or concentrate on specific situation for a long time.
- (4) RRA is especially suitable for small-scale (e.g. village) development planning.
- (5) RRA is suitable for quick qualitative or quantitative analysis for a small area but not for quantitative analysis for a large area.

1.6 COMPREHENSIVE EVALUATION OF RRA

RRA is endowed with both advantages and disadvantages. Its advantages are:

- (1) It saves expenditure and time.
- (2) It helps control the theme or direction of a study by starting from a general topic and progressing to a specific topic, which is a good start for a project.
- (3) Multi-disciplined groups can make effective judgement according to the situation and requirements of the targeted area.
- (4) A multi-disciplined group promotes interaction and exchange of knowledge and experience.

- (5) Working methods and sub-topics can be changed during the process due to the high adaptability and speed of RRA.
- (6) RRA works both as a complementary part for normal study and an in- depth plan for future study.
- (7) It can be applied to different target groups like peasant and local official.

Its disadvantages are:

- (1) Its can only be applied with caution, otherwise mistakes can easily arise.
- (2) RRA is not a standard method, but requires experience and highly qualified investigators.
- (3) Its application also has some time-lag before results are established.
- (4) RRA cannot provide high-quality results for a large area at this stage.
- (5) It is usually used for qualitative study and remedy for quantitative results.
- (6) Its sampling method does not satisfy strict statistical requirements, but can be supplemented by other methods like triangle method to ensure its effectiveness and dependability.

2. From RRA to PRA (Participatory Rural Appraisal)

Rural development models have changed in the past ten years as a result of reforms (mainly in the process of policy making) in China and some Southeast Asian countries. The top-down process has changed from bottom to top; from the standard central plan to local diversification; from the "blue-print" to the process of learning. It has been realised that insufficient local participation in RRA influences accuracy, acceptability and applicability of project plan. Researchers have been combining the concept of participation with RRA to develop PRA (Participatory Rural Appraisal).

2.1 CONCEPT OF PRA

Only a preliminary definition of PRA can be presented here because the concept of PRA is still developing. PRA is a series of methods to help local people share, improve and analyse their understanding for their life and condition, and as a result to motivate them to make and apply project plans. The process involves participation of locals in project investigation, planning and application of the plan.

One of the characteristics of PRA is mass participation. The locals are encouraged to participate actively in not only implementation of projects but also in investigation, analysis of material, and the judgement of process to find the best result.

The core of PRA is:

- (1) The investigator is a motivator and service-provider, his goal is to strengthen the confidence of the locals to help them finish jobs like investigation, analysis, imitation, table-making and scoring, and to share with them the final results.
- (2) The performance and attitude of the investigator are far more important than his method. Success requires his harmonious relationship with the villagers. Villagers control the power of analysis.
- (3) The investigator should blend into the cultural environment to share materials, methods, experiences and even food.
- (4) The investigator should be brave enough to -recognise his own limitation and to accumulate experience in a way to improve himself.

2.2 COMPARISON OF RRA AND PRA

	RRA	PRA
Time of origin	Late 70s and 80s	Late 80s and 90s
Key resource	Knowledge of local people	Participation of local people
Major innovation	Methods	Behaviour and attitude
Major method	Information extracted by visitors	Promotion and participation of the visitors
Goal	Understanding the local situation	Local authority
Long-term result	Planning, project and publication	Continuous local behaviour and organisation
Level of difficulty	Relatively small	Relatively big .
Requirement of researcher	Relatively low	Relatively high

2.3 CONTINUITY OF RRA AND PRA

Transition in the characteristics of RRA with change to PRA is indicated below. Possibly RRA is superior to PRA in practice.

	RRA		PRA
Function of visitor	Investigator	6	Coordinator, promoter
Information possession, analysis and usage	Visitor	6	Local people
Method	RRA	6	PRA

2.4 APPLICATION SCOPE OF PRA

PRA has been widely applied to the conservation and management of natural resources due to its characteristics. It is usually applied to water and land resource conservation, planning and

management, community forestry management, fisheries, outdoor area management of protected areas, village energy evaluation, village natural resource management, agriculture, and hygiene and so on. In many cases both RRA and PRA are used together, and the latter promotes participation by locals.

3. The Development of RRA and PRA and their Application in China

Traditional methods used by social sciences for local planning were found to be inadequate (for instance slow) in the late 1970s when dealing with rural issues. New and efficient methods were required to collect materials on natural conditions, villages, households, peasants and their habits, production and the interrelation between different factors. Researchers began to apply methods, tools and skills from other disciplines to collect information from the countryside, and new methods appeared such as "speedy investigation" (Honadle, 1977), "Searching investigation" (Collinson, 1981), "rural evaluation" (Carruthers, 1981), "casual rural investigation" (Rhodes, 1982), and RRA (Chambers, 1980). RRA is preferred due to its characteristics like speediness and accuracy, and is applied in such developing countries as Peru, Indonesia, the Philippines, Thailand, and India, and has proven to be efficient. The Khon Kaen University in Thailand started to evaluate RRA systematically from 1983, and held the International Conference on RRA in 1985. This method has become more comprehensive since then, and RRA and PRA were developed on its basis.

RRA and PRA were introduced to China by the Ford Foundation and other international organisations in the 1990s after trials were conducted in the poor areas in Yunnan Province. The applications of RRA and PRA in Yunnan Province include:

Forestry

Implemented by Yunnan Forestry Department and financed by the Ford Foundation, three places along the upper stream of Changjiang River were selected to apply RRA. Bottom-up investigation and planning were made after collecting opinions of the locals about what kinds of trees to plant, how to plant these and how to manage them. Semi-structured conversation and participation analysis were used to settle the conflict between the Lugu Lake Protected Area and the local peasants. Pressure on local peasants increased after the Lugu Lake Protected Area was set up and the peasants could only collect firewood from places far away.

In fact, the forested area in the protected area still decreased after being protected as a result of illegal collection of wood. It was finally decided that areas as highly-productive of firewood in the Protected Area were to be allocated to individual households for harvest and management. This was done without affecting the protected kinds of forest or natural scenery. These areas are managed by individual households and harvested in rotation. In the meantime, steps for upgrading the local stoves, producing gas, developing tourism to increase local income, and encouraging coal consumption were taken. These steps have been proven to be effective in reducing pressures on nature conservation in the Lugu Lake Protected Area.

Soil Protection

Financed by the World Agriculture Organisation and implemented by the Southwest Forestry College, RRA and PRA were applied in Qiaojia County, Zhaotong Area in Yunnan Province. It was found that two-thirds of the firewood was used for cooking food for pigs and that this was the major cause of forest damage. Forest loss was increasing soil erosion. Later a village development plan which tackled this problem was well accepted by the villagers.

Development of a poor area

Financed by the Ford Foundation and coordinated by the Poverty Elimination Office of Yunnan Province, implemented by Kunming Geography Institute, Kunming Ecology Institute, Yunnan Academy of Forestry Science, Southwest Forestry College and Yunnan Agriculture University, the project included RRA training (training course was given in Kunming and people were sent to the Philippines and Thailand), and selection four areas for poverty alleviation. After four years this project proved to be successful.

Community development within a protected area

Financed by the Ford Foundation and coordinated by the American Crane Foundation together with the Poverty Elimination Office of Yunnan Province, PRA training and field work were finished in the Caohai Nature Reserve, Guizhou Province to study land utilisation and wetland protection. It was found that a small hill within the Reserve could be used for fruit trees without damaging the wetland, and that tertiary industry including tourism could be developed in this area close to Weining County.

Agriculture and forestry in Xishuangbanna

Financed by the WWF and coordinated by the Southwest Forestry College as well as Xishuangbanna Nature Reserve Administration Bureau, RRA is used for projects on mixing agriculture and forestry, but no obvious result has arisen after four years. Major reasons might be that the selection of place and project do not match the problems that locals really face. The mixture of agriculture and forestry solves the problems of soil deterioration, soil loss and shortage of forest products, but the people in the places where the project was implemented did not feel the urgency of these problems and did not have the incentive to participate.

Management of deteriorated mountain area (no detailed case).

Improvement of mountain grassland (no detailed case).

Management of backyard economy (no detailed case).

Study on biodiversity (no detailed case).

Financed by the Ford Foundation and coordinated by Kunming Institute of Botany, a study on the effect of the "slash and burn" way on biodiversity conservation carried in the Kino village out in Xishuangbanna. RRA and PRA have become the most popular approaches to community development in China, and have tended to replace traditional investigation methods.

4. APPLICATION OF RRA AND PRA IN CHINA'S GEF-B PROJECT

The goal of China's GEF-B project is to improve institutional administration at provincial and national levels for biodiversity conservation and to strengthen biodiversity protection through protection and management of five sample reserves. The five chosen natural reserves selected by GEF-B project all face the question of survival and economic development. Conflict exists between conservation of the reserves and the use of resources in them by the local community, especially in the experimental and changing areas of the reserve. It is proven that legal tools are inadequate to solve the problems involved. The goal of community development and joint management of resources is promoted for these five reserves so as to achieve the long-term co-existence of survival of the reserves and economic development. Biodiversity conservation is a common goal for these five reserves, especially the recovery of

natural wide-leaf forests. Pursuing this goal will affect the local people. In some areas like Mountain Wuyi and Qinling, a conservation corridor is to be set up to connect divided ecological environments. Reasonable plans for land use, which take account not only of the condition of the land but also the demand of locals and the land contract system, is to be taken into account. The former top-down plan for agriculture areas is no longer valid. RRA and PRA can be applied efficiently in this typical natural-social system where the subject is the human society and the object is conservation of the natural ecological system.

Three typical kinds of program are suitable for the application of RRA and PRA in China's GEF-B project:

- (1) Plan-making (plans for land use, management, tourism, etc);
- (2) Community development (including mixture of agriculture, energy, tea-farm reform);
- (3) Joint management of community (including corridor areas, common area and experimental area);

4.1 STEPS FOR RRA AND PRA IN CHINA'S GEF-B PROJECT

RRA and PRA are usually involved in the following procedures:

Personnel training for RRA and PRA

Although most experts in China who engage in rural development have considerable experience in dealing with peasants, proper training is still necessary to master theory and methods for RRA and PRA. Because of the regional characteristics of RRA and PRA, training is given mainly by Chinese experts. Yunnan has trained a large group of RRA and PRA experts with help from the Ford Foundation for poverty alleviation.

Setting up multi-disciplined groups

A plan for the combination of multi-disciplined groups is made according to the principles of RRA and PRA:

- a) Land use plan. The group is made up of three to five people, one female, one local preferred. Agriculture, forestry, sociology, botany or zoology should be included in this group.

- b) Management plan for reserves. Composed of three to five people, with one to two staff (including leader of the reserve) from the reserve, this group covers zoology, botany, protected area management and sociology.
- c) Tourism plan. Composed of three to five people, with one from the local tourism department, this group covers ecology, management, and horticulture.
- d) Community development. The group is made up of three to five people, one female, one agriculturist, horticulturist, anthropologist, sociologist or manager from the local area.
- e) Community joint management. The group is made up of three to five people, one female anthropologist or sociologist, ecologist, manager of reserves, land planning expert or leader of reserves.

Preparation

- a) Collection of secondary materials, including map, diaries, publications or unpublished literature.
- b) Analysis of secondary materials in group meetings; preliminary hypotheses formed according to background material and project goal; deciding major problems and framework for fieldwork; preliminary selection of study method, tools and techniques.
- c) Getting advice from people who know the targeted area well.
- d) Preliminary investigation of the targeted area and selection of working places, providing necessary supporting supplies.

Field investigation

Participation of the locals is required for this work.

- a) Visiting leaders of the village.
- b) Visiting household.
- c) Direct observation undertaking quantitative analysis of factors, e.g. soil samples, if necessary)

- d) Draft pictures are made with the help of the locals or made by them.
- e) Discussion and analysis with the peasants to find problems and issues and ways to solve or address them. This is a circular process until common agreement reached.

Finishing report

Land use plan, management plan, resource joint management plan and community development projects are developed according to the results from RRA and PRA.

Implementation of projects

The goals of the locals are reflected in the project and local organisations are established to organize the locals to participate.

Audition and evaluation of project

RRA and PRA are used for both investigation and project decision before implementation of the project and to monitor and evaluate results during the progress of the project. It is necessary to publicise criteria and methods to help villagers participate in the audition and evaluation of the project so as to ensure the project proceeds in the correct direction and so as to make the villagers realise their gain from the project.

4.2 PARTICIPATION OF THE LOCAL GOVERNMENT

Local governments include administrative bodies at county or township levels, sometimes also at shire (higher than county) level. It is agreed that the support and understanding of the local governments is crucial for the success of any project favoured from outside the area. The local governments help coordinate relationships between the protected area and community, help solve the conflicts about resource conservation and depletion, and promote the experimental results for community development. The appreciation of local governments of the Volug of conservation can be improved through their participation, and they are more likely to take account of conservation in their policy making.

Local governments take part in RRA and PRA as members of the project coordination or organising group to fulfil duties of organising, coordinating, helping and motivating.

4.3 PARTICIPATION OF THE LOCAL VILLAGERS

Only when villagers realise the benefits of certain project are they likely to participate actively. Some areas where villagers can participate are listed as below:

At the investigation phase:

- (1) Information provider and coordinator;
- (2) Collecting material, recalling events and changes in the natural environment;
- (3) Helping visitors draw draft maps or sketches of rivers, water systems, land objects, land uses, and hills;
- (4) Providing visitors with their knowledge on nature, society, plant and production method;
- (5) Helping visitors to rank or score factors that are familiar to them, like soil quality, distribution of rainfall, and quality of plants;
- (6) Participation in analysing problems and their relationships.

At the planning phase:

- (7) Encouraging others to express their opinions and to give their own suggestions.

At the implementation phase:

- (8) Setting up villager organisations;
- (9) Establishing a responsibility system and a benefit distribution system;
- (10) Taking part in the implementation directly in the form of supplying material, labour or money.

At the evaluation phase:

- (11) Participating in evaluation according to publicised criteria and methods.

4.4 CONCEPTUAL FRAMEWORK FOR RRA AND PRA IN CHINA' GEF PROJECT

Land use plan

Land use plan is adopted to obtain the maximum economic, ecological and social benefit from limited land areas by planning land use reasonably in accordance with the basic principles in ecology. In the five natural reserves relevant to China's GF project there are heavy pressures from increasing population, backward production methods, low-unit land values, deforestation and soil loss. Soil deterioration results in encroachment on forested area and puts more pressure on most of China's natural reserves, resulting in isolation of reserves from the surrounding areas.

As a result, the conceptual goal for RRA and PRA in land use in China should be to increase land productivity, to decrease deforestation, to arrange a reasonable spatial distribution of different land uses, and to adjust land management and use further to achieve a diversified and stable rural ecological system.

Management plan for natural reserves

The goal of land management plan is to increase protection for biodiversity in natural reserves and to improve regional or even larger scaled bio-economic environments. With the increasing number of natural reserves in China in the last ten years, problems of reserve management are becoming complicated. How to solve the conflict between protection and production or the life of people living within (or near) reserves has become a crucial issue. Knowledge, skill, a sense of responsibility, and their economic benefits (including prize, penalty, and promotion) of the management staff of the reserves and basic structure also play a role in the future of reserves.

Thus the conceptual framework for making a management plan for natural reserves is to coordinate the goal of conservation with the production and life of locals, to motivate reserve staff and local people to participate in the management of reserves, and to efficiently organise facilities in reserves to make full use of human and natural resources.

Tourism plan

Rich tourism resources within natural reserves, including both natural scenery and cultural heritage, are fragile to disturbance from human activity. Thus tourism development plans for

natural reserves should be included in both regional tourism plan to promote tourism development and in management plans for natural reserves to achieve goals for conservation.

Ecotourism is one of the major ways for reserves and local communities to obtain economic benefit from conservation. However, the distribution of benefit has been uneven in the past, resulting in disappointment in reserves and amongst local communities. On the other hand, in China local communities often lack the ability to develop ecotourism or to benefit from it.

RRA and PRA can be applied to tourism planning to coordinate development and conservation, to help reserves and local communities to participate in ecotourism and to benefit directly, and to explore value for tourism of folk culture, history, local culture and religion.

Community development

The goal for community development in China's GEF-project is to find a practical model to help local communities around reserves to improve their productivity, to decrease unscientific usage of resources, and to achieve sustained utilisation and conservation of resources. RRA and PRA should find and promote projects selected by the participation of local communities as a way to compensate for constraints on local communities imposed by the establishment of reserves. In the meantime, reserves and local communities must clarify each other's responsibility and obligation.

Community-reserve joint management

Resource sharing is the prerequisite for community-reserve joint management. RRA and PRA help to review quickly the interests and attitudes of local people, to analyse interrelationships among varieties of resources and form a basis to establish a community-reserve joint management system. For example, the grass resource in Lake Poyang Reserve is a helpful basis for community-reserve joint management, because reasonable grass-cutting performed by the locals helps the growth of new grass which is a good-quality food for protected birds. RRA and PRA can be used to discover common benefits between a community and a nearby reserve.

4.5 AUDITION AND EVALUATION OF RRA AND PRA

RRA and PRA require the following three parameters for audition and evaluation in China's GEF project:

- (1) Economic benefit: production of major plants, poultry numbers, types and amount of cash crops; labour structure, input and distribution, fertiliser, living conditions, dressing and consumption style.
- (2) Ecological benefit: shape and area of different landscapes, complexity and stability of system, biodiversity, change in the population of species protected, soil production, soil loss and pollution.
- (3) Social benefit: population quantity and quality, health and hygiene, sense of participation, conservation, responsibility and legality.
- (4) Management level: personnel qualification, facilities, motivation mechanism and public relations.

5. Concluding Comments

RRA and PRA attract attention from subject areas such as agriculture, forestry, rural development, conservation, resource management and education although they are still recent. Strict training is necessary.

It is a challenge to apply RRA and PRA in China's GEF-B project. Training and experiment are imperative before full implementation of the project. Nevertheless, RRA and PRA are promising methods for China's GEF-B project.

This paper arose from a report for the World Bank designed to consider the scope for applying RRA and PRA in China's GEF-B project. China's GEF-B project is financed by the Global Environmental Facility of the World Bank. Its goal is to conserve China's biodiversity through advanced and creative methods, and it consists of five major parts to improve management in five sample nature reserves, produce change in of forest-related enterprises, to improve management within reserves, to establish information system for nature reserves,

and to finance scientific study in reserves.

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