

# **Development of Participatory Resources Monitoring in two nature reserves in Yunnan, P.R. China**

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## **1. Introduction**

### **1.1. General context of Participatory Monitoring within the project**

To conserve forests and improve the integrated management of the nature reserves, it is essential that biological and ecological information is available about the forest and biodiversity in and around the nature reserves, as well as socio-economic information about the communities depending on these forest resources, and that this information is regularly updated throughout monitoring exercises. This will enable the nature reserve managers, related institutes as well as the local population to take the right management measures and to adapt if necessary. The Sino-Dutch Forest Conservation and Community Development Project aims to improve forest conservation in Yunnan Province, P.R. China, through the integrated management of 6 nature reserves. The project developed three activities related to biodiversity inventory and monitoring, based on three different objectives:

- (1) A scientific inventory and monitoring system implemented by senior staff from provincial research institutes, aiming to monitor species and ecosystems protected in the nature reserve as well as land and resource use in the adjacent areas. Local nature reserve staff is involved in the implementation and receives on-the-job as well as in-class training. The monitoring system has both qualitative and quantitative components.
- (2) An improved method for monitoring the main protected wildlife species by nature reserve staff during patrolling. The aim is to keep track of the abundance of those species. The patrollers receive training in species recognition and monitoring techniques, and implement the monitoring independently, with feedback from experts if necessary.
- (3) A participatory monitoring exercise by villagers and nature reserve staff, of resources like timber, NTFPs and water, as well as some land uses and protected species. The aim is to monitor the change in resource use and abundance, as well as to raise awareness, enhance capacity and improve the relationship between the villager and nature reserve staff.

The three systems are meant to be complementary to each other. The more conventional, discipline-specific inventory and monitoring system plays a fundamental role in understanding and explaining the (changes in the) physical and biological environment. Participatory monitoring of wildlife species through patrolling by staff and participatory monitoring of resources by villagers can only give an initial idea about the (changes in) abundance of protected species and forest resources. Still, it generates important feedback for biodiversity and resource management. In addition, participatory monitoring addresses the need to improve the capacity of local nature reserve staff in the management of 'their' nature reserves, and increases the recognition that local communities should and could play a role in planning and managing their use of the environment. Both are therefore also capacity building processes, maximising the transparency of decision-making and the sense of responsibility for conservation and management at local levels.

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The Participatory Resources Monitoring (PRM) followed-up on the RRA and RFA<sup>3</sup> that gathered socio-economic and resource management data as well as information on resource availability, use and conflicts. The PRM was also designed to further improve the communication between communities and nature reserve staff, which had begun to be addressed through training in facilitation skills of the staff and in inter-active awareness building activities. The PRM is in fact the next step, to let villagers together with local staff monitor the sustainability of the use of some resources from the nature reserve and adjacent forests and help the local authorities and communities to make the regulations more operational. The PRM can therefore also be seen as a tool to reach co-management agreements of forest resources.

## 1.2. Legal framework for forest resource use from nature reserves in Yunnan

Secure tenure and use rights are a prerequisite for the success of participatory monitoring by villagers. To become interested in monitoring resources, the villagers should at least be sure they can use the resources now and in the future. NTFPs, fuel wood and timber are presently harvested from collective forests<sup>4</sup>, state forests, and nature reserves. In many areas, but also in our case in Yunnan, concern among the local villagers over loss of access to resources is one of the main problems raised after the establishment of nature reserves. To permit sustainable use of NTFPs and other resources within protected areas and/or in the surrounding bufferzones has internationally become a widespread strategy to defuse land-use conflicts (McNeeley, 1988). Although the general idea is that collection of resources from the nature reserve is forbidden in Yunnan, the present regulations do give room for the sustainable use from the nature reserve (see Box 1).

### **Box 1: Sustainable use and co-management options stipulated in the Yunnan Nature Reserve Rules and Regulations and Yunnan Forestry Law**

*Yunnan forest and wildlife Nature Reserves rules and regulations(1987):*

- 'Sustainable use and management of forest and wildlife resources' is permitted in the experimental area of the nature reserve (Article 12).
- 'On the premise of not destroying natural resources, the native people inside the nature reserve may engage in plantation, raising and other activities in the experimental areas, under the arrangement and direction of the nature reserve management department.' (Article 16).

*Yunnan Provincial Forestry Law:*

'The government at different levels should further define the responsibilities for forestry production and management, the right, obligation and benefit of the owner and manager/user of the forest and forest land, to improve production, technical service and forest management. (...) A sound joint management responsibility system should be established for the nature reserve mountain and the mountain contracted to the local household. (...) The forest management measures and afforestation requirement should be defined.' (Article 4).

This paper will present the process and results of the development process of PRM in the two nature reserves in July-August 2001, and will discuss some challenges and expectations.

## 2. Short description of the pilot areas

Xiaoheishan is a provincial nature reserve established in 1995, situated in Longling County of Baoshan Prefecture. It covers 16,013 ha in total, consisting of 4 parts linked by corridors. The PRM is being implemented in one of the 4 parts. Altitude varies from 600 to 3,100 m, with vegetation ranging from subtropical to temperate forests. The nature reserve was established to protect the mountainous evergreen broadleaf forest, the rare *Cyathea spinulosa* and the rich wildlife (leopard, golden eagle, leaf monkeys, slow loris, etc.). Over 36,000 people live in the area, spread over 178 villages, of which 12 are located inside the nature reserve. The Han population is the majority, but Dai, Lisu and Yi

<sup>3</sup> Rapid Forest Appraisal, a methodology developed by the project, complementary to RRA aiming to have a quick indication of the status and condition of the forests under human influence.

<sup>4</sup> Forests for which the management is decentralised in the early 80s to be managed collectively by the village according to the Forest Law.

minorities are also present. Their livelihood is based on agriculture, animal husbandry and forestry. Net income per capita per year is 359 Yuan (around US\$ 44). Forty percent (40%) of the population depends heavily on the nature reserve for fuel wood, water and various NTFPs (70% of the nature reserve are collective forests).

Tongbiguan is a provincial nature reserve established in 1986 to protect the dipterocarp forests (*Shorea assamica* and *Dipterocarpus turbinatus*) and its wildlife (leopards, tiger, Asian elephant, Hoolock gibbon, etc.). It is situated in Dehong Dai and Jingpo Nationality Autonomous Prefecture, bordering Myanmar. It covers a total area of 30,712 ha, but is divided into three sections in three counties. The most Southern part, located in Ruili county, covers 8,273 ha, this is where the PRM is being implemented. The human population in the whole nature reserve is living in 88 villages with around 18,000 people, more than half of which are ethnic nationalities like Jinpo, Dai, Aini, Lisu, De'ang etc. Their livelihood is based on agriculture, animal husbandry and forestry. Net income per capita per year is 770 Yuan (around US\$ 94). More than half of the population collects resources such as NTFPs from the forests in the nature reserve (65% of the nature reserve are collective forests).

### **3. The steps in methodology development**

The main participants of the PRM process were:

- (1) Local villagers in and around the nature reserve
- (2) Local staff from Management Office (MO), Management Station (MS), Forestry Station (FS), Forestry Bureau and other relevant bureaux
- (3) Project officials and experts

All these participants were involved in the whole process of PRM development, consisting of the following steps:

#### **Step 1: Selection of villages**

Since there are many villages in and around both nature reserves, we needed to make a selection for this pilot phase. The criteria for village selection were:

- Those villages where people are highly dependent on the forests (in and around the NR, including NTFPs) for their production and subsistence, thus not only for income from sale of products but also for household use
- Those villages where there is a conflict in resource use (either within the village or with outsiders), or where resource use is believed to be unsustainable
- Those villages located in ecologically sensitive areas.

Per nature reserve and adjacent area we selected 6 villagers (12 in total).

#### **Step 2: Resource Users meetings in the village**

The village is not a homogeneous unit. Within each village, different people use different forest resources, have different knowledge about and interest in forests and resources, and therefore different biodiversity values and conservation motives. The PRM partners should preferably be based on this heterogeneity.

During the time of one day per village, we met with different groups of villagers (old men, young men, women & children, poor and rich)<sup>5</sup>. In each group session, participants indicated the types of resources they collect from the forests by choosing from cards with drawings of 15 different categories of resources<sup>6</sup>. Subsequently they listed the most important species in each of these categories, the estimated amount collected per household per year, whether it was for own use or marketing, and the period of collection. During and after this exercise there was a lively discussion among villagers and between villagers and nature reserve staff about resource use, conservation and

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<sup>5</sup> It should be noted that for most villages additional information was already available from previous assessments like RRA and RFA, see introduction.

<sup>6</sup> The categories are: timber, wood for agricultural tools, fuel wood, water, fungi, medicinal herbs, wild vegetables & fodder, wild fruits, bamboo & rattan, ornamental plants & flowers, resin & latex, birds & eggs, insects & honey, frogs, fishes & other aquatic products, and game.

management. After the village meeting, 4 people per village were selected to participate in the workshop (a village leader, a forest guard, a women representative and another person who would be a good representative of (other) resource users in the village and who could stimulate other villagers). These persons constituted the PRM working group, and were responsible for co-ordination of PRM activities in the village.

### **Step 3: PRM Workshop for all partners**

After the village meetings, a facilitated workshop of four days was held. Participants were the selected villagers, Management Office staff, Management Station and Forestry Station staff, staff from prefecture and project staff. The objectives of this workshop were:

1. To introduce the PRM idea and to agree on specific PRM objectives from the participants' perspective;
2. To identify monitoring targets, indicators and methods for PRM;
3. To determine the work plan.

The methods used for the workshop were small working groups, facilitated discussions and plenary sessions. The workshop addressed various exercises (technical and social), some of which were based on those from the ICDP trainer's manual of WWF (Worah, S. et.al. 1999).

### **Step 4: Define and approve PRM implementation procedures**

A few weeks after the workshop and before the actual take-off of the implementation, an additional visit to the region was undertaken. Since in a workshop participants may not always fully realise all the implications of the work, the primary results from the working groups may not always be very realistic. In this meeting we evaluated the selected targets and the work plan. Furthermore, the budget was communicated to the participants, and staff, villagers and project officials signed an implementation agreement, stipulating the rights and responsibilities of the parties.

## **4. PRM development results**

### **4.1. Resource use**

Results on resource use can only be described qualitatively, since the intention of the survey was not statistical analysis, but to get an idea about the variability of resource use and perceptions towards resource use within the village and between the villages. Furthermore, the subsequent workshop was explained to the villagers and we had discussions about conservation & management. A thorough and complete picture about the heterogeneity within the village would have required a survey of more than one day. Because it was only the beginning of the process, and villagers were not clear on why to share all this information, we chose not to take too much time from the villagers.

#### *Heterogeneity of resources used*

Villages collected all categories of resources, except resin & latex and just a few ornamental flowers. The villagers also hunted for game, but since there is a hunting ban in all areas and hunting in the nature reserve is strictly forbidden, villagers were not keen to talk about this with the nature reserve management staff. Medicinal plants were one of the most valuable products, as well as fuel wood, fungi, wild vegetables and fodder. The resources were mostly used for subsistence.

#### *Different use and perceptions of quantities within village*

Women gave highest collection estimates for fungi and fodder & vegetables, which may indicate that they are the major user group of these resources. Men are the main collectors of insects, timber, construction wood & wood for agricultural tools. Birds & eggs is the specialty of children. For many resources men list more species than women (except for fruits, fungi, insects, wild vegetables & fodder). The poor seem to sell a higher percentage of what they collect than the rich. There was a great difference in documented resource collection quantities, except for fuel wood. This in fact indicates that through monitoring, people became more aware of the amount they collect. For some

time the Chinese government is paying much attention to reducing fuel wood consumption in rural areas by introducing biogas pits. This has resulted in the fact that all villagers were very aware of the reduced quantities of fuel wood they consume nowadays.

#### *Differences of resource use between villages*

Although we could observe some generalities as indicated above, there were differences between villages in the types and quantities of resources they used and who collected them. Apart from the poverty level in the village, distance to the forests may be an important factor determining forest resource use. Some villages marketed some of the resources (like fungi, medicines, and sometimes fruits, vegetables and fish) while other did not sell any forest products at all.

#### *Discussions on resource use and conservation*

Although we gained a lot of information, villagers were still hesitant to provide much information. The difficulty is that the nature reserve and forestry staff is on the one hand 'police', on the other hand they need to grow into the role of community developers. Both sides need to get used to that new role. We did have a lively discussion, among others on differences between resource use and abundance in the past and at present, and the reasons for change. For some resources, the villagers needed to walk longer distances than in the past, they were aware that these resources had become scarcer. At the beginning of the workshop we presented the survey results in overview tables. The villagers were very interested to see their resource use visualised in figures.

The following results were obtained through the facilitated workshop.

## **4.2. Perceived benefits and problems**

First we made an inventory of the existing 'monitoring' activities by both staff and villagers. The staff listed checking the use of forest resources by villagers (i.e. poaching, fuel wood consumption, logging), monitoring of wildlife damage, and evaluations of their work on improved stoves, afforestation, fire and pests control, publicity. The villagers listed examples related to health and production status of the environment (water, fertilisers, pests and diseases, bamboo growing, household forests, etc.), patrolling activities by the village forest guard to check whether outsiders damage the forests, and monitoring support programs by others to see whether funds are not misused or activities are implemented in time. This exercise made both groups aware that they were already practising some types of monitoring. In the next exercise, both groups listed their perceived benefits and problems for participatory monitoring of biodiversity and resources; for the results see table 1. These include benefits and problems perceived by both villagers and staff, but also different views.

These differences led to an interesting discussion. The villagers indicated that they were already very aware of the benefits from certain species, however they were afraid that the objectives would only be protection of species, instead of use, and in this way would further restrict their resource use. The staff held the opinion that villagers first needed a training, e.g. in species recognition, before they could do the monitoring. The villagers on the contrary indicated that they knew the species already, although they named them using local names instead of scientific names. They said that if they would need training, it would be on long-term benefits and the importance of using resources in a sustainable way.

**Table 1: Benefits and problems of participatory resources monitoring as perceived by staff and villagers**

	<b>Agreed benefits</b>	<b>Agreed problems</b>
<b>Technical</b>	<ol style="list-style-type: none"> <li>1. Protection (of resources used, wildlife that eat 'bad' animals, insects that pollinate flowers to get fruits, water, wildlife and plants to promote tourism)</li> <li>2. Problem solving related to lack of wood and other resources</li> <li>3. Prevention &amp; control: of pests, diseases, fire, wildlife damage</li> <li>4. Decision-making: to improve rules and regulations which are not suitable to actual situation</li> <li>5. Evaluation: to assess whether forest conservation activities are successful</li> </ol>	<ol style="list-style-type: none"> <li>1. Lack of manpower &amp; funds</li> <li>2. Lack of knowledge &amp; skills</li> <li>3. Our suggestions may not be adopted by the management department</li> <li>4. Accuracy: results may not be correct</li> <li>5. Different views of villagers and staff towards resources (i.e. use and conservation respectively)</li> </ol>
<b>Social</b>	<ol style="list-style-type: none"> <li>1. Awareness raising &amp; capacity building: of villagers and staff</li> <li>2. Increase participation of villagers in conservation</li> <li>3. Improve communication between villagers and staff</li> </ol>	<ol style="list-style-type: none"> <li>1. Different languages impede good communication</li> <li>2. Many people with different ideas are difficult to manage</li> <li>3. Conflicts will arise when illegal cases happen</li> <li>4. Accessibility difficult in rainy season.</li> </ol>
	<b>Different benefits</b>	<b>Different problems</b>
<b>Villagers</b>		We may be restricted in grazing, logging and other resource use
<b>Staff</b>	<ol style="list-style-type: none"> <li>1. Supervise the work of villagers</li> <li>2. Increase work efficiency when villagers will provide information</li> <li>3. Reduce workload of staff when villagers are involved</li> <li>4. Villagers will understand benefits from certain species, like timber, water, NTFPs</li> </ol>	The work is optional, so hard to manage

### 4.3. Why working together?

The next exercise was a game (from the WWF manual), where 30 people received an instruction on paper; there were 3 different instructions: put all 20 chairs in a circle in the middle of the room, put all 20 chairs in the left-back corner of the room, put all 20 chairs in the right-front corner of the room. This game was meant to visualise the need to work together. After a few minutes the game was stopped, without any group having fulfilled their task, leaving them in chaos. Participants' feelings were conflict, confusion, aggression, disappointment, and annoyance. Among the observers it was a villager who noted that this exercise reminded him of forest resource use; that the game was probably played to show that a conflict will arise when there are not enough resources (=chairs). Another villager observed that this might be illustrating what happens when the administrative decisions (=instructions) are not clear, which may happen when they are drafted by people who are not familiar with the local situation. Staff mentioned that this exercise showed that conflict would emerge if people do not have common objectives. The exercise illustrated that in a situation with restricted resources and with partners having different objectives it is crucial to work together to reach a compromise.

Thereafter the participants listed existing formal and informal relationships within the village as well as between the village and others, giving advantages and disadvantages for each of these relationships. The main problems villagers had in their relationship with the nature reserve management bureau were that the latter restricted forest use, and that the imposed alternative activities were not always in accordance with the villagers' ideas and needs, nor were they always appropriate to the local situation. Both villagers and staff acknowledged that there were some difficulties in the

relationships between them, since villagers focussed more on use whereas nature reserve and forestry staff focused more on conservation.

#### 4.4. Objectives of PRM

The participants were given a set of objectives for the participatory resources monitoring, and asked to delete, add and adjust as needed. Consensus was reached on the following objectives, which were similar in both pilot areas:

- (1) To select the target resource species, species to be protected, and land uses
- (2) To develop and improve monitoring indicators and methods
- (3) To monitor the distribution & abundance of the target species and changes in land use
- (4) To monitor the resource use by villagers
- (5) To find problems of resources use and try to find solutions
- (6) To monitor wildlife damage to crops and livestock, and seek possible solutions.

The major difference compared to the set of objectives originally provided was that both the methodology development itself and the data analysis ('to find problems and solutions') were listed as separate objectives. In Xiaoheishan an added objective was: 'to get institutions interested to provide more funds for forest management', in Tongbiguan-Ruili: 'to monitor and identify the boundary between the nature reserve-village and village-village', both proposed by villagers.

#### 4.5. PRM monitoring targets

Participants selected the species they would like to monitor on the basis of the list of resources used, which had been produced in the village meeting. Subsequently they selected which wildlife to monitor and/or protect (including wildlife damaging crops), as well as which land uses. The targets were evaluated and fixed in the meeting some weeks after the workshop. See table 2 for the results from Xiaoheishan NR<sup>7</sup>. In the minority area of Tongbiguan-Ruili, where most resources are only known by local names, we needed to include sampling of specimen (by staff and -if needed- experts) in order to identify scientific names.

**Table 2: Examples of monitoring targets of PRM**

Monitoring target	Amount of species selected per village	Example of species chosen by more than one village in Xiaoheishan
Herbal medicines	3-7	<i>Paris polyphylla</i> , <i>Pinellia ternata</i> , <i>Aconitum carmichaeli</i> , <i>Bupleurum</i> spp.
Wild fruits	0-4	<i>Prunus conradinae</i> , <i>Elaeagnus conferta</i> ,
Insects, honey	2-4	Honey bee, wasp
Fungi	1-7	<i>Pholiota adiposa</i> , <i>Lentinus edodes</i> , <i>Auricularia auricula</i> , <i>Termitomyces albiceps</i> , <i>Lactarius hatsudake</i>
Wild vegetables	2-6	<i>Callipteris</i> spp., <i>Crataeva</i> spp., <i>Asparagus</i> spp., <i>Elsholtzia kachinensis</i> , <i>Ammannia multiflora</i> , <i>Crassocephalum crepidioides</i> , <i>Houttuynia cordata</i>
Fodder	0-6	<i>Musa acuminata</i> , <i>Oxalis corniculata</i>
Fish & aquatics	0-3	Frog*
Bamboo & rattan	2-3	<i>Phyllostachys sulphurea</i> , <i>Phyllostachys pubescens</i>
Fuel wood	1-3	<i>Quercus</i> spp., <i>Pinus yunnanensis</i> , <i>Pinus armandii</i>
Bird & eggs	1-4	Swallow, Owl, Woodpecker
Wildlife + those damaging crops	3-4	<i>Muntiacus muntjak</i> , <i>Selenarctos (Ursus) thibetanus</i> , <i>Sus scrofa</i>
Construction timber	2-4	<i>Catalpa fargesii</i> , <i>Quercus</i> spp., <i>Pinus armandii</i> , <i>Taiwania flousiana</i>

<sup>7</sup> During an evaluation visit in 2002 some of these targets were adjusted based on experience and better comprehension of villagers about the PRM, and because some selected species were cultivated instead of wild.

Farming tools timber	0-3	<i>Manglietia</i> spp.
Ornamental flowers	0-2**	<i>Rhododendron</i> spp, <i>Camellia japonica</i>
Land use types	1-2	Plantation forest, 'water source forest'

\* (no species name available), \*\* only one village listed this category

#### 4.6. PRM indicators and methods

In a subsequent exercise the term 'indicator' was explained. Still, the choice of indicators was a very difficult one. However, the village forest guards, very experienced people on forests and resources, provided useful indicators for abundance of resources as well as wildlife (in a separate evening meeting). A merged table with all indicators and methods mentioned is shown in table 3<sup>8</sup>.

**Table 3: Indicators and methods of PRM**

Objective	Target species	Indicators	Methods
Monitoring resource abundance	The target species selected by each village	Frequency (how many times) of seeing or hearing, Amount of species seen / heard, Time needed to collect resource, Estimation of amount in field, Amount in market (fungi, wild vegetables, medicines), Difficulty level of catching (fish, frogs)	Direct observation, Interview, To collect investigation data by Forestry departments, Market investigation, Mapping
Monitoring wildlife to be protected	Muntjac, Bear, Wild pig, Wild chicken, Wild cat, Snake	Number of traces (footprint, dropping), Frequency of seeing or hearing wildlife in mountains, Number of species seen/heard each visit, Habitat condition of wildlife	Observation in the forest, Interview village forest guard
Monitoring wildlife damage	Bear, Wild pig, Macaque	Frequency damage to people, livestock and crops, Damaged area & quantity of crops, Frequency of seeing wildlife in crop fields, Food abundance in forest	Direct observation, Interview
Land use monitoring	Plantation forest, Watershed forest	Total estimated area, Growth condition	Direct observation, Collection of investigation data through Forestry department, Interview
Monitoring resource use and dependence	The target species selected by villages	Estimated consumption, Frequency of eating, Average marketing amount, Proportion of income, Cutting quota, Number of houses built per year, Number of households who use alternative energy, Plantation area per household	Interview, Market investigation, To get to know the cutting quota
Data analysis (find problems and solutions)	All selected targets	All selected indicators	To have village meeting with villagers, staff, experts to discuss
Through PRM to get institutions invest more funds on forest management (specific for Xiaoheishan)	Conservation & poverty alleviation departments, Township government, FCCDP, Local community	Amount of funds received	Regular/irregular report on monitoring to high level department to try to get funding support
Monitor boundary between NR and	NR and collective forest land	Whether villagers are clear about the boundary of forest land, Frequency of conflicts	Direct observation, Interview, Discussion

<sup>8</sup> In an evaluation after one-year implementation these indicators and methods were further simplified.

villages (specific for Tongbiguan-Ruili)			
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#### 4.7. Data analysis

Local people, if given the opportunity to discuss the findings and observations, often provide interpretations and insights that otherwise may have been missed if the results had only been interpreted by staff and advisors (Steinmetz, 2000). PRM involves both villagers and staff in the data analysis. Moreover, participatory data analysis enables the drafted solutions to be more practical and adjusted to the local conditions. At the time of this writing there is not yet sufficient information on data analysis, as this will be done after one year of implementation (Sept 2002). To get an impression on how the data analysis would go, we exercised the data analysis during the workshop in a simulated village meeting where the causes, solutions and specific actions for a set of assumed monitoring results were discussed. The process was taped on video.

In general the results from this simulation was exactly one of the bigger worries the villagers had in reality in participating in monitoring, i.e. that it would result in an even further restriction of the use of resources. Most of the solutions formulated during the simulation exercise were management decisions on enhanced conservation of resources and on prohibition of resource use. Only a few identified solutions were addressing alternatives for the villagers' loss or restriction in resources use. This may reflect the dominance of the staff in the discussions, as was indeed the case. Furthermore, data analysis in the future would require outside assistance to guide for a more thorough analysis (including underlying causes) and more specific measures. The process was evaluated through watching the video. Before seeing the video everyone evaluated the discussion positively, but after seeing the video the staff acknowledged that they had been dominating the discussion. The reason why villagers were not really participating in the discussion was believed to be the low educational background of villagers. This was stated by the staff as well as the villagers themselves. They added that time was an additional reason since villagers need more time to warm up for discussion. We tend to think that creating the proper atmosphere (and with taking enough time) may be a more important factor to stimulate village participation than educational background.

#### 4.8. Dissemination of PRM data

Table 4 gives a complete overview of target groups and variable and creative methods to disseminate the PRM results as listed by both staff and villagers in the workshop.

The result clearly indicates that for informal relationships informal methods are chosen, whereas for more formal relationships also formal dissemination methods, such as written reports, are preferred. The exercise brought out ideas of villagers to use the results of the PRM for discussions with other institutions than only the forestry bureau. One such an idea was to discuss the results with the transportation bureau in order to let them reconsider the planned construction of a road through the nature reserve in Tongbiguan-Ruili.

**Table 4: dissemination channels for PRM results**

Present to	Presentation method
Villagers in the same village	Village meeting, Visit the other villagers home, Communicate with friends who visit us, Blackboard, Broadcasting, Newspaper, Video, film (if we get the means)
Other villages	Visit relatives and friends, Invite representatives of other villages to our village meeting or to other activities
Village Committee	Talk with each other, or written report
Forestry Bureau, MO /MS	Verbal report and written report
Township government	Written report

Other government departments such as Hydrology, Energy, Poverty alleviation, Transportation, etc.	Written report
FCCDP	Written report and materials

#### 4.9. PRM Work plan

The results of the work plan drafted by the participants indicated that all activities would be implemented once or twice a year, except for wildlife damage monitoring which would be dealt with whenever it occurs. All villagers will be involved in the monitoring of resources abundance and use. For resource use monitoring the Forestry Station will also be involved. The monitoring of wildlife abundance and wildlife damage will be the main responsibility of the village forest guards. The village commission, forestry station (FS), management station (MS) and office (MO) will assist the villagers in the monitoring of land use change, data analysis, search for funds, data dissemination and management. Technical support and evaluation will be provided by the village commission, FS, MS/MO and FCCDP. Funding needs to come from FCCDP and MO. The recording by villagers will be done during their daily work; if possible they can also make some notes to remind themselves. The necessary paper work will be done by MS/FS staff. The project will regularly visit the area to monitor the process, and will conduct an evaluation after one year.

#### 4.10. Feedback on benefits and problems

At the end of the workshop the participants re-assessed the benefits and problems listed at the beginning of the workshop. The NR staff initially mentioned that one benefit would be that 'the villagers will realise the benefits of certain species', this was changed into 'make the villagers become aware of the long-term benefits and need for sustainable use of resources'. They deleted 'our suggestions may not be adopted by the management bureau', since this bureau will be involved in the data analysis. Also the suggestion that the monitoring results may not be correct was taken out, since everyone realised that the PRM is not a very specific and quantitative monitoring tool, but merely indicates trends. The worry that villagers lack skills required for monitoring was taken out, since during the previous days everyone had experienced that PRM only uses very simple tools and the actual monitoring can be easily integrated in the daily work of the villagers. As for the 'different understanding between staff and villagers', they expected this to be solved during the PRM process. Some problems were added, such as the fact that the rest of the village did not yet know what PRM is, as only 4 representatives took part in this workshop. An additional benefit identified was that the education, knowledge and attitude of all people (villagers and staff) would be improved.

### 5. Discussion

The methodology for participatory monitoring depends on the objective of the biodiversity assessment. Your main objective may be information needs, quantitative monitoring on species richness and abundance, or just indications of changes, but can also aim for mutual capacity building, awareness raising, transparency of decision-making. With PRM we chose for resource abundance and use monitoring as well as empowerment of local staff and villagers in forest conservation and management. This requires involvement of both staff and villagers in the identification of objectives, indicators, methodologies, data analysis and dissemination, to enable to include insights and perceptions of all partners, and to enhance the anticipated empowerment and sense of responsibility for the management decisions drafted. The methodologies are simple to start with, allowing increased sophistication at later stages, since both villagers and staff have shown interest in 'scientific' management. The methods should enable integration in the daily life of the villagers, so as not to take too much extra time of the already busy poor farmers.

The question then emerges how objective or rigorous data gathered by villagers can be? And if the data collected are objective, how can they fit into scientifically based (and therefore assumed to be reliable) formats? The question of ensuring both local participation and external validity largely

depends on the level at which monitoring information is needed and by whom it is used (Abbot & Guijt, 1998). We have chosen for complementary systems with different methodologies, since we believe this is more valuable than putting all efforts into one all-embracing monitoring system. But the challenge remains how to connect or communicate between these systems. To support the PRM as a tool for participatory forest resource management, the project started to experiment with a rapid assessment of PRM species' potential for sustainable use, based on Peters 1996. The rationale behind this is that due to their reproductive biology, regeneration and growth strategies, and population structure, some species are better able to withstand extraction than other species, depending on demand levels.

Another consideration before embarking on a participatory monitoring process is the enabling policy, legal and institutional framework for participatory monitoring in and outside the nature reserve. PRM intends to monitor outside as well as inside the nature reserve. The rules and regulations appear to enable sustainable use of some resources and joint management of parts of the nature reserve. However, not all nature reserves are presently managed accordingly. Moreover, actual participation from local levels is still relatively new since the forestry department has a history of top-down management. Chinese people in general are still quite accustomed to a centralised management system. This is the case for both local staff as well as the isolated mountain farmers themselves. There will still be a long way to go before the concept of empowerment will sink deeply into everyone's consciousness. Therefore, one of the biggest challenges for the success of participatory monitoring is the establishment and improvement of a trustworthy relationship and a two-way negotiating process between the staff, villagers and other end-users of the information (like researchers and project officials). Changing to participatory management styles requires social learning and conflict management. Only then can management decisions not only be restrictive but also be directed towards sustainable or alternative uses.

Since benefits were our starting point, the monitoring targets are resources on which the villagers depend. However, also other targets were selected by the villagers, such as land uses, species that damage their crops (boar, bear, deer, macaque), and (other) species with an important role in the ecosystem (wild cat, predator birds, snakes). We believe we should not force villagers to monitor all kinds of biodiversity, if they do not have a direct interest in it. However, the process revealed that villagers are interested in more than just the resources they use. Still, the short-term needs of poor farmers versus the long-term character of monitoring may remain a pitfall. Moreover, the monitoring results may not reveal clear differences every year. The villagers suggested training in conceptualising long-term benefits and sustainable use to address this issue.

Villagers are anticipated to be both direct participants and final beneficiaries of the PRM activity, therefore they are expected to carry out the PRM on the basis of these motivation and benefits. However, in the current economic development condition, mountain people have to spend most of their time on farming activities to ensure their livelihood. In addition, villagers' awareness in environmental conservation is presently not developed to such an extent that they will volunteer in PRM. Although PRM will not cost too much of villagers' extra time, they still have to sacrifice some of their time. Therefore, we chose to provide a small compensation fee, as well as operational support for data analysis & dissemination, which will be evaluated after one year. With increasing capacity and awareness, we anticipate that these activities can be integrated in the livelihood and development efforts of the village.

## **6. Conclusion**

Probably the best and most scientific way to find out whether the use of a resource is sustainable or not, is to implement long-term research on the growth dynamics of these species in combination with the demand. This however takes years and we cannot afford this time-span before taking management decisions. Moreover, it is important to involve local people in the planning and management of their environment, through capacity building, awareness building and transparent decision-making processes for biodiversity conservation. Through PRM we aim to facilitate these processes in addition

to generating information to draft preliminary management decisions for resource use and some wildlife.

Participatory Resources Monitoring is a completely new concept and practice in Yunnan. It requires a high level of villagers' participation, since they are involved in deciding the objectives, selecting target species, formulating indicators and methods, data analysis, disseminating the results and carrying out the suggestion to improve forest resources management. The process described in this paper is believed to be appropriate to initiate the necessary frank and intense discussions among the staff and the villagers.

Challenges in the participatory monitoring are to link up with the scientific monitoring, which is preferably established complementarily. Furthermore, how to overcome the logically short-term benefit focus of poor farmers, to remain motivated for an in essence long-term activity like monitoring of biodiversity? We anticipate that with the development of the capacity and awareness, these monitoring activities will become part of the villagers' livelihood and development efforts. Maybe the most crucial challenge is the enabling policy, legal and institutional framework, including a good and mutually respectful relationship between the staff from forestry and other departments, and the villagers. At present there is a need for social learning to change the top-down management styles into participatory management styles. It is believed that the PRM can be a tool for this. Still, experts should guide the PRM in the first years of implementation, especially to evaluate methods and indicators as well as data analysis and proposed activities. Because of the felt success of the PRM workshop and people's enthusiasm about the concept, PRM is believed to be relevant for the other nature reserve areas too.

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