

# Finding and promoting a local conservation consensus in a globally important tropical forest landscape

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**Abstract** Can democratic processes favour conservation outcomes in the tropics? This study focuses on local viewpoints within a forested landscape of high conservation significance in East Kalimantan (Indonesian Borneo). Stakeholders received posters displaying results from a previous study; these posters emphasised local priorities and views regarding local biodiversity. We assess local attitudes to this information, and consider some implications. Knowledge of, and agreement with, poster content increased among villagers, townspeople and civil servants after they received posters. All respondents appreciated the posters and all supported some form of forest conservation. All respondents agreed that biodiversity conservation and local views are vital in land-use planning. All agreed that logging companies need to be better controlled, while 80% consider them a ‘major environmental threat’. These results bolster our belief that involving communities is not only an ethically defensible way to achieve conservation outcomes, but also a pragmatic opportunity to do so.

**Keywords** Borneo · Democracy · Dipterocarp forests · Education · Forest-dependent-peoples · Governance · Indigenous-peoples · Information campaign · Logging · Local priorities · Perceptions ethnicity and knowledge

## Introduction

Conservation—in an appropriate form—is often desirable to local stakeholders, even in the tropics. Though widely recognised in wealthier countries (Fazio and Gilbert 1986), tropical conservationists are still struggling to find effective ways of seeking out and building on local views (McNeely and Miller 1994; Little 1994; McDuff 2001; Sheil and Lawrence

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2004). Aside from addressing various ethical concerns, popular consensus can provide a firmer basis for more effective environmental governance and conservation (Steinberg 2005). Surveys to assess local people's attitude regarding nature and conservation generally focus on acceptance of protected areas and preconceived policy options (e.g. Parry and Campbell 1992; Newmark et al. 1993; Harada 2003; Fiallo and Jacobson 1995). Though conservation information campaigns (generally supporting top-down interventions) are increasingly common (Jacobson and McDuff 1998), published assessments of their impact remain scarce. Here we examine if various stakeholders are receptive and sympathetic to conservation relevant information and perspectives. We demonstrate that a small-scale (low cost) survey can reveal useful and significant information. Overall, the results give grounds for optimism: people want conservation.

### **Context and rationale**

Tropical forests are disappearing and forest-dependent people are losing their livelihoods and culture (Posey 1997; Bowles et al. 1998; Achard et al. 2002). In many regions, such as Indonesia, these changes are mainly driven by large-scale commercial enterprises such as timber concessions and plantation developments (Padoch and Peluso 1996). Some developments may ultimately be beneficial, but the social and environmental costs are often high (Stone 1996; Padoch and Peluso 1996). Democracy is new across much of the tropics, and both the decision-makers and the electorate remain uncertain about the choices they face. Decision-makers generally lack the information they need to make the best choices, and have little idea how to find it—consultation is often poor, and remote communities are neglected (Nguyen 1996; Sheil et al. 2006).

Better information could help decision-makers to be better aware of their choices. We can design surveys to help identify and weigh options. With these goals in mind, we previously developed and implemented surveys to evaluate the local relevance of species, sites and habitats (Sheil 2002). We combined biophysical landscape assessment to techniques to identify and gauge local needs and perceptions (Sheil et al. 2002, 2004). We have shared this information through a range of approaches including posters. Whether this information will have a positive affect depends on how it is received and understood.

### **Location**

Malinau is a young district, created in 2000 as part of Indonesia's decentralisation process (see Barr et al. 2001). It covers more than 40,000 km<sup>2</sup> and around 90% remains forested. Commercial interest focuses on logging, coal mining and plantation crops like oil palm and acacia. The Upper Malinau is steep, rugged, and the soils are poor and prone to erosion, making the area unsuitable for plantation crops (Basuki and Sheil 2005). From a local perspective, natural environments provide many local goods and services (for example, we previously recorded more than 2000 plant species, with local people identifying a value for nearly three-quarters of them, Sheil et al. 2006).

Kalimantan contains extraordinary levels of biodiversity, with many species occurring nowhere else (MacKinnon et al. 1996; Kier et al. 2005; WWF-Indonesia 2005). Malinau is itself exceptionally species-rich: one 1-ha plot contained the highest tree species diversity recorded in Indonesia (225 species >10 cm diameter, Kartawinata et al. in preparation). Our surveys have continued to record species new to science (e.g. Rachmatika et al. 2005, CIFOR-unpublished data).

## Posters

The original surveys were conducted in seven villages in the Upper Malinau watershed (Malinau District, East Kalimantan, Indonesia). We worked with two distinct local cultures: the Merap and Punan. Most communities grow rice, but the forest still provides them with a wide range of products, services and values (Sheil et al. 2003a, b, 2006; Liswanti et al. 2004). We examined alternative means to share our results with communities, local decision-makers and educators in Malinau. The survey teams had noticed that local people liked to decorate their houses with pictures, so posters appeared promising.

We developed four posters, written in uncomplicated Indonesian, yet the ideas are not oversimplified. Each contains a richly illustrated assortment of information. Plasticised against moisture, they should last for years and can be returned to over time, like an 'open book'. In brief, Poster-1 outlines why and how the original surveys were conducted. The poster emphasises local perspectives, but also explains why outsiders are concerned about Malinau's forests. Poster-2 is about the 'most important' local land types. It focuses on forests and rivers, explains threats and identifies locally important 'special places'. Poster-3 considers land use including traditional cultivation and options for commercial crops. Poster-4 focuses on important species for building, food and various other uses and values. After several reviews and revisions with the communities, and a review with local government staff (the local government was asked to endorse the posters, which it did with only one minor change), we finalised, printed and distributed just under one-thousand sets of posters. As we had hoped, these were popular and are now widely displayed in the region.

## Methods

We selected a small number of respondents from Malinau Town and seven local villages, stratified by location, age gender and occupation, to obtain satisfactory coverage by background. Before this study, only half the respondents from the five villages were involved in the original data collection surveys or in subsequent poster review process. Our approach examines the *views of individuals*—it proved impractical to assess the 'views of institutions' in this way. Timber and mining company staff were approached but only one (of five) was willing to be interviewed. No other individuals refused. This may bias respondents to those sympathetic to our aims, though we have no reason to believe any such bias is large. We interviewed 54 respondents initially, but three were unavailable for the second round and are excluded from our analyses. The first interviews took place in late April and early May 2004. After interviews were completed, each respondent received a set of posters. We returned about 2 months later for the second interview.

The questionnaire possess three sections: **Part A** assessed each respondent (gender, age, education, ethnic group, occupation). We scored 'forest reliance' by counting respondents who (a) 'go to the forest more than once a month' and (b) 'use river water for their basic needs'. 'Access to information' was scored by counting respondents who (a) 'own a television and/or radio' and (b) state that 'they often watch or listen to the news'. In each case, population summaries were calculated by adding the 'yes' scores, dividing by twice the number of respondents, and then multiplying by 100. In most overviews, we divide respondents into three primary groups: 'study villages' (from communities involved in the original data gathering study), non-study villages, and those from town, i.e. Malinau, the district capital.

**Part B** gauged agreement with 26 statements concerning information on the posters. The statements ranged from well-known to more obscure topics. Respondents had five choices: 'strongly agree'; 'agree', 'disagree'; 'strongly disagree'; and 'don't know'. On

suspicion that ‘agreement’ is culturally easier and could lead to biased responses, we mixed ‘true’ and ‘false’ statements. We classified statements into two groups: ‘insider’ (those where we explicitly reflect local views or would expect respondents to have the necessary information locally), and ‘other’ statements (outsider analyses, or contextual knowledge such as global setting). Questions consistently answered the same by all respondents will not reveal change, so some questions were made ‘harder and vaguer’ to ensure some variation. One statement was omitted from analysis because initial examination suggested it had proved overly confusing.

Our analyses summarise answers before and after respondents received posters. We scored responses as ‘correct’ if they confirmed poster content: i.e. ‘agree’ with confirming a poster statement or ‘disagree’ with a contradictory statement. The score was expressed as a percentage, representing our ‘measure of agreement’. This does *not* measure % agreement with overall poster content, but rather is intended as a sensitive index of agreement and uncertainty.

We assess the probability of observed changes in responses occurring due to chance by assuming that respondents (not questions) are independent. The binomial distribution (implemented in *Microsoft Excel*) provides the exact (one-sided) probability of obtaining the number of changes seen in the expected direction (e.g. decreased ‘don’t know’ answers or increased measure of agreement), if changes were in fact randomly signed. We assume our posters account for significantly different responses between the first and second interviews.

**Part C** explored local opinions on conservation, using 10 specific, open-ended questions. In this open-ended format, differences before and after poster exposure are unstructured and do not necessarily represent a change in view as respondents were often eager to finish the interview.

## Results

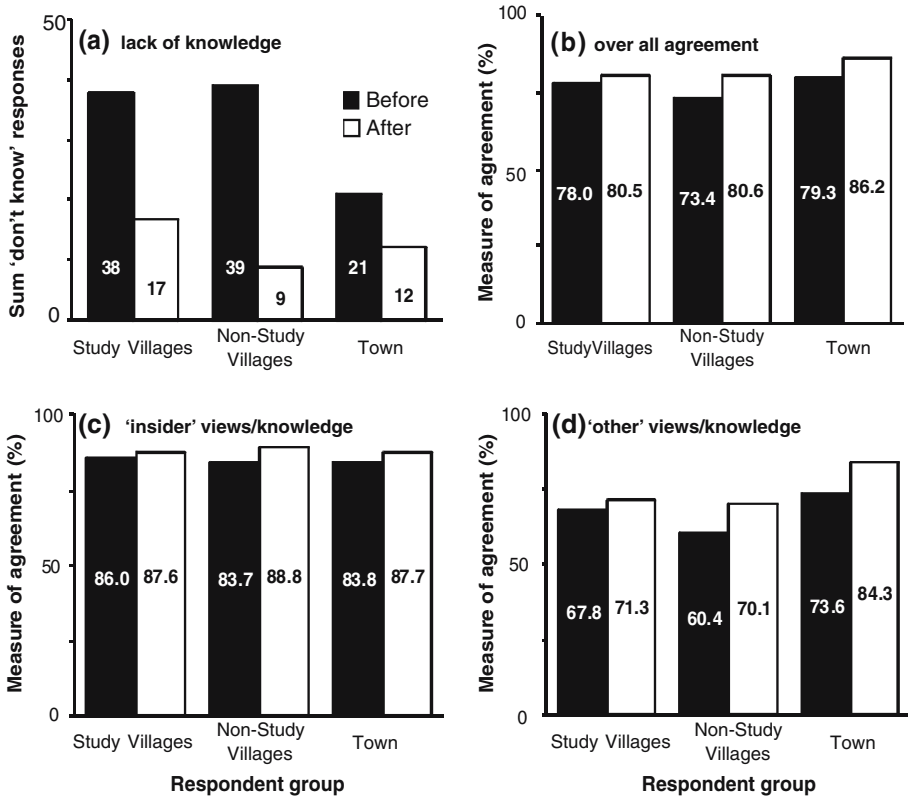
### Respondents

Our 51 respondents (26 male, 25 female) were 14–63 years old and from various backgrounds. Nineteen respondents were Merap and six were Punan; the others included Kenyah, Lundaye, Brusu, Tebilun and Tidung. All respondents were literate, but more than two thirds (69%) had not progressed beyond junior school. More than half were farmers. Six were civil servants and five were teachers. Sixty-eight percent of the villagers interviewed go to the forest more than once a month compared with 27% of the townspeople. All villagers depended on river water for drinking and bathing, while 82% in town used piped water. A higher proportion of town-based respondents, compared with villagers, owned a TV or radio. Further information is summarised in Appendix 1.

### Knowledge

The number of ‘don’t know’ answers decreased in all main respondent categories after the posters were distributed (Fig. 1a, Appendix 1). Overall, 35 respondents gave 98 ‘don’t know’ answers before they received our posters. Afterwards, this dropped to 38 ‘don’t know’ answers from 26 respondents.

The improvement in knowledge per respondent was significantly different than would be expected by chance (a) overall, (b) in study villages, and (c) in the non-study villages. In the town there was only a 9% likelihood that the improvement would have been noted by chance alone (Table 1). People were better informed after seeing the posters.



**Fig. 1** Differences by respondent groups before (black) and 2 months after (white) poster distribution. (a) Lack of knowledge measured by total ‘don’t know’ answers. All comparisons show a decrease. (b) Overall group mean measures of agreement with poster information. All comparisons show an increase. (c) Group mean measures of agreement regarding ‘insider views and knowledge’. (d) Group mean measures of agreement regarding ‘other views and knowledge’

Agreement

Agreement with poster content was high. Differences between villagers and town dwellers are relatively small (Fig. 1b). Two months after receiving posters, the average agreement had increased in all three categories. The change in agreement was positive for 36 respondents, and negative or unchanged for 15; the binomial tests show that these patterns are significant (a) overall, (b) in non-study villages, and (c) in the town (Table 1). In the study villages the data implies only a 16% probability that the posters had no positive effect.

Differences are small but (as expected) study villages show a slightly stronger initial agreement on ‘insider views’ (Fig. 1c). Considering statements reflecting non-insider information (Fig. 1d), town dwellers had the highest agreement (again as expected). However, the agreement (Fig. 1c, d) and increase in all respondents’ understanding in both statement classes is striking (Fig. 2).

Townsppeople had the highest agreement with poster content both before and after distribution (Fig. 1b). A key factor was that university graduates (mostly town-based) had the highest agreement (Table 2). Overall, educational background and access to information appears to be associated with greater agreement. Nonetheless, even remote and uneducated people show good overall agreement.

**Table 1** Change in number of 'don't know' answers and in agreement, by individual respondents, evaluated by a one-sided binomial test

	'Don't know' answers				Agreement		
	Decreased	Same	Increased	Probability	Increased	Decreased	Probability
Study villages	12	10	4	0.01	15	11	0.16
Non-study villages	8	6	0	0.003	12	2	0.0009
Town	6	2	3	0.09	9	2	0.006
All combined	26	18	7	0.0002	36	15	0.0009

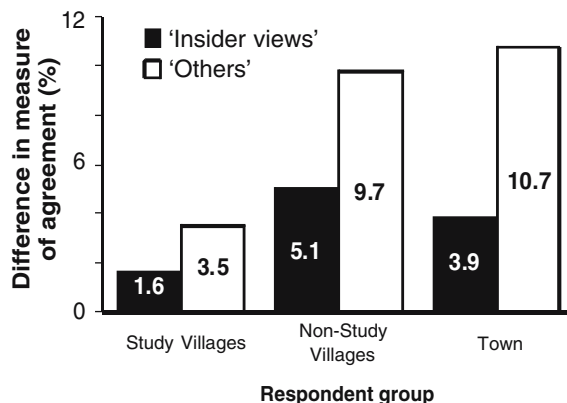
One subset of specific interest is the civil servants: All six increased their agreement with content after seeing the posters (binomial probability=0.016). They had a high initial agreement with 'insider views', but still showed a mean rise of 6% points (83.3% before to 89.3% after poster distribution). Agreement with 'other' information started lower but climbed by 15.3% points (63.9% before to 79.2% after poster distribution).

### Disagreements

Respondents understood and agreed with most statements in the questionnaire. Of the total of 25, 12 statements regarding content were answered correctly by all respondents in all exchanges. An additional six statements gained 100% agreement after poster distribution.

Several questions proved especially informative. Six questions initially received 'don't know' answers from more than 5 respondents; all involved statements regarding 'other views'. These included several statements on the wider conservation significance of the region including for example: 'There are many plants and animals in Malinau that are not found in most other parts of the world'—true (before=16 don't know answers; after=8); and 'The forest of Malinau is not outstanding as there are many other forests in the world'—false (before=12 don't knows; after=9). One especially significant statement 'most areas in upper Malinau are not suitable for permanent crop such as oil palm, pepper, and cacao', received 12 don't know answers beforehand (and 9 after) and most respondents (65% before and 61% after poster distribution) actually disagreed.

**Fig. 2** Change in average agreement, by group, for 'insider' (black) and 'other' (white) information classes 2 months after poster distribution. Change is positive for all six comparisons



**Table 2** Average agreement scores and numbers of ‘don’t know’ answers, by educational background, before and 2 months after poster distribution

Education (n)	Measure of agreement (%)				‘Don’t know’ (%)	
	Re-insider		Re-other		Before	After
	Before	After	Before	After		
Non-formal (5)	75.7	85.7	52.7	60	16.8	4.8
Elementary, not completed (14)	85.2	88.8	61	67.5	10	2.6
Elementary (8)	83	88.4	65.9	68.2	7	3
Junior high (8)	90.2	86.6	75	77.3	1.5	2.5
High school (8)	87.5	86.6	72.7	80.7	4.5	4
University (8)	83.9	90.2	73.9	88.6	8	2

### General views

The interviews also probed opinions starting with an initial agree-or-disagree question. All said water quality was important enough to be considered in land-use planning. The majority suggested that clean, clear water was important for health. Also, all stated that land-use planning should recognise plant and animal conservation. A majority suggested this should lead to sustainable use of resources, and keep wild animals and plants from extinction ( $n_{\text{before}}=19$ ;  $n_{\text{after}}=31$ ). One villager and one civil servant mentioned future ecotourism. All agreed that forests in Malinau need to be protected. Most suggested that uses must be sustainable, and nine (both interviews) considered this necessary to “prevent disaster”. Three villagers wished to protect their resources from other villages.

Various forest areas were proposed for protection: village-owned forest or customary forest; upstream forests that were still intact; or even all forest in Malinau. A few civil servants answered that “protected forests” should only be those ‘legally recognised’. When asked who should be responsible for forest conservation, most respondents suggested that all stakeholders be involved. Others, however, stated it was primarily the villagers’ responsibility.

During the first interview, 29 respondents stated that logging companies were needed in Malinau and 22 disagreed. This ratio switched in the second interview. Those who want logging noted that companies were useful for jobs and income and other benefits. Others said companies destroyed forest resources and caused land degradation, and brought *no* benefits (six both occasions). All respondents believed logging should be controlled. They suggested direct monitoring by village representatives ( $n_r=43$ ), or creating a team representing the main stakeholders (government, village representatives, and a company officer) (six both occasions). In addition, some civil servants, teachers, farmers and a company worker proposed improved enforcement of regulations and better agreements between villagers and timber companies. However, most respondents (41, both occasions) believe these companies remain a major threat, while illegal logging concerned nine (both occasions).

All respondents stated that information was important to help with land-use planning. They suggested this could be achieved through increased local knowledge, sharing of lessons learned, and guidance to improve decisions.

All respondents thought our posters were useful. They increase local knowledge ( $n=32$ ), show the importance of plants and animals (34), and for some respondents in the lower Malinau, they improve their knowledge of life upstream. The posters are viewed as most important for villagers (44); few respondents mentioned local government (4) or investors (3).

More than half the respondents (29) said they had discussed the posters with other people. Eleven respondents suggested that additional explanatory training would help them to benefit more from the posters (this is taking place). We have concluded, based on our various discussions and seeing people's response (rather than on our data alone), that the posters have bolstered local confidence in expressing their views, and have encouraged broader discussions about what land-use changes and conservation imply.

## Discussion

Our study was small and relatively cheap: an activity likely to be within the capacity of local agencies even in less wealthy regions. We see that such surveys can reveal useful and statistically robust information: within the sample group the posters had a significant positive influence. Access to the posters lead to a better-informed and broader consensus on many issues.

### Poster distribution and respondents' perception of conservation

We emphasise that the reception of our posters may be very different to many superficially similar conservation education efforts, as the bulk of the information presented comes from the local people themselves. Most poster content is neither obscure nor controversial: knowledge of and agreement with the content was high even before the posters were distributed. Nonetheless, there was a decline in 'don't know' responses (increased knowledge), and increased agreement with poster messages after distribution. Increased agreement was statistically significant overall, in the non-study villages, and in town. The increase among study village respondents was less marked but many were already familiar with the content (directly and indirectly) as a result of our previous activities and had less to learn from the final posters. Does the reduction in 'don't know' responses reflect a change in knowledge or perhaps greater confidence in stating a viewpoint? It is likely a combination of both reflecting greater understanding and/or a willingness to be associated with the poster concepts.

### Implications

Some specific results suggest an opportunity to improve knowledge and pride in local biodiversity. Few people know the region's global significance. We find many local people intrigued and enthusiastic to learn that they have plant and animal species found nowhere else.

The majority of respondents consider the upper Malinau "is suitable" for permanent plantation crops. Such plantation schemes are currently promoted by local government as desirable future developments. Most of the upper Malinau is rugged and inaccessible. Steep slopes and thin, easily eroded soil dominate the area. Our analysis, based on field sampling of soils and the application of official Indonesian Government criteria suggests that most land in the upper Malinau (200 out of 200 sample points) is not economically suited for sustainable large-scale plantation crops including oil palm, pepper, and cacao (Basuki and Sheil 2005). Clearing the steep slopes in the upper Malinau would have considerable environmental costs.

So, why is there disagreement? People are not familiar with what is needed for successful plantations. In these remote regions, investors promote the supposed benefits and play down the potential risks of plantations. These investors seek permission to clear land (for the plantation) gaining considerable timber revenues. Many plantation schemes are never planted. Fictitious oil palm plantations in East Kalimantan may have already cost the state

more than Rp. 3.5 trillion (US\$372 million) (*Kompas*, an Indonesian language newspaper, as quoted in Sheil and Basuki 2005). In short, plantation schemes provide camouflage for removing timber and there has been little local publicity warning against this.

Our survey question asked whether the region *is suitable* for permanent plantation crops. But what about support? Views are mixed and nuanced. Some local people are against any such developments, others would welcome the promised benefits. Almost everyone, including all those involved in our interviews, believe such developments should be carefully planned and should be integrated with other needs including conservation.

We emphasise that *we* are not against plantations *per-se*; when well planned and implemented such schemes can bring benefits, but such schemes need to be based on adequate assessments, consultations and guarantees. We have already taken some steps to inform people of our results and warn against hasty and ill-informed decisions (Sheil and Basuki 2005). Given vested interests, this remains a difficult topic, but additional public-education is needed.

Why are Malinau's forests threatened? We can dismiss two simplistic explanations: it is neither because local people *don't care* nor because the local government *is unaware* of local concerns. However, we do note scope for improvement. Of course problems remain. Agreement on a need for conservation does not imply agreement on how and where this should be implemented. Some topics not included in our survey will pose challenges; for example, road building is generally popular, and causes significant damage in the rugged interior of the district.

More importantly, at least in the short-term, the switch from centralised to local government has brought considerable confusion, and has not yet resulted in the consultative and responsive planning, implementation and governance that was intended. Governmental goals and processes show inertia, and working modes lag behind realities. Experience elsewhere shows that even democratic governments are slow to relinquish control over valuable resources (Edmunds and Wollenberg 2003). Conflicts between central and local government also hinder progress. There is little in the way of on-the-ground presence or law enforcement in the more remote regions, and little clarity over how this situation might be improved. One general consequence is disorder and conflict over natural resource ownership and regulation. Insecurity has led to an ongoing 'tragedy of the commons': many who can, take advantage of the situation, and those who choose not to, lose out. Put simply, the choice is 'get something from the forest now, or lose the forest anyway and have nothing'. Some optimism is warranted. This study and our wider consultations and informal discussions, suggest that local people want regulation as part of a fair, transparent and legitimate process.

Regional autonomy is new in Indonesia and democratic processes are young. Decision-makers may become more sympathetic to conservation if it proves popular. Indonesia appears increasingly receptive to environmental concerns. There is an emerging pride in the nation's vast biological wealth and a growing commercial interest in green markets, such as timber certification.

Our broader vision for this project is described more fully elsewhere (Sheil et al. 2006). In brief, momentum towards environmental damage can be reduced. Balancing local needs and priorities with local realities, social and biophysical, suggest a genuine potential to build a strong local economy within a landscape that continues to maintain considerable forest cover and conservation significance.

The region needs economic development, and land-use choices will need to strike an acceptable balance of costs and benefits. The optimal role for researchers in bringing about positive change is debatable. But in our view it is clear that the decisions to be made will

be made by others: local people and their democratic representatives. Our role is to provide information and stimulate discussion. Democratic processes are underdeveloped: people are not used to challenging orthodoxies, asking for explanations, and lobbying; and decision makers are not used to being accountable. We do not push for specific outcomes, but promote the need for broad-based well-informed choices. The fact that people are willing to support conservation provides a platform to develop tangible conservation benefits. We can encourage and be engaged in this process but we should not control it. Will our efforts lead to real benefits? They might—but there is still some way to go.

We note considerable local support for improved land-use planning and implementation, including conservation. This support remains largely untapped. Since our original project was undertaken and the posters distributed, the District of Malinau has made a public commitment to being a ‘Conservation District’ (July 2005). Though a political symbol rather than a commitment to any specific course of action, this is a positive gesture. We believe our activities, and those of other CIFOR researchers and partners, have helped. We are currently collaborating with local government and WWF to develop an environmental education syllabus for Malinau’s elementary and junior high school students, based on the original surveys and using the poster, an associated video and set of playing cards.

## Conclusions

Results confirm and extend our original surveys. Various stakeholders accept the importance of ensuring the conservation and wise management of the region’s forests. The posters have helped develop an even better-informed and supportive consensus. Our respondents were interested in the global conservation significance of their region but were poorly informed about this. Further information campaigns could capitalise on this interest, and could certainly help generate local pride. At the same time, we intend to broaden the consensus by sharing local views with a wider national and international audience.

Everyone we interviewed supported the idea that forests need to be managed and conserved, that land use requires good planning, and that this planning should include good information. They agreed planning should consider local people; water quality; and plant and animal conservation. Most respondents considered that logging and mining companies remain a major environmental threat. Everyone supported the proposition that logging must be better controlled.

Forest conservation in Malinau has considerable local support and the government is aware of this. Forests are not disappearing because local people don’t care or the local government is unaware of local concerns. Whether our posters and other dissemination efforts will lead to better outcomes for people and biodiversity in Malinau remains unknown, but they have improved people’s interest in achieving such outcomes. This study supports our assertion that measures to better access and engage with local views concerning conservation are important and practical. Involving local stakeholders is not only a means to developing a more democratic and thus more legitimate type of conservation, but also offers opportunities for achieving conservation outcomes.

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**Appendix 1** Summary of responses by respondent categories

	n	Dependence on forest (%)	Access to information (%)	Worked with wife (%)	Agreement (%)		Number of don't knows <sup>a</sup>		Agreement (%) Insider views		Agreement (%) other views	
					Before	After	Before	After	Before	After	Before	After
All combined	51	70.6	81.4	33.3	77.0	81.7	98	38	84.9	88.0	67.0	73.8
Study villages (all)	26	84.6	80.8	50.0	78.0	80.5	38	17	86.0	87.6	67.8	71.3
Ethnicity												
Punan	1	100.0	0.0	100.0	76.0	92.0	5	1	92.9	100.0	54.5	81.8
Merap	19	92.1	84.2	57.9	75.6	78.9	31	14	84.6	88.0	64.1	67.5
Other	6	58.3	83.3	16.7	86.0	83.3	2	2	89.3	84.5	81.8	81.8
Education												
Elmn. incompl.	10	90.0	80.0	60.0	75.2	80.4	21	8	85.0	90.0	62.7	68.2
Elmn.	6	100.0	91.7	50.0	74.7	77.3	9	5	82.1	85.7	65.2	66.7
Jun. high	5	60.0	90.0	20.0	83.2	81.6	2	2	88.6	85.7	76.4	76.4
High school	2	75.0	75.0	50.0	88.0	86.0	0	0	89.3	82.1	86.4	90.9
Non-formal	3	83.3	50.0	66.7	78.7	81.3	6	2	90.5	90.5	63.6	69.7
Sex												
Men	11	81.8	77.3	54.5	79.6	84.7	18	8	89.0	90.3	67.8	77.7
Women	15	86.7	83.3	46.7	76.8	77.3	20	9	83.8	85.7	67.9	66.7
Occupation												
Farmer	18	86.1	72.2	55.6	78.4	80.9	31	11	87.3	88.5	67.2	71.2
Teacher	1	50.0	100.0	0.0	88.0	84.0	0	0	92.9	85.7	81.8	81.8
Other	7	85.7	100.0	42.9	75.4	78.9	7	6	81.6	85.7	67.5	70.1
Age (years)												
<20	1	100.0	100.0	0.0	52.0	72.0	0	2	42.9	85.7	63.6	54.5
20-29	4	87.5	100.0	75.0	76.0	75.0	6	1	83.9	80.4	65.9	68.2
30-39	5	80.0	90.0	60.0	79.2	83.6	7	4	88.6	88.6	67.3	81.8
40-49	9	83.3	77.8	44.4	80.4	77.8	13	8	89.7	87.3	68.7	65.7
50 up	7	85.7	64.3	42.9	78.9	84.6	12	2	86.7	91.8	68.8	75.3

## Appendix 1 continued

	<i>n</i>	Dependence on forest (%)	Access to information (%)	Worked with cifor (%)	Agreement (%)		Number of don't knows <sup>a</sup>		Agreement (%) Insider views		Agreement (%) other views	
					Before	After	Before	After	Before	After	Before	After
Non-study villages (all)	14	82.1	71.4	21.4	73.4	80.6	39	9	83.7	88.8	60.4	70.1
Ethnicity												
Punan	5	80.0	70.0	60.0	76.0	78.4	12	3	84.3	91.4	65.5	61.8
Other	9	83.3	72.2	0.0	72.0	81.8	27	6	83.3	87.3	57.6	74.7
Education												
Elmn. uncompl.	4	62.5	62.5	50.0	73.0	77.0	14	1	85.7	85.7	56.8	65.9
Elmn.	2	100.0	75.0	50.0	78.0	86.0	5	1	85.7	96.4	68.2	72.7
Jun. high	1	100.0	50.0	0.0	80.0	88.0	1	1	100.0	92.9	54.5	81.8
High school	4	75.0	100.0	0.0	82.0	87.0	4	2	91.1	91.1	70.5	81.8
University	1	100.0	100.0	0.0	80.0	84.0	0	0	85.7	92.9	72.7	72.7
Non-formal	2	100.0	25.0	0.0	46.0	64.0	15	4	53.6	78.6	36.4	45.5
Sex												
Men	7	85.7	78.6	14.3	73.7	81.1	18	7	84.7	89.8	59.7	70.1
Women	7	78.6	64.3	28.6	73.1	80.0	21	2	82.7	87.8	61.0	70.1
Occupation												
Farmer	10	85.0	65.0	20.0	69.6	77.6	35	7	82.1	86.4	53.6	66.4
Teacher	2	75.0	100.0	0.0	82.0	86.0	2	1	85.7	92.9	77.3	77.3
Other	2	75.0	75.0	50.0	84.0	90.0	2	1	89.3	96.4	77.3	81.8
Age (years)												
20–29	3	83.3	50.0	33.3	80.0	86.7	6	2	90.5	95.2	66.7	75.8
30–39	4	100.0	100.0	25.0	82.0	85.0	2	1	89.3	92.9	72.7	75.0
40–49	4	62.5	75.0	25.0	72.0	78.0	15	1	83.9	83.9	56.8	70.5
50 up	3	83.3	50.0	0.0	57.3	72.0	16	5	69.0	83.3	42.4	57.6
Town (all)	11	22.7	95.5	9.1	79.3	86.2	21	12	83.8	87.7	73.6	84.3
Ethnicity												
Other	11	22.7	95.5	9.1	79.3	86.2	21	12	83.8	87.7	73.6	84.3

Appendix 1 continued

	<i>n</i>	Dependence on forest (%)	Access to information (%)	Worked with wife (%)	Agreement (%)		Number of don't knows <sup>a</sup>		Agreement (%) Insider views		Agreement (%) other views	
					Before	After	Before	After	Before	After	Before	After
Education												
Jun. high	2	0.0	100.0	0.0	86.0	82.0	0	2	89.3	85.7	81.8	77.3
High school	2	0.0	100.0	0.0	72.0	76.0	5	6	78.6	82.1	63.6	68.2
University	7	35.7	92.9	14.3	79.4	90.3	16	4	83.7	89.8	74.0	90.9
Sex												
Men	8	25.0	93.8	12.5	79.0	87.5	16	7	85.7	88.4	70.5	86.4
Women	3	16.7	100.0	0.0	80.0	82.7	5	5	78.6	85.7	81.8	78.8
Occupation												
Gov. officer	6	25.0	91.7	16.7	77.3	88.0	14	8	83.3	89.3	63.9	79.2
Teacher	2	25.0	100.0	0.0	82.0	82.0	5	1	89.3	82.1	72.7	81.8
Other	3	16.7	100.0	0.0	81.3	85.3	2	3	81.0	88.1	81.8	81.8
Age (years)												
<20	2	0.0	100.0	0.0	86.0	82.0	0	2	89.3	85.7	81.8	77.3
20–29	4	25.0	87.5	25.0	79.0	89.0	6	4	76.8	89.3	81.8	88.6
30–39	3	50.0	100.0	0.0	77.3	94.7	12	1	92.9	95.2	57.6	93.9
40–49	1	0.0	100.0	0.0	84.0	72.0	1	1	85.7	71.4	81.8	72.7
50 up	1	0.0	100.0	0.0	68.0	72.0	2	4	71.4	78.6	63.6	63.6

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