

# Scoring the Importance of Tropical Forest Landscapes with Local People: Patterns and Insights

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**ABSTRACT** / Good natural resource management is scarce in many remote tropical regions. Improved management requires better local consultation, but accessing and understanding the preferences and concerns of stakeholders can be difficult. Scoring, where items are numerically related in relation to each other, is simple and seems appli-

cable even in situations where capacity and funds are limited, but managers rarely use such methods. Here we investigate scoring with seven indigenous communities threatened by forest loss in Kalimantan, Indonesia. We aimed to clarify the forest's multifaceted importance, using replication, cross-check exercises, and interviews. Results are sometimes surprising, but generally explained by additional investigation that sometimes provides new insights. The consistency of scoring results increases in line with community literacy and wealth. Various benefits and pitfalls are identified and examined. Aside from revealing and clarifying local preferences, scoring has unexplored potential as a quantitative technique. Scoring is an underappreciated management tool with wide potential.

Good natural resource management is scarce in many economically poor, but biologically rich tropical regions. Management choices often harm the welfare of local people as well as the environment. For example, timber concessions often operate with little regard for the needs and wishes of the local inhabitants (Sheil and others in press). A big part of the problem is that local people's views and aspirations are unknown and neglected. In contrast, the interests of economically powerful stakeholders such as timber concessionaires and oil-palm investors are well-known and well catered to by local governments. The outcome is frequently management that focuses on large-scale exploitation with negative consequences for local people's livelihoods and well-being. Such consequences are not planned—local managers, politicians, and regulators often regret such outcomes but are unsure how to avoid them. Although there is general agreement that community views and perceptions should be better understood, effectively assessing local views and preferences appears to be costly and difficult, and is not part of the management culture.

Scoring is a quick and inexpensive approach to fill this information gap. Such techniques are sometimes used in the context of rapid assessments [i.e., Rapid Rural Appraisal (RRA); Participatory Rural Appraisal (PRA)], but their reliability remains contested (Chambers and Guijt 1995). Outside of specific development projects, researchers and managers are rarely trained in such methods. Such neglect, and perhaps skepticism, means that scoring methods are seldom encountered in peer-reviewed studies of natural resource value in the tropics (e.g., Lynam and others 1994, Campbell and others 1997). It may be that these approaches are flawed and should be avoided. However, scoring—if sound—offers a simple but widely neglected means to answer important questions concerning human well-being, to improve local consultation, and to foster informed management. Given the need for such improved management, some assessment of scoring methods is much needed.

Scoring has known pitfalls. For example, understanding is not assured; numbers may imply an inappropriate precision; and judgment scales may be distorted (Nemarundwe and Richards 2002). However, such problems are not reason enough to discard an entire approach. Tape measures are useful even if people sometimes get them tangled; what we need is a way to recognize and avoid such tangles.

Scoring is by definition a quantitative procedure in that it results in numbers, but many practitioners, concerned by various problems both known and

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hypothetical (Abeyasekera 2001, Kanbur 2001), prefer to consider scoring a “qualitative” method. However, numbers (cardinal ratings or scores) are potentially more useful for assessing preferences than simple ordering (ordinal rankings). For example, results can be compiled and summarized in a logically consistent manner that is not possible in ordinal systems (Arrow 1951, Pettit and List 2002). Numbers appear more likely to carry weight with high-level decision makers, who are more usually concerned with financial data (Sheil and Wunder 2002). In addition, when handled appropriately, numbers can be analyzed for accuracy and precision.

Replication is one option for assessing scoring results. Another option is cross-checking (“triangulation”) (Chambers 1992). However, questions of preference and stated importance seldom allow assessment by strictly objective means. Like any quantitative method, scoring is more reliable if it is done carefully, is well replicated, and is thoroughly evaluated, yet to be practical in the field, it will continue to be done quickly and under poorly controlled conditions. Still, this weakness is also a strength: the method is flexible, easy to grasp, quick, and inexpensive. So how reliable is it?

PRA and RRA methods (including scoring) have been subjected to various critiques, most of which emphasize political and epistemological concerns (e.g., Kanbur 2001, Ruggeri Laderchi 2001). Our concerns are narrower: we consider scoring as a means to improve communication between local communities and naïve researchers (ourselves, as potential “managers”). We also consider its *potential* to lead to better-informed management. We do not dwell on how managers might choose to use such understanding. Communication with local stakeholders is generally recognized as desirable even if suitable responses are contested (Ruggeri Laderchi 2001).

Here we investigate scoring exercises using replication, “cross-check” scoring exercises, and interviews. These activities were undertaken with indigenous people in East Kalimantan (Indonesian Borneo). Our scoring exercises were developed to assess how local people perceived the importance of various environments and resources (Sheil and others 2003a, 2003b).

We assumed that *importance* could be expressed as a holistic rating of relative preferences without any assumed relation to financial or easily defined economic characteristics. We focused on a linked suite of scoring exercises to assess both their consistency and their capacity to provide new insights. We also identified what makes consistent results more likely and

how scoring reveals insights and clarifies understandings. So, does scoring offer hope that managers can gain useful insights regarding local views and preferences?

## Methods

### Research Area, People, and Communication

The Upper Malinau Valley, Malinau District, in East Kalimantan is a rugged and sparsely populated tropical forest landscape with considerable conservation significance. Rural population densities are low (often less than 1 person per km<sup>2</sup>). Primary forest dominates the landscape, with localized patches of swidden (shifting) cultivation and secondary regrowth. The valley has been divided into traditional claims, although previous governments have allocated most of the area to timber concessions (Sellato 2001, Sheil 2002).

Headhunting and warfare were prohibited in the early 20th century under Dutch colonial rule. Christianity has been widely practiced since the 1960s, although many traditional taboos remain. Settlements are exclusively riverside villages. The recent devolution of power to the district level now gives local authorities more power over land-use decisions (Barr and others 2001) and local conditions are changing rapidly. Ethnic identities remain strong, but are increasingly exposed to outside influences through trade, a cash economy, education, and even television.

We worked with seven communities (Table 1) from the Merap and Punan ethnic groups. The Merap have long cultivated rice, whereas the Punan specialized in forest extractive activities and were traditionally semi-nomadic. Past governments generally neglected these communities, although there was some effort to settle the nomadic Punan and encourage them to farm (Sellato 2001). Various local languages are spoken. Most people less than 30 years old can speak Indonesian, but working with older people sometimes requires translators. Few older people can read and write, especially in some communities. Shame deriving from regional and national prejudice about “primitive” forest lifestyles further stifles communication (Sheil and others 2003b).

This study is part of a larger project using various methods to clarify “what is important” to local communities and to clarify links with local biodiversity. Efforts were made to introduce and explain our goals to each community. Teams involved Indonesians from various backgrounds, including NGOs and government as well as foreign researchers. Efforts were made to informally interact with, and relate to, the communities during the research period, and a significant degree of

Table 1. Villages surveyed

Name of village	Traditional territory (km <sup>2</sup> )	Households	Population	Inhabitants per km <sup>2</sup>	Ethnicity	Number and type of scoring groups
Gong Solok I	324 <sup>a</sup>	44	208 <sup>a</sup>	0.64 <sup>a</sup>	Merap	4: M,W,Y,O
Paya Seturan	22 <sup>b</sup>	13	116	7.05 <sup>a</sup>	Merap	4: M,W,Y,O
Punan Rian	22 <sup>b</sup>	9	39		Punan	2: M,W
Langap	469	99	415	0.88	Merap	4: M,W,Y,O
Laban Nyarit	256	29	138	0.54	Merap & Punan	4: each M,W
Liu Mutai	370	11	53	0.14	Punan	4: M,W,Y,O
Long Jalan	748	31	114	0.15	Punan	4: M,W,Y,O

<sup>a</sup>Gong Solok I disputes territory with Gong Solok II.

<sup>b</sup>A shared territory, although both of these communities actually use much larger areas.

M = Men, W = Women, Y = Young (16–34 yrs), O = Old (>35 yrs).

Table 2. Categories of landscape area

Landscape elements	Definition
Village	Human habitation and immediate surroundings
Old village	Abandoned villages and immediate surroundings
Garden	Areas planted with perennial crops
River/lake	Water bodies
Swamp	Areas of wet, flooded, or seasonally flooded ground
Cultivation	Areas under annual crops
Young fallow	Areas abandoned <5 years after cultivation
Old fallow	Areas abandoned >5 years after cultivation
Forest	Areas of tree cover other than fallows and gardens

Table 3. Categories of importance

Category	Agreed definition
Food	Primary and secondary foods; famine foods
Medicine	Medicinal and health-related
Light construction	For building huts, forest camp structures, fences
Heavy construction	For building houses
Boat construction	For making boats (not including oars or punting poles)
Tools	Tools in agriculture, hunting, boating; includes blowpipes, spears, oars, punting poles, rice ponders, tool handles
Firewood	Fuel
Basketry/cordage	For weaving or tying
Ornamentation/ritual	Used in ceremony, dress, jewelry, decoration
Marketable items	Products that are sold for cash
Hunting function	Poisons, bait, gums used to catch animal prey
Hunting place	Indirect as benefiting hunting location, usually when fruiting
Recreation, toys, fun	For entertainment or play
The future	General (not explained in detail)

trust was established. Further contextual information is provided elsewhere (Sheil 2002, Sheil and others 2003a, 2003b, in press, Basuki and Sheil 2005, Liswanti and others 2004).

#### Landscape Classes and Importance

Working first in two communities (one Merap, one Punan), we developed and refined a simple list of the

main landscape classes and a list of “value” types contributing to the landscape’s importance (Tables 2 and 3). It should be stressed these lists are the product of an initial iterative process between the researchers and the communities. Although we could have revised the classification with each community, we chose to use a fixed approach because it allowed systematic comparison and evaluation. All seven

Table 4. An example of three scoring exercises (A, B, C) by women &gt;35 years old in Long Jalan

	Village	Old village	Garden	River/lake	Swamp	Cultivation	Young fallow	Old fallow	Forest	Forest current time (C) <sup>c</sup>
All/overall importance (A) <sup>a</sup>	20	7	13	5	10	9	9	5	22	
Category of importance (B) <sup>b</sup>										
Food	9	7	10	9	7	9	9	9	31	10
Medicines	46								54	5
Light construction								45	55	4
Heavy construction									100	11
Boat									100	8
Tools	17								20	5
Firewood				31		28		20	21	9
Basketry/cordage							39		61	8
Ornamentation/ritual				46					54	9
Marketable items	18		19	11		20			32	9
Hunting function	40								60	6
Hunting place				39					61	4
Recreation	37			29		34				4
Future	22		8	12	9	9		11	29	8

<sup>a</sup>A is the overall scoring of different land types.

<sup>b</sup>B is the scoring of different classes of importance.

<sup>c</sup>C is the scoring of current forest importance.

N.B. for A and B the rows add to 100, for C the column adds to 100.

communities found the final terms and their definitions acceptable.

#### The Scoring Exercises

In each village, we assembled four groups of six or seven individuals each (although in practice the numbers sometimes dropped as low as four). These were determined by gender, ethnic group, and age (older or younger than 35 years). In Rian, the small population allowed only two groups (men and women). In mixed-ethnicity Laban Nyarit, division was by ethnic group and gender. Respondents received a small payment for their time. Translators, where needed, were drawn from the village.

We sought to avoid confusing monetary value with importance. For example, we avoided words such as “price/cost,” “fee,” “cash,” “expensive,” “cheap” (in Indonesian: *harga*, *ongkos*, *uang*, *mahal*, *murah*), but we emphasized concepts of “general value” (*nilai*), “usefulness” (*manfaat*), and “importance” (*penting*).

There were three main scoring exercises (A, B, C, see also Table 4). A is the exercise of overall importance across different landscape types. B scores these landscape types by each of 14 importance categories. C considers only forest and scores the relative contribution of each importance category to overall importance.

Each set of exercises followed a fixed procedure. One by one, the facilitator introduced the cards for

scoring and laid them on the floor. Each card showed a written label in the local language, and usually a picture symbolizing the aspect to be scored, such as the landscape type. One hundred counters (seeds, buttons, or matches) were piled in the middle and the exercise was explained. A facilitator would demonstrate three or more times how the counters could be distributed and what that implied, emphasizing quantitative relationships. Each card’s meaning was then repeated and the group was invited to distribute the counters among the cards in proportion to their “importance.”

The respondents worked as a team. Sometimes they disagreed and discussions arose. The facilitator did not usually intervene, unless a card-title or the exercise itself needed clarification. Facilitators sought responses from quiet group members. The general mood was invariably concentrated and light-hearted; disputes were always resolved with good humor.

When the initial round was finished and all the counters were allocated, a facilitator read the title on each card again, and then asked each team member if the piles of counters were all right. Often this started a new round of minor changes. When agreement was reached, the scores for each card were counted and recorded. Interviews regarding the scores were conducted after, never during, the exercise.

### Analysis of Consistency

These data allow several analytical approaches. We developed a direct cross-checking approach based on predicting the result of one exercise from the others. Namely, we developed ways to compare overall importance across different landscape types as scored during the exercise A (we call this result **A**), and to compare it to a derived result expressing the same concepts but based on B and C (we call these results **B** and **C**). This indirect result we call **A'** and we can compare it directly with **A**. Example results from the three scoring exercises **A**, **B**, and **C** are given in Table 4.

Here we introduce specific notation to describe the analyses precisely. **A**, the scored overall importance by different landscape types (*i*), is represented by the individual scores or “elements”  $\{A_i\}$ . **B** (actually a series of 14 subexercises) scores these landscape types by specific importance categories (*j*) to give a matrix composed of elements  $\{B_{ij}\}$ . **C** scores across the current stated importance of these same categories in primary forest only (*vertical* in Table 4) to give a series of elements  $\{C_{\text{forest}, j}\}$ .

We start by assuming the following:

- 1) “overall importance” can be divided into, and arithmetically summed from, suitable “categories of importance”;
- 2) Table 2 provides a good approximation of such categories (i.e., more-or-less everything that matters without significant overlap); and
- 3) the participants understand the scoring process and are giving meaningful numerical answers (cardinal ratings). If our assumptions hold, we can predict **A** from elements in **B** and **C**. We call this prediction of **A**, **A'**. Our evaluations will be based on comparing the actual scores (**A**) with the predicted scores (**A'**). The prediction, **A'**, is composed of elements  $\{A'_i\}$  and is generated in a series of simple steps. **C** provides per-category weightings. Using these, the elements in **B** can each be weighted to give an overall consistent relative score across these classes matching **C** (for forest). These values are then summed per landscape class and rescaled to add up to 100. This result is **A'**. These calculations are individually simple, but we found it convenient to automate them in a spreadsheet. More specifically, the key steps are as follows: as long as  $B_{\text{forest}, j}$  stays  $>0$ , we can derive a weighting  $X_j$  per value category where  $X_j = C_{\text{forest}, j} / B_{\text{forest}, j}$ . Applying this to every term in **B**, and dividing each term by the total sum of these intermediate terms and multiplying by 100, gives **B\***. **B\*** is composed of

elements  $\{B_{ij}^*\}$ , where  $B_{ij}^* = 100 B_{ij} X_j / (\sum_i \sum_j B_{ij} X_j)$ . Adding the sum importance of each landscape type, *i*, we have **A'** to compare with **A**, i.e.,  $\{A'_i\} = \{\sum_j B_{ij}^*\}$ .

If our results are meaningful, we expect the patterns of **A** versus **A'** to show consistency, i.e., to reveal similar patterns of relative importance. Although some commentators feel that a  $\chi^2$  approach is suited, it is invalid because counts of this type are not independent. Consistency is instead measured with Pearson's correlation coefficient (Sokal and Rohlf 1995; N.B.: Because the sum of elements in **A** and **A'** are bounded, *df* should be reduced by 1, but we ignore this for simplicity). Consistency is also evaluated with a measure of deviation,  $\underline{d}$ . This is a “root-mean-square” measure of difference among the equivalent category elements in **A** and **A'**,

$$\underline{d} = \sqrt{\frac{\sum_i (A_i - A'_i)^2}{n - 1}}$$

where *n* is the total number of items scored (here land types) and values range from 0 to  $100/(n - 1)$ . Unlike correlation,  $\underline{d}$  considers only the magnitude of the differences between the **A** and **A'** elements and not their relative scaling within **A** or **A'**, and is thus better able to assess consistency if all items are rated near equal.

### Educational Level and Community Wealth

We suspected that results would become more numerically consistent in line with the participants' understanding and ability to express themselves. We thus hypothesized that factors potentially linked to literacy, numeracy, and proficiency in Indonesian would improve results and—we predicted—these factors would be associated with formal education (schooling) and informal education (which may be related to community wealth). Ethnic identities are not independent of these factors: Punan have often shunned education, or had no access, so few older people have had much education, and some think it unimportant; even as this is changing, it may influence overall community performance.

Using the schooling records for villagers aged 12 and up, we calculated the education level in each village (total educated people divided by total people), based on our own 100% census (year 1999–2000). Village wealth was estimated from our own inventory of capital assets per household. We classed televisions, radio-cassette players, ceramic jars, rice-husking machines, and sewing machines as “luxury items.” We excluded chainsaws, generators, boat en-

Table 5. Total scores by land type for all seven communities

Village <sup>a</sup>	GS	PS	Lg	LN	PR	LM	LJ
Ethnicity <sup>b</sup>	m	m	m	m/p	p	p	p
N, n	(4,24)	(4,23)	(4,22)	(4,19)	(2,10)	(4,17)	(4,24)
Village	12	8.5	12.3	11.3	14	12	19
Old village site	5.3	3.8	5.8	5.8	7.5	5.8	7.3
Garden	15	12.8	9	9.8	10	15	8.5
River	12	16.5	9	12	17	12.5	14.8
Marsh/swamp	4.8	12.3	9.3	9	7	3	6.5
Cultivation	17.8	15.3	12.3	11.5	14	15.5	8.5
Young fallow	7	5	6.3	7.3	8.5	6.5	5.8
Old fallow	6.8	6.8	10.8	11.5	6	7.5	6.5
Forest	<b>19.5</b>	<b>19.3</b>	<b>25.5</b>	<b>22</b>	<b>16</b>	<b>22.3</b>	<b>23.3</b>
Total	100	100	100	100	100	100	100

<sup>a</sup>GS = Gong Solok, PS = Paya Seturan, Lg = Langap, LN = Laban Nyarit, PR = Punan Rian; LM = Liu Mutai, LJ = Long Jalan.

<sup>b</sup>m = Merap, p = Punan.

<sup>c</sup>N, n = mean of N separate group exercises involving a total of n individuals.

gines, or canoes because these reflect livelihood activities and village accessibility. We estimated a mean price for each item type, multiplied by the quantities per village and calculated the village score as a mean value per household.

## Results

### Overview of Scoring Patterns

In the overall importance of land types, “forest” gets the highest score in every case except one (Punan Rian, the poorest replicated result,  $n = 2$ ), and even in that case it is close (Table 5).

We can examine the probability that such scoring patterns might arise by random (e.g., if people did not understand the exercises). If each class is equally likely to be scored top, the probability of any one being top is  $1/9$ ; the odds of this happening by chance six times out of seven is very small (around  $2 \times 10^{-7}$  by binomial probability). More importantly, in any discussions the communities confirm “forest” as the most important land type because so much can be taken and derived from forests. However, rivers, cultivated land, and village areas also score highly, and all land types still have some value. We noted that these weightings do depend on accessibility: swamps, for example, are more likely to be highly valued if they occur nearby.

So, the overall rankings appear meaningful to some degree, but how meaningful? Measures of consistency help us gauge whether respondents understand and use the process in a manner consistent with our assumptions.

### Consistency Within Groups

Plotting **A** versus **A'** for the mean scoring data (**A**, **B**, **C**) for each community (see Methods section) suggests

some degree of consistency (Figure 1). In both **A** and **A'**, “forest” is the most valuable land type (except **A** for Punan Rian); in some cases the magnitude is considerable. The forest value in **A'** is always higher than for **A**, in some cases by nearly 100% (Long Jalan and Liu Mutai), whereas other categories such as village land show the opposite trend. The degree of difference between **A'** and **A** for most land types is marked. Deviations,  $d$ , are low and six correlations are significant (Table 6).

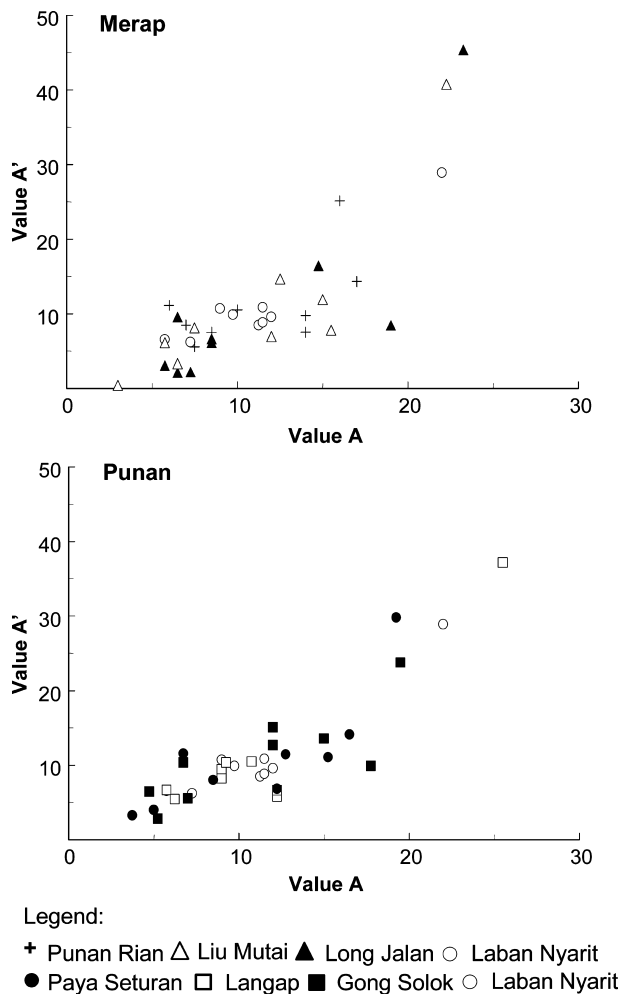
### Is Consistency Predictable?

We looked at the relationship between our measures of consistency and community levels of formal education, and household wealth (Table 6). The weakest correlations occur in communities owning few luxury items. The overall pattern indicates that the likelihood of consistent scoring results (correlation rises and deviation declines) increases with community-level measures of formal education and of wealth. Merap communities are generally ahead of Punan.

### Errors and Insights

Can scoring exercises provide new insights? Sometimes results appear strange. After the scoring is completed, odd results can be queried and explanations can be sought. If the fault lies in simple error or oversight, the explanations would not be particularly interesting, but this is seldom the case.

Most Borneo people gather medicinal plants from fallows and other sites (Colfer and others 1997). Now consider the medicinal-importance category in Table 4. It is surprising to find no medicinal values outside the forest and village. However, when asked, these Punan women confirmed that they indeed only gather medicinal plants from the forest or grow them



**Figure 1.** Actual versus predicted summary values for major landscape unit (A and A'; see text) in the (top) Merap and (bottom) Punan villages. Note X and Y scales are not equal.

near their homes. This community has only recently and half-heartedly adopted cultivation, and the vegetation in fallows remains relatively unfamiliar.

In another example, several villages rated the river highly for fuel despite the limited woody cover on the banks. However, it was readily explained, and confirmed by observation, that washed-up dry wood, suitable for firewood, was abundant. Similarly, cultivated land scored a “hunting function,” which was surprising until we learned that some Punan planted cassava and other crops not simply as food crops but primarily to attract wild game.

Scoring can highlight genuine inconsistencies. Young men in Long Jalan, the most remote and forest-rich community in our survey, gave an “overall importance” score of zero to cultivated land but gave it

“12” for the category “food.” The inconsistency was easily explained: these men spend long periods away from their families in the forest, searching for a valued resin called *gaharu*, a product of fungus-infected eagle wood (*Aquilaria* spp.). This *gaharu* is then traded for rice. Although these men help clear fields for cultivation, they feel little personal reliance on the crops because they rely on wild foods in the forest. The cultivated land’s value is not “as food” but as “security for their families” while they are away—a distinction that leads to the scoring contradiction.

Narrowly defined questions and more holistic judgments are different. Scoring “overall importance” seems to invite a cautious response—a fear of over-looking and thus undervaluing any aspect. To explore this idea further, we examined scoring in the “future” category. Like the “overall” category, “future” is a holistic and fuzzy class, and we would not expect to see zeros as often as in clear, narrowly defined classes. This expectation is confirmed in Table 7. After the category “overall” (eight zeros), and the genuinely broad category “food” (10), the category “future” (37) has the fewest zero responses. This table is also striking for emphasizing how many different resources and services occur in each land type: forest has some importance in all categories for most groups in all communities.

These cases, and many more, lead us to observe that although the scoring exercises may sometimes be confusing, results can always be explained. Many cases give new insights and help to refine understanding and improve communications. (Note that relevant themes from additional management relevant cases and their management implications are discussed in Sheil and others 2003b and in press). Of course, even results confirming expectations should be viewed as useful corroboration.

## Discussion

### The Importance of Malinau’s Forests

The forest is important for its products and land, as well as for less tangible reasons. The scoring exercises suggest that Merap people value forest primarily for heavy construction (i.e., house building), boat construction materials, and tools, whereas Punan people highlight basketry (i.e., rattan), as well as heavy construction and boat-building materials. In discussion, some Langap people noted areas with birds’ nests, which are a prized and lucrative soup ingredient traded throughout Southeast Asia. Liu Mutai and Long Jalan people also emphasized wild foods.

Table 6. Mean value summary of community wealth, education, deviation, and Pearson's correlation coefficient for seven villages

Villages	Ethnicity	Value of luxury Items/household (x Rp1000)	Education %	A to A'	
				Deviation	Correlation
Langap	M	588	89.3	1.829	0.915
Gong Solok	M	587	75.8	1.346	0.795
Paya Seturan	M	157	76.7	1.722	0.794
Laban Nyarit	M/P	472	63.5	1.070	0.936
Liu Mutai	P	290	10.7	2.382	0.839
Long Jalan	P	175	23.1	3.243	0.818
Punan Rian	P	0	35.0	1.694	0.585

M = Merap, P = Punan.

Table 7. Number of "zero" responses among all 26 respondent groups

Important of use category	Village	Old village	Garden	River/lake	Swamp	Cultivation	Young fallow	Old fallow	Forest	Total
All /overall importance	0	1	1	0	2	1	2	1	0	8
Food	0	1	0	0	5	0	2	2	0	10
Medicines	1	10	6	3	9	14	11	5	0	59
Light construction	20	13	16	9	10	20	21	0	0	109
Heavy construction	21	22	24	15	11	23	23	16	0	155
Boat	24	23	25	17	13	23	24	19	0	168
Tools	22	19	25	12	13	24	21	10	0	146
Firewood	22	17	7	0	13	1	4	1	0	65
Basketry/cordage	20	16	19	7	12	23	20	3	0	120
Ornamentation/ritual	7	15	8	3	17	24	17	5	0	96
Marketable items	5	8	1	0	12	1	16	17	0	60
Hunting function	15	13	17	12	16	21	22	7	0	123
Hunting place	25	10	10	2	9	10	10	2	0	78
Recreation	6	20	9	0	21	6	25	19	3	109
Future	2	10	0	4	9	2	7	2	1	37
Total 0s	190	198	168	84	172	193	225	109	4	

The forest's status is changing. Paya Seturan and Gong Solok noted that clearing land for cultivation allows them to gain recognized ownership at a time when national and local governments are disputing tenure over larger village territories. Many informants explained that logging and coal mining have reduced forest access and that many valued resources are declining. Rapid change accentuates a genuine feeling of uncertainty, leading to some difficulty in evaluating diverse concerns. It is hard for anyone to give rational and consistent answers when asked to weigh components of their livelihoods and well-being in such fluid social and environmental circumstances. For example, if we ask whether forest will be important in the future, the answer depends not only on prefer-

ences, but also on a judgment about future accessibility and status.

The consistent differences between elements of **A** and **A'** raise questions about bias and assumptions. Why is "forest" more important when scored and summed across value categories than when scored once for "overall importance"? The differences may reflect the following:

- a bias towards forest products in our selection of basic categories;
- multiple counting (e.g., values associated with hunted food);
- the omission of certain key values; or simply
- caution with overall general questions.

Although some products are hard to classify unambiguously (e.g., medicines for dogs), these appear relatively minor and discussion with the communities failed to identify significant exclusions. The value categories we use emphasize tangible “product-based” values. We suspect that less tangible emotional factors—a sense of place, preference for “home,” and a sense of belonging—are relevant, and may have been omitted, but this has not yet been investigated and additional work on this topic is required. The main result from our discussions with the communities was to infer that the summed scores,  $A'$ , based on narrower, more specific questions, may be the truest reflection of relative importance, at least when more easily expressed tangible values are considered.

It is impossible to answer how “meaningful” scoring is or can be. Ultimately the question is metaphysical. This is not a specific weakness of scoring: any efforts to assess nonmarket values can suffer from such concerns. Certainly the role of intangible factors should not be neglected, but suitable means to assess such issues may lie beyond the realms of what we view as “management ready” approaches (Goldstein and Hogarth 1997). Nonetheless, our measures of consistency provide a partial surrogate for “meaning” by explicitly indicating whether respondents understand and use the process in a manner consistent with our assumptions.

#### Scoring Methods

There are alternatives to simple scoring, such as paired comparison techniques (Saaty 1996, Schmoltdt and others 2001), but these do not avoid the main pitfalls of scoring and have additional problems, especially when used with those lacking a “conventional” Western education. Indeed, our provisional evaluation of paired comparison with local communities in Malinau found them unworkable, in part due to linguistic barriers and the necessary understanding of what was required (CIFOR unpublished results). Although we are optimistic about future methods deriving from clearer conceptual models of how values and judgments are formed (e.g., Lockwood 1999), scoring seems a simpler and more transparent method when working across cultures.

Scoring helps to integrate local views into assessments involving data and information from other sources and methods. Ultimately these exercises have two distinct, but important benefits:

- 1) as easy short-cuts to asking specific and sometimes insightful questions;
- 2) as a means to assess the relative magnitude of what people find important, especially when these

preferences have been underestimated or unrecognized.

The numbers are uncertain but they appear to be the best available; they will frequently be more valuable than vague qualitative statements as long as the uncertainties are not glossed over. Further work is needed to examine the nature of biases arising in scoring exercises, and whether they can be reduced: for example, how the definition and division of categories might distort the overall scores, and how context influences scoring.

We already see that the best questions are narrow and clearly defined. This may seem a truism, but it is a pertinent one. Broad fuzzy questions tend to get broad fuzzy answers. The scores that examine narrow individual value classes tend to be more useful. The appearance of zeros, for example, is a very clear statement that certain values simply do not apply to some locations. Although we have focused on a very limited set of predefined exercises, we must stress that this limitation is artificial. A user can adapt classes and values with their respondents to fit their needs; detailed information can be sought. For example, other exercises have allowed us to quickly identify and score the most important wild species in each value category for all the communities we worked with. Consistent scoring appears also to be more likely if respondents have some education, but even uneducated respondents can provide apparently meaningful numbers if sufficient care is taken.

#### The Bigger Picture

We have shown that seven communities, including some that are generally viewed as cultivators, have a profound and strong relationship with tropical forests. Forests are important to these people for various reasons, including some with significance beyond our knowledge. The scoring exercises, coupled with discussions, interviews, and other investigations, have helped clarify these reasons. We see that forest loss and degradation seem likely to continue to severely impact these people’s livelihoods and well-being.

These concerns need to be addressed. Our scoring exercises encouraged the communities to reflect on and articulate what they regarded as important. Respondents were surprisingly appreciative of the interactions, pleased that after decades of “feeling invisible,” outsiders were finally seeking out and valuing their opinions. Some villagers also said the exercises were helpful because they needed to learn how to articulate their wants and concerns better, especially to outsiders, and to discuss their preferences among

themselves to present a coherent viewpoint. Although these people already knew what was important from their own perspective, the formal assessment process delivered a sense of “validation.” We have recently mounted a publicity campaign in our study area to communicate the forest’s local significance back to all local stakeholders. We hope this will promote a wider appreciation of the local costs entailed by forest loss, and encourage better, more informed land-use decisions and improved management.

Scoring methods are simple and do not require significant resources or training to apply and understand. Complex analyses are not required to gain understanding and yield insights. Given the local costs of current practices in many regions of the world, the need for more effective local consultation and involvement is hard to overstate but the situation is unlikely to change while managers remain unaware of what scoring approaches can offer. Scoring and cross-checks such as we have used are useful as an initial means to seek and assess stakeholder input in regions where such input has been lacking.

Scoring is an underrated management tool with wide potential to improve local consultation and thus guide managers to improved management. Aside from revealing and clarifying local preferences, scoring has unexplored potential as a quantitative technique. It would appear that a valuable and widely applicable approach has been unjustly neglected. We advocate its wider use and investigation.

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