



Assessment of Human Well-Being under Co-Management Initiatives in Chunati Wildlife Sanctuary

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Abstract

Forests render both a home and a livelihood for people living in and around them. To reconcile the needs of local communities with conservation, the Nishorgo Support Project is supporting co-management in five protected areas of Bangladesh, including Chunati Wildlife Sanctuary. In these protected areas, the assessment of human well-being is of central concern. This study seeks to assess the well-being of three main groups of stakeholders (collectors, betel-leaf cultivators, and forest villagers) participating in the co-management activities of the Nishorgo Support Project in Chunati Wildlife Sanctuary by answering three fundamental questions: (1) "Is co-management effective in promoting maintenance of and access to resources?" (2) "Do forest actors enjoy a reasonable share of the economic benefits derived from forests?" and (3) "Do people link their own and their children's future with the management of forest resources?" Various frameworks have been formulated to assess human well-being. This study employs a set of methods developed by the Center for International Forestry Research to assess three main areas of well-being: (1) intergenerational access to resources; (2) means and rights to manage forests; and (3) health of forests, forest actors, and their cultures. Findings reveal that intergenerational access to resources is not ensured, though stakeholders have clearly acknowledged rights and means to manage forests. In addition, local stakeholder groups do not seem to have serious conflicts within and among themselves. Despite these and other promising results from co-management, it is evident that human well-being is being compromised in Chunati Wildlife Sanctuary. I conclude that Nishorgo's conservation efforts will only succeed if local people can truly benefit, thereby ensuring their well-being. In this regard, Nishorgo's initiatives to establish and ensure the full functioning of Co-management Councils and Committees can play a momentous role.

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Introduction

Forests render both a home and a livelihood for people living in and around them. They can serve as vital safety nets, aiding rural people to rise out of poverty (Sunderlin *et al.* 2003). An intricate relationship exists between forests and people, especially surrounding protected areas (Sayer 2000), and cooperation among stakeholders is likely the only way that sustainable forest management can be achieved. Therefore, in protected areas (PAs) where collaborative management (co-management) is being implemented, the assessment of human well-being is of central concern. There have been many formulations and definitions of human well-being (Alkire 2002). Furthermore, the concept of well-being is relative to a specific socio-cultural and geographical context, and can change with time, according to what people value being and doing. The Millennium Ecosystem Assessment (2003) provided a broad definition of well-being, which focuses on social, physical, mental, and spiritual aspects, and characterized well-being as a situation-dependent state. Lamb (2003) refers to human well-being as a measure of ecosystem services.

Well-being is multidimensional, dynamic, complex and context-dependent (Narayan *et al.* 2000a; Narayan *et al.* 2000b). Colfer *et al.* (1995) define well-being according to four dimensions: (1) security and sufficiency of access to resources; (2) incorporation into a network of other human beings who participate in a common cultural system; (3) justice; and (4) health and safety. Later, Colfer *et al.* (1999a) expanded this definition to include intergenerational access to resources; means and right to manage resources; and health of forests, forest actors, and cultures. Finally, Colfer *et al.* (2001) explained human well-being as an aggregation of security and sufficiency of access to resources now and in the future, economic opportunity, decision-making opportunity, heritage and identity, justice, and health and safety. This study uses these definitions provided by Colfer *et al.* (1999a, 2001) to delineate a conceptual framework that places human well-being within the context of sustainable forest management. Due to an increased focus on human well-being, the management of PAs has undergone a shift from the traditional 'blueprint' paradigm to a more collaborative and participatory approach. The Nishorgo Support Project (NSP or Nishorgo) has initiated co-management in five PAs of Bangladesh, with the aim of assisting local people to improve their



livelihoods, through greater access to and control over local forest resources. This entails addressing longstanding inequities in forest management, especially with regard to state land. Thus, co-management is increasingly seen as a tool for empowerment and promoting social justice, especially where inequities are blatant. Mayers *et al.* (2005) defined co-management as “the equitable access to resources and the benefits of management activities usually carried out through [a] collaborative approach that improves human well-being”.

Various frameworks have been formulated to assess human well-being within the context of environmental conservation (Millennium Ecosystem Assessment 2005; Moiseev *et al.* 2002; Prescott-Allen 2001). The Center for International Forestry Research (CIFOR) has developed a set of methods to measure the well-being of forest-dependent stakeholders based on results from systematic studies in Cameroon, Indonesia, and Brazil, and supplementary work in Thailand, Gabon, and the United States (Colfer *et al.* 1999a). These methods assess three main areas of well-being: (1) intergenerational access to resources; (2) means and rights to manage resources; and (3) health of forests, forest actors, and cultures. This case study uses the CIFOR methods (Colfer *et al.* 1999a; Colfer *et al.* 1999b; Salim *et al.* 1999) to assess the well-being of three groups of stakeholders – collectors, betel-leaf cultivators, and forest villagers – participating in the co-management activities of NSP in Chunati Wildlife Sanctuary (CWS). As such, it provides a baseline for future research, by facilitating comparison of future and current human well-being, and seeks to guide policy-makers – in international, regional and local organizations (especially the NSP implementing body) – and researchers working on human well-being issues in the context of PA management. The results of this study suggest that human well-being is being compromised in CWS.

Background

Site description

CWS was declared a PA in 1986. The area covers about 7,763 ha (NSP 2006) in two Forest Ranges (Jaldi and Chunati) under the Chittagong Wildlife and Nature Conservation Division. These ranges are divided into seven Forest Beats. The Chittagong–Cox’s Bazaar Highway crosses the eastern part of the sanctuary.

Figure 1 shows the location of the sanctuary and its land-use patterns. CWS belongs to the Tropical Evergreen and Semi-Evergreen Forest Biogeographic Zone, representative of the biodiversity of the northeastern subcontinent, with hilly to mountainous areas ranging from 30–90 meters in elevation (Mollah *et al.* 2004). Since its establishment, Chunati has seen more research activity and positive attention than any other PA in the country. At present, there is little natural forest left, with only a few scattered patches of Garjan (*Dipterocarpus spp.*). Since designation as a PA, CWS has become substantially degraded due to heavy human interference. Many low-lying areas and valleys have been converted to paddy cultivation (Mollah *et al.* 2004). The management plan for CWS identified a 5-kilometer-wide landscape (buffer) zone around the sanctuary (NSP 2006). Vast areas of paddy lands and settlements are found throughout the sanctuary and the adjacent reserve forest. Most of the local population uses forests to meet their consumption and income needs.

Stakeholders and their livelihoods

There are 70 settlements (paras) with approximately 7,810 households located in and around the sanctuary (Mollah *et al.* 2004). Nearly half (48%) of these households are situated inside the sanctuary and the rest are located adjacent to or near the sanctuary. About 64% of the households are extremely poor and the rest are either poor or middle class (Mollah *et al.* 2004). On average, 40% of the households are landless and 30% are unemployed. Nearly three-fourth of the total inhabitants depend on CWS for the collection of various primary forest products (ibid). Mollah *et al.* (2004) identified 24 categories of stakeholders, including 19 primary groups and 5 secondary groups, with an interest in the sanctuary. Fuelwood collectors, bamboo collectors, betel-leaf cultivators, and land encroachers were among the primary stakeholders. According to the local people and Forest Department (FD) staff, about 6,000 people (30% of the households) living in and around the park are involved in betel-leaf cultivation (Mollah *et al.* 2004). As a result of this and other activities, human pressure on the forests is quite high. This heavy dependence on forests and forest land has resulted in an active opposition by local people to wildlife conservation efforts.

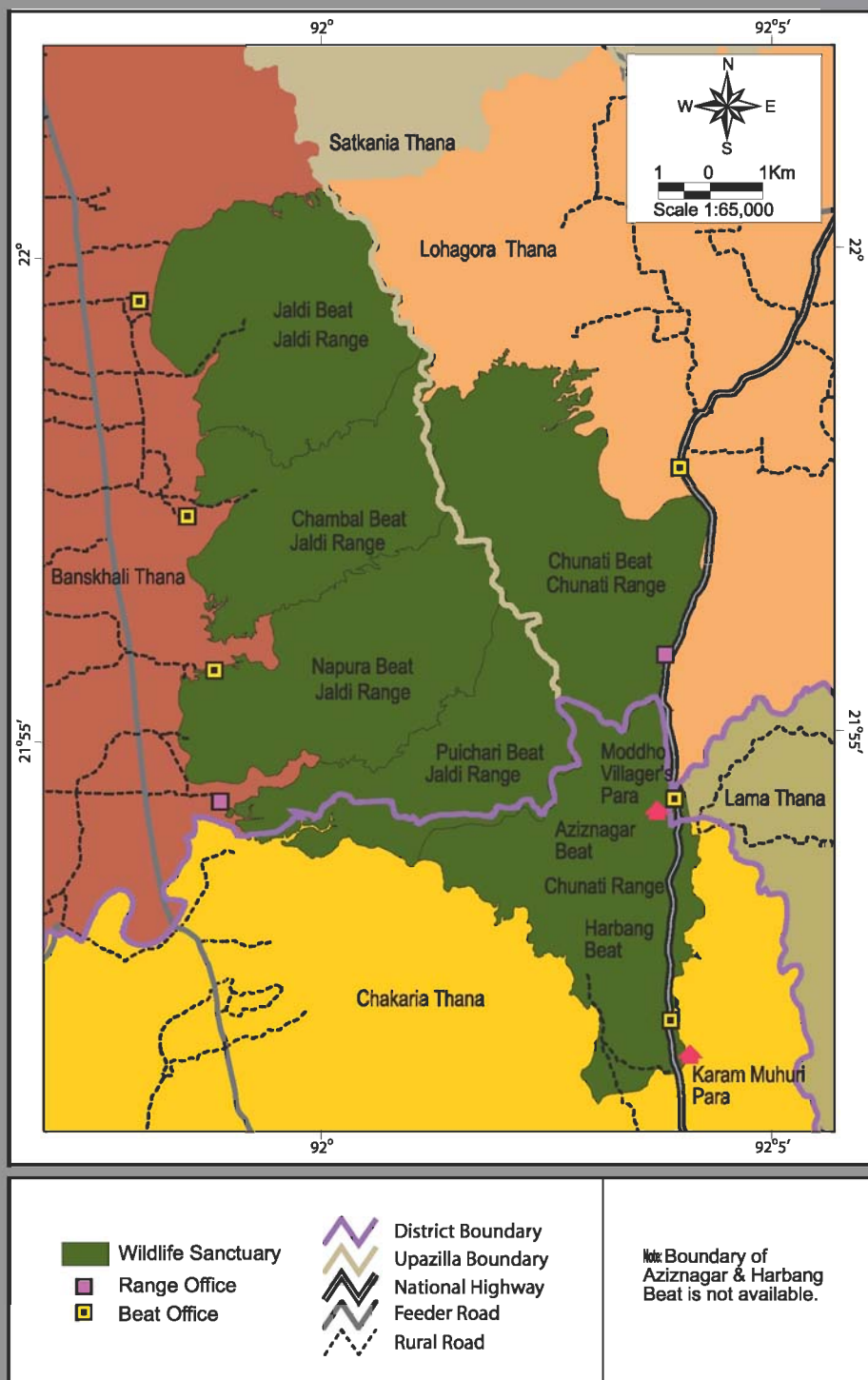


Figure 1: Map of Chunati Wildlife Sanctuary with resources, buffer zone and sample areas

Co-management institutions

Nishorgo, a partnership between the FD and the United States Agency for International Development, is responsible for introducing co-management in the area surrounding CWS and other PAs of Bangladesh. The local entities responsible for carrying out co-management are the Co-management Councils (Councils) and the Co-Management Committees (Committees). Nishorgo has assisted in forming two Councils and two Committees in CWS (one each in Chunar and Jaldi, respectively). The Council and the Committee are comprised of representatives from civil society groups, local administrators, people from local villages, and representatives of various government organizations. The Council is responsible for planning, management and decision-making in CWS, including the setting and reviewing of annual action plans, the resolution of conflicts among stakeholders, the design of policies, and ensuring the fair distribution of benefits derived from the forest and co-management activities. The Committee, on the other hand, is the operational body responsible for the implementation of the decisions and plans approved by the Council.

Objectives

The broad goal of this study is to assess the human well-being of those people who depend on the resources of CWS. I have divided this broad goal into three primary objectives:

1. To assess whether co-management maintains or enhances fair intergenerational access to the resources in CWS;
2. To evaluate whether stakeholders have the appropriate rights and means to manage forests of CWS cooperatively and equitably; and
3. To learn whether the health of stakeholders, cultures and the forest is acceptable to key stakeholders in CWS.

Methodology

The study was conducted by a team comprised of three foresters, following the “Basic Assessment Guide for Human Well-Being” (Colfer *et al.* 1999a) and the “Supplementary Methods for Assessing Human Well-Being” (Colfer *et al.* 1999b). Before beginning fieldwork, we conducted a thorough review and discussion of the



methodology, including the specific criteria and indicator format. Box 1 summarizes the steps we followed. We made several initial field visits to Chunati in order to identify the most important forest-dependent stakeholders and to plan fieldwork. During these visits, we met with FD officials, settlement heads, leaders of forest villages, and members of the Council and Committee, to select and learn about possible research locations, and to understand the situation inside and outside of CWS.

Box 1: Basic steps in the human well-being assessment methodology

1. Identification of relevant stakeholders
2. Assessment of security and intergenerational access to resources
3. Assessment of rights and means to manage forests cooperatively and equitably
4. Assessment of the health of forests, forest actors and cultures
5. Scoring and analysis of collected data or information

Identification of stakeholders

Based on the preliminary visits and an earlier stakeholder analysis conducted by Mollah *et al.* (2004), the five stakeholders with the highest forest-dependence levels were identified: (1) betel-leaf cultivators ¹, (2) fuelwood/bamboo/sungrass ² collectors (hereafter called “collectors”), (3) encroachers, (4) forest villagers ³, and (5) farmers (villagers who live in the forest and farm low-lying paddy lands) (Table 1). From these five, the three most important forest-dependent stakeholders - collectors,

¹ Betel-leaf (*Piper sermentosum*) cultivators build small frames of bamboo (structure) and sungrass (shade) where they cultivate betel leaves for the market. The frame is usually constructed on the bottom slope of a hill to facilitate good drainage.

² Sungrass (*Imperata cylendrica*) is a low-cost material used especially for roofing. It is readily available/sellable in the market.

³ “Forest villagers” are those people who were settled by the FD in 1952 in what were then reserve forests. In exchange for assisting the FD with forest maintenance chores, they received the right to collect and/or cultivate specific products (e.g. betel leaves, bamboo, sungrass, fuelwood and paddy) in certain low-lying areas of the forest. They have considerable knowledge about local ecological, social and forest management conditions, as well as program implementation. All of the study’s respondents were forest villagers. Some now reside in areas adjacent to, but technically outside of, CWS. They work as betel-leaf cultivators, collectors, farmers, and in a variety of other professions. Thus they overlap with other resource-based categories of stakeholders.

betel-leaf cultivators, and forest villagers (practicing a variety of economic activities) – were selected using the ‘who counts matrix’, based on seven dimensions: (1) proximity to forests; (2) pre-existing rights; (3) dependency on forest resources; (4) poverty; (5) indigenous knowledge of their local resources; (6) cultural link with the forests; and (7) power deficits (Table 1). The team randomly chose three study sites – Harbang, Aziznagar, and Jaldi (Figure 1) where each team member independently conducted focus group discussions with members of each of the three stakeholder groups in the three villages (for a total of 27 focus group discussions). The team members were assisted in the focus group discussions by a qualified community member, selected by the focus group participants, or by a Nishorgo site facilitator⁴. These assistants helped in data recording only.

Table 1: Identification of key stakeholders in Chunati Wildlife Sanctuary using the “Who Counts Matrix” (Colfer 1995, Colfer *et al.* 1999c)

Dimensions'	Stakeholders				
	Encroachers	Betel - leaf cultivators	Forest villagers	Farmers	Collectors
Proximity	2	1	1	2	1
Pre -existing rights	3	1	1	1	1
Forest dependency	3	Variable	1	2	1
Poverty	2	3	3	3	1
Indigenous knowledge	2	Variable	1	2	Variable
Culture - forest link	3	1	1	2	1
Power deficit	Variable	2	3	2	1
VALUE	2.14	1.14	1.57	2.00	0.86

*Note: 1=High, 2=Medium, 3=Low, Variable = Uncertain ranking, depending on field experiences.

Assessment

To assess the well-being of selected stakeholders, we followed CIFOR’s human well-being assessment guides (Colfer *et al.* 1999a; Colfer *et al.* 1999b; Salim *et al.* 1999). Two basic methods were used: the Histo-Ecological Matrix (to assess intergenerational access to resources) and the Pebble Distribution Method (PDM) (to assess both generational access to resources and benefit-sharing among stakeholders) (Colfer *et al.* 1999a; Colfer *et al.* 1999b). The PDM is a tool for comparing the relative importance of different factors or time periods, based on the number of pebbles that respondents allot to each factor or time period. Data were collected

⁴ A ‘Nishorgo Site Facilitator’ is responsible for coordinating local participation in the implementation of Nishorgo program activities in specific areas/sites.



through focus group discussions and both pebble distributions and opinions expressed during the exercise were recorded. To assess stakeholders' rights and means to manage resources, we also followed the methods established by Colfer *et al.* (1999a).⁵ We assessed the remaining indicators concerning the health of stakeholders, their culture, and the forests through open-ended discussions and personal visits to different areas of CWS, as suggested by Colfer *et al.* (1999a). For overall assessment of human well-being in CWS, team members used the 'Social Criteria and Indicators' sheet of Colfer *et al.* (1999a), with some modifications to fit local conditions, to record scores ranging from 1 to 10, as per Salim *et al.* (1999). Each team member conducted the scoring independently based on experiences from all field visits, focus group discussions, and personal judgments. Data were analyzed using SPSS statistical software (version 13) and Microsoft Excel 2003.

Results

Assessing intergenerational access to resources and economic benefits

This section addresses three main questions: (1) "Is co-management effective in promoting maintenance of and access to resources?" (2) "Do forest actors enjoy a reasonable share of the economic benefits derived from forests?" and (3) "Do people link their own and their children's future with the management of forest resources?" The evidence for each of these questions is presented in detail below.

1) Is co-management effective in promoting maintenance of and access to resources?

In focus group discussions, the three selected stakeholders groups (forest villagers, betel-leaf cultivators, and collectors) were asked to score past, present and future trends in the availability of major forest products at six points in time (past and present) at 5-year intervals: 1992, 1997, 2002, 2007, 2012 and 2017. The participants themselves selected these reference years during discussions. Figure 2 shows the trends in perceived availability of various resources from the study sites during the 25-year period between 1992 and 2017. Generally, respondents perceived higher resource availability in the past (with 1992 being the highest), with decreasing availability of resources through time.

⁵ However, we did not follow the exercise of form B and only the allocated pebbled and opinions expressed were recorded.

Figure 2 shows a perceived decrease in the availability of resources through time, as revealed by the average number of pebbles allotted by different groups to each year. Paddy was the single exception, showing an increase in perceived availability (in both total land cover and crop productivity) between 1992 and 2007, and then a decrease into the future. We believe the perceived increase in the amount of paddy is due to the adoption of chemical fertilizers, high yielding varieties, gravity-fed irrigation, and increases in area of coverage due to conversion of more forest land into paddy field (See Plates 1 and 2). After 2007, respondents predicted a decrease in paddy resulting from increased protection of the wildlife sanctuary by the FD and NSP. Community members also predict that fuelwood scarcity will become even more pronounced in the future relative to the other resources, as indicated by the relative steepness of the fuelwood curve, compared with those of the four other resources analyzed.

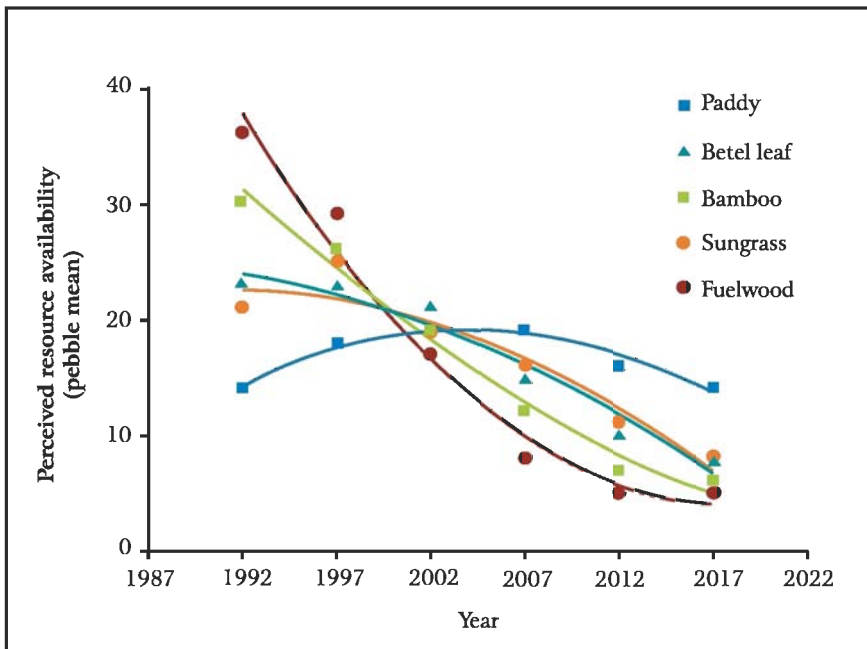


Figure 2: Perceived past, present and future availability of major forest products from Chunati Wildlife Sanctuary by three major stakeholders (using Histo-Ecological Matrix and Pebble Distribution Method, Colfer *et al.* 1999a)



Table 2 summarizes the respondents' explanations for why forest resources are decreasing in availability. Respondents perceived the betel leaf crop to be decreasing due to rainfall scarcity, the increased price of production inputs (i.e. bamboo, sungrass, pesticides, insecticides, etc.), and government policies restricting expansion. They perceive that bamboo is becoming scarce because of intentional forest fires, unsustainable extraction methods, and population growth. In the case of fuelwood, respondents perceive the scarcity to be due to illegal logging, collection by local people, and the high demand for fuelwood from brick factories (Table 2). Finally, the respondents felt that sungrass was being depleted in response to the high demand for this resource, as well as the conversion of sungrass growing areas to paddy land, which is in even higher demand.

Table 2: Reasons given by community members for scarcity of major resources in CWS

Resources	Reasons for scarcity
Betel-leaf	<ul style="list-style-type: none">• Between 1992 and 2002 betel-leaf was profitable as a result of affordability and availability of raw materials for production (e.g. bamboo, sungrass, pesticides, leaf shoots, labor) for fence construction, irrigation, fertilizer, etc. However, respondents suggest that these resources have become scarcer today and will continue to decline in the future.• The FD had a policy to destroy betel leaves. The Council has since changed this policy to limit the further expansion of betel leaf cultivation.• Rainfall scarcity in recent years
Bamboo	<ul style="list-style-type: none">• Forest fire• Population growth and its associated demands• Increased need for income (resulting in exploitation of the resource for sale)• Unsustainable extraction levels (i.e., uncontrolled and repeated cutting)
Fuelwood	<ul style="list-style-type: none">• Brickfields located around CWS require large amounts of fuelwood• FD restrictions on harvesting being motivated by Nishorgo staff members• Fuelwood collectors are now digging out the stumps and roots of trees• Illegal tree harvesting by the local community members and FD staff members
Sungrass	<ul style="list-style-type: none">• Depletion of the forest resources and conversion of land to other uses• High demand by local poor

2) Do the forest actors enjoy a reasonable share of the economic benefits derived from forests?

This analysis helps to assess different stakeholders' perception of the distribution of forest benefits among the local population. In focus group discussions among the three stakeholder groups in each of the three villages, respondents were asked to use one hundred pebbles to show the percentage of total benefits they received from each of several major forest resources. They identified these major forest resources as paddy, betel-leaf, bamboo, sungrass and fuelwood. Paddy was considered a forest resource because it grows in forested areas (see Plates 1 and 2). The stakeholders who received benefits from these resources include the FD, betel-leaf cultivators, farmers, forest villagers, collectors, encroachers and businessmen.

Table 3 shows the median proportion (i.e. percentage) of benefits that the three stakeholder groups reported they received from each major resource. All three stakeholders ranked bamboo as the forest resource from which they received the most benefit (forest villagers had a median value of 16%, collectors and betel-leaf cultivators a median value of 15%). Collectors and betel-leaf cultivators received the second highest amount of benefit from paddy and sungrass, while forest villagers received their second highest amount of benefit from betel-leaf cultivation.

Table 3: Distribution of benefits from major resources in Chunati Wildlife Sanctuary among three major stakeholders

Respondent (key stakeholders)	Resources	Median % of benefits
Forest villagers	Paddy	12
	Betel-leaf	14
	Bamboo	16
	Sungrass	12
	Fuelwood	10
Collectors	Paddy	12
	Betel-leaf	10
	Bamboo	15
	Sungrass	12
	Fuelwood	8



Respondent (key stakeholders)	Resources	Median % of benefits
Betel-leaf cultivators	Paddy	12
	Betel-leaf	8
	Bamboo	15
	Sungrass	12
	Fuelwood	10

Appendix 1 shows how focus group respondents distributed perceived benefits from the forest among the three major stakeholders. Appendix 2 shows the distribution of these benefits across each of the three study sites. The values differ widely across beneficiaries, suggesting that not all forest stakeholders feel they receive an equal share – or even a reasonable share – of the economic benefits derived from forests. However, there is general agreement among focus group participants about the distribution of forest benefits among the various beneficiaries and sites.

Figure 3 illustrates the respondents' perceptions of the distribution of forest resource benefits among various stakeholders including the FD, businessmen, farmers, encroachers, betel-leaf cultivators, collectors, and forest villagers. Focus group participants reported that farmers receive the greatest benefits from paddy (20%); that betel-leaf cultivators benefit most from betel-leaf cultivation (30%);

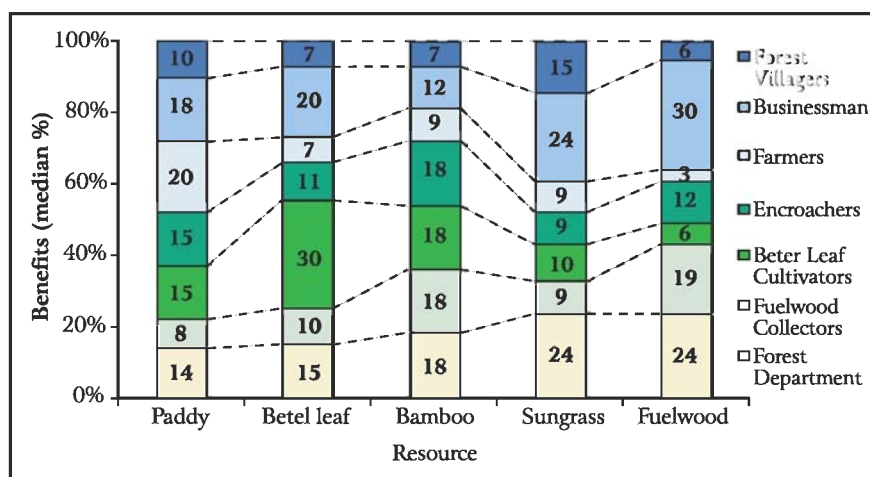


Figure 3: Perceived distribution of resources among various stakeholders at CWS

and that collectors benefit most from bamboo harvesting (18%). Businessmen are perceived as receiving a greater share than collectors for all resources except bamboo. Overall, businessmen and the FD receive 30-50% of the benefits from forest resources despite their higher economic status and less direct relationship to the forest compared with forest villagers, betel-leaf cultivators and collectors. This suggests an inverse relationship between forest benefits and dependency, and inequity in the distribution of benefits.

3) Are people linking their own and their children's future to the management of forest resources?

This section attempts to capture local actors' perceptions of changes in access to resources occurring over time. Using the PDM, we asked participants in focus group discussions to gauge how the ability to access forest resources has changed, or is changing, for their grandparents, themselves and their grandchildren. Table 4 shows the results of this analysis. It reveals that all major stakeholders perceive that their access to those forest resources upon which their livelihood depends (as mentioned in Figure 2) is better than it was for their grandparents. However, current collectors believe their grandchildren will have less access to forest resources; forest villagers think the grandchildren will have the same amount of access; and betel-leaf collectors think their grandchildren will have greater access. Group discussions suggest that grandparents had less need to use forest resources because they could meet their needs from their private lands and their population density was low, but their access to forest resources was also limited due to the stricter enforcement of the Forest Act by the FD. Today, however, people have fewer private resources, resulting in higher overall consumption of forest resources. In the future, however, forest villagers' fear that the government will become more strict and prohibit their use of these resources (as they believe the FD sees them as a burden on the forest); collectors think that the government might be more strict than at present in prohibiting their use of resources; and betel-leaf collectors feel confident that their level of access will continue to rise because they have witnessed a steady increase in betel-leaf farming over the last decade.



Table 4: Perceived generational differences in resource access among three main stakeholders at Chunati Wildlife Sanctuary (stakeholder's perceptions of their own group)

Stakeholders (respondents)	Generation	Access to resources (median % value)
Forest villagers	Grandparent	21
	Self	39
	Grandchildren	39
Betel-leaf cultivators	Grandparent	10
	Self	40
	Grandchildren	48
Collectors	Grandparent	32
	Self	35
	Grandchildren	30

Figure 4 presents a comparative picture of how all respondents perceive the distribution of resources among the three stakeholder groups (forest villagers, betel-leaf cultivators and collectors) and among the three generations (grandparents, self and grandchildren). Forest villagers feel that the ability of their grandchildren to access resources will be greatly diminished (28%) compared with their grandparents (43%) and themselves (34%), respectively. On the other hand, both collectors and betel-leaf cultivators predict that their grandchildren will have better access (36%) to forest resources compared with their grandparents (29% and 28%, respectively) and themselves (33% for both) (based on median percentages using the PDM).

Forest villagers feel that they have less access to forest resources than the other two stakeholder groups, and that their future access will be reduced due to increased irrigation costs, which were not as significant in the past because forest cover helped to conserve natural water supplies. Respondents also feel pressure not to expand their paddy fields, a primary source of livelihood for many. In general, the declaration of CWS has created a situation of conflict over traditional resource use that has been further aggravated by the attitudes of local FD officials. This conflict has led local people to believe that the declaration of the Sanctuary will impede their livelihoods. As a result, local people have become concerned with the loss of their traditional rights.

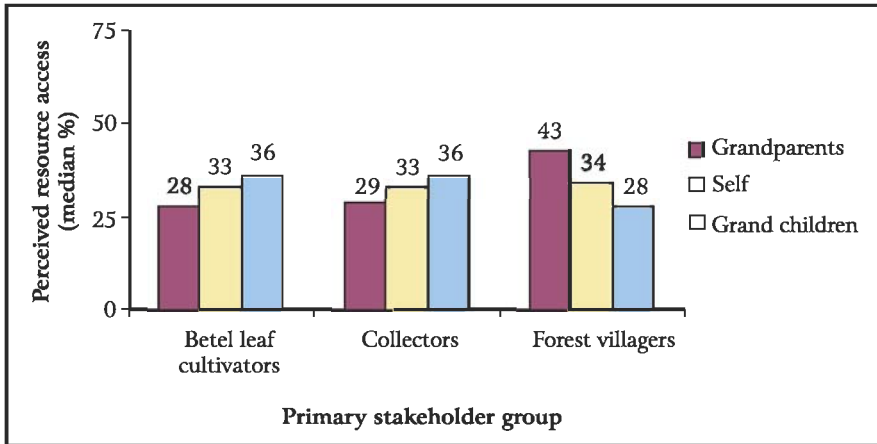


Figure 4: Perceived distribution of access to resources among all stakeholders by each of the three major forest beneficiaries in Chunati Wildlife Sanctuary.

Assessing stakeholders' acknowledged rights and means to manage forests

Our focus group discussions generated information about various rights and means of forest management. Figure 5 shows the distribution of scores for this category among all major stakeholder groups, as identified by the respondents during focus group discussions. This figure suggests that participants perceive that the rights and means to manage forests are highly skewed with the FD having the greatest rights, followed by NSP, the Council and the Committee, the patrolling groups, and the forest user groups.

The group with the least perceived rights and means to manage forests were 'other stakeholders', or those local people who are not directly involved in NSP activities. More broadly, dividing the management groups

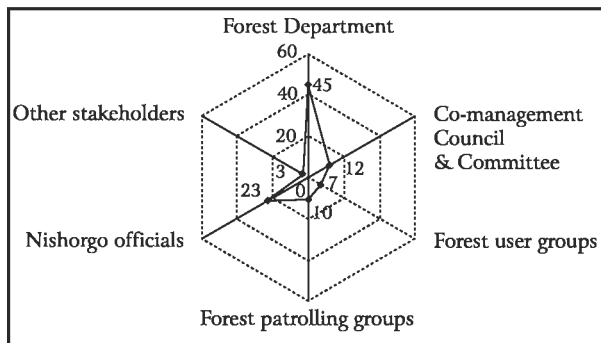


Figure 5: Perceived distribution of rights and means to manage resources in Chunati Wildlife Sanctuary among various stakeholders (mean % of all participants' responses)



into three major groups – the FD, NSP and the groups it has initiated (co-management institutions and user groups), and other stakeholders – shows that both the FD (45%) and Nishorgo (52%) are perceived to share roughly equal rights and means to manage resources in CWS (Figure 6).

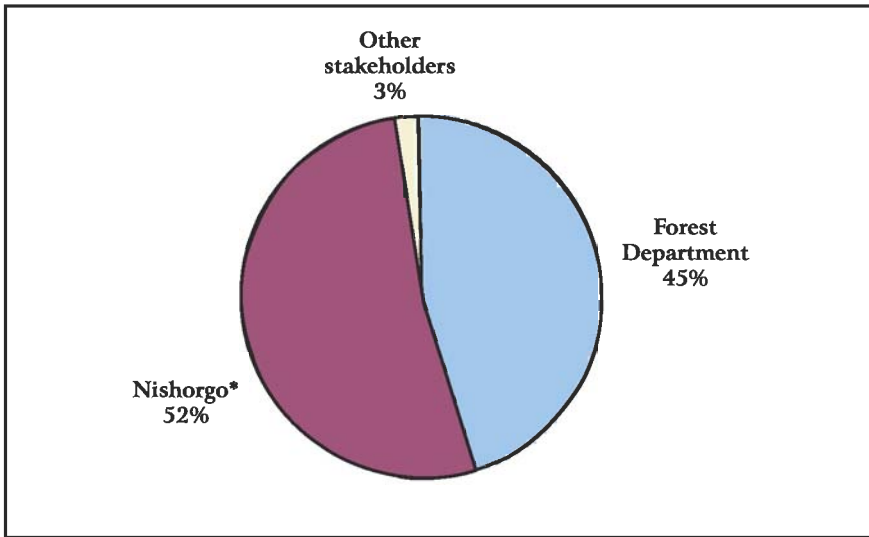


Figure 6: Perceived distribution of rights and means to manage resources in Chunati Wildlife Sanctuary (*grouping all Nishorgo-related stakeholders together)

Assessing the health of stakeholders, cultures and the forest

This section focuses on assessing the health of forest respondents, their culture, and their surrounding PAs. The three members of the team assessed these issues independently, through open-ended discussion and personal visits in different areas of the sanctuary (see Colfer *et al.* 1999a).

In focus group discussions, participants said that they perceived no “balance between human activities and environmental conditions.” Participants acknowledged that activities such as illegal logging, fuelwood and bamboo collection, forest fires, removal of top soil for brick-making and cultivating paddy and betel-leaf on encroached land have all contributed to the degradation of the wildlife sanctuary. Participants also noted that certain NSP activities – such as providing alternate

livelihood support and motivating forest users through meetings, campaigns, group discussions, and development of social organizations – are improving environmental conditions in the sanctuary. Hence, to some extent they do recognize a balance between human uses and environmental conditions. However, they were also concerned that the activities promoted by Nishorgo would also restrict their ability to maintain their livelihoods. They further mentioned that immigrants from both nearby areas and distant locations (e.g. refugees from Myanmar) are placing additional pressure on the sanctuary and exacerbating the current imbalance between the environment and human activities.

Participants are aware that forestry work is potentially hazardous to their physical well-being, and they feel that the FD does not ensure workers' safety. Wild elephants in the sanctuary pose another threat to the health of inhabitants. Some participants have suggested that NSP should provide indirect health benefits to local inhabitants by improving recreational and health care facilities, and by promoting a cleaner environment through restricting brick-making factories and introducing improved cooking stoves (thereby decreasing exposure to smoke and other environmental hazards). Participants further expressed that neither the FD nor Nishorgo have formal mechanisms for addressing health-related issues.

Historically, strong connections have existed between forests and human cultures. These relationships are often reflected in the status of forests and the communities that live in or near them. Participants feel that neither the FD nor Nishorgo have promoted a link between these two issues. Forest management plans do not typically consider human culture, since they do not include indicators of cultural disintegration.

Overall assessment of human well-being in Chunati Wildlife Sanctuary

Human well-being consists of three broad issues or principles: access to resources; rights and means to manage forests; and health of humans, their culture and the forests they rely upon (Colfer *et al.* 1999a). The three team members estimated human well-being in CWS individually, according to these criteria and related indicators. Figure 7 shows the summary of these calculations. A detailed list of selected criteria and indicators under each of the three principles, with values assigned by each of the three investigators, can be found in Appendices 3-5.



Figure 7 illustrates that rights and means to manage forests cooperatively and equitably (Principle 2) has a higher overall score than both intergenerational access to resources (Principle 1) and health of the human, culture and the forests (Principle 3). Furthermore, the results reveal that local stakeholders do acknowledge the importance of the relationship between forest maintenance and human culture (6.98); all three team members agreed that local stakeholders have knowledge of forest resources and forest management plans prior to implementation (6.57); and that effective mechanisms exist for two-way communication between forest management staff and the various stakeholders (6.16). However, the relationship between forest management and human health is poor (1.89); and to date co-management has not yet promoted adequate control of and access to resources (3.3). Respondents also perceive a strong link between the management of resources and their own/children's future. The government-approved Councils and Committees, with their defined roles and procedures for management activities, may outline the rights and responsibilities of different stakeholders. However, it is too early to have achieved the goal of equitable access for all stakeholders, as such institutions have yet to be fully assessed and operationalized.

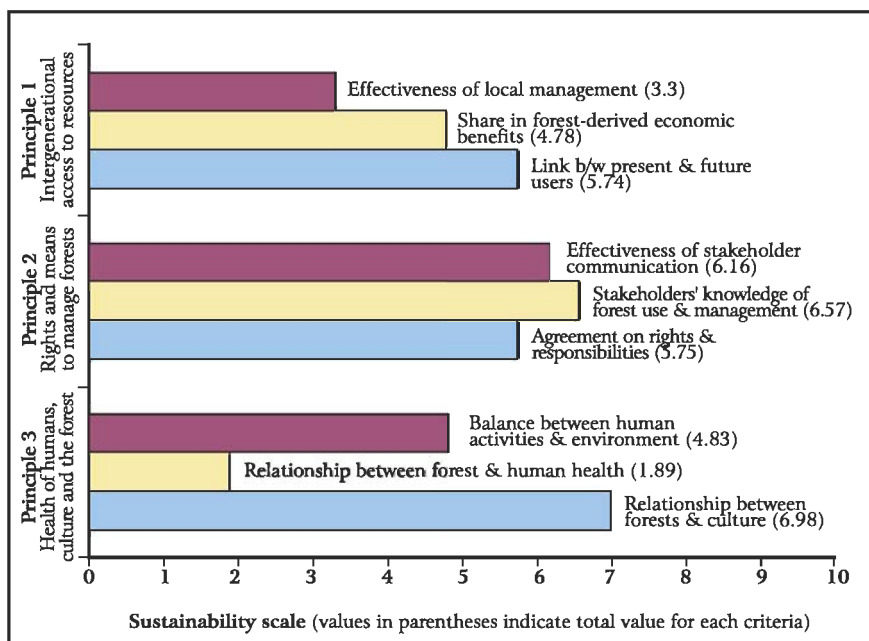


Figure 7: General picture of human well-being at CWS under the three broad principles

Figure 8 below summarizes the scores for the three main dimensions (principles) of human well-being for CWS (see Appendix 6 for a more detailed breakdown of this scoring). According to Colfer *et al.* (1999a), any value of 3 or below (on a scale of 1-10) means that the level of human well-being is unacceptable. Box 2 shows the final calculation of human-well being according to this methodology, revealing that human well-being in CWS is not acceptable at current levels (total score = 1.67).

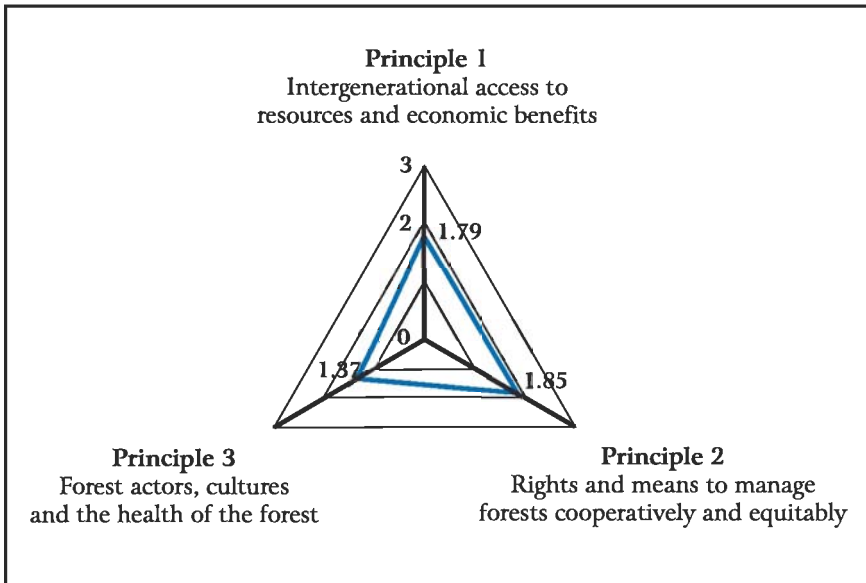


Figure 8: The overall status of human well-being in Chunati Wildlife Sanctuary

Box 2: Calculations of human well-being in Chunati Wildlife Sanctuary

Human well-being in Chunati Wildlife Sanctuary

$$\begin{aligned}
 &= [P1 (\text{Score}) \times W1] + [P2 (\text{Score}) \times W2] + [P3 (\text{Score}) \times W3] \\
 &= [1.79 \times 40\%] + [1.85 \times 30\%] + [1.37 \times 30\%] \\
 &= 0.71 + 0.55 + 0.41 = 1.67
 \end{aligned}$$

Note: P1/P2/P3 = Principles 1/2/3; W1/W2/W3 = Weighting for Principles 1/2/3

(According to methodology of Colfer *et al.* 1999a)



Discussion and conclusions

This study utilized a methodology developed by CIFOR to assess the well-being of three groups of stakeholders participating in co-management activities of NSP in CWS. We assessed three main areas of well-being: intergenerational access to resources; means and rights to manage resources; and the health of forests, forest actors and their cultures. Results suggest that human well-being in CWS is already unacceptably low and decreasing.

In terms of intergenerational access to resources, results reveal that local stakeholders believe forest resources will decrease in CWS in the future (Figure 2). Among these resources, they feel that fuelwood will have the highest scarcity, which might boost the rate of extraction of alternative fuels such as bamboo, thereby affecting elephant habitat. Nishorgo is trying to alleviate the fuelwood crisis by introducing alternative energy-saving strategies, such as an improved stove technology that will help minimize the use of fuelwood, but these activities are still in their pilot phase. We conclude that access rights to forest resources in CWS are ill-defined, poorly monitored, and inadequately enforced. The lack of clear definition of these rights results in conflict, as people perceive that resources are not distributed fairly, and that their present and future access to these resources is not secure.

On a more positive note, I observed that NSP activities have resulted in increased employment and associated training opportunities for local people; that local people feel that damages to their crops and property are compensated in a fair manner; that wages and benefits received from forest activities are fair and reasonable; and that mechanisms exist for sharing benefits among local communities and community members. Forest villagers, however, believe that the FD and businessmen receive the largest share of benefits from the forests, particularly compared to those stakeholders who depend on these resources for their livelihoods, including themselves. This is a 'red flag' suggesting a lack of equity in access to benefits. Thus, NSP and the FD should focus on ensuring equitable access to benefits among all stakeholders. Furthermore, illegal activities must be met with strong action to effectively enforce forest policy. Finally, marketing channels should also be developed to facilitate the development and sale of alternative forest products.

Inter-generational access to resources is the most important aspect of human well-being assessment, because this dimension affects the long-term availability of forest resources for those who depend on them most, thereby influencing their propensity to take care of the forest (Colfer *et al.* 1999a). Our study reveals that different stakeholders have different perceptions about how resources are distributed among generations. Betel-leaf cultivators and collectors feel that access to forest resources will improve in the future, while forest villagers think that access will be reduced. In Cameroon, Brocklesby *et al.* (1997) and Tiani *et al.* (1997) reported an inverted U-shaped distribution – reduced access for grandparents and grandchildren in comparison to the current generation – which we also found for collectors in CWS. In most cases, inequitable access to resources occurs only when traditional resource management institutions, either formal or informal, break down (Binwager 1989; Jaganathan 1989; Duraiappah 1998). This generally happens when these institutions become inefficient and/or ineffective. We hypothesize that the massive resource harvesting that occurred in CWS immediately after it was declared a wildlife sanctuary generated insecurity of traditional resource rights (especially among forest-dependent people) and produced conflicting ideas about PAs that were further aggravated by the actions and attitudes of FD officials. The result was a rapid loss of resources from the area due to illegal harvesting, as the focus group discussion revealed. At the same time, a communication gap formed between local people and the FD, ultimately leading to the obstruction of traditional resource uses. NSP was initiated, in part, to reduce this fissure.

NSP's strategies for improving forest management include motivating people to conserve resources; involving local stakeholders and FD personnel in resources management; and providing support for alternative livelihoods. All of these are worthy measures for ensuring the well-being of local people, but questions remain about how well the project is being managed and implemented. Local people claim that the current distribution process of alternative livelihood support is unfair. Moreover, NSP's lack of capacity to handle multiple stakeholders – combined with their prolonged decision-making process, slow implementation, and frequently changing policy decisions – has created a state of uncertainty and insecurity about access to resources, both now and in the future. However, on a more promising note, local people are aware of the link between resource exploitation and destruction and value the importance of protecting these resources for their own and their



children's sustainable future use. Hence, the current generation places some value on protecting forest resources for their descendants, even if they are primarily concerned with their own immediate future.

In terms of rights and means to manage resources, the FD has historically assumed sole responsibility for managing CWS and has denied local stakeholders their rights. This has created an unsustainable situation. Local stakeholders have knowledge that can strengthen the legitimacy of their claims to land and forests (Kaskija 2002). Thus, there should be some legally binding mechanism that supports their rights to management, extraction, ownership and monitoring in the PA (Tacconi *et al.* 2004). Our study reveals that local stakeholders perceive that approximately 55% of the resource management rights and responsibilities in CWS are now assigned to stakeholders other than the FD (Figure 5). This perceived change in who holds the rights and means to manage the sanctuary may provide an opportunity for drawing on valuable local experience (Colfer *et al.* 1999a). The major achievement NSP has made is to have brought FD personnel and local stakeholders to the same table for discussion. This provides local stakeholders with a voice in decisions about management prescriptions and implementation plans.

Nishorgo's efforts to give local stakeholders greater rights and capacity for accessing and managing resources will almost certainly have a positive impact on the future well-being of all stakeholders. Studies conducted in Indonesia, Cameroon, and Brazil by Tchingkawa *et al.* (2001), following the same "Basic Assessment Guide for Human Well-Being" approach employed here, conclude that greater management rights for local communities promote more sustainable forest management, which ultimately helps to ensure human well-being.

In terms of assessing the health of stakeholders, their culture and their forests, it has been suggested that large-scale ecological degradation heightens tensions, leads to conflict, and threatens human well-being by contributing to health problems (Homer-Dixon 1994). Our field experience revealed that ecological degradation is extensive and pervasive in CWS. NSP is trying to rectify this problem by teaching people about the importance of conservation, and by promoting alternative income-generating activities for forest-dependent communities. However, local stakeholders have also expressed concern about people immigrating into the vicinity of the sanctuary from neighboring areas, including (refugees) from

Myanmar. These migrants might have negative impacts on the health of stakeholders, their culture and their forests. However, it is promising that local stakeholder groups do not appear to have serious conflicts within or among themselves, although it would require a longer-term study to provide more insight on this issue.

Safety and health are key concerns of management activities at CWS where the existence of wild elephants provides an immediate threat. Results show that respondents spent the majority of their day engaged in activities within the PAs including farming and collecting fuelwood, sungrass, bamboo, and betel-leaf (Plate 3). However, we found no provisions for ensuring the health and safety of local people or tourists entering into the area. Moreover, the FD does not have any safety rules, laws, policies, or guidelines on health and safety issues for workers engaged in various forestry activities, although local people have developed some innovative techniques to safeguard themselves from wildlife, especially elephants. It is important to develop such guidelines, and to conduct awareness raising activities to ensure health and safety in PA management.

The preceding analysis, using criteria and indicators adapted from Colfer *et al.* (1999a) with some modifications, shows a clear picture of the overall level of human well-being in the Sanctuary (Figure 7). These results suggest that NSP has improved the condition of local stakeholders by enhancing their rights and means to manage forests. In terms of the health of local people, their culture and their forests, however, serious concerns remain. The population is increasing and resource harvesting continues unabated, thereby creating a threat to conservation and long-term human well-being in the Sanctuary (see Plates I-4). The study reveals that conservation goals cannot be achieved without active involvement of local inhabitants, and that NSP's conservation efforts at CWS will only succeed if local people benefit. Therefore, concrete guidelines and institutions should be developed to ensure adequate and equitable local benefits and to promote human well-being in CWS in the long-term. In this regard, Nishorgo's initiatives to establish and support Councils and Committees can play a critical role.



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Plate 1: Landscape
view of Chunati
Wildlife Sanctuary
- A compromised
scenario



Photo: Abu Rushed Jamil Mahmood

Plate 2: Compet-
ing land-use
pressure with
agriculture - Paddy
as major resource
in Chunati
Wildlife Sanctuary



Photo: Abu Rushed Jamil Mahmood

Plate 3: Traditional
betel-leaf cultiva-
tion – A major
source of
livelihood from
Chunati Wildlife
Sanctuary



Photo: Abu Rushed Jamil Mahmood



Plate 4: Harvesting
sungrass and
bamboo from
Chunati Wildlife
Sanctuary –
A daily activity for
sustaining the
livelihoods of
resource depen-
dent people



Photo: Abu Rushed Jamil Mahmood

Appendix 1: Perceived distribution of forest benefits among various beneficiaries by the three principal stakeholder groups

Major resources	Beneficiaries	Location (research sites)*			Average (all sites)
		Aziznagar	Harbang	Jaldi	
Paddy	Forest department	14.0	13.3	10.3	12.5
	Fuelwood collectors	7.6	8.3	9.6	8.5
	Betel-leaf cultivators	9.6	13.0	6.3	9.6
	Encroachers	11.6	10.3	12.0	11.3
	Farmers	21.0	24.3	26.3	23.8
	Businessmen	23.3	20.6	24.0	22.6
	Forest villagers	12.6	10.0	11.3	11.3
Betel-leaf cultivators	Forest department	23.3	29.0	18.0	23.4
	Fuelwood collectors	7.0	4.6	6.3	6.0
	Betel-leaf cultivators	25.0	23.3	26.6	25.0
	Encroachers	7.6	3.0	5.0	5.2
	Farmers	6.0	5.6	6.3	6.0
	Businessmen	21.6	22.3	28.3	24.1
	Forest villagers	9.3	12.0	9.3	10.2

Major resources	Beneficiaries	Location (research sites)*			Average (all sites)
		Aziznagar	Harbang	Jaldi	
Bamboo	Forest department	19.3	20.6	16.0	18.6
	Fuelwood collectors	20.0	21.6	19.3	20.3
	Betel-leaf cultivators	14.3	20.6	23.0	19.3
	Encroachers	16.0	8.6	10.3	11.6
	Farmers	8.6	6.3	4.3	6.4
	Businessmen	15.0	12.3	21.3	16.2
	Forest villagers	6.6	9.6	5.6	7.3
Sungrass	Forest department	17.0	9.6	11.6	12.7
	Fuelwood collectors	9.3	12.0	10.3	10.5
	Betel-leaf cultivators	14.0	15.6	23.6	17.7
	Encroachers	9.3	9.0	11.3	9.8
	Farmers	6.6	13.3	7.6	9.2
	Businessmen	29.3	31.0	25.3	28.5
	Forest villagers	13.0	9.3	10.0	10.7
Fuelwood	Forest department	25.3	24.3	26.0	25.2
	Fuelwood collectors	20.3	24.3	18.0	20.8
	Betel-leaf cultivators	5.3	4.3	5.3	5.0
	Encroachers	9.6	8.6	11.3	9.8
	Farmers	4.6	4.3	7.0	5.3
	Businessmen	30.0	29.3	26.6	28.6
	Forest villagers	4.6	5.6	5.6	5.0

*Note: Figures represent average perceived percentage among respondents at each site.



Appendix 3:

Scoring of criteria and indicators on Principle 1 - Security of Intergenerational Access to Resources of selected stakeholders at three sites in Chunar Wildlife Sanctuary (by each investigator and collectively)

Cases/Evidence	Harbang			Aziznagar			Jaldi			CWS average			
	Investigator No.			Site avg.	Investigator No.			Site avg.					
	1	2	3		1	2	3						
C 1.1 Local management is effective in controlling maintenance of, and access to, the resource											[3.30]		
(i) 1.1.1 Ownership/use rights to resources (inter/intra-generational) are clear and claims are respected.	2.30	2.16	2.50	2.32	3.75	3.30	3.21	3.42	3.90	3.00	3.15	3.35	3.03
(i) 1.1.2 Rules and norms of resource use are monitored and enforced	2.90	3.29	3.20	3.13	3.00	2.10	5.40	3.50	4.75	3.25	5.80	4.60	3.74
(i) 1.1.3 Means of conflict resolution function without violence	4.50	4.75	5.60	4.95	5.15	4.56	5.20	4.97	6.25	6.29	5.70	6.08	5.33
(i) 1.1.4 Access to forest resources is perceived to be fair at the local level	2.50	1.99	2.10	2.20	2.60	2.09	2.70	2.46	2.00	2.36	2.40	2.25	2.30
(i) 1.1.5 Local people feel secure about access to resources	1.00	2.19	2.70	1.96	1.00	2.00	2.80	1.93	2.60	1.76	2.40	2.25	2.05
C 1.2 Forest actors have a reasonable share in the economic benefits derived from forest use											[4.78]		
(i) 1.2.1 local people receive employment and training from different forestry projects/programs	7.50	5.90	5.60	6.33	8.10	8.50	5.30	7.30	8.90	7.75	5.80	7.48	7.04
(i) 1.2.2 Damages are compensated for in a fair manner	2.75	2.65	2.80	2.73	2.50	2.85	2.30	2.55	2.90	2.16	2.90	2.65	2.65
(i) 1.2.3 Wages and other benefits conform to regional standards	2.60	2.17	2.60	2.46	2.60	2.20	2.70	2.50	2.10	2.10	2.20	2.13	2.36
(i) 1.2.4 Fair mechanisms exist for sharing of benefits among local communities	7.50	7.10	6.50	7.03	7.50	7.00	6.40	7.00	7.50	7.12	7.20	7.27	7.10
C 1.3 People link their and their children's future with management of forest resources											[5.74]		
(i) 1.3.1 People invest in their surroundings (time, effort, money, etc.)	5.10	4.01	4.00	4.37	5.22	4.12	4.20	4.51	5.50	4.88	4.60	5.00	4.63
(i) 1.3.2 Out-migration levels are low	7.50	7.99	4.10	6.53	6.20	6.70	4.60	5.83	6.32	7.05	5.80	6.39	6.25
(i) 1.3.3 People recognize the need to balance population with natural resources	2.06	2.16	2.80	2.34	2.10	2.89	3.00	2.66	3.00	2.95	3.50	3.15	2.72
(i) 1.3.4 Children are educated (formally or informally) about natural resource management	6.59	5.36	5.60	5.85	5.36	4.50	4.80	4.88	5.15	5.50	5.80	5.48	5.41
(i) 1.3.5 Destruction of resources by local communities is rare	5.60	4.50	7.80	5.96	7.65	6.90	7.20	7.25	8.90	8.79	8.20	8.63	7.28
(i) 1.3.6 People maintain emotional links to the land	8.23	7.01	9.20	8.15	8.25	7.30	8.70	8.08	8.70	7.36	8.50	8.20	8.14

Appendix 4:

Scoring of criteria and indicators about Principle 2 - Concerned Stakeholders' Rights and Means to Manage Forests at three sites in Chunati Wildlife Sanctuary (by each investigator and collectively)

Cases/Evidence	Harbang			Aziznagar			Jaldi			CWS Average		
	Investigator No.			Investigator No.			Investigator No.					
	1	2	3	Site Avg.	1	2	3	Site Avg.	1		2	3
C 2.1 Effective mechanism exist for two-way communication related to forest management among stakeholders												
(i) 2.1.1 Over 50% of forestry officials speak one or more local language, or over 50% of local women speak the national language	7.25	7.99	7.00	7.41	7.25	7.99	7.60	7.61	7.00	7.50	7.10	7.20
(i) 2.1.2 Local stakeholders meet with satisfactory frequency, representation of local diversity, and quality of interaction	5.60	6.89	3.20	5.23	5.75	7.19	3.60	5.51	6.75	7.39	3.90	6.01
(i) 2.1.3 Contributions made by all stakeholders are mutually respected and valued at a generally satisfactory level	4.67	6.99	3.90	5.20	5.89	7.20	3.60	5.56	5.92	7.25	4.20	5.79
C 2.2 Local stakeholders have detailed, reciprocal knowledge pertaining to forest resource use as well as forest management plans prior to implementation												
(i) 2.2.1 Plans/maps showing integration of uses by different stakeholders exist	7.26	8.25	4.40	6.64	7.50	8.25	4.30	6.70	7.75	8.50	4.80	7.02
(i) 2.2.2 Updated plans, baseline studies and maps are widely available, outlining development programs details, and including temporal aspects	8.50	8.95	5.20	7.55	9.00	9.25	5.40	7.90	9.60	9.75	5.50	8.28
(i) 2.2.3 Baseline studies of local human systems are available and consulted	7.50	8.89	4.80	7.10	7.50	9.00	5.10	7.20	8.25	9.00	5.90	7.72
(i) 2.2.4 Management staff recognizes the legitimate interests and rights of other stakeholders	5.50	4.27	4.00	4.59	6.00	4.25	4.50	4.92	5.85	4.58	4.30	4.91
(i) 2.2.5 Management of resources reflects the interests and rights of local stakeholders	7.00	6.92	4.40	6.11	7.00	7.00	4.20	6.10	7.17	6.95	4.00	6.04
C 2.3 Agreement exists on rights and responsibilities of relevant stakeholders												
(i) 2.3.1 The level of conflict is acceptable to all stakeholders	5.30	7.01	3.50	5.27	7.25	7.00	3.80	6.02	7.00	7.00	3.90	5.97
[5.75]												
5.75												



Appendix 5:

Scoring of criteria and indicators on Principle 3 - Stakeholders' Acceptance about their Health, Cultures, and the Forests at three sites in Chunar Wildlife Sanctuary (by each investigator and collectively)

Cases/Evidence	Harbang			Aziznagar			Jaldi			CWS Average
	Investigator No.			Investigator No.			Investigator No.			
	1	2	3	1	2	3	1	2	3	
				Site Avg.			Site Avg.			Site Avg.
C 3.1 There is recognizable balance between human activities and environmental conditions										
(i) 3.1.1 Environmental conditions affected by human uses are stable or improving	4.50	5.29	5.30	5.03	4.85	5.00	5.50	6.00	5.75	5.00
(i) 3.1.2 In-migration and/or natural population increases are in harmony with maintaining the forests	3.75	4.33	4.30	4.13	4.00	4.67	4.10	5.13	4.80	4.70
C 3.2 The relationship between forest management and human health is recognized										
(i) 3.2.1 Forest managers cooperate with public authorities regarding illness related to forest management	1.00	2.39	2.30	1.90	1.35	2.40	2.10	1.50	2.00	2.50
(i) 3.2.2 Nutritional status is adequate among local populations	1.00	1.78	2.80	1.86	2.00	2.00	3.10	2.50	2.79	3.60
(i) 3.2.3 Forest employers follow general or specified work or safety conditions and take responsibility for forest related health risks of workers	1.00	1.50	1.30	1.27	1.00	1.50	1.60	1.00	1.50	1.60
C 3.3 The relationship between forest maintenance and human culture is acknowledged as important										
(i) 3.3.1 Forest managers can explain links between relevant human cultures and the local forests	7.25	5.34	6.00	6.20	7.25	6.38	6.30	7.50	6.25	6.10
(i) 3.3.2 Forest management plans reflect care in handling human cultural issues	5.37	6.98	5.60	5.98	5.50	6.50	5.80	5.50	6.60	6.30
(i) 3.3.3 There is no significant increase in signs of cultural disintegration	8.00	8.29	9.10	8.46	8.00	8.30	9.60	8.00	8.20	8.50
[4.83]										
[1.89]										
[6.98]										
[8.44]										

Appendix 6:

Calculation of score of three principles under the assessment of human well-being in Chunati Wildlife Sanctuary

Principle / criteria	Average score*	Weighting factor (%)	Average value (avg. score x weighting factor)	Total score for principle
P1 Forest management maintains or enhances fair intergenerational access to resources and access to, the resource				
C 1.1 local management is effective in controlling maintenance of, and access to, the resource	3.30	15	0.495	1.79
C 1.2 Forest actors have a reasonable share in the economic benefits derived from forest use	4.78	15	0.717	
C 1.3 People link their children's future with management of forest resources	5.74	10	0.574	
P2 Concerned stakeholders have acknowledged rights and means to manage forests cooperatively and equitably				
C2.1 Effective mechanism exists for two-way communication related to forest management among stakeholders	6.16	10	0.616	1.85
C 2.2 Local stakeholders have detailed, reciprocal knowledge pertaining to forest resource use as well as forest management plans prior to implementation	6.57	10	0.657	
C 2.3 Agreement exists on rights and responsibilities of relevant stakeholders	5.75	10	0.575	
P3 The health of forest actors, cultures and the forest is acceptable to all concerned stakeholders				
C 3.1 There is recognizable balance between human activities and environmental conditions	4.83	10	0.483	1.37
C 3.2 The relationship between forest management and human health is recognized	1.89	10	0.189	
C 3.3 The relationship between forest maintenance and human culture is acknowledged as important	6.98	10	0.698	

*Note: Average scores are from calculations in Appendices 3-5.