

**Plain Tales from the Grasslands:
The Utilisation of Natural Resources in Royal Bardia National Park, Nepal**

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Abstract

This paper examines the use of grassland products from the Royal Bardia National Park in the Western Terai of Nepal. This area has been appropriated as state property from previously being an area of agricultural use less than two decades ago. However, the management of the area for nature conservation relies on human disturbance in the form of grass cutting. This is currently carried out through permitted extraction of resources for a ten day period each year. The extent of the extraction of different grass species and their uses is outlined, and the importance of the various products to local households is discussed. Prospects for the sustainable utilisation of the grasslands, optimising the benefits of biodiversity conservation, tourism, and the livelihoods of local people are explored. The current policy includes the establishment of a Buffer Zone adjacent to the National Park, and user groups will be set up to involve local people in the management of the Buffer Zone and the Park. Some implications for use and access to resources are discussed.

1. *Introduction*

It is now widely recognised by many, though by no means all of those involved in environmental protection in developing countries, that a "fortress conservation" approach to enforcing protected areas is unlikely to be either sustainable, nor equitable (Wells, 1992). Many agencies and writers recommend a more integrated approach to conservation and development which aims to take account of the needs of local human populations. This view has been articulated, for example through the IUCN policy document "Caring for the Earth" and by the 1992 World Parks Congress. Such approaches take many different forms. There are as yet relatively few examples of integrated conservation and development projects (ICDPs, see Wells and Brandon, 1992, Stocking and Perkin, 1992). The paradigm is also applied through the approaches of Extractive Reserves (Schwartzman, 1989); various attempts at community management of wildlife resources outside protected areas (e.g. the CAMPFIRE Programme in Zimbabwe, see Child, 1993), through the creation of buffer zones around protected areas (Brandon and Wells, 1993) and the development of multiple use conservation areas, such as the Annapurna Conservation Area Project in Nepal (Wells, 1994).

For a country like Nepal, which is extremely poor with a rapidly increasing human population, yet which relies on the integrity of its natural resources to attract tourists, the largest foreign exchange earner, the conflicts between the needs of rural people and those for conserving natural habitats and wildlife species may appear to be particularly acute. Yet Nepal has what is considered to be an enlightened and innovative approach to integrating conservation and development needs (see

Heinen and Kattel, 1992, for a review) The 1993 Nepal Environmental Policy Action Plan (HMG, 1993) reiterates this commitment to integrate the environment and development, but also pledges to involve local people in the management of protected areas.

This paper examines the use and management of natural resources in the context of Royal Bardia National Park (RBNP) which lies in the southern lowlands of Nepal, the Terai. This protected area, which consists of *sal* (*Shorea robusta*) forest and areas of grassland, harbours a number of internationally important endangered wildlife species, including the Bengal tiger, Asian one-horned rhinoceros, Hispid hare, and Bengal florican. Under the current management regime local people are permitted to enter the park for a period of ten days during the dry season to harvest a number of grass species from which they make different products, mainly to meet their subsistence needs. However, concern has been expressed over the extent of this utilisation and a number of issues including possible degradation of the habitats; disturbance of wildlife; increasing numbers of people entering the park for the annual cutting; and the illegal poaching of other products (particularly wood) have been raised. These put the sustainability of this practice into question. However the contrary view is that habitat diversity is maintained by precisely this human intervention and that critical habitats such as the grasslands have persisted only as a result of the annual cutting.

This paper aims to describe and quantify the extraction of the various grasses and to comment on its desirability within the context of Nepal's evolving Protected Areas policy. The next section describes the study site, giving some historical and ecological perspectives and outlining current management policies. Following sections discuss the extraction and use of the grasses, and the implications for conservation of the grassland habitats within the RBNP. The proposed implementation of a Buffer Zone¹ around the RBNP, its implications for the welfare of the local human population and their rights of access and use of natural resources both inside and outside the protected area are discussed. These developments have marked a gradual shift in property rights from groups and individuals to the state, and now a partial reversal with the possible attenuation of particular or limited rights from the state to certain groups. This may in some way constitute an

¹ There are numerous definitions and interpretations of the term Buffer Zone (see Brandon and Wells, 1993). A useful definition is provided by Sayer (1991). "A zone, peripheral to a national park or equivalent reserve, where restrictions placed upon resource use or special development measures are undertaken to enhance the conservation value of the area"

attempt to 're-invent the commons' as part of a conservation and development strategy ('People and Parks' see HMG/UNDP, 1994) to strengthen the conservation of biological diversity in the protected areas

2. *The Royal Bardia National Park: historical, ecological and human perspectives*

The RBNP covers an area of 968 square kms in Bardia and Benke Districts in the southern Terai in the mid-western region of Nepal (see Figure 1) The Park extends east of the Geruwa branch of the Karnali River to the west; its northern boundary runs along the crest of the Churiya Ridge, and its southern boundary is demarcated by a fringe of cultivated land and government forest (Upreti, 1994). The park area can be roughly divided into the Churiya Ridge which dominates the northern portion, the Bhabar area which lies at the foothills of the Churiyas, the Terai flatlands and the alluvial floodplain to the south and west, and the Babai Valley to the east. The south-western floodplains and flatlands are most easily accessible during the grasscutting period, although the construction of a tarmac road through the middle of the RBNP has enabled access to the interior (Figure 2).

Seven major vegetation types have been identified inside the RBNP (Pokarel, 1993); four types and forest, and three different grassland habitats. The *sal* (*Shorea robusta*) forest covers approximately 70 percent of the park area, dominating the alluvial floodplain, and also found on parts of south-facing slopes of the Churiya. Khair-sissoo forests, composed of *Dalbergia sissoo* and *Acacia catechu* is restricted to major water courses and flood plain islands. Moist riverine forest is characterised by evergreen species such as *Ficus racemosa*, *Syzygium cumini*, and *Mallotus philippinensis*. Mixed hardwood forest is similar to the riverine forest but differs according to density of the shrub layer and a more open grown tree layer. Pokarel (1993) states that this type of forest is linked to human interference (though the study does not specify what form this takes).

Three types of grassland have been identified: wooded grassland, open areas of grassland known as *phanta*, and floodplain grassland. The first two types consist of tussock forming perennials such as *Imperata cylindrica*, *Saccharum spontaneum*, *Erianthus ravennae* and *Vetivera zizaniodes*. Wooded grassland is savannah type, often dotted with *simal* (*Bombax ceiba*), or silk cotton trees. According to Upreti (1994) this forms the most important habitat for wildlife. The *phantas* consist of open areas. Both of these habitats are thought to represent previously disturbed and cultivated

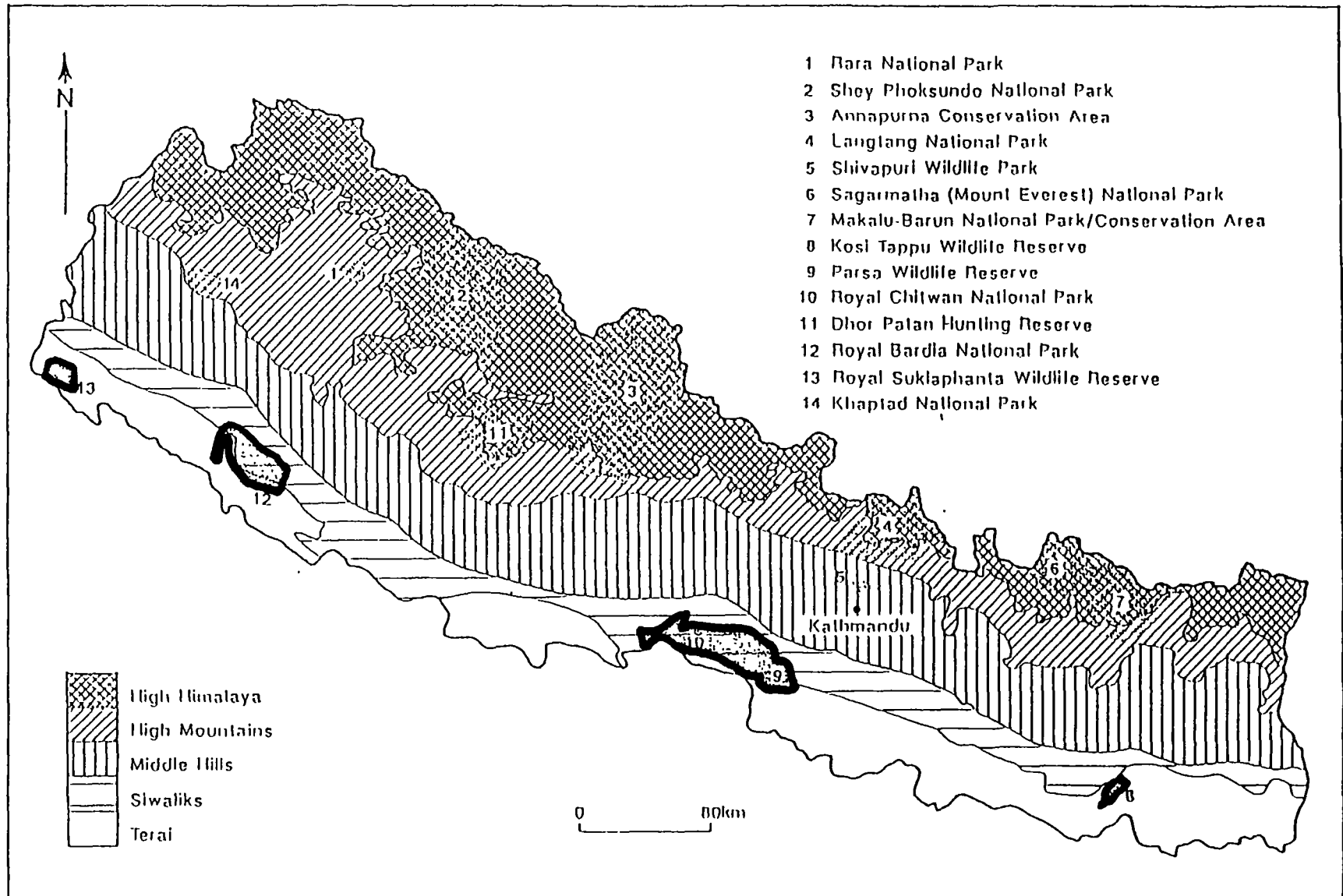
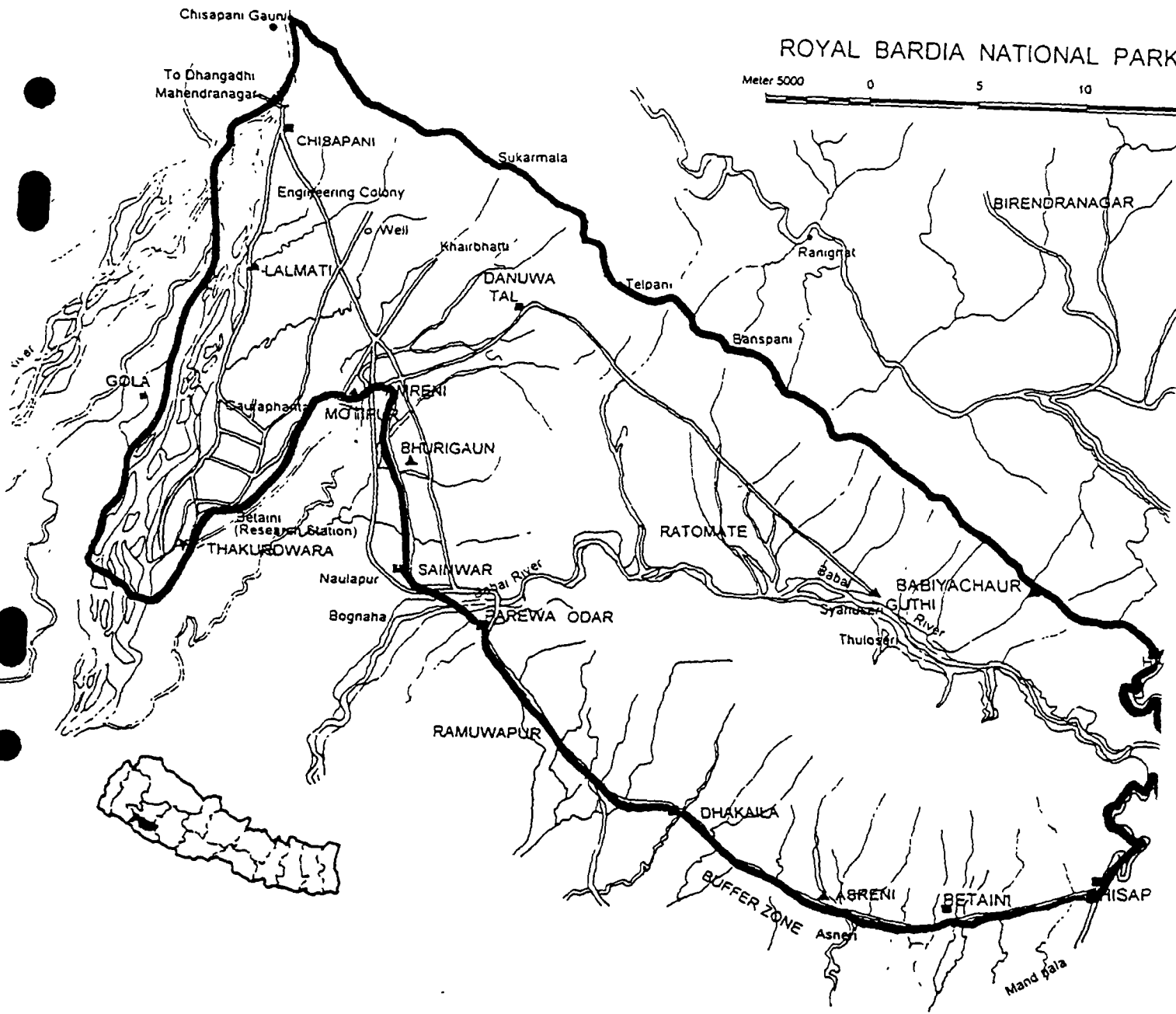


Figure 1 Ecological Zones and Protected Areas in Nepal







sites The third grassland habitat is found in the floodplain and along the banks of the Geruwa, Babai and Aurai rivers in areas commonly inundated during the monsoon. These areas are characterised by tall grasses including *Saccharum spontaneum*, *Saccharum bengalense* and *Phragmites karka*. More detailed descriptions of the vegetation of the park can be found in Dinerstein (1979), Jnawali and Wegge (1993) and Pokarel (1993)

In terms of the human population, there are a range of different ethnic and caste groups inhabiting the Terai, although this has been changing over time. The Tharus are perhaps the oldest and original inhabitants of the Terai; according to Cox (1990), Tharu people have lived in the region for more than 600 years. Ghimire (1992) states that the Tharus migrated from India during the 15th and 16th centuries. There is speculation that some Tharu groups originally came from Rajasthan, indeed their dress and customs are similar to tribal people in that region. There are several clans of Tharu in the Terai, including Dangora, Kathariya, Dhakar and Rana Tharu. Much of the available literature alludes to these groups as living in harmony with nature, consistent with a view of indigenous people as “ecosystem people” (Dasman, 1991, see also Gadgil, 1993). For example, Upreti (1994) claims that Tharu people are part of the jungle ecosystem and that their needs and habits do not have significant negative impacts on the natural environment. Tharus are traditionally dependent on the forest for timber, thatch grass and fodder, and also collect fibres, leaves, canes and reeds, mushrooms, honey, vegetables, medicinal herbs and fruits. They snare deer, pigs, birds, but do not generally hunt larger animals. Fish and aquatic snails are important additions to their diets.

It seems likely that scattered groups of Tharu were the most numerous inhabitants of the area up until the 1960s. Although there had been migration and land colonisation during the Rana regime, according to Ghimire (1992:50) “due to the existence of malaria, endemic disease and other dangers (wild animals and bandits) in the plains, the response from both landlords and peasants from the Hills to land colonisation measures remained fairly limited. The peasants showed most interest in clearing a cultivating lands only in the close adjacent plains so they could get to higher ground to sleep, and the landlords came only to the plains during the winter when malaria was less prevalent and when harvests and rents were collected.” Agricultural labourers were recruited from India in the second half of the 19th century, and there was increased immigration from India during the 1930s and 1940s, from the densely populated plains across the border. A malaria eradication

programme, and land shortages in the uplands of Nepal, led to rapid expansion of the population of the Terai from the 1960s onwards, principally as a result of migration from the Hills.

Human pressures on the natural resources of the Terai have thus changed considerably over time, primarily as a result of the migration of the last two decades. This movement continues, and the areas bordering the RBNP have experienced high rates of population increase in the past twenty years. The population in Bardiya District rose from 199,044 in 1981, to 290,313 in 1991, an increase of nearly 46 percent (Central Bureau of Statistics, 1993). Over the same period the population of Nepal rose by 23 percent. The ethnic mix of the population is changing due to migration from the Hills and uplands; Tharu consisted 75 percent of population of Bardiya in 1971 (cited by Pokarel, 1993), but now account for less than 52 percent (1991 Census, Central Bureau of Statistics 1993). The areas closest to the Park, the Village Development Committees² in the area defined by the HMG/UNDP Parks and People Project as the Buffer Zone, consist of a total of 137,640 people in 18,599 households.

The region that is now RBNP has undergone a number of shifts in property rights and changes in conservation status. Prior to the nationalisation of the forests in 1956, most of the forests in Bardia were *birta* (private) forests (Upreti, 1994). As personal property of the Rana rulers, these areas were under strict protection. In 1969 the area was declared a Royal Hunting Reserve, although local people had free access to the forest and to graze their livestock. An area of 386 square km was officially gazetted as the Royal Karnali Wildlife Reserve in 1976 and was renamed the Royal Bardia Wildlife Reserve in 1982. In 1984 it was extended to the east to include the Babai Valley. It was upgraded to national park status in 1988. For an explanation of different conservation classifications and legislation, see Heinen and Kattel (1992) and Heinen and Yonzon (1994).

Little documented evidence exists describing the human use of these areas, although we know that the area which is now the RBNP was inhabited within the last two decades. Before the area was declared a reserve in 1976 two villages were inside the park area, one at Chisipani and another at Auraini. The Chisipani village was eventually relocated but the Auraini village remained. Before the

² Village Development Committees, (VDCs) are the form of local administration which consist of nine wards each, a ward being a village. There are 16 VDCs in the Buffer Zone, ranging in size from under 3000 to nearly 15000 people.

establishment of the hunting reserve, the villages of Bagaura Phanta and Lamkauli Phanta were also relocated outside the reserve boundary (Upreti, 1994). Recent expansion of the Park resulted in more widespread resettlement, and Resources Nepal (1994) reports that: "Between 1979-1984 during the extension of the park a total of 1572 families, comprising over 9500 people were moved out of the Babai Valley. Some 220 families did not want to leave their homesteads, however, they were forcibly removed. The total population from the 20 villages had left 1200 ha of farmland, 1096 permanent houses and 1793 semi-permanent structures behind"

In terms of management of the grassland habitats within the area, relatively little is known on the human ecology. Pokarel (1993) describes the history of the phantas as being quite obscure. Dinerstein (1975) reported that Baghaura and Lamkauli phantas were under cultivation prior to 1975. Pokarel states that a number of people used to cultivate the phantas and are still residing outside the park, though very close to it. One of these informants is recorded by Pokarel (p13):

"According to Gopi, in 1965 when he was one year old, his father and friends came down from Surkhet in search of cultivable land. Obtaining land at that time was no problem. They found Baghaura a very suitable open place to live and cultivate. Later they settled there with 15 different families from Surkhet. They were the first inhabitants of Baghaura. Cultivation of Lamkauli could have taken place much later than Baghaura, according to Gopi. He did not know if Khauraha was cultivated before. Baghaura could have been a small open and flat grassland in 1965, which was expanded according to the need of new inhabitants by peripheral deforestation in the jungle."

Grass cutting was a regular activity in Bardia, but it is difficult to trace when this began. In RBNP the phantas were cultivated and grazed between 1965 and 1975. Records from the RBNP show authorised grass cutting since 1983, six years before the National Park was created. Livestock grazing in the phantas and other areas prior to 1975 was apparently very common. After 1976 the area was fenced and livestock grazing prohibited. Fire has also been used as a management tool, and in the past, uncontrolled burning in the park was described. Fire is generally set at the end of the dry season when grass cutting is completed. To what extent maintenance of the sward requires cutting and burning - and therefore the necessity of human intervention to maintain the patchwork of habitats, is relatively unknown. It can be hypothesised that grazing by domestic and wild animals, but especially the destructive browsing of elephants, were instrumental in maintaining grassland in

the past when large herds were prevalent. The extent to which annual cutting and human-set fires recreate or mimic these natural processes can only be postulated (see Peet, 1994).

In summary, the protected area under state control was inhabited until recently. Human populations surrounding the protected area utilise a range of products, including grazing and fodder, fuelwood (illegally extracted) and grass (legal). This paper discusses the findings of research examining the use of grassland products which are legally extracted from the park during the dry season, and following sections discuss the extent of this extraction, its implications for conservation, and management and property rights issues.

3. *The Grasses and their uses*

A number of different grass species are utilised by people from the RBNP. The three major products extracted are thatch grass, building materials and rope. Thatch grass, generically known as *khar*, consists of a mixture of the shorter grass species, predominantly *Imperata cylindrica* and *Saccharum* spp. Canes and reeds are extracted for house building and a number of other uses. They are known as *kharai* and include taller grasses, *Saccharum*, *Narenga* and *Phragmites* spp. The third product is rope, made from *Eulaliopsis binata*, known as *buncas* or *babiyo*. Table 1 shows the most important grass species harvested from RBNP, and their main uses. *Khar* is collected primarily from the wooded savanna areas and the *phantas*, *kharai* from the floodplains, and *buncas* from the foothills. Much of the analysis presented in this paper concerns the collection and use of thatch or *khar*.

The list of grasses and products in Table 1 is by no means exhaustive and does not detail all of the different species of grass and reeds used by local people, nor all of the uses. There are certain species which have highly specialised and localised uses. For example, one type of grass, known locally as *bus heri* is used for constructing fish traps, because of its properties of resisting rot even when repeatedly saturated in water. These different resources are not examined here, but rather this analysis is focused on the products which are used in large amounts by a majority of people.

Table 1: Grasses collected from Royal Bardia National Park

<i>Grass species</i>	<i>local name</i>	<i>uses and names</i>
<i>Narenga porphorycoma</i>	<i>khadaï or kharai</i>	cane - if burned, used for building etc. <i>sakhata</i> cane, not burned, whole used for grain silo <i>phank</i> cane, top part only <i>silicili</i>
<i>Saccharum bengalense</i>	<i>narkat</i>	cane for walls and ceiling <i>chatati</i> cane for baskets <i>kenari</i> cane for lamp stand for diwali festival
<i>Tifa augustifolia</i>	<i>pat or pater</i>	mats, fans, mattresses, howdahs
<i>Imperata cylindrica</i>	<i>khar</i>	thatch, brooms; flower head used as a for ceremonial lamp <i>kuwar bati</i>
<i>Eulaliopsis binata</i>	<i>buncas, sabai, babiyo</i>	rope, used for beds, chairs, bullock carts, tying thatch; paper
<i>Saccharum spontaneum</i>	<i>khans</i>	reeds and canes for walls, bed, thatch fodder

Ethnobotanical investigations conventionally require linguistic analysis, and an understanding of local terms for plants and their uses is crucial to shed light on the cultural as well as economic significance of different resources. A number of complications arise in obtaining local names for the grasses. First, a particular species may be given a different name, according to its use or which part of the plant is used, or its method of harvest or treatment. In the table above, for example, *Narenga porphorycoma* may be known by a generic term for cane or reed, *kharai* or *khadaï*. The same species has a number of alternative names, according to different uses and whether it is burned before it is cut, and whether the whole, or part of the plant is used. Secondly, complications arise because of different local languages and dialects. There are a number of different Tharu clans in the area, who may give different names to the grasses. There are marked differences between the terms used around Chitwan (and differences in pronunciation, for example, between *kharai* and *khadaï*) and those used around Bardia.

Table 1 gives the terms most commonly reported and used in Bardia, some are Tharu names, others Nepali. A number of different terms are used locally for the same grass, as in the case of *Eulaliopsis binata*. This may reflect the uses and cultural importance of the species. Martin (1995) observes that species of great cultural significance are *over-differentiated*, or split into distinct categories by local people, whereas species that are less important are usually *under-differentiated*, or lumped together in a single generic. Use values will also be reflected by the number of different uses repeatedly cited by respondents (see Phillips *et al*, 1994, for a discussion of quantitative ethnobotanical techniques) and this would confirm the importance of the three products discussed above.

Table 1 gives some indication of the number of different uses for the grasses, and how important these resources are for local households. This is especially true in the case of house building, where the grassland provides raw material for walling (both small and large cane) and roofing (cane and thatch). But the grass products also have important cultural functions. For example, they are used in ceremonial lamps, and the flower head of *Imperata cylindrica* is used as a wick in lamps for temples or shrines. The grass cutting is an extremely important event in the annual calendar; preparations are made by the community in advance, and Tharu people celebrate the Maghi festival at the end of the grasscutting. *Saccharum spontaneum* has an important role in Hindu worship and plays a role in a number of festivals (Majupuria and Joshi, 1989). Some of these grass species also have medicinal uses. For example, *kush* grass (*Vetivera zizanioides*) is used in a number of traditional medical preparations as an astringent, diuretic, expectorant and stomachic (Majupuria and Joshi, 1989). This grass is also considered sacred by Hindus, being a reincarnation of the Lord Vishnu, and is used in a number of ceremonies, including weddings and funerals.

4. *The extent of harvesting in RBNP*

Since 1983 permits have been sold which enable local villagers to enter the protected areas in the Terai and collect grass and cane. This policy was initiated as a means of granting people partial recompense for the loss of access to these and other products as a result of protected areas implementation, and to improve relations between the local community and the Parks Authorities. In the past a nominal fee of 1NR (75NR = £1, in 1994) was imposed, which acted as a means of controlling the total numbers of grass collectors, and also enabled the DNPWC to keep a tally of the numbers entering the protected areas over the 15 day period, and to cover administration costs

However, as the numbers of people entering the protected areas increased over the years, the fee has been increased, and the cutting period has been shortened to 10 days. In RBNP in 1994/5 people reported paying 12 NR for a permit (equivalent to over 25% of one days wage of 40 NR), which would enable one person to enter the National Park each day for the 10 days. Each person can carry as much grass or cane as possible, but no carts or other means of transportation are allowed inside the protected areas. Around the entrance points, bullock carts are loaded to transport the biomass back to the village, but only people are allowed in the Park.

Table 2 shows the number of permits sold annually for grass cutting in RBNP since 1983. Permits are sold in advance of the cutting days, and are checked at each of 44 different entrance points around the Park perimeter by DNPWC and army officials during the grass cutting. Table 2 shows a steady increase in the number of permits sold, representing more than a doubling in the years 1983-1993 (i.e. greater than increase in the population), with 1994 showing the first drop in numbers, a decrease of some 4% of the 1993 figure. Over forty-three thousand permits were sold in 1994

Table 2: Number of grass-cutting permits sold in Royal Bardia National Park

Year	No of permits	Year	No of permits
1983	21082	1989	33142
1984	25367	1990	38117
1985	27824	1991	38962
1986	30586	1992	41413
1987	29161	1993	45531
1988	30241	1994*	43580

* Cutting period 2-11 January 1995; reduced from 15 to 10 days

A series of household surveys were conducted in sample villages in VDCs adjacent to the RBNP and inside the proposed Buffer Zone. Interviews were undertaken in the two weeks prior to the cutting period, and direct observations and enumeration of collecting during the 10 day cutting period. All of the households interviewed, with one exception, were sending adults into the RBNP to collect grass. Many households committed all their adult labour to this task, and although both

women and men participated, some households sent just adult males. From the survey, the average number of permits per household was 3.4, and the household size ranged from 5 to 40. The total numbers indicate that the average for the Buffer Zone is 2.34 per household. Total numbers of permits sold indicates that 32% of the total population of the defined Buffer Zone (i.e. the 16 VDCs adjacent to the RBNP) participate in the grass cutting. This is confirmed by the findings of the household survey: much of the available adult labour is deployed to the task of grass cutting and collection.

How does the demand for the grass by local communities compare with the supply of biomass inside the RBNP? There is an assumption by conservationists that over-exploitation, caused by increased numbers of cutters entering the park, is leading to changes in the composition of the grassland, and there is some anecdotal evidence of a decline in the quality of the thatch grass, perhaps caused by a change in the species mix.³ However, cutting and/or burning is required to prevent the grassland areas from succeeding to *sal* forest. On-going ecological experiments aim to examine the impacts of different cutting and burning regimes on the grassland diversity. But is there any evidence of over-exploitation of the biomass resources from the observations of the grass cutting?

Using the observations and measurements from the survey, and data from Pokarel's study (1993) on the area of the phantas, the total amount of thatch grass available from the southern *phantas* (Upper and Lower Baghaura, Upper and Lower Khauraha, and Lamkauli) is calculated and this is shown in Table 3. This gives the estimated production of biomass from the five southern *phantas*, using measurements from the 1994 survey.⁴ These calculations indicate that a total of 840825 bundles of *khar* were available from the five southern *phantas* in RBNP in January 1995. Observations of the grass collection, based on a sample of cutters entering and leaving the Park at Thakadwara Gate in the south west, indicate that the possible total harvest of *khar* may be in the region of 1049680 bundles, or approximately 2645193 kg. This figure is larger than the estimates

³ The change in quality may be a result of changes in the species mix, in the growth habit or quality of the plants themselves, or because cutters are utilising more marginal areas of grassland.

⁴ Bundles of grass harvested from Lower Baghaura *phanta* were sampled and weighed just prior to the cutting period. The average weight of a bundle was 2.52 kg. The same proportion of yield/productivity i.e. the same rate of offtake as Pokarel's study (1993) were assumed, and confirmed by field observations.

for the *phantas* alone, as small patches of grassland occur throughout the RBNP and will be utilised by local people

Table 3: Estimates of biomass production in five southern phantas in RBNP

	Area ha	Production t/ha*	Yield t/ha	No of bundles available
U Baghaura	41.6	13.98	8.5	140673
L Baghaura	58.7	8.06	4.9	114442
U Khauraha	94.7	11	6.7	251973
L Khauraha	34.5	8.57	5.2	71517
Lamkauli	111.3	9.74	5.9	262220
				840825 Total bundles

*Production is net primary production

This estimate of nearly 841000 bundles is likely to be an overestimate for a number of reasons. Firstly, the offtake rate may well be lower than estimated, as the observations may have been biased to the higher quality parts of the *phanta*. Secondly, the observations from Thakadwara gate were used, and then extrapolated to give a figure for the whole Park according to the number of permits sold at each gate. However, Thakadwara is situated close to the *phantas* so a higher proportion of *khar* may be removed through this gate. Thirdly, assumptions have been made about the amount of time spent collecting *khar* and other products, and (as indicated by observations) that *khar* collection was concentrated in the first three days of harvest. It has therefore been assumed that each of the 43580 people with permits will have collected *khar* for three days out of ten days. Such an assumption is confirmed by household interviews, although again this may be biased due to the geographical proximity of the surveyed villages relatively close to the southern *phantas*.

How do these estimates of harvest relate to the predicted demand? According to the village surveys, many households have at least one thatch roof, and in response to household interviews, an typical roof might require 250 bundles of *khar* for thatching every 2-3 years. Given the estimates of the yield, this implies that only 56 bundles are available per household in the Buffer Zone each year, or enough to thatch one roof per household every four to five years. These figures imply a

short fall in thatch available, which is confirmed to a certain extent by the interviews and information obtained from key informants. It may also go some way to explain the drop in the number of permits sold. A perception of scarcity of the grass means that people are not willing to invest the permit fee when they are not sure of collecting enough grass for their needs.

5. Assessing the economic importance and value of grass collection

The grass and cane collected from the protected areas of the Terai undoubtedly have importance, especially, as the foregoing discussion has shown, in terms of their uses in house building. Information on the relative importance of these products, and how households would fare if access were stopped, is essential for future management strategies. A number of different approaches can be made to assess the economic value of extracted biomass (see, for example, Martin, 1995, Godoy et al, 1993). Three approaches are most commonly used, based on the marketed value of products, the cost of time or labour involved in their extraction, or the cost of substitutes. For the purposes of this paper some indication of the relative value of these products and their importance in the livelihood strategies of local people is required. Limited data on the quantities of materials extracted, their local prices, and the costs of substitutes, primarily for *khar*, were collected and are now briefly discussed. This represents only a cursory survey of the economic values rather than a full analysis, and only concerns the direct use value of these resources. For a discussion of the range of economic values of non-timber forest products, see Chopra (1995).

In an earlier study by Lehmkuhl *et al.* (1988) the gross value of cane and grass collected from Chitwan National Park (RCNP) in January 1986 was calculated to be in the region of US\$ 451836. The net value, with labour and permit costs subtracted, amounted to US\$252103, as shown in Table 4. The study also examined the costs of alternative building materials, and concluded that most villagers close to the park do not have enough capital to invest in other supplies, but they do have the time to cut their own grasses. The standard of living of these people would therefore be lower, without access to park resources.

Table 4: The Value of Grasses and Cane collected from Royal Chitwan National Park, 1986

<i>Product</i>	<i>Number of loads</i>	<i>weight '000 kg</i>	<i>value million Nrupees¹</i>	<i>Value '000 US\$²</i>
<i>Khar</i>	162592	6406	4 55	206 9
<i>Kharai</i>	134265	4726	5 39	244.9
Total gross value			9 94	451.8
Net value ³			5 46	252.1

Source: Data from survey reported by Lehmkuhl et al. (1988)

Notes: 1. Local prices for *Khar* was 0.71 NR/kg, *Kharai* 1.14 NR/kg

2. Exchange rate of US\$1 = 22NR (1986)

3. Permit (1 NR pp/day) and labour costs (20NR pp/day) subtracted

Similar calculations for the amount of *khar* harvested from RBNP in January 1995, can be made using the estimates outlined in the preceding section. If it is assumed that 1049680 bundles were harvested at a cost of 1.5 NR per bundles (prices indicated in our household interview) then the gross value of production is 1574520 NR. If a labour cost of 40 NR per day (the agricultural wage rate) is assumed, and a permit cost of 12 NR per person, but that grass cutters spent only three days collecting *khar*, then the net value of *khar* from RBNP is in the region of 819133 NR, or £10922 or US\$16383 (75 NR = £1, 50 NR = US\$1 in 1994)

This figure is considerably lower than Lehmkuhl *et al.*'s estimate for RCNP in 1986. This is for a number of reasons. The biomass production and harvest, and the actual area of grassland, are considerably lower in RBNP than RCNP. Less people enter RBNP to cut grass than RCNP (some 80000 permits were sold in 1994 in Chitwan). The harvest period is now restricted to 10 days whereas it was 15 days at the time of Lehmkuhl *et al.*'s study. The costs of permits and labour are now higher than in 1986. The prices of the grasses differ, and around Bardia only a relatively small proportion of the grasses are sold. In addition there are a number of problems associated with using the price of labour to impute the value of extracted materials. Although the agricultural wage rate of 40NR per day is used, this does not accurately reflect the opportunity cost of time, as the two weeks when grass collection takes place are the slack season for farm labour, and it is unlikely that there are many employment opportunities at that time.

The economic value may not reflect or be indicative of the cultural significance of these resources (see Brown, 1994a for a discussion) Despite the apparently low economic value of the grass using this type of analysis, these findings indicate that the grass is a very important resource, especially for the Tharu people This is confirmed by the cast range of uses - most important in housing - grain silos, beds, mats, bullock carts and other uses. There are few - or no - alternative sources of grass outside the protected areas. Perhaps surprisingly, the survey found only limited local markets for thatch and cane, although there are reciprocal arrangements between friends and neighbours. The grass cutting has great cultural significance - in terms of the uses (for example, in ceremonial lamps in religious activities) - and as a social event, and is linked to the Maghi festival The next section discusses some of the management issues which will affect the access and use of the Park resources by local people and whether they are able to participate more fully in the management of the protected area and the surrounding Buffer Zone.

6. *Management options: Property rights, access and equity*

Successful management strategies require that the competing demands for conservation of biodiversity, livelihoods of local people, and tourism need to be reconciled. Trade offs between these competing needs may be necessary A range of different interest groups and stakeholders are concerned with these competing demands, and these may have access to differing sources of power, scales of influence and means of reaching their aims, as analysed for the protected areas of the Terai in an earlier paper (Brown 1994b) The Parks and People project proposed by the HMG and UNDP attempts to reconcile these demands primarily through the creation of Buffer Zones in areas adjacent to the protected areas in the Terai (HMG/UNDP, 1994).⁵

Prospective activities in the buffer zones include community forestry and community development activities including income generating schemes. The HMG/UNDP project document specifies few of these, beyond suggesting craft production, sericulture, food processing, weaving, handmade paper, apiculture, herb cultivation and processing as possible activities. The expected outputs from the project are: reduction in wildlife/people interactions; widespread conservation awareness among women and men in the community; availability of fodder and fuelwood in the Buffer Zone; use of

⁵ The Buffer Zone legislation awaits final approval by the HMG (May 1995) Funding for three year has been granted by UNDP. The DNPWC will be the main implementing agency and recruitment of project personnel has already proceeded.

driftwood for community development work, implementation of income generating, community development and community forestry programmes in the Buffer Zone HMG/UNDP, 1994 16).

The mechanisms through which these objectives will be achieved centre on participatory management, increased park-related employment and access of local communities to economic benefits from the local tourism industry. Currently local communities have no formal role in the management of any of the parks or reserves under DNPWC control. The Parks and People Project makes a commitment to the involvement of local people in management of the protected area and buffer zone in the form of user groups whereby: "The concerned Warden may constitute an "Users Committee" or "Group" in co-ordination with local agencies for the management of fallen trees, dry wood, firewood, fodder and grass inside the national park, reserve, conservation area or buffer zone. An amount ranging from 30-50% of the income earned in a national park, reserve or conservation area can be used for the community development in consultation with local agencies and communities. This fund will be a key element in the sustainability of future park management activities" (HMG/UNDP, 1994 3)

The utilisation of these funds raises the question of the revenue generating capabilities of DNPWC. Currently, revenue is raised by entry fees, permits for grass cutting, elephant hire, concessions and penalties. The current proposals that a proportion of this be recycled back into local communities may be a viable proposition, in terms of providing a meaningful amount of money, in the case of RCNP which is visited by over 50000 tourists each year. However, RBNP receives little over 5000 visitors, and Suklaphanta National Park in the far west, and Kosi Tappu Wildlife Reserve in the east even fewer.

The lack of benefits of tourism captured by local people around the Terai protected areas is also difficult to resolve, as the mode of tourism makes decentralised, small scale activities to instigate, compared, for example, with the experiences of the Annapurna Conservation Area Project in the Himalayas (see Brown, 1994b, Wells, 1993).

A number of problems are posed in facilitating participation of women, tribal people, and poorer people in management and decision making. The People and Parks document stresses the importance of getting women involved in the decision-making and management - to the

extent that user committees will have to consist of at least 50% women (P&P HMG/UNDP, 1994: 28) This is likely to be extremely difficult in practice, as evidenced by Mary Hobley's study of social forestry in Nepal (Hobley, 1991) Although women may be nominally on committees, a number of factors will prevent them participating actively in meetings and decision making. Likewise, poorer people and tribal groups will be excluded.

According to the HMG/UNDP document, the land ownership of local residents are not affected by activities relating to conservation and management of the buffer zones, but implementation of the plans involves attenuation of property rights to a whole set of different resources In setting up user groups and joint management, the states aims to create community management of resources in the Buffer Zone Again, however, there are numerous problems in such a strategy, the fundamental issue being that of power and legitimacy According to Lynch and Alcorn (1994:374) who conceptualise community property regimes as a mix of individual and group rights, "the distinguishing characteristics of community-based tenure systems is that they draw their primary legitimacy from the community in which they operate and not from the nation state". How then can state imposed community management be resolved, or top-down participatory management be facilitated? This issue remains to be resolved, despite the rhetoric of Nepal's enlightened policy objectives.

7. *Conclusions - extraction, rights and sustainability*

This paper has reported the results of fieldwork conducted in and around the RBNP and has also discussed a number of issues of wider significance to the protected areas in the Terai. Human intervention is necessary to maintain the supply of *khar* (thatch) which is a vital resource for local communities. Research indicates that certain households - tribal Tharu people and those with access to less land and other productive resources - may be more dependent on the biomass materials extracted (legally and probably illegally) from RBNP. The grassland materials, *khar*, from the wooded savannah areas and the *phantas*, and cane and reeds from the floodplains, are especially important for house building. Grasses are also used for a number of other practical and ceremonial functions.

The ecological impacts and sustainability of these practices are currently uncertain, although ecological experiments on-going under the current research programme, intend to shed some light

on any changes occurring in the grasslands. On the one hand, biologists argue that the disturbance associated with cutting and burning will have detrimental impacts on small animals, insects and birds, whilst, on the other, the flush of short grass resulting from burning may encourage ungulate species. These in turn attract large predators such as tigers, which are most highly prized by tourists. There is therefore much uncertainty, further clouded by the vested interests of the parties concerned, of the relative benefits and costs of current management regimes. It may well be that certain types of cutting and burning, at particular times of the year, produce the mosaic of habitats which optimise multiple uses by both animals and humans (see Peet, 1994). The diversity of the grasslands, where a patchwork of diverse habitats is provided by micro-scale differences of site, means that planning needs to take localised features into account, rather than attempting to implement one regime across all the Terai protected areas

The current management strategy puts an emphasis on resources outside of the protected area - in the Buffer Zone - and plans to invest revenue here, to provide benefits for local residents in order to improve relations with the DNPWC, and at the same time take pressure off the resources inside the Park. However, it is unlikely that the Buffer Zone will be able to provide alternatives to the grass resources, save perhaps for encouraging the establishment of tile making workshops to substitute for thatch. The extraction of grass products from the Parks will continue. Implications of changing property rights regimes, whether the user groups established under the Buffer Zone Management Plan will be able to effectively incorporate local users into Park management, and enable presently under-represented groups such as indigenous people and women, remains to be seen.

In summary, the rich biological diversity of the Terai protected areas is maintained in part by human intervention. There is mixed evidence of what changes are taking place in the grasslands and the long-term impacts of current management. Effectively, the Parks are managed as restricted Extractive Reserves, and the main issue for investigation concerns identifying sustainable rates of utilisation. Proposals for management of resources outside the protected areas involve implementing Buffer Zones, and the critical issue here is how effective participation of local people can be facilitated. These two mechanisms, the Extractive Reserve and the Buffer Zone have significant implications for property rights, local livelihoods and sustainable conservation of biodiversity.

References

Brown, K. (1994a) Approaches to Valuing Plant Medicines The Economics of Culture or the Culture of Economics? Biodiversity and Conservation 3 734-750.

Brown, K. (1994b) Conservation or Development in Nepal's Terai? Resolving Land Use Conflicts in Asia's Last Land Frontier CSERGE Working Paper GEC 94-23, University of East Anglia and University College London

Central Bureau of Statistics (1993) Statistical Yearbook of Nepal. CBS, HMG, Kathmandu.

Child, B. (1993) Zimbabwe's CAMPFIRE programme: using the high value of wildlife recreation to revolutionise natural resource management in communal areas Commonwealth Forestry Review 72 284-296

Chopra, K. (1995) The Valuation and Pricing of Non-timber Forest Products A Study in Raipur District of Central India Mimeo, Institute of economic Growth, Delhi.

Cox, T. (1990) Land Rights and Ethnic Conflict in Nepal. Economic and Political Weekly(June 16-23, 1990), 1318-1320

Dasmann, R.F. (1991) The Importance of Cultural and Biological Diversity. In Oldfield, M. and J.B. Alcorn (eds) Biodiversity: Culture, Conservation and Ecodevelopment Westview Press, Boulder pp7-16.

Dinerstein, E. (1979) An Ecological Survey of the Royal Karnali-Bardia Wildlife Reserve, Nepal Part 1 Vegetation, Modifying Factors and Successional Relationships Biological Conservation, 15, 127-150.

Gadgil, M. (1993) Biodiversity and India's Degraded Lands Ambio 22.2-3 167-172.

Ghimire, K. (1992). Forest or Farm? The Politics of Poverty and Land Hunger in Nepal Delhi: Oxford University Press.

Godoy, R., R Lubowski and A. Markandya (1993) A Method for the Economic Valuation of Non-timber Tropical Forest Products. Economic Botany 47.3 220-233

HMG (1993). Nepal Environmental Policy and Action Plan: Integration Environment and Development. Environment Protection Council, Kathmandu.

HMG/UNDP (1994) Parks and People Project Document. DNPWC, Kathmandu.

Heinen, J. T., & Kattel, B. (1992) A Review of Conservation Legislation in Nepal: Past Progress and Future Needs. Environmental Management, 16(6), 723-733

Heinen, J. T., & Yonzon, P. B. (1994). A Review of Conservation Issues and Programs in Nepal: From a Single Species Focus toward Biodiversity Protection. Mountain Research and Development, 14(1), 61-76.

Hobley, M. (1991) Gender, Class and Use of Forest Resources Nepal. In Rodda A (ed) Women and the Environment. Zed Books Ltd., London pp146-150.

Lehmkuhl, J F., Upreti, R. K., & Sharma, U. R (1988). National Parks and Local Development: Grasses and People in Royal Chitwan National Park, Nepal Environmental Conservation, 15(2), 143-148

Lynch, O.J. and J.B.Alcorn (1994) Tenurial Rights and Community-based Conservation. In Western, D., and R.M.Wright, Natural Connections: Perspectives in Community-based Conservation. Island Press Washington DC pp373-392

Majupuria, T.C. and D.P.Joshi (1989) Religious and Useful Plants of Nepal and India M.Gupta, Lashkar, India.

Martin, G.J. (1995) Ethnobotany Chapman and Hall, London.

Peet, N. (1994). Fire and Biodiversity Conservation in the Tall Grasslands of Nepal and Northern India. Mimeo, School of Biological Sciences, University of east Anglia, Norwich, UK

Phillips, O., A.H.Gentry, C Reynel, P.Wilkin and C.Galvez-Durand B. (1994) Quantitative Ethnobotany and Amazonian Conservation. Conservation Biology 8.1:225-249

Pokharel, S.K. (1993) Floristic Composition, Biomass Production and Biomass Harvest in the Grassland of the Royal Bardia National Park, Nepal. Msc Thesis, Agricultural University of Norway, As, Norway

Resources Nepal (1994). Habitat Himalaya Resource Nepal Newsfile January-February, p2. Resources Nepal, Kathmandu.

Schwartzman, S. (1989). Extractive Reserves: The Rubber Tappers' Strategy for Sustainable Use of the Amazon Rainforest. In J. O. Browder (Eds.), Fragile Lands of South America (pp. 150-165). Boulder CO Westview Press

Stocking, M., & Perkin, S. (1992). Conservation-with-Development: An Application of the Concept in the Usambara Mountains, Tanzania. Transcriptions of the Institute of British Geographers, 17, 337-349.

Upreti, B.N (1994). Royal Bardia National Park. National Planning Commission, HMG, Nepal, in Collaboration with IUCN.

Wells, M. (1992). Biodiversity Conservation, Affluence and Poverty: Mismatched Costs and Benefits and Efforts to remedy Them. Ambio, 21(3), 237-243.

Wells, M., & Brandon, K. (1992). People and Parks: Linking Protected Area Management with Local Communities. Washington D.C.: The World Bank, The World Wildlife Fund, US Agency for International Development.

Wells, M , & Brandon, K. (1993). The Principles and Practice of Buffer Zones and Local Participation in Biodiversity Conservation. Ambio, 22(2-3), 157-162

Wells, M P (1993). Neglect of Biological Riches. The Economics of Nature Tourism in Nepal. Biodiversity and Conservation, 2, 445-464

Wells, M. (1994) A Profile and Interim Assessment of the Annapurna Conservation Area Project, Nepal. In Western, D., and R M Wright, Natural Connections: Perspectives in Community-based Conservation Island Press Washington DC pp261-280