

Trend Analysis and Purpose of Use of Some Important Plant and Animal Species of Ghandruk VDC, Nepal

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Abstract

Ghandruk is one of the famous tourism VDC of Annapurna Conservation Areas (ACA). Trend analysis and propose of use of plants and animal species of Ghandruk Village Development Committee of Kaski district, western part of Nepal was carried out. A total of 54 plant species and 18 animal species with high local economic value were documented from structured questionnaire, interviews, key informants interviews, and focused group discussion with representatives and ACAP staffs. Trend analysis shows that most of the species increased during the past 20 years. All species are equally important for their purpose of uses. *Michelia champaca*, *Schima wallichii*, *Castanopsis indica* are very important trees for timber production. *Quercus lamellosa*, *Q. semicarpifolia* and *Ficus roxburghii* are very good fodder species. *Alnus nepalensis* colonizes landslides and degraded sites very successfully. Leaf extract of *Ageratum conyzoides* and fur of *Lepus nigricollis* is used to control bleeding from cuts and wounds. Medicinal plants, *Terminalia bellirica*, *Terminalia chebula*, *Acorus calamus* and *Curcuma langa* are used to control cough and bronchitis. The litter of plants is used to make compost fertilizer. Some animals were found the important medicinal purposes, some other used for control mouse populations. Some animals like *Canis aureus* and *Martes flavigula*, however, were found to be pests for domestic animals.

Key words: Medicine, timber, fodder, resource, sustainable, Ghandruk, Nepal

Introduction

Analysis of observed temperature and precipitation records in Nepal shows that temperature in Nepal is increasing at a high rate in comparison to other mountains of the world (Shrestha *et al.*, 1999). The warming seems to be consistent and continuous after the mid-1970s and found to be more pronounced at high altitude. Therefore, the studies of climate change are urgently needed in order to better understanding the linkage between changing climatic pattern, increasing natural hazards and its effects on livelihood. But the climatic records in Nepal

are very limited. Most of the meteorological stations are located at lower elevation (<2000 m), therefore time series analysis of recorded climate data for the assessment of climate change at higher altitude is not possible. We need to identify alternative way to study climate. One of such alternative could be dendrochronology, and dendroclimatology.

Nepal, a small Himalayan kingdom with an area covering 147,181 km², representing 0.03% and 0.3% of the total land of the world and of Asia, respectively,

is endowed with rich biodiversity. Over 7,000 species of plants, 175 species of mammals and 861 species of birds are recorded in Nepal (BCDP, 1994). Vegetation is an important carrier of biodiversity (Hellier *et al.*, 1999). In addition, forests provide a wide variety of ecological services, which should be maintained. Social sustainability requires that natural resource use meets human needs without disrupting environment and social harmony beyond capacity of social structure to tolerate such change (Wollenberg, 1995). The forest biomass (timber, wood) is an important source of fuel, fodder, or building material. The value of forest as an energy resource is very important, providing 75% of total energy needs in Nepal (MOPE, 1998).

This study examines the allocation of natural resources in Ghandruk village. Forest resource management in Ghandruk has been documented by several authors (Rayamajhi, 1994; Jones, 1996; Banskota and Sharma, 1997). Rayamajhi (1994) emphasized that the management of forest resources should lie with the people themselves since they have detailed knowledge of the local ecology and environment and know which methods are appropriate to the means, organizations, and traditions of their community. There is remarkable ethnic and biological diversity and wealth of indigenous knowledge of plants and animals with economic value (Tamang, 2003). In absence of alternative modern medicine and belief on the traditional medicine, plants will continue to be a major source of medicine in near future for the people living in the Himalayas (Shrestha and Jha, 2009).

Jones (1996) stated that community development and biodiversity conservation

are complementary concepts and considered that social development without biodiversity conservation and biodiversity conservation without social development are inappropriate processes. Jackson and Ingles (1995) discussed several factors that limit Nepal's efforts to increase the welfare of rural people and manage natural resources in sustainable manner.

Ghandruk is one of villages, with social harmonies, cultural sharing and community work participating. There is an outstanding indigenous knowledge of plant and animal species with high economic value. Trend analysis and documentation of plant and animal species with their economic value is helpful to preserve the record of diversified utilization of the flora and fauna in the study area.

Ghandruk VDC lies in Kaski district (28.49°N- 83.84°E) of Gandaki zone, western Nepal. It is on the route to Annapurna Base Camp with 30,000 trekker visits annually (BCDP, 1994). It is situated at an elevation of 1,975 m asl on the west slopes of the Modi watershed. The topography is moderately steep with aspects mainly facing south. Monsoonal precipitation is relatively high with an average of 3000 mm annual precipitation (BCDP, 1994). Ghandruk in 2008 had a total population of 6,158 people (2,993 male and 3,165 female). About 1446 households exist with an average household size of 4.25 people (ACAP, 2008). The majority belongs to the Gurung people with occupational castes and Brahmins intermingled at the periphery of the main Ghandruk villages. The local economy is characterized by agriculture (maize, millet, barley, rice and wheat are the major crops, while potatoes, mustard and other vegetables are also grown) livestock farming, overseas

employment and tourist trade. Buffaloes are kept for milk, ox are kept for ploughing, while cows are kept by few Gurungs, Brahmins and other castes. Sheep and goats are raised for wool and meat. Woollen products are essential for making Bakkhu (warm woollen cloth) which is used to keep off the rain and the mountain chill (BCDP, 1994).

Materials and methods

Based on primary and secondary data sources both quantitative and qualitative data have been collected during summer 2008. The primary data were collected during field work through household surveys, interviews of key informants, informal interviews, focused group discussions with user member and officials, and direct field observations. The secondary data were obtained from published and unpublished materials such as office records, ACAP reports, community forest administration, local government and community, journals and reports. Besides these, different accessible resource libraries (TU, TUM, ACAP Pokhara) were approached. Stratified random sampling was used to select the sample households. Household surveys were carried out using a random sample of 46 respondents, comprising 22 males and 24 females. The main respondents were heads of households. Other members of households were also requested to share knowledge and opinions. The Conservation Area Management Committee members, women, Dalit and ACAP people were called upon and made focused group discussion to express the existing situation in regards to participation, transparency, accountability and predictability of the group. The discussions

were made at groups and a total of 15 participants were involved for expressing their opinions and thoughts. The collected specimens were identified with the available literature (Shrestha, 1997; Shrestha, 1998; Polunin and Stainton, 1984) and for further confirmation specimens were taken to Godawari herbarium (KATH) and Central Department of Botany. 52 important species of plants and 18 species of animals were studied.

Results and discussion

The analysis shows that only few species of the study area, important for different purposes, increased. The number of plant and animal species, which Ghandruk people use for different purposes either from traditional knowledge or modified knowledge is remarkable (Tabs. 1-2). During the survey we also noticed that not only the utilisation increased but also the conservation awareness among local people resulting from environmental education. Observations of animal track counts, pellet counts and direct observations of selected species such as barking deer (*Muntiacus muntjak*) and Himalayan tahr (*Hemitragus jemlahicus*) indicated higher abundances within ACA (Bajracharya *et al.*, 2005). In turn people living in and around Ghandruk became aware on the importance of natural resource and the benefits of plant and animal species, which enhances them for the establishment of different user groups like Women Group. The mean density of cut tree stumps was significantly lower inside ACA, associated with a decline in use of fuel wood as an energy source over the past decade. Study survey also shows that population of most of all plant and wild animal species increased. Similar results

Table 1. Main plant species used in Ghandruk village and status trends

Local name	Botanical name	Propose of use	Part Used	Status trend- last 2 decades
bhojho	<i>Acorus calamus</i> L.	Medicine for cough and bronchitis	Stem	Increased
ghandhe jhar	<i>Ageratum conyzoides</i> L.	Medicine for cuts and wounds	Leaf extract	Increased
uttis	<i>Alnus nepalensis</i> D.Don	Fuel, wood, timber, litter	Wood, leaf	Increased
tite pati	<i>Artemisia indica</i> Willd.	Medicine for nausea problem and intestinal worms, cultural value, nursery seed cover, fodder for goat	Leaf, root, flower,	Increased
nigalo	<i>Arundinaria aristata</i> Gamble	Vegetable, handicraft, decoration (rest., hotel, house) fence	New shoot (tusa) leaf, wood	Constant
kurilo	<i>Asparagus racemosus</i> Willd.	Vegetable, medicine	Baby plants, roots	Constant
koiralo	<i>Bauhinia variegata</i> L.	Medicine for dysentery, piles, diarrhoea, worms and fodder	Flower, leaf and seed	Increased
chutro	<i>Berberis aristata</i> DC.	Medicine for fever, jundice and fodder	Stem, leaf and fruit	Increased
chuletro	<i>Brassiopsis polycantha</i> (Wall.) Banerjee	Fodder, fuel, recreation	Leaf, wood	Increased
simal	<i>Bombax ceiba</i> L.	Gum, timber, fuel, medicine for dysentery and diarrhoea	Bark, leaf, seed and wood	Constant
kalki phool	<i>Callistemon citrinus</i> (Curtis) Skeel	Fodder, fuel, ornamental	Leaf, wood	Increased
gaja	<i>Cannabis sativa</i> L.	Use for pain killer, smoke	Leaf, seed	Constant
gholtapre	<i>Centella asiatica</i> (L) Urb	Medicine for skin disease and digestion	Steam and leaf	Increased
haledo	<i>Curcuma langa</i> L.	Medicine for cough and bronchitis and use as gradients in vegetables	Leaf and powder	Increasad
akash beli	<i>Cuscuta reflexa</i> Roxb	Medicine for jundice	Tendril	Increased
kaduz	<i>Castanopsis indica</i> (Roxb.) Miq.	Timber	Leaf, wood, steam	Increased
panisaro	<i>Cautleya spicata</i> (J.E. Smith) Baker	Juice, medicine, used for hot	Leaf, roots	Increased
lapsi	<i>Choerospondias axillaries</i> (Roxb.) B.L. Brutt & A.W. Hill	Wood, pickle, fuel, jam	Fruits, wood	Constant

dalchini	<i>Cinnamomum tamala</i> (Buch.-Ham) Nees & Eberm.	Tobacco, tea and species	Root, wood cover, leaf	Increased
haledo	<i>Curcuma angustifolia</i> Roxb.	Medicine	Roots, leaf	Increased
panchaule	<i>Dactylorhiza hatagirea</i> (D. Don) Soo	Medicine used paste on burnt part of human and animal	Roots, leaf	Increased
dar	<i>Debregeasia salicifolia</i> (D. Don) Rendle.	Cultural value, recreational, wooden pot, fuel. Wood	Wood, leaf	Increased
tama bans	<i>Dendrocalamus hamiltonii</i> Nees & Arn.ex Munro	Vegetable, handicraft decoration, fence, fuel	Baby bamboo, leaf, wood	Increased
dudhilo	<i>Ficus nerifolia</i> Sm.	Fodder, fuel	Leaf, wood	Increased
nimaro	<i>Ficus roxburghii</i> Wall.	Fuel, fodder, cultural value, fruits	Leaf, wood, fruits	Increased
khainyu	<i>Ficus semicordata</i> Buch.-Ham.ex Sm.	Fodder, fuel, wood	Leaf, wood	Increased
okhar	<i>Juglans regia</i> L.	Fruits, wood, fuel, cultural value	Fruits, leaf, wood	Constant
ashuro	<i>Justicia adhatoda</i> L.	Medicine	Leaf	Increased
siltimur	<i>Litsea cubeba</i> (Lour) pers.	Medicine for cholera, also use in vegetables and pickel	Seed	Constant
angeri	<i>Lyonia avalifolia</i> (Wall.) Drude	Medicine, reduce blood pressure	Leaf, fruits	Increased
mallow	<i>Malva neglecta</i> Wallr.	Juice, jam	Fruit	Increased
bakaino	<i>Melia azedarach</i> L.	Medicine for fever, headache, loose bowel and fuel	Seed and trunk	Constant
champ	<i>Michelia champaca</i> L.	Fuel, wood, cultural value,	Wood, leaf, root	Increased
kerā	<i>Musa paradisiaca</i> L.	Fertilizer, medicine for diarrhoea and dysentery	Leaf extract	Increased
kutki	<i>Neopicrorhiza scrophulariiflora</i> (Pennell) D.Y. Hong	Medicine for blood pressure fever	Leaf, Roots	Increased
satuwa	<i>Paris polyphylla</i> Smith	Medicine (root paste) for fevers	Roots, leaf	Constant
sallo	<i>Pinus roxburghii</i> Sargent	Fuel, wood, electricity pole,	Wood, leaf, root	Increased
gindari	<i>Premna intergrifolia</i> L.	Medicine for Gum problem, fuel and also use to make sticks	Bark, leaf and branches	Constant
painyu	<i>Prunus cerasoides</i> D.Don	Fuel, fodder, jam	Leaf, wood, fruits	Increased
ambak	<i>Psidium guajava</i> Linn	Medicine for Diarrhoea, dysentery	Leaf and bark	Constant

ghangaro	<i>Pyracantha crenulata</i> (D.Don) Roem	Fodder, fuel,	Leaf, wood	Increased
falant	<i>Quercus lamellosa</i>	Fodder, control landslides	Leaf, wood	Increased
kharsu	<i>Quercus semicarpifolia</i>	Fodder, fuel	Leaf	Constant
lali guars	<i>Rhododendron arboretum</i> Smith	Recreational, fuel, medicine,	Lower, wood, leaf	Increased
aiselu	<i>Rubus ellipticus</i> Smith	Medicine, juice, fruits	Fruits	Increased
gogan	<i>Sautauia nepalensis</i> DC.	Fuel, fodder	Wood , leaf	Increased
chilaune	<i>Schima wallichii</i> (DC.) Korth.	Fuel, wood, medicine for fever, leaf for compost fertilizer	Wood, bark, leaf	Increased
thaune	<i>Taxus bacatta</i> L.	Poison for fodder, fuel, stick	Leaf	Decreased
barro	<i>Terminalia bellirica</i> C.B. Clarke	Medicine for cough and bronchitis	Seed	constant
harro	<i>Terminalia chebula</i> Retz	Medicine for cough and bronchitis	Seed	constant
ban kapas	<i>Thespesia lampas</i> (Cav.) Dalz.et Gibs	Medicine	Tendril	Increased
sisnu	<i>Urtica dioica</i> L.	Vegetable, animals grasses	Leaf	Decreased
harchure	<i>Viscum articulatum</i> Burm.f.	Medicine	Roots	Increased
timur	<i>Zanthoxylum armatum</i> DC.	Medicine, fuel, wood, grasses	Fruit, leaf	Increased

Table 2. Main animal species used in Ghandruk village and status trends.

English name (local name)	Scientific name	Use for	Part used	Status trend-last 2 decades
Lrrawaddy squirrel (lokharke)	<i>Callosciurus pygerythrus</i>	Hunter of mouse (mouse population control)	-----	Increased
Jackal (syal)	<i>Canis aureus</i>	-----	-----	Increased but pest
Wolf (fauro)	<i>Canis lupus</i>	-----	-----	Increased
Serow (thar)	<i>Capricornis sumatraensis</i>	Meat, shoes, belt, ornament	Body, skin, horns	Increased
Monkey (bander)	<i>Cercopithecus hamlyni</i>	-----	-----	Increased

Mongoose (nawori musa)	<i>Herestes edwardsi</i>	Hunter of mouse (mouse population control)	-----	Increased
Porcupine (dumsi)	<i>Hystrixis brachyura</i>	Recreation, meat, medicine of asthma	Skin, quills , liver	Increased
Rabbit (kharayo)	<i>Lepus nigricollis ruficaudatus</i>	Meat, medicine to stop bleeding, recreation	Fur, skin, teeth	Increased
Monkey (pahare bander)	<i>Macaca assamenis</i>	-----	-----	Increased
Monkey (rato bander)	<i>Macaca mulatta</i>	-----	-----	Increased
Martens (malchapro)	<i>Martes flavigula</i>	-----	-----	Increased but pest
Musk deer (kasturi)	<i>Moschus leucogaster</i>	Medicine	'seductive musk'	Increased
Barking deer (ratuwa mirga)	<i>Muntiacus muntjak</i>	Recreation, meat, leather, medicine for pneumonia	Horns (male), body, skin, liver	Increased
Goral	<i>Naemorhedus goral</i>	Medicine, meat, recreation, leather	Skin, body	Increased
Common Leopard (chituwa)	<i>Panthera pardus</i>	Leather, decoration	Leather, teeth	Increased
Tiger (pate bag)	<i>Panthera tigris</i>	Leather, recreation	Skin, teeth	Increased
Monkey (longur bander)	<i>Semnopithecus schistaceus</i>	Medicine for Jaundice	Liver	Increased
Black Bear (bhahu)	<i>Ursus thibetanus</i>	Medicine, food, meat, recreation	Gall baldder, teeth	Increased

were drawn by Bajracharya *et al.* (2005).

Two animals, *Callosciurus pygerythrus* and *Herestes edwardsi*, were found to control mouse populations (Adhikari, 2008). Wild animals were for recreation both hunting and watching, and also meat and leather from wild animal species used for decoration and ornamental purposes. Liver of *Muntiacus muntjak*, *Semnopithecus schistaceus* and *Hystrixis brachyura* is known to cure asthma, jaundice and pneumonia diseases. Similar findings can be drawn from the study of

Tamang (2003). However, *Canis aureus* and *Martes flavigula* were found as pest animal for poultry farm and kids of goat in Ghandruk VDC.

Relative preferences of utilisation of tree species as for timber production are *Michelia champaca*, *Alnus nepalensis*, *Bobbax ceiba*, *Castanopsis indica*, *Pinus roxburghii*, *Schima wallichii*. Their timber is of high value, and also branches are used as fuel wood. As a fuel wood tree, *Alnus nepalensis* and *Dendrocalamus hamiltonii* are ranked highest in preference. *Alnus*

nepalensis, a native species, colonizes landslides and degraded sites very successfully (Jackson, 1994).

Quercus lamellosa (falant) is preferred as a fodder species. It has profuse regeneration in the area. *Quercus semicarpifolia* (kharsu) is also regarded as an important fodder resource in Ghandruk. Primarily, the species are ranked on the basis of the multiplicity of its utilization. Generally, the species which grow faster and favour the climate of the area are deemed significantly (Adhikari, 2008). One of the examples is *Ficus roxburghii* (nimaro) that has become increasingly popular as a fodder species in Ghandruk. On the basis of preferential order, the species are selected for plantations. Similarly, *Brassiopsis polycantha*, *Ficus nerifolia*, *Ficus semicordata* and *Prunus cerasoides* are also significantly used as fodder plants in Ghandruk.

Leaf extract of *Ageratum conyzoides* and fur of *Lepus nigricollis* is used to control bleeding from cuts and wounds. Medicinal plants such as *Terminalia bellirica*, *T. chebula*, *Acorus calamus* and *Curcuma langa* are used to control cough and bronchitis. The leaf and stem extract of *Psidium guajava* is used as a medicine for diarrhoea and dysentery. Similarly, the leaf extract of *Musa paradisiaca*, *Bauhinia variegata* and *Bombax ceiba* is also used to control diarrhoea and dysentery.

From the study we can conclude that all plants and animals are not over used. Plants and animals are important for people and people are conscious to use them so their status in Ghandruk village is significant, because people have indigenous and tradition knowledge in the utilisation of natural resources for various purposes. But this tradition and indigenous knowledge has

been passing on orally from generation to generation without keeping any records. For that reason, it is necessary to keep such traditional and indigenous knowledge of plants and animals with out losing valuable purpose of use forever.

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