PLANT INVENTORY AND ETHNOBOTANICAL STUDY OF KHIMTI HYDROPOWER PROJECT, CENTRAL NEPAL

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Abstract: The present study is related to plant species and their utilization by the local people inhabiting in the project area of Khimti Hydropower project, central Nepal. We collected the plant species and ethnobotanical data using questionnaire survey and group discussion methods. A total of 96 plant species belonging to 86 genera and 58 families were reported. The highest numbers of plants were used as medicine (46 plant species) followed by fodder (21 plant species) and edible (18 plant species) categories. Although the project impacted area of Khimti Hydropower had relatively moderate biodiversity, there were many medicinal and other ethnobotanically useful plants. To fulfill the loss caused by project, local communities should be made aware about the proper management of biodiversity and it is necessary to have cultivation of highly used as well as potentially important plants outside the project area.

Keywords: Ethnobotany; Environmental impact assessment; Khimti hydropower project.

INTRODUCTION

Biodiversity refers to variety of life and is unevenly distributed across the world (Gaston, 2000). Nepal with varied type of bioclimate is rich in biodiversity (Chaudhary, 1998) but is too heterogeneous across the country. People in Nepal are very much dependent on biodiversity to fulfill various needs. There are many studies carried out related to the use of biodiversity (see Chaudhary 1998; Shrestha et al., 2004; Joshi and Joshi, 2005) and several other studies have also assessed the particular uses of biodiversity locally in various parts of Nepal (e.g., Manandhar, 2002; Shrestha *et al*., 2004; Baral and Kurmi, 2006; Rokaya *et al*., 2010, 2012; Uprety *et al*. 2011).

It has been repeatedly pointed out that biodiversity has declined due to human induced activities such as haphazard over-harvesting, forest fires, shifting cultivation, deforestation, habitat encroachment in Nepal (Chaudhary, 1998). Different natural hazards like landslides, heavy rainfall, etc. also often contribute in depletion of various biodiversity components such as medicinal plants. In addition to above mentioned points, many human needed developmental activities (construction of roads, hydropower, etc.) too have negative impact on biodiversity. Thus, Nepal which is biodiversity rich and is embracing many developmental activities needs proper monitoring and risk assessment of upcoming developmental projects. Nepal has mandatory provision to have Environmental impact assessment (EIA) or Initial Environmental Assessment (IEA) or Initial Environmental Examination (IEE) for all kinds of developmental projects (MoFSC/NCSIP, 1995). These two tools help to identify and evaluate the possible impacts caused by any developmental projects (Bhatta and Khanal, 2009).

The present study is related to plant inventory and their utilization by the local people inhabiting in the project area of Khimti Hydropower project located in between Ramechhap and Dolakha Districts, central Nepal. We specifically try to answer the following questions in the present research: What is floral diversity in Khimti area? How is the plant diversity used by local people?

MATERIALS AND METHODS

Study area

The study area is located in between 86 º19'20" E to 86º21' 40" E longitudes and 27º39'24" to 27º41' 54" N latitudes that is about 188 Km east of Kathmandu in between Ramechhap and Dolakha districts. It falls inside the recently established Gaurishanker Conservation Area.

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The study was conducted in the Chuchure VDC of Ramechhap and Shyma VDC of Dolakha district. Total population of these two VDCs is 4778, accounting 52 percent of female population (2001 Census). These VDCs have 906 households with an average household size of 5.3. Major caste and ethnic groups inhabiting in the study area are Chhetri and Sherpa. Other caste/ ethnic groups are Tamang, Kami, Damai, Sarkee, Newar, Bhujel.

The vegetation within the project area is of subtropical type. The dominant tree species are *Alnus nepalensis, Lyonia ovalifolia, Quercus* and *Rhododendron* species and other major associated tree species are *Eurya acuminata, Juglans regia, Persea odoratissima Pinus roxburghii* and *Symplocos ramosissima* in the lower altitudinal range while *Pinus wallichiana*, *Taxus wallichiana, Tsuga dumosa* in the higher altitudinal range. The dominant associated shrub species are *Berberis aristata*, *Edgeworlhia gardneri, Gaultheria fragrantissima, Girardinia diversifolia*, *Rubus ellipticus, Sarcococca coriacea* and herbs species *Arisaema tortuosum, Artemisia indica*, *Arundinaria maling*, *Eupatorium adenophorum, Imperata cylindrica, Rubia manjith*.

Data collection

The field study was carried out in November 2009. The plant species were collected by using quadrat method (Zobel, 1987). Most of the plants were identified in the fields but in the case of unidentified plant species they were collected, pressed and dried in the field using a natural drying technique in sunlight (Forman and Bridson, 1989) and identified with the help of the voucher specimens deposited in the National Herbarium at Godawari, Lalitpur and floristic books (Polunin and Stainton, 1984; Stainton, 1988; Manandhar, 2002; Baral and Kurmi, 2006). Local names as well as the uses of the species collected. The questionnaire survey method was used to document the local uses of plants. The detail information on use of medicinal plants was documented by discussing with the three traditional healers and also during the discussion with two groups of local people.

RESULT AND DISCUSSION

A total of 96 plant species belonging to 86 genera and 58 families (76 angiosperms, 6 gymnosperms, 6 pteridophytes, 6 fungi and 2 lichens) were recorded in the study area (Table 1 and 2). The plant species belong to different life forms, with herbs (39 species) most frequent, followed by trees (25 species), shrubs (17 species), climbers and fungi (6 species each), lichens (2 species) and epiphyte (one species). The largest family is Asteraceae (8 species), followed by Rosaceae (7 species) and Poaceae (5 species). The biodiversity of the area was moderate compared to other researches in Nepal (Manandhar, 2002; Baral and Kurmi, 2006; Rokaya *et al*., 2010; Uprety *et al*., 2011) and Asteraceae family represented the highest number of plants as mentioned in overall plant checklist of Nepal (Press *et al*., 2000).

Some of the species that were collected from the study area fall in CITES II and IUCN threat categories. They were *Dioscorea deltoidea*, *Swertia chirayita*, *Taxus wallichiana* and lichens (*Parmelia* spp. and *Ramalina* spp.) fall under Nepal's Forest Act (1993) and Regulations (1995) (Table 1). The guidelines for proper harvesting and management were needed to have sustainable use of plants in Nepal (Uprety *et al*., 2011).

In the total association of plants, the highest number of herbs followed by trees and shrubs is also reported on other studies from east (e.g., Gautan, 1995; Rai, 2003), central (e.g., Joshi and Edington, 1990; Uprety *et al*., 2010) and west Nepal (e.g., Kunwar *et al*., 2010; Rokaya *et al*., 2010). It was found that there was high diversity of plant species in Khimti area like others regions of Nepal as mentioned above.

The highest number of plant species in Khimti area was used as medicine (46 plant species) (Table 2) followed by fodder (21 plant species) and edible (20 plant species). Eight species were used for other purposes such as making clothes, thatching, extracting ropes, making baskets and for religious purposes). Only one species (*Juniperus recurva*) was used as incense (Figure 1, Table 1 and 2). The use of plants for various purposes and medicinal plants do possess additional uses in Khimiti area as other studies elsewhere in Nepal (e.g., Rokaya *et al*., 2010; Uprety *et al*., 2011) and other parts of world (e.g., Rossato *et al*., 1999; Kala *et al*., 2004; Gemedo-Dalle *et al*., 2005; Cunha and Albuquerque 2006).

Although plants were used for wide ranges of diseases, no new uses were reported from the study site when comparing with several previous studies (Rajbhandari 2001; Manandhar, 2002; Shrestha and Dhillion, 2003; Baral and Kurmi, 2006; Joshi and Joshi, 2001). Wild fetch food which second most valuable in study area. Women and herders were most knowledgeable for in indentifying the edible plants. This could be due to the fact that they frequently visit forest to collect fodder and firewood for daily uses.

It is evident that many species that are protected due to over-harvesting for local use and trade from the study region have economic potential and thus could help in uplifting the income of indigenous people living in Khimiti area. The practice of cultivation for such species is required so that the proper production of such plant species in made possible.

Table 1: List of all the plants recorded in Khimi area, central Nepal

S.N	Plant Names; Family; Voucher Number	Local Name	Plant categories; Habit	Uses
1	*Achyranthes aspera* L.; (Amaranthaceae) SSK-61	Datiwan	Dicot; H	Religious, Medicine
2	*Aconogonum molle* (D. Don) H. Hara; (Polygonaceae) SSK-36	Thotne	Dicot; S	Fodder
3	*Agaricus campestris* L.; (Agaricaceae) SSK-47	Chata Chyau	Fungi; M	Vegetable
4	*Ageratum conyzoides* L.; (Compositae) SSK-41	Gande jhar	Dicot; H	Medicine
5	*Alnus nepalensis* D.Don; (Betulaceae) SSK-89	Uttis	Dicot; T	Medicine, Timber, Fuel wood
6	*Arisaema tortuosum* (Wall.) Schott; (Araceae) SSK-90	Bank	Monocot; H	Medicine, Vegetable
7	*Artemisia indica* Willd.; (Compositae) SSK-21	Titepati	Dicot; H	Medicine
8	*Arundinaria maling* Gamble; (Gramineae) SSK-91	Nigalo	Monocot; S	Making baskets
9	*Astilbe rivularis* Buch.-Ham. ex D. Don ; (Saxifragaceae) SSK-93	Thulo Okhati	Dicot; H	Medicine
10	*Athyrium umbrosum* (Aiton) C.Presl; (Aspidiaceae) SSK-94	Kuthurke	Pteridophytes; H	Vegetable
11	*Berberis aristata* DC; (Berberidaceae) SSK-60	Chutro	Dicot; S	Medicine, Fruit edible, Fuel wood
12	*Berberis asiatica* Roxb. ex DC.; (Berberidaceae) SSK-96	Chutro	Dicot; S	Medicine, Fruit edible, Fuel wood
13	*Bergenia ciliata* (Haw.) Sternb.; (Saxifragaceae) SSK-37	Pakhanved	Dicot; H	Medicine
14	*Betula alnoides* Buch.-Ham. ex D. Don; (Betulaceae) SSK-1	Saur, Lekh paiyau	Dicot; T	Timber, Fuel wood
15	*Bidens pilosa* L.; (Compositae) SSK-56	Kalo kuro	Dicot; H	Fodder
16	*Centella asiatica* (L.) Urb.; (Umbelliferae) SSK-46	Ghodtapre	Dicot; H	Medicine
17	*Cheilanthes bicolor* (Roxb. in Griff.) Griff. ex Frans.-Jenk; (Adiantaceae) SSK-88	Kali sinka	Pteridophytes; H	Medicine
18	*Cissampelos pareira* L.; (Menispermaceae) SSK-12	Batulpate	Dicot; C	Medicine
19	*Crotalaria alata* Buch.-Ham. ex D. Don; (Fabaceae) SSK-76	Chinchine	Dicot; S	Fodder
20	*Cyanotis cristata* (L.) D. Don; (Commelinaceae) SSK-6	Kane jhar	Monocot; H	Fodder
21	*Cynodon dactylon* (L.) Pers.; (Gramineae) SSK-83	Dubo	Monocot; H	Medicine, Fodder, Religious
22	*Cynoglossum zeylanicum* (Vahl ex Hornem.) Thunb. ex Lehm.; (Boraginaceae) SSK-67	Masine kuro	Dicot; H	Medicine
23	*Cyperus rotundus* L.; (Cyperaceae) SSK-59	Mothe	Monocot; H	Fodder
24	*Daldinia concentric* (Bolt. ex Fr.) Ces. and de; (Xylariaceae) SSK-8	Phusphuse chyau	Fungi; M	Poisonous
25	*Daphne bholua* Buch.-Ham. ex D. Don; (Thymelaeaceae) SSK-45	Lokta	Dicot; S	Making handmade paper

26	*Edgeworlhia gardneri* (Wall.) Meisn; (Thymelaeaceae) SSK-92	Argeli	Dicot; S	Making handmade paper
27	*Dendrophthoe falcata* (L. f.) Etting.; (Loranthaceae) SSK-11	Ainjeru	Dicot; E	Medicine
28	*Digitaria ciliaris* (Retz.) Koeler; (Gramineae) SSK-22	Chitre banso	Monocot; H	Fodder
29	*Dioscorea bulbifera* L.; (Dioscoreaceae) SSK-53	Githa	Monocot; C	Fruit edible
30	*Dioscorea deltoidea* Wall. ex Griseb.; (Dioscoreaceae) SSK-54	Ban tarul	Monocot; C	Traded
31	*Dryoathyrium boryanum* (Willd.) Ching; (Athyriaceae) SSK-75	Kalo niuro	Pteridophytes; H	Vegetable
32	*Dryopteris cochleata* (D.Don) C.Chr.; (Aspidiaceae) SSK-116	Niuro	Pteridophytes; H	Vegetable
33	*Elatostema sessile* J. R. & G. Forst.; (Urticaceae) SSK-7	Gagleto	Dicot; H	Fodder
34	*Equitesum arvanse* L.; (Equisetaceae) SSK-18	Talche jhar	Pteridophytes; H	Fodder
35	*Eulaliopsis binata* (Retz.) C. E. Hubb.; (Gramineae) SSK-55	Babiyo	Monocot; H	Thatching, Extracting ropes
36	*Eupatorium adenophorum* Spreng.; (Compositae) SSK-57	Banmara	Dicot; H	Poisonous
37	*Eurya acuminata* DC.; (Theaceae) SSK-31	Sano Jhigane	Dicot; T	Medicine, Fodder
38	*Fragaria nubicola* Lindl. ex Lacaita; (Rosaceae) SSK-42	Bhuin ainselu	Dicot; H	Fruit edible
39	*Gaultheria fragrantissima* Wall.; (Ericaceae) SSK-13	Dhasingre	Dicot; S	Medicine
40	*Geranium nepalense* Sweet; (Geraniaceae) SSK-48	Chunetroghans	Dicot; H	Medicine
41	*Girardinia diversifolia* (Link) Friis; (Urticaceae) SSK-74	Allo	Dicot; S	Making clothes, Extracting fibers
42	*Gnaphalium affine* D. Don; (Compositae) SSK-52	Kairo jhar	Dicot; H	Fodder
43	*Gnaphalium polycaulon* Pers.; (Compositae) SSK-49	Boke phul	Dicot; H	Fodder
44	*Hypericum cordifolium* Choisy; (Hypericaceae) SSK-38	Khareto	Dicot; S	Medicine
45	*Ilex sikkimensis* Kurz; (Aqifoliaceae) SSK-29	Lise	Dicot; T	Timber
46	*Imperata cylindrica* (L.) P. Beauv.; (Cyperaceae) SSK-20	Siru	Monocot; H	Fodder
47	*Inula cappa* (Buch.-Ham. ex D. Don) DC.; (Compositae) SSK-5	Dware	Dicot; S	Fuel wood
48	*Juglans regia* var. *kamaonia* L.; (Juglandaceae) SSK-32	Hade okhar	Dicot; T	Medicine, Fruit edible
49	*Juniperus recurva* Buch.-Ham. ex D. Don; (Cupressaceae) SSK-62	Dhupi	Gymnosperm; T	Medicine, Timber, Fuel wood, Incense
50	*Laetiporus sulphureus* (Bull.: Fr.) Murr; (Polyporaceae) SSK-24	Rato chyau	Fungi; M	Vegetable
51	*Leucas cephalotes* (Roth) Spreng.; (Labiateae) SSK-43	Gumpati	Dicot; H	Medicine
52	*Lindera neesiana* (Wall ex. Nees) Kurz; (Lauraceae) SSK-77	Siltimur	Dicot; T	Medicine, Fodder
53	*Lycopodium clavatum* L.; (Lycopodiaceae) SSK-17	Nagbeli	Pteridophytes; H	Medicine

54	*Lyonia ovalifolia* (Wall.) Drude; (Ericaceae) SSK-78	Angeri	Dicot; T	Medicine, Fuel wood, Poisonous
55	*Mahonia napaulensis* DC.; (Berberidaceae) SSK-9	Jamanemandro	Dicot; S	Medicine
56	*Oxalis corniculata* L.; (Oxalidaceae) SSK-30	Chariamilo	Dicot; H	Medicine
57	*Paris polyphylla* Sm.; (Liliaceae) SSK-58	Satuwa	Monocot; H	Medicine
58	*Parmelia* sp.; (Parmeliaceae) SSK-50	Jhyau	Lichen; L	Medicine
59	*Pericampylus glaucus* (Lam.) Merr.; (Menispermaceae) SSK-14	Dude lahara, Pipal pate	Dicot; C	Medicine
60	*Persea odoratissima* (Nees) Kosterm.; (Lauraceae) SSK-33	Seto Kaulo	Dicot; T	Fodder
61	*Pinus roxburghii* Sarg.; (Pinaceae) SSK-25	Khote sallo	Gymnosperm; T	Timber, Fuel wood
62	*Pinus wallichiana* A. B. Jacks.; (Pinaceae) SSK-85	Sallo	Gymnosperm; T	Medicine, Timber, Fuel wood
63	*Plantago major* L.; (Plantaginacea) SSK-82	Isabgol	Dicot; H	Medicine
64	*Pleurotus nepalensis* Corner.; (Pleurotaceae) SSK-28	Kanne Chyau	Fungi; M	Vegetable
65	*Podocarpus neriifolius* D. Don; (Podocarpaceae) SSK-19	Ghunsi	Gymnosperm; T	Fuel wood
66	*Potentilla fulgens* Wall. ex Hook.; (Rosaceae) SSK-87	Bajradanti	Dicot; H	Medicine
67	*Prunus cerasoides* D. Don; (Rosaceae) SSK-79	Painyu	Dicot; T	Fodder, Medicine
68	*Pycnoporus cinnabarinus* (Jacq. ex Fr.) Karst.; (Polyporaceae) SSK-86	Rato chyau	Fungi; M	Poisonous
69	*Pyracantha crenulata* (D. Don) M. Roem.; (Rosaceae) SSK-23	Ghangaru	Dicot; S	Fruit edible
70	*Pyrus pashia* Buch.-Ham. ex D. Don; (Rutaceae) SSK-2	Mayal	Dicot; T	Fruit edible, Fuel wood
71	*Quercus glauca* Thunb.; (Fagaceae) SSK-63	Phalant	Dicot; T	Timber, Fodder
72	*Quercus lamellosa* Sm.; (Fagaceae) SSK-44	Bansho	Dicot; T	Timber, Fodder
73	*Quercus semecarpifolia* Sm.; (Fagaceae) SSK-27	Kharsu	Dicot; T	Timber, Fodder
74	*Ramalina* sp.; (Usneaceae) SSK-72	Jhyau	Lichen; L	Medicine
75	*Ramaria botrytis* (Pers.) Ricken; (Ramariaceae) SSK-15	Thakre chyau	Fungi; M	Vegetable
76	*Rhododendron arboreum* Sm.; (Ericaceae) SSK-4	Laligurans	Dicot; T	Timber, Fuel wood, Flower edible
77	*Rhus javanica* L.; (Anacardiaceae) SSK-69	Bhakkimlo	Dicot; T	Medicine, Fruit edible
78	*Rhus wallichii* Hook. f.; (Anacardiaceae) SSK-51	Bhalayo	Dicot; T	Medicine
79	*Rubia manjith* Roxb. ex Fleming; (Rubiaceae) SSK-81	Majitho	Dicot; H	Medicine
80	*Rubus ellipticus* Sm.; (Rosaceae) SSK-34	Ainselu	Dicot; S	Fruit edible
81	*Rubus paniculatus* Sm.; (Rosaceae) SSK-65	Kalo ainselu	Dicot; S	Fruit edible
82	*Rubus pentagonus* Wall. ex Focke; (Rosaceae) SSK-26	Rato ainselu	Dicot; S	Fruit edible

83	*Saccharum spontaneum* L.; (Gramineae) SSK-68	Kans	Monocot; H	Fodder
84	*Sambucus hookeri* Rehder; (Caprifoliaceae) SSK-3	Galeni	Dicot; H	Medicine
85	*Sarcococca coriacea* (Hook.) Sweet; (Buxaceae) SSK-39	Phitphiya	Dicot; S	Medicine
86	*Smilax aspera* L.; (Smilacaceae) SSK-10	Kukur daino	Monocot; C	Medicine
87	*Smilax microphylla* C. H. Wright; (Smilacaceae) SSK-65	Kukur daino	Monocot; C	Medicine
88	*Sonchus oleraceus* L.; (Compositae) SSK-71	Dudhe kanda	Dicot; H	Fodder
89	*Swertia chirayita* (Roxb. ex Fleming) Karsten; (Gentianaceae) SSK-84	Chirayito	Dicot; H	Medicine
90	*Symplocos ramosissima* Wall. ex G. Don ; (Symplocaceae) SSK-80	Kharane	Dicot; T	Medicine
91	*Thalictrum foliolosum* DC.; (Ranunculaceae) SSK-35	Dampate	Dicot; H	Medicine
92	*Taxus wallichiana* Zucc.; (Taxaceae) SSK-16	Lauthe sallo	Gymnosperm; T	Medicine, Timber, Fuel wood
93	*Tsuga dumosa* (D. Don) Eichler; (Pinaceae) SSK-70	Thinge sallo	Gymnosperm; T	Timber, Fuel wood
94	*Urtica dioica* L.; (Urticaceae) SSK-73	Sisnu	Dicot; H	Vegetable
95	*Viburnum erubescens* Wall. ex DC.; (Sambucaceae) SSK-66	Ganmane	Dicot; T	Fuel wood
96	*Zanthoxylum armatum* DC.; (Rutaceae) SSK-40	Timur, Parpare timur	Dicot; T	Medicine

Note: C, climber; E, epiphyte; H, herb; L, lichen; m, mushroom (fungi); s, shrub; T, Tree.

Table 2: List of medicinal plants used in Khimti area, central Nepal.

S.N.	**Scientific Name**	**Parts used**	**Uses**
1	*Achyranthes aspera* L.	St	Stem is chewed to relieve from toothache.
2	*Ageratum conyzoides* L.	Wh pl	Juice of whole plant is used in cuts.
3	*Arisaema tortuosum* (Wall.) Schott	Yg sh	Young shoot is useful in digestion.
4	*Artemisia indica* Willd.	Lvs	Leaves juice is used to cure skin diseases.
5	*Astilbe rivularis* Buch.-Ham. ex D. Don	Rt	Root extracts is used in fever and cough.
6	*Berberis aristata* DC	Rt	Root juice are used to treat eye diseases, fever and for stomach problems.
7	*Berberis asiatica* Roxb. ex DC.	Rt	Root juice are used to treat eye diseases and for stomach problems.
8	*Bergenia ciliata* (Haw.) Sternb.	St	Stem extract is orally taken for kidney stone. Roots powder is taken to treat intestinal disorder.
9	*Centella asiatica* (L.) Urb.	Lvs	One spoonful leaf juice is taken twice a day used in fever.
10	*Cheilanthes bicolor* (Roxb. in Griff.) Griff. ex Frans.-Jenk	Wh pl	Whole plant extract is used to cure fever.
11	*Cissampelos pareira* L.	Wh pl	Whole plant is used as diuretic and is also used against fever.
12	*Cynodon dactylon* (L.) Pers.	Wh pl	Juice of whole plant is used in used as tonic.
13	*Cynoglossum zeylanicum* (Vahl ex Hornem.) Thunb. ex Lehm.	Fl	Flower paste are applied on boils.
14	*Dendrophthoe falcata* (L. f.) Etting.	Wh pl	Whole plant paste is used as antihelmintic.
15	*Gaultheria fragrantissima* Wall.	Lvs	Leaves extract is used in muscle cramp.

16	*Geranium nepalense* Sweet	Rt	Root power is beneficial for treating stomach problems.
17	*Hypericum cordifolium* Choisy	Wh pl	Plant juice is used against fever.
18	*Juglans regia* var. *kamaonia* L.	Br	Bark power is used against tooth problems and stomach disorder.
19	*Juniperus recurva* Buch.-Ham. ex D. Don	Fr	Fruits are taken to cure throat problems.
20	*Leucas cephalotes* (Roth) Spreng.	Wh pl	Whole plant is considered as laxative.
21	*Lindera neesiana* (Wall ex. Nees) Kurz	Lvs, Fr	Leaves and fruits are used in the treatment of skin diseases.
22	*Lycopodium clavatum* L.	Spo	Spores are diuretic and are used against indigestion.
23	*Lyonia ovalifolia*	Lvs	Leaves juice is used in scabies.
24	*Mahonia napaulensis* DC.	Br	Bark juice is used against diarrhea.
25	*Oxalis corniculata* L.	Wh pl	Whole plant juice is used against fever.
26	*Paris polyphylla* Sm.	Rh	Rhizome is used as anthelmintic.
27	*Parmelia* sp.	Wh pl	Plant powder is used in cuts.
28	*Pericampylus glaucus* (Lam.) Merr.	Fr	Fruits are laxative in nature.
29	*Pinus wallichiana* A. B. Jacks.	Res	Resins are used in skin cracks.
30	*Plantago major* L.	Lvs, Rt	Leaves and roots are uses against stomach problems.
31	*Potentilla fulgens* Wall. ex Hook.	Rt	Root extract is used in toothache.
32	*Prunus cerasoides* D. Don	Br	Bark paste is uses against burns.
33	*Ramalina* sp.	Wh pl	Power is used in cuts.
34	*Rhododendron arboreum* Sm.	Fl	Flower powder is used as tonic.
35	*Rhus javanica* L.	Fr	Fruits are used in diarrhea
36	*Rhus wallichii* Hook. f.	Fr	Fruits are used in diarrhea
37	*Rubia manjith* Roxb. ex Fleming	Rt, Fr	Roots and fruit are used in ulcer and skin diseases.
38	*Sambucus hookeri* Rehder	Fr	Fruits are chewed to cure fever.
39	*Sarcococca coriacea* (Hook.) Sweet	Br	Plant paste is used to relieve swelling.
40	*Smilax aspera* L.	Lvs	Leaves extract is used in dysentery.
41	*Smilax microphylla* C. H. Wright	Lvs	Leaves extract is used in dysentery.
42	*Swertia chirayita* (Roxb. ex Fleming) Karsten	Wh pl	Whole plant is used in fever, cold and cough.
43	*Symplocos ramosissima* Wall. ex G. Don	Fr	Fruit oil is use in skin allergies.
44	*Taxus wallichiana* Zucc.	Lvs	Leaves juice is used in headache and diarrhea.
45	*Thalictrum foliolosum*	Lvs	Leaves extract is inhaled for sinusitis.
46	*Zanthoxylum armatum* DC.	Fr	Fruits are used in gastritis.

Note: Br, barks; Fl, flowers; Lvs, leaves; Rt, roots; Spo, spores; Wh, whole plant; Yg sh, Young shoot.

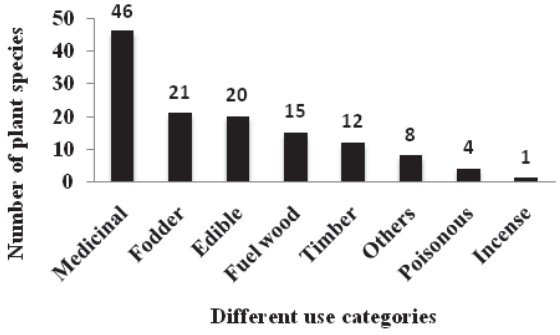

Figure 1: Use categories of the inventoried species in Khimti area, central Nepal

CONCLUSION

The project impacted area of Khimti I Hydropower was rich in biodiversity where there were many protected, medicinal and ethnobotanically useful plants. To fulfill the loss caused by project, local should be made aware about the proper management, utilization and even the cultivation of highly used as well as potentially important plants outside the project area.

ACKNOWLEDGMENT

We are grateful to the local people of the upper Khimiti area, central Nepal for their participation in the study and for sharing their valuable knowledge. A grant by Himalaya Urja Bikas Company (Pvt.) Ltd. was appreciated.

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