Chapter 13
Ethnobiology and Indigenous Regimes in the Conservation of Species, Watersheds, and Landscapes: Experiences and Evidences from the Hindu Kush-Himalayan Nations for a Global Application

Tirth Raj Ghimire, Pitamber Pant, Ganga Ram Regmi, and Falk Huettmann

13.1 Introduction

The Merriam Webster Dictionary defines 'ethnic' as relating to large groups of people classed according to common racial, national, tribal, religious, linguistic, or cultural origin or background (Merriam-Webster 2004). Ethnicity is about institutions, learned behavior, and customs (Upadhyay 2013). The word 'Indigenous' means 'son of the land' which is actually hold by the ancestors for future generations. Indigenous people have actually no real history of migration from other places and are the vulnerable tribes who only have a limited ability to participate in the ongoing development process (Upadhyay 2013). Although it is not easy to differentiate between the definitions of ethnicity and indigenous, these terms are used in many texts synonymously.

T. R. Ghimire (✉)
Animal Research Laboratory, Faculty of Science, Nepal Academy of Science and Technology (NAST), Khumaltar, Lalitpur, Nepal
e-mail: tirth.ghimire@nast.gov.np

P. Pant
Tri-Chandra Multiple Campus, Tribhuvan University, Kathmandu, Nepal

G. R. Regmi
Third Pole Conservancy, Kathmandu, Nepal

F. Huettmann
-EWHALE Lab- Institute of Arctic Biology, Biology and Wildlife Department, University of Alaska Fairbanks, Fairbanks, AK, USA

G. R. Regmi, F. Huettmann (eds.), *Hindu Kush-Himalaya Watersheds Downhill: Landscape Ecology and Conservation Perspectives*,
https://doi.org/10.1007/978-3-030-36275-1_13

Western scientists state that ethnobiology is a science of biological knowledge of a particular ethnic group about the cultural and religious use of plants and animals for their welfare, especially for the veterinary and human health. Although biology seems to be principal, the study of an integrated approach of various branches like anthropology, cognitive psychology, geography, environmental studies, and indigenous studies is critical to understand ethnobiology. Thus, ethnobiology is a multidisciplinary approach of traditional or local understandings of the many relationships among plants, environments, and invertebrate and vertebrate animals including humans for the aim to treat and prevent the diseases, to enhance the longevity, and the physiological, physical, and psychological well-being. Ethnobiology can be further easily rebranched into ethnobotany, ethnozoology, ethnomedicine, and ethnogenomics. The term ethnozoology is defined by Jose Geraldo W. Marques, for instance, as the transdisciplinary study of the thoughts and perceptions (knowledge and beliefs), sentiments (affective representations), and behaviors (attitudes) that intermediate the relationships between human populations and the species of animals in the surrounding ecosystems (Alves and Souto 2015). It has been further subdivided into ethnoentomology, ethnoichthyology, ethnoornithology, ethnomastozoology, ethnoprimatology, and ethnoherpetology depending on the human interactions with the respective aspects of insects, fish, birds, mammals, primates, and amphibians and reptiles (Alves and Souto 2015). In comparison to ethnozoology, ethnobotany usually deals with plants and their relations with humans and animals. The term ethnomedicine is actually an inherently multi-disciplinary approach that accompanies with a set of empirical indigenous practices of use of plants and/or animals, spirituality with or without *mantra*, and the natural environment for the healing process in animals or human. Another important modern term called ethnogenomics, previously ethnogenetics or ethnic genetics, is defined as dealing of genetic structure of human population living in different geographies and time. Interestingly, to deal with this sub-branch, the critical analyst such as a geneticist, mathematical modeler, and programmer is required.

Thus, it should be noted that an ethnobiologist records myths, religious practices, spiritual beliefs, economic activities, kinship associations, and other knowledge of plants and animals that can be found in landscapes (Anderson et al. 2011). While often ignored in some circles, the recorded ethnobiologic information has actually received critical attention in resource management because it has been suggested to lead new paths in scientific research by enhancing the understanding of ecologic processes and conservation monitoring (Berkes et al. 2000; Huntington 2000; Olsson and Folke 2001). It matters in real life (see Fig. 13.1 for urban Kathmandu). This can be illustrated by providing an example of The Earth Summit (TES) articles {Articles 8(j) & 10 (c)} in Rio de Janeiro in 1992, through the Convention of Biodiversity (CBD) that highly recognized the essential role of indigenous knowledge in understanding the role of customary livelihoods within sustainable development and the links among environmental management, science, and well-being (IASG 2014). Since then, academies, conservationists, and authorities have prioritized the value of local knowledge in informing the design of people-centered resource management approaches on a landscape-scale (Cunningham

Fig. 13.1 Animal parts and other products from nature sold in modern Kathmandu, Nepal. A typical example for modern Hindu Kush-Himalaya. (Photo by Pitamber Pant)

2001). In 2009, the Government of Nepal (GoN) already started a landscape management program in Nepal, part of the **transboundary Kailash Sacred Landscape** that extends across parts of Nepal, China, and India (MoFSC 2014a). The International Centre for Integrated Mountain Development (ICIMOD), in collaboration with various agencies and communities in eastern Nepal, Sikkim, and Darjeeling of India, western Bhutan, and China, has also implemented the transboundary Kanchenjunga Landscape Project (KLP) (Sharma 2008). Other landscape programs like the **Tarai Arc Landscape (TAL), Kailash Sacred Landscape Conservation and Development Initiative (KLCDI), Sacred Himalayan Landscape (SHL), and Chitwan Annapurna Landscape Programs (CHAL)** are also crucial in promoting sustainable livelihoods and conserving biodiversity (MoFSC 2014a, b).

The use of local knowledge is applicable for the people working on academics and research institutes in the Hindu Kush-Himalayan countries like Nepal. There are large heaps of knowledge on ethnobiology, but its association with conservation science has not been fully detailed yet and awaits wider study, recognition, and implementation. Thus, the aim of this chapter is to review the available data collected on ethnobiologic studies, political history and development, ethnic groups, their ethnic knowledge and practices, and roles in conservation. Finally, we list a few recommendations for the concerned authorities and the Government of Nepal (GoN) to advocate the utilization of ethnic knowledge in conservation of flora and fauna.

13.2 Ethnobiology in Nepal

While it is believed that the study of a western-style ethnnobiology started in the European regions in the late nineteenth century (Sobral and Albuquerque 2016), several religious books indicate that practice of this subject had actually been made since the beginning of human civilization. Many gods, goddesses, and sages (Sanskrit: *rishis*) came to Nepal, meditated, spent very simple lifestyle, survived by consuming cow's milk and plants, and taught the pupil about these practices. Thus, the actual history of ethnobiology in the eastern civilization – including the civilization of Nepal – really dates back to the origin of human race that principally depended on a close association with food, shelter, medicine, clothing, and other necessary materials. These associations have been well-documented in the *Vedas, Puranas, Upanishadas*, *Samhitas, Mahabharata, Ramayana* and other several literatures that were written many years ago (Flood 1996; Knott 2016). Although most literatures and original texts have been lost in the course of Indian history, the currently available ones written in Sanskrit are the remaining rhythms of Hinduism. Notably, ethnobiology is the basis of Ayurvedas in which it is studied from the medical point of view and for the Sanskrit University where it is studied from the traditional and philosophic approaches in Nepal. Since few years, the course has actually been included in undergraduate and graduate levels of few universities in which its main aim is to enhance the knowledge regarding conservation biology. Conservation action is facing critical problems particularly because of the lack of meaningful participation, for example, the ongoing equivalent participation problem of local communities in the management of natural resources (MoFSC 2014a). Equivalent participation might be difficult probably due to the presence of multi-religious, multi-ethnic, multi-racial, multi-lingual, and multicultural people within this small country. To solve this issue, the concept of the equivalent participation among the ethnic and local people has been decided by establishing the Community Forestry Program (CFP). CFP itself is a participatory approach which has already gained worldwide popularity and one of the successful participatory approaches in the sector of conservation. CFP has been prioritized to enhance the conservation of wildlife and to spread the forest areas by the Nepal Biodiversity Strategy and Action Plan 2014–2020 (MoFSC 2014b). That is why consideration of ethnobiology in the conservation of species seems to be essential and wise.

13.3 A Short Hindu Kush-Himalayan (HKH) Political History, Its Ethnic Groups, and Related Conservation Output on a Landscape Scale

Several religious articles state that since the start of life – since deep time – the Himalayan region has been one of the crucial parts for the gods, goddesses, intellectuals, meditators, emperors, and sages. That region had been the last target of

their life to achieve wisdom, peace, and the way to heaven. During those periods, all the people including rulers and common men would follow the ethnic knowledge and practices to treat and prevent the diseases.

Interestingly, already the name Nepal itself has been suggested to be derived from various words related to ethnic knowledge. For example, *nepalaya* (*Sanskrit*) meaning at the foot of the mountains; niyampal (*Tibetan*) meaning holy land; ne (*Tibetan*) meaning wool and pal (*Tibetan*) meaning house; nepa (*Newari*) meaning country of the middle zone; ne (*Lepcha*) meaning holy and pal (*Lepcha*) meaning cave (Bhattarai 2009). It is widely believed that a Buddhist deity named 'Manjusri' drained the water from snake pond (Sanskrit: *Nagadaha*) within the valley and made inhabitable. Then, saint Ne, one of the great writers and teachers, selected a pious cowherd, Bhuktaman, to be the first king of the *Gopalvamsi* or the Cowherd Dynasty (Shaha 1992; Bhattarai 2009). That dynasty followed the spiritual life including meditation and cattle rearing and ruled this Himalayan country over 500 years. Subsequently, the country was ruled by *Mahispaalvamsa* (Buffalo-herder Dynasty) who would rear buffaloes during their period. When the king Mahispaalvamsa was defeated by Yalambar in the final phase of Dwaparyuga or at the beginning period of Kaliyuga or around the sixth century BC, the Kirati Dynasty came into existence and ruled the Kathmandu valley for more than 1200 years. The valley had been flourished socially, economically, and religiously during that dynasty (Bista and Singh 1972; Shrestha and Singh 1972). Indian, Tibetan, and Chinese traders used to visit Nepal for commercial purposes, especially for the wool (Shrestha and Singh 1972). The dynasty was followed by the Soma Dynasty, the Rajputs, when Nimistakar Barma defeated Gasti, the last Kirati King. Bhaskar Varma, the rich and open-hearted last king of the Soma Dynasty, adopted Bhoomi Varma, a Lichchhavi Kshetri of the Solar Dynasty who started the Lichchhavi Dynasty. Lichchhavi Dynasty became one of the golden ages in the history of the country and was comparable to the Elizabethan period in English history (Bista and Singh 1972; Shrestha and Singh 1972). It mainly focused on the use of ethnic and religious knowledge, with the flourishing arts, sculpture, architecture, and languages like Sanskrit, Newari, and others. Further, literature, astrology, medical sciences, religious scriptures including the tantric Buddhism, as well as the trades and commerce with India, Tibet, and China grew with the concept of Nepal being the central link between India and China and for the generic good growth of agricultural products like rice, but giving equal values to all religious and ethnic people like Kirantis, Abhir, Karnatak, and Mallas (Shrestha and Singh 1972).

During the Lichchhavi dynasty, the Thakuri clan also practiced parallel government. Consequently, the Thakuri Dynasty, the Malla Dynasty, and the Shah Dynasty all came into existence and the practice of ethnic knowledge in medicine – widely shared – became an important topic to the general people although it was without any (western-style) scientific basis. From 1320 AD, the Malla Dynasty – led by Arideba Malla – started ruling the country. In the mean time, the Karnatak Dynasty fled from Delhi and ruled a few years in the country. The Malla Dynasty is blamed for the differentiation of people into different caste, sub-caste, dresses, their duties, and social customs. Increased trade with the neighboring regions, and an increased

art, culture, and literature, also practicing of Tantrism were found predominantly in that era (Bista and Singh 1972). During the era, there had been the establishment of Yasho Brahma Shah, the Rajputs of Mewar of India, located in the hilly areas of the country. One of his successors, Prithvi Narayan Shah and his successors, defeated the smaller states and kingdoms ruled by the Malla Dynasty and by various ethnic and indigenous groups like 22 kingdoms in Gandaki region, 24 kingdoms in Karnali region, 3 kingdoms in the Kathmandu valley, Kiranti states in the eastern region, and other several states (Baral 1964; Whelpton 2005). This resulted into the geographic unification of the country and the values of the Shah Dynasty came into being (Baral 1964). From 1814 to 1816, Nepal or the Gurkha had to face a war with the British East India Company probably due to the consequences of disputes for border or some believes that the Company was searching a trade route to Tibet from India via Nepal (Marshall 2005). A treaty called 'The Treaty of Sugauli' was finally signed in 21st December, 1923 and was the first formal proof by the British that Nepal as an independent nation that had rights to formulate the foreign policy independently. However, following the Treaty, several touristic regions and low, and high lands with many ethnic people of the country like Kumaon and Garhwal were ceded to the British (Marshall 2005).

All these changes occurred during the Shah Dynasty in which there was a huge political instability within the Kingdom. It resulted into the emergence of the Rana tyranny in 1846 ruling until 1951. The Rana Dynasty followed the policy of friendship and cooperation with the British Raj in India, even in the context of handing access to the people in the form of Gurkhas or armies to Britain and natural resources (Marshall 2005). It should be noted that both Rana and Shah Rulers have been blamed for the loss of flora and fauna and indigenous skills and knowledge and the prejudice to indigenous people. Before the end of the Shah Dynasty in 2008, the King Birendra had contributed much in the conservation of the biodiversity by establishing national parks, conservation areas, CFP, and various research centers including Nepal Academy of Science and Technology (NAST), one of our author's current affiliations.

Although the constitution of the country before 1990s advocated the equality for all ethnic groups, in practice, there had been somewhat discriminatory system of caste/ethnicity in many areas and fields including the head of politics. The entrenched system of caste hierarchy and its practice was the underlying cause of leaving behind many ethnic groups except the few of them in mainstream politics or decision- making bodies. As a result, the majority of the ethnic groups, especially in the rural areas, had been suffering from prejudice and partiality in the context of opportunities of education, social status, and employment, and use of local natural resources (Bennett et al. 2008). With the formulation and foundation of the Constitution of Nepal-2015, many leaders, including women from various ethnic groups have been selected and now established in the central and local politics and in many fields of development and system due to the principle of proportional equality. It resulted into a better concept of local empowerment with a mean-to-be more fair participation.

13.4 Associated Religions and Practices of Ethnobiology by the HKH People

It has been reported that there are 125 different ethnic groups including top 25 major ones like Chhetri, Brahamana (hilly), Magar, Tharu, Tamang, Newar, Kami, Muslim, Yadav, Rai, Gurung, Damai/Dhobi, Thakuri, Limbu, Sarki, Teli, Chamar/Harijan/Ram, Koiri, Musahar, Kurmi, Sanyasi, Dhanuk, Dusadh/Paswaan/Paasi, and Mallah indicating the crucial significance in diversification of ethnic knowledge all over this Hindu Kush-Himalayan country (MoPE 2017). This results into large cultural complexities (Figs. 13.2 and 13.3). The major Nepalese religions include Hinduism, Buddhism, Islam, Kirat, Christianity, Prakriti, Bon, Jainism, Bahai, and Sikhism (MoPE 2017). The caste/ethnic groups have been classified into various divisions depending on their habitat by altitudinal landscapes, for example, mountains, hills, and terai (low land) (Bennett et al. 2008; Table 13.1).

While two or more of the above ethnic and religious groups may have shared ethnobiologic knowledge, they are mostly unique, inherited, and locally vital. They still regard sacred forests and sacred mountains, and also practice social and cultural activities that contribute to the protection of geology, geography, and natural environment, including flora and fauna. While herbal medicines actually provide the health needs of about 80% population of the world (WHO 2001), still 87% of the people living in rural area of Nepal directly or indirectly depend on the formal and informal system of traditional medicine for healthcare (Bhattarai 1992). In this context, it has been reported that although the percentage of plants used as ethnomedicine increases along an increasing altitude, there is no significant trend in increased usage of plants for ethnobotany (Kunwar and Bussmann 2008).

Fig. 13.2 A house of a Musahar. (Photo by Tirth Raj Ghimire)

Fig. 13.3 A Musahar making a fishing net. (Photo by Tirth Raj Ghimire)

Table 13.1 Nepalese caste and ethnic groups and their further divisions and social groups

Main caste/ Ethnic groups	Regional divisions	Divisions of caste/ethnic groups
Brahaman/ Chhetri	Hill Brahman	Hill Brahman
	Hill Chhetri	Chhetri, Thakuri, Sanyasi
	Terai/Madhesi Brahaman/ Chhetri	Madhesi Brahman, Nurang, Rajput, Kayastha
Terai/ Madhesi other castes	Terai/Madhesi other castes	Kewat, Mallah, Lohar, Nuniya, Kahar, Lodha, Rajbhar, Bing, Mali Kamar, Dhuniya, Yadav, Teli, Koiri, Kurmi, Sonar, Baniya, Kalwar, Thakur/Hazam, Kanu, Sudhi, Kumhar, Haluwai, Badhai, Barai, Bhediyar/ Gaderi
Dalits	Hill Dalit	Kami, Damai/Dholi, Sarki, Badi, Gaine, Unidentified Dalits
	Tarai/Madhesi Dalit	Chamar/Harijan, Musahar, Dushad/Paswan, Tatma, Khatwe, Dhobi, Baantar, Chidimar, Dom, Halkhor
Newar	Newar	Newar
Janajati	Hill/Mountain Janajati	Tamang, Kumal, Sunuwar, Majhi, Danuwar, Thami/Thangmi, Darai, Bhote, Baramu/Bramhu, Pahari, Kusunda, Raji, Raute, Chepang/Praja, Hayu, Magar, Chyantal, Rai, Sherpa, Bhujel/ Gharti, Yakha, Thakali, Limbu, Lepcha, Bhote, Byansi, Jirel, Hyalmo, Walung, Gurung, Dura
	Terai Janajati	Tharu, Jhangad, Dhanuk, Rajbanshi, Gangai, Santhal/Satar, Dhimal, Tajpuriya, Meche, Koche, Kisan, Munda, Kusbadiya/ Patharkata, Unidentified Adibasi/Janajati
Muslim	Muslim	Madhesi Muslim, Churoute (Hill Muslim)
Others	Others	Marwari, Bangali, Jain, Punjabi/Sikh, Unidentified Others

Adapted from Bennett et al. (2008)

The Kirati people including Limbu, Sunuwar, Rai, and Yakkha are regarded as the indigenous groups in the Himalayas that extend from eastern Nepal to India, Bangladesh, Burma, and beyond. The Kirat priests never use medicine for the treatment of sick people unless they are directed by the Good-spirit God in their dreams for its use (Cemjoṅga 2003). They practice Sakela/Sakewa in which they worship using plants like *Bauhinia variegata, Nephrolepsis cordifolia,* and others. The Kirati are famous for the beautiful stone masonry of their farm terraces. They also build *chautara*, stone resting platform topped by large, shady *Ficus religiosa* tree, on the trail outside villages as memorials to the dead (Burbank 2002).

The Limbu people normally reside near jungles and streams in the eastern hill regions due to their dependency upon natural resources. In these parts, they have been reported to use the roots and barks of 225 species of plants for medicinal purposes like rabies, snake bite, diarrhea, cut, constipation, sprain, sinusitis, piles, tonsillitis, jaundice, burns, scabies, toothache, fracture, epistaxis, and others (Limbu and Rai 2013). The agrarian law of Limbu suggests that one day should be observed without working in the fields if a domestic animal bears a calf or pig (Cemjoṅga 2003). Similarly, a holiday should be taken after clearing the forest indicating their close-association with pregnant animals and nature overall (Cemjoṅga 2003). The eastern part is also inhabited by the Rai community which has been shown to use 87 plant species and 27 animal species to treat illnesses including gastrointestinal (GI), cardiac, psychologic, respiratory, skeletal, parasitic, gynecologic, hormonal, hematologic, vector-borne, and nervous diseases (Rai and Singh 2015; Table 13.2). Their indigenous traditional knowledge (ITK) has given ideas to cure vaccine-preventable diseases like cholera, pneumonia, measles, rabies, mumps, whooping cough, leprosy, chicken pox, tuberculosis (TB), Herpes Zoster, and tetanus suggesting a further possibility of causal pharmacologic mechanism. These are great achievements for mankind, and they wait to be applied correctly virtually anywhere in the world!

The Tangbetons is an ethnic group found originally in the Mustang district, western Nepal. But by now, they have migrated to Jomsom, Pokhara, and Kathmandu. A study on the migratory Tangbetons of the Pokhara valley found that they used 17 species of animals and 60 species of plants to treat one or more of gynecologic, cardiac, hematologic, urinary, ophthalmic, hormonal, skeletal, immune, and psychologic disorders (Paudyal and Singh 2014; Table 13.2).

Lapcha, an ethnic group found in close association with forest or forest patches, are mostly found in eastern Nepal. They were described to use 19 animal species and 61 plant species for scabies, jaundice, snake bite, insect bite, dog bite, intestinal worms, measles, typhoid, dysentery, nose bleeding, and cut and burnt wound (Tamang and Singh 2014) (Table 13.2). They are skilled at preparing dyes, preparing bamboo materials for houses, bridges, handicrafts, bows, arrows, furniture, baskets, fences, firewood, and flutes, preparing and using biopesticides from *Bhumea lacera* and *Nicotiana tobaca*, and preserving the biodiversity of medicinal plants, wild edible food, and animals (Tamang and Singh 2014).

The Raute, a wandering group, live in the forest or on riverbank and are also called as ‘Kings of the forest’. They possess a unique tradition of hunting few species of monkeys like *Macaca mulatta, M. sylvanus, and Semnopithecus schistaceus*

Table 13.2 A selection of ethnic groups, their knowledge of using plants and animals against illness in the Hindu Kush-Himalaya region

Caste/ ethnic groups	Geographic locations	Ethnic knowledge for using		Used against	Citation
		Animals	Plants		
Limbu	Limbuwan area (Eastern Nepal)		225 species of plants	Rabies, snake bite, diarrhea, cut, constipation, sprain, sinusitis, piles, tonsillitis, jaundice, burns, scabies, toothache, fracture, epistaxis, and others.	Limbu and Rai (2013)
Rai	Bhojpur (Eastern Nepal)	27 animal species like *Ichhneumonid, Lophura leucomelanos, Cosmopolites sordidus, Panthera tigris,* and *Paa liebigii*	87 plant species *Schima wallichi, Daphny papyraceae, Centella asiatica, Urtica dioica, Viscum album, Vitis capreolata, Curcuma longa,* and others.	GI, cardiac, psychologic, respiratory, skeletal, parasitic, gynecologic, hormonal, hematologic, vector-borne, and nervous diseases.	Rai and Singh (2015)
Tangbetons	Pokhara (Western Nepal)	17 species of animals like *Bos grunniens, Capra hircus, Panthera tigris, Canis aureus, Moschus chrisogaster, Bos indicus, Gyps himalayaensis, Apis cerana, Periplaneta americana, Equus hemoionus kiang, Equus kiang,* and *Apodemus gurkha*.	60 species of plants like *Justicia adhatoda, Ephedra gerardiana, Rhododendron arboretum, Emblica officinalis, Swertia chirayita, Hordeum vulgare, Solanum surattense* and others.	Gynecologic, cardiac, hematologic, urinary, ophthalmic, hormonal, skeletal, immune, and psychologic disorders.	Paudyal and Singh (2014)

(continued)

Table 13.2 (continued)

Caste/ ethnic groups	Geographic locations	Ethnic knowledge for using		Used against	Citation
		Animals	Plants		
Lapcha	Ilam (Eastern Nepal)	19 animal species like *Anadenus, Apis dorsata, Equus coballus, Panthera tigris, Elephas maximum, Hystrix brachyuran, Palaemon malcolmsoni,* and 61 plant species like *Ageratum conyzoides, Heracleum nepalense, Tagetes erecta, Cucumis stivus, Mentha aquatic, Rosa brunonii, Nephrolepis auriculata,*and *Dryopteris filixmas*.		Scabies, jaundice, snake bite, insect bite, dog bite, intestinal worms, measles, typhoid, dysentery, nose bleeding, and cut and burnt wound.	Tamang and Singh (2014)
Raji	Surkhet (Mid-western Nepal)	36 animal species like *Rana tigrina, Melurus ursinus ursinus, Columba livia, Tor tor, Varanus* spp., and *Cosmopolites sordidus*.	91 plant species like *Justica adhatoda, Achyranthes bidentia, Drymeria diandra,* and *Utrica dioca.*	Asthma, cold, fever, hemorrhoids, pneumonia, rheumatism, mastitis in livestock, diphtheria, conjunctivitis, cardiac and psychologic disorder, and snake bite, gynaecologic and GI problems.	Poudel and Singh (2016)
Tharu	Chitwan (Central Nepal)		71 species of plants	GI, cardiac, respiratory tract, genitor-urinary, parasitic, and dermatologic infections.	Dangol and Gurung (1991)

(continued)

Table 13.2 (continued)

Caste/ ethnic groups	Geographic locations	Ethnic knowledge for using		Used against	Citation
		Animals	Plants		
Tamang	Sindhupalchok (Central Mountain of Nepal)	41 genera like *Apis* spp., *Schizothorax* spp., *Paa* spp., snakes, *Gallus* spp., *Lepus* spp., *Ovis* spp., *Hystrix* spp., slugs, *Pheretima* spp., *Sturnus* spp., *Myophonus* spp., *Spilornis* spp.		Asthma, burns, cuts, fever, gastritis, and typhoid; the fat of these species are to treat arthritis, burns, cracked skin and rheumatisms.	Lohani (2010)
Tamang	Makwanpur		161 species of plants	Foot-and-mouth disease, diarrhea, eye problems, as well as tapeworm, lice, and tick infestation, dyspepsia, neck wounds, and to enhance sexual stimulation as well as milk production.	Luitel et al. (2014)
Tharu and Magar	Rupandehi (Western Terai of Nepal)		74 plant species	Tumors, anemia, piles, and toothache.	Singh et al. (2011)
Magar	Gulmi (Hilly region) of Nepal		161 plant species	GI, dermatologic, ophthalmic, respiratory infections and snake bite.	Acharya (2012)

(continued)

Table 13.2 (continued)

Caste/ ethnic groups	Geographic locations	Ethnic knowledge for using		Used against	Citation
		Animals	Plants		
Magar	Kavre (Central hilly region of Nepal)	39 species of animals like *Manis pentadacyla, Panthera tigris tigris, Melurus spp., Myotis spp., Sus scrofa, Vanellus indicus, Ketupa spp., Muntiacus muntajac, Cervus unicolor, Hystrix indica, Tor tor, Schizothorax spp., Varanus bengalensis,* and *V. flavescens.*		Aphrodisiacal as well as esthetic values	Lohani (2011a)
Balami	Nuwakot (Central Hilly region of Nepal)	65 species like *Pila, Helix, Araneae, Plytis stigma*, Termite, *Vespa*, *Canis aureus, Felis chaus, Selenarctos thibetanus, Hystrix brachyuran, Bubo bubo, Hemidactylus flaviviridis,* and *Bufo*.	185 plant species like *Allium hyposistum*, *Acoras calamus, Berberis asiatica, Terminalia chebula.*	Headache, arthritis, asthma, dysentery, infertility, cough, paralysis, typhoid, allergy, cut, wound, cough, jaundice, anemia, asthma, rheumatism, diarrhea, mumps, fracture, urinary disorder, taeniasis, and scabies.	Timilsina and Singh (2014)

(continued)

Table 13.2 (continued)

Caste/ ethnic groups	Geographic locations	Ethnic knowledge for using		Used against	Citation
		Animals	Plants		
Jirel	Dolakha (Mid-mountain region of Nepal)	49 faunal species like honeybee, earthworm, slug, snail, spider, crab, *Hoplobatrachus tigerinus*, *Paa polunini*, python, sparrow, starling, *Lophura leucomelanes*, *Lophophorus impejanus*, *Ithaginis cruentus*, *Python molurus bivittatus, Hystrix indica*, *Panthera pardus, Melurus ursinus, Selenarctos thibetanus, Panthera pardus, Canis lupus pallipes, Moschus chrysogaster, Muntiacus muntjac, Sus scrofa, Macaca assamensis, Macaca mulatta, Myotis, Canis alpines, Canis lupus pallipes,* and *Martes flavigula.*		Diarrhea, dysentery, cold, cough, and others.	Lohani (2011b)

and the collection of forest vegetables resulting in the declining of these flora and fauna (CV 2011; Chan 2016). This group barters with the local communities so that it exchanges wooden products like bowls, boxes, beds, and other utensils with the quantity of grains that the same product can contain (CV 2011). Although this may indicate that their livelihood ultimately depends on deforestation, they cut down only a certain common species of trees rather than *Shorea robusta, Acacia catechue,* and *Dalbergia sisoo.* Also, they continue moving from one forest to another to reduce deforestation and allow for sufficient re-growth (CV 2011). Modernization including the increased use of cheap plastic goods have replaced the public use of wooden products affecting their livelihood (Chan 2016).

The Raji community actually originated at Surkhet and later migrated towards Dang, Bardia, Kailali, and Kanchanpur districts of Mid-Western and Far-Western regions of the country. Although initially they were nomadic, they settled in their

own permanent community indicating they are closest to nature after nomadic Rautes (Poudel and Singh 2016). They have been reported to use 36 animal species to treat 30 different ailments like asthma, cold, fever, hemorrhoids, pneumonia, rheumatism, mastitis in livestock, diphtheria, conjunctivitis, cardiac and psychologic disorder, and snake bite as well as 91 plant species to treat 60 different ailments like gynecologic and gastro-intestinal (GI) problems (Poudel and Singh 2016; Table 13.2). However, they practice sustainable forms of wildlife hunting and trapping, and they actually cultivate wild medicinal plant species in their gardens also practicing mechanical and biologic control, for example, handpicking and spraying cow's urine, local beer (*Jaand*), tobacco and *Azadirachta indica* leaf juice to control insects promoting their involvement in conservation and in safe insect pest management (Poudel and Singh 2016).

Most of the Nepalese tribes depend on wildlife for their food products. It has been shown that the Chepang community has been using 17 forest species for their food requirements (Lamichhane 2017). They hunt many bats especially for their family or for business purposes at the hotels in the highways (Acharya 2015). Local people and tourists highly demand the meat of wild species because they believe they are delicious as well as have pharmacologic properties. Besides, hunting these species is a recreational activity without any taxes or cost, thus, leading even income generation. In addition to Chepang, other tribes like Raji, Bankariya, and Raute principally depend on wild foods including fiddlehead ferns, *Dioscorea deltoidea, Dioscorea alata, Asparagus racemosus,* and *Urtica dioica* (Acharya et al. 2017).

It is believed that the word Tharu represents 'man of the forest', probably because of the forest life for hundreds of years maintaining inherent and strong economic, spiritual, and cultural links to forests (Muller-Boker 1991). They are fully dependent on the forest for vegetables, fruits, and medicines and *Imperata cyli1indrica* for covering the roof of the house and *Saccharam* for house walls (McLean 1999). Interestingly, the Tharu communities, living in the tropical region of the southern foothills and inner Terai of the country, have subsequently a very rich and diverse food culture that may vary according to geography. In a study, they have been reported to use 101 species of non-timber forest products (Lamichhane 2017). They traditionally conserve, grow, and consume various local varieties rice including *Anadi*, a type of sticky rice used to prepare a traditional dish called *chichor*. Their food habits include consumption of wild mushrooms, yam, sesame seeds, legumes, and wild vegetables including fiddlehead ferns. They collect and eat invertebrates like mussels, shrimps, crabs, and snails and vertebrates like mice of paddy fields, chicken, ducks, pigeon, pigs, wild boars, and fish. It is interesting to note that these groups in the Far-Western region of Nepal extract bark of trees accompanied with phloem tissues of endangered species called *Shorea robusta* to prepare local alcohol that may by now result in the species being overused, and having a threatened conservation status (Pitamber Pant pers. comm.). A study in Chitwan, the central part of Nepal, shows -not really surprisingly – that the Guruwas of the Tharu community has a wealth of ITK. For example, they use one or more of the 71 species for the treatment of GI, as well as cardiac, respiratory tract, genitor-urinary, parasitic, and dermatologic infections (Dangol and Gurung 1991). Both ethnobiologists as well as

ethnogenecists are curious to know the physiology and genomics of Tharus because of the presence of genes for thalassemia, resistivity to *Plasmodium* infection, and the resulting reduced incidence of malaria in these ethnic communities (Terrenato et al. 1988; Modiano et al. 1991).

Majhi is another ethnic group that lives cooperative. They are distributed along the inner terai, plain terai, and mountain areas especially near the river shore. Because of their close relationship with water and water sources, people usually think that they are the sons of river. They traditionally work as a swimmer, boat builder, river transportation service provider, fishing net-builder, and fish-catcher. They sell *Marcha*, an ayurvedic raw material to prepare wine. For a cash-based livelihood involving food and money, they solely depend on fish and aquatic products. It makes for a unique perspective to consider in the puzzle of sustainable lifestyles in Nepal. However, with the increasing water pollution and development projects along riversides may pose the risks of increase the adverse effects on their livelihood, and an entire culture gets lost.

The Dom people of the terai area fulfill their needs from the jungle by using their own tiny gardens. They plant *Mangifera indica, Dalbergia sisoo, Melia azedarach,* and *Eukalyptus camaldulansis*, for human consumption. As found elsewhere, they use mostly dry animal dung for cooking as fuel (Shah 2007). Their occupation includes bamboo works, mat-weaving, basketry, drum beating, scavenging, pig-, hen-, goat-, and duck-taming, and general agricultural works (Shah 2007). In eastern Nepal, they use dried flesh and bones of snakes for medicinal properties (Shrestha 2001).

Sauka or Bhote, residing in mountains of western Nepal, and subsequently toward the Kumaun Himalaya in India, follow a semi-nomadic lifestyle and they rely on natural resources (Joshi and Pande 1997). They practice the collection and marketing of medicinal plants, animals, and their products which suggest their main role in conservation for such resources, too.

In the mountains, the Sherpa communities have also many sacred forest areas, the temple and monastery forests, the sacred mountains, the lama's forests, and the nawa system involving the management of community forests, wildlife, and rangelands (Stevens 2008). These features are commonly found throughout the Hindu Kush-Himalaya region in which lama and monastery guide for the conservation of these species because they believe that conservation is their ancestor's duties (Stevens 2008; Verschuuren et al. 2010).

The Thakali people of Mustang – including its Upper region, the Myagdi, Baglung, Parbat, and Kaski districts – celebrate a cultural festival in which they pierce yak's neck to collect fresh blood and drink it. They do it particularly for the reason in that they traditionally believe that the yak feeds on herbs like *Ophiocordyceps sinensis, Nardostachys jatamansi*, and *Dactylorhiza hatagirea* and thus yak products cure gastritis, jaundice, muscle sprain, and body swelling (Bhattarai 2015). This leads not only to the appreciation of yaks but also of their habitats, and consequently results in their protection. It essentially goes back to the ancient concept of 'use or loose it' when supported by a wider good cultural framework allowing for sustainability for centuries, if not millennia even.

Another ethnic group, the Gurung, live in the hills around Pokhara and east toward Gorkha (Burbank 2002). In a large study involving Gurung, Shahi, Sherpa, Rokaya, Thakuri, Kshetri, Brahamin, and Dalit, they were reported to use 107, 59, 44, and 166 species of ethnomedicinal important plants from Dolpa, Humla, Jumla, and Mustang districts respectively (Kunwar et al. 2006). These ethnic groups were found to prepare many traditional drugs by various methods such as juice, paste, extract, decoction, powder, oil, and smoking of the root, rhizome, tuber, leaf, flower, fruit, seed, shoot, bark, wood, resin, and whole parts of 84 species of plants to treat diseases like GI illnesses, skin diseases, cuts and wounds, and febrile illness all indicating a wide application of ITK on ethnomedicine (Kunwar et al. 2006).

The Tamang are the largest of the mountain-living groups and the most independent one having retained their own language and peculiar Buddhist religion. They live in the high hills to the north, east, and west of Kathmandu, however, they are also found in the terai region. It has been shown that the Tamang have a traditional knowledge of using wild and domestic animals like *Apis* spp., *Schizothorax* spp., *Paa* spp., snakes, *Gallus* spp., *Lepus* spp., *Ovis* spp., *Hystrix* spp., slugs, *Pheretima* spp., *Sturnus* spp., *Myophonus* spp., *Spilornis* spp. that possess great food and or medicinal values. In these contexts, *Schizothorax* spp., and *Hystrix* spp. are killed to extract the ingested fresh algal and plant materials that are believed to have medicinal values (Lohani 2010). These ethnic groups believe that the bile of domestic cow, buffalo, sloth bear, and *Hystrix* spp. can treat asthma, burns, cuts, fever, gastritis, and typhoid; the fat of these species are to treat arthritis, burns, cracked skin and rheumatisms indicating the existence of ethnomedical practices and their values (Lohani 2010). A study in the Makwanpur area shows that they use whole plants or their roots, rhizomes, bulbs, tubers, young shoots, stems, bark, wood, leaves petioles, flowers, fruits, seeds, and resins of a total of 161 species to cure 89 types of human illnesses (Table 13.2). These plants are used in various ways for construction, and people use them to make wooden tools like plough, and to worship gods (Luitel et al. 2014). They also practice the delivery of drugs prepared from plants either through oral or topical methods to treat, for instance, foot-and-mouth disease, diarrhea, eye problems, as well as tapeworm, lice, and tick infestation, dyspepsia, neck wounds, and to enhance sexual stimulation as well as milk production (Luitel et al. 2014).

The ethnic group of the Magar also lives in the central and western parts of Nepal. The Magar have had the longest contact with caste Hindus from India (Burbank 2002). In a study conducted in the terai region of Western Nepal, the Tharu and Magar communities were listed to use 74 plant species to cure various types of diseases like tumors, anemia, piles, and toothache (Singh et al. 2011). In another study conducted in the hilly region of the Western Nepal, the Magar community was found to use 161 plant species to treat GI, dermatologic, ophthalmic, respiratory infections, and snake bite (Acharya 2012). In the central region of Nepal, they have been found to use 39 species of animals including *Manis pentadacyla, Panthera tigris tigris, Muntiacus muntajac, Cervus unicolor, Hystrix indica, Tor tor, Schizothorax* spp., *Varanus bengalensis,* and *V. flavescens* for food, medicine, ethnomusicology, religious, and magicoreligious values, aphrodisiacal, as well as

esthetic values indicating Magar people's wide relations with above-mentioned endangered and threatened faunal species (Lohani 2011a; Table 13.2).

The Newar are actually the indigenous inhabitants of the Kathmandu Valley, where they have been living for the past 1500 years (Burbank 2002). It is accepted that they are the oldest and so-called most developed and civilized groups in the region. Newars have a heterogeneous, urban, and highly stratified society that has developed for at least two and a half millennia in the Kathmandu Valley. The ITK for medical practices by the Newars are many and they vary within their subcastes, subgroups, and genders in several areas (Tuladhar-Douglas 2008). There is a report of catching, killing, drying, rolling, and heating a 'house bat' of the Hipposideridae and Rhinolophidae family in mustard oil to prepare bat oil medicine by the Newars in the Kathmandu valley (Tuladhar-Douglas 2008). The oil is used to remove ear bugs, and also as a cure for baldness, and as an antiparalytic liquid (Tuladhar-Douglas 2008). Culturally, the Newars practice a ritual called *Bel Bibaha* (Nepali; *Bel*: *Aegle marmelos* and *Bibaha*: marriage), which means the first marriage of a lady with the fruit of *Bel* suggesting a huge respect and relation with plants (Verschuuren et al. 2010). Balami is a subcaste of the Newar that were once traditionally farmers, porters, woodcutters, and firewood sellers living near forested areas all around the ridge encircling the Kathmandu valley (Timilsina and Singh 2014). However, most of them have left these jobs by now and they are good field workers and buffalo traders. A study in the Nuwakot area shows that although they occupy a comparatively small geographic area, they have been reported to use 65 faunal species and 185 plant species (Timilsina and Singh 2014) (Table 13.2). They practice the use of eggs and whole body of animals, fats, stings, blood, web of birds, meat, bile juice, the head and skull, but also the mud where the animals live to treat various diseases like headache, arthritis, asthma, dysentery, infertility, cough, paralysis, and typhoid and leaf, stem, rhizome, fruit, bark, seed, shoot, tubers, or whole plant and its extracts to cure allergy, cut, wound, cough, jaundice, anemia, asthma, rheumatism, diarrhea, mumps, fracture, urinary disorder, taeniasis, and scabies (Timilsina and Singh 2014).

In a study of the Jirel group in the hilly areas, it has been reported that they use one or more parts of 49 faunal species including their flesh, viscera, bones, GI tract, skin, claws, whiskers, fur, spines, and products like musk, milk, semen, fecal matter, and urine suggesting a huge link of the faunal diversity in Jirel's livelihood and their medical health (Lohani 2011b; Table 13.2).

It has been reported that people in the Kailash Sacred Landscape were using the fruit, leaves, stems/shoots, bark, buds, bulbs, flowers, tubers, corms, roots, and seeds from a total of 99 species of wild and non-cultivated edible plants for the purposes of food, medicine, spice, and others (Aryal et al. 2018). Interestingly, people's attitude toward using these plants in treating stomach disorder, colds, and cough, wounds and cut, skin diseases, fever/headache, nausea and vomiting, worms in the stomach and snake, as well as scorpion bites suggest that the landscape is highly important in the indigenous knowledge as well for its application in public health (Aryal et al. 2018).

13.5 Ethnobiology, Traditional Healers, and the Conservation of Resources, Landscapes, and Watersheds

The history of relation of traditional healers with ethnobiology is very deep and long. It makes for a crucial and essential link all over the Hindu Kush-Himalayan region including Nepal. Although acupressure, acupuncture, aromatherapy, ayurvedic medicine, balneotherapy, biofeedback, chiropractic, homeopathy, naturopathy, reflexology, and reiki are emerging subjects, the actual practice of Ayurveda (*Vaidya*) and folklore systems like shamanism (by *Jhakris* in Nepali) and tantra (by *Jharfuk* in Nepali) is predominant all over Nepal. Amchi – the traditional healer and a perhaps now called village-doctor – is another practice of a traditional healing system of the Tibetan region that has now been gaining significance in the wider HKH regions of Nepal like Mustang, Dolpa, Humla, Mugu, Gorkha, and Rasuwa for instance (Pandey 2006). Amchis have multiple skills of diagnosis and treatment and have a well-founded ITK, thus, they are actually responsible for the conservation of high altitudinal medicinal plants.

The exact methodology is somehow different among shamanists because these magico-religious healers use parts or all of invertebrates and vertebrates in addition to medicinal plants and herbs. They exercise and perform to remove evil spirits from the patient's body. They wear animal part/s, exercise and play with or without traditional music. In some cases, they may ask the patient's relatives to sacrifice domestic or wild animals in order to please gods and subsequently remove the spirits from the patient's body. Interestingly, in the Far - Western Region Hills, it can be observed that they demand the sacrifice of *Gallus varius* and *Lophura leucomelanos* (Pitamber Pant personal observation). The situation is further somewhat problematic by the fact that the shemanists use bones and claws of *Hemidactylus* spp. and *Spilornis cheela*, bones, claws and whiskers of tiger *Panthera tigris tigris*, musk of *Moschus chrysogaster*, the tail of *Bos grunniens mutus*, or horns of *Cervus unicolor* to remove the spirits, and milk of *Panthera tigris tigris* might be used to prevent the spread of fire in the village (Lohani 2010). Limbu healers (*Phedangma*), who are ethnomedicine practitioners, also recite some magical words called "mantra" during the treatment. It is considered that the use of the mantra increases the healing power of the herbal medicine resulting into more effective treatment (Limbu and Rai 2013). Notably, all the healers prepare drugs from raw herbs through personal experience and ancestral prescription (Aryal et al. 2018). They collect those plants from wild landscapes, watersheds, and ancient groves which are essential for healing. These drugs are actually thought to be effective, inexpensive, and beneficial and have a lower side effect compared to allopathic drugs although they need further proofs (Aryal et al. 2018).

Arguably, the healers have a high level of strong faith on ethnomedicine. They also have a high level of concern on the harvest location and the timing of the medicinal plants. For example, by studying the effects of traditional harvesting patterns by local healers or by commercial collectors on the population ecology of two

highly threatened Himalayan medicinal plants, *Nardostachys grandiflora* and *Neopicrorhiza scrophulariiflora*, in Shey-Phoksundo National Park and in its buffer zone in the northwestern part, it has been concluded that ethnoecological knowledge, plant life forms, and growth patterns are essential to consider for the actual management of Himalayan medicinal herbs (Ghimire et al. 2005).

While the above traditional healers play a critical role in the management of public and veterinary health all over the country, they normally do not transfer their knowledge to other people creating a gap in the ITK transfer in the traditional healing system. They are not much concerned in listing and preserving the plants and animals with ethnomedicinal principle. In addition, young generations think that either ethnobiology is not a trustworthy science to treat diseases or it is not easy to earn money through the application of this subject, thus, creating the risk of disappearance of this subject altogether in the near future.

13.6 Ethnobiology, Musical, Esthetic and Recreational Tools, and Conservation of Landscapes

Ethnic people in Nepal are highly skilled at making musical tools especially from the skin of various animals that is concerned with the conservation of many species. For example, the skin and stretched leather of *Muntiacus muntjac* and *Varanus flavescens* is used to prepare different musical instruments (Lohani 2010; Tamang and Singh 2014). Tamang keep *Cervus unicolor* as a decoration purpose in the house (Lohani 2010). Hunting of vertebrates for recreations and alcohol preparation, for example, from the jackal's flesh is common in many ethnic groups (Lohani 2010; Tamang and Singh 2014). These examples indicate that overuse of faunal species for esthetic, musical, and recreational tools may lead to an endangerment process.

13.7 Ethnic Knowledge: At Least Two Sides of a Coin in Conservation

Since time immemorial, deep time, ITK has been an inseparable theoretical and practical experience of ethnic and indigenous people living in the HKH nations like Nepal. This greatly differs from industrial societies, their landscapes, watersheds, people and societies. The knowledge has been classified as individual, distributed, and communal (Maden et al. 2008). Among them, individual knowledge is strictly confidential and even is not shared among family members that may otherwise lead to the risk of wide and generational disappearance after the person dies. This is true in the case of many ethnic groups like the Gurus of Tharu (called Guruwas) who do not want to share their ITK because they think that the ethnomedicine fails to treat

the disease if they share the idea with other people (Tirth Ghimire personal observation). The same concept applies to many Ayurveda practitioners who keep their materials and methodology even away from their own children. However, few groups may share it with the next generation or with community members so that anyone can practice the ITK whenever necessary.

While ethnic knowledge is both – somewhat open as well as secret – it also has both cons and pros for the conservation management of the species. In many cases, it increases the negative impact on conservation because the practice of ethnic knowledge is actually one of the underlying causes of endangerment of many species of flora and fauna. Some of the plants and animals are regarded as a symbol of evil or are believed to have magical powers leading either to success or failure in their lives, and thus, people harm those species. In the western world, many examples can be found, for instance, the European-centric perspective to rid predators, wolfs, raptors or even snakes and spiders. The disappearance of the Yew (*Taxus bacata)* followed a similar motivation as it might kill horses when eaten. In Nepal, several examples are found, for instance, *Artocarpus heterophyllus* as a symbol of awfulness, *Canis lupus* as a sign of evil, whereas the bone of *Panthera pardus* as a symbol of protector from evil, and *Panthera tigris tigris* as a symbol of bravery, and the tail hair of *Elephas maximum* as a sign of beauty and attraction. The horn of *Rhinoceros unicornis* is believed to be the symbol of protector from evil power, skin is to be sacred for using in annual rituals (*Shradda* Nepali) for a dead person, and it is believed to have unlimited medicinal values including aphrodisiac effects. Similarly, sights of flying *Gyps fulvus* near the house, unusual sounds of *Bubo bubo*, the laughing sound of *Ketupa* spp., and howling of *Vulpes vulpes* are thought to predict bad news for the living people (Lohani 2010). Believing such myths may lead to the mass collection or wholesale destruction of the fauna by the local people. It has been frequently shown that ethnic people residing nearby forest areas are reported to involve in poaching for recreation, money, and accessible employment leading negative impacts on wildlife (Dangol 2015). Taboos, and their establishment and decay play a big role in this discussion. Just consider a holy cow vs a cash cow (Fig. 13.4). This general principle also applies to *Ophiocordyceps sinensis*, the Himalayan Viagra, that is also gaining significance in the national and international markets. And thus, people have actively collected it *en mass* for its legal or illegal trade. It appears like a new culture stimulated by Asian rise of markets and global governance of *laissez faire* and in the absence of proper law, rules and regulations, this mushroom becomes a widespread means of corruption, crimes, and war among politicians and government officials leading a problem of overharvesting and hindrance in sustainable development of the local people (Harvey 2014; Schaedla 2016).

Such types of commercial overharvest have also been reported to lead to the endangered status process of *Valeriana jatamansi*, *Rauvolfia serpentina*, *Trillium govanianum*, *Nardostachys jatamansi, Dactylorhiza hatagirea, Trillidium govanianum, Frittillarai cirrhosa,* and many species of orchids throughout the country and the wider Hindu Kush-Himalaya region (Raut and Khanal 2011; Byers et al. 2016; Acharya et al. 2017; Acharya 2017). The situation is also challenging due to the lack of ITK and taboos for such newly-formed cultures often triggered by outside

Fig. 13.4 Holy Cow vs Cash Cow: Cattle Worshipping during Dipwali festival of Hindu as a sign of animal respect. Those concepts have by now been pushed out in the western scheme of things. (Photo by Tirth Raj Ghimire)

demands not attached to the local resource. Globalization and with a neoliberal capitalism promotes such destructions, now almost globally and certainly in the HKH region. Often, nations like China, Korea, Singapore, Taiwan, and India are big drivers on those issues, backed up by development banks from elsewhere. The lack of ITK has one important example with *Pterocarpus marsupium:* It's a critically endangered plant and its population in natural stands is limited in the western parts like Kanchanpur and Kailali districts (Bhatt 2007). The tree has a peculiar medicinal properties as its wood is considered astringent, antioxidant, anthelmintic, and anti-inflammatory (Barstow 2017) although it is targeted by the local people and is cut down for the sole use of firewood because of the modern lack and decay of ITK (Bhatt 2007). Thus, while the endangered status and trend is caused by the medicinal, economic, and daily purposes, or spiritual issues, the haphazard research mechanisms also critically play role in this process. For example, many research scholars and scientists make a field visit and intentionally and unintentionally collect many ethnically important flora and fauna without following relevant rules and regulations. This also applies to media and TV companies and all their contactors. It has been usually reported that many type specimen from this Himalayan country have been exported even without informing the GoN that has unable to identify, address, and solve this issue (Chaudhary 2015). The HKH region has many issues of specimen repatriation to deal with and to resolve still.

But the positive aspect of ethnobiologic knowledge is that people themselves become aware of conservation if they are guided by two approaches or factors:

– Firstly, if they are controlled by religious and traditional ideologies of protection and conservation, it creates the plus point. For example, it is believed that killing animals without proper justification will result in the punishment by the god in his/her life or in rebirth. The killer of bird, *Hirundo rustica* is believed to suffer from leprosy, the snake- and bird-killer is to suffer from lifelong sin. A cat-killer will suffer from hand paralysis, a dove-killer from the tragedy in his/her family, and a pigeon-killer will suffer from war. Many strict Hindu fellows and scholars prohibit killing of all animals including a single insect because they think that if a person kills an animal in his/her life, he or she will be killed by the animal after his/her rebirth (BDS 2015). Hindus worship, care, love, and conserve few sacred species like *Ficus religiosa*, *F. benghalensis*, *F. benjamina*, *F. racemosa*, *Ocimum sanctum*, *Aegle marmelos*, and *Desmostachya bipinnata* indicating their religious activities in the conservation management because their destruction is a kind of taboo. These religious groups worship cattle, ox, dog, crow, and snake as symbol of gods and goddess which directly helps in the conservation of these species. However, during certain occasions, in order to appease and gratify their gods, they sacrifice male goats, chicken, ducks, buffaloes, and others presenting a controlled utilization of species.
– Secondly, if people are properly guided and are offered alternate opportunities for economic development, they become fervent towards conservation. This is because of the principle of sustainable natural resource management practice in which permission is to be granted to the local people with their participation in their management (Yonzon and Hunter 1991). The population in rural areas and around protected areas often consists of distinct ethnic groups with specific socio-cultural practices and ITK. ITK is a pillar of the environment management strategy in Nepal, and it has been adopted into policies that attempt to ensure that indigenous communities live in and benefit from 'nature' in a sustainable manner (O'Neill and Rana 2016). Other practices like agroforestry and sustainable harvesting practices of medicinal and useful plant species may further provide economic incentives necessary to ensure the effective conservation of wild species (GoN 2015). In this context, CFP is handing the duties of sustainable resource management and conservation to the native communities who have traditionally and ethnically used forest and its products for many years (O'Neill and Rana 2016).

Interestingly, the appointment of Rautes as Forest Security Guards by the District Forest Office (DFO) of Surkhet in 2014 for 5 years term for controlling wildfires and deforestation is based on this approach (CV 2011; Poudel 2014). This CFP is one of the best and successful participatory conservation programs in the country (Beltran 2000). The Annapurna Conservation Area Project (ACAP) is an example of the most successful conservation program that employs the partnership approach based on traditional life and subsistence systems. In order to replicate the success gained from ACAP, GoN has designated Kanchanjungha, Manaslu, Krishnasar, Gaurishanker, and Api Nampa Conservation areas. These areas target communities to be the main actors and beneficiaries and they promote integrated conservation and development.

The integrated and participatory approach has given people a greater appreciation of conservation and a feel of ownership and subsequent engagement towards the protected areas (Khatri 2010). It has been shown that the communities, local level authorities, and civil society organizations have now been directly involved to support the national park and the protective area management and associated livelihood programs indicating public enthusiasm toward conservation (DNPWC 2017a, b). The most recent Acts – the Local Government Operation Act 2074 BS, and the National Natural Resources and Fiscal Commission Act 2074 passed by the GoN – are essential to participate, empower, and utilize ITK for the conservation. These Acts have handed many powers and responsibilities over to the local authorities in order to formulate, amend, and apply the necessary rules and regulations. Thus, the GoN has been on the right track of principle that ethnobiology can help to establish and improve the two important links; firstly, the ITK and its uses on biodiversity, and secondly, the understanding and maintenance of culture (Bobo et al. 2015).

13.8 Conclusions and Recommendations

In older times, there was lack of the advanced tools and techniques we now consider as 'essential', 'standard' or 'modern. And thus, ITK had had a great impact on humans who used to spend life also maintaining a good harmony and relation with nature and natural resources. That was usually done through entrenched policies and following taboos linked with a sustainable approach. Leisure and happiness were valued (Fig. 13.5 for musical instrument). While the topic remains debated by some scholars, the traditional methods were ecofriendly, sustainable, and long-lasting and did not cause global devastation, world wars, and climate change. At least, it was more benign for thousands of years than what has happened just the last 40 years during unconstrained globalization affecting the entire universe. For example, cooking was made in a soil stove (Fig. 13.6), digging of land was done by wood plough, husking and grinding through a water flour mill (*Ghatta* Nepali; Fig. 13.7) based on the community or with locally made husking equipment (*Dhiki* Nepali) in individual houses (Fig. 13.8) or with locally made bamboo basket to collect garbage (Fig. 13.9). Water is the fuel and consequently why disturbing or not protecting it, or the landscape and watershed when entire religions and good lifestyles can be run with it (Fig. 13.10 for a praying mill fueled by a mountain stream).

A sustainable harvesting of wild species was commonly done, traditional healing systems exist being holistic and connected with 'Mother Earth', and the system of worshipping to the nature, and natural resources are among the prime concerns of indigenous people. It allowed for a relatively low, somewhat sustainable human impact, if at all. Thus, although ITK is a critical part of biodiversity conservation, now with the rapid human population explosion, increased globalization, and with the advent of modern tools and techniques, e.g. mobile phone and internet, it starts to have been lost and by now sometimes even threatening the conservation of flora and fauna. Traditional approaches to new problems are still used and new and

Fig. 13.5 A musical instrument with its outer one-side skin made up of skin of animals. (Photo by Pitamber Pant)

Fig. 13.6 Cooking in a locally made soil stove by an ethnic lady. (Photo by Tirth Raj Ghimire)

blended ones are used and forming (Figs. 13.8 and 13.10 as an example). ITK remains an invaluable basis though for developing cost-effective, participatory, and sustainable adaptation and natural resource management strategies in response to environmental and other forms of change (IAC 2010).

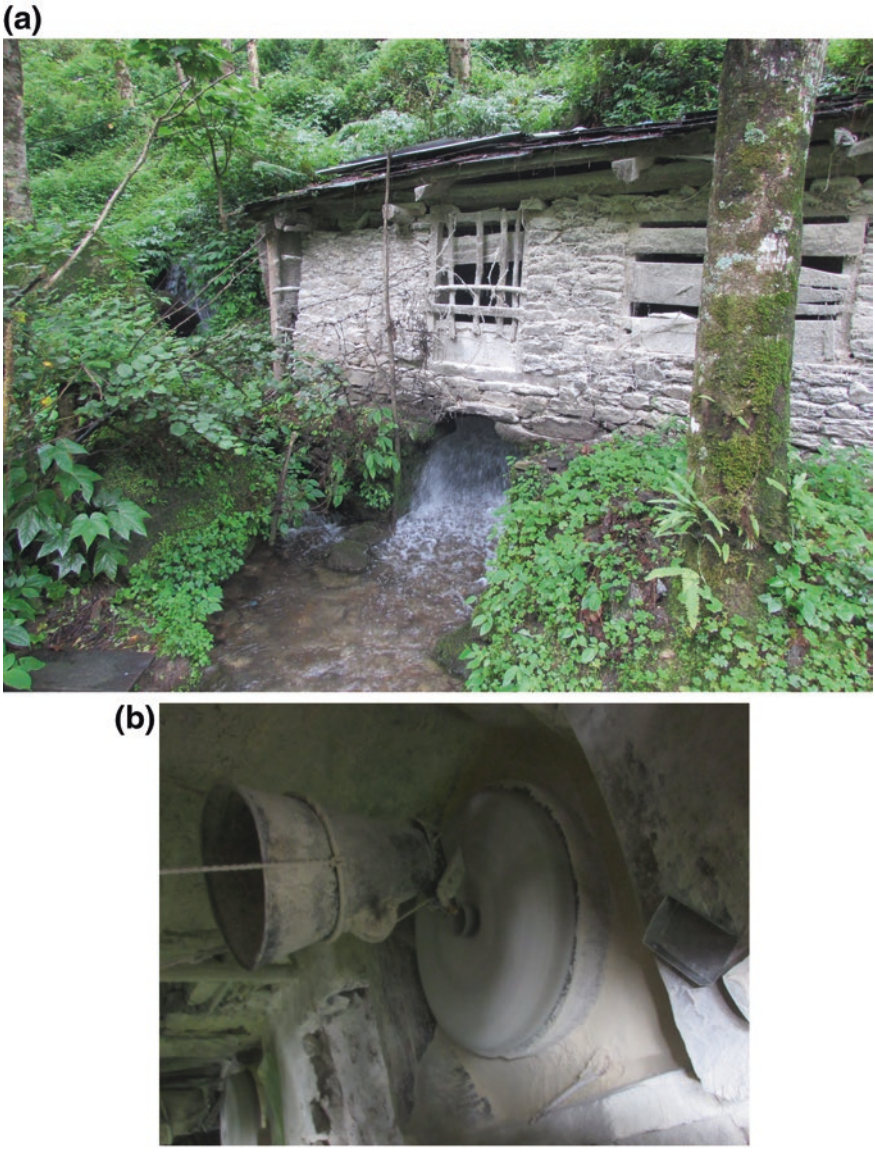

Fig. 13.7 A community water mill for flour 'fueled' naturally by water. (**a**) building, (**b**) the actual mill; Photo by Falk Huettmann)

In conclusion, experiences and evidences of ethnobiologic practices from this HKH nation suggest that conservation strategies developed by 'first' and so-called developed countries cannot and must not be imposed rigidly onto so-called developing countries like Nepal. Needless to say that those 'modern' and highly technical policies even fail in the western nations themselves and thus are no so

Fig. 13.8 Dhiki and Doko (bamboo carrier) from the hilly region of Nepal. (Photo by Tirth Raj Ghimire)

Fig. 13.9 Bamboo basket used for collecting garbage at hilly areas of Nepal. (Photo by Tirth Raj Ghimire)

Fig. 13.10 A praying mill, fueled by a mountain stream. (Photo by Falk Huettmann)

good (global) rules to go by really. This issue is essential to acknowledge when we review the failure of the protection of ITK and diversity of Tharu groups, for instance, who were protectors of the forests and had a wealth of ITK, however, they were forcefully relocated from the current geography of the Chitwan National Park through a 'modern' mindset. These groups were then not allowed to grazing or any collecting of wild fruits, vegetables, medicinal plants, and materials for making houses and household items. It is a typical example where an entire culture was put to extinction; some might call it a certain form of genocide. In turn; even the increased conflict with the natural' wildlife led to a loss of their harvest and livestock. For example, their 80% cattle decreased without any compensation from the authorities (Muller-Boker 1991). This particular issue suggests that the permission to use natural resource sustainably by the local people and within traditional concepts should probably be reviewed and then provided for their effective management (Yonzon and Hunter 1991). It is a well-known scheme to follow for an alternative of the western concept. It is here where nations like Nepal and the HKH can contribute towards a better global conservation scheme, rather than *vice versa* and just top-down.

Thus, in summary, the following recommendations can be made:

- A good global framework is to be found that actually has a valid track record of sustainability.
- Identification and documentation of knowledge related to use of various plants and animals should be conducted.
- Morphologic, molecular, and genetic characterization of the local flora and fauna should be made.
- Biochemical, pharmacologic, and immunogenic properties of plants and animals with ethnozoolgic, ethnobotanic, ethnomedicinal, and ethnoveterinary significance should be analyzed, characterized, and documented in the research laboratories.
- Further scientific proofs of efficacy, specificity, and susceptibility of the products obtained from flora and fauna in the treatment of vaccine preventable diseases, snake and dog bite effects, and vector-borne diseases should be looked for.
- Research in the history, sociology, distribution, biology, and ethnogenomics including resistance to various diseases of ethnic or indigenous groups should be conducted.
- Awareness and training programs related to the proper and modern-time management of the biodiversity, sustainable harvesting of natural resources, modern tools and techniques in agriculture, safe disposal of landfill site, and reduction of pollution should be conducted by and for the local people.
- Trainings related to identification and harvesting of flora and fauna to local people by involving special focus groups such as researchers, woodcutters, cattle herders, and healers should be organized and conducted.
- Ethnobiolgists should be properly trained with updated and proper ethical guidelines that are necessary before discussion with focus groups and collection, identification, and documentation of specimen used by the local people.

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