Figure 1. Reforestation site at Ramdurga village, Koppal district, North Karnataka.

of the forest will be monitored in terms of carbon stored in the forest using non-destructive methods, i.e. developing biomass tables with variables like diameter at breast height, basal area, tree height and wood density. The study is an attempt to quantify carbon pools (living biomass only, i.e. above ground and below ground biomass) from within the maturing forest over a period of 5 years as a role to play in our fight against global warming and climate change.

The study area comes under the North Dry Zone. The place experiences a semi-arid type of climate characterized by hot summers and low rainfall (about 52% of the annual rainfall is received during rabi season). It is cool and pleasant during major part of the year, except during the summer months of March to middle of June. The coldest period is December to January; minimum temperature reaches up to 16°C and maximum reaches 45°C during hot summer. The area is characterized by dryness for the major part of the year because of a less rainfall. The annual normal rainfall is 571.92 mm and normally rain commences from June and continues up to November. The area falls under the north median region of the state. The elevation is between 450 and 900 m. The area is characterized by a large stretch of barren plains covered with black soil, red soil in granites and grey granite areas. The total population of the district is 1,193,496, of which the rural population is 995,224, accounting for 83% of the total population. The district has 3,020 small and marginal industries, which (13%) are agriculture-allied units and are broadly agricultural based.

The reforestation programme aims to create a 'carbon sink' at the proposed site to improve the local biodiversity and also to offset/reduce carbon emission to achieve sustainability. The carbon quantification data will be useful to assess the trends of carbon balance in the region.

1. State of Forest Report, Forest Survey of India, 2011; www.fsi.nic.in

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Depletion of traditional knowledge of medicinal plants

Traditional knowledge (TK) related to the use of natural resources including medicinal plants has been recognized as one of the important assets inherited through generations by the local communities[1]. Such knowledge is generally passed down to the next generation verbally, in the form of odes and poems. In the process of rapid modernization and advancement of medical sciences, partially documented or undocumented knowledge on ethnomedicine began to deplete drastically. Although several ethnobotanists and anthropologists have made attempts at documenting such knowledge in various parts of the world, several remote localities and indigenous communities have remained unnoticed. Traditional knowledge has now regained importance due to the discovery of new drugs and formulations from phytoresources[2,3]. It has been established that more than 80% of the people in the developing countries depend on traditional medicines for healthcare mainly due to their less side effects[3]. As a result, there has been a spurt in herbal industries. The pharmaceutical sector has to meet the ever-growing, excessive demand and this in turn has led to wild harvest of these resources, which may lead to rapid depletion of resource base. Contrary to the growing demand of medicinal plants all over the globe, TK on ethnomedicine is declining rapidly, especially in the developing countries[4].

The Himalayan region, well known for diversity and richness in medicinal plants, also harbours a large number of ethnic communities, each with distinct culture and TK system. Rapid pace of development and socio-economic transformations have led to erosion of natural resources and TK in the western Himalayan region. It is in this light that we undertook a study to assess the status of TK on medicinal plants by conducting a rapid survey on current knowledge on the use of medicinal plants among various ethnic groups in Uttarkashi district, Uttarakhand. Semi-structured interviews were used to know the extent of knowledge on medicinal plants passed from the older to the new generation. The survey was conducted in Bhagirathi, Upper Yamuna and Tons valleys, which represent agro-pastoral (Garhwalis), pastoral (Gujjars) and Jadhs (Bhotia) communities. A total of 861 persons living in 134 (of total 686) villages in the entire

district were interviewed, covering different age groups.

The study revealed that only 31% of the population possesses traditional knowledge. However, 30% of them do not use medicinal plants for treatment of day-to-day ailments. Nearly 69% of the surveyed population was unacquainted about the use of these plants. Only 1% of the surveyed population practised TK to cure various diseases. The herbal practitioner charged a nominal fee or nothing for the treatment of diseases and this practice never formed part of their main income. Irrespective of gender, the age group of above 40 years was found to be the custodian of TK (84.93% male and 65.75% female) compared to the younger generation (15.04% male and 16.44% female). Out of 31% of TK-holder respondents, only 23% had taught the next generation about herbal remedies and only 8% of the new-generation (up to 20 years) respondents showed willingness to retain and use this knowledge.

This clearly proves that knowledge about medicinal plants in these regions is vanishing. Depletion of such an important source of knowledge is a big loss for a country like India. Documentation of the uses of haldi, neem and basmati in our classical traditional healthcare system (e.g. Ayurveda) and to a certain extent in traditional folklore has helped India retain patents of these plants. Thus, documentation of TK helps in protecting unconventional mode of knowledge and so it is equally important to conserve it along with medicinal plants. At the same time, the livelihood of traditional healers should be taken care of. As mentioned above, practising traditional healthcare was not a primary source of income; there was increasing ignorance about the whole healthcare system. Nearly 60% of the respondents mentioned that they do not have any interest in using herbal medicines, as it is painstaking to find, prepare and use such medicines, apart from restriction from government on wild harvest of some plants. About 15% of the respondents mentioned that availability of modern medical facilities plays a major role in depletion of TK, whereas 19% of the respondents pointed out the unavailability of medicinal plants in nearby forests.

Nowadays, rural life is changing into fast life of modern cities. This change is affecting the young generation and overall increasing willingness to use allopathic medicines over ethnomedicines for its faster effect. Though the respondents shared that the process of collection of medicinal plants is time consuming and tedious, it was observed that villagers were more interested in selling these medicinal plants instead of using them for self cure. But, this trade is more or less in the informal sector and so difficult to document.

Changes in agricultural practice were evident from the fact that locals preferred cash crops like soybean, rajma, potato and tomato over medicinal plants. Local needs and micro-socio-economic–environmental conditions of knowledge holders and of medicinal plants should be considered to formulate policies to conserve both traditional knowledge and the plants.

1. Johari, R. and Karki, M. (eds), *Tribal Folk Medicinal Plant Resources of South Asia*, International Development Research Centre, Canada, 1999, pp. 7–13.
2. Alves, R. and Rosa, I., *J. Ethnobiol. Ethanomed*., 2007, **3**, 1–9.
3. Pandey, G., *Int. J. Pharm. Stud. Res*., 2011, **II**, 32–38.
4. Hassan, R., Choles, R. and Ash, N. (eds), *Ecosystems and Human Well-Being: Current State and Trends*, Island Press, Washington, 2005, vol. 1, pp. 1–22.

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Religious taboo among the tribes of West Kameng – an excellent traditional system of conserving biodiversity

Conservation of natural resources by traditional societies across the globe seems to have arisen out of the age-old practice of animistic religious belief systems. Such belief systems are fundamental aspects of people's culture, which strongly conditions their use of natural resources[1]. Arunachal Pradesh, a biodiversity hotspot region in the eastern Himalayas, is a tribal-dominated state with 26 major tribes and 110 ethnically distinct sub-tribes[2], where more than 80% of the population is from the rural area and is directly or indirectly dependent on the surrounding forest resources for its livelihood[3]. Besides these, the forest is also an integral part of the local people, which fulfils their cultural and social needs. This reliance has created an indivisible bond between the ethinic communities of the state and the natural resources.

Monpa and Sherdukpen, two ethnic groups of the West Kameng District, have managed and conserved the biodiversity of their surrounding since time immemorial. Subsequently, they have developed their own folk culture, customs, beliefs, faith, tradition, taboos, etc. For them, conservation of biodiversity is not an isolated, compartmentalized concept, but an integrated part of their lives. These two tribal groups are not only familiar with the economically important plant species in their surrounding forest, but have also good knowledge of religious and cultural values of plant diversity. Many plants like *Gymnocladus assamicus*, *Rhododendron* spp, *Quarcus* spp, *Daphne papyracea*, *Thuja occidentalis*, *Manihot esculentum* and *Illicium griffithii* have been conserved in their natural habitats through their deep knowledge of beliefs, faith and taboos. They worship nature and consider many of the forest patches as sacred groves. Almost adjacent to all the villages of the Monpa and Sherdukpen tribes there is a sacred grove (Figure 1 *a*). These sacred groves vary in size from a few trees to dense forests covering vast tracts of land and have been protected by the tribes through generations. Each sacred grove is dedicated to local deities and nobody is permitted to cut plants or kill animals or any form of life. To protect these forests the ancestors of the two tribes have made specific sets of rules and regulations enshrined in religious or cultural beliefs and superstitions, and all