WORKING PAPER 214

TRADITIONAL KNOWLEDGE SYSTEM (MEDICINE): A CASE STUDY OF ARAKALGUD TALUK, KARNATAKA, INDIA

B K Harish Kumar

K Lenin Babu

INSTITUTE FOR SOCIAL AND ECONOMIC CHANGE
2009

TRADITIONAL KNOWLEDGE SYSTEM (MEDICINE): A CASE STUDY OF ARAKALGUD TALUK, KARNATAKA, INDIA

B K Harish Kumara[1], K Lenin Babu[2]

Abstract

This paper attempts to assess the status of Traditional Knowledge Systems (TKS) as a tool of conservation in the Arakalgud administrative unit of Karnataka. The Study is based on the field investigation and interaction with the followers of Traditional systems such as healers and practitioners. Many plants in traditional agricultural systems have medicinal value; these are found in home gardens, as scattered trees in croplands and grazing lands on field bunds. Consequently there has been a reduction in the use of home remedies and preventive diets at the household level.

Introduction

Indigenous people around the world have sought the knowledge of physical reality throughout the ages. Their understanding of the physical universe is codified in their indigenous knowledge systems. A major component of these systems is ethno-botanical knowledge which refers to a cumulative body of traditional knowledge on the interaction between human societies and the plant kingdom, and, more specifically, how indigenous people perceive, manage, and utilise the plants around them. Largely oral in nature, ethno-botanical documentation is one way of capturing this body of knowledge in written and graphic form.

Himalayan sage-scholars who practised traditional medicine said *"Nanaushadhi bhootam jagat kinchit",* i.e., "There is no plant in the world which does not have medicinal properties." Medicinal plants are among the most important non-timber forest products (NTFPs) in India. Globally,

---

[1] Centre for Ecological Economics and Natural Resources (CEENR), ISEC, Bangalore

[2] Assistant Professor, CEENR, lenin@isec.ac.in

about 85 per cent of the traditional medicines used for primary health care are derived from plants (Farnsworth 1988). India has about 8 per cent of the world's biodiversity on 2 per cent of the earth's surface area, making it one of the 12 mega-diversity countries of the world, due to the species richness and level of endemism recorded in the various agroclimatic zones of the country. Medicinal plants, as a group, comprise approximately 8,000 species and account for around 50 per cent of the higher flowering plant species of India. Even today 75 per cent of the world population in developing countries are dependent on traditional medicine for their health care (Anthropological Survey of India, 1994). Most of the medicines are prepared and consumed locally using available plants (Biswal *et al*. 2003). It is estimated that nearly 4,600 ethnic communities are using more than 7,500 species of plants for human and veterinary health care in India. About 1,500 plants with medicinal uses are mentioned in the ancient texts and around 800 plants have been used in traditional medicine. Around 50,000 herbal drug formulations have been developed by Traditional Medicine Systems (TMS).

The aim of the present study is to document human-plant interactions in main stream societies in a part of Karnataka state in Southern India. All humans are dependent on medicinal plants in order to meet various requirements for survival (Phillips and Meilleur, 1998). Plants were used extensively to treat different ailments. However, the introduction of allopathic drugs decreased the degree of human dependency on medicinal plants. In the present world, where industrialisation and urbanisation have greatly modified values and life standards of the majority of the population, knowledge pertinent to uses of medicinal plants is in danger of being lost forever. It was thus considered worthwhile to document the uses of medicinal plants in curing major human diseases.

The overall objectives of the study is to

- Document the uses of medicinal plants to cure different ailments in traditional health care systems
- Assess the community perception of medicinal plants usage and conservation.
- Record the change in the usage of medicinal plants

Study area

The study was conducted in Arakalgud Taluk of Hassan district in Karnataka state, South India, that lies between $12^{0}31'$ to $12^{0}47'$ N and $75^{0}48'$ to $76^{0}13'$ E. The study area was divided into Southern Malnad, Semi Malnad and Southern Maidan regions. The topography of the area is gentle slope and plain region. The elevation range of the study area is between 1200mts to 1500 mts. The main characteristics of the study region are depicted in Table 1. Arakalagudu taluk has a geographical area of 68816 ha. The important water sources are tanks and groundwater. The river Cauvery passes through a part of the taluk. The taluk has significant variation in agricultural practices. It comprises arid and semi-arid regions, and the forest area comprises only 3.8 per cent. In the study region the average household size is 5.25. Of the 68,816 ha geographical area, 52,767 ha is cultivable land and 1,159 ha is forest land. It has a total population of 1,84,210, of which 92,453 are female (Table 1).

Table 1: General information of Arakalgud Taluk

Total Geographical Area in Hectares	**68,816**
Total Cultivable Area in Hectares	**52,767**
Total Area Irrigated Under other sources in Hectares	**540**
Total Area Irrigated in Hectares	**34,434**
Total No of Electrified Pumps	**1,262**
Total No of Non-Electrified Pumps	**878**
Total Forest Area in Hectares	**1,159**
Total area under Village forest in Hectares	**6,771**
Total Male Population	**91,757**
Total Female Population	**92,453**
Total Population	**184,210**

Source: RDPR 2003,

The vegetation in the region can be described as dry forest. Finger millet and paddy are the major crops in the taluk. Tobacco, horsegram and areca are the major commercial crops in the taluk. The mean temperature of Arakalagudu varies between 24.4^0 C and 29^0 C, although there are fluctuations ranging between 35.6^0 C and 12^0 C. Some parts of the taluk near Coorg (western Ghats) receive good rainfall (Tarigalale). But the remaining part of the taluk receives very low rainfall and sometimes even faces drought conditions. The annual rainfall of Arakalagudu taluk is around 898 mm. It receives normal rainfall of 919mm. This taluk has different regional climatic changes. Tarigalale, which lies toward Coorg, receives high rainfall compared to other villages. While Banugundi receives normal rainfall, two other villages record poor rainfall. Over 80 per cent of the annual rainfall occurs from June to September. The soil in the taluk is mainly red and sandy. Charnockites, gneisses and unclassified crystalline are the main rock formations in the area. Canal and tube wells are the major sources of irrigation.

Fig 1: Map of Study Region

Map of Study area, a. India b. Karnataka c.Arakalagud Taluk

Methodology

The information regarding the knowledge of the persons practicing traditional medicine was obtained by making queries through village representatives (Table 2). Villages selected represented a) good vegetation, b) normal vegetation, c) dry forest and without forest cover. Thus, Banugundi, on the banks of river Cavuery, Tarigalale at

the foothills of Western Ghats, Hampapura near to the Ganguru State Forest and Basavanahalli, a dry area, were selected. This was done to establish the links between traditional knowledge and the prevailing biodiversity and its richness.

Table 2: Sampling Villages

Sl. No.	Village name	House holds	No. of Respon-dent/ healers	Source for medicinal plants collection	Region	Nearest public Hospital in Km
1	Banugundi	186	25	Agricultural field	Semi arid	Konanuru-4km
2	Tarigalale	208	20	State forest	Sub-tropical	Konanur-8km
3	Hampapura	210	20	State Forest	Arid	Ramanathapura-6km
4	Basavanahalli	113	15	Agricultural Field	Arid (Dry)	Paduvalahippe-2km

Source: Field survey

Questionnaires, both closed and open-ended, were used to collect household-wise information on the use of medicinal plants and their conservation. The study was accomplished by incorporation of photography and documentation of medicinal plants observed. In this study, 80 healers were surveyed, the head of each household was interviewed to record their dependence on traditional medicine systems and allopathy. The simple methodology of species identification utilising the indigenous knowledge of the people in the area, termed as "spot identification method", was employed. All the species recorded were collected and field notes on taxonomic and other characteristics were made for subsequent identification. This exercise was further backed by literature with the field taxonomist's help.

Results

Available Medicinal Plants in the study region

In the present study, 82 plant species belonging to 44 families were recorded and classified under different life forms (44-trees; 20-herbs; 13-shrubs; 5-climbers). *Rutaceae* family was represented by 5 species,

Euphorbiaceae and *Mimosaceae* families by 4 species, *Amaranthacae, Apocynaceae, Asclepiadaceae, Caesalpiniaceae, Combretaceae, Fabaceae, Lamiaceae, Sapindaceae, Solanaceae, Tiliaceae and Verbenaceae* by 3 species, *Asteraceae, Moraceae, Piperaceae, Poaceae, Rubiaceae* by 2 species, *Acanthaceae, Agavaceae, Araceae, Basellaceae, Burseraceae, Cactaceae, Cannabinaceae, Caricaceae, Cochlospermaceae, Cucurbitaceae, Cyperaceae, Ebenaceae, Lecythidaceae, Liliaceae, Malvaceae, Meliaceae, Menispermaceae, Moringaceae, Myrtaceae, Nyctaginaceae, Oxalidaceae, Papaveraceae, Plumbaginaceae, punicaceae, Salvadoraceae, Santalaceae* by only one species each, indicating the evolutionary significance of the area.

Community Knowledge

The medicinal use of 82 species was known to the local communities and used for 62 different ailments (table 3). Most of them were commonly used for body pain, head ache, fever and stomach disorder. In Arakalgud the use of plants in curing various ailments indicated the importance of monitoring the diversity of medicinal plants for human welfare. For instance, Leucas aspera spreng (7 ailments), *Piper nigrum* (6 ailments), *Syzygium cummi* (6 ailments), *Xeromphis spinosa* (6 ailments), *Santalum album* (6 ailments), *Ocimum tenviflorum* (5 ailments), *Acacia concinna* (5 ailments), *Mimosa pudica* (5 ailments), *Ficus religosum* (5 ailments), *Citrus medica* (5 ailments) and *Schleichera oleosa* (5 ailments) are some of the popular medicinal plants. Although some of the plants were used in to cure only a few ailments, they were known for quick and effective relief. This has created a subsequent biotic pressure on medicinal use of plants.

Table 3: Traditional use of Medicinal Plants in Arakalgud Taluk

Sl. No.	Botanical Name	Family	Common Name	Parts used	Particular Health Problem
1	*Adhatoda zeylanica Medic*	*Acanthaceae*	*Adusoge*	F, L, Rt, St	Diuretic, Anthelmintic, Asthama, Antispasmodic
2	*Agave americana Linn.*	*Agavaceae*	*kathale*	Rt	Anthelmintic
3	*Achyranthes aspera L*	*Amaranthacae*	*Uttarani*	L, S, St, Tender Shoots, WP	Whooping cough, Blisters in mouth
4	*Amaranthus spinosus*	*Amaranthacae*	*Keere*	L, Rt, WP	Expectorant, Laxative
5	*Alternanthera sessilis*	*Amaranthacae*	*Honagone*	WP	Galactagogue
6	*Nerium indicum miller*	*Apocynaceae*	*Kanigile*	Rt,	Astringent, Aphrodiasic
7	*Vallaris solanaceae*	*Apocynaceae*	*Bugudi*	Rt, WP	Antiplegmatic, Purgative
8	*Catharanthus roseus L*	*Apocynaceae*	*Nanjabattalu*	F	Astringent
9	*Acorous calamus L*	*Araceae*	*Baje*	Nuts	Intoxicating
10	*Tylophora indica*	*Asclepiadaceae*	*Adumutta*	L	Antidysentric
11	*Calotropis procera*	*Asclepiadaceae*	*Ekka*	B, Gum	Vermifuge, Purgative
12	*Leptadenia reticulate*	*Asclepiadaceae*	*Buguri*	WP	Stimulant

Contd....

Sl. No.	Botanical Name	Family	Common Name	Parts used	Particular Health Problem
13	*Centratherum anthelminticum*	*Asteraceae*	*jeerige*	F,	Febrifuge
14	*Tageles erecta*	*Asteraceae*	*Chendumallige*	F	Febrifuge
15	*Basella rubra L*	*Basellaceae*	*Basale*	L	Antidote
16	*Canarium strictum*	*Burseraceae*	*doopa*	B	Febrifuge
17	*Opuntia dillenii*	*Cactaceae*	*Kalli*	K	Stimulant
18	*Cassia fistula*	*Caesalpiniaceae*	*Kakke*	B, F, L, F, Tender Shoots	Leprosy, Fever, Cardiac Disease
19	*Delonix elata Gamble*	*Caesalpiniaceae*	*Vayunarayana*	B, L	Pain Relief
20	*Caesalpinia bonducella fleming*	*Caesalpiniaceae*	*Gajaga*	K,	Astringent
21	*Cannabis Sativa L*	*Cannabinaceae*	*Bhangi*	L	Digestive Problems
22	*Carica papaya L*	*Caricaceae*	*Parangi*	F	Digestive
23	*Cochlospermous religosum L.*	*Cochlospermaceae*	*booruga*	B	Headache
24	*Terminalia bellirica*	*Combretaceae*	*Thare*	B, F, S,	Antipyretic, Laxative, Antiparalutic

Contd....

Sl. No.	Botanical Name	Family	Common Name	Parts used	Particular Health Problem
25	*Terminalia arjuna*	*Combretaceae*	*matthi*	B, F	Hair Growth, Cardiac Problems
26	*Terminalia catappa*	*Combretaceae*	*Badami*	F, S	Cardiac Problem
27	*Momordica Charantia*	*Cucurbitaceae*	*Hagala*	F, WP	Anthelmitic, Antipyretic, Antibilious
28	*Cyperous rotundus*	*Cyperaceae*	*Kodanari*	Rt, L, St	Astringent, Digestive, Stomachia, Diuretic
29	*Diospyrous melanoxylon*	*Ebenaceae*	*Thooparu*	B, L	Leucorrohea, carminative,
30	*Phyllanthus acidus Skeels*	*Euphorbiaceae*	*Kirinelli*	WP	Urinary disorder
31	*Euphorbia pilurifera linn*	*Euphorbiaceae*	*Achegida*	WP	Anthelmitic, antipyretic, antibilious
32	*Jatropha curcas linn*	*Euphorbiaceae*	*Kaduharalu*	S	Purgative, anthelmintic
33	*Ricinus communis linn*	*Euphorbiaceae*	*Haralu*	S	Purgative, anthelmintic
34	*Abrus precatrius L*	*Fabaceae*	*Gulaganji*	F	Leprosy, antiprutic
35	*Butea monosperma*	*Fabaceae*	*Muttuga*	B, St, Rt	Digestive, laxative, Anthelmintic
36	*Pongamia pinnata pierre*	*Fabaceae*	*Honge*	S	Vulnerary

Contd....

Sl. No.	Botanical Name	Family	Common Name	Parts used	Particular Health Problem
37	*Leucas aspera spreng*	*Lamiaceae*	*Thumbe*	L	Laxative, anthelmintic, Stimulant, diqaphoretic, asthama, dyspepsia, Antiparalytic
38	*Coleus amboinicus lour*	*Lamiaceae*	*Patre*	WP	Antiseptic
39	*Ocimum tenviflorum*	*Lamiaceae*	*Tulusi*	L, F,	Stimulant, antispasmodic, diuretic, stomachia, snakebite
40	*Careya arborea Roxb*	*Lecythidaceae*	*Goujalu*	B, F, F	Astringent, demulcent, digestive
41	*Asparagrus racemosus*	*Liliaceae*	*Kolugalli*	Kernel	Astringent
42	*Hibiscus rosa-Sinensis*	*Malvaceae*	*Dasawala*	F, Rt	Emollient, febrifuge
43	*Azadirachta indica*	*Meliaceae*	*Bevu*	B, Rt, L, F	Antpyretic, stimulant, stomachia
44	*Tinospora cordifolia*	*Menispermaceae*	*Amrutaballi*	L	Expectorant, rheumatism
45	*Acacia concinna*	*Mimosaceae*	*sige*	F, L	Purgative, anthelmintic, digestive, antibilius, expectorant,
46	*Albizzia amara boivin*	*Mimosaceae*	*tagali*	B	Vulnerary
47	*Albizzia Odorddtissima*	*Mimosaceae*	*Bilwara*	B, L	Leprosy, antiphlegmatic

Contd....

Sl. No.	Botanical Name	Family	Common Name	Parts used	Particular Health Problem
48	*Mimosa pudica linn*	*Mimosaceae*	*muttidare muni*	Rt	Antiplegmatic, antibilius, leprosy, antidysentric, antiphlogistic,
49	*Ficus religosum L*	*Moraceae*	*arali*	B, F, Rt,	Astringent, antbilius, asthama, antiphlogistic, purgative
50	*Ficus glomerata*	*Moraceae*	*Athi*	B,	Restorative, leprosy, antibilius,
51	*Moringa oleifera lamk*	*Moringaceae*	*Nugge*	B, L, F	Anthelmitic, cephalgia, astringent, antiphlegmatic, antibilius,
52	*Syzygium cumni*	*Myrtaceae*	*Nerale*	B, L	Astrngent, anthelmintic, asthama, antibilius, antidysentric, vulnarary
53	*Boerhavia diffusa L*	*Nyctaginaceae*	*Komme*	L, S	Edible uses
54	*Oxalis corniculata linn*	*Oxalidaceae*	*Kaduhuruli*	L, WP	Febrifuge, antidysentric, expectorant, diarrhoea
55	*Argemone mexicana L*	*Papaveraceae*	*Datturi*	WP	Scabbies, opthalmia
56	*Piper betle*	*Piperaceae*	*Veelyada yele*	L	Healing wounds, fever, cough
57	*Piper nigrum*	*Piperaceae*	*karimenasu*	F	Anthelmintic, carminative, aphrodisiac, purgative, antiperiodic, rubefacient

Contd....

Sl. No.	Botanical Name	Family	Common Name	Parts used	Particular Health Problem
58	*Plumbago Zeylanica*	*Plumbaginaceae*	*Chitramoola*	Rt	Diuretic, piles, anaemia
59	*Cynodon dactylon*	*Poaceae*	*garike*	Rt, L,	Urinary troubles
60	*Bambusa arundinacea*	*Poaceae*	*Bidiru*	Rt	Digestive
61	*punica granatum*	*Punicaceae*	*Dalimbe*	F, B	Chest problem
62	*Xeromphis spinosa*	*Rubiaceae*	*Kare*	B, F,	Astringent, carminative, antipyretic, vulnerary, aperient, asthama
63	*Xeromphis uliginosa*	*Rubiaceae*	*Kare*	Rt, F	Antidysentric, diarrohea, diuretic, antibilius,
64	*Aegle marmelos corr*	*Rutaceae*	*Bilpatre*	L	Burning sensation
65	*Limonia acidissima L*	*Rutaceae*	*Bela*	B, F	Chest problem
66	*Toddalia aculiata pers*	*Rutaceae*	*Kadumenasu*	F	Cough
67	*Citrus medica*	*Rutaceae*	*Nimbe*	F, Rt	Stimulant, astringent, digestive, asthama, anthelmintic
68	*Murrayya koeniggi*	*Rutaceae*	*Karibevu*	L	Anthelmintic, antiplogistic, antidysentric, febrifuge
69	*Azima tetracantha lamk*	*Salvadoraceae*	*Egachi*	B	Stomach ache
70	*Santalumalbum*	*Santalaceae*	*Shreegandha*	St, Rt	Antipyretic, aphrodisiac, antibilius, asthama,

Sl. No.	Botanical Name	Family	Common Name	Parts used	Particular Health Problem
71	*Sapindus laurifolia*	*Sapindaceae*	*Antuvala*	Fs	Purgative, stimulant, expectorant
72	*Cardisperum halicacabum L*	*Sapindaceae*	*Agni*	Rt	Diaphoretic, diuretic, aperient
73	*Schleichera oleosa*	*Sapindaceae*	*sogade*	B, F, Rt,	Astringent, vulnerary, leprosy, antiplegmatic, purgative
74	*Datura metal*	*Solanaceae*	*Ummathi*	Rt, S	Vulnerary, diarroea
75	*Solanum eriathum*	*Solanaceae*	*Chowdangi*	WP	Antiphlogistic
76	*Solanum toruum*	*Solanaceae*	*Sunde*	F	Vomiting
77	*Cassia tora linn*	*Tiliaceae*	*Bilikakke*	B, L	Antiparalytic
78	*Corchorous capsularis L*	*Tiliaceae*	*Senabu*	L, Rt	Antidysentric, digestive
79	*Grewia tiliifolia*	*Tiliaceae*	*Tadasalu*	B,	Vulnerary, antiphlegmatic, antiparalytic, antibilius,
80	*Tectona grandis L.f*	*Verbenaceae*	*Tega*	B, Rt, St	Antidysentric, asthama, antibilius,
81	*Lantana camara L*	*Verbenaceae*	*Unni*	L	Vulnerary, rheumatism, vermifuge, diaphoeretic
82	*Clerodendrum inerme*	*Verbenaceae*	*Kundali*	Rt	Rheumatism

Note: L-Leaves, B-Bark, Rt-Root, St-Stem, S-Seeds, F-Flowers, Fs-Fruits

Habit-wise distribution of medicinal plants

As of the total number of species, 52 per cent were trees, 24 per cent herbs, 18 per cent shrubs and 6 per cent climbers (fig 2). All the plants were procured from their cropping land, grazing land and bunds of the canals. The collection of plants in the study area revealed, that the people collected/procured only the required quantity of the medicinal plants.

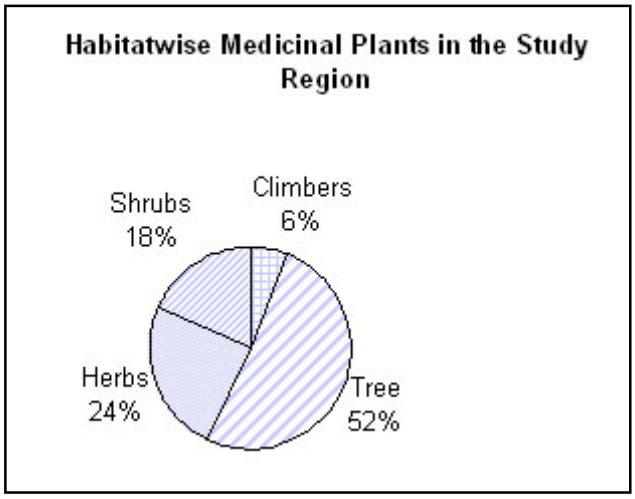

Fig 2: Habit wise distribution of plants

Discussion

Many studies have focused on the documentation of TKS in indigenous societies. However, very few have concentrated on the documentation of TKS in mainstream societies. The present study (1) has tried to document the use of medicinal plants in mainstream societies. (2) In the study region, forest cover is negligible even though the villagers have close affinity with their surrounding vegetation and they have been using them in a variety of ways. Many of the trees that the communities are using for medicinal purposes are available on the bunds of their agricultural fields. Herbs and shrubs are cultivated in their home gardens and used only for common ailments like headache, cough, cold, etc.

It is said that interest in medicinal plants is increasing as an alternative to modern medicine (Mahapatra and Mitchel, 1997), so there is an urgent need for conservation of these treasures. The old experts are, however, reluctant to share their traditional knowledge of conservation (Table 4). The information obtained from them is expressed as perception on conservation represented in Table 4. It is seen that growing medicinal plants abundantly in available spaces like home gardens, natural forests, farmer's forest, etc., is an important approach to conserve such valuable biotic assets in the rural region of Arakalgud area. According to the community, spreading awareness of conservation among the common people and the younger generation should be made obligatory. It is necessary to adopt sustainable harvesting techniques to protect these species in the wild. It is important that these medicinal plants be used in a sustainable way in order to preserve them for future generations.

Table 4: Perception of the community towards conservation of medicinal plants conservation

Sl. No	Options for conservation and management	Respondent (80)
1	Prevention of cutting of plants that are identified as having medicinal values	2
2	Adoption of cutting rules like cutting only the necessary parts of medicinal plants	20
3	Restriction on harvesting seasons to reduce interference in propagation and regeneration	3
4	It should be saved for future generation	8
5	Should be grown in abundance	23
6	Medicinal plants should be made familiar	5
7	Awareness should be spread to local people	12
8	Medicinal plants should not be used for other purposes	16
9	Traditional knowledge should be shared	4

The local community is very interested in conservation by growing plants (Fig 3); but they are expecting financial support from the government through the forest department by providing good medicinal plants to the farmers. In the study area, many of the healers were conserving plants in their horticultural land and home gardens.

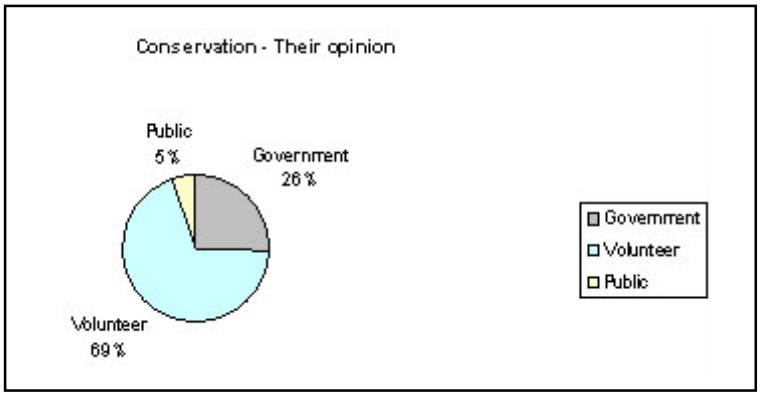

Fig3: Conservation, people's opinion

Humans have developed their knowledge of using available plants to cure a number of different ailments. Different types of ailments are prevalent in different cultural groups and ethnic communities all over the world (Lislie and Young, 1992). In the study region, traditional healers were not limited to the cultural groups, they were widely spread over the region. We found traditional healers from all castes in the study region. The list of plants used in the treatment of different ailments in Arakalgud was diverse. Even within the minor altitudinal variations we found diversified uses of the same plant species. The local population consulted the knowledgeable elders, particularly the local *vaidhya,* or, in their absence, elderly women who were regarded as the repositories of such knowledge. In the absence of proper diagnosis or in extreme conditions, the patient was taken brought to a reputed *vaidhya* considered to be an expert in traditional herbal treatment. Similar findings were recorded by Nautiyal *et. al.,* 2000.

In the remote areas, the use of plants for various therapies is considerably higher than in urban and semi-urban areas due to lack of allopathic forms of treatment. Among various classes of indigenous uses, a sizeable number of plant species have been discovered to cure various types of gastrointestinal disorders that were predominant, across different ethnic communities (*Ankli et al., 1999 and Bennett* and Prance 2000). However, in Arakalgud taluk the highest number of species documented was to cure generalised body aches and colic disorders and the number of species used in the treatment of gastrointestinal disorders had reduced. In Arakalgud region 2 plant species were used to treat snakebite. Similar herbal use was also reported by the Yanomani Indians of Brazil, where the healers use about 11 species of plants in treating snakebite (Milliken, 1997and Milliken and Albert, 1997). In Uttaranchal Pradesh 26 species are used for snakebite (Kala *et al.,* 2004).

About 10 per cent of the world's vascular plant species are facing various degrees of threat as estimated by the International Union for the Conservation of Nature and Natural Resources (IUCN). There is no doubt that certain medicinal plant species are critically endangered due to their small population size, narrow range of distribution, habitat specificity, destructive mode of harvesting, high use values, over collection for commercial purposes, habit alteration and developmental activities (Samant *et al*. 1998; Dhar *et al.* 2000 and Kala 2000). Four species of medicinal plants fall under the list. In the present study 3 species have been recorded as vulnerable and one as data deficient.

Table: Rare, Endangered and Threatened (RET) Status of medicinal plants of Arakalgud area

Sl. No.	*Botanical Name*	*Family*	*Common Name*	Parts Used	Status
1	*Basella rubra L*	*Basellaceae*	*Basale*	Leaves	Vu
2	*Diospyrous melanoxylon*	*Ebenaceae*	*Thooparu*	Bark	Vu
3	*Piper nigrum*	*Piperaceae*	*karimenasu*	Fruit	Vu
4	*Santalum album*	*Santalaceae*	*Shreegandha*	Leaves, stem, root.	DD

In many parts of the country, indigenous knowledge related to availability and uses of medicinal plants has not been thoroughly catalogued, having been overlooked in ethno botanical surveys to date. Indeed, quantitative information on the role of medicinal species in the rural socio-economy is limited (Dobriyal, 1997, Farooquee, 1996 and Hegde, 1996). Indigenous knowledge and uses of medicinal plants are eroding under the increasing emphasis on western medicinal systems promoted by the government under the social welfare and health care programmes. An urgent need for a comprehensive analysis and documentation of the indigenous knowledge societies in the semi-arid region of India exists. The reluctant attitude of the inhabitants may put end to cease the trend of passing such knowledge from generation to generation. On the other hand, the easy availability and ready-to-use nature of modern medication is reducing the dependency on Ayurvedic medicine and now its use is restricted only to common diseases like cold, cough and minor accidents. The ready-to-use nature of allopathic medicine, psychology and the concept of its reliability and security has resulted in higher dependency on it among the younger generation.

Many of the plant families are represented by single a species indicating a poor genetic base of the medicinal plants. Over exploitation may lead to extinction. Change in the agricultural practices has been the main reason for decrease in the use of medicinal plants. When medicinal and the marketing value is concentrated in barks, stems and specially roots, it is generally concluded that it is highly vulnerable for the concerned species in terms of both existence and continuity in generation, as observed in 50 per cent of plants in the present case where their medicinal value is concentrated in roots, stems barks, etc. Such statistics indicates that the proportion of species that is used for their root, stem, and bark have less regenerative ability thus making it vulnerable to extraction.

Several studies have been carried out by several workers on the existing natural resources and it has been reported that many useful plant species (particularly medicinal and aromatic plants), which are at present endangered, rare and threatened, are being exploited legally or illegally by the local people or outsiders for commercial purposes (Kala 1998; 1999; Nautiyal 1998 and Nautiyal et.al., 2000b). But in the study region it was observed that much of the landscape was converted into large scale horticulture plantations. These are incorporated with other crops like tobacco, ginger, banana, vegetables, etc., showing that marketing of medicinal plants are very limited. Consequently for the conservation of biological resources the government has implemented various programmes in different parts of the country. In the present study, healers have opined that they are still interested in cultivation of, medicinal species in their agricultural lands with government facilities.

It is said that interest in medicinal plants is increasing as an alternative to modern medicine (Mahapatra and Mitchel, 1997), so there is an urgent need for conservation of this treasure. Participatory conservation is more effective than government initiatives. The introduction of medicinal species in degraded government and common lands could be another option for promoting the rural economy together with environmental conservation, but it has not received attention in the Arakalgud Taluk or any parts of Hassan district. The study region has very meagre forest cover, so urgent combined efforts should be initiated by non-governmental organisations, government Organizations and social workers for the development of semi-arid medicinal and aromatic plant species to generate income for of the local community. This will not only help socio-economic upliftment of the local community but also contribute to the conservation of local vegetation cover.

Bibliography

Ankli A., O. Sticher and M. Heinrich, 1999. Medical ethnobotany of the Yucatec Maya: Healers consensus as a quantitative criterion. *Economic Botany* **53**: 144-160.

Bennet B.C. and G.T. Prance, 2000. Introduced plants in the indigenous pharmacopeia of northern South America. *Economic Botany* **54**: 90-102.

Charles Perrings, Kart Goran Maler, 1995. *Biodiversity Loss Economic and Ecological Issues, (1st Edn),* University of Cambridge, Newyork

Chaudri R.D., 1999. *Herbal Drug Industry,* Syndicate Binders, New Delhi

Darell A. Posey and Graham Dut field, 1996. *Beyond Intellectual Property,* International development research center, Canada, Darrell Addison Posey, *Cultural and Siritual Values of Biodiversity,* UNEP, Nairobhi pp 345-351

Dhar U., R.S. Rawal and J. Upreti, 2000. Setting priorities for conservation of medicinal plants- a case study in the Indian Himalaya. *Biological Conservation* **95**: 57-65.

Dobriyal R.M., G.S. Singh, K.S. Rao, and K.G. Saxena, 1997. Medicinal plant resources in Chhakinal watershed in the north-western Himalaya. *Journal of Herbs, spices & Medicinal Plants* **5**:15-27.

Farnsworth J.D., 1988. Screening plants for new medicines. In: Wilson E.O. (ed.), Biodiversity. National Academy Press. Washington, DC, pp. 83-97

Farooque N.A. and K.G.Saxena, 1996. Conservation and utilization of medicinal plants in high hills of central Himalaya. *Environmental Conservation* **23**:75-80.

Gecil J.Saldana, Dan H.Nicolson, 1976. *Flora of Hassan District,* Amerind Publishing Co. Pvt. Ltd, Delhi

Harish R.Bhat, *2006, Medicinal Plants of Devarayana Durga Forest,* Abhimani Printers, Bangalore-10

Harold A., J. Mooney, Hall Gushman, 1996, *Functional Roles of Biodiversity, A Global Perspective,*John Wiley & Sons, Newyork

Ivan A. Ross. 2001. *Medicinal Plants of the World, Volume 3,* Humana press Inc, New Jersey

Kala C.P., 1998. Ecology and Conservation of alpine meadows in the valley of Flowers National Park, Garhwal Himalaya. *Ph.D. Thesis.* FRI (Deemed University), Dehradun, India. pp. 180.

Kala C.P., 1999. The Valley of Flowers: A Botanical Paradise. *Plant Talk*, **19**: 26-28.

Kala C.P., A.N. Farooquee and U. Dhar, 2004. Prioritization of medicinal plants on the basis of available knowledge, existing practices and use value status in Uttaranchal, India. *Biodiversity and Conservation* **13**: 453-469.

Leslie C. and A. Young, 1992. Paths to Asian Medical Knowledge, University of California Press, Berkely, California.

Magadi R. Gurudeva,2001. *Karnataka Aushadiya Sasyagalu..*(2nd Edn). Divyachandra Prakashana, Bangalore-53.

Milliken W. 1997. Traditional anti-malarial medicine in Roraima, Brazil. *Economic Botany* **51**:212-237

Milliken W. and B. Albert B, 1997. The use of medicinal plants by Yanonami Indians of Brazil, Part II. *Economic Botany* **51**: 264-278.

Nautiyal S., 1998. Ecosystem function of buffer zone villages of Nanda Devi Biosphere Reserve. Ph.D. Thesis. Garhwal University of Srinagar, Garhwal, India.

Nautiyal S., K.S. Negi, R.K. Maikhuri, H. Manral and K.S. Rao, (2000a). Roopkund: Sanskrit evam Vanaspatik Vishleshan. *Hima-Paryavaran Newsletter.***11**(2): 24-28.

Nautiyal S., K.S. Rao, R.K. Maikhuri and K.S. Negi, (2000b). Apne hee ghar gai Mukhmar. *ENVIS* Bulletin (*Himalayan Ecology and Development*) **8** (2): 83-84.

Nautiyal S., K.S. Rao, R.K. Maikhuri, A. Purohit and K.S. Negi, (2001b). Aitihasik Nanda Raj Jat Yatra-Sankriti evam Prakriti ka parasparik Sambandh: Vigat evam Vertman Swarup. *ENVIS* Bulletin (*Himalayan Ecology and Development*). **9** (2): 75-91.

Nautiyal S., K.S. Rao, R.K. Maikhuri, R.L. Semwal and K.G. Sexena, 2000. Traditional Knowledge related to medicinal and aromatic plants in tribal societies in a part of Himalaya. *Journal of Medicinal and Aromatic Plant Sciences* **22**/4A and **23**/1A: 528-441

Phillips O.L. and B.A. Meilleur, 1998. Usefulness and economic potential of the rare plants of the United States: a statistical survey. *Economic Botany* **52**: 57-67

Ramakrishnan P.S., U.M. Chandrashekar, 2000, *Mountain Biodiversity, Land Use Dynamics and Traditional Ecological Knowledge,* Oxford & IBH Publishing Co. Pvt. Ltd. Delhi

Ramakrishnan P.S., K.G. Saxena, 1998,*Conserving the Sacred for biodiversity management,* Oxford & IBH Publishing Co. Pvt. Ltd. Delhi

Rao K.S. and K.G, Saxena, 1996. Minor forest products management- Problems and prospects in remote high altitude villages of Central Himalaya. *International Journal of Sustainable Development and World Ecology.* **3**: 60-70

Ravikumar.k. and D.K Ved, 2000. 100 *Red-listed Medicinal Plants of Conservation Concern in South India. (1st Edn).* FRLHT Publications. Pp 92-101

Ritwick Dutta, Pushpa Jain, 2000*. CITES Listed Medicinal Plants of India,* WWF India

Samant S.S., U. Dhar, and L.M.S. Palni, 1998. Medicinal plants of Indian Himalaya: diversity distribution potential values. GB Plant Institute of Himalayan Environment and Development, Almora, India.

Shekhar Singh, A R K Sastry, 2000, *Setting Biodiversity Conservation Priorities for India,* Elegant Printers, New Delhi

T.I.Khan, *Global Biodiversity and Environmental Conservation, Special Emphasis on Asia and Pacific.* Pointer Publishers, Jaipur, India

Wagner H., R. Norman, Farnsworth, *Economic and Medicinal Plant Research, Vol-4,* Acadamic Press INC, San Diego.