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Folk medicinal knowledge and conservation status of some
economically valued medicinal plants of District Swat,
Pakistan

English

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Abstract

This paper is based on an ethnobotanical project, carried out in the remote Hindu Kush mountain region of District Swat, Pakistan. The prime objectives of the project were to explore the conservation status, folk medicinal knowledge and traditional pre and post harvesting techniques of some economically important medicinal plants of the area. It was observed that 49 medicinal plants belonging to 32 families were collected and traded in the herb markets of Swat. Most of these plants are used by local population for curing different ailments, while some are exported to other parts of Pakistan. The traditional plant collection techniques have resulted in huge losses of these valuable plant resources. The conservation assessment of these plants revealed that due to increased exploitation and un-sustainable harvesting, 49% of these economically valued medicinal plant species are threatened.

Key Words: Folk medicinal uses; Conservation; District Swat; HinduKush-Himalayas

Introduction

Plant containing active chemical constituents in any of its part or parts like root, stem, leaves, bark, fruit and seed which produces a definite curing physiological response in the treatment of various ailments in humans and other animals is termed as medicinal plant. The various chemicals work together to reach equilibrium in the body as they do in the plant, and so produce gentle progressive healing within the body tissues.

From the earliest times mankind has used medicinal plants in an attempt to cure diseases and relieve physical suffering. Medicinal plant knowledge has usually resulted from trial and error, and was based on speculation and superstition. Medicinal plants remain the prime source of primary health care throughout the world for thousands of years. However, in the middle of 20th century, the contribution of medicinal plants was reduced by approximately one fourth as researchers favored the use of synthetic chemicals for curing diseases. Now this trend is reversing in favor of medicinal plants as they contain natural products that are chemically balanced, effective and least injurious with none or much reduced side effects as compared to synthetic chemicals. Herbal medicine is thus experiencing a revival in Western society, along with other complementary therapies such as Traditional Chinese Medicine, Osteopathy, and Homeopathy. In general, people are becoming more aware of the harmful side effects of artificial commodities and are realizing the benefits of a more natural way of life.

It has been estimated that about 20,000 plant species are used for medicinal purposes throughout the world. According to World Health Organization report (2002), 70% of the world population use medicinal plants for curing diseases through their traditional practitioners. In sub-continent, plant oriented drugs are used extensively and from a very long time. According to a survey conducted by W.H.O., traditional healers treat 65% patients in Srilanka, 60% in Indonesia, 75% in Nepal, 85% in Mayanmar, 80% in India and 90% in Bangladesh. In Pakistan, 60% of the population, especially in villages is getting health care by traditional practitioners (Hakims), who prescribe herbal preparations (Haq, 1983).

Developed countries, are turning to the use of traditional medicinal systems that involve the use of herbal drugs and remedies. About 1400 herbal preparations are used widely, according to a recent survey in Member States of the European Union. Herbal preparations are popular and are of significance in primary healthcare in Belgium, France, Germany and the Netherlands. Such popularity of healthcare plant-derived products has been traced to their increasing acceptance and use in the cosmetic industry as well as to increasing public costs in the daily maintenance of personal health and well being. Examples of such beauty-oriented therapeutics are skin tissue regenerators, anti-wrinkling agents and anti-age creams. Most dermaceuticals are derived from algal extracts that are rich in minerals and the vitamin B group. Skincare products such as skin creams, skin tonics, etc. derived from medicinal plants are grouped together as dermaceuticals. Also, amongst the poor, cures and drugs, derived from plants, constitute the main source of healthcare products (Hoareau and Da Silva, 1999).

The practice of traditional medicine is widespread in China, India, Japan, Pakistan, Sri Lanka and Thailand. In China about 40% of the total medicinal consumption is attributed to traditional tribal

medicines. In Thailand, herbal medicines make use of legumes encountered in the Caesalpiniaceae, the Fabaceae, and the Mimosaceae. In the mid 90s, it is estimated that receipts of more than US\$ 2.5 billion have resulted from the sales of herbal medicines. In Japan, herbal medicinal preparations are more in demand than mainstream pharmaceutical products.

The development and commercialization of medicinal plant based bio-industries in the developing countries is dependent upon the availability of facilities and information concerning upstream and downstream bio-processing, extraction, purification, and marketing of the industrial potential of medicinal plants. Absence of such infrastructure compounded by lack of governmental interest and financial support restricts the evolution of traditional herbal extracts into authenticated market products. Furthermore the absence of modernized socio-economic and public healthcare systems reinforces reliance of rural and low income urban populations on the use of traditional medicinal herbs and plants as complementary aids to routine pharmaceutical market products.

Materials and Methods

Study Area: SWAT

The valley of Swat is located in the remote Hindu-Kush mountains of Pakistan. The valley of Swat is one of the most scenic places of sub-continent and is called Switzerland of the sub-continent. Swat has large number of beautiful valleys and also innumerable monuments of ancient Gandhara civilization.

Swat is situated at the northwest corner of Pakistan. It lies from 34° 34' to 35° 55' north latitudes and 72° 08' to 72° 50' east longitudes. It is bounded by Chitral and Ghizer on the north, Indus Kohistan and Shangla on the east, Buner and Malakand protected area on the south and Dir on the west (Anonymous, 1998). The total area of the Swat is 5337 Km² and population of about 1.3 million. Swat is part of the Malakand Division.

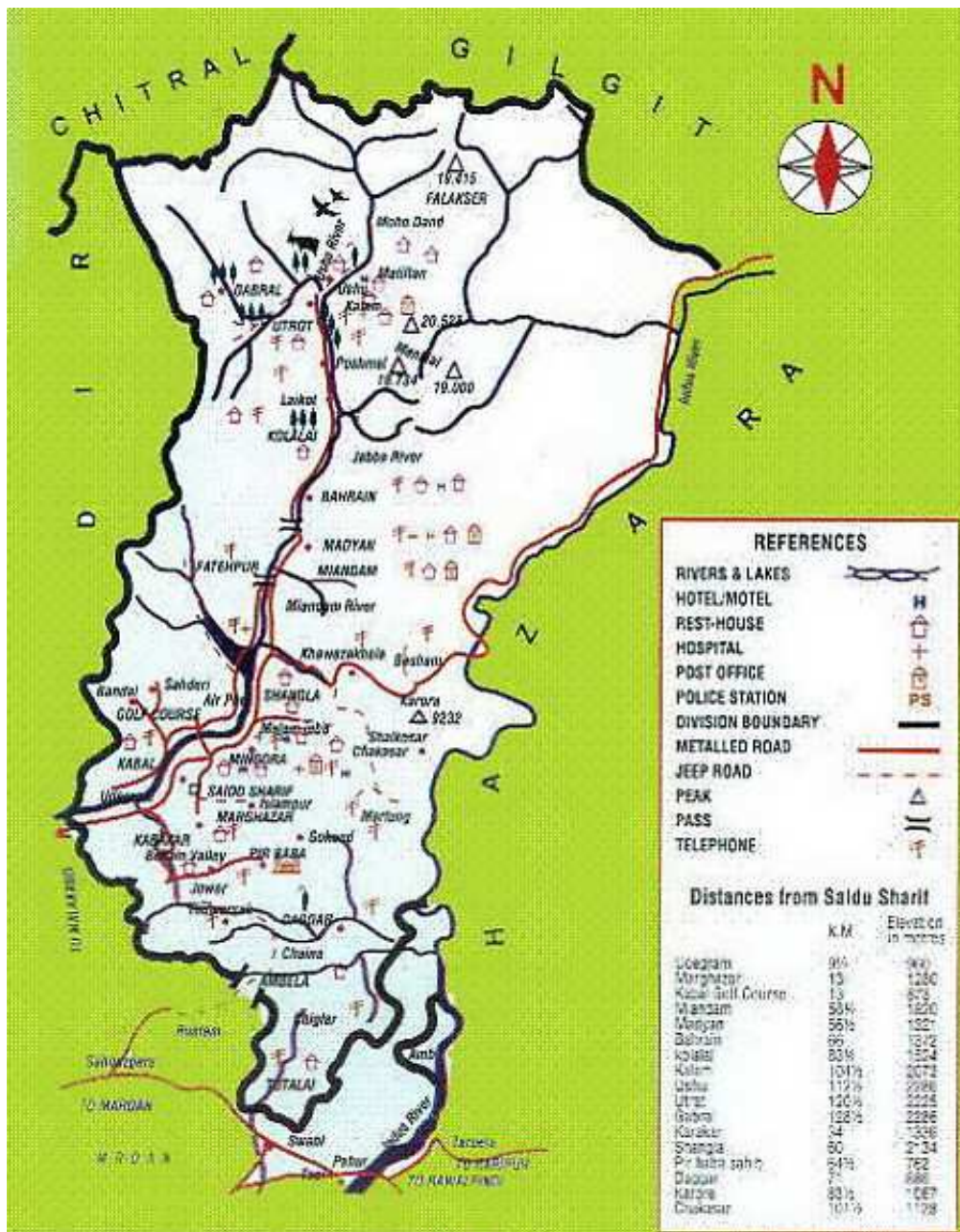


Figure 1: Map of District Swat

Swat can be divided into two regions i.e., Swat-Kohistan and Swat Proper. Swat-Kohistan is the mountainous country on the upper reaches of the Swat river up to Ain in the south. The whole area south of Ain is Swat proper, which can be further divided into:

Ethnicity and Tribes

Swat has predominantly rural population. It is inhabited by Yousafzai Pathans, Mians, Kohistanis, Gujars and Pirachas. The Pashto speaking Yousafzai Pathans are the direct descendants of Afghan of Ghazni. The Gujars and Kohistanis, who speak their own dialects of Gujri, Garwi, Torwali and Kohistanis inhabit the mountainous areas up north. The Kohistanis are settled in and around Kalam, Ushu, Utror and Gabral valleys. The nomadic Gujars also form a substantial part of the population in the northern parts of Swat valley.

Gandhara Civilization

Swat, has been home to Buddhism from about 6th century BC to 7th century AD. Buddhism flourished in Swat and spread to other parts of Asia from here. This great progress became possible due to personal dedication of King Ashoka to Buddhism. During his reign, Buddhism spread to Tibet, China, Bhutan, Korea and Japan. Many monasteries have been found, where monks were used to

live. Some historians consider Swat as the center of Gandhara civilization.



Figure 2: Buddha carved on a mountain rock near TindoDog, Swat



Figure 3: Statue of Buddha (Swat Museum)

Flora of Swat

District Swat contains about 1550 taxa of flowering plants and 55 Pteridophytes. There are seven types of forests from tropical dry deciduous to alpine. There are various reports about ethnobotanically important medicinal plants; the number varies from 55 to 345 species in Swat (Ahmad & Sirajuddin, 1996). The flora of Swat is very diverse and unique as the area is a nexus of three big mountain ranges namely Karakorum, Hindu-kush and Himalayas.

Methods

The field work includes interviews, observations and guided field walks/ transects walks. Two methods i.e. observations and interviews were frequently used during the field work. Observations were made while visiting different villages. During this process, local methods of medicinal plants collection, storage, drying, harvesting time, processing and utilization were observed. During field work, interviews were conducted with the local inhabitants, selected informants, the herbalists 'hakims' (local physicians of eastern system of medicine), pansaries (medicinal plants sellers in the local markets). Questionnaire method was adopted during the surveys in order to get qualitative and participatory approach about the plant resources and their utilization by the local people. Questions concerning the utility of different plants, quantity of plants used, rate of consumption, availability, economics/market value was asked.

Conservation status of medicinal plants

Local people especially plant collectors got valuable information about plants abundance, distribution and localities of their maximum availability. These information's were confirmed through field visits. Personal observations were made in the field keeping several parameters in consideration. These observations include, Range extent and area of occupancy; Exploitation level; Plants availability; Habitat alternation; Conservation efforts; Plant collection techniques; Part collected; Invasive plants; Threats (Pollution, Urbanization, Lack of awareness, Deforestation etc.).The species were then categorized into Critically Endangered, Endangered, Vulnerable, Rare, Near Threatened and Secure.

[[Results and Discussion]]

During the present study, it was observed that 49 medicinal plants species belonging to 32 different families were sold in local markets and thus these play a role in uplifting the socioeconomic conditions of the area. Some of these medicinal plants are traded to national herb markets of Lahore, Karachi and Peshawar. It was observed that out of these 49 medicinal plants 24 plant species are threatened (9 Endangered, 7 Vulnerable and 8 Rare) due to excessive collection from the wild. These plants are also used locally for curing different ailments. In most cases, the market availability status of these medicinal plants have increased, showing an increased inclination of local people towards medicinal plants collection and increased dependency of local population on medicinal plants trade. A brief set of information about these plants is given below.

Table 1: Folk medicinal uses, market availability status, conservation status of some important medicinal plants of Swat, Pakistan

Plant Material	Part Used	Market Status	Conserv. Status	Folk Medicinal Uses
Araceae				
<i>Acorus calamus</i> L. [Skha waja]	Whole plant	Persistent	Endangered	Cough, dyspepsia, flatulence, colic and diarrhea
Amaranthaceae				
<i>Achyranthus aspera</i> L. [Gishkay]	Rhizome/ fruit	Increased	Secure	Diuretic, laxative, stomachic and for removing kidney stones
Adiantaceae				

<i>Adiantum capillus-veneris</i> L. [Sumbal]	FronDS	Increased	Vulnerable	Skin diseases, fever, cough and diabetes Expectorant, emetic and diuretic
<i>Adiantum incisum</i> Forssk [Sumbal]	FronDS	Increased	Secure	Skin diseases, fever, cough and diabetes Expectorant, emetic and diuretic
Alliaceae				
<i>Allium sativum</i> L. [Ooga]	Bulbs/ leaves	Increased	Secure	Heart diseases, diaphoretic, diuretic, expectorant, antiseptic, flatulence, asthma, whooping cough and epilepsy
Anacardiaceae				
<i>Pistacia integerrima</i> Stew.ex Brand [Shanai]	Leaves	Increased	Vulnerable	Jaundice and chronic wounds
Apiaceae				
<i>Bunium persicum</i> B. Fedtsch [Tora Zeera]	Fruit	Increased	Rare	Carminative, stomachic and stimulant
<i>Coriandrum sativum</i> L. [Dhanyal]	Leaves/ seeds	Increase	Secure	Piles, gastric juice secretion and colic
<i>Foeniculum vulgare</i> Mill [Kaga]	Leaves/ seeds	Increased	Secure	Diuretic, digestive, laxative, aphrodisiac and improve eyesight
Araliaceae				
<i>Hedera nepalensis</i> K.Koch [Da Wano Kalay]	Leaves	Increased	Secure	Anticancer
<i>Artemisia brevifolia</i> Wall [Jaukay]	Flower head	Increased	Secure	Respiratory stimulant, intestinal worms, purgative and ear ache
<i>Artemisia vulgaris</i> L [Tarkha]]	Leaves/ shoot	Increased	Secure	Intestinal worms and skin diseases
<i>Calendula arvensis</i> L. [Zair Gulae]	Leaves/ flowers	Increased	Secure	Scrofula, diaphoretic, antihelminthic and tonic
Berberidaceae				
<i>Berberis lycium</i> Royle [Speen Kwaray]	Whole plant	Increased	Vulnerable	Stomachic, intestinal colic, expectorant, diuretic, diarrhea, piles, jaundice and internal wounds

<i>Berberis vulgaris</i> Linn [Tor Kwaray]	Whole plant	Persistent	Endangered	Stomachic, intestinal colic, expectorant, diuretic, diarrhea, piles, jaundice and internal wounds
Dioscoreaceae				
<i>Dioscorea deltoidea</i> Wall. [Kanees]	Tubers	Decreased	Endangered	Uterine sedative, haemostatic, diuretic, expectorant, antihelminthic
Ebenaceae				
<i>Diospyos lotus</i> L. [Tor Amlook]	Fruits/ leaves	Increased	Secure	Carminative, purgative and flatulence
Ephedraceae				
<i>Ephedra gerardiana</i> Wall. ex Stapf [Asmani Bootai]	Fruit/ leaves	Increased	Vulnerable	Asthmatic bronchitis, rheumatism and cardiac circulatory stimulant
Fumariaceae				
<i>Fumaria indica</i> Pugsley [Papra]	Shoot	Increased	Secure	Blood purifier, diaphoretic and antipyretic
Helveliaceae				
<i>Morchella conica</i> Fries [Gujai]	Whole plant	Persistent	Rare	General body tonic, joins aches or potency, insomnia, enterogastritis, indigestion and poor appetite
<i>Morchella esculenta</i> (L.) Pers. [Gujai]	Whole plant	Persistent	Rare	General body tonic, joins aches or potency, insomnia, enterogastritis, indigestion and poor appetite
Juglandaceae				
<i>Juglans regia</i> L. [Ghuz]	Bark/ leaves	Increased	Secure	Bark (Dandasa) is used for cleaning and sparkling teeth. Decoction of leaves is given in eczema and intestinal worms.
Lamiaceae				
<i>Ajuga bracteosa</i> Wall. ex. Benth [Khwaga Bootei]	Whole plant	Increased	Secure	Internal colic, pimples, jaundice, hypertension and sore throat
<i>Mentha longifolia</i> (L.) Huds. [Villanay]	Whole plant	Increased	Rare	Anti-rheumatic, stomachic, carminative, tonsillitis, diarrhea and dysentery

<i>Mentha spicata</i> L. [Podian]	Leaves	Increased	Secure	Dyspepsia and carminative
<i>Salvia moorcroftiana</i> Wall.ex Benth [Khur Dug]	Leaves/ seeds	Increased	Secure	Wound healing
<i>Thymus linearis</i> Benth. [Kaneesh]	Fruits	Increased	Rare	Cold, cough and digestive trouble
Liliaceae				
<i>Colchicum luteum</i> Baker. [Suranjan-e-talkh]	Rhizome/ seeds	Increased	Vulnerable	Blood purifier, laxative and aphrodisiac
<i>Polygonatum verticillatum</i> All. [Peramole]	Rhizome	Persistent	Endangered	Rheumatism and aphrodisiac
Myrsinaceae				
<i>Myrsine africana</i> L. [Maru Rang]	Leaves	Increased	Secure	Carminative, appetizer, flavoring agent
Paeoniaceae				
Paeoniaceae <i>Paeonia emodi</i> Wall. ex Hk.f. [Mamaikh]	Rhizome/ seeds	Persistent	Endangered	Backbone ache, dropsy, epilepsy, emetic, cathartic, blood purifier, colic, purgative and tonic
Plantaginaceae				
Plantaginaceae <i>Plantago lanceolatum</i> L. [Jabai]	Leaves/ seeds	Increased	Rare	Sores, wounds and inflammation healing, laxative, mouth diseases and dysentery
Podophyllaceae				
<i>Podophyllum hexandrum</i> Royle [Kakorra]	Rhizome	Persistent	Endangered	Hepatic stimulant, purgative and emetic
Polygonaceae				
<i>Bistorta amplexicaulis</i> (D. Don) Greene [Tarva Panra]	Rhizome	Persistent	Endangered	Ulcer

<i>Rheum australe</i> D. Don [Chotial]	Rhizome/ Leaves	Increased	Secure	Purgative, astringent tonic, alexiterix, emmenagogue, diuretic, biliousness, lumbago, sore eyes, piles, chronic bronchitis, fever, asthma, pain, bruises, blood purifier, stomachic, dyspepsia and laxative
Portulacaceae				
<i>Portulaca olearacea</i> L. [Warkharay]	Seeds/leaves	Increased	Secure	Kidney, liver, urinary bladder and lungs diseases
Punicaceae				
<i>Punica granatum</i> L. [Anar]	Fruit/ bark/ leaves	Increased	Secure	Skin diseases, dysentery, blood purifier, whooping cough, laxative, antihelminthic, antipyretic and expectorant
Rhamnaceae				
Rhamnaceae <i>Zizyphus sativa</i> Gaert [Markhanaey]	Fruits	Increased	Secure	Astringent, cooling effect
Ranunculaceae				
<i>Aconitum violaceum</i> Jacq. ex Stapf [Zahar mora]	Rhizome	Persistent	Vulnerable	Gout and Rheumatism
Saxifragaceae				
<i>Bergenia ciliata</i> (Haw) Sternb. [Qamar Panra]	Leaves; Rhizome	Increased	Endangered	Muscular pain, pus discharge and tonic
Solanaceae				
<i>Capsicum annuum</i> L. [Marchakay]	Fruits	Increased	Secure	Common cold, dyspepsia and diarrhea Nervous disorders, asthma, whooping cough, antispasmodics, sedative and astringent to bowels
<i>Hyoscyamus niger</i> L. [Dewana Bhang]	Fruits	Increased	Secure	Common cold, dyspepsia and diarrhea Nervous disorders, asthma, whooping cough, antispasmodics, sedative and astringent to bowels
<i>Solanum surratense</i> Burm. f. [Manraghonay]	Fruits	Increased	Secure	Expectorant, stomachic, diuretic, anti-asthmatic, anti-gonorrhoea, cough and fever pain in chest

<i>Withania somnifera</i> (L.) Dunal [Kutilal]	Leaves/ fruits/ roots	Increased	Secure	Poultice to swellings, ulcers and carbuncles, diuretic, rheumatism and aphrodisiac tonic
Thymeleaceae				
<i>Daphne mucronata</i> Royle [Laighonai]	Fruits	Increased	Vulnerable	Rheumatism
Valerianaceae				
<i>Valeriana jatamansi</i> Jones [Mushk-e-Bala]	Rhizome	Decreased	Endangered	Cholera, dysentery, hysteria and antispasmodic
Violaceae				
<i>Viola biflora</i> L. [Banafsha]	Flower	Increased	Rare	Diaphoretic, antipyretic, febrifuge, cancer, epilepsy and nervous disorders
<i>Viola canescens</i> Wall. ex Roxb [Banafsha]	Whole plant	Increased	Rare	Astringent, demulcent, purgative, diaphoretic, antipyretic, febrifuge and anti cancerous
Verbenaceae				
<i>Vitex negundo</i> L. [Marvandaey]	Leaves / roots / seeds	Increased	Secure	Febrifuge, diuretic, antihelminthic, headache and tonic

Medicinal Plants Collectors and Collection

Medicinal plant collectors are usually poor villagers. Plant collection is their part time activity besides farming and live stock rearing. They collect medicinal plants during spring and summer season which starts from April to September and sell it in the local market to earn some money. One can see a person coming from a hilltop with a bundle of fuel wood on his head and a bag of medicinal plants in his hands. He handover his bag of medicinal plants to local Pansaris and put in his pocket whatever money he gets. According to Choudhary *et al.* (2000) about 500 families are involved in medicinal plant collection in Swat and they collect 5000 tons of medicinal plants annually. However, no economic analysis exists to date for the marketing chain from collection to consumption systems. It is also necessary to know that how much plant material is collected and passing through the whole process of refinements how much quantity reaches to the market. It will give us the rough picture of the whole system from collection to consumption. It may also be the one reason of overexploitation of highly valuable and endangered medicinal plants. All available data is related to quantities traded in markets at a specific time and their approximate values.

Bulk of medicinal plants collected in the area is rhizomatous. The collectors carry with them digging tools and dig medicinal plant wherever found. Major proportions of plants collected are sold in fresh while some plants are stored in bags and sacks from one week to one year. Before storing, these plants are washed and kept under the sun for drying. During storage considerable amounts of medicinal plants are wasted due to humidity, insect attacks, inappropriate storage facilities and lack of awareness on the part of collectors.

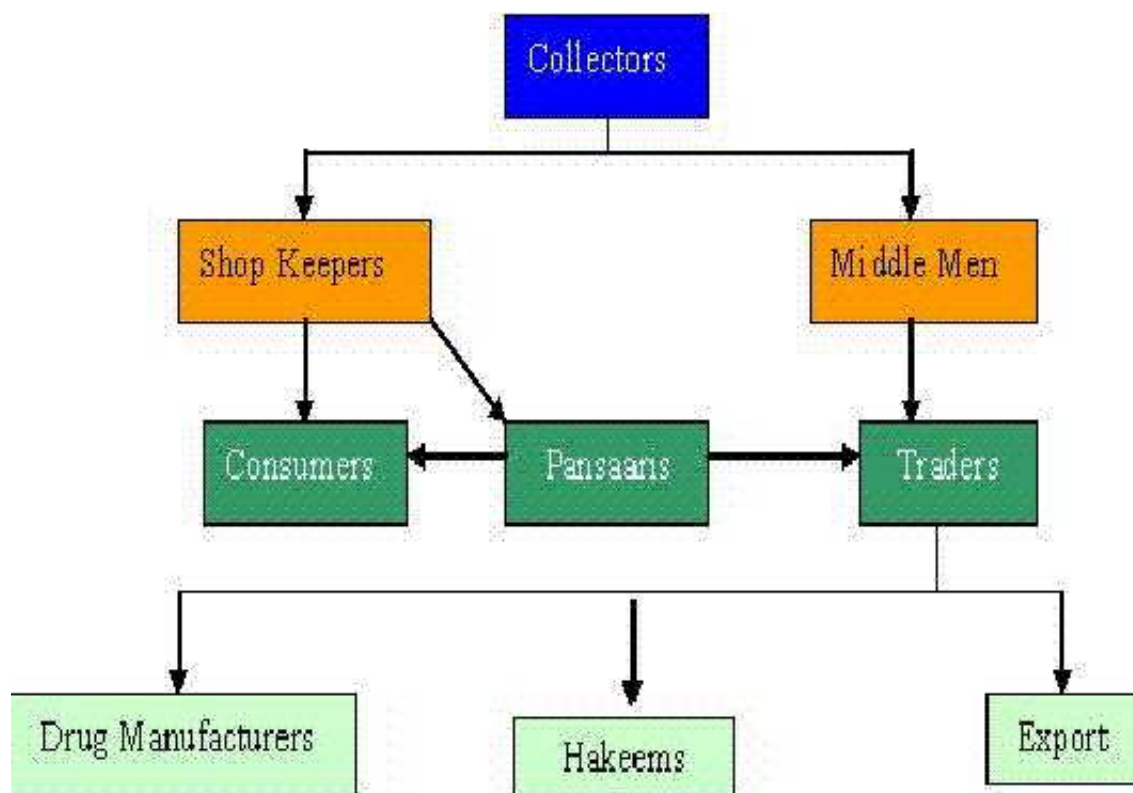


Figure 4: Chain of people involved in the medicinal plant trade in Swat

Medicinal plants are collected extensively during the summer season starting from March when the snow has almost melted to September. The collectors include men, women and children. The women and children collect plants while on their way to work in the fields and surrounding areas of their work place. The women and children of nomads (Ajar) families collect medicinal plants while grazing their livestock. This type of collection of medicinal plants is carried out on daily basis.

Drawbacks of Traditional Collections and Post Collection Processing

1. The collectors are mostly ignorant about the proper time of collection of medicinal plants. An early or late collection of medicinal plants result in an inferior quality of drug. The ideal time of a plant collection is that when plant contain maximum amounts of therapeutically active principles. Majority of medicinal plants collected are rhizomatous. These plants are primarily collected in summer and during this period the plant utilize the root chemistry and nutrition for the development of aerial parts and fruit yield. As a result the rhizomes collected are depleted of active chemical constituents. The ideal time for the collection of these plants is winter or early spring (November to February) when the plants are dormant. During this period the plant converts the nutritional chemistry of aerial parts in to alkaloidal contents and stores it in the underground parts. Thus the plant at this stage contains maximum percentage of active ingredients in its rhizome/roots. Beside this the rhizome collection has resulted in a drastic decrease of these medicinal plants in the area.
2. Medicinal plants degraded in terms of their active constituents if they are not properly dried. The local collectors are also unaware of the bleaching effect of sun rays on colored or other light sensitive drugs. The night dew and humidity also deteriorates the quality of these drugs.
3. The plants after collection are packed in bags, sacks and cotton cloths. The collectors use same packing material again and again until fully rotten. The plants are stored in mud huts and some times in the rooms used for dinning and sleeping as well. Large amounts of medicinal plants are thus wasted during packing and storage process.
4. The collectors do not afford to buy vasculums, canisters and other appropriate packing material. Medicinal plants deteriorate if the material is not properly packed and stored. The nature of the packing material has its bearing on the conditions and quality of the stored material. Similarly, the nature of storing place also has a significant effect on the stored material. Factors like temperature, humidity, light can have both direct and indirect adverse effects on the stored material. Improper storage also results in the attacks of moths, insects, beetles and ants. All these factors greatly

damage the quality and quantity of the drug.

Recommendations for sustainable use of medicinal plants in Swat

Coordinated efforts are needed for conservation, documentation and sustainable use of medicinal plants. The following recommendations may help towards this goal.

1. Conservation education including advance collection techniques, post collection processing techniques may be extended to the local communities especially to the plant collectors
2. Sustainable use of MP and accessibility of the community towards national markets would help to uplift socio-economic conditions of this backward area
3. Nurseries of some important MP should be established. Herbal Industries should be brought in contact with the local communities and it will provide the collectors better economic returns and thus better conservation environment to the flora
4. Community mobilization and involvement may be ensured in conservation. Community based organizations should be encouraged to play their due role
5. Cultivation of the profitable medicinal plants like *Colchicum luteum*, *Bergenia ciliata*, *Dioscoria deltoidea*, *Bistorta amplexicaulis*, *Caltha alba*, *Valeriana jatamansi*, *Viola species*, *Berberis lycium*, *Polygonatum verticilatum*, *Acorus calamus*, *Aconitum heterophyllum*, *Podophyllum hexandrum*, *Paeonia emodi* and *Geranium wallichianum* can be introduced as minor crops on marginal fields

Conclusions

Swat is a mountainous area with diverse and unique flora. However, over the last two decades the plant resources has been largely degraded due to indiscriminate deforestation for acquiring cultivation lands, over exploitation of plant resources for economic purposes, urbanization and industrialization trends, population explosion and increased tourism. Different measures are needed on the part of Government of Pakistan and NGO's working in the area, to check practices which have resulted in the degradation of the biodiversity. The involvement of local community in any conservation effort is highly valued as without local community participation and mobilization, conservation efforts can not be effectively materialized. Community awareness projects should be initiated in Swat, to educate the inhabitants of the area about the importance of natural resources for them and their future generations and how to utilize medicinal plants for their better livelihood on sustainable basis.

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