

## Need of Conservational Strategies of Medicinal Plants in Kashmir Himalayas

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**Abstract:** The present study entitled “need of conservational strategies of medicinal plants” conducted in the year 2019-2010 of the Kashmir Himalayas. World Health Organization has listed over 21000 plant species used around the world for medicinal purpose. In India, about 2500 plant species are being used in native system of medicine. The red data book lists 427 Indian Medicinal plant entries on endangered species, of which 28 are considered extinct, 124 endangered, 81 rare and 34 insufficiently known. The devoted medicinal plants are used by various tribal’s and local people to cure different affliction ranging from simple injuries, wounds, cuts, fever, diarrhea, ulcers, swelling, bone fractures, potency, antidote, skin care, night blindness, toothache, asthma, cough & cold. Medicinal plants occupy a essential precinct of health care system in India and represent a major national resource. Hence, there is an massive need for conservation of diversity of medicinal plant wealth for the present and fore coming generations, by adapting the suitable strategy with most pertinent method of conservation.

### Introduction:

The process of driving drugs is not new. Over the centuries peoples have depended on the surrounding plant diversity for the treatment of various ailments. It is a well-known fact that Traditional Systems of medicines always played important role in meeting the global healthcare needs. In recent years, the herbal medicine is gaining wide currency and acceptability and the documentation of valuable indigenous knowledge about medicinal plant species is assuming urgent priority (Anim *et al.*, 2012), due to the recent controversies of illegal Bio-piracy. The primordial knowledge about the use of valuable medicinal plants in the Kashmir Himalaya when authenticate by various scientific incites provides aggregate models of sustainable development that are suitable for all. The Kashmir Himalayas, often referred to as terrestrial paradise on earth, is located at the north-western tip of the Himalayan biodiversity hot spot. The region supports a rich and glorious biodiversity of great scientific interest and promising economic benefits owing to its topographic variations to stretch from valley floor.

Medicinal plants are widely used in non-industrialized societies, mainly because they are readily available and cheaper than modern medicines. In many countries, there is little regulation of traditional medicine, but the World Health Organization coordinates a network to encourage safe and rational usage. Medicinal plants face both general threats, such as climate change and habitat destruction, and the specific threat of over-collection to meet market demand. The unique

diversity of medicinal plants is a treasure of the planet Earth. The medicinal species have received that live in natural areas increasing scientific and commercial attention in recent years.

### **Material and methods:**

#### **Study area:**

The Pir Panjal Range is a group of mountains with largest range in the lower Himalayas. It runs in the Inner Himalayas from east-southeast (ESE) to west-northwest (WNW) across the Indian states of Himachal Pradesh and Jammu and Kashmir and Pakistan occupied Kashmir where the average elevation varies from 1,400 m to 4,100 m. Pir Panjal separate itself from the Himalayas near the bank of Sutlej river and forms a divide between the Rivers Beas and Ravi on one side and the Chenab on the other. In this range, the famous Murree and Galliat mountains are also located. The Banihal pass is a mountain across the Pir Panjal range at 2,832 m and lies at the head of the Vitasta River at the southern end of the Kashmir valley. Banihal pass of Jammu region connects Qazigund area of Kashmir.

#### **In depth baseline survey:**

A rapid rural survey will be conducted in the rural and far-flung areas Baramulla and Ganderbal district selected for the survey because they are laboriously dependent on the traditional health care system, hakims and families were involved in the interviews in order to document their knowledge about traditional health care. The people living in some areas of the district Baramulla and Ganderbal are also economically dependent on medicinal plants.

#### **Strategies for conservation of medicinal plants:**

- The conservation of the wild medicinal plants or any other such threatened species can be handled by scientific techniques as well as social actions.
- There are fundamentally two scientific techniques of conservation of genetic diversity of these plants.

2. *In-situ* conservation

3. *Ex-situ* conservation

#### **Conservation of medicinal plants: Strategies**

##### **In-situ conservation**

- Conservation of a given species in its natural domain or in the area where it grows naturally is known as in-situ conservation.
- It includes Gene bank / Gene sanction, Biosphere reserves, national parks, sacred sites, Sacred grooves etc.
- It is only in nature that plant diversity at the genetic, species and ecosystem level can be preserve on long-term basis
- It is necessary to conserve in distinct, representative bio-geographic zones inter and intra-specific genetic divergence.

It is cost-effective way of protecting the existing biological and genetic diversity is the 'in-situ' or on the site conservation wherein a wild species or stock of a biological community is protected and preserved in its natural habitat. The prospect of such a 'eco-centric', rather than a species centered approach is that it should prevent species from becoming endangered by human

activities and lower the need for human interference to prevent untimely extinctions. Establishment of biosphere reserves, national parks, wild life sanctuaries, sacred groves and other protected areas forms examples of 'in-situ' methods of conservation. The idea of establishing protected area network has taken a central place in all policy decision process related to biodiversity conservation at national, international and global level..

### **SACRED GROVES:**

Sacred groves are small or large patches of vegetation protected on the basis of cultural and traditional practices on the religious background.

Outlines for in-situ management

### **Ex-Situ Conservation:**

Conservation of medicinal plants can be accomplished by the ex-situ i.e. outside natural habitat by cultivating and maintaining plants in botanic gardens parks, other suitable sites, and through long term protection of plant prop gules in gene banks (seed bank, pollen bank, DNA libraries, etc.) and in plant tissue culture depository and by cryopreservation).

Botanical gardens can play a key role in ex-situ conservation of plants, especially those facing close threat of extinction. Several gardens in the world are oriented in cultivation and study of medicinal plants, while some contain a special medicinal plant garden or maintain special collection of medicinal plants.

India has a network of about 140 botanical gardens which include 33 botanical garden attached to 33 universities botany departments. But hardly 30 botanical gardens have any active programme on conservation. Tropical Botanical Gardens & Research Institute (TGBRI), located in a degraded forest region of Western Ghats Mountains in Kerala has an excellent example in ex-situ conservation of plant diversity in India. The field gene bank programme launched by TBGRI from 1992-1999 is now well approved as a very effective method of conservation of medicinal and aromatic plant genetic resources. This field gene bank of medicinal plants at TBGRI, Thiruvananthapuram is essentially a blend of the ex-situ and in-situ situations [3].

### **To Conserve Populations of Medicinal Plant Species Ex- Situ:**

- The primary function of this is as an insurance policy. But it also has the advantage that it is usually easier to supply plant material for propagation, for re-introduction, for agronomic improvement, for research and for education purposes from *ex situ* collections than from *in situ* reserves.
- The disadvantages of *ex situ* conservation are that the sample of the species conserved *ex situ* may represent a limited range of genetic variation than that which occurs in the wild.
- Species conserved through *ex situ* can also suffer genetic erosion and depend on continued human care. On this basis, *ex situ* conservation must not replace, but should **complement, in situ conservation.**

### **Ethno-medicinal plant gardens:**

There should be creation of a network of regional and sub-regional ethno-medicinal plant gardens which should contain succession of all the medicinal plants known to the various ethnic communities in different regions of India.

This chain of gardens will act as regional repositories of our cultural and ethno medicinal history and realize the living traditions of our society's knowledge of medicinal plants.

### Gene banks:

Gene banks are a type of bio repository that preserves genetic material. For plants, this is done by in vitro storage, freezing cutting from the plants, or stocking the seeds.

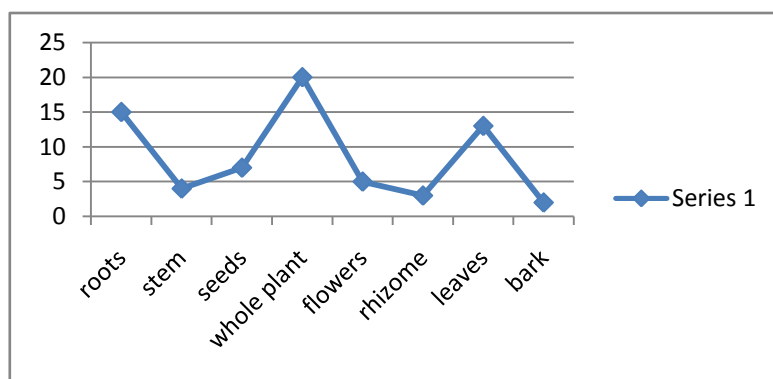
The preventative principles would suggest that an immediate and country-wide exercise be taken up to place seeds of wild medicinal plants with a first priority to known Red listed species and endemic species.

### Community based enterprises:

- A strong case exists for promotion of community level enterprises for value addition to medicinal plants through simple, on site techniques like drying, cleaning, crushing, powdering, grading, packaging etc.

### Results:

During the survey a brief set of information including botanical name, family, local name, habitat, part used and conservation status of medicinal plants used by the inhabitants of Kashmir are given below. A sum of 47 species (45 herbs, 1 shrub, and 1 tree) of medicinal plants representing 31 families was recorded. Asteraceae (9 spp.), Apiaceae (2 spp.), Lamiaceae (4 spp.), Araceae (5 spp.), Ranunculaceae (2 spp.), Primulaceae (2 spp.), Polygonaceae, Boraginaceae, Papaveraceae, Asparagaceae, Discoraceae, Betulaceae, Rubaceae, Adiantaceae, Filinaceae, Saxifragaceae, Braccaceae, Solinaceae, Iridaceae, Liliceae, Amranthaceae, Utricaceae, Fabaceae, Rececaceae, Portulaceae(1 each spp.). Analysis of utilization pattern of these species indicates that the whole plant (28 spp.), root stock (14 spp.), leaves (6 spp.), flower (4 spp.), seeds (3 spp.), rhizome (1 spp.), stem (1 spp.), bark (1 spp.) have been used to cure diseases. In some diseases, plant parts are used in combination.



**Fig. 4:Utilization pattern of plant parts for the treatment of various diseases.**

During 2019-2020, the ethno medicinally important sites particularly in district Bandipora and Baramulla were selected for the study. The areas/sites were visited regularly for one year with special emphasis of collection/ extraction and mainly conservation of medicinal plants during April to November. Professional herbalists (Hakeem's), occasional practitioners and experienced established prescribers and also local peoples were undertaken, and interviewed with them. To avoid inaccurate identification, knowledgeable persons and herbalists were taken to confirm the plant samples and their utilization by local people keeping some parameters in to consideration, personal observation including range of extent, area of occupancy, exploitation level, plant

availability, habitat alternation, and mainly conservation efforts, plant part collection technique, threats (pollution, urbanization, lack of awareness, deforestation, etc.) were also made in the field. Based on the above, these species were categorized into critically endangered (CR), Endangered (EN), Vulnerable (VU), and Rare(R), according to our survey. The plants which did not fall in these categories were considered as 'Secure'(S) in the study area.

**Critically endangered (CR):** Specie is one that has been categorized by the International Union For conservation of Nature (IUCN) as facing an extremely high risk of extinction in the wild.

**Endangered species (EN):** is specie that is very likely to become extinct in the near future, either worldwide or in a particular region.

**Rare(R):** Rare plants may be scarce because the total population of the species may have just a few individuals, or be restricted to a narrow geographical range, or both. Some rare plants occur sparsely over a broad area. Other rare plants have many individuals, but these are crowded into a tiny area.

**Vulnerable (V):** specie is specie which has been categorized by the International Union For Conservation of Nature as likely to become endangered unless the circumstances that are threatening its survival and reproduction improve. Vulnerability is mainly caused by habitat loss or destruction of these species home.

We also discuss with local peoples, Hakeem's and with the knowledgeable peoples in the study area what are the reasons of present conservation status of these medicinal plants. And we see there are various anthropogenic as well as natural threats. We have recorded 11 different types of threats operative to medicinal plants in the study area. Which includes: over grazing, grass cutting, landslides, soil erosion, constructional activities, floods/flash floods, over exploitation/over harvesting, conversion of forest and grass lands into agricultural land/land use changes, alien species invasion and trade. These medicinal plants species are also overharvested legally or illegally from wild for local use, examples are Rheum webbianum, arnebia benthamii etc.

In addition to 11 threats that is over-grazing, grass cutting, landslides/soil erosion, constructional activities /unplanned development, floods/flash floods, over exploitation/overharvesting, cement factory dust, mining/stone quarrying, conversion of forests and grasslands into agricultural land/land use changes, alien species invasion, huge tourist influx operative in kashmir Himalayas the intensive field survey carried out during the present study revealed that 2 more threats, namely smuggling/illegal trade and unregulated research work. The locals extract some plant species at the time of flowering, when we interacted with these peoples and asked them, why are u digging whole herb and particularly at flowering stage? They told us that the contractor has instructed us to do it like this. The extraction of whole plant and that too at the time of flowering is disastrous for existence of these plant species because by doing so both the vegetative as well as sexual propagules are not left in their natural habitats which results into drastic decrease in their natural population rather than cause of vanishing of these plant species from their natural habitats.

**Table 1:** List of critically endangered medicinal plants used in traditional health care by inhabitants in the study area.

S. NO	Botanical Name	Local Name	Family	Habitat	Part Used	Status	Used for	Source
1	Angelica Glaucia edgew	Chore	Apiaceae	Herb	Root	CR	Root powder is applied over aching teeth. Also used for stomach ache.	Z .A Wani et al.(2016)
2	Saussurea lappa C.B Clarke	Kuth	Asteraceae	Herb	Root	CR	Root paste used for toothache, jaundice, snake bite and skin disease.	U. Amara et al.(2017)
3	Saussurea sacra edgew	Jogipadshah	Asteraceae	Herb	Whole plant, Root	CR	Pimples ,acne, boil, rheumatis.	Zakir hussain et al.(2018)
5	Arnebia benthamii	Kahzaban	Boraginaceae	Herb	Leaves, roots, flowers	CR	Leaves and flower tops the herb form an important ingredient of 'SHARBAT', to cure jaundice, palpitation of heart, cough , cold, chronic constipation, fever and a good blood purifier. Decoction is also given to ladies after child birth to keep healthy and strength their bones. Roots after crushing are applied as poultice over wounds.	Z.A Wani et al.(2016)
6	Rheum emodi	Pumba chalam	Polygonaceae	Herb	Root stock,	CR	Leaves are used as vegetables. Rhizome is dried completely and ground to make powder. Powder is sprinkled on ulcers,	A.R Malik et al. (2011)

					rhizome		burns and non-healing wounds for quick healing.	
9	Mecanopsis aculeata royle	Patharmaway	Papaveraceae	Herb	Whole plant	CR	Broken bones, inflammation fractures and pain in the upper bodily regions.	Bilal ahmad beigh et al (2014)

**Table 2. :** List of endangered medicinal plants used in traditional health care by inhabitants in the study area:

S. No	Botanical Name	Local Name	Family	Habitat	Part Used	Status	Used for	Source
1	Jurinea macrocephala (royale) Clarke	Dhoop	Asteraceae	Herb	Whole plant, Root	EN	Used as incense, stimulant, given in colic, in fever after child birth.	Zakir hussain et al.(2018)
2	Artemisia absinthium	Teethwan	Asteraceae	Herb	Whole plant	EN	Abdominal pain, Chronic fever.	A.R Malik et al. (2016)
3	Artemisia moorcroftiana	Jangli teethwan	Asteraceae	Herb	Whole plant	EN	Abdominal pain, vermicide, high fever.	A.R Malik et al.(2016)
4	Foeniculum vulgare	Jangli bodian	Apiaceae	Herb	Seeds	EN	Disease of chest, swelling of testicles, falling of hair, sores , headache.	A.R Malik et al.(2016)

5	Thymus serpyllum	Jangli javind	Lamiaceae	Herb	Whole plant	EN	Skin infection, stomach ache, weak vision, antiseptic, carminative cooling effect.	A.R Malik et al (2016)
6	Asperagys recemosus	Satavar	Asparagaceae	Herb	Root	EN	Constipation, stomach spasms, stomach ulcers, anxiety, diarrhea, bronchitis, tuberculosis, diabetes.	Thenmozhi M et al.(2018)
8	Dioscorea deltoidea	Kraeth	Discoreceae	Herb	Rhizome	EN	Digestive orders, sore of throat, diarrhea, irritability, abdominal pain, wounds, burns, anemia.	Z.A Wani et al.(2016)
9	Euphoebia wallichii	Guri-dud	Euphorbiaceae	Herb	Stem leaves	EN	Breathing disorders, , tumors, mucus in nose and throat.	Z.A Wani et al.(2016.)
10	Androsace rotundifolia	Uzmposh	Primulaceae	Herb	Rhizome	EN	Malarial fever, jaundice, mouth ulcers.	Z.A Wani et al.(2016)
11	Betulautilis	Bhuz	Betulaceae	Tree	Bark	EN	Antiseptic, carminative, wounds, burns.	Zaki et al.,(2011)

**Table 3:** List of vulnerable medicinal plants present in the study area :

S. No	Botanical Name	Local Name	Family	Habitat	Part Used	Status	Used for	Source
1	Acorus calamus	Via	Araceae	Herb	Root stock	VU	Stomach pain, diarrhea, fever, liver and kidney trouble, insecticide.	A.R Malik et al. (2016)



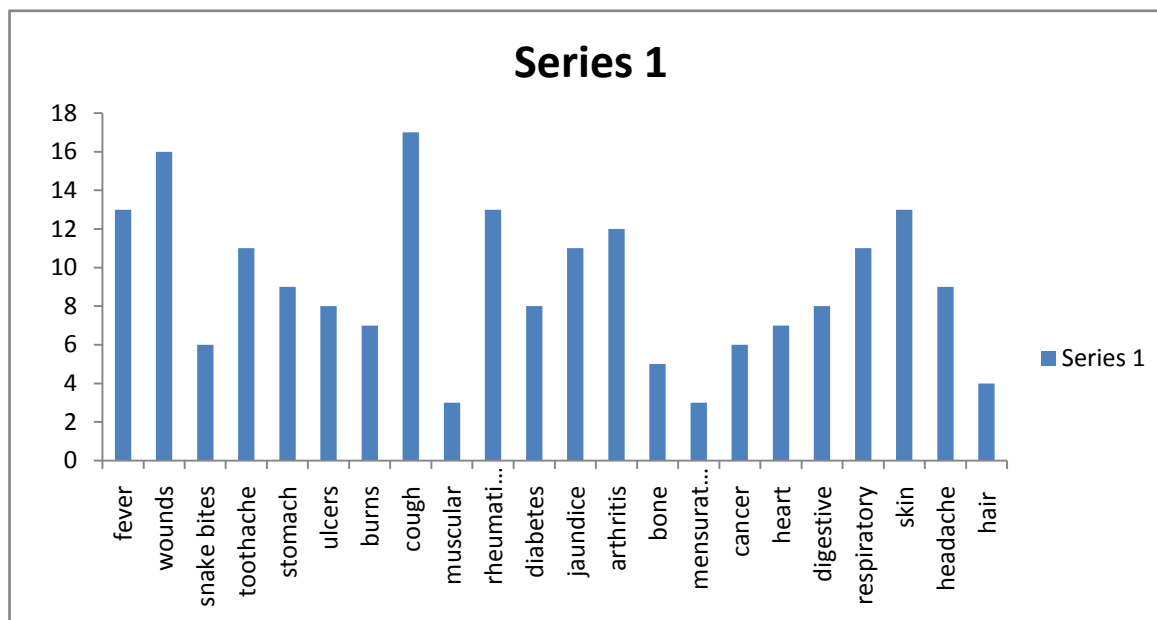
2	<i>Adiantum capillus-veneris</i>	Geutheer	Adiantaceae	Herb	Whole plant	VU	Expectorant, hair tonic, stomach pain.	A.R Malik et al. (2016)
3	<i>Ajuga bracteosa</i>	Jain-I adam	Lamiaceae	Herb	Whole plant	VU	Blood purifier, fever, rheumatism, hair tonic, wounds.	A.R Malik et al.(2016)
4	<i>Aquilegia vulgaris</i>	Dadue jaid	Ranunculaceae	Herb	Whole plant	VU	Gallbladder disorder, intestinal problem, rashes.	A.R Malik et al.(2016)
5	<i>Asplenium falcatum</i>	Dade	Filicinae	Herb	Whole plant	VU	Burn, expectorant, headache, sterility in women.	Res. J.Med. plant,(2011)
6	<i>Bergenia ligulate</i>	Zakhmi hayat	Saxifragaceae	Herb	Root stock	VU	Wounds, internal injury, acidity, cough, fever, headache.	A.R Malik et al. (2016)
7	<i>Cardamine macrophylla</i>	Pahal laish	Brassicaceae	Herb	Whole plant	VU	High fever, vermicide, diuretic asthma, tumor, fertility in women.	A.R Malik et al.(2016)
8	<i>Datura stramonium</i>	Datur	Solanaceae	Herb	Whole plant	VU	Intoxicating, asthma, teeth ache, loss of hair, dandruff, antiseptic.	A.R Malik et al. (2016)
9	<i>Rumex acetosa</i>	Abijie	Polygonaceae	Herb	Whole plant	VU	Chest involvement, astringent and hardness of muscle, asthma and skin disease.	A.R Malik et al. (2016)
10	<i>Paeonia emodi</i>	Kukli pot	Papsveraceae	Shrub	Roots	VU	Hypertension, palpitation, asthma, bilious obstruction.	Gh Mohd Mir et al. (2014)
11	<i>Nepeta raphanorhiza</i>	Vangogil	Lamiaceae	Herb	Whole plant	VU	Fever, cold, flue, headache, diarrhea, flatulence.	A.R Malik et al (2016)

12	Rubia cordifolia	Rubes	rubiceae	Herb	Roots	VU	Wound, antiviral, food colorant.	Arun M Gurav et al. (2017)
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**Table 4:** List of Rare medicinal plants present in the study area:

S. NO	Botanical Name	Local Name	Family	Habitat	Part Used	Status	Used for	Source
1	Iris nepalensis wall ex lindle	Mazar mund	Iridaceae	Herb	Rhizome	R	Hasub (frequent diarrhea in children), abdominal pain.	A.R Malik et al (2016)
2	Allium stoliczka	Schothach	Liliaceae	Herb	Whole plant	R	Hepatitis B, abdominal gas, stomach pain, hypertension, and hypotension.	A.R Malik et al. (2016)
3	Amaranthus caudatus	Leesa	Amaranthaceae	Herb	Whole plant	R	Expectorant, high fever.	A.R Malik et al.et al (2016)
4	Anagallis arvensis	Chaire seban	Primulaceae	Herb	Whole plant	R	Allergy, killing of lice.	A.R Malik et al.(2016)
5	Arisaema jacquemontii	Hapat makhe	Araceae	Herb	Root stock	R	Boils	A.R Malik et al. (2016)
6	Cichorium intybus	Saze hand	Asteraceae	Herb	Whole plant	R	Rheumatic pain, high fever, internal ulcer, stomach disease, blood purifier.	A.R Malik et al. (2016)

7	<i>Urtica dioica</i>	Soi	Urticaceae	Herb	Whole plant	R	Fever, fractures, stomach pain, wounds, skin infection, paralyzed limbs, nose bleeding.	A.R Malik et al.(2016)
8	<i>Teraxacum officinale</i>	Madan hand	Asteraceae	Herb	Whole plant	R	Chronic cough, asthma, infection, abdominal swelling, stomach cramps, acidity, urine irritation.	A.R Malik et al. (2016)
9	<i>Glycyrrhiza glabra</i>	Shanger	Fabaceae	Herb	Root	R	Respiratory disorders, epilepsy, fever, sexual debility, paralysis.	Gh Mohd Mir et al.(2014)
10	<i>Matricaris chamomilla</i>	Fake gasse	Asteraceae	Herb	Flower	R	Cough, bronchitis, fever, cold, inflammation, infection, burns.	A.R Malik et al. (2016)
11	<i>Sambucus wightiana</i>	Hapat fal	Caprifoliaceae	Herb	Root, leaves.	R	Expectorant, diuretic, chest congestion.	A.R Malik et al. (2016)
12	<i>Prunella vulgaris</i>	Kalwauth	Lamiaceae	Herb	Flower	R	High inflammation, protect against cancer, prevent diabetes.	Res.J.Med. Plant,(2011)
13	<i>Arisaema jacquemontii</i>	Hapat brand	Araceae	Herb	Whole plant	R	Boils	A.R Malik et al.(2016)
14	<i>Origanum vulgare L.</i>	Baber	Lamiaceae	Herb	Whole plant ,seeds.	R	Promote menstrual flow. For cooling effect, diuretic, fever.	A.R malik et al. (2016)
15	<i>Portulaca oleracea Linn.</i>	Nunner	Portulacaceae	Herb	Whole plant	R	Ulcer, liver, heart , kidney and bladder diseases.	Z.A Wani at el.(2016)



**Fig. 5:** Frequency of plant species used for treatment of various diseases

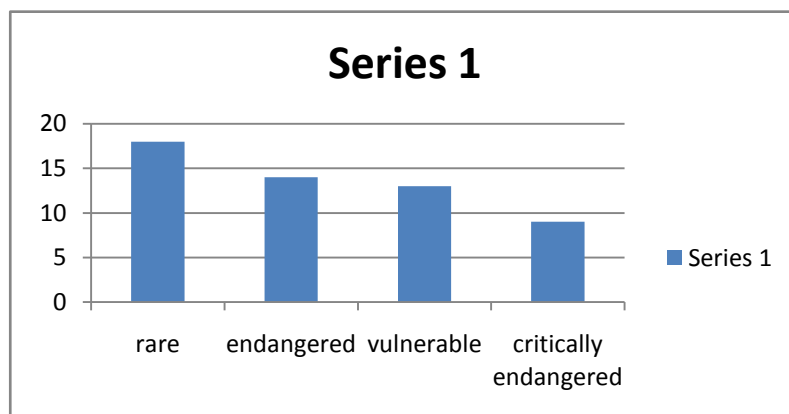
The question based survey on perception of local peoples indicates that the availability of medicinal plants has decreased over the past 20 years. Most plants that were available near a village are now confined to the forest ecosystem and alpine meadows. At present poor peoples in the region collect plants from the wild in order to complement their income and for treatment of various diseases. Due to continue collection and increasing market demand, numerous plant species are under threat and need immediate conservation.

### **Conservation implications:**

Despite the large scale cultivation of *Angelica glauca*, and *S.costa* in other states of India, there are no programs for the cultivation in Jammu and Kashmir. The conservation efforts have remained confined to small scale ex- situ measures and maintenance of these threatened medicinal plants in forest department nurseries and botanical gardens of research institutions without any proper multiplication and reintroduction agenda.

One of the basic steps for the conservation is that through surveying is needed across the predicted areas of distribution to determine the current status of wild subpopulations and get the appropriate population data. This will also ascertain the area where the species were reported earlier and now eradicated. Mass propagation of the species is required followed by reintroduction to suitable habitats so that the viable populations of the species can be maintained. For in-situ conservation of the species, regular monitoring of the habitats and their complete protection is advisable. These species may also be introduced in cultivation by given facilities and incentives to farmers to provide socio-economic benefits along with the conservation goals.

Mass awareness campaign to discourse people for unsustainable collection needs to be launched and conservation capacity building programs should be started. For long term conservation goals, establishing cooperation between forest departments, research institutions, nongovernmental and other governmental organizations is strongly needed. Moreover, strict implications of the rules and regulations are also required.



**Fig. 6:** Number of medicinal plants in different threat categories according to present survey.

### Conclusion:

On the basis of this survey, it was not possible to extend our findings to the whole Kashmir Himalayas. Given various obstacles to the conservation of these threatened medicinal plants and very little efforts thus far from the government and local institutions there is an urgent need for an effective and long-term conservation programs in these high altitude ecosystems. Demand of medicinal plants is increasing day by day due to rich capacity for treatment of certain disorders and also their less or no side effect. And also conservation of critically endangered and endangered medicinal crops can be treated as an alternative income generating activities. By doing so, we will not only be able to conserve the precious wealth of medicinal plants but also we will achieve the goal of conserving critically endangered , endangered, vulnerable and rare species, which are threatened, and at the verge of extinction. In this regard in Kashmir government has taken some important steps in conservation of these highly threatened medicinal plants, like nurseries, forest research institutions, botanical gardens etc.

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