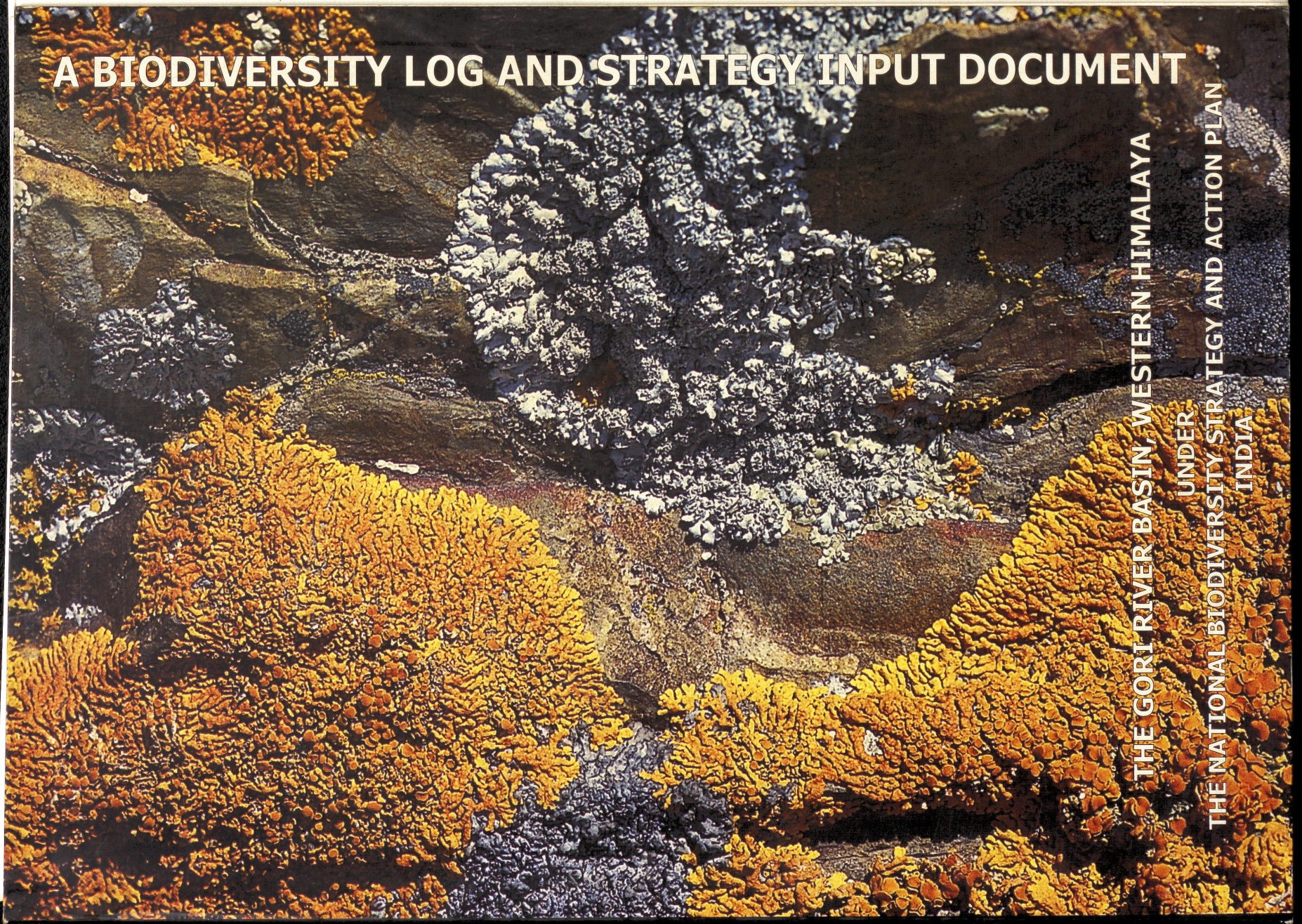
A BIODIVERSITY LOG AND STRATEGY INPUT DOCUMENT
THE GORI RIVER BASIN, WESTERN HIMALAYA
UNDER
THE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN
INDIA

A BIODIVERSITY LOG AND STRATEGY INPUT DOCUMENT

FOR

THE GORI RIVER BASIN

WESTERN HIMALAYA ECOREGION

DISTRICT PITHORAGARH, UTTARANCHAL

A SUB-STATE PROCESS UNDER

THE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN INDIA

BY

FOUNDATION FOR ECOLOGICAL SECURITY

MUNSIARI, DISTRICT PITHORAGARH, UTTARANCHAL

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FOREWORD

The authoring institution

The Foundation for Ecological Security (FES), which has projects in seven states of India, has been working in the Gori river valley, in the north of Pithoragarh district in Uttaranchal, now for over ten years. Its work involves creating, strengthening and assisting village institutions, (in this case Village Forest Councils or Van Panchayats), to revegetate and revitalize their natural resource commons, and in the local and democratic governance of these commons. Around this core, is a range of activities on the interconnected dimensions of building and conserving biological diversity, both of wild as well as 'minion' species, as well as necessarily addressing the subsistence livelihoods of local communities that are based on such a diversity of life.

The Project Team of the FES at Munsiari has, over the past decade, been interacting with almost every village in the Gori river basin. The basin has 171 inhabited villages, and direct physical work through the project is underway in about 88 of them. While work has now been initiated in the neighboring Darma and Byans valleys, it was decided to undertake the exercise only for the Gori valley where the team was more familiar with the communities and the issues, and which by itself was a substantial task.

The area, as we will see in this description, is unusually rich in biological diversity. However, despite its remote location and difficult access, it is deeply penetrated by large and distant markets. A severe degradation is underway in the area, but one that you cannot easily 'see', and this is described later. We are also witness to the progressive falling apart of the more cohesive and self-reliant existence of local communities, and the increasingly desperate recourse to extracting and selling whatever they can from their landscapes.

The project attempts to understand, sometimes with village communities and sometimes from them, more dimensions of the diversity of life around them, and how they ascribe values to them. To collectively discover and enunciate the links between various dimensions of biodiversity on the one hand, and on the other, the economic dimensions of long-term food security, diverse livelihoods options, and the ability to cope with risk and uncertainty in a harsh environment. The project also attempts to understand how various elements are related to and are interdependent on other elements around it, to gain cues on what can and must be done to try and conserve it.

Certain aspects are all too apparent, though the causes, and therefore the redressal of many of the problems, cannot really be local. For those that are relatively so, the project is working with village communities to build a common perspective on the causes and processes involved, and wherever possible, to initiate community action in this regard.

The scope

Because of the work that FES is involved with, the emergence of the NBSAP process on the horizon was responded to with enthusiasm. We see the value of the process being formal, initiated by government, as well as part of an International Convention. Though fraught with some uncertainties that normally do accompany such large and orchestrated ensembles, there is no doubt that the process has generated some synergy between government departments, research institutes as well as non-government organizations working with people and with conservation issues. There are however, some larger questions that all of us must contribute the answers to.

There is a momentum and a seeming sense of common purpose, though obviously, divergent paths will become more apparent further down the line. Different actors involved in such processes will have their own perceptions of and values for biological diversity, different perceptions of what degradation means, and different priorities on what should be done. While this is understandable, even desirable in terms of representation on a broad-based discourse, how are such essentially discordant notes hoped to be synthesized? Can there be a synthesis, a commonly agreed upon and cohesive central narrative, or will various parts of the collage vie for weightage and priority? On the question of weightage, will there be a clear distinction between a stakeholder, and an interested party? All too often, every finger in the pie is construed to be a stakeholder.

A 'crisis scenario' could well be the refrain of most Sub-state and State BSAP documents, and we can see the inevitability of this in such a process. Ours is. Not that describing the crisis would be constructing a myth, but because processes such as this also stimulate and present a renewed opportunity to institutions. The opportunity, for example, for self-perpetuation; sometimes through new initiatives, and sometimes through casting new guises to old agendas. This we know, is not new, especially when it comes to spinning the appropriate development phrase that is most current with and driving international development funding priorities. What happens on all these fronts, will perhaps define the utility of this process, and the direction it will take.

The Munsiari node had made a 'disclaimer' when it took upon itself to be a part of the BSAP process. It partly defines the scope of the exercise undertaken by us:

We have undertaken a widely consultative process to draw up a document that will:

a) Initiate a log of, and describe to the extent possible by us, the biodiversity of the sub-state area, i.e. the entire Gori river-basin,

b) describe the major concerns and threats to the biodiversity of the valley and attempt to represent what is perceived locally, as well as our interpretation of the causes, and

c) enumerate aspects where urgent and critical attention is required. Inputs as far as strategy is concerned will be substantial, but the exercise will not result in a Local Action Plan or project proposals thereof.

The document represents certain outcomes of the wide and sustained discourse with village communities over a time-span of a decade, and specific workshops and consultations held

during the past year. Our understanding has been supplemented by analyses of the data that we generated for the purpose, and by relevant literature. It was essentially an interpretive exercise, a search for patterns and connections.

The reason why this node is **not** attempting to draw out an Action Plan under this process is because it anticipates the following:

1. It is considered possible, however difficult, to draw out action plans for projects, task-forces, bureaucracies and institutions that will 'implement' a plan in a project mode. It is quite another matter, to work with and evolve a commonly accepted plan between hundreds of village communities, for a common, jointly inhabited landscape, and the way they use it. Village communities are stratified, even within themselves, on the lines of caste, class, race and gender, and the complex political nature of resource-use and appropriation, is highly contested, even over generations. While individual village-plans, and even village-cluster plans are possible, they are only practically possible in time-frames and spelt-out activities under project-modes. The more fundamental dimensions such as changes in land-use, changes in patterns of land-holding and tenure, inequitous resource distribution, are one set of complex considerations of a political nature. The resolution of divergences in the wider circles of identification - of 'global' commons as in the valuable Protected Areas, in the many mutually incompatible use and exchange-values imputed to biodiversity, and the compulsions that arise from failing livelihoods, we feel, cannot be planned for under a process such as this. At least not locally. And certainly not in the time-frames envisaged.

2. The causes of the major problems in the river-basin are a reflection of much larger pervasive phenomena; those that emanate from outside the valley, or from those historic administrative events that have resulted in the existing property holding patterns, both private and the Commons. While local communities can plan how they could respond in terms of coping, there is little they can do alone to change the situation. The increasing conflicts amongst themselves as well as the law with regard to natural resource use, is the compulsive fallout of failing livelihoods. For them to plan how they will be good boys and girls henceforth would be entirely irrelevant, unless there is a manifest and larger political commitment to try and change the factors that are driving them down this spiral. This is nowhere in sight. A local plan of how to respond to these larger political phenomena that affect their lives would perhaps entail a process of evolving a wider perspective on what is going wrong, who are the players, and who wins and who loses. This is a highly political process, and one without a time-frame. The project team, or the Gori basin BSAP node feels that this is quite beyond it, and practically outside the scope of this exercise for them.

3. The absence of a process that could have led to establishing a *locus standi* or mandating the FES team to assume the role of conducting such a fundamentally political planning process with the communities in the first place. In the second, there was neither a mandate for FES to articulate or represent such a plan on behalf of communities, to an abstract *Sarkar* or others, from whom there was no manifest committment to the communities so involved, that there would be the kind of engagement they need.

However, the Local Action Plan apart, the exercise most importantly, begins to log and to describe the very valuable biodiversity of the area, and the factors affecting the lives and well-being of all who dwell there, and to attempt to elevate this area on the state and national conservation agenda. If anything, the effort seeks to provide a detailed, close-to-the-ground view of the river basin, and to contribute with substantial locational data and information, as well as to represent some local perspectives (in the sometimes detailed description of micro-processes) to the BSAP process, and to the discourse on biodiversity conservation and people in the Himalaya.

Some of the significant data is new, in that it has been generated or modified by FES according to the situation we have discovered in the field, or where previously published data has been verified and altered by our GIS cell for our use. Two significant bits of information of this kind are: 1) the proportion of land under village commons or Van Panchayats, and 2) the proportions within the landscape under various altitude bands and vegetation types (Life-zones). Both bits of information surprised even us, and speak for themselves in terms of the unusual configuration of both biodiversity elements and have major implications on human governance aspects.

This process has been undertaken and the document been prepared as a team effort by the FES Team at Munsiari. Most of the people in the team were born and have lived in villages within the river valley for much of their lives. Before they joined the team, a few were shepherds, one a teacher, one a mail-runner, one a tailor, a few hunters and herb collectors, a full-time priest and dispenser of local medicine, and one a pack-horse herder. There are others who were farmers, a road construction mate, and a few chronic job-appliers to the army. The centrally recruited officers are from various parts of the Himalaya, and also from some distant cities. All have contributed variously, and sometimes in ways not easy to specify.

The ready and very important assistance of Dr. Gopal Rawat of WII is gratefully acknowledged in the compilation, categorization and analysis of the flora of the basin that was basically done by him. Dr. Y.P.S Pangtey for his list on the Pteridophytes of the valley, and his fundamental guidance and enthusiasm in all matters related to plants. Malika Virdi, who contributed valuable data, insights and analyses on the wild plant collection and trade in the area. Rashid Raza, who contributed significant additions and depth to the bird-list and to an understanding of patterns. Valuable comments and suggestions from Madhu Sarin, from Lalit Pande and Michael Jackson of the Uttarakhand Seva Nidhi, from Anand Swamy, Laxmi Murthy, Kavita Tewari and Pankaj Sheksaria are also gratefully acknowledged.

Despite all the protestations on scope proferred already, the Foundation for Ecological Security believes the NBSAP to be a valuable process to be involved in, and has drawn from its own project resources (funded during this period by the Canadian International Development Authority CIDA), for any expenses incurred.

The staff from FES who have contributed to the drawing out of this document:

Field Associates who contributed valuable primary data from villages regarding agriculture, as well as on the extraction of wild plants and animal parts from their respectives areas of work:

Kedar Bisht, Chandar Baunal, Ramesh Pande, Gangotri Devi, Kishen Singh, Bhagat Singh, Khushal Nitwal, Sitaram Sumtyal, Anand Ram, Balram Arya, Jeevan Singh, Narendra Singh, Lalit Singh, Darpan Singh, Duryodhan Singh, Thakur Singh, Pushkar Singh, and Manohar Singh.

Senior staff of the FES Team:

K.Ramnarayan compiled the Mammal and the Bird lists, and coordinated an extensive primary data collection exercise from villages. Manshi Asher wrote the chapter on Forest and Land Related Policy in the Region, and major portions of those on the River Ecology and on Mining. Prakash Bhandari compiled data and the list of plants and their local use, as well as wrote all the cropping aspects of the chapter on Agriculture. Hem Tewari assisted with much of the difficult data collection regarding food production, foodgrain import, Van Panchayat boundaries and village level data. Vijay Rawat assisted with the data collection on foodgrain flows through the Public Distribution System (PDS), with estimating figures on livestock and in digitizing the flora list and the fish list. Nidhi Aggarwal for data collection regarding tourism in the area and for scanning secondary data from the Census records. Bhupendra Mehta and Preeti Rao from the GIS lab of FES at Anand contributed significantly with industrious ground-work, and generated valuable data and maps to help understand assemblages and patterns in the landscape. Emmanuel Theophilus wrote all the other chapters and portions of this document, and coordinated the exercise.

This document is written in the hope that it will contribute to the policy discourse as well as to efforts on Biodiversity conservation. That we need to conserve the richness and diversity of Nature, there is no doubt ; for ethical reasons, for maintaining ecosystems, for material and economic benefits to people, and for maintaining evolutionary processes[1]. But as a wise woman put it, and I paraphrase, we need Nature, in all her diversity, "to look for answers to questions we have not yet learned to ask."

[1] Summarized by Inskipp 1992.

A DESCRIPTION OF THE AREA

The landscape

The Gori river basin is located in Eastern Kumaon, in the state of Uttaranchal. The Gori river is a tributary of the Kali and the river basin forms part of the upper catchment in the Indian territory. The coordinates are 70°45′ to 81°5′ E Longitude, and 29°5′ to 30°10′ N Latitude. The basin is bounded by the international border with the Tibetan Autonomous Region of the Peoples' Republic of China in the north, and by the river Kali in the South-East, which constitutes the border with the Kingdom of Nepal. To the west of the Gori valley is Chamoli District in Garhwal, along the high rim of the Nandadevi Biosphere Reserve. A map is attached for reference.

We are looking at a river basin that is 120 km long, (the actual river is about a 100 km) and roughly 25 km wide, that covers an area 2240 square kilometers. This is about 4% of the area of the State of Uttaranchal.

This river basin would make an interesting, if most unusual component landscape of the NBSAP process. About 1439 square kilometres or 64.24% of the entire basin is under village commons (FES GIS data), lands that are administered by village forest councils or Van Panchayats. Another 8.71% is under Reserved Forests, which include portions of such valuable Protected Areas such as the Nandadevi Biosphere Reserve, a World Heritage Site, and the Askot Wildlife Sanctuary. The Askot Sanctuary, though lower in profile, is being discovered to be almost unmatched in the range of ecosystems and biological diversity that it represents[2]. About 347 square kilometres of area in the Gori basin, that is classified as Civil and Soyam Land, falls under the Askot Wildlife Sanctuary. A sum of all these – village commons, Reserve Forests and Civil and Soyam under the Sanctuary area- makes almost 88% of the entire area of the basin as Protected Areas, both by village communities, as well as the State. (IUCN now considers Community Protected Areas such as village forests also under the category of Protected Areas.) Significantly, 1891 square kilometres or about 96% of these protected areas are in one large contiguous swathe.

Because of the great compression of Life-zones in a small geographical area, this valley presents a diversity of landscape and ecosystems that would be difficult to find contained in an equivalent area. From about 590 metres above sea level at Jauljibi, at the confluence of the Gori with the Kali, to 7434 metres a.s.l at the summit of Nandadevi East, which is only one of three 7000 metre high mountains that are arrayed at the high rims of this basin. Hardeol (7151m) and Trisuli (7074m) are the other seven thousanders that dominate the landscape, amongst a multitude of ice-bound mountain massifs. These mountains are amongst the highest in the country, and their precipices that slope down to progressively warmer valleys, yield elevational gradients and climatic conditions that range from frigid arctic conditions to the warm and humid sub-tropical.

To add to the diverse conditions that such a range of altitudes produce, is the area's special biogeographic location on the east to west (longitudinal) transition zone of the flora and

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[2] Protected Area Network in Indian Himalayan Region: Need for recognizing values of low profile protected areas. Ranbeer Rawal and Uppendra Dhar.

fauna of himalaya, and its proximity to Tibet, that enables it to share characteristic elements and affinities of all three. Further, in the north-to-south axis within this area, is another layer that compounds the diversity of conditions, and that is the existence of the three (latitudinal) zones of the Trans-Himalaya, the Greater-Himalaya, and the Lesser-Himalaya. All three transitions represent distinct habitats.

The very diverse climate types[3] that such a range of altitudes yield, are :

Altitudinal belts	*Corresponding climate types*	*Altitude range (meters asl)*	*Area Sq. kms*	*Percentage of total area*
Nival	Polar	> 5500	176.94	7.90
Alpine	Sub Polar	3500 to 5500	1208.72	53.95
Sub-alpine	Boreal	3000 to 3500	191.61	8.55
Montane	Cool Temperate	2200 to 3000	262.63	11.72
Lower Montane	Temperate	1200 to 2200	322.08	14.38
Subtropical	Sub tropical	< 1200	78.33	3.50

As you go up, with every successive 1000 metres elevation there is a significant change in air pressure, availability and tension of oxygen, drop in temperature and subsequently in humidity as well. As a rule of thumb, mean temperature is known to drop at an average rate of 1 degree centigrade for every 270 metres of ascent, the drop being steeper and more rapid above 1500m[4]. Altitude, combined with the different slope orientation of each mountain slope, also expose it to different number of hours of sunlight and intensity of radiation from the sun. These, among other factors such as severity of slope, subsequently varying soil depth and moisture regimes, produce very diverse habitats within a small geographic area, for both plant and animal species that have specialized to occupy specific niches.

Rainfall is quite variable in this area. Averaging below 200 cm annually in the lower reaches of these valleys, the areas in the Greater Himalaya zone here receive as much as 300 cm of torrential rain. The upper Trans-Himalaya reaches of these valleys, on the other hand, are in the rain-shadow, and comprise an arid cold-desert area that receives less than 15 cm of rain annually. This is excluding the precipitation in the form of snow in winter, which has not been measured and recorded anywhere in the valley. The lone met-data collection centre in the valley is at the veterinary hospital at Munsiari, which is at mid-altitude, and only measures and records rainfall data. Snow at the high altitudes is heavy and wet, and unlike other places in the trans-Himalaya where dry snow is blown away by strong winds, it accumulates up to the roofs of the alpine inhabitations, making it necessary for people to migrate with their livestock to lower villages in the montane belt in early October. Avalanches are a regular phenomenon, as witnessed by the huge compacted cones of avalanche debris

[3] As in Leslie Holdridge's Life-zones

[4] Salim Ali and Ripley 1983

along the gorge where the river flows, forming snow bridges across the river at many points, that can sometimes last till the following autumn.

The People

It is a remote part of the country, where access by roads is very limited, and where many communities live in distant high altitude areas, that require days of walking over difficult terrain to reach. While there is a typically deep penetration of the market with regard to valuable but contraband plant and animal resources of this frontiers area, only a few of the more accessible village communities are integrated in relatively mainstream economies. The overwhelming majority continues to struggle with bare subsistence.

Permanent human habitations occupy the lower altitudes up to the temperate zone more densely. There are only a few settlements in the Cold-temperate areas and villages in the Alpine zone are only seasonally occupied, and form part of the transhumant land-use practices common in high mountain areas. The valley being described is relatively narrow and steep, rendering little land suitable for agriculture. Of a total land area of about 2248 square kilometres, only about 102 square km or just 4.54 % of the area is cultivated land. For about 43,542 people in 8647 households, who live in 171 villages in the valley, highly fragmented holdings in this 4.54 %of land do not suffice even for subsistence. Roughly about half the foodgrain requirements of humans and their livestock are met from local agriculture. The rest is required to be bought, for which the people need cash incomes.

The per capita cultivable land in the basin surprisingly, is 0.23 hectares, which is higher than the state and national per capita availability. Land-holding patterns are looked at in more detail in the chapter on agriculture. Suffice it to say here that the marginal and scattered holdings here are far insufficient to even meet subsistence requirements, and local populations therefore have no choice, but to depend so heavily on their surrounding forests and alpine grasslands, for animal husbandry and for extractive use.

The mountain soils in the valley are poor in nutrients, and to produce crops at all require to be constantly supplemented with humus and manure. This is possible only through a heavy nutrient cycling from surrounding forests and grasslands, by conversion through animal husbandry. In the project area, at least four to six tonnes of farmyard manure are applied to agriculture fields per cropping, depending on the crop and frequency of cropping (normally 3 crops in 2 years). For crops like potato as much as 17 tonnes per hectare can be applied. In order to be able to do this, in terms of forest area and grasslands from which leaf-litter and fodder is collected, it is estimated (and these are the most modest estimates we have come across) that a support area to the ratio from 1:4 to 1:6 is required, to support agriculture alone. A hamlet of 50 households, it is estimated, would require about 206 hectares of support area to meet their needs of fodder, fuelwood and leaf-litter from. Very few (46 out of 171 villages) villages possess such a positive ratio. This however, is just a simplistic math, as mountain landscapes are far from uniform in terms of what they produce and how much. Almost every village in the basin has to depend on other village forests for different produce and at different times of year. Both near, and far. It is not just area of production but production capability that is determined by variables such as altitude and aspect.

The point being illustrated here is that human survival needs, as well as those of their domesticated species, both plants and animals, make them heavily dependent on their forest areas. The animal holdings far outnumber the human population of about 43,542[5] in this river basin. Cows and buffaloes number above 39,000, and sheep and goats, yet another 19,000[6] odd animals. Their existence is essentially biomass based, and they must rely heavily on their landscapes for their pastures, hayfields and fodder, and for fuelwood, fibre, and timber. Animal, bird and fish food, as well as seasonal pickings of shoots and tubers and honey only supplement their food sources marginally.

The economy is essentially agriculture-based, and their agriculture and animal husbandry is forest-dependent. The majority of the land holdings are small and marginal, and they are highly fragmented between successive generations. It is largely a subsistence economy that is propped up by money-order remittances by those who manage to land jobs elsewhere, notably the armed forces, and a few government jobs.

Among the people who inhabit these valleys are Rajputs or *Jimdaar*, who are essentially agriculturists, the *Shaukha* (a progressive distortion from the tibetan Shok-pa[7]) or Bhotia, who are mostly traders, and the Scheduled Castes or *Shilpkar*, engaged in a range of subaltern roles, ranging from performing arts, to being feudally attached to families as agriculture and domestic labour, to skilled labour such as carpenters and masons.

The *Shaukha* of the Gori valley was essentially involved in the trade from this area with Tibet, and in trade-dependent ancilliary activities, such as rearing and running the caravans of pack-goats, horses and Yaks, as well as growing food-grain for trade. Of all the adjoining valleys that had *Bhotia* inhabitants, such as Darma, Byans, Chaudans or even the Niti valley, those of the Gori valley, referred to as the *Juhari Bhotia*, were by far the most politically powerful and influential traders.

The seasonally occupied alpine villages, which served as entrepot nodes then, were bustling over-populated villages, (Milam village which today has less than 30 inhabitants, was reported to have 1494 'souls' at the time of the first Land Settlement there in the late 1800s), and where tiny fragments of land were vied for and apportioned to families in the community, to grow some food-grain on. A highly unsustainable intensity of landuse for as fragile an ecosystem as the trans-himalayan alpine zone, as was borne witness to by the over-utilized sub-alpine forests of juniper and birch near some villages. Being relatively wealthy though, and having acquired a savvyness that comes with successful trade with distant markets as far flung as Amritsar, Kalimpong and Calcutta, not to speak of Gyanima and Gartok in the kingdom of Tibet, they had also acquired land extensively in the villages of the middle and lower altitudes. They were latter-day multinationals, so to speak, with partnerships in different countries, and who were even capable of independent negotiations with other nations (on the matter of a few stolen ponies, for example), as was witnessed during the Kazakh incursion into independent Kashmir and British held India in 1941[8].

[5] Dissagregated figures for the villages in the basin from the 1991 Census, plus 10%.

[6] Figures collated by FES, since the Livestock Census gives aggregated figures for a Tehsil, and does not account for movement of transhumant livestock from other valleys.

[7] Himalayan Gazetteer. E.T. Atkinson

[8] The Kazakh Incursion of 1941, Elmar Grypa.

With the cessation of trade with Tibet in 1962, however, the Shaukha of the Gori valley practically abandoned the practice of seasonal migration to the alpine villages. With the subsequent abolition of *Zamindari* (feudal land ownership) and the Land Settlement by 1965, and land being legally handed over to the tiller, the Shaukhas extensive land holdings, which till then were administered through feudal relationships, especially in the middle and lower altitudes, was greatly reduced. While the Shaukhas of this area can be described as having a loosely grouped ethnic distinction, even amongst themselves, their social organization was not tribal in any sense of the word, at least for the past 150 years or so. Being politically organized and astute, they succeeded in negotiating a tribal status in 1967, and have put to good use the opportunities that opened up through reservations. But even among them, there are the few family groups who have done well in integrating themselves in the mainstream government jobs, as well as in trade, but a large segment of them, the *Barpattia*, continue to practice marginal agriculture and live off what they can from the landscape.

There exists at the other end of the spectrum, an almost aboriginal tribe of negrito-mongoloid people called the Banraji or Banraut. They live deeply embedded in the sub-tropical forests of the lower Gori and Kali river valleys, and have had little to do with mainstream settlements. They were 'discovered' only a few decades ago by academia. Their numbers are not reliably censused, but are less than two thousand today, and with their entire range now being designated the Askot Musk Deer Sanctuary, (the subsequent Supreme Court order of February 2000, which prohibits even the removal of dead-wood or grass from all protected areas) their way of life has been rendered illegal. Today, they still live largely elusive lives in the forests of what is now the Sanctuary, at the very margins of the cash-economy.

Their interactions and exchange with the farming communities in the past included their catching and selling fish from the rivers, and bartering vessels made from the wood of Oogenia, and turned on water-run lathes. They were especially sought after for the excellent grindstones they prepared for water-mills. All this has changed today. The felling of Oogenia for wood is prohibited, and water-mills are progressively falling to disuse due to diesel-run mills. The Banraji has now taken to selling head-loads of wood as fuel to the bazaar at Jauljibi. (pers comm. Pradeep Pathak) They are sometimes also hired as labour for the extraction of wood or valuable herbs, and paid in foodgrain.

Their social organization is basic, unstratified, and tribal, if there ever was one. Very recently, in the year 2002, by means of an unexpected but calculated maneuver by the non-tribals of the valley, a man from the Banraji community was put up for MLA elections from this constituency, in opposition to Shaukha tribal candidates. This was a seat reserved for tribals. He won. What this portends in terms of change, or proxy representation, will have to wait to be seen, but manner in which this transpired makes the outcome rather predictable. There was no process of a build-up for such a representative within the Banraji community, let alone amongst the majority (non-tribal) community who voted him in in order to keep the Shaukha candidate out. It was a sudden political maneovre which took even the young candidate completely by surprise.

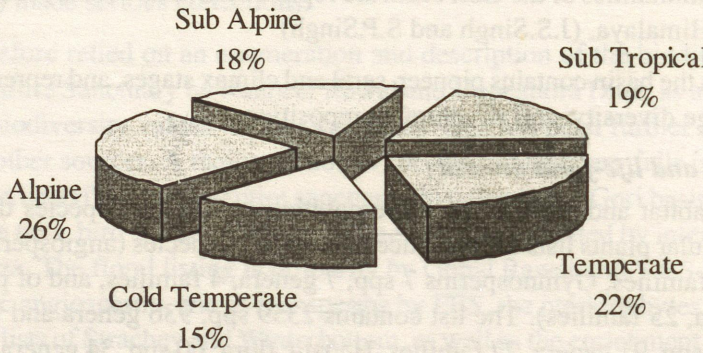
The aberration of a Banraji youth having been pulled out of a forest dwelling and put up in a proxy move as a Member of the Legislative Assembly apart, the lot of the Banraji is perhaps the most desperate of any of the communities that inhabit the Gori basin. The Government Notification of 30th July 1988 that declared their forests as part of the Askot Musk Deer Sanctuary, bore no mention of their existence, let alone provide for rights of subsistence within the forest. The Supreme Court Order of February 2000, while intended to put an urgent halt to illegal and largescale felling of timber from the country's Protected Areas, has unwittingly amputated the Banraji from their only source of livelihood; the forests. They are not essentially agriculturists, and own no titles to land to be able to grow their food from, and many may well be deemed 'encroachers' in the forest. Their settlements ofcourse have no government primary schools, and they interface with the local 'mainstream' at the very bottom rung of the division of labour now. Their trajectory seems to be identical to those of other indigenous 'primitive' tribes who have found themselves fenced out (legally) and enclosed from the forests that were their frugal sustenance, (the very name of the tribe means 'forest people') or else ridden in traps of debt and exploited as cheap labour by the mainstream villages and urban eruptions along the margins of the Sanctuary.

As described earlier regarding the mainstream communities as well, most landholdings in the basin are small and fragmented, and are able to meet only a part of a family's food requirements. The image of the Kumaoni male at large, who is fabled to knit and gossip at tea shops, is rather generalized, and is not quite an accurate description of the men of this area. The business of staying alive requires all able hands to contribute. However, without a doubt, the overwhelming burden of agriculture, of tending cattle, of fetching fuelwood, fodder and sometimes water from great distances over difficult terrain, as well as cooking and rearing children, lies with the women.

Though village communities and hamlets are quite small, and not as socially stratified as one would find in more densely populated areas, systems of discrimination are however, still firmly in place. While the pervasive feudal relationships have substantially dissipated after Zamindari Abolition, caste, ethnic grouping, economic class and gender are all existing lines of division, as even gender itself is divided along lines of caste and class. Yes, there is some evidence of change beginning to come about, but it is more in the area of emerging assertions at the political level. Reservation for ethnic groups, caste and gender is being competitively asserted for and negotiated at Panchayat Raj and State levels, and most evidently for reservation quotas in employment. At the village and at home, change is barely evident.

The Mycoflora of the valley is, to all appearances, extremely rich. There has been no documentation so far for the Gori basin. However, in 2001, the FES team initiated a listing and documentation of the macro mycoflora of the basin, and in one season was able to collect and identify 132 specimens to genus. The list is very rudimentary, and verification is being sought from BSI, and is therefore not presented here. The sub-alpine forests of *Betula utilis* and *Abies spectabilis* were found to be by far the richest in mycoflora.

Distribution of species across life-zones in the Gori basin



The distribution in life forms indicate the presence of 209 trees, 284 shrubs, 1427 herbs and 268 ferns, 202 mosses, 49 lichens, 60 liverworts, and at first listing, 132 macro-fungi. The species richness does vary across the great elevational range, with its maximum diversity in the alpine life-zone (3500 to 5500 asl). Among taxonomic groups, species richness in the family Orchidaceae (120 species) is exceptionally high, and represents 62.5% of those found in Kumaon (Y.P.S.Pangtey, S.S.Samant and G.S.Rawat) and 50.8 % of the entire Northwest Himalaya.

No detailed documentation of the faunal species richness by academics is available today. Preliminary listing by G.S.Rawat and S.Sathyakumar, as well as by the FES team lists the presence of 29 species of mammals, and 225 bird species. FES is working on a herpetofauna list, which is too rudimentary to present here. We did not come across any listing for chiroptera, insects or arachnids of the area, and have begun a process of listing them ourselves, while searching for lists for the broader region.

Biological integrity and sensitive elements

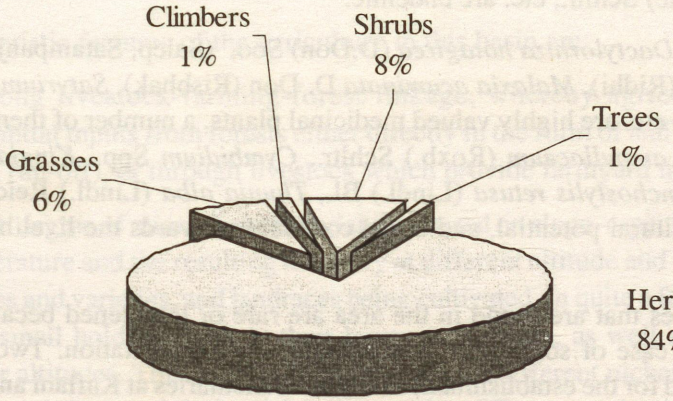
Over 40% of the representative floristic elements present in the basin are native, or Himalayan in origin. It has been found that richness and relative dominance of native species, in all growth forms, increase significantly with elevation, and in a landscape where over 60% of the area is under high elevations where plants can grow, the area is rich in native elements.

This is significant in view of the fact that biological integrity been accorded the status of the most comprehensive norm in conservation, and native species populations with their natural interactions in naturally structured communities are considered as the best indicator of such integrity.

With nearly 21% of its flora (234 near-endemic and 24 endemic) representing Himalayan endemics, conservation efforts require to be given high priority.

In the biological integrity and sensitive elements in the fauna of the basin, over 80 % of the representative mammalian fauna fall under various protected categories. Twelve of these are listed as endangered Himalayan taxa. The area is also home to three critically endangered bird species: the Satyr tragopan, the Monal pheasant and the Cheer pheasant.

Life-form distribution in the Alpine and Sub-Alpine zones of the gori basin



Over and above considerations of species sensitivity, the critically important habitats and communities that exist in the basin require mention. While considering the cumulative biodiversity values, the sub-alpine Timber Line Zone (TLZ) of the Panchachuli sub-basin and the Ralam sub-basin, both constituents of the Gori river basin are identified among the ten top-ranking priority sites in the Western Himalaya[9]. Even amongst the top ten, these two sites score the highest uniqueness scores in terms of naturalness, endemicity and use value of biodiversity elements. In terms of biological integrity or nativity, these areas support a high proportion of native plant species- trees and shrubs 100% and herbs 70%[10]. In view of the overall value of the West Himalayan TLZ in maintaining the regional pool of biodiversity, and in view of its sensitivity to anthropogenic influences, the existence of

[9] Protected Area Network in Indian Himalayan Region: Need for recognizing values of low profile protected areas. Ramber Rawal and Uppendra Dhar.

[10] Protected Area Network in Indian Himalayan Region: Need for recognizing values of low profile protected areas. Ramber Rawal and Uppendra Dhar.

these most unique sub-alpine sites in the Gori basin certainly present this landscape to be prioritized for conservation, and for conservation oriented development strategies.

Orchid Diversity in Gori Valley

India is known to have around 1229 species of orchids, of which about 255 species occur in the North-West Himalayan states of Himachal Pradesh, Jammu & Kashmir and Uttaranchal. 150 of these are found in the Kumaon Himalaya.

The Gori Valley alone is host to about 120 species of orchids belonging to 44 genera[11]. It is said to represent a hyperdiversity centre for over 47 % of the NW Himalayan Orchid flora in just about 0.67 % of its geographical area. *Bulbophyllum* Thou. with 14 species is the largest genus in the area, followed by *Dendrobium* Sw. (10), *Habenaria* Willd. (9), *Eria* Lindl. (8), *Cymbidium* Sw. (7), *Oberonia* Lindl. (5), whereas 19 genera are represented by a single species. About 9 species, viz. *Dendrobium normale* Falc., *Eria occidentalis* Seidenf., *E. retcosa* Wight, *Flickingeria herperis* Seidenf., *Herminium mackinnonii* Duthie, *Nervilia mackinnonii* (Duthie) Schltr., etc. are endemic.

While species like *Dactylorhiza hatagirea* (D.Don) Soo, (Salep, Satampanja) *Habenaria intermedia* D.Don (Ridhi), *Malaxia acuminata* D. Don (Risbhak), *Satyrium nepalense* D. Don (Salam misri), etc. are highly valued medicinal plants, a number of them like *Aerides* spp., *Ascocentrum ampullaceum* (Roxb.) Schltr., *Cymbidium* Spp., *Kingidium taenialis* (Lindl.) Hunt, *Rhynchostylis retusa* (Lindl.) Bl., *Thunia alba* (Lindl.) Reichb. f., *Vanda* Spp., have horticultural potential, and could contribute towards the livelihoods of some people in the area.

A number of species that are found in the area are rare or threatened because of loss of habitat, and in the case of some terrestrial species, over-exploitation. Two critical sites have been identified for the establishment of Orchid Sanctuaries at Kaflani and Dafiadhura, and action on this has been long overdue for effective conservation of these taxa.

The most favoured phorophytes (host species) in the Gori basin is the Toon (Toona serrata). There are reports of a single toon branch bearing as many as 30 species of orchids[12].

[11] The data here is from D.K.Singh in Orchid Diversity in the Gori Valley-Proceedings of the SSC, IUCN Workshop, WII.

[12] B.P. Uniyal and B.Ghosh. Orchid Diversity in the Gori Valley.

THE AGRICULTURE

Patterns and diversity

We speak now of domesticated biodiversity. The adaptation of all mountain communities to uncertainty, and to the harsh climate and terrain on the one hand, and to the very diverse conditions due to altitude gradients require versatile responses. Today, this diversity and versatility, and the accompanying stability of livelihoods is clearly declining.

About 4.54% (or about 102 square km) of the landscape comprises agricultural land of which about 6119 hectares or about 60 % of the crop land, or 2.72 % of the total area is actually cultivated[13]. The communities, however, do depend substantially on agriculture to meet their basic survival needs. While the percapita availability of agricultural land in the basin is higher than the state, regional or even national average at 0.23 hectares, mountain soils are poor in nutrients, and holdings are severely fragmented, not even sufficing for year-round subsistence for most households.

Some characteristic features of the agriculture in this basin are:

- A strong livestock-farming-forest linkage, whereby agriculture fields draw substantial inputs from forests either directly in the form of leaf litter, soil nutrients (from run-off), or through livestock which provide farmyard manure.
- A high degree of microclimatic variability based on slope, aspect, humidity, rainfall, temperature and the resulting diversity at different altitude and aspect gradients, in species and varieties, and landraces being cultivated. In quite a few villages, farmers have small holdings both at their lower settlements, as well as in settlements at higher altitudes. This enables farmers to utilize different niches, grow a variety of crops, and also to minimize risk by harnessing different production systems, without over-intensive cropping.
- Except for a few crops, agriculture is largely for subsistence use.

The traditional methods of farming here incorporate some techniques to maintain and improve the fertility of the fields:

a. A high input of compost manure
b. Cultivation of legumes or nitrogen fixing crops
c. Leaving fields to fallow for a season
d. Changing the crops grown (taking a low nutrient demanding crop after a high nutrient demanding crop)
e. Field terracing to check soil erosion
f. Growing crops and varieties according to the capability of the land e.g. prime or irrigated fields are used for growing wheat and paddy and the relatively degraded and gravelly land is devoted to pulses, oil- seed crops.

[13] Data collected by FES from Patwari records

Cropping Systems

Since most landholdings are small and fragmented, there exists a very practical categorisation and use of land. A farmer will assess and decide the intensity of use and type of crop for each fragment based on the various characteristics of the field, such as soil texture, soil moisture and location. Three broad categories of croplands are:

1. Main agriculture fields: With light loamy soil, with high humus content, and surrounded by other fields. Such fields are less subject to damage from wild animals, and grazing by 'stray' livestock. Varieties with higher productivity, better taste and requiring more intensive labour, and those that are more susceptible to damage from wild ungulates and bears, such as wheat, paddy, and finger millets are grown here.

2. Intermediate fields: These lie between main and marginal fields. Types of crop sown depend on type of soil as well as the availability of labour.

3. Marginal lands: More sloping lands with hard or gravelly soils and low humus content, located in the periphery of the villages croplands. Hardy varieties of horse-gram, wheat, and finger millets which have well developed awns and are less prone to damage by wild birds and animals are grown here. Seed is broadcast in the field after a single ploughing, no weeding is done. The weeds that do come up, are used as fodder.

For data on **how much land was cultivated**, and **to quantify food production** in the basin, we were unable to use census data since it was aggregated tehsil-wise, and parts of three tehsils fall within the basin. We had to refer to all the Patwari level records that estimate area cultivated and the production under various crops in a Patwari Circle over a cycle of 10 years. So the annual estimates are not for a particular year, but do provide as close an estimate as possible from government records, which also form the basis of Census figures.

Area and Production of Various Crops in the Gori Valley

	Crop	Production(MT)	Area (Ha)	%
1	Paddy	1781*	2473	27
2	Wheat	3799	3166	35
3	Maize	635	635	7
4	Millets	1241	1241	14
5	Pulses	460	919	10
6	Oil Seeds	78	156	2
7	Barley	318	454	5
8	Buckwheat	7	7	0
Total	**9051**	**100**		

* After weight deduction of 40% to account for paddy husk.

Food-grain production as per Patwari records then show an annual production of about 8319 MT or 523 gms per capita per day availability. Over and above this, data from the Public Distribution System (PDS) show that 795 MT of rice and wheat are sold within the basin through the system. That is about 50 gms per capita per day. We then also estimated the quantity of rice and wheat that comes into the basin from the plains and is retailed in the open market, commonly referred to in local parlance, and for obvious reasons, as 'balack'. This quantity is about 2388 MT and works out to a per capita daily consumption of 150 gms. These three figures put together, however, reveal a startling total percapita consumption of 723 grams per day. While this certainly seems to be rather high, since people are buying rice and wheat from the PDS and the 'balack' market, (and those figures are reliably estimated by us), this probably accounts for the food-grain used to feed livestock[14] and also the quantities used in the making of local liquor.

Food-grain production from agriculture, we see, meets about 72% of all foodgrain requirements for both humans and livestock. About 7% is met from the PDS and about 21% from the open market. This is an average however, and while some villages are able to grow almost all their foodgrain requirements for the year, most villages depend heavily upon the PDS and the open market for much of the year.

Women play a central role in the agricultural economy. From the collection of leaf litter for bedding, and grass for fodder, to the transport of these products to the household, this work is handled by women. They look after livestock needs entirely, while providing the agricultural system with compost, which women carry to the fields and work into the agricultural land. Most farm work such as weeding, manure application and harvesting of crops is done by women. The responsibility for meeting daily subsistence needs through the collection of forest produce, the maintenance and tending of crops is also done by women.

Patterns of land distribution

Here again, figures on land-holding were not available in a disaggregated form for the villages in the basin. So we analysed primary data collected by us from the 88 villages in the basin that we work with, and since they represent more than half the villages in the entire basin, the patterns reflected are very representative of landholdings in the basin. Here they are:

a. 25.71% of the households are officially classified as Landless, or those who have either no land, or possess less than half an acre.

b. 69.44% of the households are Marginal landowners, or those who own between half an acre to 2.5 acres.

c. 4.34% are classified as Small landowners, or those with between 2.5 to 5 acres of land.

d. 0.51% are Big landowners, owning more than 5 acres.

However, the per capita land availability here at 0.23 hectares is higher than the rest of the state (0.13 hectares), higher than the rest of the Himalaya (0.16 hectares), and even the

[14] While the world's population has doubled in the past half-century, its appetite for meat has quadrupled. To produce more than 200 million tons of meat a year, livestock are now fed 40 percent of all grain harvested. (T.R.Reid National Geographic, October, 1998)

national average (0. 20 hectares). With even those possessing less than half an acre being classified as landless, we can see that most people do own some land, but that the overwhelming majority of them are marginal holders.

Crop Rotation

Through the year, two cycles of planting, growth and harvesting are followed. Crops common to the winter season include: wheat, barley, mustard and peas. Crops grown in summer are corn, kidney beans, paddy, potatoes, millets, lentils, soybean, amaranth and a variety of vegetables. Although the largest harvest is the Kharif, the presence of the winter crops ensures some minimal source of nutrients the year round.

The crop sequence is designed for optimal production without deteriorating fertility within existing conditions. These crop sequences are formulated on the basis of nutrient requirements of a particular crop. Rice and wheat are produced every year as staple food grains in lower and mid valley. Every third year the land is kept fallow during the Rabi season.

Crop Diversity

In this valley about 211 different local varieties of food crops were identified. Of which 105 can be classified as cereals or pseudo-cereals, 21 pulse crops, 10 oil-yielding plants, and 10 spices. Almost 31 different vegetables and 31 fruits plants are grown (refer list attached). Many plants from the wild are also eaten and are mentioned in the list of plants of economic value that is also attached. Villages located above 1800 meters do not cultivate more than 7-8 varieties of vegetables in a year due to the short growing season, but they use 10 to 12 different wild plants as vegetables, also listed. Liquor is made from 4 types of cereals. Koni (*Setaria italica*), barley, millets, and buckwheat. The equivalent of staple cooked as rice are Paddy, Setaria, Amaranth, and Triticum, and chapati or roti and the equivalents are made from wheat, maize, barley, triticum, millets, buckwheat, and bitter buckwheat.

Varieties are progressively selected for considerations such as productivity, resistance to uncertain rainfall, pest resistance (a species of wheat, for example, that macaques and langurs find difficult to eat because of a very spikey ear-head), taste, colour, nutritive value, suitability to climate and maturing time.

In the high altitude or alpine villages, agriculture is only possible in summer, with a six-month cycle at most. The Shaukha people and some families of Scheduled Castes who were feudally attached to them in the past, migrate for the season with their livestock in early June, when grazing is also to be had in the alpine pastures. A very few of those who now migrate up actually own agricultural land. Most of them cultivate abandoned fields owned by others who have jobs in the plains, or shops and business in between. Crops like buckwheat, barley, potato, mustard, some vegetables, caraway and chives are grown here. Some differences in the summer cropping done in the high altitude villages are:

- The use of less organic manure since not much is available, and no use of chemical fertilizers.
- Single cropping because of the short growing season.
- No crop mixtures.

The diversity in the **mixed-farming** system in much of the mid and lower altitudes can be seen in a number of ways. The diversity of crops planted:

a. In different locations

b. During one season in a single field i.e. mixed cropping

c. Number of crops a year or crop sequences

Farmers in the valley are quite aware of the benefits of diversified agriculture. They even grow a diverse number of crops together in one field. The number of crops grown in one field can be as many as eight. Nitrogen-fixing plants are grown with those that do not, and can benefit from them.

There are several crop combinations that are useful because of several practical considerations. For instance finger millets are planted with pulses of different types because:

- The mixed crops mature 15 days before the main crop, which helps in spreading out the workload at harvest.
- Mixed-cropping is done with a combination of millets and pulses that have roots at different depths, as that means less competition for nutrients between the crops.
- The stowers of the millets also provide support to the pulses which are climbers and are sown together.
- Pulses have mycorhizal associations that benefit the millets.

The traditional strategies adopted to minimize damage to crops from **pests** include crop rotation or growing different crops in the same field. These prevent the spread of pests to the entire field. Growing tree species in the fields, which act as nesting and perching places for birds - the natural predators of insects and rodents, is another strategy. Farmers have been also able to develop high diversity in crops and within crops, some known to be more resistant than others.

To prevent food grain from infestation by insects during storage, several methods are used. Pulse seed are treated with mustard oil, and certain food grains with cow dung ash.

Growing several crops in the same field helps reduce competition from weeds. Many weeds are also used as fodder and some are even eaten, either as green vegetables (Bathua or *Chenopodium album*) or as fodder for cattle (all the species of grass and *Urtica dioca* to name a few), or the seed is used as oilseed (Bhanyur or *Perilla frutescens*). Weeding, whenever necessary, is done manually and the use of herbicides has so far been absent in this valley.

Farmers here are not competitive or clutchy with their seed. There is a free exchange of germplasm between farms and villages, and this has played its role in the conservation of the agricultural diversity in the valley. Replacing old or weak seed-stock with new stock from neighbouring villages is still a common practice. It is significant that seed is actually selected from the previous harvest by women, who do all the harvest and post harvest processing. Seed is held and exchanged most freely amongst women.

While reciprocal communal labour is dying out in certain aspects such as house building, there still is evidence of such reciprocity in agriculture, and here again, more so in those tasks that involve women. The carriage of compost from the village to the fields, which involves hard labour is often done by the entire village; the transplanting of paddy, and the planting of seed potato is also done communally, as is the harvest of certain crops. The sharing of bullocks for draught is also still common and ploughing is done exclusively by the men.

Changing trends and patterns in agriculture

Over the past two decades, the government programmes have been promoting some high-yielding varieties especially in wheat and paddy. These are higher nutrient demanders and are more prone to infestation by pests, requiring external and expensive inputs.

With the introduction of chemical fertilizers in the valley, their use in combination with organic manure is becoming a more common practice. Certain quantities of these chemicals go into the HYV crops introduced in the region. Experiences with the use of chemical fertilizers have not been all positive, and after two cycles people often realize that productivity has stagnated or even reduced. The most visible effect of the use of chemical fertilizers identified by the farmers has been the consequent decrease of humus in the soil thereby decreasing the moisture retaining capacity of the soil.

People speak of an increase in the incidence of pest and insect infestation. The reasons identified by the people are: change in climatic conditions – rising temperatures and progressively less snowfall in the region, reduction in certain birds that eat insects during ploughing, and the introduction of new pests with the HYV seed from outside. As a result, the use of chemical pesticides is spreading in many villages in the valley. There are numerous incidences of careless use of insecticides e.g. being used for killing termites and houseflies in their homes. In some villages people have linked up reduction in population of honeybees with the indiscriminate use of chemical pesticides. In Bona village, which once boasted 'modern' horticulture and by far the largest production of apples in the district, complete with the heavy use of pesticides, now has no bees, and practically no apples either, due to recurrent scab disease.

In recent years exotic weeds like Eupatorium, which has traveled up from the *terai*, are encroaching on private as well as common lands. Strangely, eupatorium seems to travel up along motorable roads for some reason. The plant is very noxious, causing illness in cattle, and farmers are unable to find any effective solution to check the spread. Eupatorium is an aggressive colonizer, and is visibly crowding out other herbaceous and grass species wherever it grows, and in places even away from roads.

There has been an increase in incidences of damage to standing crops in the field by wild animals such as rhesus macaques, wild pigs, and porcupines, in the past few years. The farmers even understand that this is due to the reduction in the leopard populations, which normally predate on such animals. The decrease in leopard populations is largely due to them being deliberately poisoned with agricultural pesticides. Damage by bears have

drastically reduced, but that is due to human fondness for bear bile. This has, in many villages affected the choice of crops being sown.

The dependence on subsidized food grains through PDS, mostly wheat and rice, has also affected food preferences of the people. This has been a major reason for the decline of nutritious cereals and crops like millets, amaranth[15] and buckwheat. There is also an aping of diet preferences of urban middle-class folk in the plains, rendering the best food crops such as the many millets, buckwheat, and barley infradig. In their common perception, these are a poor man's diet, which they would rather not be seen eating, whether they are poor or not.

Subsidized wage labour, especially those to be had through development schemes such as JRY, are sometimes more lucrative than agriculture. Subsidized fertilizers and pesticides, and distribution of free high yielding seeds to 'help' farmers get into the cycle of growing for the market, has meant intensive cultivation with external inputs. This, in the opinion of some farmers, is affecting the ability of the land to regenerate its fertility in the long-run. While it may have meant higher incomes for some, it has also increased their vulnerability and risk.

Herb cultivation

There is feverish talk about the endless possibilities of herb cultivation in the himalaya. This is bandied about mostly in workshops and such congregations, and can serve to generate a false optimism that further promotes the loosening of restrictions on the trade of many valuable but threatened species of medicinal plants. The Gori basin is home to many 'medicinal' plant and animal species, whose parts are highly valued in the market, fetching as much as Rs. 50 thousand per Kg for *Cordyceps sinensis*, to the price of gold in weight for the musk of *Moschus crysogaster* for the 'collector'. The lower-value plants which fetch from Rs. 60 a kilo to Rs. 1000 a kilo, are collected and traded in large volumes from these valleys, no matter they figure in Red-Data books. People in these valleys have tried for years to cultivate some of these species, and have succeeded in a couple of them. They have succeeded, in fact, where research organisations have failed, but for inescapably specific reasons such as mycotic associations, and niche-specific conditions, cultivation at a commercial scale in the valley will not be possible, even in the near future. It is however, desirable to promote the cultivation of the few species that do grow, because their cultivation is labour-intensive, and their remuneration good enough to absorb a part of the population that is involved in its cultivation, to keep them off intensive extraction from the wild. The cultivation of herbs to sell, be they spices such as *Carum carvi* and *Allium strachii,* as is the case in the Gori valley, or even food-grain such as *Fagopyrum esculentum* grown in the Darma valley, can provide alternative livelihoods (or a steady portion of it) to a good number of people.

[15] In the years1852 and 1876, during the plague epidemics in Kumaon, people in villages noticed a co-relation between those villages that grew more amaranth and the start-up of the disease. They also noticed the incidence of dead rats, but strangely, did not put the two together. They thought the rats were dying due to poisoning from the Amaranth, much as in the ergot-of-rye. (The Himalayan Gazetteer. Vol III.2)

In a different context, the high altitude villages of the Gori valley have often been cited in literature as a place where much cultivation of 'medicinal plants' is taking place. This is really a rather fuzzy and generic reference to a range of not so familiar spice and aromatic plants. There is, infact, no commercial-scale cultivation of medicinal plants in the Gori valley. There is however, a huge-scale extraction of medicinal plants from the wild (discussed in the next chapter). The plants that are being cultivated are:

1. Jambu- *Allium stracheyii* , chives, dried and used as spice in local seasoning.
2. Thoya- *Carum carvi* , caraway, used locally as a spice.
3. Chipi- *Pleurospermum angelicoides*, spice, and a minor ameliorative home remedy .

These are all essentially aromatic plants. Tonnage would be very low, but their cultivation can be said to be on a commercial scale, and sold largely within Kumaon. Farmers have experimented with the translocation of wild specimens as well as germination from seed of a few high value medicinal plants, but have not succeeded in any, other than very recently in *atis, (Aconitum heterophyllum)* of which so far, not more than 10 kilos would have been extracted from their fields and sold. The medicinal plants attempted to be cultivated (mostly through transplanting from the wild to their fields) are:

1. *Podophyllum hexandrum*
2. *Dactylorhiza hatagirea*
3. *Aconitum heterophyllum*

The attempts cannot be said to be successful yet, except for aconites in small measure[16].

Domesticated animals

Sheep and goats

Sheep and Goat rearing still forms an important part of the nomadic pastoralism practiced today. About 19,842 sheep graze within the basin in the summer months, about 754 sheep from the basin graze in adjoining basins. The genetic stock of sheep however, has degraded with unsystematic breeding with Merino and another exotic breed with an exotic name, Ramboulette. While exotic rams were introduced into local herds by the government with the good intention of producing sheep with softer, more valuable wool, the breeding was not systematic and has successively bred out all distinction of either genetic line. Moreover, these sheep don't graze well on precipitous slopes (they stampede and skydive in unison when panicked), are not wilderness-savvy in terms of alertness to predators, or in discriminating between poisonous species such as aconites, from plain nutritious ones. They are also much more vulnerable to ungulate disease such as Foot and Mouth Disease (FMD) and Peste de Petit Ruminants (PPR) and Contagious Pleuro-pneumonia (CCPP). Not only is mortality high amongst them, they also carry these afflictions to the grazing lands they share with wild high-altitude ungulates, for whom these epidemic diseases are also fatal, sometimes decimating entire herds in a range.

[16] FES and WII study on medicinal plants in the Gori basin. Malika Virdi 2003.

We are told by people in the basin that in the year 1972, when a large number of livestock died of a contagious disease, they came upon large numbers of dead Sambar (Cervus unicolor) in their forests. The Veterinary department here confirms that in 1972 there was an epidemic of CCPP. In the year 1999, there was an epidemic of PPR amongst sheep and goats while they were in the seasonal alpine grazing ranges. During the contagion, it is reliably estimated that over 40% of the entire stock grazing in the basin that year died[17]. We have no estimate of what effect this must have had on wild ungulate populations[18].

There are a very few perceptive herders who wish to breed back good indigenous genes, but are unable to do so because there are no high quality rams left of the species they desire in the valley. They is still some good stock of the Tibetan *Balphu* sheep in some very remote parts of western Nepal, which could enable them to be bred back into their stock. The Balphu is a much taller animal, the year-old males of which are much valued for meat, and they fetch a good price. They are large and sturdy enough to be used as pack animals as well, individuals carrying as much as 15 kilos. The wool is coarser but has many local applications such as rugs, ropes and saddle-packs. The animal is robust in every sense, and the economics of it more viable in this terrain.

Aesthetics plays a significant role too. Shepherds will combine herds of sheep with a good number of *lakhi* goats. The *lakhi* goats are tall, long-haired and majestic, and when the billy leads the flock while on the move, it adds, as the shepherds put it, "show". These goats are sturdy pack animals too, and assist in carrying the salt required for the whole stock, as well as carrying in foodgrain not just for the shepherds, but also for earning on carriage for the high villages. Almost all the contraband medicinal plant parts are carried out on pack-goats, who unlike horses, do not need to stick to the bridal path, and therefore yield many options to where they can be safely off-loaded. But still on aesthetics, the sound of a cross-bred sheep bleating is reminiscent of a very sick human retching to throw-up. Unlike the pleasant sound of the *balphu*, which makes the heart swell with almost maternal feeling.

Goats and sheep are readily eaten throughout the year. They are also ritualistically slaughtered at times of *puja* such as *Nanda Ashtami*, and even during sacrifice as propitiation of *devtas* (revered spirits) and *chhal* (unkind spirits and ghosts) they may have inadvertently offended. Every part of the carcasse is eaten here, including the clotted blood, except the inedible hide, the larger bones and teeth. We have estimated that in just the 10 meat shops in various bazaars in the basin, about 4000 sheep and goats are slaughtered for sale in a year. This does not account for the sheep and goats slaughtered for meat in the villages themselves.

Cows and buffaloes

There are about 39,121 cows and buffaloes in the Gori basin. Most of the cows are non-descript, and of an undiscernable mix or degeneration of breeds. What is largely characteristic

[17] We were reliably told by a veterinarian that almost always, a far smaller number is officially declared by the local veterinarian, who, if an epidemic scale of infection were declared, would have to personally bear the cost of hospitality to a large number of AH officials who would descend on the area.

[18] The manner in which the wild dog or Cuon alpinus disappeared suddenly about 50 years ago from the basin, despite its habitat as well as its prey species still being present, could perhaps be due to canine distemper, which is now a recurrent phenomenon.

though, is that they are very short, and small-bodied. This has two advantages. One is that because of their small size and lightness, they are able to conduct themselves better on the steep slopes that they are put out to graze upon. Two, they require less feeding and housing space, which makes it possible for many more poor families to own and, well rear them. It is almost like having a goat, but goats are expensive because they sell for meat. On the other hand, these cows produce more manure.

The milk production from a typical small cow is not in litres, but in millilitres. However, milk is not what these cows are primarily kept for. Cattle here are reared mostly for the dung they produce, for converting biomass otherwise unusable by humans, into nutrients for their croplands. Leaf-litter put down as bedding in the cow-shed, is swept out with the dung and urine and composted for a season. Cow and buffalo dung is preferred over all others for manure, since it provides nutrients for two or even three years in decreasing succession. Goat or sheep manure, while known to be *garam* , provides no nutrients in the second year. Poultry manure is negligible, since the number of fowl kept per household are very few (they fly over the fences and dig up all the veges!) and are always free-ranging. Poultry, like donkeys, have in the past been considered 'lowly' here, and were only reared, or eaten by Scheduled Caste families. Ofcourse this is rapidly changing, and many a village headman or *Gram Pradhan* finds it useful to rear at least a few, to gratify the visiting *Patwari.*

Lower in the valley, Veterinary Stockman Centres, have on occasion held Jersey bull studs, which have produced some better milk-yielding crossbreds, but only a very few people have such cows, and even then, milk production rarely exceeds domestic requirements.

The bigger milk yielders are buffaloes, which have been progressively introduced into the valley through Integrated Rural Development Programmes (IRDP). These buffaloes are brought from the plains and are given to poor households on a part-grant and part-loan basis. The past two decades have seen a substantial increase in the number of buffaloes in the basin. Buffaloes are large animals, and require large quantities of fodder. With the kind of land-holdings most people have, it is impossible to sustain them on cultivated fodder or agriculture residues alone. Almost all buffalo owners therefore have to move with their buffaloes to *chaumasi chappars* or monsoon encampments in cold-temperate or montane forests, to meet the huge demand for fodder while the animal is in milk, which is in its peak during the monsoon.

The buffaloes range freely and extensively around these monsoon encampments, mostly on Reserved Forest land, and sometimes in Van Panchayat land as well. Buffaloes are not the most discerning feeders, and will eat most vegetation. Forest regeneration pays a heavy price, as over successive years all young saplings and young trees are grazed off. Montane bamboo (both *Thamnocalamus spathiflora* and *T. jaunsarensis*) for example, which flowers once in thirty years or so, and will regenerate from seed all together in any given forest, are in many places grazed to oblivion by buffaloes. These two species of bamboo, we know also plays host to many rare and endangered species here, ranging from Musk deer to the Satyr tragopan.

Cows and buffaloes are not eaten by local populations any more. The gradual process of assimilation into Hindu society, where the cow is sacred, has rendered the meat of these

animals not kosher to eat here. Just across the Kali river though, this is not so. Buffalo bulls however, are still ritually sacrificed at some pujas in the basin. The one sacrificed to the devta Mesar is said to be unacceptable to Mesar if it happens to bleed externally from anywhere while being killed, and is therefore bludgeoned to death with the back of an axe-head, after it is trapped in the fork of a tree. It is then left to wild scavengers such as the black bear and the jackals.

Forest workers from Jumla in Nepal, who work in forests in the basin, have no such restrictions and will readily buy and eat young buffalo bulls.

Yaks (Bos grunniens)

Yaks are extremely hardy and formed perhaps the most valuable component of the trade caravans to Tibet, being good pack and draught animals suitable to very precipitous terrain as well as deep crevassed snow and ice. While most of the local herds were decimated successively by avalanches, when they were abandoned to winter in the high altitudes after cessation of trade, the last herd of four animals was lost in a forest fire only two decades ago. People in the area are very keen to breed yaks again, for inter-species breeding with cows, as milch animals, pack animals, and for draught. Almost all populations of Yak in India are highly inbred. This is partly due to the nature of the terrain where they live, such as the himalaya. This terrain is characterized by very high and cliffy north-south ridges, uncrossable laterally at high altitudes, even by the sure-footed Yaks, and partly due to the hostile reiterations of international boundaries over the past fifty years, where the movement of livestock and people to traditional pastures and markets is restricted. Like the Pashmina goat, you cannot bring the yak down to the lower crossings in the valley, because of their great susceptibility to heat and to the large cattle-leech, which while only causing morbidity in cattle, is a fatal affliction for the yak. This unfortunate assemblage of conditions, and subsequent isolation of yak populations due to disruption in cross-boundary transhumance is not likely to change in the near future, and could spell doom for the species, especially in Uttaranchal and Himachal Pradesh. Today Uttaranchal has just about 22 yaks left ; 12 in a herd being bred by FES, 4 in a government farm in Chamoli, and six yak bulls in a few villages in Darma and Byans.

Cross-breeding between Yaks and cattle has been practiced traditionally for long. The F1 male hybrids produced are sterile, but very valued draught and pack-animals. The female hybrids milk yields greatly exceed those of pure-bred female yaks, and while they are greatly valued in these valleys, they are also in very great demand in Tibet, both for their milk yield and for meat. Since F1 males are infertile, back-crossing with them is not possible, but back crossing with a Yak bull is what is most desirable. With the great shortage of Yak bulls, it is not uncommon for bulls to sire and then breed with offspring upto F2 generations. Despite protestations by Chinese geneticists that genetic inbreeding takes centuries to build, the rule of thumb followed by most sheep and goat breeders here is to change rams in a herd between four to seven years.

It is relevant to say here that not many people can handle such a large and aggressive animal such as a Yak bull in rut. The animal is huge, and often ranging free on the alps becomes semi-feral. Fatalities amongst bulls in rut are common. Only a handful of men

and women have the experience and the will to do so well. It is important to help build back the stock, and keep the experience and knowledge of husbanding this most valuable animal of high-altitude pastoralists alive.

Horses and mules

Horses and Mules are greatly valued as pack animals in these valleys, where roads have very limited access, and where villages are many days distance from the road-head. Having good pack-animals also provides frequent and reliable employment for many local people, unlike places where there are motorable roads, and where vehicle owners from distant towns hold sway. Enough people with pack animals helps broad-base earnings and discourages the clamour for motor-roads in the area, a phenomenon that can greatly damage forests and intensify extraction. A good mule is most highly valued, and can fetch from Rs. 20 thousand to even Rs. 50,000. Those who get together the money, need to go to the distant plains in order to buy mules, since there is no stud ass here. They are, in the first place, not easy to come by, since a good stud is valuable and will rarely be sold. Amazingly, the practice of rearing donkeys, is still considered a low-caste job.

Being at the border itself, people have seen the enormous mules bred by the army, deployed in the area. These mules are too large and bumbling for the mountain paths here, and often nudge each other or stumble over precipices. They also require the kind of feeding that would be unaffordable by local mule-freighters. They prefer a smaller, hardier breed. The Jumla steed is a smaller equine, known for its hardiness on rough terrain and cold weather, and would breed well to produce suitable mules for the area.

Bees

Bee-keeping in log-hives has been customarily practiced in these valleys. While this has been a customary method in many parts of the world, it is a somewhat inefficient method in which extraction involves robbing the entire honeycomb, with all its larvae and young, and a great number of bees are either killed or chased away. The use of frames in the Newton-hives however, enables extraction of honey in a manner that leaves the entire honeycomb intact, as well as the swarm unharmed. We are talking about the feral *Apis cerana* here, who can be induced to live in close proximity with humans, provided the conditions offered are good enough in terms of a safe, warm, dry and sunlit log-hollow. Forage close at hand is preferred, but not a must; they will forage far and wide if necessary. There are an astounding 900 odd such log-hollows kept by people in the Gori valley itself, and while honey is not sold at a commercial scale here, it forms a valuable nutritional supplement for children and for the infirm, and can be bartered, volume to volume, with ghee. The very same *Apis cerana* has recently been practically been wiped out by some epidemic affliction in the neighbouring region of Jumla in Nepal, and we must value our present affluence in this regard with care.

Bees are also valued for their pollination 'service', which helps manifold, in the seed-setting or fruit-setting of all their crops. It also encourages the harbouring of a diversity of trees in their forests, that provide forage for bees on the one hand, and on the other, due to enhanced seed-setting, strengthens the regenerative capacity of forests. Not in the least, it helps assuring abundance of food seasonally, to the myriad fruit and seed-eating beings in the forests.

The FES project has been working with communities to diffuse innovations on bee-keeping that have been developed in Jumla in Nepal. They have combined the frames of the newton-hive with the basic structure of the log-hive, and also have mimicked the log with planks. But that is another story. As with using the plough, women are proscribed from handling or keeping bees here. Discriminatory myths about women and menstruation, in this context, as well as in their homes, their fields and 'sanctified' places abound. There are numerous instances here where women have been severely and publicly punished for having put their hand to the plough, even under dire poverty and stress, and this is just another manifestation of a pervasive system of discrimination.

Bees apart, livestock in general have greatly enabled human communities here, to utilize a wide range of terrain that would otherwise have been unusable directly by them. Just the alpine areas for example, which constitute 54% of the entire basin, would be almost unusable without livestock; and these high altitude areas are subject to severe grazing by a large number of animals during summer. Degradation by over-grazing is certainly a phenomenon here, but one that is not easily visible or measured, unlike other areas where tree canopy begins to thin out, and progressively disappear. The alpine and sub-alpine areas of the basin together hold the highest species richness among the different life-zones (44%), and of the species that occur in these areas 84% are herbs and 6% are grasses. The point being made is that when 90% of the vegetation is herbs and grasses, any change in terms of degradation would hardly be visible, and noticed only by human users over time.

As described earlier, livestock do form a very important link in the nutrient flows from forests for agriculture, for food and for some fibre, and will continue to be so. However, it is the extent and intensity of grazing that will determine the nature of degradation and loss of biological diversity. And it is not grazing by itself that causes such loss. In late autumn vast areas in Van Panchayats are set ablaze deliberately by village communities, and this is in order to extend and maintain large areas as pastures and hayfields by retarding all natural regeneration of shrub and tree growth. Such **fires** also stress grass stands, those that are not destroyed altogether, to go green unseasonally in early spring, 'providing' grazing when the entire landscape is otherwise dry and at rest. This is a regular annual phenomenon, and such fires are not controlled at all, and will most often go wherever the wind takes them up-slope, destroying whatever forests that come in their way, and leaving the soil charred, exposed and friable, when the torrential monsoon comes upon them. While there are many justifications for this at the local and 'technical' levels, in terms of such practices being reflective of traditional wisdom, and that it actually provides 'better', more succulent grass, (some of our scientists have offered that grazing in the Valley of Flowers actually 'increased' biodiversity), we know that such claims are essentially spurious. Adding a few synanthropes does not make for better biodiversity, does it? There are a few villages in the basin who have stopped setting fire to certain grass-stands and have measured, over a few years, the increase in quality and quantity of grass, as well as the diversity. Periodic fires, such as those set off by nature herself, may yield open spaces for certain plant and animal species, or make way for the succession of seral species, but these are not periodic fires. These are regular annual features, and it would be enough to say that while this might be a labour saving method for local communities, these fires that are set to extend or maintain pastures, in combination to those set by hunters to flush musk deer, form a grave and recurrent threat to the biodiversity of the river basin.

THE TRADE IN WILD ANIMAL AND PLANT PARTS

Trade in wild animal parts

Hunting has been part of the land-use of human communities here ever since they can recall. Hunting made it possible for them perhaps even to inhabit, such difficult and inhospitable landscapes where any bit of agriculture land would be hard-won[19]. It has been credibly suggested that the social evolution of humans has been deeply and centrally influenced by their basic instincts as collective hunters.

Before people had guns here, they were compelled to overcome the physically more capable prey by collective engagement, and the wily use of snares. Even with guns now, because of the very precipitous and difficult terrain, we see communal engagement in hunting. Snares are also still used, because only a few have access to guns, and also because the use of guns pitches them at a different level against the law.

Hunting in the past here was only for community consumption- as food, as medicine, for pelts and even teeth for cultural ornamentation. Hunting in groups, as everywhere, also served the many functions of community bonding, of adventure, team-work, and of education. The difficulty of the terrain, and the relatively crude technology available in the form of weapons, ensured that the scale of hunting was limited, and posed no major threat to the populations of the hunted species. Today, while all aspects of community consumption remain, and by themselves still seem to pose no threat, the hunting of a few species whose parts are sold commercially, and the pervasive destruction of the habitat of all the species (described later), poses a grave threat to the faunal biodiversity of the basin.

It is not that hunting for commerce in animal parts is a new phenomenon here, or that there is a linear progression to the scale of hunting. As described earlier, the Shaukhas of the valley have been traders into Tibet, who traded anything that had a market on either side of the ice-bound passes. The trade in wild animal parts worked both ways. Pelts of the Ei, a large cat (could it be the Lynx?), the Snow leopard, the Tibetan wolf, and the Bharal were bought and traded out of Tibet into the markets of Amritsar, Calcutta and Delhi till as late as 1962, till the cessation of trade with China. From this valley into Tibet, it was mostly the pelts of the Otter, which were used to line the *Chuba*-like tibetan gowns at the collar and the cuff. While the Otter was also to be found and occasionally hunted in the valley, much of the pelts came from the wide river banks of the Kali near Tanakpur and of the Ramganga near Ramnagar. Pelts of the snow leopard, the panther, the bharal, musk pods, red fox tails, and bear bile from the Gori river basin were traded in the markets mentioned in India. The trade was legal then, and even large valuable consignments could be trusted to be sent by post. After 1964, when trade with Tibet was shut down, the hunting and trade of wild animal parts from this basin picked up many-fold. The trade was now to Indian markets, and mostly included leopard skins, musk and bear bile.

An erstwhile trader in the valley recalls selling 32 ser of bear bile in the China Market in Calcutta in 1952 (86 tolas make one kilo, and 80 tolas was a ser, which makes a ser somewhat less than a kilo). That makes about 30 kilos of dried bear bile, or the equivalent of 2,560

[19] Robert Ardrey in The Hunting Hypothesis.

tolas. A freshly extracted gall bladder from an adult would weigh about 1.25 kgs, and the yield of bile, after drying, could range anywhere from 1.5 tolas to 40 tolas. So that consignment would be had from at least a hundred bears killed in the valley in one or two years. In 1955 the trader remembers purchasing bear bile (bhalu pittha) at Rs. 4 a tola, and selling it at Rs. 8 per tola[20]. The purchase price in the valley three years ago was Rs. 900 per tola. And this gentleman was only one of numerous such traders of wild animal parts from the valley.

Now shall we say this here and get it done with? What is being written about in some of these chapters is unsettling information. The purpose of mentioning all this is not to sensationalize it. Since almost all the species are protected by law, and some of them highly endangered, this could come across as a back-handed indictment of the Forest Department, whose job it is to protect the forests and all these animals who dwell there. This is not intended to be an indictment. Nor is this in the populist vein of dismissing legal bans and government departments since they are often ineffective by themselves. We believe that there must be bans to protect vulnerable species, just as there must be law to protect against crime. We believe there must be a Forest Department, but one with much more strength to its elbow, in terms of quality and financial support. Policing alone can never be a solution to the commercial depredation of wildlife, especially in the situation of desperate people with failing livelihoods, and an international mafia that uses them. It would be most unfair to expect a grossly understaffed Forest Department, (at least in the Protected Areas in the basin) and one that does not even have funds to draw up periodic working plans let alone execute them, to be effective in tackling this situation alone. The information here has been collected informally and in confidence, and no evidence was sought for obvious reasons.

[20] The FES and WII study on Medicinal Plants in the Gori basin, Malika Virdi 2003.

Present trends in hunting wild animals

Listed below is the fauna that is hunted in the river basin.

S.no	Common Name	Latin Name	IUCN (Redlist)	WPA (Sch)	CITES (App)
1	Black Bear	*Selenarctos thibetanus*	E	I	I
2	Common Leopard	*Panthera pardus*		I	
3	Snow Leopard	*Panthera uncia*		I	
4	Bharal	*Pseudois nayaur*		I	
5	Himalayan Tahr	*Hemitragus jemlahicus*		I	
6	Musk deer	*Moschus chrysogaster*	E	II	I
7	Goral	*Nemorhaedus goral*		III	
8	Barking Deer	*Muntiacus muntjak*		III	
9	Sambhar	*Cervus unicolor*		III	
10	Serow	*Capricornis sumatraensis*		I	
11	Jackal	*Canis aureus*		II	
12	Red Fox	*Vulpes vulpes*		II	
13	Wild Pig	*Sus Scrofa*		III	
14	Porcupine	*Hystrix indica*		IV	
15	Snow Cock	*Tetraogallus himalayensis*		I	
16	Koklas Pheasant	*Pucrasia macrolopha*		IV	
17	Kaleej Pheasant	*Lophura leucomelanos*		IV	
18	Monal Pheasant	*Lophophorus impejanus*		I	
19	Satyr Tragopan	*Tragopan satyra*		I	
20	Cheer Pheasant	*Catreus wallichi*		I	
21	Hill Partridge	*Arborophila torqueola*		IV	
22	Black Partridge	*Francolinus francolinus*		IV	
23	Chukor Partrdge	*Alectoris chukar*		IV	
24	Snow Partridge	*Lerwa Lerwa*		IV	

Of the list, the only ones to be hunted commercially are Musk deer and the Black bear.

Jackals are also trapped for their skins once every few years by a migratory tribe of people, who for their appearance, seem to be classic gypsies from the heart of mainland India. Their skins (the jackals) are said to make the finest and most sought after drum-skins.

Panthers and the Snow leopard are no longer hunted down specifically, but are poisoned whenever they predate on livestock. The Red-fox for their luxurious tails and Otters for their fine pelt, were traded in large numbers in the past, but the demand for these has recently waned to practically nil.

The rest of the animals and birds listed here are hunted or trapped for food. There are a few villages in the valley who hunt more intensively, and in an organised community way, than the others. None of these communities depend primarily on hunting for their food, so the number of animals and birds killed to occasionally supplement their food is not very high, and for all appearances, does not seem to pose a major threat to these species directly.

Far greater than hunting for food, is the threat posed indirectly to all these species through habitat loss and degradation, through competitive use by humans and their livestock. The scale of hunting for Musk deer for trade however, is a different story, and in combination with habitat loss, can prove to be fatal for the species here.

There are five black-smiths in the valley who have some knowledge of firearms, and with innovative minds and skilled hands, are able, with the crudest of tools, to fashion muzzle-loaders, bored from junked vehicle parts such as tie-rods and axles. A small number of guns are made by them for local hunters.

The ace gunsmith was a man from across the river, the Kali, in the Nepal Darchula, who was employed by the poaching syndicate - on their missions that were outside their home-ground; often in Garhwal, sometimes in Himachal Pradesh, and some, even as far as Ladakh. They used to travel with partly worked-on parts, which had no resemblance to any firearm, and actually finished the weapon onsite, in the wilderness. It is learned that sometime during the past year, a time when the Nepal Government has cracked down on the Maoist insurgency in the west of their country, that this man was picked up and divested of both his hands, to prevent him from making guns for the rebels. A recent and significant development is that due to the insurgency, both the Nepal and Indian governments are intensively policing the river on both sides, no doubt greatly hampering the traffic of guns and other contraband from either side. This border with Nepal was the prime route for animal parts to the international market, which will be impeded by these developments.

With the cessation of granting new licenses for muzzle-loaders, the availability of loose gun-powder and lead-shot is diminishing. Local hunters, however, are able to be quite self sufficient for their requirements. Some hunters have the knowledge and ability to make the equivalent of gun-powder from certain leached salts scraped off rocks in the damp under-storeys of their homes, charcoal from particular plants and sulphur from hot-springs. As a substitute for lead-shot, they sometimes use various sizes of almandine crystals or garnets, that are to be found abundantly embedded in mica-schist in certain areas in the valley.

The scale of hunting for commerce today is not as large as it used to be just a decade ago. A broad and informal estimate would be upto 60 Musk deer a year from the Gori basin. Till five years ago, an estimated 90 musk deer were killed every year. Hunting of musk is done

in large communal groups. Say a dozen or more people, with the younger apprentices driving the deer up the steep gullies and ravines which constitute their escape routes. Musk deer have certain predictable behavioral propensities that make them especially vulnerable to the marksman. While fleeing, they tend to stop periodically and look back at the pursuer. The other is their revisiting and stopping at their 'latrines'. While these piles of pellets and the urine sprayed thereabouts do serve as a prize data-base of the procreative hormonal status of females in a herd, for passing males weighing their choices, gunmen lying in wait, get the moment they need. Every fleeing animal in range is shot at. The male, for whatever musk it yields, (an average of one to three tolas per pod), and the female too for the pot. The money and the meat to be had from the total number of kills made during the hunt is shared amongst the hunting group, with the gunmen getting twice the share of what the 'beaters' get.

The other is the most harmful method, which is labour-saving for the hunters who then have fewer people to share the spoils with. It is the practice of driving Musk deer out of hiding with the help of fire. In autumn and early winter, while the marksmen lie in wait on the ridge, one or two men will set ablaze tinder-dry grass in the sub-alpine krummholz, or even the high cold-temperate forest shrubs lower down, when the wind is up-slope, and send the deer fleeing to the ridge. Every autumn, large areas of very fragile sub-alpine and alpine slopes are set ablaze in the Gori basin. Beautiful old stands of hemlock and yew, hundreds of years old, stand charred in testimony.

Other than the use of snares, almost all the hunting in the valley is done by shot-guns, either cartridge loaders or muzzle loaders. Rifles are not owned or used in the valley. The purchase of certain high velocity bores have been restricted by state arms policy now, and even for those that have inherited such rifles, ammo is exorbitantly priced, if ever available. The tehsil armoury in Munsiari contains rusting piles of such rifles and musket-loaders that were bought prior to 1964, when trade with Tibet was on, for protection against highwaymen who waylaid trade caravans. The restriction on owning high velocity bores, and the unavailability of suitable ammunition is some impediment and limit to the possibilities of hunting in the valley.

A certain amount of trapping Musk deer with wire foot-snares is also resorted to by some hunters. The results are more uncertain, but the entire procedure safer for those involved, since being caught with an unlicensed gun can change your life.

Of late, musk pods sold by people from the valley has either been beaten down in price, or bought 'reluctantly'. This is due to a recent loss of credibility of local hunters who had begun to adulterate musk crystals with congealed blood at the time of extraction and drying. Today, the purchase price in the valley ranges from Rs. 2,800 per tola (10 gms) to Rs. 3,200 per tola, though it is negotiated with every seller. At the bottom of the valley at Dharchula, which is the entrepot for all such 'informal' trade into the global market, the purchase price is Rs. 4,000 per tola. One animal, depending on its age and size, could bear anything from 1 tola to 7 tolas. There is no local use for musk, except that the first person in the hunting party to spot and come upon the freshly shot musk deer, is likely to surreptitiously pry out a small quantity of musk from the pod, and quickly smoke it at the tip of his *bidi*, like hash, for the '*garmi*' that it gives. *Garmi* is generic for everything ranging from cranked-up libido, to actual body heat.

In comparison to local prices, Musk is reported to cost 22,000 US$ per kilogram in the international market[21], and more than twice as much in the black market[22]. For one kilo of musk, 40 to 50 deer may have to be poached. Japan is said to be the worlds biggest buyer, consuming around 150 kilogrammes of Musk a year, for 'medicinal' use.

The global perfume industry transacts about 15 billion US$ annually[23]. European perfumeries alone are estimated to use 20 to 30 kilos of Musk per year[24].

At the local canvas again, the scale and intensity of hunting any species is clearly price driven. Between the years 1986 and 1989 the purchase price of Musk fell to a drastic Rs. 400 a tola. The reasons for this are not known by the local hunters, who still puzzle over it; but for those four years, they concentrated on bears.

Bears are hunted differently. They are sighted and hunted down by small hunting parties with guns. Bears, as you may imagine, can get somewhat upset at being shot, and not being 'efficient', like apex predators are, tend to make a messy job of whom they attack. Nevertheless, a local hunter will attempt not to give a full-blooded shot on the body, which is difficult not to do with a shot-gun, for fear of puncturing the gall bladder, rendering the animal 'worthless'. The beast is often just wounded, and tracked down to its hiding, where it bled slowly to death. Both males and females are shot for bear bile and our estimate is that not more than 6 or 7 bears are shot in the valley in the year. Here again, bear bile has no local use, and is entirely sold. Bear fat is sometimes stored locally and used as balm to massage rheumatic joints.

Panthers and Snow leopards are rarely ever pursued and shot. On the occasion that they happen to predate on livestock, who come tantalizingly into their hunting ranges every summer, the carrion is located and poisoned by the herdsmen. Serious poisons such as Nuvan or Dichlorvos 76% EC (acute oral Ld 50 being 58 to 76 mg/ kg body weight) are readily available of the shelf and on subsidy from the Crop Protection Unit and the Horticulture department. The most commonly used poison here is Nuvan, and sure as daylight, the predator is down the next day. It can take less than 5 gms to bring down a leopard. Skins and bones are large and smelly (not easy to conceal), and are only very rarely carried out and sold from the valley any more.

A study in a similar area in Garhwal, the Kedarnath Wildlife Sanctuary (KWLS)

(S. Sathyakumar, S.N. Prasad, G.S.Rawat and AJT Johnsingh) estimated density of Musk deer populations that ranged from 1.0 to 4.1 per square km. The Mean Density for the KWLS was 2.81 per sq km, which was also considered representative for the Uttaranchal Himalaya. The potential Musk deer habitat then (area between 2,500m and 3,800m) in the Gori river basin is about 507 square kilometres (FES GIS cell) which would, at a crude estimate, support over 1400 Musk deer. Even after discounting, to account for poaching and other habitat variables, and it may be unreasonable to hazard a guess at the population; but there could be upto a thousand Musk deer in the basin.

[21] Rashmi Bajaj, WWF Report.
[22] Ira Tewari and R.P.Singh Tiger Paper.
[23] National Geographic Magazine, October 1998.
[24] Rashmi Bajaj,WWF Report.

In combination with poaching, habitat destruction is proceeding at a very alarming pace. Musk deer depend substantially on montane bamboo for food during autumn and winter (Green 1985). Montane bamboo (*Thamnocalamus spathiflora* and *Thamnocalamus juansarensis*) is extensively extracted for agriculture and domestic use by villages. However, most of it is grazed by sheep and goats, and in some areas by buffaloes. The large scale extraction of lichens for sale to the perfumes industry, especially *Usnea longissima* from sub-alpine areas, is also a major threat to Musk deer, who, when there is deep snow on the ground, depend on Usnea hanging from the half submerged birch trees for a major portion of their food. Without it they would have to leave their familiar habitat and travel far in search for food, or perish.

The biggest threat perhaps to this extremely critical habitat, the sub-alpine Krummholz forests that support a great number of valuable species and their prey species, is the destruction of the Krummholz by livestock grazers and alpine herb collectors. There are over 20,000 sheep and goats in the valley. Almost all of them are taken up seasonally to graze in the alpine meadows and in the Krummholz forests in the sub-alpine belt. Apart from grazing the understorey vegetation, and all the palatable herbs, forbes, sedges and grasses that would also form the diet of wild ungulates, there is also a progressive loss of prostrate or dwarf woody vegetation such as birch (*Betula utilis*) and alpine rhododendron (*Rhododendron campanulatum*) through cutting by shepherds for fuelwood. This tangled mass of vegetation in this transition zone would otherwise provide critical protective vegetation and breeding refuge to a host of animals and birds that inhabit both the alpine and the sub-alpine areas.

The collection of plant parts; medicinal and aromatic herbs, is done in very large quantities from the high alps and sub-alpine forests of the Gori river basin. Perhaps the largest scale of extraction anywhere in Kumaon. This aspect is discussed separately. What is relevant to mention here though, is the veritable 'gold-rush' that was witnessed in 2001 for example, and again this year, in the collection of Yarsa Gombu or *Cordyceps sinensis* from almost all the alpine areas in the basin. Fetching a purchase price of upto Rs. 50,000 per kg at the village level, thousands of people from villages dropped everything cold, and headed to the alps where the snow was melting in the month of May, to scour the earth for these fungus infected lepid larvae. Children took off from school to collect cordyceps, as did their teachers or *acharyas*. People took leave from the military to join their families in the 'prospecting'. In the alps around Chipplakot itself last year (this falls under the Askot Wildlife Sanctuary), there were an estimated 5000 people, who occupied every *udiar* or rock overhang, or in colonies of tents with their entire families for about a month. The amount of fuelwood that such a large number of people would burn in the high meadows, to cook and to heat themselves in the cold alpine nights has, no doubt, caused serious damage to the fragile and slow-growing Krummholz vegetation, and subsequently greatly disturbed the habitat of the musk deer, among other animals and birds associated with it. The spring of 2001 however, was the first year of the frantic scramble for the collection of Cordyceps, and the fever has just caught on. Collections were most intensive in the sub-basin areas of Panchachuli, Chipplakot and Ralam. In 2001, people from 25 villages in the basin collected and sold about 47 kgs of Cordyceps sinensis, worth about Rs. 18 lakh. From one village alone, 10.2 kgs worth 3.7 lakh were collected in 2001. In 2002 this village collected 19 kilos worth 9.5

lakh and in the spring of 2003 again 20 kilos which is being negotiated by the collectors in the village to be sold to a trader for about 10 lakh.[25] While the Department of Forests in Uttaranchal has taken some timely and rational steps to regulate the extraction of Cordyceps from the vast areas that come under Van Panchayats, it will be neigh impossible to prevent the collection from Protected Areas as well, because of the remoteness and difficulty of terrain. Certainly not by the Forest Department alone.

The steps the government has taken are essentially to put in instruments of regulation of extraction by Van Panchayats. A government order was passed in 2002 that:

Declared that the extraction of Cordyceps from Van Panchayat areas was not illegal.

Instructed Van Panchayats to institute rules for the regulation of extraction, and rules that kept the use-regimes in the realm of the commons. This included ensuring that:

- only right-holders were allowed to extract from a Van Panchayat area and no employed labour by contractors,
- the village institution or Van Panchayat would formally negotiate for and sell by resolution the collection of Cordyceps of the whole village,
- the Van Panchayat would retain upto a 5% commission in order to meet its watch and ward expenses,
- the village resolved to keep aside, in rotation, some areas that would not be extracted from in a given year, in order to allow regeneration.

The phenomenon witnessed some of classic fallouts; feuding between villages for territory, the Commons fabric being threatened by the element of high-value commerce, and even the mysterious disappearance of people. The issue here is not just whether such intensive extraction will lead to the depletion of this infected lepidoptera larvae (as it has in Nepal and Tibet), but also about how such intensive human presence is going to affect every form of life in the fragile and critical sub-alpine TLZ. The collection of Morrel mushrooms, for example, in spring is known to greatly affect the populations of the Cheer Pheasant who in April would be incubating their eggs, and refusing to flee, would be spotted and taken home for the pot (S.Sathyakumar pers comm). With every succeeding year, ever increasing numbers of men, women and children from every village are scouring every alp for cordyceps. The price of Cordyceps has gone up from around 40,000 a kg in 2001 to almost 60,000 in 2003. Ever more locations of wild plants that can be sold are made note of during the extensive search for Cordyceps, and returned to later in the season, after the Cordyceps has spored.

The trade in wild plants

The trade in wild plant material, be it for the pharmaceutical industry, or the aromatics industry is seen to be of a large magnitude from the Gori basin. Perhaps the largest from any basin in Uttaranchal. A detailed study carried out by FES and WII in 2001, reveals location specific data and trends for the basin.

[25] The FES and WII study on Medicinal Plants in the Gori Basin, Malika Virdi 2003.

1. The scale of extraction is poverty driven. In villages where agriculture is more intense, dependence on extraction was inversely proportional.
2. Of the 103 villages surveyed in the basin, 82 were involved with collection from the wild.
3. The bulk of the 'contraband', or banned (also high value) plants come from the alpine areas of the basin.
4. The highest volume of herbs extracted and **traded legally**, are for the perfumes and aromatics industry. They include Lichens, Cinnamomum, Acorus, Bergenia, Heydechium, and Zanthoxylum alatum

These large volumes, though of a lower value, are also used to decoy and mask the passage of contraband consignments in transit.

For an idea of the volumes traded legally from the basin during the year 2001:

1.	Lichens- from 29 villages	275 quintals
2.	Cinnamomum- from 4 villages	805 quintals
3.	Bergenia- 1 village	6.5 quintals
4.	Acorus calamus- 2 villages	1.3 quintals
5.	Zanthoxylum alatum- 8 villages	8 quintals

It is the **illegally extracted** ones that bring in the greater remuneration, which wherever they are listed and banned, have nonetheless been regularly extracted and traded in. These include Pichrorhiza kurrua, Aconitum heterophyllum, and Dactylorhiza hatageria, for which there has been a steady demand for in the market for the past 40 years. In more recent times, Chaerophyllum vilosum, pleurospermum angelicoides and Cordyceps sinensis have been collected and traded in large volumes:

In the year 2001, for an idea of the reported volumes extracted and traded from the basin;

1. Cordyceps sinensis-	from 25 villages-	47.5 kg worth 17.75 lakh
2. Pichrorhiza Kurrua-	25 villages-	10.18 tonnes worth 6.32 lakh
3. Chaerophyllum villosum-	5 villages-	2 tonnes worth 1.71 lakh
4. Lichens (Parmellea spp)-	28 villages-	27.23 tonnes worth 5.99 lakh

The collection of wild plants is more intensive year by year, compounded by the large number of people who have gone up to try their 'fortunes' with Cordyceps. In autumn they would have moved on to other plant species that they would already have taken advances for, and for which they have a definite demand, and a preset price. The collection and trade in lichens is quite illustrative. When dry, lichens are very light but voluminous, and 27 tonnes is a huge quantity. This quantity is what is officially reported. They feed a global market, and during transport are used to decoy and mask the passage of the higher value but illegal plant parts. In 1991, lichens were bought from the collector at Rs.10 per kg and about 6 tonnes was traded from the basin. In 2002, the price was Rs. 22, and over 27 tonnes was traded.

At the global level, we are told of the great market potential that our country has. A current member of our Planning Commission quotes, with patriotic fervour, the trade turnover of medicinal plants in China, and exhorts Indian planning to aim to exceed that of China (6 billion US $ a year we are told). Worldwide trade in medicinal and aromatic plants, we are told, is 52 billion US $, and India's share of it is half a percent[26]. A government department has been created to oversee this whole business of scaling up, a Department of Indian Systems of Medicines, under the Ministry of Health. The link between ill-health and the present scale of trade in medicinal plants is somewhat difficult to comprehend.

For China, 'medicinal' animals probably far exceed medicinal plants in turnover, or even tonnage. Most of these are not consumed in the form of processed extracts, but in the form of food. Medicine in the wider sense that includes nutrition and cures, but also enhanced immunity, enhanced vitality, or even virility.

We know that from our basin, Cordyceps, bear-bile, and musk presently go to this large market for such medicine in China. The market for both live animals, as well as animal parts in China is huge. If it is live, and wild, it fetches a good price; and if it is rare, a much higher price. Owls, hawks, dogs and terrapins are valued for the pot. In Shanghai town alone, 100 tonnes of live snakes find their way to the meat market every year[27]. Wild, rare and exotic meat was always eaten in China, but mostly by the aristocracy. Today, with growing incomes of a wider band of people, the consumer-base is exponentially expanded, and the volumes of trade are now so large, that it needs to be supplied from a large 'catchment' of even adjoining nations. Tibet adjoins the border of Munsiari tehsil, and in addition to what was customarily consumed by Tibetan culture, the area (Tibet) is now a conduit and consumer of what Chinese cultures consume. The meat market in Lhasa, for example, a deeply inland cold-desert town sells sea creatures and tropical wildbirds from distant places, and could be a meat market anywhere in any other large mainland Chinese town.

In the larger discourse today, the 'market' seems to be immutable. The whole ambit of 'medicine', whether modern or traditional, whether food or cure, whether scientific or hocus- pocus, seems to subsume and legitimize anything. The term 'medicinal plants' is rather generic and can include a huge range of plant species, but more importantly, the prefix 'medicinal' adds a positively legitimate and even noble feel to it. The concept of 'medicinal' animals however, would make some of us in India uneasy. We know that leeches are being used in modern allopathic medicine in the West to help re-activate reattached limbs, horse serum to produce antibodies in our common tetanus shot, and that pig skin is grafted onto humans to replace skin lost in severe burns. Then we have a transition to say the consumption of the soup of the forelimbs of the HimalayanTahr for gynae disorders, the meat of the monal pheasant for rabies (strangely overlaps with sheeps brain and now chick embryo bases for active rabies vaccine in allopathy), or the consumption of donkey's milk and sparrow heads for people convalescing from serious illness. Then we descend deeper into the transition where 'beliefs' such as the use of parts of the nilgiri langur, tiger penises, sea-horses, the spiny lizard, rhino horns or musk for failing libidos, to sex with a

[26] Pushp Jain. Traffic India.

[27] BBC Worldspace programme.

child to 'cure' gonorrhea. These are real market phenomena, and all in the name of medicine. It does not stop here, it goes deeper, to things like animal sacrifice for propitiation, and darker doings we hear generically of as 'black magic'. Where does one draw the line? It is anyway a blurred line, where the morality of vegetarianism palls in the face of the animals used in the scientific testing and development of almost all our vaccines and other allopathic medicine. While different communities, different cultures and different individuals will draw the line variously at different points on the transition described above, depending on how benign they choose to be, the market however, continues to cater to the entire range. Increasingly so, and in a manner where a huge global demand is concentrated on small and limited sources of supply.

While markets vary greatly in scale, coverage, the tiers and proportions of profits that accrue to the various players, we see that whenever a demand arises or increases, people will sell. The poorest will sell most desperately. We see them sell whatever they can from their landscapes, and when there is nothing left to sell there, migrate to urban and industrial areas in order to survive. An ILO study[28] of four South Asian countries (Indonesia, Malaysia, Thailand and the Philippines) reveals that if the business transacted by sex workers were to be estimated in the context of the GDP of these nations, it would range between 2 and 14% of their GDPs, variously. The number of women estimated to be in the sex sector in these countries ranged between 0.25% and 1.5% of the population. The estimates for India of the women in prostitution are about 0.23%. The correlation should be obvious. There is no moral position being taken here on sex work *per se*, but cited here only to describe the all-encompassing nature of the market, its centrality as the driving force, and the desperation of the poor.

[28]The Sex Sector: The economic and social basis of prostitution in S.E.Asia. Ed by L. Lean Lin ILO 1998.

THE RIVER

The Gori river is, in many ways, the *sutradhar* or the central narrator of the entire river basin. It physically links the entire landscape together, right from the glaciers, the alpine meadows, on down past the krummholz, the temperate forests, and down to the warm sub-tropical gorges and riparian forests, along which the river steeply cascades on its way to its union with the Kali. It is also reflective of the health or ill-health of the entire landscape that it links.

The Gori river, which is about a hundred kilometres long, is fed by 32 distinct glaciers and numerous other fluvial sources, and forms the largest of three other tributaries of the Kali river on the Indian side.

Glaciers feeding into Gori river

Kali herself is the largest trunk river in Kumaon with a Mean Annual Discharge of 23.2 million cubic metres half way down the river. The Mean Annual Discharge at Bungapani, a point two-thirds down the Gori, is estimated to be about 3.8 million cubic metres. The elevation difference, and therefore the range of terrain that the river runs through, is 2700 metres, in a distance of a hundred kilometres, from about 3500m above the sea at the snout of Milam glacier, to less than 600m above sea level at its confluence with the Kali at Jauljibi. The river is then known as the Sarda, on the Indian side, and lower down as Ghagra and goes on down to its confluence with the Ganges in Ballia district in Uttar Pradesh. Eventually, it meets the ocean at the Bay of Bengal.

Milam Glacier
- Iklulari Glacier
- Billanlari Glacier
- Surajkund Glacier
- Mangraon Glacier
- Pachhmi Bamchhu Glacier
- Syakaram Glacier
- Timphu Glacier

Gonkha gad
- Bamlas Glacier
- Safed Glacier
- Tringi Glacier
- Gonkha Glacier
- Rata Glacier
- Shutpani Glacier
- Kwalgang Glacier

Panchu Gad
- Panchu Glacier

Burphu Gad
- Burphu Glacier

Lwa Gad
- Lwa Glacier
- Nanda Ghungti Glacier

Shalang Gad
- Shalang Glacier

Laspa Gad
- Laspa Glacier

Poting Gad
- Poting Glacier

Ralam Gad
- Kalabaland Glacier
- Shunkalpa Glacier
- Yankchar Glacier
- Shipu Glacier
- Rajrambha Glacier

Madkani Gad
- Uttari Balati Glacier
- Dakhni Balati Glacier
- Panchchuli Glacier

Paina Gad
- Bainti Glacier
- Rulla Glacier
- Jimba Glacier

Like all mountain rivers, the Gori and its tributaries constitute critical **aquatic corridors** and highways that link the entire landscape. Mycoflora washes off leaf-litter in the quiet oak forests, which is scraped off rocks in the substrate by larval insects in mountain torrents, who in turn form part of the food of fish in the streams and rivers. Fish that interact with all the riparian landscape, swimming up from the turbid river to the dark limpid pools in upstream branches, or to sand and shingle-beds to spawn. The flushing of silt, humus and gifts of nutrients down from high mountain forests and ravines down to river banks enroute, along its entire length, links distant landscapes and all the life therein.

The larvae of the mayfly can be found in every stream within the basin, so we know the water as good as it could be. Studies down the river in neighboring Nepal have yielded over seventy species of fish. Every species has its unique habitat niche in this large and greatly varied river, and will only be found at certain segments and micro-environments of the river in different seasons.

Almost all human habitations in the basin are along the Gori river, or its many tributaries (not too close though, for peril of the frequent spates), or next to springs that emerge from an impermeable layer, and eventually flow down to the river. As in all other such places, the lives of the people living here are deeply tied-in with the river in very many ways. In life, and in death. The people who live along these rivers partly depend on these fish for food through the year. A few villages low down near the river, that have their crop fields on ancient river-beds, irrigate their paddy-fields.

People are cremated at various points along the river, (dead infants are just submerged and weighed down by rocks) and the obvious symbolism perhaps serves to wash away the immediate trauma of loved ones who have died. The not-so-dear ones, (widows, on occasion, when there is property to be shared) are idiomatically exhorted to go jump in the river, and it is not rare for someone (most recently drunk *Gram Pradhans* returning home with payments for some 'scheme') to be helped by a nudge. The river, fed by at least 32 glaciers, is cold and swift, and the results quite conclusive.

The river ecology

No serious listing of the fish fauna in the Gori river or its tributaries has been undertaken so far. There has been a limited listing by the Kumaon University as well as by the FES team. However, there does exist very extensive documentation of the fish fauna of the main trunk river Kali, downstream by scientists in Nepal. A list of the fish fauna studied in the main trunk of the Kali, is appended. The two rivers are really a part of each other, and whatever of these species swim up above 600 metres altitude, would, in reasonable probability, be found in the Gori. The list may be seen as indicative, except where specifically marked as recorded in the Gori. The listing of all of them is important anyway because what happens in the Gori, affects all life in the Kali downstream.

The documentation by Dr. T.S. Shrestha in Nepal, on the fish in the Kali lists 73 species from 25 families. A preliminary survey by FES team of the three most basic physical parameters of water quality: ph, oxygen levels and temperature of the Gori and its streams has shown that the waters are healthy and a habitat for three main fish taxa: Schizothorax – the snow trout, Neomacheilus and Glyptothorax.

The presence of insect larva like beetles, the May Fly, the Caddis Fly, the Stone fly, and Dragon Flies in large numbers indicates the presence of high levels of oxygen. These aquatic insects also form the main food for the fish.

The smaller streams play an essential role in the life cycles of all benthic fauna. Many insects spend all but their adult stage in water. For fish migrating upstream in the Gori, the smaller streams serve as spawning grounds because they are less turbid and the velocity of the water is not as high as the bigger glacial rivers. In spring, the waters of the bigger glacial rivers rise and the fish that have lived in the small streams in winter migrate downstream into the Gori. The fish from the big rivers migrate upstream into the smaller streams to spawn and by autumn return downstream. Some fish also spend their entire life-cycle in the same stream.

In the past few years the Munsiari region has witnessed severe landslides and floods. While the whole area is geologically unstable, the construction of the road along the Gori, from Madkot downwards, seems to have visibly increased the sites and frequency of landslides along the river-banks.

There are some use-practices along the course of these rivers that are greatly affecting the **fish-fauna**, and the associated ecology. Fishing methods that employ the use of plant-poisons such as agave, caustic soda, and explosives (can be had from any friendly neighbourhood road-contractor) are causing major depletions in fish populations. Commercial mining of sand and shingle-beds, where fish may spawn, greatly affect habitats and populations of the many species of fish that inhabit different segments of these corridors in different seasons.

A fisherman spoken to, said that the Gori river has changed significantly in the past 10-15 years. He confirmed that there is much more sediment deposition in the river-bottom, and also said that floods have become a more frequent phenomenon.

" In a three kilometre stretch of the Gori, my father caught an average of about 4-5 kgs fish in three hours. Of this 80% were asela (schizothoraz) and 20% others like saur/Tor. Today in the same time and place, I catch just about 2-3 kgs a day, and in the past ten years 100% of my catch has been Asela... the other species have stopped coming up." He identifies one of the reasons as bigger nets being laid in the lower reaches of the Kali. The Tanakpur barrage is also located in the lower reaches of Kali river which effectively prevents many species of fish from migrating upstream, thereby dooming their populations. Commercial fishing is also extensive here.

Many small-scale water-mills, industries and power-stations are situated near the lowland catchment area of the Kali. Agriculture is more intensive and on the Green Revolution mode lower down and chemical pollutants also flow into the river.

Proposed hydro-electric projects on the Gori river

The Gori as it is today, and its riparian ecology is slated to change drastically with the building of hydroelectric works at various points on the river.

The National Hydroelectric Power Corporation Ltd (NHPC) has estimated the power potential of the three main tributaries of the Kali – the Dhauliganga, the Gori and the Ramganga and has already initiated the Dhauliganga project of 280 MW.

There is a major Project planned for the generation of hydroelectricity from the waters of the Gori river. The project is not underway yet, and the people in the valley are unaware of what stage of approval it presently is in. The proposed Gori Ganga Hydro-electric Project falls between Jauljibi and Madkot (Stages I, II and III A), and between Madkot and Ratgarhi (Stage IIIB). The project Stage I is proposed at Chippaltara, which is about 9 km upstream of the confluence of the Gori with the Kali at Jauljibi. A 61.5 metres high concrete gravity dam (60 mw) will generate 60 MW. Stage II is proposed at village Gharuri Malli, about 22 km upstream of Jauljibi. Here a 20 metres high barrage will generate 120 MW of power. Stage IIIA will be located near Madkot, about 23 km above the stage II barrage site, and will also be designed to generate 120 MW of power. The dam site of stage IIIB was to be located at Ramthing, about 5 km upstream of the confluence of the Madkani with the Gori. Here a 28 metres high barrage will generate 20 MW of electricity[29].

Hydro-electricity is perhaps the cleanest, most renewable form of energy we know today. Uttaranchal would need its own electricity, and located where it is, be in a position to sell electricity to neighboring States. However, there are certain aspects that are a cause for some anxiety.

The area falls under the Seismic Zone V. It is very close to the Munsiari Thrust and the Dharchula Fault. Landslides are frequent, and a serious one almost wiped out Kauli village four years ago, close to where stage II is proposed. 61.5 metres seems a big structure, by all standards.

The Gori is a tumultuous river. Thirty-two glaciers and innumerable fluvial sources, and a catchment over 2200 square kilometres catching upto 300cm of rain a year. In cycles of every five years of so, there are severe spates in the river that tear down all bridges enroute, seriously tear away land at the banks, and bring with them huge boulders and loads of soil.

The riparian forests along the lower Gori valley, where these projects are proposed, is also an area known to be very rich in Orchid flora. The basin itself is known to be the richest in Orchid flora anywhere in the Western Himalaya. Most of the orchid species are epiphytic or lithophytic, and occur on the Toon trees and on rocks along the river banks. The exact location of the barrages would need to keep such considerations in mind.

The character and health of a river and all the life in it, is determined by the rhythms of seasonality, the volume and speed of flow, the silt-load and turbidity, as well as the chemical balance of the water, which is determined by the landscape the waters have traveled through. This will change radically, depending on whether much of this electricity generation will be run-of-the-river, or whether impounding will be large scale, and significantly alter flows

Submergence and displacement are relatively minimal in such projects in mountain areas. However, there are some settlements and their agriculture fields that seem bound to be displaced by impounding water behind large structures. The concerns are regarding resettlement and rehabilitation. Any reliable (declared by government) information on what the plans and schedules for submergence are unavailable to the local communities. The experience with such ways of functioning in the past have always yielded alienation and resentment by those affected. The government needs to engage with the public with information at this stage.

[29] Plant Diversity in Lower Gori Valley, -Pithoragarh, UP. Higher Plants of Indian Subcontinent BSI Vol X SK Murthy, DK Singh, Surendra Singh.

MINING

While no large-scale, extensive mining is being carried out in the valley yet, small-scale extraction of sand from river-beds and talc-mining in a lower part of the valley is prevalent.

Sand mining

The sand that is extracted from the riverbed at different points in the valley is mainly used for local construction of buildings, which has been on the rise since the past few years. The mining is carried out all the year round with an exception of monsoon months. From a place called Bhadeli on the bank of the Gori river, about 20 trucks of sand are extracted over a period of one month. Higher up in the valley, and close to Munsiari, the contractors are generally local businessmen who sell the sand in the local market and employ local labour.

Lower down in the valley the magnitude of extraction is more and the contractors belong to bigger places like Pithoragarh and arrange their own labourers mostly from Nepal or from bigger towns. In a day approximately 4 trucks, (about 70 quintals each) of sand are mined. Since the mining site is close to Dharchula (army-base, Indo-Nepal Border Town) the sand is sold to NHPC and the Border Roads Organization.

The status of the land has been reported as Van Panchayat and Private Land, though the river-bed is legally owned by the state and any such activity requires a lease or permit from the SDM.

The river-bed of the Gori has in places, eroded much of the privately owned land near the river in years of floods, and sand is now being mined from it. Even in case of mining from private lands a *chalan* has to be issued by the patwari and permission taken from the Soil Conservation Department of the government. This permit is also time bound. The records show that so far only one individual has taken such a permit for mining from his own land.

Talc-mining

Talc is being mined at Chipaltara, a place in the Gori valley about 45 kms from Munsiari, since 1970. Five sites are being mined currently and from the biggest site approximately 750 quintals a day are extracted. The talc is sold at Haldwani and Tanakpur in the *Terai* region. It is used in the manufacture of toothpaste, talcum-powder, medicines, paper and soap.

Over the years the area being mined has gradually increased from one to five different sites. The status of land is Civil Benaap, and in some cases private land. There is no information about the lease status except that some tenders have been issued to the contractors and that they pay a tax for the same to the revenue department. The private lands have been bought off from the locals. The contractors are from Pithoragarh, Haldwani and Nachni (not local).

At a time there are about 75 people employed as labour for the mining and atleast one-third of them are from Nepal. There have been 4 deaths in accidents since the time the mining started. Though the impacts of the mining on health are not really clear, people residing

close to the site have linked up frequent digestive disorders and poor eyesight to the mining activity.

Soil erosion and fissures in the land are visible today. The longer-term effects will probably depend on the extent of such mining in the area.

Precious and other metals

Just outside, and at the foot of the river basin, close to the small town of Askot is a site that has been explored in great depth, and that is proposed to be mined in the near future for a high grade ore-body. It was explored by the Geological Survey of India, and the UP Directorate of Geology and Mining, with assistance from UNDP between 1960s and 1980.

Pebble Creek, a Canadian company, in collaboration with its Indian affiliate, Adi Gold Mining private limited, has a Prospecting License on zinc, copper, silver, lead and gold deposits that are expected to be mined near Askot. The company estimates that the total area has a resource of 50 million tonnes of mineral ore.

The area proposed to be mined is 7.93 square kilometres. It is anticipated that when brought into production, extracting at a rate of 2000 metric tonnes of ore a day, the mine would supply 10 percent of India's mined Gold, 30 percent of India's mined Silver, 30 percent of India's mined Copper, 20 percent of mined Zinc and 22 percent of mined Lead[30].

The macro-economics of this are not understood by us at all, or by the communities at the lower end of the Gori basin, who have news of the proposed developments, and are looking forward to the employment opportunities that the various operations of extraction and transportation may have to offer.

In view of the past experiences with mining elsewhere, the government would do well to ensure:

a. Adequate and speedy compensation, and if necessary, resettlement of people displaced in the proposed mining area.
b. Newer and least destructive technologies be employed that cause the minimum possible environmental impact.
c. A commitment for the effective disposal of residues after metals are extracted from the ore.

[30] Pebble Creek Website.

FOREST AND LAND RELATED POLICIES IN THE REGION

The Munsiari region did not go through the struggles during the British rule that the lower parts of Kumaon and many areas of Garhwal had to go through, simply because it was distant and difficult to access in terms of extractive commercial interests of the colonial regime. They did have an interest in the trade route to Tibet that passed through the valley though, and they did what they could in terms of levying taxes on the trade, and intervening in the salt trade. It is however important to discuss the history of forest related policies of the entire state for the following reasons:

- The high level of dependence on forest resources for survival needs is a common feature of the whole region. This very dependence has caused the history of the area to be greatly affected by the developments related to utilization, management and ownership of these forests
- Secondly, state legislations, orders and policies may have been passed as a reaction to circumstances in one part of Kumaon but they were and are implemented in all parts of the state. The creation of Van Panchayats is a case in point.
- To understand the ramifications of these policies on the ecology and society of a remote region like Munsiari.

Pre-Independence Period

The first form of state control that the Himalayan forests and the local communities witnessed was in **1815** by the British. While the Pre-British period saw the rule of local rajas and the Gorkhas, who had the power to allocate forest resources, there was no system of individual ownership of the non-tilled land, with vast resources available for people to use. Vast in the sense that local needs from forests were entirely at a subsistence scale, and populations were small and often migratory.

The British established legal precedence for land and resource use in the year **1823** with the first **Land Settlement** under Commissioner Traill.[31] Villages were encouraged to reclaim deserted agricultural terraces as well as claim new fields in the uncultivated lands. The Gazetteers say that this settlement was done in a fair manner and recognized the traditional village and customary used boundaries.

In **1850s** the British began their 'timber management' operations in the Sal forests of the Lower Himalayas/ Siwaliks. "Between 1855-57 demand for railway sleepers induced reckless cutting of old trees" Atkinson. E (Vol. I.2, The Himalayan Gazetteer). By 1868 the "world's most sophisticated" Imperial Forest Department was set up in the region to manage the supply of timber for the huge railway network being established in British India.

India's first **Forest Act** was passed in **1878**, providing space for extraction on one hand but even recognizing local use by villagers. The most important provision of the act was the power given to Forest Department to create **Reserved Forests**, which for the first time restricted access of communities to these forests for grazing, timber, fodder. A bureaucracy

[31] This is referred to as the Sal Assi bandobasti since 1823 was the 1880th year according to the Hindu calendar

for implementing these restrictions was set up with the locally recruited Forest guards at the lowest rung, to directly police the people. The local people often looked upon them as agents of repression and over the years many folk songs revolving around problems with the guard evolved especially in the middle and lower Himalayas (Martins, P. 1987).

The Reserved Forests set up initially in Kumaon covered an area of 1700 sq. km. in Almora and Nainital districts and did not affect the life of the people as much as the **1893** declaration whereby all non-agricultural land was declared as **Protected Forests** under the control of the Deputy Commissioner, Revenue Department (Saxena, 1995).

A series of pioneering surveys were undertaken in the middle and upper regions after which commercial extraction went into full swing. **Commercial logging** was done mainly through contractors (who were rich zamindars of the Uttar Pradesh plains) who would bid for the right to harvest trees marked by the department and the highest bidder would carry out the operations. Contractors pervasively bribed forest guards to cut more than permitted, or sought legal loopholes such as getting off lightly in the name of 'damage' to other trees while felling, or lenient compounding of deliberate 'offences'.

Another development that aggravated the impact on local subsistence as well as environmental interests was the large scale planting of commercial species especially the conifer Chir Pine in the middle Himalayas of Kumaon and Garhwal. The resin produced by the tree was exported to Europe. The pine needles form a thick mat on the forest floor and discourage the growth of grasses. Further the pine being an aggressive species competed with oak, which provides fodder, fuel wood and timber for various purposes. Labour was brought in from Nepal, Bihar and Uttar Pradesh plains for resin-tapping.

Along with plantation of Chir, the department took up other 'silvicultural operations', mainly, clear felling of other forests, which were of lesser commercial value, and systematic use of fire to regulate the growth of other species in pine forests.

Between **1911 and 1916** to meet the pressures of the wartime and higher demand for timber the department brought more areas under reserve forests referred to as the **"new reserves"** which were established in the middle Himalayas over about 7500 sq. km. (Sarin, M. 2001)

Obviously, the local economy and the ecosystem were under tremendous pressure. The process of polarization reached a peak and as a sign of protest the people of middle Kumaon set huge areas of forests ablaze in 1916.

In **1921** this was repeated and thousands of hectares of Reserved Forests were set on fire by the communities. As a result, the British government in Uttar Pradesh was forced to set up the **Kumaon Grievance Committee** in the same year, which recommended the following:

- The less valuable New Reserves of 1916 be returned to the revenue Department which may allocate them to villages for management by *Van panchayat*s. *Van Panchayat* land would be under the jurisdiction of the revenue department.
- Classification of forest into two categories: Class I and II

Class 1 Reserved Forests were those that did not have any monetary value and were generally used by communities for fuelwood and fodder. From the Soil and Water conservation viewpoint these forests were extremely important. The Class 1 forests were transferred to the Revenue Department and could be handed over to Village Forest Councils called *van panchayats* (under Revenue Department control) for management and use by villages.

Class 2 Reserved Forests were commercially important and remained with the Forest Department.

Thus by early 20th century the uncultivated lands had three categories

1. The Old Reserve Forests and Commercially valuable Class II forests (from the New Reserves) under the Forest Department;
2. Commercially less Valuable Class I forests (from the New reserves) under the Revenue Department and;
3. Civil, also referred to as civil soyam, under the Revenue Department (comprising of common lands outside the ambit of the new reserves).

In 1931 the Kumaon Van Panchayat Rules were passed for the creation of Van Panchayats on revenue lands (Civil Soyam and Class I reserves)

Post-Independence Period

The Indian forest department worked largely according to the policies laid down by the British. Local livelihoods continued to get neglected, as the state policy focused on export of raw timber and resin to the plains. This was the scenario in most parts of Kumaon and Garhwal. The Munsiari region however did not experience this extraction because of its remoteness and the un-viability of transportation of raw material.

The 1960s saw several significant developments that also affected forest resource-use, even in this valley.

The year **1960** brought the **Land Resettlement** that redrew village boundaries to exclude reserve forests (both Class 1 and II that were not already under Van Panchayats) from the revenue boundaries of the village. This was coupled with the **1964** state order that **retransferred all Class I Reserved Forests** from Revenue to the Forest Department which meant that these could no longer be converted to Van Panchayats and therefore, not be managed by the communities even though they might have been dependent on them for survival.

During this period (**1962**) the cross-border trade with Tibet was closed which impacted seriously on the local economy of the Shaukas also referred to as Bhotiyas of the area.

In **1976**, the **Kumaon *Panchayat* Forest Rules** were amended and stated that the Van Panchayat was the area under the resettlement boundaries and the area under *assi sala* boundaries was not eligible for Van Panchayat formation. The Van Panchayats control over their income was curtailed in addition to being reduced to 40% as compared to 100% earlier.

In **1976** again the Uttar Pradesh government passed the **Tree Protection Act**, which prevents individuals from felling marketable species of trees for timber even on private lands, without obtaining permission from the forest department.

At the National level

In **1980** the Indian government passed the **Forest Conservation Act,** which makes it mandatory for the state government to obtain prior permission from the center to transfer any forest land for non-forest purposes.

In 1980 a fifteen-year ban was imposed on all felling of green trees above thousand metres altitude in the Himalaya. The only felling permitted is by villagers for meeting their timber needs. In 1995 this was revised to 2500 metres on pressure by the Forest Department.

The 1980s were also significant because several areas were brought under the Protected Areas Network under the Wildlife Protection Act 1972. About 3 sanctuaries and 4 National Parks were declared in the Uttar Pradesh hills (at that time) during this period alone. The displacement of local livelihoods vis-a-vis the conservation policies is a very charged debate in the state today.

The 1988 Forest Policy, a progressive document, was a positive departure from the earlier forest policies as it gave primacy to Conservation and subsistence livelihoods. While the implementation of such a policy is difficult considering the history and bureaucratic structure of the Forest Department and the non-statutory status of policy documents, at least it was a statement in principle supporting ecological as well as livelihood security. The Forest Department Working Plans in the state also draw their objectives from the 1988 policy.

In the wake of this policy, the Central government (1990) issued guidelines to all states to adopt Joint Forest Management, which in other states meant Forest department land being jointly managed by the people and the department but in the Uttar Pradesh hills there was a backlash. The Joint Forest Management in Kumaon and Garhwal was envisaged and operationalised as Village Forest Joint Management (VFJM) on Van Panchayat lands. This implied that the Forest Department would be a dominant player and stakeholder in community managed forest lands.

Soon after the drafting of the Village Forest Joint Management Rules, 1997, the state Government drafted the **'Uttar Pradesh Panchayati Forest Rules 2000'** which was an amendment of the '76 rules and gave extensive and critical involvement to the Forest Department in the governance of Village Forests. The Cabinet of the new state of Uttaranchal (formed in November 2000) passed the amended draft Rules which were notified on 3rd July 2001.

The colonial regime brought in a radical shift in resource-utilisation in the entire country, systematically transforming vital commons and natural resources into profit-generating raw materials in the terai and the lower hills. The collapse of the imperialist rule, however, did not, as expected, replace this phenomenon with primacy on local interests. What happened instead was a continuation of resource use based on the colonial and industrial paradigm, in a more sophisticated and complex manner, still fulfilling the needs of national and international markets. Classic colonialism seems to have been replaced by 'development',

which remains industrial in scale and extractive in nature. The process further accelerated with the opening up of the economy to global capital. Multilateral lending organizations have provided funds to our governments for macro-development projects like power projects/ large dams on one hand; and also for 'natural resource management' programmes like forestry, JFM and Watershed development, on the other.

Old Reserves and Class II Forests

These forests consisted mostly of Sal in the Sub-Himalayan areas, Chir Pine, Deodar and other conifers in that had timber value in the rest of the hills. In the high and middle altitude areas of the Gori Valley and Munsiari Range the Reserved Forests are mostly temperate mixed deciduous, alpine, coniferous (Cyprus) forests since Chir (*Pinus roxburghii*) does not grow at this altitude.

While these reserves remained under Department control, after independence, the department had no power to regulate grazing and lopping of trees for fuelwood and fodder, except in some areas. The commercial exploitation of these forests by the state continued, even under the Indian Forest Department. With the expansion of the road networks in late 1950s and 1960s the spread of contractors reached remoter corners of the hills.

Rights in the Old Reserves

Timber : The households have to give an application to the elected head of the Panchayat stating timber requirements. The *Pradhan* constitutes a committee each year to decide timber distribution. This is given to the Range officer who sanctions their quota, this is referred to as a *haqdari list,* as recorded in the settlement right and marks trees that can be felled and appropriated under the supervision of the *Pradhan*. The *pradhan* then allots this timber to deserving applicants.

The same for **grazing** where the number of cattle that can free graze in the Reserved Forest is specified in the Settlement notification or *haqdari list*. The *Patwari* and *Pradhan* allocate this number to the households as per the need. The list for each village has to be approved by the Deputy Commissioner and passes are issued.

Fallen wood can be collected for fuel.

Lopping of green fodder is strictly regulated on the basis of Protected Species.

All above rights are only for *bonafide* domestic use and the department can close them any time as per the need but has to provide for rights elsewhere.

In case of Class II Reserved Forests people have the following rights:

- Free Grazing of livestock without passes, settlements of cattle: 'chhappars'
- Cutting grass
- Lopping for fodder
- Fuelwood
- Leaf-litter extraction
- Other Forest produce extraction
- Timber for building: same procedure as old reserves
- Wood for Agricultural Implements

These rights hold good for areas specified by the Forest Department and not afforested, regenerating and other closed (for grazing and lopping) plots/areas. However, in a village settlement area not more than one sixth of the area can be closed at a time.

Class I Reserved Forests

The Revenue Department under the British after 1922 continued to encourage people to convert these lands to agriculture at the expense of tree cover. Some of these lands were converted to Van Panchayats while the rest remained open-access civil lands without any regulations on use.

1964 onwards many of the Class 1 reserve forests that had not been declared Van Panchayats were re-transferred to the Forest Department. The reason cited for this was that the Revenue department was unable to protect these forests, which had led to their degradation.

The status of the transferred Class I reserves, in terms of rights to locals, is the same as Class II Reserved Forests

While the procedures say all the above, the use-patterns of the reserve forests in the valley vary according to availability of alternative resources in Van Panchayats, the area of Van Panchayat and number of dependents, and proximity of the reserve forests to habitations. For instance in the Khalia Reserve, which is close to the densely populated mountainside of Munsiari, many villages on the slopes of Munsiari that do not have adequate forest areas of their own depend on this forest. Khalia is also the nearest *Bugyal* (grassland), which makes it possible for livestock to be grazed during the monsoon. Apart from this people cut hay for the winter, take fuel wood for use and for sale, leaf litter, timber for construction and wood for implements, bamboo for *Rajma* cultivation, and for making baskets and mats. Some medicinal plants are also extracted from Khalia's alpine grasslands for sale. In reserve forests, which are far away from villages and where villages have adequate resources in Van Panchayat lands, the pressure is significantly lower. Watch and ward by the department in places like Khalia is inadequate, and understaffing is a real problem.

Civil Forests

In the pre-independence era, these lands were under the Revenue Department of the state. They continue to be so, and are often referred to as village commons because they are shown in the revenue boundary of the village and are supposed to be managed by the *Gram Sabha*. The legal powers are with the Sub Divisional Magistrate and Deputy Commissioner and the local representative of the department is the *Patwari* through whom all transactions are carried out. Much of the civil land, in the Gori Valley, was transferred to Van Panchayats after the 1922 recommendations.

Civil *soyam* lands in most cases are adjoining the village and were carved out of some forest, fallow uncultivated wastelands or grazing areas. They also include paths, streams etc. According to Neeru Nanda "there was no question of considering these as community resource banks for biomass production". The indigenous land use pattern considered the need to have considerable amount of fallow land that could be used for cultivation or grazing.

With other areas being declared reserved for commercial plantations these were the only areas unreserved for grazing. The British encouraged bringing these lands under cultivation (*nayabad)* for agriculture revenue – a policy that was also followed by the Indian administration. Of course, the well-placed and influential farmers extend their fields into this land for allotment. Apart from this these lands are also expected to provide housing sites for the poor, in case of landslides or displacement by roads, as well as lands for the landless. The pressure on these lands has mounted and over the years this resource base degraded considerably and at a fast rate.

The Forest Department between **1980-90** undertook afforestation on Civil *Soyam* lands. This was a part of the general national policy of allocating more funds to the forestry sector for promotion of plantations on village common lands. N.C. Saxena has pointed out the following reasons for the failure of these civil soyam plantations: Target rather than context oriented, already degraded nature of lands, plantation on small insignificant patches, closure of open-access land led to pressure on other forests. Further the process lacked transparency- with a single resolution in the Gram Sabha for transferring land to Forest Department, which in reality involved cajoling the *'pradhans'*. Ad-hoc and inadequate planning with village persons, lack of attention to fodder species, inefficient protection mechanisms and monitoring made the entire programme unsustainable. This programme was wrapped up around 1998.

In the Gori valley too the sight of such plantations is common in many villages, while in the higher altitude the focus was on planting Cyprus, lower down in the valley Chir was promoted. Both are species used for timber. In some areas these plantations still survive though most plots are back to their open-access situation, and subsequently degraded.

Van Panchayats

Following the recommendation of the Kumaon Grievance Committee (KGC) the first Village Forest Councils called Van Panchayats were created initially in Kumaon and later in Garhwal under the Scheduled Districts Act. The Kumaon Panchayat Forest Rules, 1931, initially governed Van Panchayats. Any 2 or more residents of a village could apply to the Deputy Commissioner to demarcate a specified area within the sal assi boundary provided that one-third or more of the right-holders in the area did not object. The Van Panchayat would elect 3 to 9 panches who would then select a sarpanch. A Van Panchayat Inspector deputed by the Revenue Department would look at the records and supervise the process of elections of managing committees. By 1937 about 200 Van Panchayats were created, by 1947 the total number went up to 428, 1074 by 1960 and today there are over 7000 Van Panchayats in the whole of Uttaranchal. There are 15699 revenue villages (18000 separate habitations) in the state.

Since Van Panchayats were instituted in 1931, the Van Panchayat Rules have undergone amendments in the years 1976 as well as in 2001. The 1976 amendments centralized many arrangements, for instance that of fining, the right to sell produce and the right to appoint a watcher, in the hands of the Revenue Department. Sarpanches viewed these amendments as a means to reduce their authority and entitlements of Van Panchayats. Most Van Panchayats have however, carried out these functions on their own at an informal level. Some policy issues with regard to Van Panchayats, especially in the context of the Gori river basin, are discussed in the chapter on the Commons.

STATE PROTECTED AREAS

The state of Uttaranchal has six National Parks and six Wildlife Sanctuaries, covering an area of 7788.44 square kilometres. This comprises only 13.94% of the total geographical area. Of these, a part of the the Askot Muskdeer Sanctuary falls in the southern end of the Gori basin, and all the high-altitude alpine villages, 11 in all, are a part of the Buffer Zone of the Nanda Devi Biosphere Reserve (NDBR). The NDBR is also designated a World Heritage Site under UNESCO, and the IUCNs Man and Biosphere (MAB) programme, on account of its natural beauty, and the value of the biodiversity it contains.

The Nanda Devi basin was first designated a Game Sanctuary as early as 1939. In November 1982, it was designated a National Park, and in January 1998, an area of about 1500 square kilometres was declared as the Nanda Devi Biosphere Reserve, that included the Nanda Devi National Park as well as the adjoining Valley of Flowers (83 sq. km). About 47 villages fall in the buffer areas of the Reserve, both in Garhwal and Kumaon.

These protected areas have been instituted under the Wildlife Protection Act (1972). Humans have found ways of using all but the most inaccessible wildscapes. The deleterious effects of over-use are increasingly apparent, and there is, without a doubt, a need to create and maintain protected spaces for wild biota and to conserve the last of their less-disturbed habitats.

The creation of Protected areas in Kumaon and Garhwal, as in some other parts of the country, has met with resistance from some local communities, and recurrent flak from some NGOs. It has been criticized for displacing rights of use of local communities, and for alienating them from their resources. The Conservationist ideology has been referred to as narrow, elitist and anti-people.

The matter is not quite so simple, and there are a few facets to this conundrum that need to be looked at.

Nanda Devi Biosphere Reserve

What is commonly referred to as the 'inner sanctuary', in mountain climbing and exploration literature, that is now the core area of the Nanda Devi National Park, had never been traditionally used by any village arrayed around the high circular rim of the basin. There are, and never have been, any villages inside. This was simply because no one had been able to get past the area's formidable and precipitous defenses till then.

In Garhwal, outside, and on the western approach through the Rishi Gorge, are the villages of Reni and Lata among others, who were witness to serious attempts, from as early as 1883[32], to traverse the Rishi gorge into the protected bowl, that is protected all around by high inaccessible ridges that link its numerous 7000 metre peaks.

At the entrance into the Rishi gorge, is Dharansi, and the forests and alps surrounding it had long been used by the villages downstream for grazing their sheep and goats, and for *chaumasi chappars*, or seasonal encampments, to graze their buffaloes during the monsoon. No human had set foot in the inner sanctuary, which got its name from the early explorers, not

[32] The expedition by W.W. Graham, Swiss guides Emil Boss and Ulrich Kaufmann, 1883.

as an upper-case Sanctuary designation of legal protection status, but from the nature of its protection by precipitous mountain ramparts.

These serious attempts to enter the inner bowl of the basin, employed the very best mountaineers and guides in the world at that time, and every seeming 'weakness' was attempted from north, south, east and west. It was not until the famous expedition of 1934, when Eric Shipton and Tillman with their Tibetan comrades Ang Tharkey, Kusang and Pasang, forced a brilliant route, was any human able to set foot inside the sanctuary.

From the east, or the Gori basin side, the first attempt was in 1893 by Kurt Boeckh with Austrian guide Hans Kerer, who were abandoned by the local porters when they understood their intentions to attempt an entry. In 1905, T.G.Longstaff came with Italian guides Alexis and Henri Brocherel, and they succeeded only in reaching what is now known as the Longstaff col on maps, and in looking onto the glaciers at the foot of Nanda Devi. Hugh Ruttledge made repeated attempts in 1926, 1927 and 1932 without success. The best mountaineers in the world then were engaged and alternating between attempts to enter the Nanda Devi sanctuary, and attempting to climb Everest from the Tibetan side. All this to say, that the inner areas of what is now the core zone of the NDBR, was inviolate till the year 1934, and it was not possible for the area to be used by local communities.

After 1934, after the first successful entry into the Nanda Devi basin, and the subsequent ascent of the Nanda Devi in 1936, there were 24 large expeditions that laid siege on the mountain, both from within the basin and also from the Gori basin. Large expeditions with hundreds of porters, who by all accounts[33], very seriously damaged the ecosystem of the unique area.

The official line is that in response to the damage caused in the Nanda Devi basin because of the massive expeditions to the area, and under pressure from conservationists to close the area for recovery, the Nanda Devi sanctuary and some surrounding area was declared a National park in August 1982, under the Wildlife Protection Act 1972. This meant that it was closed for any human activity or interference. There is another line of speculation as to why the area was closed, that is mentioned a little later in this chapter.

An area of 1,56,000 ha, or about 1500 square kilometres was declared as the Nanda Devi Biosphere Reserve in January 1988. This included the Nanda Devi National Park and the Valley of Flowers (83 sq. Km), and apart from classic Core Areas, also contained a Buffer Zone of 1200 sq. km. that encircles the National Park, and includes 16 Bhotiya villages in the Chamoli district and 11 Bhotiya villages in the Gori basin in Kumaon.

While the constitution of the National Park did not physically displace any village, there was a displacement of livelihoods (from porterage, pack animals, and all the smaller-scale buying and selling that such traffic brings) that was dependent on mountaineering tourism, due to which there were protests from some villages. There were two other aspects where local people were significantly affected.

[33] Reports such as Lav Kumar Kacchar 1979 JBNHS, and HJ 35 1979.

1. Due to the declaration of large areas outside the inner basin as a Buffer Zone, forests and alps that were traditionally used by villages along the Rishi Ganga, were then closed for entry by local communities and their livestock.

2. With the yearly traffic of expeditions across the cliffs of the formidable gorge and into the basin, a relatively 'safe' route had been established, with fixed-rope anchored at various dangerous sections to aid crossing. It was possible now for local people to go in when they wished to. The area was found to be incredibly rich in certain species of medicinal and aromatic plants that fetch a high price, of which the extraction and trade through local *thekedars* picked up very significantly. Infact, so rich was the area for such collection, that people from the Gori basin went all the way around and into the Sanctuary to collect such plant parts. The people from the Gori basin, are particularly known to combine plant collection with the hunting of musk deer. With the closure of the area, this activity was also greatly affected[34].

While the concept of a Buffer Area has been demonstrated to be a brilliant idea in areas where the topography allows for access by humans and livestock from various points, in the case of the Nanda Devi Biosphere Reserve it seems to be somewhat misplaced. In terms of reducing the intensity of human use gradually, into an area that is entirely closed for extractive use by humans, is an effective means of zoning for certain intensities of use. The other strategic angle is that villages falling within a Buffer Zone are likely to be recipients of special programmes of aid that are aimed at strengthening alternative means of livelihood, thereby reducing pressure on the Protected Area. This too is valid. However, in a situation such as the Nanda Devi National Park, where there was absolutely no ingress or use by humans or livestock in the area proposed to be protected, and where it was relatively simple to monitor any traffic at the only possible entrance, there was no practical need to blindly apply the pattern of buffer areas as well. By doing so, local communities towards the western side have been unnecessarily warded off areas they customarily used, and alienated from the protection process as well.

The people have been protesting, and have also begun to organize themselves. A 'movement' of sorts has started from one village and has gradually snowballed into the formation of a forum of people in all parts of Uttaranchal affected by other Protected Areas (Govind Pashu Vihar, Rajaji NP, Askot WL Sanctuary) The group is called 'Vanadhikar', and it works to assert local rights on forests and to protest against the conservation policy of the state. The group is well organized, has the accumulated organizational experience from the Chipko Movement, and has, with NGOs such as Janadhar from Dehradun, and Arpan from Askot, been able to build a deep and somewhat broad-based perspective on certain aspects. They have even worked out a well-considered '*Van-Jan Suraksha Niyamavali*', or 'forests

[34] Though during the special multidisciplinary Indian Army expedition to Nanda Devi led by Col.Bhat in1993, local people who accompanied them as porters were shocked to see several hundred snares set for wild animals in the core-area ('*Sangharshnama*' of Lata village). In 1997, sixteen poachers from Dharchula, (the valley adjoining the Gori basin on the east) hunting musk deer were arrested by the Forest Department from the Biosphere Reserve area with help of locals, but were released by the District Court in 1999 (Hindustan Times, 5th Sept '99).

and people protection bye-laws' as it were, that will form part of their governance mechanisms in the context of the NDBR. The group is demanding that:

1. Customary use-rights in the Nanda Devi National Park be given back to the people;
2. An objective study of the socio-economic impacts of closure be undertaken and;
3. If the park were to be re-opened, then the villages along the basin would run the tourism (without interference from tour companies and contractors) placing primacy on the conservation and equity aspects.

These are all very valid expectations, and principally, the government should have every reason to attend to these representations. Some areas of contention that one can anticipate will be the interpretation of 'customary use.' In the same manner, and with the same thick brush that the government used to paint the protected area, in terms of adding an unnecessary buffer zone and excluding subsistence users from it, the same thick brush is being used by the protestors now, when they ask for customary use to be restored. They include the inner areas as well (the government has facilitated this by indiscreetly including customarily used areas such as Dharansi and Dubdidevi patta in the Core Area).

The questions here are: How old does 'use' have to be, to be justifiably be called customary? Does fifty years qualify? And what is the nature of use that qualifies it as customary? The word *Jadi-booti* is generic for any wild plant, be it used for medicine, for dyes, food, aroma, spice, tanning, cosmetics or even ritual ornamentation. While the use of medicinal plants for minor ailments was certainly a long-standing practice, people always got the small quantities they needed for their domestic use, or that of anyone else in their village, from high altitude areas outside the inner sanctuary. Large-scale extraction for sale was never customary, but would it now be stretched to qualify? These are questions that would need to be resolved mutually between the government and the people.

When the NDBR was closed in 1982, it was declared that it was being closed for an initial period of ten years, to allow for recovery from expedition fatigue. Ever since, the host of people who have an interest in such areas; dismayed mountaineers, proximate local communities whose economies benefit from tourist traffic, and businessmen such as tour operators, have been waiting for the opening up once again. With the formation of the new state of Uttaranchal, which is somewhat bankrupt by all accounts, and which has little to sell other than its landscapes and natural resource goods and services, there has been an acceleration of interest in the opening up of the NDBR for tourism.

Last year a 'small' eight-member, Indian Mountaineering Foundation (IMF) expedition, comprising among others, a commercial expedition tour-contractor, managed to pull off a thinly veiled 'scientific' foray to assess the recovery, yet again, and to recommend whether or not the area should be opened to a few climbing expeditions[35]. There was only scientist in the group; a geologist we are told. This eight-member expedition took along 140 porters. That they left an enormous cache of expedition rations, enough for another large expedition in the Inner Sanctuary, and that the contractor put out advertisements on the net soliciting customers, before any policy decision was taken in this regard[36], is another matter. It bears

[35] *Sajish benaqab*: '*Sangharshnama*', Dhan Singh Rana, Lata.
[36] '*Sangharshnama*' Dhan Singh Rana, Lata village.

mention here only in the context that the expedition, which was supposed to break bureaucratic trail in facilitating the area to be opened up to judicious, and eco-touristy trips that would benefit 'all', succeeded in deeply alienating not only the people of Lata village by their interactions, but also in setting verglas on the state bureaucracy. The fears of Vanadhikar, were valid all along.

The 11 alpine villages in the Buffer Zone that falls in the Gori basin have so far not been affected in any negative way by the Biosphere Reserve. Like other villages around the whole sanctuary, the Nanda Devi basin is practically inaccessible from this side. There has only been one crossing so far, and that was when Tillman and Ang Tharkey climbed incredibly out of the Nanda Devi basin into the Gori basin over the Longstaff col in 1936, after the first ascent of the Nanda Devi.

All the land that falls in the Buffer Area here, except for the small area covered by abandoned agriculture fields, are under Van Panchayats. All use-regimes are in place, customary or otherwise. They (many of whom are shepherds) are also startled recipients of fortuitous bales of wool that comes all the way from the plains, and a per-*jadi-booti*-grown 'incentive' received on occasion from NDBR development budgets.

However, the real link that these villages do have with those that are organized under Vanadhikar, is the tourism potential of the Gori basin, and the possible trajectories that tourism can take. There are three mountain peaks over 7000 metres high, each of which have only been climbed by one route. There are also a host of unclimbed mountains over 6000 metres high, and these form very attractive objectives for climbers all over the world. Trekking routes are spectacular, and even well known. A determination of how tourism will develop here is relevant. Will it be in the hands of local people, and will the primary benefits be broad-based, or will it be in the hands of remote control operators, and local people remain underpaid porters? And it is not just about local versus outsider. So far the major earnings from the little tourism that does take place in the basin presently, is cornered by a few *thekedars*. A broad-basing of the earnings, its local control, and its impact on the local environment and culture are the more relevant aspects.

There is another aspect of the Nanda Devi Biosphere Reserve that has received international media attention, but that local communities living around the periphery of the park are entirely unaware of. While the subject is sensational, and can be taken out of proportion because of the subject it deals with, it is the official silence that surrounds it that makes it more so. The story is an old one, over thirty years old, and if the government were to come clear to the public about its present status, it would perhaps lose some of its sensitivity and its speculative juice.

We read[37] that a nuclear powered spying device was attempted to be placed on the Nanda Devi mountain (the East part of the mountain massif drains into the Gori basin) between the years 1965 and 1968, by successive joint expeditions of the CIA and the Indian Army. This was reportedly to keep an 'eye' on Chinese missile tests in the Sinkiang Province.

[37] Nanda Devi, Exploration and Ascent, a compilation of mountain exploration accounts by Shipton and Tillman, pub 2000.

In 1965, it was carried up this precipitous mountain face, (helicopters have not been made that go as high as Nanda Devi summit; 7816m) and, since they could go no further that year, they secured it to the mountain at 22,000 feet. On return the next year to take it further up, the device was not there; it was found to have been swept off the mountain by an avalanche. This necessitated further, and we are told unsuccessful, expeditions to locate and remove it from the Dakshini Rishi glacier or the cwm of its catchment. There is concern that at some point it will emerge from where it is buried in the ice, (as do old bodies of mountaineers) because glaciers are constantly heaving and cracking open, and cascading off slopes. The National Park, and a World Heritage site apart, the Rishi Ganga eventually feeds the Ganges, and the concern is, after reading all this, that the effects, if any at all, could be far from local.

Later, we are told[38], a similar device was successfully installed on Nanda Kot, (this mountain is right on the rim of the Gori basin, and therefore drains into it as well), but was soon made redundant by improved satellite technology. Ten years later, revelations regarding the 1965-68 CIA and Indian Army activities in the Sanctuary hit the press[39]. In 1982, the Inner Sanctuary was closed to allow the area to 'recover' from expedition pollution, and there is speculation (among mountaineers) as to what kind of pollution was the real cause.

In the intervening period, and till last year, only one multi-disciplinary army expedition (1993) with a strong medical contingent, was allowed into the Inner Sanctuary, to monitor the recovery of the area. Then last year, the Indian Mountaineering Foundation (IMF) expedition mentioned earlier in the context of tourism, went and alleged ineffective management and protection by the State Forest Department. This was then followed by what is so far the last expedition; a highly under-equipped, and under-stocked expedition by the Garhwal Rifles, who were greatly assisted by the huge cache of food and equipment left behind by the preceding IMF expedition, quite obviously for future commercial expeditions. They did not climb any mountain, but did speak of significant recovery in the area, due to protection by the Forest Department in this very difficult terrain.

The problem with this nuclear device story is that the public only has what the press had to say about all this, and no clarification from the government to the public regarding how much of this is true, and whether or not the device has been recovered and disposed off by the 1993 army expedition, and what of the device on Nanda Kot? There may be nothing at all to this story any more. We have half-baked information, which may be way outdated, and half-baked knowledge of radioactive substances and their half-life[40]. Such derelict devices are presently being cleaned up in places in the erstwhile USSR, and the US, our 'partner' in these missions, is still cleaning up its incredible mess on the Bikini[41]. But information about such devices on the Nanda Devi or on Nanda Kot are sensitive by their

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[38] Berkeley Barb, Vol 4, Issue 95-"USAF Mystery Mission", Seattle Post Intelligencer, 5th May 1974-"Filling in the Blanks on the CIA" by Jack Anderson; Outside, May 1978- "The Nanda Devi Caper" by Howard Kohn.

[39] American Alpine Journal, 1979.

[40] Radioactive substances such as Cesium, we are told, have a half-life of 30 years, whereas Plutonium 239 has a half-life of 24,360 years (William.S.Ellis, National Geographic June 1986).

[41] **After** Hiroshima in 1945, twenty-three nuclear explosions were conducted on the islands of the Bikini and Enewetak atolls by the US. As if Hiroshima were not enough to know, one of the explosions set off in 1954, heroically named Bravo, was a **thousand times** greater than the atom bomb dropped on Hiroshima (Same ref as W.S.Ellis, above).

very nature, and our government would do well to put our public, or whoever may come across such open-ended information, at rest regarding what the present situation is, or what we can anticipate in this regard.

Askot Musk deer Sanctuary

The Sanctuary was declared in 1986, and covers a total area of the sanctuary is 600 square kilometres. This area covers three major watersheds, a portions of the Kali (West Himalaya), the Gori and the entire East Dhauli. Of the 600 square kilometre area, about 225 square kilometres is Civil and Van Panchayat land, and 85 square kilometres consists of agriculture land. The entire Dharchula tehsil, many villages and towns (Dharchula, Balwakot and Jauljibi) come under the designated Sanctuary area. The towns mentioned are all below 1000 metres in altitude, with Jauljibi as low as 600 metres. An unusual demarcation for the protection of musk-deer, whose range is largely between 2,500 metres and 3,800 metres asl.

From conversations with people in villages included in the Sanctuary, the manner in which public dealings were conducted with regard to the Notification, seem to have been classic. We are told that after the initial notification in July 1986 the District Magistrate released an order for the 'settlement of rights' in October '86 stating that the area had been notified as a protected area and that if any claim had to be made, its nature and extent should be specified in writing. This letter went to Gram Pradhans and about ten of them signed that they had no objections or claims. The Pradhans who signed the orders were told that it would bring 'development' like roads and electricity to their villages. No information was given about the restrictions that would be imposed or of the boundaries of the sanctuary. Even today, many villages are not aware that their village or village forest is in the Sanctuary area, and in most of these areas no new restrictions have been brought into force yet.

The Gram Sabhas in Dharchula block and Vanadhikar have sent applications and memoranda to the state to exclude the Civil, Van Panchayat and agricultural land from the sanctuary. The Forest Department, we are informed, is presently preparing a proposal that will re-demarcate the boundaries of the Askot Sanctuary to exclude all the agriculture land, as well as the Civil and Van Panchayat lands, and propose a final Notification from the Ministry to that effect.

The situation prevailing in the Askot Wildlife Sanctuary is somewhat unusual. The largest chunk of Civil land in the Gori basin actually falls partly within the Sanctuary area (about 347 square kilometres in all, as per FES GIS estimations). This area has recently been discovered to contain some of the highest and most valuable biodiversity, as compared to other Protected Areas in the Western Himalaya[42]. But unlike all the other alpine areas in the basin, the major portion of the alpine areas in this chunk are not under any Van Panchayat, and there is no way one village can restrict the other from coming to these alps to collect or extract whatever they can. Consequently, this most valuable area, is the most heavily extracted from in the entire river basin; be it for Cordyceps, or for medicinal plants, or even for musk. There is an ongoing feud between villages situated close to this area in the Gori basin, and those over the ridge on the Darma side, where even the hand of *devta* and

[42] Protected area network in Indian Himalayan region: Need for recognizing values of low profile protected areas: Ranbeer Rawal and Uppendra Dhar.

demons have been invoked to arbitrate, and visit retribution. In the year 2001 there were an estimated 5000 people camped on the alps digging for the Cordyceps caterpillar. The number of people prospecting is rapidly on the increase every year since then, as are the areas being scoured for them.

Since 225 square kilometres is Civil land within the Sanctuary, it can possibly be applied for and given to proximate villages as Van Panchayats. A few villages who could pull this off, are planning to apply for this land to be given to them. All this at a time when re-demarcation is going on. Doing so, on the one hand, will give a particular village the right to extract, and prevent others from doing so. The advantages of this will need to be considered.

1. While this may be able to prevent a free-for-all, it will in effect, be subjected to the same kind of use already on, by the new owners of the Van Panchayat. Purely extractive use at a commercial scale.
2. Other than passing the administrative buck to a few villages, it will not have any positive effect towards the conservation of the valuable biodiversity of the area.
3. It will most certainly heighten legal conflict in the initial years, because many villages can claim such 'customary' use.
4. It would repeat the earlier unjustifiable bestowing of huge areas to some Van Panchayats, who already have large areas as Van Panchayats. **This area under discussion is about two days walk away from the villages around it.**
5. The area is already a designated Sanctuary. In the political environment today, it is going to be impossible to designate new areas under such legal protection, whether they merit it or not. There is already a rising chorus that Uttaranchal has too much area under Protected Areas (Reserve Forests in the Gori basin comprise only 8.71%). Once this Civil area is de-notified from the Sanctuary, it would not be possible to reverse it for a long time.

Just a word about this chorus. While the antipathy towards Protected Areas which have been instituted, is largely earned because of the manner in which local communities have been dealt with by the bureaucracy since the British times, the growing demand for the dismantling of **all** protected areas in the State of Uttaranchal is indefensible. This is an unreal juxtaposition. Amazing comparisons are made with states in the plains, such as Haryana and Punjab which have 2.18 % and 2.80 % as Forest Land respectively[43], and most of this is politically motivated. Forests have historically been a strong rallying point for the people of Uttaranchal, and their real link with forests is so immediate and so deep, that it touches them to the quick. Masked in this call for restoring 'rights' by dismantling Protected Areas, are thin ends of many other wedges: the mafias and the consortia dealing with the trade of biological products from the wild, for one. Politicians casting about for a cause (banning Valentine's Day is also high on their agenda) for another. While people may respond to the rallying call against Protected Areas, (witness epithets such as '*Jhapto-cheeno*' used during protest demonstrations; which is really an overstatement of an otherwise valid cause) and even win the battle, who really, they need to see clearly, will lose the war?

[43] FSI, 1999.

It also bears mention that there are some very sincere and well-meaning NGOs and activists, whose interventions on behalf of, and with forest-dependent people is most valuable. With a few of these, however, the picture of what is wrong, is painted with a rather broad brush and in monochrome, that glosses over some of the less obvious, but defining hues. The usual polarization is between 'local' and 'outsider' (irrespective of the exploitative stratification within the local, and the 'local' face of the abstract, distant 'outsider' body), between 'government' and 'people' (no matter that each has a distinct and important role to play in the governance of forests), and the hold-all of 'customary use' (that often refers to the landscape that was customarily used, but is silent on what the landscape was customarily used for).

The State of Uttaranchal, and the Gori basin in particular, contain areas of rich biodiversity. As described later in the chapter on the Commons and in the Recommendations, the areas such as the Gori basin, and large swathes of contiguous areas such as the NDBR, the Askot WLS all along the Greater and Trans-Himalaya areas of the State constitute the last of the frontier forests of the state, as indeed of the nation. The value of the biodiversity they are being discovered to contain, as well as just the irreplaceable value of large, unfragmented 'wildernesses' for the future of biodiversity conservation cannot be overemphasized. The area under protection must be sought to be increased, even with varying intensities of subsistence use where necessary, and in cases non-extractive use. A zonation of such areas in state and national planning, and a prioritization for conservation-oriented development, is called for. More on this in the recommendations.

THE COMMONS IN THE GORI RIVER-BASIN

The Commons are quite simply the most significant dimension of landscape of the Gori basin. They comprise most of the area of the basin, contain the most biodiverse landscapes, and even the most pristine wildernesses of the area. Their significance in the context of land-use, in the context of the governance of remote mountain areas, the political economy of local livelihoods, and various dimensions of the biodiversity of the area requires to be recognized.

The assemblage of commons in the Gori basin is, by all standards, most unusual. Consider this:

About 72 % of the landmass of the entire river basin is actually owned by villages as village commons, both as Van Panchayat village forests, and as Village Grazing Lands. This is in addition to their owning over 405 square kilometers of land in adjoining watersheds as part of their Van Panchayats. There are 171 villages in the Gori River basin. 46 of these villages, or 25% do not have any village forest or Van Panchayat. 125 villages do, and between them have 135 distinct Van Panchayats. Yes, in cases more than one Van Panchayat per village. These Van Panchayats own 1,439 square kilometers of land as village forests, which constitutes about 65% of the total area of the entire river basin[44]. Village Grazing Lands comprise about 7%.

The question of how well these village commons are governed, and what state they are in, is not a simple one, and the response deserves to be elaborated in its few layers. While such an overwhelming proportion of land under commons is unusual, and not representative for much of the lower Himalaya, it is a magnification that could well serve to illustrate and to peel open some of the layers of the current and hotly debated subject of 'people's interests' versus conservation.

Almost all the literature on Van Panchayats that we have come across, are analyses or a description of phenomena that have to do with Van Panchayats in the lower Himalaya. These just do not reflect or represent the processes in this area, either historically, or those that are unfolding today. Some of the information is unsettling and does not readily conform to either poles of the conventional drifts of the debate on people and forests. This piece is intended to be a contribution to this discourse, and while it is interpretive in places, it is first-hand, and somewhat compelling.

Van Panchayats

The first Van Panchayats, or Village Forest Councils in the Gori basin were constituted in the year 1947, about sixteen years after the first ones were formed in the lower hills of Kumaon. One would have imagined that as word got around regarding the possibilities, there would have been a flurry of applications and formation of Van Panchayats. People from the valley who owned sheep traveled to and from the terai, past Almora and Nainital districts every winter, and would therefore encounter and be informed of such significant policy changes. They grazed their animals on lands along villages enroute where, due to the formation of new Van Panchayats, these herders would need to re-negotiate grazing

[44] FES GIS data.

privileges, and where such information would inevitably be exchanged. But we see that there was no coordinated or urgent response to the new opportunity. On the contrary, the sheep and goat owners were the relatively well-off, and it is possible that they held the information close to their chests, and used it to the advantage of their villages, and their clans wherever they could.

A look at the dates of the constitution of Van Panchayats in the area shows that the build-up was slow, sporadic and irregular. Sometimes three or four Van Panchayats were constituted in a year, and never exceeding eleven. In 20 years between 1947 and 2002, none were organized at all. The only pattern that is discernable is that in some cases, immediately neighbouring villages (which were often contesting 'customary' use-boundaries) applied together for and accessed land for their Van Panchayats concurrently. Out of the 125 villages that do have Van Panchayats, seven of them were either wholly or partially made from Class I Reserve Forest land. Out of 1439 square kilometres under Van Panchayats, 29.25 square kilometers, or a little over 2 % was from Reserved Forest land.

There is no doubt that the decision in 1931, to give back some lands to villages to own and manage as their commons was good common sense. Looking at similar situations in other parts of the country, it seems path-breaking. Under the circumstances it happened though (ref the largescale protests in the region), the government may have had little choice. However, if we look at the distribution of land to Van Panchayats, any principled basis or rationale to guide the allocation of land to villages, of equity between villages, or even rationality of governance and use, in terms of endowment and multiplicity of users, seems to be absent. The human population of a village, its animal holding and the extent of its agriculture would normally guide any determination of how much land as support-area they would require. Some margin for growth perhaps, in those rare cases where there may be sufficient land for such future considerations. The location, (in terms of aspect, altitude and steepness of land) and the consequent land capability and use-regimes, would be further determinants. Inevitably, the constellation of other villages nearby, and their competing use of forest and grazing areas, would surely be another practical consideration. At another level altogether, would be considerations that could take into account the interaction of the forest area with its surrounding forests and the integrity of the multiple interactions that would determine its productive capacity, both located and mobile. There is no evidence of even the simpler considerations being taken into account.

As mentioned earlier, 46 villages in the basin have no village forests. One village, on the other hand, which is presently inhabited by 12 households, has 847 square kilometers as its village commons. This is not the only one. 21 villages that are sparsely populated, and some only seasonally, have over a thousand hectares each, and similar ratios of per-household

availability. There are two entirely uninhabited villages, Sumdu and Poting, that have large Van Panchayats. At the other end of the spectrum are villages like Chulkot, with 52 households who have just 9 hectares as a Panchayat Van.

There are glaring disparities even between neighboring villages. Just adjoining Chulkot village (number 57 in the map) just mentioned, is Ringu village (no:58) which has 633 hectares in their Van Panchayat which was organized in 1949 in addition to 360 hectares of Village Grazing Land. Just below it is Waiga (no:56), with 13 households, which had no Van Panchayat till the year 2000, when FES assisted them in creating a Van Panchayat on just the 27 hectares available. Another village Phalyanti (no:24), not far away, has 23 households with 73 hectares as village forests, and Uchhaiti (no:25), right next to it, with 32 households has just 18 hectares as a village forest. Obviously, conflicts are recurrent and intense. There are also other complex variations in the composition and ownership of Van Panchayat lands that challenge the successful governance of commons.

Appropriation by villages, or sections within communities, of land for Van Panchayats from the government seems to have been largely opportunistic. On the one hand, this is quite understandable and may even be universal. Till not very long ago, the year 1815, the basin was overrun by Gorkha invaders from Nepal who appropriated land and levied crippling taxes and fines to raise revenue, in addition to selling people as slaves from the area[45]. A British multinational trading corporation, the East India Company, forced the Gorkhas into retreat across the Kali, and later, in the name of the Crown appropriated all the commons and every inch of land that was not measured as croplands. Being a very remote part of Kumaon, where the logistics of effective 'administration' or exclusion in the Gori basin being impossible at that time, there was little tangible day-to-day effect of this appropriation, and no people's struggle against it, as was witnessed in lower Kumaon. However, for the local people to negotiate land back from the government, and in competition with neighbouring villages, it was one step at a time.

In stages, the British administration encouraged the extension of agriculture onto cultivable wastelands under a provision for Nayabad Grants. After independence from the British, and subsequent build-up of hostilities with China, came the big shock in 1962: the closure of the border with Tibet. This was a severe blow to the Shaukha traders. This was closely followed by a Land-Settlement between 1962-65, where the Shaukhas, who owned most of the lands in the valley, lost them to the real tillers, who were Jimdaars or Rajputs. The only legal avenue then, to negotiate with the government for more land was through the procedures of applying for the constitution of Van Panchayats on Civil land. In rare cases, Reserve Forest lands could be given to them to be held as common property under Van Panchayats. And this they did, progressively, in every way they could.

[45] In the year 1811-1812 over thirty thousand slaves were sold from Kumaon (Ref A.K.Mittal, Kumaon during Gorkha and British Rule). However, this seems to have been a bit of a home-grown 'tradition', for even till the year 1837, well after the Gorkhas had left, the practice of buying and selling children and adults as slaves in Kumaon was not uncommon. The sale of wives by husbands, of widows by relatives of the deceased, and of children and females for prostitution was legally proscribed in 1819, but continued for years thereafter. The sale of children and adults by parents continued to be legal, and was accompanied by a deed of sale and was recognized by court, which heard claims of servitude or freedom like any other suit till 1837. Ref. The Himalayan Gazetteer, E.T.Atkinson Vol III.2.

This 'every way', on the other hand, was often opportunistic, even autistic. It was often, and unrealistically, at the expense of the neighboring villages, and wherever possible, exclusive even within the village. In cases, membership even restricted to clans, or the earlier settlers, or more powerful families. While the first Van Panchayat Niyamavali of 1931 broadly laid down some rules for governance at the village level, and its connections with the district administration, it was far from evolved to specify any detailed provisions that could ensure equitable or democratic functioning. Even today, some Van Panchayats are being formed and run as collective private property of a few, rather than as common property with its attendant characteristics. In many villages today, membership to the Van Panchayat is restricted, and relatively recent settlers in some villages are refused membership. Many of these new settlers are from villages progressively destroyed in landslides, and they have had to move, or some that have moved to a village closer to higher-secondary education for their children. There are also numerous villages where such exclusion is practised, and those where the grass-stands for hay have been permanently parceled to particular families.

A significant part of the problems between villages, lay in village boundaries changing over time. The first formal and legal demarcation of village boundaries was done during the first Land Settlement of 1823, that is commonly referred to as the *Assi Sala*, being the 1880th year on the Hindu Calendar. The demarcation of village boundaries was reportedly done on the basis of customary use. While this might have been the principle on which demarcation was attempted, it is clear that in many cases there are major distortions. In the first place, what is 'customary' need not necessarily be democratic or equitable. At a time when trade with Tibet from the valley was at a high, and social and economic stratification was distinct due to the very disparate economies of trade and subsistence, and relationships feudal, might was clearly right. Customary assertion of such right then, got legally reinforced.

Feudal relationships apart, the villages along the trade route were densely populated, especially at caravan stages, trade points and the entrepot village. Some villages, such as Milam for example, where a population of 1,490 was recorded at the time of the first Settlement, could hold no more people, and certain families and clans overflowed onto adjoining lands, or across the river, and even entered previously uninhabited sub-valleys, such as Poting. Under such circumstances, the interpretation of customary use was inevitably skewed. So we had, and in some cases still have, villages whose boundaries go up along their side of the river bank right up to the glacier, and then over the other side and down the opposite river bank right upto the village on the other side. This village on the other side though, may have little or no land on its side. In certain cases, however rare, village boundaries even spilled over the high rims of the river basin, into adjoining watersheds.

Such distortions, one would expect, would be removed in subsequent Land Settlements, but this does not seem to have happened. The second Land Settlement that took place between 1960 to 1964, was successful in breaking down feudal land-ownership or *Zamindari*, and in the removal of Forest Lands from Village boundaries, but seems to have redistributed inequities in village boundaries in many cases. During the second Land Settlement in the basin, village boundaries were redrawn, and here again, it is difficult to decipher any uniform

or rational basis for division and redistribution. Many boundaries go against the grain of reason. While some *Assi Sala* boundaries were retained, the boundaries of numerous villages were redrawn, and we are told, in many cases, there was quiet collusion between Revenue Department Officials and such changes effected on record. There were even cases of honey-trapping *patwaris* by villages, and coercing them to reallocate land to them during the Settlement in the Gori basin.

After the Settlement, the *Assi Sala* boundaries were declared void, but villages were legally given the opportunity to dispute or seek legal redress to these Settlement boundaries for another twelve years. Practically no one it seems, in any village, seems to have known of these provisions, except a very few. It is therefore not uncommon to hear during the legal settlement of current disputes today, people still harking to *Assi Sala* boundaries, without having a clue that those boundaries were nullified by 1975.

Another interesting aspect of land holding in this area, and one that is relevant to how people perceive collective ownership, is the existence of almost all private land-holding in large joint-accounts called *Gol Khata*. Almost all land in this basin is registered with the revenue Department in joint-holdings of many families. Sometimes clans are joint holders, and sometimes even unrelated families are. Sometimes almost the entire village are joint holders of the land. There is a record however, of how many *hissas* or what share or proportion of land belongs to which family, but actual *kabza* or persistent holding is determined by old divisions and long-standing possession and use, and can be contested by any joint holder at any point. This administrative arrangement may have seemed convenient to the British, but has resulted in the following:

a. recurrent squabbling between joint-holders, resulting in a level of insecurity of tenure, more so for the less powerful.

b. The near-impossibility of being able to sell land independently, or being motivated to invest in land improvement, because of lack of cohesion, and almost perverse contestation.

The point being made, however, is that *Gol Khata* land is truely private property that is collectively held by a few, unlike their commons. While commons do have clear definitional elements that are identical to private property[46] held collectively by a few, there are additional intrinsic elements that (we would like to see?) apply to commons universally, and that would distinguish them form plain private property. These would include, among others, equal rights to benefits between co-owners, primacy of use-values, and wider circles of identification to other life-forms, as well as human society at large. Joint holdings of private agriculture land, or *Gol Khata* land, which comprises almost all private land in the high alpine villages, and most agriculture lands in much else of the basin, does seem to be somewhere in the conceptual transition between collectively held private land and common land, and influences the way joint holdings of common property are also perceived.

With about 73% of the land being under Van Panchayats and Reserve Forests, it may seem that the area is overwhelmingly under **forest cover**. On the contrary. About 8% of the

[46] Ref Margaret McKean in 'Common Property'.

landscape is nival, or under permanent (year-round) cover of snow and ice. Another 54% is alpine, which is under snow for at least six months, with practically no tree vegetation. 9% is sub-alpine with some dwarf and krummholz vegetation. Only 29% of the entire landscape comes under the range of cold-temperate, temperate and sub-tropical life-zones which could support tree vegetation, or forest cover in the general sense. Even here, there are steep cliff and rocky areas, and also areas where tree cover and the regeneration of it is deliberately retarded by humans through the use of fire for the extension and maintenance of certain areas as pastures. Then there are the open-access areas such as some Civil and Soyam lands that are subject to unregulated and over-intensive use, and are degraded. Many Van Panchayat forests that are too small to meet even subsistence needs or those that are violently disputed are also subject to sudden or progressive deforestation.

Most of the Van Panchayats that are located in the alpine and sub-alpine areas are **not visibly** deforested. The term deforestation however is a many-layered notion, where degradation, fragmentation, forest decline, forest loss and conversion require to be specified[47]. In the alpine and sub-alpine areas of the basin, which together constitute about 73% of all Van Panchayats land in the basin, and where 90 % of all plant species listed by us are herbs or grass, and therefore have no visible or above-ground biomass for more than half the year, deforestation or even degradation cannot be easily seen. Some of these Van Panchayats however, such as Ralam and Poting, contain forests and alpine wildernesses comparable to those found in the best Reserve Forests in the area. It would only be fair to compare with State Protected Forests that have similar physical access by human communities, both remote and difficult.

Being under Van Panchayat ownership and control has certainly contributed to a certain level of protection. There is an important distinction though that is appropriate to make here. The protection is, by and large, from an open-access situation, which would not have changed the **nature** of use, but would perhaps have increased the **intensity** of present use. Whatever can reasonably be extracted, whether for domestic consumption or for sale to international markets, is still being done even under some of these Van Panchayats. Protection of Van Panchayat lands from encroachment is quite outstanding in the area. Almost no Van Panchayat lands are encroached by individuals. Van Panchayat lands are viewed in this respect as commons and attempts at encroachments are dealt with by the community themselves. It is however, in the Civil and Soyam lands that are viewed and used as State Property and used as open access areas, that encroachment is rampant. There is one recent exception, which is also being resorted to under exceptional circumstances. Kultham village was seriously affected by a severe landslide in the year 2000. Many families lost their homes and some, all their agriculture fields. After repeated representations to government for help and possible relocation, and no positive response forthcoming, some of the families just moved into some suitable areas in their own village forest, demarcated sections for their homesteads and for agriculture, and set up residence there. After an initial period of waiting for a response, either from the village or from the state, many more families from the village moved in, including those not affected by the landslide directly.

The small populations that now inhabit the high alpine villages (ranging from three households to a maximum of about 45 households), have a relatively small requirement of fuelwood.

[47] The Economics of Deforestation: The example of Ecuador. Sven Wunder 2000.

The requirement is high per capita because of the low air-pressure due to high altitude, cooking takes much longer and therefore more fuel. The cold climate requires fire for heating living spaces as well. But populations are very small, and the total requirement is relatively low. This is met from whatever juniper stands there are. In most villages, the stands that were close to villages have been decimated, and the further ones are being progressively degraded. The old juniper stand in Panchu village was burnt down by the neighbouring village in an inter-village feud over village boundaries in 1994. In Bilju, which had the most spectacular centuries-old stand of juniper (*J.pseudosabina*), local hunters set them ablaze to flush out Musk-deer in the early winter of 1990, and similarly to the stand above Lwa village in 1995.

So generalizations, we can see, with regard to decentralized governance do not always hold good. There is no guarantee that giving communities greater control over forest resources will necessarily lead to their being used wisely, or be more effectively protected. Elinore Ostrom and Poteete have studied situations in five countries including India[48], where government agencies lack the capacity to regulate the use of forests, and under what circumstances could communities be expected to do so. They found that it could happen more easily where:

1. Government agencies do not undermine local efforts to monitor forest use, sanction against abuse and resolve conflicts.
2. Where local groups perceive forests as important, and where benefits from protecting them outweigh the costs.
3. Groups have previous organizational experience, and share a common understanding on what is happening in the forest.
4. Forests are small enough and easy to monitor.
5. The political system empowers groups **within** communities to favour sustainable forest management, rather than those that have strong vested interests in unsustainable activities.

On a few of these counts, there is reason and scope for serious consideration in the instruments of forest policy in Uttaranchal. Regarding point 2, as described earlier, the administratively arbitrary, and locally opportunistic manner in which the demarcation and delimitation of Van Panchayats was and still is being undertaken, has doomed the Van Panchayats to be hubs for increasing and interminable conflicts and feuding between villages. Rising human and domestic animal populations, and the subsequent changes in administrative units of villages (subdivision due to increase in populations) are one set of complications. The increasingly intensive and desperate recourse to extraction of high value commodities from their village forests for distant markets, is clearly making matters worse. Under these circumstances, the costs of protection in terms of more intensive watch and ward, and the protracted and expensive court cases is creating an increased and sometimes crippling financial burden on communities, and more so on very poor people.

[48] 'An Institutional Approach to the Study of Forest Resources' for CIFOR.

Regarding previous organizational experience (point 3), we can say that some communities in the basin do have long-standing Van Panchayats, but many have no Van Panchayat or have recently acquired the institutional framework, and therefore have yet to gain the experience. But even in villages where there have been Van Panchayats for decades, there are often divergent perspectives on what is happening in their forest, and what is desirable. These divergent perspectives have to do with the often incompatible political economies of subsistence-use and those of larger-scale commercial extraction. We were unable to distinguish any clear co-relation between longer-standing Van Panchayats and relatively newer ones, and better governance *per se*. There are many other variables such as recent market impulses, the emergence of overlapping institutional structures such as in the Joint Forest Management programmes or even larger *Zilla-Panchayat* overlaps on commons governance, that seem to present new personal or political advancement opportunities to those who interface on behalf of villages, to name a few.

On point 4, regarding the size of the resource and ease in monitoring. As mentioned earlier, while there are many villages with miniscule village forests or those with none at all, there are numerous in the alpine areas that have hundreds of square kilometres of land as village forests. High and remote, often stretching beyond glaciers to high nival ridges, there is no way that village communities can effectively monitor such large stretches on such difficult terrain. But because of this very harsh and dangerous terrain, there are only a few feasible ways in and out of these remote areas for humans. These passages are used, however occasionally, by local people themselves, and if anyone would notice an intrusion, or hear a gunshot at all, it would be them. Ofcourse the government machinery in such places, if there were any, would be far less aware, let alone effective in apprehending deviation by themselves. But that having been said, we have then to acknowledge that in practice, the allotted area of many such Van Panchayats is far too large for villages to monitor by themselves, and the communities that are charged with governing them, are in such cases often given to exactly the same failings that the government is accused of; collusion and rent-seeking by a few.

The size of a village does sometimes have a demonstrable advantage towards protection, in terms of more people being able to contribute money or food-grain towards paying for watch and ward. In the Gori basin, we see that this is less so than the daunting effect a large village can have on a smaller neighbouring village, that would discourage unauthorized use. Infact, in most cases, and we could only see one recent exception, the larger village often uses the daunting effect of its size to bully and forcibly use the Van Panchayat of the smaller village.

Point 5 underscores the fact that there are divergent interests not just between communities, but **within** communities. The exploitative divisions of labour, or the formation of exclusive clan-based Van Panchayats are but a few illustrations in this account. Political systems, as reflected in government policy, and further in regulations and programmes, do have tangible impacts in terms of encouraging a particular kind of land-use. Different land-use decisions determine whether the benefits will be more enduring, more equitable and in local control, or whether they are centralized, benefit a few, and be determined by forces outside the community, and whether they can be sustained. A political system can favour one or the

other. With regard to Van Panchayats, the new policies of the government that can infuse inessential expenditure through Van Panchayats, such as loans that must be paid back through the sale of commodities from these village forests, raise such a concern. The rising rhetoric by both government and NGOs with regard to the area being a 'storehouse' or 'reservoir' or '*bhandar*' of medicinal plants, and the broad and undiscerning momentum being given to its commercialization, all in the name of livelihoods for the poor, is a galloping Trojan-horse bearing vested interests.

Another characteristic aspect of the use and appropriation of benefits from these Van Panchayats is the complex patterns and multiplicity of users. In the mid-altitude and lower villages there are numerous arrangements whereby villages either mutually share particular advantages of their particular village forests or grass stands. A village for example may have a south or east facing cliffy slope where there are no trees and where the production of grass, particularly *Chrysopogon gryllus*, a good grass for thatch, is abundant and of high quality. The slope could have much more grass than they would use themselves every year, and so they will permit a few neighbouring villages to cut and carry away, either on payment or on mutual exchange, loads of grass every year. In return, they may be permitted to enter a broadleaf forest of the closest village to sweep and carry away leaf-litter in autumn for their compost needs.

Even more common than mutual exchange, is the wide-spread prevalence of multiple users in almost every village Van Panchayat, which is often not mutual. As described earlier, the landscape has been parceled with no consistent logic at the village or watershed levels, to different villages. Mountain landscapes and their very diverse forests, also described earlier, are the result of the complex and continuous interaction of larger units of the landscapes. If we parcel them off, disturbing these interactions and imposing exclusive strategies, we will not only unhinge the productive capacities of the forests, but also lose the diversity of elements that it is composed of. Village communities know this, and because their village forests, like the rest of their village, is located at a particular altitude and aspect, it can only meet a part of their year-round requirement of diverse forest products. A few villages do have entire sub-watersheds as village forests, that can meet all their requirements and more, but they are only a few, and they also share with other villages. So willy-nilly, and whether villages are predisposed to share or not, people will enter their forests at different times of year, for different produce, be it leaf-litter or be it grass or fuelwood, or a particular sort of timber or bamboo. They have little choice. The cost of being able to protect village forests from such pressures is high and most villages cannot afford the cost of such intensive protection, since one watcher cannot possibly monitor such forests that are distant from the village, and where visibility is poor[49]. So most villages settle for agreeing to allow some formally accepted use by neighbouring villages, on some payment, whether they have enough for themselves or not. The alternative is fierce and violent confrontation, which may not be worth their while.

[49] The cost of watch and ward forms the greatest burden on Van Panchayats today. For aspects such as cow herding, villages commonly employ children, or old people, or most often people born with physical or mental handicaps that make it impossible for them to get any other employment. Such people come cheap and are easily exploited. An able bodied person who could effectively apprehend intruders from a village forest however, would require to be paid a part of what she or he could earn from other employment, which works out to at least Rs.1000 a month, in this area. Not many villages are able to work up that kind of cash.

Within village boundaries, and as per the last Settlement of the 1960s, are patches of Revenue Land (as differing from upper-case Forest Land), that are remnant patches from land appropriated for cropping, and from those larger patches that have been constituted as village forests. These are often adjoining agriculture fields. While this falls within village boundaries, villages do not have formal rights over it as they do over their commons, and subsequently, these patches of land that are often in open-access conditions, are over-used and most degraded. In some cases they are in various stages of encroachment, which is always done in stages. In other villages they have been 'customarily' parceled to particular families. Where such encroachment is sufficiently common, and many people are doing likewise, they are all expected to, and do keep the matter away from the law. Such land is eligible to be added on the existing Van Panchayats as village commons, or for the creation of a new Van Panchayat, but very few villages are keen to see this happen. It will displace informal appropriations in many cases, which they hope will be formalized in the next Settlement. In some cases, land has also been allotted to landless households from such Civil Land, and as long as there is some such land in the village, the hope of getting some of it allotted to more hopeful families is always alive. It is relevant to add here that in the Gori basin, there are practically no encroachments on Van Panchayat land or on Reserve Forest lands by individuals.

There are some long-standing arrangements too, whereby the landscape is shared by people from distant valleys, even different states, and in one particular aspect, even people from different countries:

Grazing of sheep and goats is one such arrangement. We have estimated that something like 19,764 sheep are grazed in the alpine pastures of the Gori basin during the summer months. Of these, 88 herders owning about 12,626 sheep are from villages in the valley itself, while 32 herders who own about 7,138 sheep come from other valleys, some close and some far away. Even as far as Palampur in Himachal Pradesh. Thirty six herders own 2976 pack-goats, and of which 1217 are from villages outside the Gori basin. Eight sheep herders, on the other hand, from the Gori basin take their sheep, about 754 of them, to the neighbouring valley of Darma to graze in the alpine pastures in summer. This has to do with the contiguity of these alps over high passes in their own valley, and with long-standing alliances with families in the adjoining valley. Sheep belonging to herders from villages other than the village they are grazing their stock in, are required to pay a surprisingly small fee of one rupee per sheep for a whole seasons worth of grazing. Till two years ago, it was just 50 paise per animal. Informal and personal gratification of the village 'leader', is often resorted to.

In some villages, where the Van Panchayats have large areas under alpine pastures, and where the grazing is good, villages like Martoli and Ralam, which fall in the transition zone between the Greater Himalaya and the Trans Himalaya, the largest number of herders are to be found. Other considerations such as a well-stocked village where they can visit for replenishing their rations, or drop-in during the evening for a drink, and in rather rare instances, for the company of a woman, are also determining factors. Sometimes more important in determining the number of herds that visit a particular village, than even the

quality of grazing to be had. More often than not, the shepherds that take the herds up to the alps are hired hands, who are required to stay away from their families, except for brief periods, for most of the year.

While carrying capacity is another complex and layered concept, systems of regulation based on any such notion, seems to be quite absent. Past history of having grazed a certain number of animals in one area (even if overgrazed) can sometimes be the basis for negotiating a consolidated fee from a grazier for the entire area, rather than a per animal fee. Certain areas in some villages seem over-intensively grazed, whereas some alps are left alone because of a predominance of poisonous aconites. The older Balphu stock of Tibetan origin were able to distinguish, but the newer stock cross-bred with Merino and Ramboullette drop dead in large numbers should they be mistakenly grazed there. But regulation by volition, or any system to determine how many sheep will be allowed to graze in a particular Van Panchayat seems to be influenced by other considerations. In terms of the governance of the area as a village commons, exclusion of others in case of over-crowding, and priority to benefit sheep-owners from the village itself also seem absent. The only advantage that shepherds from the village that owns the grazing land do exercise, is that they graze their sheep as a matter of right, and do not pay the per-animal fee, while they are in their village area. On their way up, as well as on their way down during seasonal migration, they would have to pay-up whatever is required, to Van Panchayats and to the informal leaders in villages enroute.

There are other extended layers of use that have links with distant markets. Almost every year in winter, small teams of five or six men come to the village forests in the cold temperate montane belt, to extract the galls formed on maple trees (Acer acuminatum). These people are physically and culturally of Tibetan stock, but come from the high border areas in Humla in Nepal. They are Buddhists and call themselves *Limia* (from lama), and continue to be called *Kham-pa* by the local people, even though they are not from the Kham province of Tibet. Not many villages have good forests that contain such maple trees, and so they will revisit a village in cycles of four or five years. They negotiate a fee with the village for being allowed to remove the knots from maple trees that infected by a particular virus that stimulates the growth of the galls. They will remove anywhere between 500 to 3000 such galls from the trunks of standing trees, (chop them off with an adze) and having boiled them overnight to prevent cracking, will set up a water-turned wood-lathe in the forest itself, and turn these knots into semi-finished vessels used by Tibetans for drinking salt-tea and *chang*. They will then carry out these semi-finished vessels on their backs from the valley, and across the river into Nepal, from where they will make their way back to their high mountain dwellings, at the border with Tibet in Humla. There, these vessels are finished to smoothness, dyed a beautiful brick-red, and suffused with oil from the small seeds of the *impatiens*, (often taken by them from here itself) and some of them trimmed with ornate silver. In spring, when the snow on the passes has melted enough to allow them over into Tibet, they will sell these vessels at different trading points.

While this does form a flow to a distant market, the scale of extraction of these knots is limited by the size of the traditional market, the simple technology used, and by the fact that they can only take out as much as they can carry on their backs. If any tree is over-extracted from, and it happens to die, the Van Panchayat will normally levy a punitive fine.

Villages often welcome these small groups of men. The Sarpanch is sometimes given personal gratification on the side, and they sometimes dress-up and come down from the rock-overhangs in the forest where they are camped, to visit the village for the evening. There they will buy food-grain, an occasional buffalo calf (which is not eaten locally) and jerrycans of local liquor (for which they pay rather generously, stimulating the local economy), and exchange stories with old acquaintances in the nepali language, which is easily understood here.

The arm of the larger, high-value and global market, however, has a deep penetration in the Van Panchayats of the area. They are the wild-animal parts and the wild-plant parts trade. This has been described in some detail in the section that deals with this aspect. The greatest volumes of all the commercially traded plant and animal parts, especially the high value ones, are from Van Panchayat areas in the higher altitudes. Insignificant quantities (other than of lichens) come from Reserve Forest areas. Whether it is legal or not, is not the deciding consideration for the collector at all. Plant and animal parts extraction at the primary level is clearly poverty-driven, and an increasingly desperate act. The intermediate traders are local, and are either office-bearers in the Van Panchayat or are right-holders in it. They are often owners of the largest herds of sheep and goats, which also serve as pack animals in the carriage of contraband out of the area, and are also able to supply through such carriage, food-grain at the high villages, as advance payment to the collector[50]. Collection is not regulated, and while it has been episodic for some species, the highest value ones are extracted every year. The volumes of a particular species collected are limited only by a) the external market demand and prices from year to year, and b) to the availability of people, which is determined by alternate labour-absorption factors ranging from the success of last years crop, to the inflow of government funds for labour employment in the village (JRY), to other seasonal, or fortuitous employment opportunities (say afforestation work by agencies like FES or the Forest Department). The priority and sequence accorded to any particular species for collection, is not determined so much by appropriate season, but more by higher price, and by urgencies created by competition.

That the scale of collection of plant parts is entirely unsustainable is abundantly clear, even to the collectors, who speak of a significant decline in availability. They just have to go farther, to reach there first, and collect everything they can reach. What this means to the entire ecosystem, and what domino will knock down the others, is farthest from the minds of those who are there to earn enough to feed their families. With practically no employment alternatives, they have to contend with increased competition from other collectors, adapt to the changing demands of the market, from one species to another, and from one year to the other. They must dance the delicate dance between bans and the law on the one hand, and the intractable fluxes in market demand, and subsequent price negotiations on the other.

While there are numerous villages where governance is somewhat broad-based and actively participated in, democratic functioning is not inherent in Van Panchayats. Not in the way they are presently structured, and neither as reflections of democracy at large in their greatly stratified everyday village lives. However, in those Van Panchayats that are of reasonable size relative to that of the village they belong to, and where the dependence on the village

[50] Cost of carriage alone to the alpine villages ranges from Rs.3 to Rs.7 per kilo.

forest for agriculture and for subsistence is high, the use within the village is not usually contested, and therefore undemocratic exclusion within the village, has little scope for play. Wherever the resource is scarcer, and more vied for, both from within the village and from neighbouring villages, the larger power profiles manifest themselves clearly in their own interest. In many villages, the interpretation of what a commons is, is based not so much on any moral conception of democratic land-use, but is more simply a form of 'institutionalized aggression'. A collective marking of the lamp-post as it were, that seeks to exclude even sections within the village.

Recent amendments in the Van Panchayat rules have made it mandatory for 4 positions on the Village Forest Council to be reserved for women. While some villages have included a few women on their Councils as *Panch*, there is but one woman Sarpanch in the entire basin, and that too in a village that was encouraged to constitute a Council comprising entirely of women, that would then make their Van Panchayat eligible for more funds from the government. By and large, women here are hardly included in any real decision-making in their Van Panchayat. In a few cases women manage to prevail to get themselves heard, sometimes on decisions that may affect them adversely. Their level of involvement is only a reflection of how seriously they are taken in other decision-making aspects, either at the village level, or at home. Here again, in villages where the commons are large enough and where the dependence on it has customarily been high in the context of agriculture and other subsistence needs, it is most seldom that new or fundamental decisions are required to be taken that could affect women's interests; such as continued access to fuelwood, leaf-litter and fodder. It is in the small, insufficient Van Panchayats, those closer to urbanizing settlements and bazaars, the more contested areas, and those closer to motor roads, that 'new' and more frequent decisions are required to be taken on access, control and flows from the Van Panchayat. It is here that we can sometimes see the stark effects of excluding women from decision making, or even see women enjoined in decisions of unfair exclusion, based on caste or clan.

There are some other important effects of government programmes that are structurally and fundamentally inconsonant with the conception of what a commons is. These have been spelt-out in the recommendations section, and flagged for consideration by the government.

The point of the entire description above, was to communicate the thinner membranes and the nuances of the micro-processes at the village level, in the backdrop of the larger processes underway. These are some of the major dimensions of how the commons are perceived and used in the Gori river basin. We have deliberately chosen to dwell on those aspects that are not going well, and are configured for recurring problems both at the village and inter-village levels. These are not spoken of enough, and taking cognizance of them, we feel, is the first step to begin to make positive changes. There are many brilliant local adaptations existing in some Van Panchayats, that have helped villages deal with the complexities of multiple and disparate users that do not form the immediate community. Some of these are taken up from, and recommendations made to the government for their wider and formal application.

STRATEGIC CONSIDERATIONS AND RECOMMENDATIONS

While there are numerous actions that require to be taken at various levels by different actors, this document will confine itself to recommending to the Government, both the State and the Centre, a few strategic actions. Those that we consider the most vital. We are making no attempt to come across as 'practical', whereby we suggest only the relatively easily do-ables, or speak of those processes that are already underway and require to be scaled up, or be better coordinated. Those, in any case, will be suggested by the various other Sub-State, State and Eco-Regional BSAP documents. While those are important too, we feel that our contribution to the larger planning process would be more valuable, if we confine ourselves to focussing on the more critical and clear imperatives from our area, however complex in feasibility they may be. Those that will have the most far-reaching effects, both on biodiversity conservation, and on the well being of forest-dependant communities in the region. A prioritization not based on ease of achievement, but more on criticality, and on logical sequence.

We first need to get something out of the way. Such analyses as those made in the document, and some of the recommendations as we are about to make, cannot be based, other than at an abstract principle level, on local consensus. Yes, the process was widely consultative, and is reflective of close to the ground 'reality', but one that, by its very nature, will not be commonly held by mutually opposing interests today. Whether local or non-local. The recommendations call upon the government to make certain basic redistributive changes, not just re-arrange the furniture. In all such changes someone will stand to lose, and someone else will stand to gain, and the wishes of the majority here is not even the point. Such changes in policy and law have been made by the State before, but have not been based on majoritarian consensus in the past either. They have been based on wider, more 'universal' considerations of political economy, and sometimes on wider notions of natural justice. The abolition of Zamindari for example, or the proscribing of slavery, or of untouchability. Or setting in place legal provisions for equal property rights to women, or the issue of Reservations for certain sections of the society are other examples. Though none of the recommendations proposed here are anywhere close to being so radical, we need to agree that any action that seeks to change existing property regimes (whether of the state or of the commons) cannot choose consensus at the local level, as validation for its *locus standi*.

These recommendations are clearly not easy to translate to action. They would require, among other things, an absence of cynicism in the bureaucracy, and a far-sightedness to be able to push these further to the legislative arm of the government, the politicians. Some of the changes being suggested will obviously not be possible through programmes and projects, but would require to be legislated for. The politicians, in turn, would need to take bold decisions that look beyond narrow constituency dictates, or immediate political mileage, but act with longer-term considerations in mind. Are we asking for too much, and are we in risk of sounding pedantic? We think not. Governments have in the past taken such actions, and we need to prevail upon them, with hope, to do so again.

Recommendation 1

The State Government should undertake a broadbased and transparent process of redrawing the boundaries and redistribution of rights in Village Forests to Van

Panchayats in the Gori basin, as indeed, in other parts of the frontier areas of the State. Redemarcation of some Reserve Forests would also be required.

In the Gori basin, about 64 % of the total area is under Village Forests. One village, Milam for example, that is inhabited only seasonally, and by 14 households, has over 847 square kilometers of land as its village commons. 442 square km within the watershed, and 405 square kilometres in two other adjoining watersheds. Put together, this is larger than some nations; two and a half times the size of the Maldives for example, and over four times the total area under Reserve Forests in the basin. Just one village. While a good third of this may be permanently snow-bound, there is no earthly reason why one village should own so much land that it will not use, and cannot govern. The closest village to Milam, that is Panchu, has absolutely no land as a Village Forest, just as another 25% of villages in the Gori basin do not. While this is a somewhat extreme example deployed for the sake of illustration, there are many villages in the basin with hundreds of hectares as Village Forests, some even hundreds of square kilometres. As described in the chapter on the Commons, there seems to have been no administrative basis for the devolution of land to Van Panchayats that took into account village size, number of people and livestock, extent of agriculture, altitude and aspect of the land that determined type of yield, or aspects of mutuality or equity between neighbouring villages. Customarily perpetuated inequalities held good under the noble hold-all of customary use.

This highly skewed distribution of land for village forests has set the stage for interminable and increasingly serious conflict between villages. Predominantly Shaukha and Barpattia villages for example, that constitute approximately 29% of the households in the basin, own 91% of the Van Panchayat holding, which is approximately 56% of the total area of the basin. Ofcourse, many of these are very poor households too, and a simple distinction on the basis of caste will not serve to guide any action in this regard. Nor is such holding correlated to greater degradation *per se*. However, increasing scarcity in the minimum requirements of fuelwood and fodder, on the one hand, and the increasing demand for high value 'commodities' of plant and animal parts by the global market on the other, has greatly heightened competition and conflict. Systems of mutuality are visibly breaking down, and costs of watch and ward, as well as recurrent litigation has already reached unsustainable levels. Destruction and degradation on village commons due to such conflict are rapidly increasing, and what this can mean to a landscape where 64% of the land area is under such governance, should be obvious.

Reserve Forests within the basin comprise about 195 sq km or just 8.71% of the total area. We know that the basis of deciding and delineating areas to be put under Reserve Forests during British occupation; which is when areas in this basin were classified as Class I (broadleaved mixed oak forests, which were then given to Van Panchayats) and Class II Forests (comprising conifers and other commercially valuable timber, which were then designated Reserve Forests) was not on practical considerations such as selection on the basis of forests being distant from villages, and their not being under customary use, or even for the biodiversity values they contained, but quite simply, on the basis of whether they contained timber of commercial value then or not. We are not speaking of areas later put under Sanctuaries and National Parks yet, we are speaking of just the land under Reserve

Forests. While this may have been a rational basis for a colonial government, it is clearly not relevant today. Not if the conservation of valuable biodiversity is a prime consideration, nor if the practical feasibility of governance, keeping local subsistence needs in mind, is necessary.

In the Gori basin itself, Van Panchayat areas, which are Protected Areas governed by village communities (the IUCN considers this a valid category of Protected Areas too), plus Reserve Forest areas plus the Civil Land that falls under the Askot Wildlife Sanctuary together comprise almost 80 % of the basin, as Protected Areas. Of this, about 88 % is contiguous, or in one large swathe, which in turn is contiguous to other such Protected Areas in adjoining watersheds. We need to remind ourselves here that despite this, the people of the basin have a larger per capita availability of agriculture land (0.23 hectares), than the rest of the state (0.13 ha), higher than the rest of the Himalaya (0.16 ha), and even higher than the per capita of the country (0.20 ha).

This large and continuous configuration, it would seem, is most unusual, and valuable in terms of a landscape approach to ecosystems management. Just looking West, is the adjoining Nanda Devi Biosphere Reserve, which by itself would add another 1000 square kilometers or so to this swathe (after excluding the approximately 500 sq km already in the buffer area in the basin). To the East is a similar area in the Darma, Byans and Chaudans basins, which we are in the process of mapping and estimating. By all accounts, this large area, and similar areas along the Greater and Trans Himalaya zones in Uttaranchal, comprise the most valuable frontier forests of the State. By frontier forests we mean large contiguous tracts of natural forests[51] that would have special significance and interest from the biodiversity angle. These areas clearly need to be looked at differently, planned for differently, and administered differently from the lower hill areas and the plains areas of the state. This may be stating the most obvious, but an exercise in Zonation of different areas of the state is called for, and one that is incorporated into a comprehensive Land-use policy for the State, that will prioritize for and govern the different intensities of use of the entire landscape.

The central guiding consideration here should be the biophysical dictates of the particular landscape under reference. The re-apportioning of land for village forests may turn out to be highly complex, and even undermine their productive capacity if done purely on simple numerical considerations. Some 'resources' like water, like fish or wildlife that are not in a fixed location, are not easy to apportion or parcel (and this is not being suggested here). While land and forests seem much more divisible, they are themselves the product of the interaction of the many components of the larger ecosystem they are located in. They would cease to produce some of the products and benefits if we divide them into smaller, exclusive parcels, which may then be put under exclusive management strategies. This is a critical consideration if it is important to manage them for their goods, but also for their ecosystem services, in terms of moisture regimes, soil protection, water and local climates and diverse habitats. Nature would be more divisible into parcels where it is more uniform in its treatment of the landscape, such as the plains. In high mountain ecosystems, where there is a great compression of life-zones yielding an immense diversity of ecosystems, and where the use of this diversity is shared seasonally amongst many communities, both human and animal, it may be imperative, if the productive capacities are to remain unhindered, to leave them unparceled and manage them in large units.

[51] The Economics of Deforestation: The example of Ecuador. Sven Wunder 2000.

Leaving natural systems unparceled, and managing them in larger integrated units, would greatly enhance and multiply the scope for maintaining or the building of biodiversity. For the Munsiari basin, which contains some of the most valuable frontier forests of the state, almost all of it being in one contiguous swathe, this would make absolute sense. So what are we proposing here?

We are proposing that the government:

a. Consider re-allocation of land for Van Panchayats in the basin, in view of the highly skewed distribution at present, which is leading to increasing and unresolvable conflicts already described. The government would need to undertake, with appropriate partners, a **process** to work out a rational and equitable basis for the re-allocation of land for Van Panchayats in such areas. Important considerations in such calculations could be the size of the village, the human population and some projected increase, the livestock population, the nature of agriculture and the extent of dependence on forests for nutrient cycling, and ofcourse, aspects of customary use, but in the context of workable sharing arrangements with other neighbouring villages.

In view of what we have just said about the undesirability of apportioning small parcels of the **resource** for exclusive use and management by individual villages in high mountain areas, the government would need to consider ways by which the forests and landscape can be managed in larger, unparceled units. While many threatened but valuable and biodiversity-rich areas would need special and prioritized protection regimes, some Reserve Forest areas adjoining villages could be considered for graded levels of protection, where there is no other option.This could be done by the apportioning of rights, priveleges and responsibilities in these larger patches, which may include Reserve Forest areas, that would ensure that local communities have enough and equitable access to forests for their subsistence needs. It would also enable a multitude of bi-lateral and multilateral sharing arrangements to be revived, which would enable them to share a wider landscape, and more diverse benefits. Importantly, it would also decrease the need for every village having to cope by themselves with crippling costs of watch-and-ward and litigation against neighbouring villages, due to increasing conflicts between them as a result of insubstantial and highly contested forest areas. Small groups of villages within sub-watersheds, two villages, perhaps three, could share rights on different forests and grass-stands at different altitudes and aspects, the way they sometimes do informally even today. But do so as a matter of right, in conjunction with the responsibility to collectively protect and manage. These combinations cannot be predicted numerically, or generalized upon, and would need to be worked out for each set of neighbouring villages, depending on the resource availability, and the combinations possible. Many villages could remain exclusive users too, if they are so located.

As complex as such an exercise sounds, and as complex as this may actually be, dealing with the issue in this manner would only be coming to terms with the complexity of the challenge already at hand. While it has been suggested[52] that single villages should have single Van Panchayats, or they won't work, such conclusions were perhaps drawn from the lower hills, where villages are relatively much larger, and where the hills are small

[52] Towards Sustainable Forestry in the U.P. Hills: N.C.Saxena. ODA 1995

and fall within a single life-zone category; where ecosystems are more uniform, and interactions not as varied and critical. In landscapes that yields such biodiversity as the Gori basin, this conclusion cannot apply. The people that inhabit the Gori basin have, in the past, come to terms with this complexity, and have adapted to it with much wider and plural orbits of identification, and multiple layers of use by themselves. Milam village for example, had families migrating up to it from 14 different villages. Panchu village had families migrating up to it from as faraway watersheds as Dharamghar and even Bageshwar (this is at least seven stages or days away, for those who come with their herds of sheep). Martoli village from as far as Pharsali. They still do, and own and run their common Van Panchayats too. Graziers have customarily come from distant watersheds, and still do, even from as far as Himachal Pradesh. Maple knot collectors still come from as far as Humla in Nepal. So what is being suggested, is only an extension of the adaptation mechanisms of the local people here in the past. An adaptation that we believe they are capable of making again.

While the government needs to own and initiate such an exercise, it is amply clear from what we see around us, that such a complex and difficult **process** would need all the help it can get. To expect the government to be capable of doing this on their own would be unreasonable, for the situation that exists today is indicative of how the government actually works at the micro level in the first place. Be it said here that neither would any other other agency be able to administer such a task on their own. There is an enabling role that government must play in this process, and there is a role civil society institutions can play, be they the Van Panchayats themselves, the PRI institutions, perhaps NGOs and motivated individuals.

b. There would, in places, be a need to **re-demarcate and re-allocate areas for Reserve Forests.** As described earlier, the basis for reservation of a particular forest area in the past was on the basis of it containing commercially valuable timber. This is no more a prime consideration. If the conservation of valuable biodiversity is now the prime consideration, the state would need to relook at areas of high and valuable biodiversity, areas that are in need of special protection, or those that form critical corridors or habitat for threatened or endangered species, and prioritize them for protection. Many such areas presently fall within the many Van Panchayats that have hundreds of hectares, even hundreds of square kilometers under Van Panchayats. Both large tracts of alpine and permanently snow-bound areas which they will be unable to administer in any case, other than rent-seeking from graziers and medicinal plant collectors. After setting aside sufficient land for the needs of each village, and prioritizing those areas that are most distant from villages, a reserving of the remnant area could be undertaken.

Conversely, areas that are presently under Reserve Forests, that are close to villages and subject to heavy pressure from proximate villages who do not have sufficient areas under village forests, may be considered for either handing over to Van Panchayats, or allowing **rights** to a certain intensity of use by a few specific communities. All this ofcourse, keeping in view biodiversity values contained in the area, and its configuration with proximate human communities and their subsistence needs.

Recommendation 2

The government should undertake a comprehensive land-use zonation exercise for the state, and prioritize areas for conservation oriented development.

It is proposed that the government undertake a zonation of different areas and ecosystems present in the state. That is take stock of and ascribe biodiversity values to what is existing, and undertake to prioritize different areas for conservation, and for different intensities of use by proximate human communities. We propose that like the Gori basin, the entire area under the Greater and Trans himalaya regions along the border be recognized for the frontier nature of the natural ecosystems, the process of severe degradation in these areas be taken cognizance of, and the area prioritized for conservation-oriented development. Just as a uniform policy was impractical and unacceptable for the plains and the hills when Uttaranchal was a part of Uttar Pradesh, similarly, a uniform policy for the terai and the lower hills would be as impractical and unsuitable. These areas must be looked at and planned for differently.

a. The according of priority and a special Conservation status to the area, and specific sites in particular, could be on the basis of the growing scientific recognition of the unusual richness and value of the biodiversity that is contained in the area, and in view of the severe degradation that it is presently subject to. The unusual configuration of large patches of contiguous protected areas, both by the state and by communities, and the value of such areas in biodiversity conservation need to be formally acknowledged by the according of such a status. Specific sites suggested for the government to consider are the Chiplakot range, the Panchachuli sub-basin (Pyunshani, Uttari and Dakhni balati gadhs), Ralam sub-basin, Kwalgang sub-basin, and the Lapthal area for a Fossil National Park.

b. It is also recommended that the area be planned for differently in terms of the kind of development to be promoted by the state. We speak of ourselves as a developing nation, as if we were in some kind of puberty. Worldwide, development and deforestation have been parallel and linked processes[53]. A principal strategic task, therefore, is to find alternatives that 'delink' development from deforestation. The feverish pitch that the medicinal plants trade and the discourse around it has acquired, is cause for concern. The accelerated rates of collection from the wild as witnessed in the Gori basin, is highly deleterious, and entirely unsustainable. The players involved in the medicinal plants and animal parts trade in the Gori basin are local extensions of a global trade, and such expanding trade, as elsewhere, commonizes the costs, while privatizing the profits[54]. State policy in this regard requires to adopt the **precautionary principle**, which tells us that "under conditions of uncertainty, it is rational strategy to minimize excessive, accelerated and irreversible damage to natural ecosystems, which would restrict our future options in natural resource management[55]."

Alternate livelihoods options need to be strengthened, both by government and non-government agencies. Traditional and diversified agriculture needs to be encouraged for food security, and for self-reliance. It is seen that in villages where there is more intensive agriculture, therefore more labour-absorption, the dependence on collection of plant and

[53] The Economics of Deforestation: The example of Ecuador. Sven Wunder 2000.
[54] Garret Hardin
[55] The Economics of Deforestation. Sven Wunder again.

animals parts from the wild is significantly less. However, while labour-absorption is important, in the longer-run, the scale must be regional, or else if the particular family or community finds more remunerative options, we see that they will move to it, while at the same time employing someone else (poorer families, or nepali migrant labour in the basin) to do the less remunerative or more dangerous tasks.

The government would require to invest more money for infrastructure and staff in the area. The kind of investments that would be most helpful would be those used to build basic infrastructure in the area that can enable the diversification of livelihood options. Infrastructure for schools, especially enabling better quality teaching staff, that would enable students from the area go out for seeking higher education or employment on an equal footing. Better healthcare and medical delivery services, and infrastructure that can help enhance the quality and scale of local enterprise: small and widely dispersed wool-carding facilities for example, and reliable electricity supply. Employment assurance programmes such as the JRY do have a significant labour-absorption effect, especially for the old, and those who are otherwise unable to get employed for labour in the village, but not all of it is positive. The present trajectory seems unfailingly headed (perhaps 'sustainably') towards dependence on aid from the government.

A part of helping provide for alternative livelihoods options, would be **attending to the very poor quality of education facilities** in such areas. In Munsiari area, about two out of three students fail every year by the time they get to class 10, their first Board Exam. After having started with the English alphabet in class 6, and barely one class a day, they are expected to appreciate poetry in archaic 16th Century English, by Henry Wotton for example, who speaks of 'princely love and vulgar breath'. Ofcourse they fail their exams, year after year, and take to desperate illegal options, or lose all self-esteem and search for livelihoods as minions in the plains. The armed forces and the paramilitary was, in the past, a frequent option for these bright and strong young men who were readily taken. Not so today, and for reasons hardly worth mentioning here. Corruption at the induction stage itself.

There is a huge deficit in the number of teachers required in terms of posts created, and the actual number of vacancies filled. For example the Girls Inter-College at Namjala that has 18 sanctioned posts for teachers, has only 5 teachers in attendance. 72% of the posts lie vacant. In the Government Inter-College for both boys and girls 11 of the 32 sanctioned posts lie vacant. The area is remote, and teachers consider being posted here as a punishment posting, which it often is. They do have the option of 'legitimately' proceeding on indefinite leave, upto five years even, and meanwhile sorting the problem out. Most teachers with children also get themselves posted out to larger towns by the time their children are in high school, in order to be able to provide their own children with better schooling facilities. This leaves the schools in the remote areas like the Gori basin always understaffed, with posts vacant, teachers absconding, and those that are still there, often in a deep sulk.

The possibility of sustaining the livelihoods of a growing population in such high mountain areas is extremely finite, and unless the coming generations have some chance of getting out into the larger economy and competing on a reasonably equal footing, the situation will only lead to more intensive commodification of their landscapes, and in a manner where the local has no control and is relegated to the lowest rung of the division of labour. The Government would require to commit itself to some radical changes in the prevailing system,

and to set in place special systems and priorities for such remote areas where the valuable biodiversity is under increased threat due to failing livelihoods.

Recommendation 3

Recommended that the government undertake a Land Settlement in the area.

While this may not be critical, it would greatly assist the government in its administration of the area. It has been about 40 years since the last Settlement, and looking to the state of the land records for villages in the Gori basin, it seems it is well overdue. Conducting a Land Settlement now would help the government:

Undertake the cadastral mapping of large areas that are presently unsurveyed by the cadastral system, and unmapped. As can be gauged from the Landsat Image attached, a very large proportion of the basin leads up to permanently snow covered and high mountain areas. These areas have been mapped thoroughly by the SOI, but are very grossly represented on village cadastral maps, and the area recorded wrongly in the patwari records. For all villages whose boundaries lead up to the high iced-out ridges, and this includes all the alpine villages (who own more than half the area of the basin), there is a rough doodle denoting the ridge-line, and a note that says that the village boundary is *himalaya tak*, or uptill the snow ridge, and as per the Survey of India maps. The corresponding area on the *Khatauni* records only a miniscule fraction of the area. It is no wonder that phenomena such as Milam village owning 847 square kilometers in three watersheds goes un-noticed, and only a fraction of it appears on the *Khatauni*. There would be a huge difference between the total area listed on the Z.A and Non Z.A *Khataunis* of the district (after adding Reserve Forest areas), and the total area as per the SOI. This is the case with many villages, and an exercise that brings cadastral maps in consonance with the SOI maps would greatly help the state administer the area, as well as villages in the resolution of disputes of boundaries, which abound.

The opportunity could be used to computerize all the Land Records after Settlement, which would help make them more accessible, and their administration and use more efficient. Similarly, since mapping technology has taken such great strides over the past 40 years, and we have such a range of technologies at hand, the Settlement process could be used as an opportunity to digitize and make accurate and readily usable maps for all villages and Van Panchayats. The present scenario on this in the Gori basin, as it must be in other remote areas, leaves very much to be desired.

The Settlement process could also attempt to undertake consolidation of land holdings in villages where people are keen to do so. The government of Uttaranchal has already taken some good initiatives on this in the past, and a wider process of Settlement could precipitate a much wider acceptance of this very necessary process.

Recommendation 4

Recommendations regarding Van Panchayats and their interface with time-bound government programmes.

Favourable state policy seems almost a pre-condition for the successful governance of natural resource commons. There are, however, some important aspects of existing government programmes that are structurally and fundamentally inconsonant with the conception of what a commons is, and these are being flagged for consideration by the state government.

While it is the role of the government to lay the policy and legislative basis, (in order to effectively be the enabler and arbitrator for the rational distribution and democratic functioning of village commons), the actual management decisions and day-to-day governance of it should be entirely in the hands of a village institution, whether formally registered or informal. The provisions of the latest Uttaranchal Village Forest JFM Rules 2001 have some provisions that seem contrary to this, and that require to be reconsidered by the government.

a. The government has done well to remove from Rule no. 3.2. clauses such that make the Panchayat Forest "subject to the supervision, direction, control and concurrence of the Divisional Forest Officer..". However, such control is still implicitly retained through various clauses. Now this displaces the notion of a commons altogether. It displaces the essential characteristics that define a commons; the elements of community and location, of mutuality and of collective. Many of these imply a political process, and an approach to community that is based on a shared ecological and moral conception of the commons[56]. Not that it exists in all the villages here, but these elements do variously characterize some of the better run Van Panchayats, and which must be worked towards for better governance. The astigmatism in perspective here seems to stem from losing sight of the Van Panchayat as a long-enduring institutional arrangement of choice, that is opted for precisely because of its lack of dependence on the state, and its ability to yield democratic self-governance, on the one hand, and the overlay of JFM, which today is a government project.

In the running of a project it may be important to be predictable in terms of activities to be undertaken and the expenses such activities will entail, and therefore annual plans are essential. Project administration then requires various tiers of bureaucracies, for fiduciary regulation, and to ensure compliance right till the village level. A set-up that would otherwise be entirely superfluous to a village institution that has successfully governed its commons for decades, where intensities of protection and the investment thereon change from time to time, but where all other 'investment' is in the form of regulation or restraint. This equivalent of a 'management plan', can be found implicit in ongoing use and regulation practices of any Van Panchayat. Programmes like the JFM are presently being funded for 5 years at a time, and like any good time-bound project, would hope to have spent their money and done their job, and the intervention become redundant at some point. In view of this, changing the entire institutional

[56] Ecological Identity and Commons. Mitchell Thomashow

arrangement of the Van Panchayat (Rule 3.2 specifies that any for any Van Panchayat who opts for funding under JFM, the Van Panchayat Rules will cease to apply) is likely to create an institutional gap, an inconsistency and even a lack of continuity that could pry loose the stability of the village commons.

b. The application of serious political concerns to projects, programmes or policy structures in a cosmetic manner or for form's sake, can do serious harm to the credibility of the cause itself. Often project proposals and programme structures include elements that may be most current on current on international funding agendas. This could range from 'poverty alleviation' to 'capacity building' to 'women in development' and so on. All of these are ofcourse relevant to work with Van Panchayats, but would only happen in a substantial, organic way if it were internalized sincerely. While there is often a real intention to do so at the senior levels, and at inception, the reality when translated in the field can be quite contrary. The case of increasing the participation of women in the governance of Van Panchayats is one such that needs attention.

The government issued instructions to Van Panchayat Inspectors to organize Women's Van Panchayats as they also did, to encourage villages to elect women Sarpanches (Council Heads) to Van Panchayats. The villages were told that if they did so, they would be eligible for special fund allocation for their Van Panchayats. The invitiation to play the game was clear, and so some villages are playing. Often wives and relatives of entrenched power centres have been put up as the face (the progression of the *Pradhan pati* is even more pervasive where seats are reserved in Panchayat elections), and in five villages where exclusive Women's Van Panchayats have been constituted, both in the Gori basin and the slopes of the Kali basin, the situation is quite bizarre. Exclusive Womens Van Panchayats

(which surely must stultify the notion of a commons) have been constituted in villages that already have existing Van Panchayats. These are in addition to the existing ones where everyone has a right, and they are, all five of them, less than 2 hectares each. Should we just look at these as harmless embelishments to a programme, or may such attempts actually drive misplaced conclusions (that many are rearing to jump to) that women and competent governance don't match?

c. Institutional overlaps set the stage for recurrent differences and conflict, seriously affecting local governance. This is borne out by experiences worldwide. The Uttaranchal Village Forest JFM Rules have provisions for the constitution of District Level Advisory Committees and Range Level Management Committees. These comprise the DFO and his nominees, the Zilla Parishad Adhyaksh or the Block Pramukh at different levels, nominated NGO representatives, and nominated women Gram Pradhans. While this may be a desirable and inclusive step that could help in the 'steering' of a government programme or project, or to include Panchayat participation in any project, it seems misplaced for running or administering ongoing village institutions, especially when someone from outside the village is given the power to **direct** a Van Panchayat. This is significant especially in the prevailing context of high contestation and conflict between villages in Van Panchayats, as well as the strong political party affiliations of the district and block level Panchayat representatives. The additional power to influence the granting

or withholding of government funding to a Van Panchayat depending on compliance at various political levels, is another important consideration.

It is recommended to the state government that it considers keeping a clear distinction between any such committee it may wish to constitute at an **advisory level** for helping **steer** the administration for any of its **projects**, and between ongoing institutional arrangements (Van Panchayats) for the governance of village commons that have much wider temporal horizons than projects, both past and future. Such overlaps at the village level are not required, and could dismantle the very pillars of the commons. The challenge is to balance the State's role as 'actor, arbitrator and guarantor of public good'[57], while creating enabling conditions for the democratic self-governance at the village level.

Recommendation 5

Regarding the Banraji tribe.

The magic illusion of a better life in the progressively urban settlements at the margins of the Askot Wild Life Sanctuary may inevitably hold many of the Banraji in thrall. We (in FES) have not yet engaged with the Banraji at this deeply political level, or been through any process that mandates us to represent what kind of future they may wish to choose. The purpose of mentioning them here is to bring the plight of these forest people to the policy forming and legislating environment, and underscore the fact that the Banraji were ridden rough shod over during the Notification of this area as a Musk Deer Sanctuary, by omitting any reference to them or their needs in the first place. The blanket ban of the Supreme court requires to be revisited, and wherever possible, specific orders require to be worked out for such situations where the largely benign presence of the aboriginal Banraji tribe require to be protected.

The State Government is presently in the process of negotiating a redemarcation of the boundaries of the Askot Musk Deer Sanctuary with the Ministry of Environment and Forests at the Centre. This is partly because over a hundred villages, both in the Gori basin as well as those of Darma and Byans, and all their agriculture land and their Van Panchayats are presently included within the Sanctuary (which makes restrictions like the ones imposed by the Supreme Court in February 2000 impossible to implement), and perhaps also because the Sanctuary is imposing impediments to 'development' activities such as Hydroelectric Projects planned along the two rivers. We recommend that the Government recognize the existence of the Banraji in any new Notification that will follow, and take measures to protect their frugal dependance on the forests they dwell in.

The Role of FES

The Foundation for Ecological Security (FES) is involved in ongoing projects related to biodiversity conservation and to the governance of natural resource commons in the border and high altitude districts of the state. This exercise was in the natural flow of our ongoing work, and will serve to inform and give sharper focus to work we will take up ahead. The various logs will be progressively built upon, subject to deeper analysis and shared with

[57] Jael Silliman and Ynestra King: Expanding Civil Society, Shrinking Political Spaces: Dangerous Intersections 1999.

partners in conservation, and wherever possible, as inputs to policy processes. The advantage of our long-term and intensive presence on location will be built upon and shared.

The FES would be willing to work with the government, if it so desires, as one of the partners in the complex task of planning with village communities for the re-apportioning, and working out combinations of rights on village commons, and in the planning of the different intensities of use-regimes and conservation, in the frontier areas of the state.

The FES has also undertaken, an extensive exercise in mapping and analysing the extent and configuration of all Van Panchayats, all Reserve Forests and all Protected Areas in five districts of the State of Uttaranchal that contain high mountain areas that fall within the Greater Himalaya and the Trans Himalaya. While this area has been studied to be the richest in biological diversity in the State, as indeed in the Western Himalaya, many Van Panchayats in this high altitude region, who actually own and govern an overwhelming proportion of this area, have not been actually surveyed and mapped. Neither have Van panchayat areas been mapped in their configuration with the State Protected Areas and studied for the value of their assemblage. The exercise conducted in the Gori basin so far has yielded very significant information which is contrary to what the State has on their Revenue records. This is because much of this area has still not been surveyed under the cadastral system, and neither has there been any synthesis with the SOI mapping regime. FES is being facilitated in this exercise by the State Government. Fieldwork is underway and the findings will be presented to the government, and to efforts at understanding and conserving the valuable biodiversity of the Himalaya.

The Gori river basin, as indeed the adjoining basins of Darma and Byans, are peopled by societies in transition. It is a time of great and rapid change. For all its remoteness, there is a deep and pervasive penetration of global markets, even distant cultures that are the vehicles of such markets. You could come across a woman, as we have, digging for roots of *Picrorhiza* high on an alp, wearing a local variant of the *saree* in action mode, but over it, protecting her from the icy mountain wind could be a recycled synthetic jacket emblazoned with a 'Baywatch' image. Or in the unlikeliest of villages, from the unlikeliest face of a child, be greeted with an "Aiwa!" straight from the heart.... oh, from the TV ad.

It is to the uncertain future of that child, and above all to Nature, that this whole exercise and all the progressions from it, are an offering.

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Map of Van Panchayat and Reserve Forest areas of Gori River Basin (foldout)

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Flora of The Gori River Basin

Angiosperms

Ranunculaceae

1 Aconitum balfourii Stapf.
2 Aconitum heterophyllum Wall.
3 Aconitum violacium Jacq.
4 Actaea spicata L.
5 Adonis chrysocyathus Hk. f. & T
6 Anemone elongata Don
7 Anemone narcissifolia L.
8 Anemone obtusiloba Bon
9 Anemone raui Goel & Bhattach.
10 Anemone rivularis Buch. - Ham.
11 Anemone riupicola Camb.
12 Anemone trullifolia Hk.
13 Anemone vitifolia Buch. -Ham.
14 Aquilegia nivalis falc.
15 Aquilegia pubigera Wall.
16 Callianthemum pimpenelloides (D. Don ex Royale) Hk. f. T
17 Caltha palustris l.
18 Clematis acuminata DC.
19 Clematis barbellata Edgew.
20 Clematis buchananiana DC.
21 Clematis connata DC.
22 Clematis gouriana Roxb.
23 Clematis grata Wall.
24 Clematismontana Buch.-Ham.
25 Clematis nepaulensis DC.
26 Clematis orientalis L.
27 Delphinium brunonianum Royle
28 Delphinium caeruleum Jack.
29 Delphinium cashmirianum Royle
30 Delphinium densiflorum Duthie ex Maxim.
31 Delphinium denudatum Wall.
32 Delphinium kumaonense Kuth
33 Delphinium pyramidale Royle
34 Delphinium vestitum Wall.
35 Delphinium viscosum Hk. F. & T.
36 Halerpestis sarmentosa (Adarns) Kom. & Klob.
37 Oxygraphis glacialis Bunge.
38 Oxygraphis polypetala Hk. f. & T..
39 Paraquilegia anemonoides (Willd.) Ulber.
40 Ranunculus aquatilis L.
41 Ranunculus arvensis L.
42 Ranunculus brotherusi Freyn.
43 Ranunculus difusus DC.
44 Ranunculus hirtellus Royle
45 Ranunculus hyperboreus Rottb.
46 Ranunculus laetus Wall.
47 Ranunculus lobatus Jacq.
48 Ranunculus pulchellus C.A. Mey
49 Ranunculus scleratus L.
50 Thalictrum alpinum (L.) DC.
51 Thalictrum chelidonii DC.
52 Thalictrum elegans Wall.
53 Thalictrum foetidum L.
54 Thalictrum foliolosum DC.
55 Thalictrum javanicum Blume
56 Thalictrum pauciflorum Royle
57 Thalictrum platycarpum Hk. F. & T.
58 Thalictrum saniculaeforme DC.
59 Trollius acaulis Lindl.
60 Trollius pumilus don

Schizandraceae

61 Schizandra grandiflora Hk. F. & T.
62 Schizandra propinqua (Wall.) Hk. F. & T.

Magnoliaceae

63 Magnolia kissopa Buch. - Ham.

Menispermaceae

64 Cissampleos pariera L.
65 Cocculus laurifolius DC.
66 Stephania elegans Hk. F. & T.
67 Stephania glabra (Roxb.) Miers.
68 Stephania gracilenta Miers.
69 Tinospora cordifolia (Willd.) Miers.
70 Stephania glabra(Roxb.) Miers.
71 Tinospora cordifolia (Willd.) Hk.f. & T.

Lardizabalaceae

72 Holboellia latifolia Wall. Var.angustifolia Hk.
73 Holboellia latifolia Wall. Var. latifolia Wall.

Berberidaceae

74 Berberis aristata DC.
75 Berberis asiatica Roxb.
76 Berberis chitria Lindl.
77 Berberis jaeschkaeana Schneid.
78 Berberis kumaonensis Schneid.
79 Berberis lycium Hk.f. & T.
80 Berberis umbellata Wall.
81 Mahonia borealis Takeda

Podophyllaceae

82 Podophyllum hexandrum Royle

Papaveraceae

83 Argemone mexicana L.
84 Meconopsis aculeata Royle
85 Meconopsis paniculata9Don) Prain
86 Papaver dubium Hk. F. & T.
87 Papaver somniferum Hk.f. & T.
88 Stylophorum lactucoides Benth.

Fumariaceae

89 Corydalis adunca Maxim.
90 Corydalis boweri Hemsl.
91 Corydalis cashmiriana Royle

92 Corydalis chaerophylla DC.
93 Corydalis cornuta Royle
94 Corydalis crassifolia Royle
95 Corydalis flabellata Edgew.
96 Corydalis govaniana Wall.
97 Corydalis meifolia Wall.
98 Corydalis moorcraftiana Wall.
99 Corydalis nana Royle
100 Fumeria indica[Haussk.] Pugsley

Brassicaceae

101 Arabidopsis himalaica (Edgew.) schulz.
102 Arabidopsis mollissima (Mey) Schulz.
103 Arabidopsis stricta (Camb.) Busch.
104 Arabidopsis thaliana (L.) Heynth.
105 Arabis amplexicaulis Edgew.
106 Arabis pterosperma Edgew.
107 Arcyosperma primulifolium (Toms.) Schulz.
108 Barbaraea intermedia Boreau
109 Barbaraea vulgaris R. Br.
110 Capsella bursa-pastoris (L.) Medik.
111 Cardamine impatiens L.
112 Cardamine macrophylla Willd.
113 Cardamine oxycarpa Boiss.
114 Cardamine pratensis l.
115 Cardamine scutata Thunb.
116 Christolea crassifolia Camb.
117 Christolea himalayensis (Camb.) Tafri
118 Coronopus didymus (L.) Sm.
119 Descuraina sophia (Lindl.) Webb.
120 Draba altaica (Mey) Bunge
121 Draba amoena Schulz.
122 Draba gracillima Hk. F. & T.
123 Draba incana L.
124 Draba lasiophylla Royle
125 Draba nubxgena (Schulz.) Desv.
126 Draba oreades Schrenk.
127 Draba repens M. Beib.
128 Draba tibetica Hk. F. & T.
129 Erysimum hieracifolium L.
130 Hedinia tibetica (T.) Ostenf.
131 Lepidium capitatum Hk.f. & T.
132 Lepidium rudurale L.
133 Lepidium virginicum L.
134 Megacarpaea polyandra Benth.
135 Nasturtium officinale R. Br.
136 Rorippa dubia (Pers.) Hara
137 Rorippa indica (L.) Hiern.
138 Rorippa nasturtium - aquaticum (L.) Hayek.
139 Sisymbrium bracissiforme Mey
140 Sisymbrium strictum Hk.f.& T.
141 Thlaspi andersonii (Hk.f.&T.)Schulz.
142 Thalspi arvense L.
143 Thalspi cochlearioides Hk.f.&T.
144 Torularia humilis (Mey) Schulz.

Violaceae

145 Viola betonicifolia Sm.
146 Viola biflora L.
147 Viola canescens Wall.
148 Viola kunawarensis Royle

Capparaceae

149 Capparis spinosa L. var himalayensis [Jafri] Jocobs

Cleomaceae

150 Cleome gynandra L.
151 Cleome viscosa L.

Flacourtiaceae

152 Flacortia indica [Burm.f.] Merr.
153 Xylosma congestum [leur.] Merr.
154 Xylosma longifolium Clos

Pittosporaceae

155 Pittosporum eriocarpum Royle

Polygalaceae

156 Polygala abyssinica R. Br.
157 Polgala arvensis Willd.
158 Polygala crotalarioides Buch. - Ham.
159 Polygala furcata Royle
160 Polygala persicariaefolia DC.
161 Polygala tatarinowii Rege

Caryophyllaceae

162 Arenaria ciliolata Edgew.
163 Arenaria ferruginea Duthie ex Williams
164 Arenaria festueoides Benth.
165 Arenaria glanduligera Edgew.
166 Arenaria kumaonensis Maxim.
167 Arenaria orbiculata Royle ex Edgew.
168 Arenaria serphyllifolia L.
169 Arenaria tenella Duthie ex Kit.
170 Cerastium cerastoides [L.] Britton
171 Cerastium dahuriccum Fisch.
172 Cerastium thomsonii Hk.f.
173 Drymaria cordata [L.] Willd.
174 Gypsophyla ceratoioides Don
175 Lepyrodiclis holosteoides Mey
176 Lychnis apatela L.
177 Lychnis brachypetala L.
178 Lychnis fimbriata Wall.
179 Lychnis himalayensis [Rohrb.] Edgew.
180 Lychnis indica Benth.
181 Lychnis inflata Wall.
182 Lychnis macrorhiza Benth.
183 Lychnis nigrescens Edgew.
184 Lychnis nutans Benth.
185 Lychnis pilosa Edgew.
186 Minuartia lineata [Mey] Bornm.
187 Polycarpaea corymbosa (L.) Lamk.
188 Sagina saginoides (L.) Karston
189 Silene conoidea L.

190 S. kunawaransis Royle ex Benth.
191 S. moorcroftiana Wall.
192 S. vulgaris (Moench.) Garcke
193 Stellaria alsine Grimm.
194 S. crispata Wall.
195 S. decumbens Edgew.
196 S. depauperata Edgew.
197 S. graminea L.
198 S. himalayensis Majumdar
199 S. media (L.) Vill.
200 S. monosperma var. paniculata (Edgew.) Majumdar
201 S. patens Don
202 S. semivestita Edgew.
203 S. subumbellata Edgew.
204 S. webbiana Wall.
205 Stellaria media (L.) Villars
206 Thylacospermum rupifragmum Schrenk.

Portulacaceae

207 Portulaca oleracea L.
208 Portulaca pilosa L.
209 Portulaca quadrifida L.

Tamaricaceae

210 Myricaria elegans Royle
211 Myricaria germanica Desv.

Hypericaceae

212 Hypericum dyeri Rechder
213 Hypericum elodeoides Choisy
214 Hypericum hookerianum W. & A.
215 Hypericum japonicum Thunb.
216 Arenaria tenella Duthie ex Kit.
217 Hypericum oblongifolium Choisy
218 Hypericum uralum Buch.- Ham.

Theaceae

219 Eurya acuminata DC.

Actinidiaceae

220 Saurauia napaulensis DC.,

Terstroemiaceae

221 Saurauia napaulensis DC.

Dipterocarpaceae

222 Shorea robusta Gaertn.

Malvaceae

223 Abelmoschus critinus Wall.
224 Abelmoschus esculentus [L.] Moench
225 Abutilon indicum [L.] sweet
226 Abutilon persicum [Burm. F.] Merr.
227 Hibiscus syriacus L.
228 Hibiscus rosa-sinensis L.
229 Kydia calycina Roxb.
230 Malva neglecta wall.
231 Malva parviflora L.
232 Malva vertcillata L.
233 Malvastrum coromandelianum [L.] grake
234 Sida acuta Burm. F.
235 Sida cordata [Burm.f.] Borssum
236 Sida cordifolia L.
237 Sida rhombifolia L.
238 Urena lobata L.

Bombacaceae

239 Bombax ceiba L.

Sterculiaceae

240 Firmiana pallens Wall. exKing
241 Helictere isora L.
242 Melochia corchorifolia L.
243 Sterculia villosa Roxb.

Tiliaceae

244 Corchorus aestuans L.
245 Corchorus olitorius L.
246 Grewia elastica Royle
247 Grewia oppositifolia Buch.- Ham.
248 Grewia sapida Roxb. ex DC.
249 Triumfetta annua L.
250 Triumfetta pentandra A. Rich/
251 Triumfetta pilosa Roth
252 Triumfetta rhomboidea Jacq.

Linaceae

253 Reinwardtia indica Dumort.

Malpighiaceae

254 Aspidopteris nutans [Roxb.] Juss. var. wallichii [Hk.f.] Niedengn.
255 Hiptage benghalensis [L.] Kurz

Elaeocarpaceae

256 Sloanea sterculiacea (Benth.) Rehder & Wilson

Geraniaceae

257 Biebersteinia odorata Stephan
258 Geranium collinum Stephan ex Willd.
259 Geranium grevilleanum Wall.
260 Geranium lucidum L.
261 Geranium nepalense Sweet.
262 Geranium ocellatum Cambess.
263 Geranium polyanthes Edgew.
264 Geranium pratense L.
265 Geranium wallichianum Don ex Sweet
266 Biophytum reinwarditia [Zucc.] Klotzsch

Oxalidaceae

267 Oxalis acetisella L.
268 Oxalis corniculata L.
269 Oxalis latifolia HBK

Tropaelaceae

270 Tropaeolum majus L.

Balsaminaceae

271 Impatiens amplexicaulis Edgew.
272 I. balsamina L.
273 I. bicolor Royle
274 I. cristata Wall.
275 I. gigantea Edgew.
276 I. glandulifera Royle

277 I. racemosa DC.
278 I. thomsonii Hk.
279 I. Sulcata
280 I. Scabrida

Rutaceae

281 Aegle marmelos [L.] Corr.
282 Boeninghausenia albiflora (Hk.) Reichb
283 Murraya koenigii (L.) Spreng.
284 M.paniculata (L.) Jack.
285 Skimmia asiatica (L.) Lamk.
286 Toddalia asiatica (L.) Jack.
287 Zanthoxylum armatum DC.
288 Z. oxyphyllum

Meliaceae

289 Heynea trijuga Roxb.
290 Melia azedarach L.
291 Toona ciliata Roem.
292 T. serrata (Royle) Roem.

Aquifoliaceae

293 Ilex dipyrena Wall.
294 I. excelsa (Wall.) Hk.
295 I. fragilis Hk. F.
296 Ilex odorata Buch.- Ham. ex D. Don
297 I. pseudodorata Loesn.

Celastraceae

298 Celastrus paniculatus Willd.
299 Euonymus echinatus Wall.
300 E. fimbricatus Wall.
301 E. hamiltonianus Wall.
302 E. pendulus Wall.
303 E. tingens Walls.
304 Gymnosporia rufa Wall.
305 Maytenus royleana (Lawson) Cufodont
306 M. rufa (Wall. ex Roxb.) Raju & Babu

Rhamnaceae

307 Berchemia floribunda (Wall.) Brongn.
308 B. lineata DC.
309 Helinus lanceolatus Brandis
310 Rhammus persicus Boiss.
311 R. procumbens Edgew.
312 R. purpureus Edgew.
313 R. triqueter wall.
314 R. virgatus Roxb.
315 Sageretia filiformes (Schultes) Don
316 Ventilago denticulata Willd.
317 Zizyphus mauritiana Lamk.
318 Z. nummularia (Burn. F.) W. & A.

Leeaceae

319 Leea asiatica (L.) Ridsdale

Vitaceae

320 Ampelocissus divaricata Wall. Ex Lawson
321 A. latifolia (Roxb.) Planch.
322 A. rugosa (Wall.) Planch.
323 Cissus repanda Vahl
324 Parthenocissus himalayana (Royle) Planch.
325 Tetrastigma camphylocarpum (Kurz.) Planch.
326 T. lanceolarium (Roxb.) Planch.
327 T. obtectum (Wall. Ex Lawson) Planch.
328 T. serrulatum (Roxb.) Planch.
329 Vitis flexuosa Thunb.
330 V. jacquemontii Parker
331 V. lanata Roxb.
332 V. parviflora Roxb.
333 V. vinifera L.

Sapindaceae

334 Cardiospermum helicacabum L.
335 Dodonea angustifolia L.
336 Sapindus mukorossi Gaertn.

Aceraceae

337 Acer acuminatum Wall.
338 A. caesium Wall.
339 A. cappadocicum Wall.
340 A. oblongum Wall.
341 A. pectinatum Wall.
342 A. villosum Wall.

Hippocastanaceae

343 Aesculus indica Colebr.

Sabiaceae

344 Meliosma simplicifolia (Roxb. Walp.
345 Sabia campanulata Wall.
346 S. paniculata Edgew.

Anacardiaceae

347 Lannea coromandelica (Houtt.) Merr.
348 Pistacia integerrima Stewart
349 Pistacia khinjuk Stocks
350 Rhus cotinus L.
351 R. javanica L.
352 R. parviflora Roxb.
353 R. punjabensis Stewart
354 R. wallichii Hk.
355 Semecarpus anacardium L.
356 Spondias pinnata (L.f.) Kurz

Coriariaceae

357 Coriaria nepalensis Wall.

Moringaceae

358 Moringa Prerygosperma Geartn.

Fabaceae

359 Abrus fructiculosus Wall.
360 A. precatorius L.
361 Aeschynomene indica L.
362 Alysicarpus bupleurifolius (l.) DC.
363 A. glamaceus (Vahl) DC.
364 A. vaginalis (L.) DC.
365 Arachis hypogea L.
366 Argyrolobium flaccidum (Royle) Jaub. & Spach.
367 A. roseum (Camb.) Jaub. & Spach.
368 Astragalus aegacanthoides Parker

369 A. candolleanus Royle ex Benth.
370 A. chlorostachys Lindl.
371 A. densiflorus Kar. & Kir.
372 A. friguidus Bunge ex Grey
373 A. graveolens Buch.-Ham. ex Benth.
374 A. himalayanus Klotz.
375 A. jacquementif Bunge
376 A. ladakensis Balak
377 A. lessertioides Benth. ex Bunge
378 A. leucocephalus Grah. ex Benth.
379 A. maxwillii Royle Ex Benth.
380 A. melanostachys Benth. ex Benth.
381 A. oxydon Baker & Hk.
382 A. psilocentros Fisch.
383 A. pycnorhizus Benth. ex. Royle
384 A. rhizanthus Royle ex Benth.
385 A. submubellatus Klotz.
386 A. webbianus Grah. ex Benth.
387 Atylosia mollis Benth.
388 A. scarabaeoides (L.) Baker
389 A. volubilis (Blanco) Gamble
390 Butea monosperma (Lamk.) Taub.
391 B. pellita Hk.
392 Campylotropis eriocarpa (Maxim.) Schind.
393 Campylotropis stenocarpa (Klotzsch) Scheid.
394 Caragana gerardiana Royle
395 C. nubigena Bunge
396 C. soongaricum Stephan ex baker
397 Crotalaria alata Buch.- Ham. ex D. Don
398 Crotalaria albida Heyne ex Roth
399 C. bialata Schrank.
400 C. calycina Schrank
401 C. humifusa Grah. ex Benth.
402 C. medicaginea Lank.
403 C. mysorensis Roth
404 C. prostrata Rottle. ex Willd.
405 C. sessiliflora L.
406 C. spectabilis Roth
407 C. tetragona Anders.
408 Dalbergia sericea G. Don
409 D. sissoo Roxb.
410 Desmodium concinnum DC.
411 D. elegans DC.
412 D. gangeticum (L.) DC.
413 D. heterocarpon (L.) DC.
414 D. laxiflorum DC.
415 D. microphyllum (Thumb.) DC.
416 D. motorium (Houtt.) Merr.
417 D. multiflorus DC.
418 D. oxyphyllum DC.
419 Desmodium parvifolium DC.
420 D. podocarpum DC.
421 D. pseudotriquetrum DC.
422 D. pulchellum (L.) Benth.
423 D. reniforme DC.
424 D. sequax Wall.
425 D. triflorum (L.) DC.
426 D. velutinum (Willd.)DC.
427 Dolichos trilobus L.
428 Dumasia villosa DC.
429 Erythrina arborescens Roxb.
430 E. suberosa Roxh.
431 Flemingia bracteata (Roxb.) W.
432 F. fruticulosa Wall. ex Benth.
433 F. prostrata Roxb.
434 F. semialata Roxb.
435 Flemingia strobilifera (L.) Ait.f.
436 F. vestita Benth. ex Baker
437 Gueldenstaedtia himalaica Baker
438 Heysarum kumaonense Benth. ex Baker
439 Indigofera astragalina DC.
440 I. cassioides Rottl. ex DC.
441 I. cylindrica Wall. ex Baker.
442 I. dosua Buch.-Ham. ex Don
443 I. heterantha Wall. ex Brandis
444 I. linifolia (L.f.) Retz.
445 I. trifoliata L.
446 Lablab purpureus (L.) Sw.
447 Lathyrus aphaca L.
448 L. luteus Baker
449 L. sphaericus Retz.
450 Lespedeza gerardiana Grah. ex Baker
451 L. juncea (L.f.) Pers.
452 Lespedeza sericea (Thunb.) Miq.
453 L. stenocarpa Maxim.
454 Lotus corniculatus L.
455 Macrotyloma uniflorum (Lam.)Verd.
456 Medicago lupulina L.
457 M. polymorpha L.
458 Melilotus alba-Medik
459 M. indica (L.) All.
460 Milletia auriculata Baker ex Brandis
461 Millettia extensa (Benth.) Benth.
462 Mucana puriens (L.) DC.
463 Ougeinia oojeinensis (Roxb.) Hochr.
464 Oxytropis colletti Prain & Duthie ex Fisch.
465 O. lapponica var. humifusa (Kar. & Kir.) Baker
466 O. mollis Royle
467 O. tatarica Jacq. ex Baker
468 Parochetus communis Buch.-Ham. ex Don
469 Piptanthes nepalensis Don
470 Pueraria phaseoloides (Roxb.) Benth.
471 P. tuberosa (Roxb. ex Willd.) DC.
472 Rhynchosia himalensis Benth.
473 Rhynchosia minima (L.) DC.
474 Robinia pseudo-acasia L.
475 Shuteria densiflora Benth.

476 S. involucrata (Wall.) W. & A.
477 Shuteria vestita (Wallich) Wight & Arn.
478 Smithia ciliata Royle
479 Sophora mollis (Royle) Grah. ex Baker
480 Tephrosia hamiltonii Drumm.
481 Thermopsis barbata Royle
482 T. inflata Camb.
483 Trifolium alexandrinum L.
484 T. dubium Sibth.
485 T. repens L.
486 Trigonella corniculata L.
487 T. emodi Benth.
488 T. foenum-graecum L.
489 T. gracilis Benth.
490 T. pubescens Edgew. ex Baker
491 Uraria lagopus DC.
492 Uraria neglecta Prain
493 U. picta (Jacq.) Desv. ex DC.
494 Vicia faba L.
495 V. hirsuta (L.) Gray
496 V. rigidula Royle
497 V. sativa L.
498 Vigna aconitifolia (Jacq.) Marechal
499 Vigna angularis (Willd.) Ohwi & Ohashi
500 V. anguiculata (L.) Walp.
501 V. vexillata (L.) A. Rich.
502 Zornia gibbosa Span.

Caesalpiniaceae

503 Bauhinia vahlii W. & A.
504 B. variegata L.
505 Caesalpinia bonduc (L.) Roxb.
506 C. decapitala (Roth) Alston
507 Cassia absus L.
508 C. fistula L.
509 C. leschenaultiana DC.
510 C. occidentalis L.
511 C. tora L.

Mimosaceae

512 Acacia auriculiformis A. Cunn.
513 A. catechu (L.F.) Willd.
514 A dealbata Link
515 Albizia chinensis (Osbeck) Merr.
516 A. julibrissin Durazz.
517 A. lebbeck (L.) Benth.
518 Mimosa himalayana Gamble
519 M. pudica L.

Rosaceae

520 Acmostylis elata (Wall.) F. Bolle
521 Agrimonia aitchisonii Schon.
522 Agrimonia pilosa Ledeb. var. nepalensis (Don) Nakai
523 Alchemilla vulgaris Boiss.
524 Aruncus dioicus (Waltar) Fem. var. triternatus (Maxim) Hara
525 Cotoneaster acuminatus Lindl.
526 C. disticha Lange
527 C. duthieanus (Schneid.) Klotz.
528 C. frigidus Wall. ex Lindl.
529 C. garhwalensis Klotz. ex Rau
530 C. lindleyi Steud.
531 C. microphyllus Wall. ex Lindl.
532 C. obtusa Wall. ex Lindl.
533 C. prostratus Baker
534 C. rosea Edgew.
535 Duchesnea indica (Andr.) Focks
536 Eriobotrya japonica (Thunb.) Lind.
537 Filipendula vestita Maxim.
538 Faragaria daltoniana Gay.
539 F. nubicola Lindl. ex Lacaita
540 Malus baccata (L.) Borkh.
541 Photinia integrifolia Lindl. var.integrifolia
542 Potentilla ambigua Camb.
543 P. arbuscuta Don
544 P. argyrophylla Wall. ex Lehm.
545 P. atrosanguinea Lodd.
546 P. biflora Willd. ex Schlecht.
547 P. bifurca L.
548 P. eriocarpa Wall. ex Lehm.
549 P. fulgens Wall.
550 P. gerardiana Lindl. ex Lehm.
551 P. leuconata Don
552 P. microphylla Don
553 P. monanthes Lindl. ex Lehm.
554 P. multifida L.
555 P. nepalensis Hk.
556 P. nivea L. var. himalaica Kitamura
557 P. peduncularis Don
558 P. polyphylla Wall. ex Lahm.
559 P. saundersiana Royle
560 P. sundaica (Bl.) Ktze.
561 P. supina L.
562 P. thomsonii Hand.-Mazz.
563 Prinsepia utilis Royle
564 P. cerasoides Don
565 P. nepalensis (ser.) Steud.
566 P. undulata Buch.-Ham. ex Don
567 Pyracantha crenulata (Don) Roem.
568 P. pashia Buch.-Ham ex Don
569 Rosa brunonii Lindl.
570 R. macrophylla Lindl.
571 R. osmastonii Rawat & Pangtey
572 R. webbiana Wall. ex Royle
573 Rubus biflorus Buch.-Hum.ex Sm.
574 R. ellipticus Don
575 R. indotibetanus Koide.
576 R. macilentus Camb.
577 R. niveus Thunb.
578 R. nepalensis (Hk. f.) Ktze.

579 R. pedunculosus Don
580 R. paniculatus Sm.
581 Sanguisorba diandra (Hk.f.) Nordb.
582 Sibbaldia cuneata Hornem ex O. Ktze.
583 S. cuneata var. micrantha (Hk. f.) Stewart
584 S. purpurea Royle
585 Sorbus foliosa (Wall.) Spach.
586 S. microphylla (Wall.) Spach.
587 S. lanata (Don) Schauer
588 S. vestita (Wall.) Spach.
589 Sorbaria tomentosa (Lindl.) Rehder
590 Spiraea arcuata Hk.
591 S. bella Sims.
592 S. canescens Don
593 S. catoniensis lour.
594 S. vaccinifolia Don
595 Stranvaesia naussia (Don) Done.

Saxifragaceae

596 Astilbe rivularis Buch.-Ham. ex Don
597 Bergenia ligulata (Wall.) Engl.
598 Bergenia ciliata (Royle) Raizada
599 B. strachayi (Hk. f. & T.) Engl.
600 Chrysosplenium carnosum Hk. f. & T.
601 C. nepalense Don
602 C. tenellum Hk. f. & T.
603 C. trichospermum Edgew. ex Hk.
604 Parnassia kumaonica Nekras
605 P. laxmanii Pall. ex. Schultes
606 P. nubicola Wall. ex. Royle
607 P. pussilla Wall. ex. Hk.
608 Saxifraga aristulata Hk.f. & T.
609 S. brachypoda var. fimbriata (Wall.) Engl. & Irmsch ex. Don
610 S. brunonis Wall. ex. Seringe
611 S. cernua L. ex. DC.
612 S. diversifolia Wall. Var. parnassifolia (Don) Engl. ex. Sternd.
613 S. filicaulis Wall. ex. Sternb.
614 S. flagellaris Willd.
615 S. hirculus L.
616 S. hispidula Don
617 S. jacquenmontiana Done.
618 S. kumaonensis Engl.
619 S. lychnitis Hk.f. & T.
620 S. microphylla Royle ex. Hk.f. & T.
621 S. moorcroftiana Wall. ex. Sternb.
622 S. odontophylla Hk.f. & T.
623 S. oppositifolia L.
624 S. pallida Wall.
625 S. poluniniana H. Sm. var. mucronata Bhatt. & Viswan.
626 S. pulvinaria Sm.
627 S. saginoides Hk.f. & T.
628 S. sibirica L.
629 S. strigosa Wall. ex. DC.
630 S. subspathulata Engl. & Irmsch.var. kumaonensis Engl. & Irmsch.

Iteaceae

631 Itea nutans Royle

Hydrangeaceae

632 Hydrangea anomala Don
633 H. marcrophylla (Thunb.) DC.
634 Deutzia compacta Craib.
635 D. staminea R. Br.
636 Philadelphus tomentosus Wall. ex. G Don

Grossulariaceae

637 Ribes emodense Rehder
638 R. glaciale Wall.
639 R. griffithii Hk.f. & T.
640 R. orientale Poir. ex. Desf.
641 R. uva-crispa L. var. sativum DC.

Crassulaceae

642 Crassula indica done.
643 Kalanchoe integra (Medik.) Ktze.
644 K. pinnata (Lamk.) Pers.
645 Sedum adenotrichum Wall. Ex. Hk.f. & T.
646 S. bouveri R. Hamet
647 S. bupleuroides Wall. ex Hk.f. & T.
648 S. crenulatum Hk.f. & T.
649 S. ewersii Leadeb.
650 S. heterodontum Hk.f. & T.
651 S. linearifolium Royle
652 S. multicaule Wall. ex Lindl.
653 S. oreadis (Done.) R. Hamet
654 S. quadrifidum Pall.
655 S. rhodiola DC. ex Cl.
656 S. rosulatum Edgew.
657 S. scabridum Franch.
658 S. sinuatum Royle
659 S. trullipetalum Hk.F. & T.
660 S. wallichianum Hk.
661 Semperviyum mucronatum Edgew.
662 Sinocrassula indica (Decne.) Berger
663 Tillaea pentandra Royle ex Edgew.
664 T. pharmaceoides Hochst.

Droseraceae

665 Drosera peltata Sm.

Combretaceae

666 Anogeissus latifolia (DC.) Wall. ex Bedd.
667 Terminalia alata Heyne ex Roth
668 T. bellirica (Gaertn.) Roxb.
669 T. chebula Tetz.

Myrtaceae

670 Syzygium cumini [L.] Skeels

Melastomaceae

671 Osbeckia chinensis L.
672 O. stellata Buch.-Ham. ex Don
673 O. truncata Don ex W. & A.

Lythraceae

674 Ammania baccifera L.
675 A. multiflora Roxb.
676 Lagerstroemia indica L.
677 L. parviflora Roxb.
678 Lawsonia inermis L.
679 Rotala densiflora (Roem. & Schultes) Koehne
680 R. pygmaea (Ktze.) Raj Gopal & Ramayya
681 R. rotundifolia (Roxb.) Koechne
682 Woodfordia fruticosa (L.) Kurz

Onagraceae

683 Circaea alpina L.
684 C. repens Wall. ex Ascher. & Magn.
685 Epilobium amurense Haussk. Subsp. Letum (Wall. ex Haussk.) Raven
686 E. angustifolium L.
687 E. brevifolium Don
688 E. brevifolium Don subsp. Pannosum (Haussk.) Raven
689 E. conspersum Haussk.
690 E. himalayense Haussk.
691 E. hirsutum L.
692 E. latifolium L. subsp. Speciosum (Done.) Raven
693 E. laxum Royle
694 E. leiophyllum Haussk.
695 E. minutiflorum Haussk.
696 E. palustre L.
697 E. roseum (Schreb.) Pers.
698 E. sikkimense Haussk. Subsp. sikkimense Raven
699 E. stracheyanum Haussk.
700 Oenothera rosea Soland

Samydaceae

701 Casearia elliptica Willd.
702 C. graveolens Dalz.

Passifloraceae

703 Passiflora foetida L.

Cucurbitaceae

704 Benincasa hispida (Thunb.) Cogn.
705 Citrullus lanatus (Thunb.) Mansf.
706 Cucumis callosus (Rottl.) Cogn.
707 Cyclanthera pedata Schrad.
708 Diplocyclos palmatus (L.) C. Jeffrey
709 Gynostemma pentaphylla (Thunb.) Makino
710 Luffa cylindrica (L.) M. Roem.
711 Melothria heterophylla (Lour.) Cogn.
712 Trichosanthes cucumerina L.
713 T. dioica Roxb.
714 T. tricuspidata Lour.
715 Zehneria heterophylla (Lour.) Cogn.
716 Z. indica (Lour.) Kern.-Aym.

Begoniaceae

717 Begonia picta Sm.

Datiscaceae

718 Datisca cannabina L.

Cataceae

719 Opuntia monacantha (Willd.) Haw.

Molluginaceae

720 Mollugo pentaphylla L.

Apiaceae

721 Acronema tenera Edgew.
722 Angelica archangelica L. var. himalaica Cl.
723 A. glauca Edgew.
724 Apium leptophyllum (Pars.) F.V.M. ex Benth.
725 Bupleurum candollii Wall. ex DC.
726 B. falcatum. L.
727 B. hamiltonii Balak
728 B. lanceolatum Wall. ex DC.
729 B. longicaule Wall. ex DC.
730 Carum carvi L.
731 Centella asiatica (L.) Urban
732 Chaerophyllum villosum Wall. ex DC.
733 Coriandrum sativum L.
734 Cortia depressa (Don) Norman
735 Heracleum brunonis Benth.
736 H. candicans Wall. ex DC.
737 H. canescens Lindl.
738 Hydrocotyle javanica Thunb.
739 Hydrocotyle rotundifolia Roxb.
740 H. sithorpoides Lamk.
741 Ligusticum daucoides Franch.
742 Oenanthe javanica (Bl.) DC.
743 Pimpinella acuminata (Edgew.) Cl.
744 P. diversifolia DC.
745 Pituranthes nuda Benth.
746 Pleurospermum angelicoides (DC.) Cl.
747 P. benthamii Cl.
748 P. brunonis (DC.) Benth.
749 P. candollii (DC.) Benth.
750 P. densiflorum Benth. ex Cl.
751 P. dentatum (DC.) Cl.
752 P. hookeri Cl.
753 P. stellulatum (Don) Cl.
754 Sanicula elata Buch.-Ham. ex Don
755 Selinum candollii DC.
756 S. vaginatum Cl.
757 S. wallichianum (DC.) Raizada & Saxena
758 Trachydium roylei Landl.
759 T. falconeri (Cl.) Wolff
760 Trachyspermum anethifolium (D. Don) Wolff.
761 T. strictocarpum (Cl.) Wolff
762 Vicatia coniifolia DC.

Araliaceae

763 Aralia cachemirica Dcne.
764 Hedera neplaensis K. Koch
765 Pentapanax parasiticum (Don) Seem.
766 Schefflera venulosa (W. & A.) Harms

Cornaceae

767 Benthamidia capitata (Wall.) Hara
768 Swida macrophylla (Wall.) Sojak
769 S. oblonga (Wall.) Sojak

Toricellaceae

770 Toricellia tiliifolia DC.

Alangiaceae

771 Alangium chinense (Lour.) Harms.
772 Alangium salviifolim (l.f.) Wangerin

Caprifoliaceae

773 Abelia triflora R. Br. ex Wall.
774 Leycesteria formosa Wall
775 Lonicera angustifolia Wall ex DC
776 L. asperifolia (Done.) Hk.f. & T.
777 L. hispida var. bracteata Rahdr. ex A. Shaw
778 L. myrtillus Hk.f. & T.
779 L. obovata Royle
780 L. purpurascens Walp.
781 L. quinquelocularis Hardw.
782 L. rupicola Hk.f. & T.
783 L. semenovii Regel.
784 L. spinosa Sacq. ex Walp.
785 L. webbiana Wall ex DC.
786 Triosetum himalayanum Wall.
787 Viburnum cotinifolium Don
788 V. cylindricum Buch.-Ham. ex Don
789 V. erubescens Wall.
790 V. mullaha Buch.-Ham. ex Don
791 V. nervosa Don

Rubiaceae

792 Adina cordifolia (Roxb.) Hk.F. ex Brandis
793 Argostemma sarmentosum Wall.
794 A. verticillata Wall.
795 Borreria articularis (L.f.) F.N. Williams
796 B. pusilla (Wall.) DC.
797 Galium aparine L.
798 G. asperifolium Wall.
799 G. elegans Wall.
800 G. exile Hk.
801 G. paradoxum Maxim.
802 G. pauciflorum Bunge
803 G. trichorne With.
804 G. vestitum Don
805 Hedyotis lindleyana Hk.f. ex W. & A.
806 H. pinifolia Wall ex G. Don
807 Hymnodictyon flaccidum Wall
808 Hymenopogon parasiticus Wall.
809 Kahautia gracilis (Wall.) DC.
810 Leptodermis kumaonensis Parker
811 L. lanceolata Wall.
812 Leptodermis reparia Parker
813 Mussaenda treutleri Stapf
814 Neonotis calycina (Wall. ex Hk.f.) Lews
815 Oldenlandia corymbosa L.
816 Oldenlandia coccinea Royle
817 Ophiorrhiza fasciculata Don
818 Pavetta tomentosa Roxb.
819 Randia tetrasperma (Roxb.) Benth. ex Hk.f.
820 Rubia manjith Roxb ex Flem.
821 Spermacoce pusilla Wallich in Roxb.
822 Spermadictyon suoveolens Roxb.
823 Uncaria scandens (Sm.) Hutch.
824 Wendlandia exerta (Roxb.) DC.
825 W. puberula DC.
826 Xeromorphis spinosa (Thunb.) Keay

Valerianaceae

827 Nardostachys grandiflora DC.
828 Valeriana dioica L.
829 V. hardwickii Wall.
830 V. jatamansi Jones

Dipsacaceae

831 Dipsacus inermis Wall.
832 Morina coulteriana Royle
833 M. longifolia Wall. ex DC.
834 M. nepalensis Don
835 Triplostegia glandulifera Wall. ex DC.

Asteraceae

836 Acanthospermum hispidum DC.
837 Achillea millefolium L.
838 Adenocaulon himalaicum Edgew.
839 Adenostemma lavenia (L.) Kutze
840 Ageratum conyzoides L.
841 Ainsliaea aptera DC.
842 A. latifolia (Don) Sch.-Bip.
843 Anaphalis adnata DC.
844 A. busua Buch.-Ham. ex Don
845 A contorta (Don) Hk.f.
846 A. cuneifolia Hk.f.
847 A. nepalensis (Spreng.) Hand.-Mazz.
848 A. royleana DC. Var. cana Hk.f.
849 A. triplinervis (Sims.) Cl.
850 Arctium lappa L.
851 Artemisia biennis Willd.
852 A. capillaris Thunb.
853 A. edgewothii Balak
854 A. gmelinii Web. ex Stechm.
855 A. japonica Thunb.
856 A. maritima L.
857 A. moorcroftiana Wall. ex DC.
858 A. nilagarica (Cl.) pamp.
859 A. roxburghiana Basser
860 A. sieversiana Willd.
861 Aster albescens (DC.) Hand.-Mazz.
862 A. diplostephoides (DC.) Cl.

863 A. falconeri subsp. Neplaensis Griers
864 A. falconeri (Cl.) Hutch. subsp. Falconeri
865 A. flaccidus Bunge subsp. flaccidus Griers
866 A. molliusculus (DC.) Cl.
867 A peduncularis Wall. ex Ness
868 A. stracheyi Hk.f.
869 A. thomsonii Cl.
870 Bidens biternata (Lour.) Merr. & Sherff ex Sherff
871 B. tripartita L.
872 Bidens bipinnata L.
873 Bidens pilosa L.
874 Blainvillea acmella (L.) Philipson
875 Blumea aromatica DC.
876 B. fistulosa (Roxb.) Kurz
877 B. hieracifolia (Don) DC.
878 B. lacera (Burm. F.) DC.
879 B. laciniata Roxb.) DC.
880 B. mollis (Don Merr.
881 Brachyactis menthadora Benth. ex Hk. F.
882 Caesulia axillaris Roxb.
883 Carduus onopordioides Fisch. ex Bieb.
884 C. trachelifolium Less.
885 Centipeda minima (L.) A. Br.& Aschers.
886 Chrysanthemum leucanthum L.
887 Cicerbita cyanea (Don) Beauv.
888 C. lessertiana (DC.) Beauv.
889 C. macrorhiza (Royle) Beauv.
890 C. rapunculoides (DC.) Beauv.
891 C. violaefolia (Done.) Beauv.
892 Cichorum intybus L.
893 Circium argyracanthus DC.
894 C. arvensis (L) Scop.
895 C. verutinum Spreng.
896 C. wallichii DC.
897 Conyza japonica (Thunb.) Less.
898 C. leucantha (Don) Ludlow
899 Picris hieraceoides L. subsp. Kaimaensis Kitamura
900 C. stricta Willd.
901 Consmos bipinnata Cav.
902 C. sulfureus Cav.
903 Cotula hemispherica (Roxb.) Raibada
904 Cousinia thomsonii Cl.
905 Crassocephalum crepidioides (Benth.) S. Moore
906 Cremanthodium decaisnei Cl.
907 C. canum (Done.) W.W. Sm
908 Cythocline purpurea (Don) Ktze.
909 Dicrocephala integrifolia (L.f.) Ktze.
910 Doronicum falconerii Cl. ex Hk.f.
911 D. roylei DC.
912 Dubyaea hispida (Don) DC.
913 Echinops niveus Wall. ex Royle
914 Eclipta alba (L.) Haussk.
915 Emilia sonchifolia (L.) DC.
916 Elephantopus scaber DC.
917 Erigeron annuus Pers.
918 E. bonariensis L.
919 E. canadensis L.
920 E. floribundus (BHK) Sch.-Bip.
921 E. karvinskianus DC.
922 E. monticolus DC.
923 E. uniflorus L.
924 Eupatorium adenophorum Spreng.
925 Eupatorium odoratum L.
926 Galinsoga ciliata (Rafin.) Blake
927 G. parviflora
928 Gerbera gossypina (Royle) Beauv.
929 G. nivea Benth.
930 Gnaphalium hypoleucum DC.
931 G. luteo-album L.
932 G. pensylvanicum Willd.
933 Gynura nepalensis DC.
934 Helianthus annuus L.
935 Inula cappa DC.
936 I. cuspidata Cl.
937 I grandiflora Willd.
938 Jurinea macrocephala (DC.) Benth.
939 Lactuca dissecta Don
940 L. macrorrhiza (Royle) Hk.f.
941 Laggera alata (Don) Sch.-Bip ex Oliv.
942 L. falcata (Don) Ktze.
943 L. pterodonta (DC.) Sch.-Bip. ex Oliv.
944 Launaea fallax (Jaub. & Spach). O.K. Reg.
945 Launaea procumbens (Roxb.) Ramayya & Rajag.
946 Leontopodium himalayanum DC.
947 L. stracheyi Cl. ex Hemsl.
948 Ligularia amplexicaulis DC.
949 L. arnicoides DC.
950 L. sibirica Cass.
951 Leucomeris spectabilis Don
952 Myriactis javanica (Bl.) DC.
953 M. nepalaensis Less.
954 M. wallichii Less.
955 Parthenium hysterophorus L.
956 Petasites tricholobus Franch.
957 Prenanthes brunoniana Wall. ex DC.
958 Saussurea bracteata Dcne.
959 S. deltoidea Cl.
960 S. falconerii Hk.f.
961 S. fastuosa (Dcne.) Sch.-bip
962 S. gossypiphora Don
963 S. graminifolia Wall. ex Hk.f.
964 S. heteromella (Don) Hand.-Mazz.
965 S. hypoleuca Spreng. ex DC.
966 S. lappa (Dcne.) Sch.-Bip

967 S. leontodontoides (DS.) Sch.-Bip
968 S. neglecta Ludlow ex Cass.
969 S. obvallata (DC.) Sch.-Bip.
970 S. piptanthera Edgew.
971 S. taraxifolia Wall. ex DC.
972 Sclerocarpus africanus Jacq. ex Murr.
973 Senecio alatus Wall. ex DC.
974 S. candolleanus Hk. & A.
975 S. chenopodifolius DC.
976 S. chrysanthemoides DC.
977 S. coronopifolius Desf. ex Ball.
978 S. graciliflorus DC.
979 S. kunthianus Wall. ex DC.
980 S. livingii Cl.
981 S. nudicaulis Buch.-Ham. ex Don
982 S. quinquelobus DC.
983 S. rufinervis DC.
984 Serratula pallida DC.
985 Siegesbeckia orientalis L.
986 Solidago virga-aurea L.
987 Soliva anthemifolia (A. Juss.) R.Br.
988 Sonchus asper (L.) Hill
989 S. brachyotus DC.
990 S. oleraceus L.
991 Sonchus wightanus DC.
992 Soroseris gillii (s. Moore) Stebbins subsp. occidentalis Stebbins
993 S. glomerata (Dcne.) stebbins
994 Sphaeranthus senegalensis Dc.
995 Tagetes erecta L.
996 T. minuta L.
997 T. patula L.
998 Tanacetum longifolium Wall. ex DC.
999 T. nubigenum Wall. ex Hk.f.
1000 T. tenuifolium Jacq. ex DC.
1001 T. tibeticum Hk.f. & T.
1002 T. tomentosum DC.
1003 Taraxacum forrestii Van.
1004 T. officinalis Webber
1005 Tragopogon gracile Don
1006 Tridax procumbens L.
1007 Tussilago farfara L.
1008 Vernonia cinerea (L.) Less.
1009 V. revoluta Hamilt.
1010 V. squarrosa (Don) Less.
1011 Vicoa cernua Dalz.
1012 V. indica (L.) DC.
1013 Waldhemia glabra (Dcne.) Regel.
1014 W. tomentosa (Dcne.) Regel.
1015 Xanthium strumarium L.
1016 Youngia glauca Edgew.
1017 Y. gracilipes (Hk.f.) Babc. & Stebbins
1018 Y. japonica (L.) DC.
1019 Y. tenuifolia (Willd.) Babc. & Stebbins
1020 Zinnia multiflora L.

Lobeliaceae

1021 Lobelia heyneana R. & S.

Campanulaceae

1022 Campanula argyrotricha Wall. ex DC.
1023 C. aristata Wall. ex Roxb.
1024 C. benthamii Wall. ex Kitamura
1025 C. cashmiriana Royle
1026 C. colorata Wall.
1027 C. lacei Duthie
1028 C. latifolia L.
1029 C. modesta Hk.f. & T.
1030 Codonopsis rotundifolia Benth.
1031 Cyananthus integer Wall. ex Benth.
1032 C. lobatus Wall. ex Benth.
1033 C. microphyllus Edgew.
1034 Wahlenbergia gracilis DC.

Ericaceae

1035 Cassiope fastigiata Don
1036 Gautheria nummularioides Don
1037 G. trichophylla Royle
1038 Lyonia ovalifolia (Wall.) Drude
1039 L. villosa (Hk.f. ex Cl.Hand.-Mazz.
1040 Rhododendron anthopogon Don
1041 R. arboreum Sm.
1042 R. barbatum Wall. ex G. Don
1043 R. campanulatum Don
1044 R. lepidotum Wall. ex Don

Monotropaceae

1045 Hypopitys lanuginasa Nutt.
1046 Monotropa uniflora L.

Plumbaginaceae

1047 Plumbago auriculata Lamk.
1048 P. zeylanica L.

Primulaceae

1049 Anagallis arevnsis L.
1050 Andorsace geraniifolia Watt.
1051 A. globifera Duby
1052 A. lanuginosa Wall.
1053 A. rotundifolia Hardw.
1054 A. umbellata (Lour.) Merr.
1055 A. villosa L.
1056 Cortusa matthiola L.
1057 Lysimachia alternifolia Wall.
1058 L. chenopodioides Watt. ex Hk.
1059 L. debilis Wall.
1060 L. lobelioides Wall.
1061 L. prolifera Klatt.
1062 L. pyramidilis Wall.
1063 Primula denticulata Sm.
1064 P. edgeworthii (Hk.f.) Pax.
1065 P. elliptica Royle
1066 P. floribunda Wall.
1067 P. glandulifera Balf. F. & W.W. Sm.

1068 P. reideii Watt.
1069 P. macrophylla Don
1070 P. minutissima Jacq. ex Duby
1071 P. moorcroftiana Wall. ex Klatt.
1072 P. munroi Lindl.
1073 P. obtusifolia Royle
1074 P. petiolaris (Hk.f.) Pax.
1075 P. primulina (Spreng.) Hara
1076 P. rotundifolia Wall. ex Roxb.
1077 P. stuartii Wall.

Myrsinaceae

1078 Ardisia floribunda Wallich in Roxb.
1079 A. solanacea (Poir.) Roxb.
1080 Maesa argentea (Wall.) A. DC.
1081 M. indica A. DC.
1082 Myrsine africana L.
1083 M. semiserrata Wall.

Sapotaceae

1084 Diploknema butyracea (Roxb.) Lamk.
1085 Madhuca indica Gmelin

Symplococaceae

1086 Symplocos chinensis (Lour.) Drace
1087 S. ramosissima Wall.
1088 S. spicata Roxb.
1089 S. theafolia Buch.-Ham. ex Don

Oleaceae

1090 Fraxinus micrantha Lingelsh.
1091 Jasminum arborescens Roxb.
1092 J. dispermum Wall.
1093 Jasminum grandiflorum L.
1094 J. humile L.
1095 J. multiflorum (Burm.f.) Anders.
1096 J. officinale L.
1097 Ligustrum indicum (Lour.) Merr.
1098 Nyctanthes arbor-tristis L.
1099 Olea glandulifera Wall. ex Don
1100 Osmanthus fragrans Lour.
1101 Syringa emodi Wall. ex G. Don

Apocynaceae

1102 Alstonia scholaris (L.) R. Br.
1103 Carissa opaca Stapf ex Haines
1104 Chonemorpha griffithii Hk.f.
1105 Chonemorpha fragrans (Moon) Alston
1106 Holarrhena pubsecens (Buch.-Ham.) Wall. ex Don
1107 Ichnocarpus frutescens (L.) R.Br.
1108 Tabernaemontana divaricata (L.) R. Br.
1109 Thevetia peruviana (Pers.) K. Schum.
1110 Trachelospermum lucidum (Don) K. Schum.
1111 Vallaris solanacea (Roth) Ktze.
1112 Vinca major L.
1113 Wrightia tomentosa Roem. & Schult.

Asclepiadaceae

1114 Asclepias curassavica L.
1115 Calotropis procera R. Br.
1116 Cryptolepis buchanani Roem. & Schultes
1117 Cynanchum arnottianum W.
1118 C. auriculatum Royle ex W.
1119 Gongronema nepalense Dcne.
1120 Heterostemma alatum wight
1121 Hoya lanceolata Wallich ex Wight
1122 Hoya longifolia Wallich ex Wight
1123 Marsdenia lucida Edgew. ex Madden
1124 M. roylei W.
1125 Pentasachme wallichii Wight
1126 Typlophora indica (Burm.f.) Merr.
1127 Vincetoxicum glaucum (Wall. ex W.) Rech.

Buddlejaceae

1128 Buddleja crispa Benth.
1129 Budleja paniculata
1130 Buddleja asiatica Lour.

Gentianaceae

1131 Canscora decussata (Roxb.) R. & S.
1132 C. diffusa (Vahl) R. Br.
1133 Centaurium pulchellum (Sw.) Druce
1134 Gentiana algida (Pall.) Stev.
1135 G. aprica Dcne.
1136 G. argentea Royle ex Don
1137 G. aurea L.
1138 G. capitata Buch.-Ham. ex D.Don
1139 G. contorta Royle
1140 G. carinata Griseb.
1141 G. crassuloides Burr. & Fr.
1142 G. detonsa Fries var. stracheyi Cl.
1143 G. infebix Cl.
1144 G. kumaonensis Biswas
1145 G. pedicellata Wall. ex Don
1146 G. pygmaea Cl.
1147 G. recurvata Cl.
1148 G. squarrosa Cl.
1149 G. stipitata Edgew.
1150 G. tubiflora Wall.
1151 G. venusta Wall. ex Griseb.
1152 Gentianella moorcroftiana (Wall. ex Griseb.)A. Shaw ex Rau
1153 G. pedunculata Royle ex G. Don
1154 Halenia elliptica Don
1155 Lomatogonium carnthiacum (Wulf.) Reichb.
1156 Swertia alata Royle ex Cl.
1157 S. chirayita (Roxb. ex Flem.) Karst.
1158 S. ciliata (Don) B.L. Burtt.
1159 S. cordata Wall. ex Cl.
1160 S. cuneata Don.
1161 S. paniculata Wall.
1162 S. petiolata Royle
1163 S. speciosa G. Don

Polemoniaceae

1164 Polemonium caeruleum subsp. Himalayanum (Baker) Hara

Ehretiaceae

1165 Cordia dichotoma Forster
1166 Cordia vestita (DC.) Hk.f. & T.
1167 C. wallichii G. Don
1168 Ehretia acuminata R. Br. Var. serrata (Roxb. I.M. Johnston
1169 E. laevis Roxb.

Boraginaceae

1170 Anoplocaryum brandisii Brand
1171 Arnebia bethamii (Wall. ex G. Don) Johnston
1172 A. euchroma (Royle) Hohnston
1173 Asperugo procumbens L.
1174 Bothriospermum tenellum (Homem.) Fisch. & C.A. Carey
1175 Cynoglossum glochidiatum Wall. ex Benth.
1176 C. lanceolatum Forssk.
1177 C. microglochin Benth.
1178 C. nervosum Benth. ex Cl.
1179 C. wallichii G. Don
1180 C. zeylanicum (Hornem.) Thunb. ex Lehm.
1181 Erithrichium pustulosum Cl.
1182 E. rupestre (Pall.) Bunge var. pectinatum (Pall.) Brand
1183 Hackelia roylei (Wall ex DC.) Johnston
1184 H. uncinata (Benth.) C.E.C. Fischer
1185 Heliotropium strigosum willd.
1186 Lappula barbata (M. Biedb) Gurke
1187 Lindelofia longiflora (Benth.) Baill.
1188 Microcaryum diffusum Brand
1189 Microula tibetica Maxim.
1190 Myosotis caespitosa Schultze
1191 M. sylvatica Hoffm.
1192 Onosma bracteatum Waoll.
1193 O. emodi Wall.
1194 O. hispidum Wall. ex DC.
1195 Trichodesma indicum (L.) R. Br. Ex Lehm.

Heliotropiaceae

1196 Heliotropium strigosum Willd.

Cuscutaceae

1197 Cuscuta reflexa Roxb.
1198 C. europaea

Convolvulaceae

1199 Convolvulus arvensis L.
1200 Evolvulus alsinoides (L.) L
1201 Ipomoea eriocarpa R. Br.
1202 I. fistulosa Mart. ex Choisy
1203 I. hederifolia L.
1204 I. nil (l.) Roth
1205 I. pestigridis L.
1206 I. purpurea (L.) Roth
1207 I. quamoclit L.
1208 Porana paniculata Roxb.

Solanaceae

1209 Cyphomandra betacea (Cav.) Sendt.
1210 Datura metel L.
1211 Datura stramonium L.
1212 Hyocyamus niger L.
1213 Nicandra physalodes (L.) Gaertn.
1214 Nicotiana rustica L.
1215 Physalis minima L.
1216 P. peruviana L.
1217 Physochlaina praealta Miers.
1218 Scopolia lurida Duna
1219 Solanum erianthum Don
1220 Solanum hispidum Pers.
1221 S. incanum L.
1222 S. jasminoides Paxt.
1223 S. nigrum L.
1224 S. pseudo-capsicum L.
1225 S. surratense Burm. F.
1226 S. viarum Dunal
1227 S. violaceum Ortega
1228 Withania somnifera (L.) Dunal

Scrophulariaceae

1229 Antirrhinum majus L.
1230 A. orontium L.
1231 Bacopa monnieri (L.) penn.
1232 B. procumbens (Mill.) Greenm.
1233 Buchnera hispida Buch.-Ham. ex Don
1234 Centranthera repalensis Don
1235 Cymbalaria muralis Schreb
1236 Euphrasia himalayica Wettst.
1237 Falconeria himalaica Hk.f.
1238 Hemiphragma heterophyllum Wall.
1239 Lancea tibetica Hk. F. & T.
1240 Limnophila connata (Buch.-Ham- ex Don) Hand. Mazz.
1241 L. rugosa (Roth) Merr.
1242 Lindenbergia grandiflora (Buch.-Ham.) Benth.
1243 L. indica (L.) O. Ktze.
1244 L. macrostachya (Benth.) Benth.
1245 Lindernia anagaliis (Burm.f.) Penn.
1246 L. antipoda (L.) Alst.
1247 L. ciliata (Colsm.) Penn.
1248 L. crustacea (L.) F. Muell.
1249 Lindernia nummularifolia (D. Don) Wettst.
1250 L. sessiliflora (Benth.) Wettst.
1251 Mazus delavayi Bonati
1252 M. pumilus (Burm.f.) Steenis
1253 M. surculosus Don
1254 Pedicularis bifida (Buch.-Ham.) Penn.
1255 P. brevifolia Don
1256 P. gracilis Wall. ex Benth.
1257 P. hoffmeisteri Klotz. ex Klotz. & Garke
1258 P. hookeriana Wall.
1259 P. longiflora Rud. Var.tubiformis Klotx.
1260 P. macrantha Klotz.

1261 P. megalantha Don
1262 P. mollis Wall.
1263 P. oederi Wall. Var. heteroglossa Prain
1264 P. ophiocephala Maxim.
1265 P. pectinata Wall. ex Benth
1266 P. punctata Dcne.
1267 P. roylei Maxim.
1268 P. trichoglossa Hk.f.
1269 Picrohiza scrophulariflora Penn.
1270 Scoparia dulcis L.
1271 Scrophularia calycina Benth.
1272 S. decomposita Royle ex Benth.
1273 S. edgeworthii Benth.
1274 S. himalensis Royle ex Benth.
1275 S. pauciflora Benth.
1276 Sopubia trifida Buch.-Ham. ex Don
1277 Striga asiatica (L.) Roxb.
1278 Verbascum thapsus L.
1279 Veronica anagalis-aquatica L.
1280 V. beccabunga L.
1281 V. biloba L.
1282 V. capitata Royle ex Benth.
1283 V. cephaloides Penn.
1284 V. didyma Tenore
1285 V. javanica Bl.
1286 V. lasiocarpa Penn.
1287 V. persica Poir.
1288 V. serpyllifolia L. subsp. Humifusa (Dickson) Vahl
1289 V. undulata Wall.
1290 Wulfenia amherstiana Benth.

Orobanchaceae

1292 Orobanche epithymum DC.
1293 O. cernua Loeffl.
1294 O. solmsii Cl. ex Hk.f. & T.

Lentibulariaceae

1295 Pinguicula alpina L.
1296 Utricularia exoleta R. Br.
1297 U. multicaulis Oliver
1298 U. scandens Benj.
1299 U. striatula Sm.

Gesneriaceae

1300 Aeschynanthus parviflorus (Don) Spreng.
1301 Chirita bifolia Don
1302 C. pumila Don
1303 Corallodiscus lanuginosus (Wall. ex DC.) Burtt
1304 Didymocarpus pedicallata R. Br.
1305 D. subalternans Wall. ex DC.
1306 Platystemma violoides Wall.
1307 Rhynchoglossum obliguum Bl.

Bignoniaceae

1308 Incarvillea arguata (Royle) Royle
1309 I. emodi (Lindl.) Chatt.
1310 Jacranda mimosifolia Don
1311 Oroxylum indicum (L.) Vent.
1312 Stereospermum suaveolens DC.

Pedaliaceae

1313 Sesamum orientale L.

Martyniaceae

1314 Martynia annua L.

Acanthaceae

1315 Acehmanthera gossypina (Nees) Nees
1316 Asystasia macrocarpa Nees
1317 Barleria cristata L.
1318 Dicliptera roxburghiana Nees
1319 Dicliptera bupleuroides Nees
1320 Echinacanthus attenuatus Nees
1321 Eranthemum pulchellum Andrews
1322 Goldfussia dalhausiana Nees
1323 Hemigraphis latebrosa (Heyne ex Roth) Nees var. rupestris (Heyne ex T. Anders.) Cl.
1324 Hygrophila polysperma (Roxb.) T. Anders.
1325 Justicia adhatoda L.
1326 J. procumbens L. var. simplex (Don) Yamazaki
1327 Justicia pubigera (Nees) Cl.
1328 J. simplex Don
1329 Lepidagathis cuspidata Nees
1330 L. incurva Buch.-Ham. ex Don
1331 L. purpuricaulis Nees
1332 Nelsonia canescens (Lamk.) Spreng.
1333 Perilepta auriculata (Nees) Brem.
1334 Peristrophe bicalyculata (Retz.) Nees
1335 P. speciosa (Roxb.) Nees
1336 Phlogacanthus thyrsiformis (Hardw.) Mabberley
1337 Pteracanthus alatus (Wall. ex Nees) Bream.
1338 P. angustifrons (Cl.) Brem.
1339 Rungia parviflora (Retz.) Nees
1340 Rungia pectinata (L.) Nees
1341 Strobilanthes wallichii Nees

Selaginaceae

1342 Lagotis cashmeriana (Royle) Rupr.
1343 L. kunawarensis

Phrymaceae

1344 Phryma leptostachya (L.) var. oblongifolia (Koidz.) Honda

Verbenaceae

1345 Callicarpa arborea Roxb.
1346 C. macrophylla Vahl
1347 Caryopteris foetida (Don) B.L. Robison
1348 Caryopteris odorata (D. Don) Robinson
1349 Clerodendrum philippinum Schauer
1350 C. serratum (L.) Moon.
1351 C. viscosum Vent.
1352 Holmskioldia sanguinea Retz.
1353 Lantana camara L.

1354 Lippia nodiflora (L.) A. Rich.
1355 Phyla nodiflora (L.) E. Greene
1356 Premna barbata Wall. ex Cl.
1357 P. interrupta Wall. ex Hk.
1358 P. latifolia Roxb. Var. mucronata (Roxb.) Cl.
1359 Verbena bonariensis L.
1360 V. officinalis L.
1361 Vitex negundo L.

Lamiaceae

1362 Acrocephalus indicus (Burm.f.) O. Ktze.
1363 Ajuga brachystemon Maxim.
1364 A. bracteosa Wall. ex Benth.
1365 A. macrosperma Wall. ex Benth.
1366 A. parviflora Benth.
1367 Anisochilus carnosus (L.f.) Wall.
1368 Anisomeles indica (L.) Ktze.
1369 Brunella vulgaris L.
1370 Calamintha vulgaris (L.) Druce.
1372 C. vulgare L.
1373 Colebrookia oppositifolia Sm.
1374 Coleus forsskohlii (Willd.) Brig.
1375 Colquhounia coccinia Wall. Var. vestita (Wall.) Prain
1376 Craniotome furcata (Link) O. Ktze.
1377 Dysophylla cruciata Benth.
1378 Elsholtzia ciliata (Thunb.) Hylander
1379 E. cristata Willd.
1380 E. densa Benth.
1381 E. eriostachya Benth.
1382 E. eriostachya Benth. Var. pusilla Benth. ex Mukerjee
1383 E. flava (Benth.) Benth.
1384 E. fructicosa (Don) Rehder
1385 E. pilosa (Benth.) Benth.
1386 E. strobilifera (Benth.) Benth
1387 Eriophyton wallichii Benth.
1388 Hyptis susaveolens (L.) Poit.
1389 Lamium album L.
1390 L. amplexicaule L.
1391 L. rhomboideum Benth.
1392 Leonurus cardiaca L.
1393 Leucas capitata Desf.
1394 L. hyssopifolia Benth.
1395 L. lanata Benth.
1396 L. mollissima Wall. ex Benth.
1397 Leucas cephalotes (Koenig ex Roth) Spreng.
1398 Leucospermum canum Sm.
1399 Melissa flava Benth
1400 Mentha longifolia (L.) Huds.
1401 M. piperata L.
1402 Micromeria biflora (Buch.-Ham. ex Don) Benth.
1403 Nepeta ciliaris Benth.
1404 N. discolor Royle ex Benth.
1405 N. duthiei Prain & Mukerjee
1406 N. govaniana Benth.
1407 N. hindostana (Roth) Haines
1408 N. laevigata (Don) Hand.-Mazz.
1409 N. leucophylla Benth.
1410 N. nivalis Benth.
1411 Ocimum canum Sims.
1412 Origanum vulgare L.
1413 Perilla frutescens (L.) Bril.
1414 Phlomis bracteosa Royle ex Benth.
1415 P. macrophylla Wall.
1416 P. setigera Falc. ex Benth.
1417 Plectranthus mollis (Ait.) Spreng.
1418 P. stracheyi Benth.ex Hk.
1419 P. striatus Benth.
1420 Plectranthus ternifolius D. Don
1421 Pogostemone benghalense (Burm.f.) O. Ktze.
1422 Roylea cinerea (Don) Baill.
1423 Salvia campanulata Wall. ex Benth.
1424 S. coccinea Juss. ex Murr.
1425 S. nubicola Wall. ex Sweet
1426 S. hians Royle ex Benth.
1427 S. lanata Roxb.
1428 S. leucantha Cav.
1429 S. pleibia R. Br.
1430 Scutellaria discolor Wall. ex Benth.
1431 S. grossa Wall.
1432 S. prostrata Jacq. ex Benth.
1433 S. repens Buch.-Ham. ex Don
1434 S. scandens Don
1435 Stachys milissaefolia Benth.
1436 S. sericea Wall.
1437 Thymus linearis Benth.

Plantaginaceae

1438 Plantago depressa Willd.
1439 P. erosa Wall.
1440 P. himalaica Pilger

Nyctaginaceae

1441 Boerhaavvia diffusa L.
1442 Bougainvillea spectabilis Willd.
1443 Mirabilis jalapa L.

Amaranthaceae

1444 Achyranthes aspera L.
1445 A. bidentata Bl.
1446 Aerva sanguinolenta (L.) Bl.
1447 Alternanthera philoxeroides (Mart.)Griseb.
1448 A. polygonoides (L.) R. Ber. ex Roem. & Schult.
1449 A. pungens Hamb.
1450 Alternanthera sessilis (L.) R. Br. ex DC.
1451 Amaranthus caudatus L.
1452 A. cruentus L.
1453 A. paniculatus L.
1454 A. pinosa L.

1455 Celosia argentea L.
1456 Cyathula tomentosa (Roth) Moq.
1457 C. capitata
1458 Psilotrichum ferrugineum (Roxb.) Moq.

Chenopodiaceae

1459 Axyris amaranthoides L.
1460 Chenopodium album L.
1461 C. ambrosioides L.
1462 C.botrys L.
1463 C. foliolosum (Moench) Asch.
1464 C. murale L.
1465 Krascheninnikovia cerasoides (L.) Gueldenst.

Phytolaccaceae

1466 Phytolacca acinosa Roxb.

Polygonaceae

1467 Fagopyrum dibotrys (Don) Hara
1468 F. esculentum Moench
1469 F. tataricum Gaertn.
1470 Oxyria digyna Hill
1471 Polygonum affine Don
1472 P. amphibium L.
1473 P. amplexicaule Don.
1474 P. aviculare L.
1475 P. barbatum L.
1476 P. caespitosum Bl.
1477 P. capitatum Buch.-Ham. ex Don
1478 P. chinenese L.
1479 P. delicatulum Meissn.
1480 P. filicaule Wall. ex Meissn.
1481 P. glabrum Willd.
1482 P. glaciale (Messin.) Hk.f.
1483 P. hydropiper L.
1484 P. islandicum (L.) Hk.f.

Aristolochiaceae

1485 Aristolochia dilatata Br.
1486 A. gourigangaica Nair

Piperaceae

1487 Peperomia heyneana Miq.
1488 P. pellucida (L.) HBK
1489 P. tetraphylla (Frost.f.) Hk. & Am.

Circaeasteraceae

1490 Circaeaster agrestis Maxim.

Lauraceae

1491 Cinnamomum glanduliferum (Wall. Nees
1492 C. tamala Nees & Ebern.
1493 Dodecadenia grandiflora Nees
1494 Lindera pulcherrima Benth.
1495 L. thomsonii Allen.
1496 Litsea monopetala (Roxb.) Pers.
1497 Machilus sericea (Nees) Blume
1498 Neolitsea pallens (Don) Momiyama var. umbrosa (Nees) Momiyama & Hara
1499 Persea duthiei (King ex Hk.f.) Kosterm.
1500 Persea gamblei King ex Hk.f.
1501 P. odorastissima (Nees) Kosterm.
1502 Phoebe lanceolata (Nees) Nees

Proteaceae

1503 Grevillea robusta A. Cunn.ex R. Br.

Thymelaeaceae

1504 Daphne papyraceae Wall. ex Steud.
1505 D. retusa Hemsl.
1506 P. kumaonum Subha Rao & Kumari
1507 P. kuttiense (Matti, Dutta & Baby) Pangtey, Samant & Rawat, comb. Nov.
1508 P. lapathifolium L.
1509 Polygonum minus Huds.
1510 P. nepalense Meissn.
1511 P. nummularifolium Meissn.
1512 P. orientale L.
1513 P. perpusillum Hk.f. ex Baltter
1514 P. plebejum R. Br.
1515 P. polystachyum Wall.
1516 P. pterocarpum Wall.
1517 P. recumbens Royle ex Bab.
1518 P. rumicifolium Royle ex Bab.
1519 P. sibiricum Lamk.
1520 P. strictus All.
1521 P. tubulosum Boiss.
1522 P. vaccinifolium Wall. ex Meissn.
1523 P. viviparum L.
1524 Rheum emodi Wall. ex Meissn.
1525 R. spiciforme Royle
1526 R. webbianum Royle
1527 Rumex acetosa L.
1528 R. dentatus L.
1529 R. hastatus Don
1530 R. nepalensis Spreng.
1531 Wikstroemia canescens Meissm.

Elaeagnaceae

1532 Hippophae rhamnoides L. subsp. Trukestanica Rousi
1533 H. salicifolia Don
1534 Elaeagnus conferta Roxb.
1535 E. parvifolia Wall. ex Royle

Loranthaceae

1536 Dendrophthoe falcata (L.f.) Etting
1537 Helixanthera ligustriana (Wall.) Danser
1538 Korthalsella opuntia (Thunb.) Merr.
1539 Loranthus odoratus Wall.
1540 Loranthus pulverulentus Wall.
1541 Scurrula cordifolia (Wall.) G. Don
1542 S. pulverulenta (Wall. G. Don
1543 Taxillus vestitus (Wall.) Danser
1544 Viscum album L.
1545 V. nepalense Spreng.

Santalaceae

1546 Henslovia heterantha Hk.f. & T.
1547 Osyris wightiana Wall. ex Wight
1548 Osyris quadripartita Salz ex Dcne.

1549 Thesium himalense Royle ex Edgew.

Euphorbiaceae

1550 Acalypha brachystachya Hornem.
1551 A. ciliata Forsk.
1552 A. indica L.
1553 Andrachne cordifolia (Dcne.) Muell.-Arg.
1554 Antidesma acidum Retz.
1555 Antidesma diandrum (Roxb.) Roth
1556 Arachne cordifolia (Decne.) Muell.- Arg.
1557 Baliospermum montanum (Willd.) Muell.-Arg.
1558 Bischofia javanica Bl.
1559 Bridelia montana Willd.
1560 B. stipularis Bl.
1561 Bridelia retusa (L.) Spreng.
1562 Bridelia verrucosa Haines
1563 Daphniphyllum himalayense Muell.-Arg.
1564 Emblica officinalis Gaertn.
1565 Euphorbia geniculata Ort.
1566 E. helioscopia L.
1567 Euphorbia heterophylla L.
1568 E. hirta L.
1569 E. hypericifolia L.
1570 E. kanaorica Boiss.
1571 E. maddeni Boiss.
1572 E. pilosa L.
1573 E. prolifera Buch.-Ham. ex Don
1574 E. pulcherrima Willd.
1575 E. royleana Boiss.
1576 E. stracheyi Boiss.
1577 E. tibetica Boiss.
1578 E. wallichii Hk.f.
1579 Excoecaria acerifolia F. Didrichs.
1580 Glochidion assamicum Hk.f.
1581 Glochidion velutinum Wt.
1582 Jatropha curcas L.
1583 J. gossypifolia L.
1584 Macaranga indica Wt.
1585 M. pustulata King ex Hk.f.
1586 Mallotus philippensis (Lamk.) Muell.
1587 Phyllanthus parvifolius Buch.-Ham.
1588 Phyllanthus emblica L.
1589 P. urinaria L.
1590 P. virgatus Frost.
1591 Ricinus communis L.
1592 Sapium eugeniaefolium Buch.-Ham.
1593 S. insigne Trim.
1594 S. sebiferum (Michx.) Roxb.
1595 Securinega virosa (Roxb. ex Willd.) Pax. & Hoffm.

Buxaceae

1596 Buxus wallichiana Baill.
1597 B. wallichiana var. microphylla Hk.f.
1598 Sarcococca saligna (Don) Muell.-Arg.

Ulmaceae

1599 Cetlis australis L.
1600 Celtis tetrandra Roxb.
1601 Holoptelea integrifolia (Roxb.) planch.
1602 Terma orientalis (L.) Bl.
1603 T. politoria Planch.
1604 Ulmus wallichiana Planch.

Cannabaceae

1605 Humulus lupulus L.

Urticaceae

1607 B. Platyphylla Don
1608 B. rugulosa Wedd.
1609 B. scabrella Gaud.
1610 Debregeasia longifolia (N. Burman) Wedd.
1611 D. salicifolia (Don) Rendle
1612 Elatostema rupestre (Buch.- Ham. ex D. Don) Wedd.
1613 Elastostemma sessile Forst.
1614 E. sessilis J. R.& G.Forst.var.pubescens Hk. F.
1615 Gerardinia palmata (Forsk.) Gaud.
1616 Lecanthus peduncularis (Wall. ex Royle) Wedd.
1617 Lecanthus wallichii Wedd.
1618 Maoutia puya (Hk.f.) Wedd.
1619 Oreocnide frutescens (Roxb.) Miq
1620 Parietaria dedilis Forst.
1621 Pilea kingii C.E.C. Fishcer
1622 P. scripta (Buch-Ham. ex Don) Wedd.
1623 P. umbrosa Wedd.
1624 Pouzolzia hirta Hassk.
1625 P. pentandra (Roxb.) Benn.
1626 P. viminea Wedd.
1627 P. zeylancia (L.) Benn.
1628 Urtica hyperborea Jacq. ex Wedd.
1629 U. parviflora Roxb.
1630 U. dioica

Moraceae

1631 Artocarpus heterophyllus Lamk.
1632 Ficus arnottiana Miq.
1633 F. auriculata Lour.
1634 F. benghalensis L.
1635 F. clavata Wall. ex Miq.
1636 F. hederacea Roxb.
1637 Ficus hispada L. f.
1638 F. microcarpa L.
1639 F. nerifolia S. Var. nemoralis (Wall. ex Miq.) Corner
1640 Ficus nervosa Heyne ex Roth.
1641 F. plamata Forsk.
1642 Ficus pumila L.
1643 F. racemosa L.
1644 F. religiosa L.
1645 Ficus rigida Jack.

1646 F. rumphii Bijdr.
1647 F. sarmentosa Buch.-Ham. ex Sm.
1648 F. squamosa Roxb.
1649 F. semicordata Buch.-Ham.ex Sm.
1650 Ficus subincisa Buch.-Ham ex Sm.
1651 Morus Alba L.
1652 Morus australis Poir
1653 M. serrata Roxb.

Juglandaceae

1654 Engelhardtia spicata Bl. Var. integra (Kurz)Manning & Steenis
1655 Juglans regia L. var. kumaonia DC.

Myricaceae

1656 Myrica esculenta Buch.-Ham ex Don

Betulaceae

1657 Alnus neplalensis Don
1658 Betula alnoides Buch.-Ham. ex Don
1659 B. utilis Don

Corylaceae

1660 Carpinus viminea Lindl.
1661 Corylus jacquenmontii Dcne.

Fagaceae

1662 Castanea sativa Mill.
1663 Castanopsis tribuloides (Sm.) A. DC.
1664 Quercus floribunda (Lindl.) Rehder
1665 Q. glauca Thunb.
1666 Q. lanuginesa Don
1667 Q. incana Roxb.
1668 Q. semecarpifolia Sm.
1669 Q. serrata Thunb.

Salicaceae

1670 Populus ciliata Wall. ex Royle
1671 Salix acmophylla Boiss.
1672 S. elegans Wall. ex Anders.
1673 S. flabellaris anders.
1674 S. fruticulosa Anders.
1675 S. lindleyana Wall. ex Anders.
1676 S. lindleyana Wall. Var. microphylla Andrs.
1677 S. sclerophylla Anders.
1678 S. tetrasperma Roxb.
1679 S. wallichiana Roxb.

Hydrocharitaceae

1680 Hydrilla verticillata (L.f.) Royle

Orchidaceae

1681 Acampe carinata (Griff.) Panigrahi
1682 A. rigida (Buch.-ham. ex J.E. Sm.) P.F. Hunt
1683 Aerides multiflora Roxb.
1684 A. odorata Lour.
1685 Ascocentrum ampullaceum (Roxb.) Schltr.
1686 Brachycorythis obcordata (Buch.-Ham. ex Don.) Summerh.
1687 Bulbophyllum affine Lindl.
1688 Bulbophyllum carniflorum Rechb.f.
1689 Bulbophyllum polyrhizum Lindl.
1690 Bulbophyllum reptans (Lindl.) Lindl.
1691 Bulbophyllum rtriste Rchb.
1692 B. careyanum (Hk.) Spreng.
1693 B. hookeri (Duthie) J.J. Sm.
1694 B. leopardinum (Wall) Lindl.
1695 B. umbellatum Lindl.
1696 B. wallichii Rchb. F.
1697 Calanthe alpina Hk.f.
1698 C. tricarinata Lindl.
1699 Cephalanthera longifolia (L) Fritsch.
1700 Cleisostoma aspersum (Rchb.f.) Garay
1701 Coelogyne cristata Lindl.
1702 C. ovalis Lindl.
1703 C. stricta (Don) Schltr.
1704 Cryptochilus luteus Lindl.
1705 Cymbidium aloifolium (l.) Sw.
1706 C. bicolor Lindl.
1707 C. cyperifolium Lindl.
1708 C. eburnum Lindl.
1709 C. hookeriana Rchb. F.
1710 C. iridoides Don
1711 C. macrorhizon Lindl.
1712 Cypripedium ordigerum Don.
1713 C. himalaicum Rolfe
1714 Dactylorhiza hatagirea (Don) Soo
1715 Dendrobium amoenum Wall. ex Lindl.
1716 D. bicameratum Lindl.
1717 D. candidum Wall. ex Lindl.
1718 D. chrysanthum Wall.
1719 D crepidatum Lindl.
1720 D. chryseum Rolfe
1721 D. denudans Don
1722 D. heterocarpum Wall. ex Lindl.
1723 D. monticola Hunt. & Summerh.
1724 D. normale Falc.
1725 D. primulinum Lindl.
1726 Diphylax griffithii (Hk.f.) Kranze
1727 Epipactis gigantea Dougl ex Hk.
1728 E. helleborine (l.) Crantz
1729 Eria alba Lindl.
1730 E. amica Rchb.f.
1731 E. coronaria (Lindl.) Lindl.
1732 E. graminifolia Lindl.
1733 E. muscicola (Lindl.) Lindl.
1734 E. occidentalis Seidenf.
1735 E. pubescens (Hk.) Lindl. ex Steud.
1736 E. reticosa Wt.
1737 E. spicata (Don) Hand.-Mazz.
1738 Epipactis veratrifolia Boiss. & Hohen.
1739 Flickingeria fugax (Rchb.f.) Seidenf.
1740 F. hesperis Seidenf.
1741 Gastrochilus acutifolius (Lindl.) O. Ktze.
1742 G. calceolaris (Buch.-Ham. ex Sm.) Don
1743 G. inconspicuum (Hk.f.) O. Ktze.
1744 Goodyera fusca Lindl. ex Hk.f.

1745 G. procera (Ker-Gawl.) Hk
1746 G. repens (L.) R. Br.
1747 G. viridiflora (Bl.) Coll.
1748 Gymnadenia orchidis Lindkl.
1749 Habenaria aitchinsohii Rchb. F.
1750 H. arietina Hk.f.
1751 H. clavigera (Lindl.) Dandy
1752 H. commelinifolia (Roxb.) Wall. ex Lindkl.
1753 H. digitata Lindl.
1754 H. edgeworthii Hk.f. ex Collett
1755 H. ensifolia Lindl.
1756 H. furcifera Lindl.
1757 H. intermedia Don
1758 H. latilabris (Lindl.) Hk.f.
1759 H. marginata Colebr.
1760 H. pectinata (J.E.Sm.) Don
1761 H. plantaginea Lindl.
1762 H. stenopetala Lindl.
1763 Herminimum josephii Rchb. F.
1764 H. kumaunensis Deva & Naithani
1765 H. lanceum (Thunb. Ex Sw.) Vuijk
1766 H. mackinnonii Duthie
1767 H. macrophyllum (Don) Dandy
1768 H. monophyllum (Don) Hunt. & Summerh.
1769 H. monorchis (L.) R. Br.
1770 Kingidium taenialis (Lindl.) Hunt
1771 K. deliciosum (Rchb.f.) Sweet.
1772 Liparis caespitosa (Thou.) Lindl.
1773 L. deflexa Hk.f.
1774 L. glossula Rchb.f.
1775 L. paradoxa (Lindl.) Rchb.f.
1776 L. platyrachis Hk.f.
1777 L. resupinata Ridley
1778 L. rostrata Rchb. F.
1779 L. viridiflora (Bl. Lindl.
1780 Listera pinetorum Lindl.
1781 L. tenuis Lindl.
1782 Luisia brachystachys (Lindl.) Blume
1783 Luisia trichorhiza (Hk.) Bl.
1784 L. zeylanica Lindl.
1785 Malaxis acuminata Don
1786 M. cylindrostachya (Lindl.) O. Ktze.
1787 M. muscifera (Lindl.) O. Ktze.
1788 Neottia listeroides Lindl.
1789 Neottianthe caicicola (W.W. Sm.) Schltr.
1790 N. secundiflora (Hk.f.) Schltr.
1791 Nervilia aragoana Gaud.
1792 Nervilia mackinnonii (Duthie) Schltr.
1793 N. plicata (Anders.) Schktr.
1794 N. prainiana (King ^ Pantl,) Seidenf. & Smitin
1795 Oberonia acaulis Griff.
1796 O. ensiformis (Sm.) Lindl.
1797 D. falconeri Hk.f.
1798 O. griffithiana Lindl.
1799 O. mysourus Lindl.
1800 O. pachyrachis Rchb. F. ex Hk.f.
1801 O. prainiana King & Pantl.
1802 O. pyrulifera Lindl.
1803 Otochilus lancilabius Scidenf.
1804 Oreorchis indica (Lindl.) Hk.f.
1805 Ornithochilus difformis (Wall. Ex Lindl.) Schltr.
1806 Pachystoma senile (Lindl.) Rchb.f.
1807 Pecteilis gigantea (J.E. Sm.) Rafin
1808 P. triflora (Don) Tang-Wang
1809 Peristylus constrictus (Lindl.) Lindl.
1810 P. duthiei (Hk.f.) Deva & Naithani
1811 P. duthiei var. inayati Deva & Naithani
1812 P. elisabethae (Duthie) Gupta
1813 P. fallax Lindl.
1814 P. goodyeroides (Don) Lindl.
1815 P. lawii Wt.
1816 Pholidota articulata Lindl.
1817 P. imbricata Lindl.
1818 Platanthera arcuata Lindl.
1819 P. stenantha (Hk.f.) Soo
1820 Pleione grandiflora (Rolfe) Rolfe
1821 P. humilis (Sm.) Don
1822 Ponerorchis chusua (Don) Soo
1823 P. renzii Deva & Naithani
1824 Pteroceras suaveolens (Roxb.) Holtt.
1825 Rhynchostylis retusa (L.) Bl.
1826 Satyrium nepalense Don
1827 Spiranthes sinensis (Pers.) Ames
1828 S. spiralis (L.) Koch
1829 Smitinandia micrantha (Lindl.) Holtt.
1830 Sunipia bicolor Lindl.
1831 Thelasis longifolia Hk.f.
1832 Thunia alba (Lindl.) Rchb.f.
1833 Vanda cristata Lindl.
1834 V. pumila Hk.f.
1835 V. testacea (Lindl.) Rchb.f.
1836 Vandopsis undulata (Lindl.) J.J. Sm.
1837 Zeuxine flava (Wall. Ex Lindl.) Benth. Ex Hk.f.
1838 Z. strateumatica (L.) Schltr.

Zingiberaceae

1839 Cautleya lutea Royle
1840 C. spicata (Sm.) Baker
1841 Costus speciosus (Koen.) Sm.
1842 Elettaria cardomomum Maton
1843 Globba recemosa Sm.
1844 Hedychium coccineum Buch.Ham. Ex J.E.Sm.
1845 H. spicata Buch.Ham. Ex J.E.Sm.
1846 Roscoea alpina Royle
1847 R. procera Wall.

Costaceae

1848 Costus speciousus (Konig.) Sm

Haemodoraceae

1849 Aletris pauciflora (Klotz.) Hand.-Mazz.
1850 Mondo intermedium (Don) Bailey

Iridaceae

1851 Iris germanica L.
1852 I. kumaonensis Don ex Royle

Hypoxidaceae

1853 Curculigo orchioides Gaertn.
1854 Hypoxis aurea Lour.

Amaryllidaceae

1855 Allium carolinianum DC.
1856 A. govanianum Wall. ex baker
1857 A. jacquemontii Regel ex Kunth
1858 A. stracheyi Baker
1859 A. victorialis L.
1860 A. wallichii Kunth
1861 Crinum amoenum Roxb. ex ker-Gawl.

Agavaceae

1862 Agave cantula Roxb.
1863 Agave wightii
1864 Agave americana L.
1865 Yucca gloriosa L.

Dioscoriaceae

1866 Dioscoria belophylla Voigt.
1867 D. bulbifera L.
1868 D. deltoides Wall. ex Kunth
1869 D. kumaonensis Kunth
1870 D. pentaphylla L.

Liliaceae

1871 Clintonia udensis Trautv. Var. alpina (Kunth ex Baker) Hara
1872 Disporum cantoniense (Lour.) Merr.
1873 Fritillaria royleri Hk.f.
1874 Gagea lutea (L.) ker-Gawl.
1875 Gloriosa superba L.
1876 Lilium polyphyllum Donex Royle
1877 Lloydia serotina Rchb.f.
1878 Nomocharis oxypetala (Royle) Wilson
1879 Notholirion thosmonianum (Royle) stapf
1880 Paris polyphylla Sm.
1881 Polygonatum cirrhifolium (Wall.) Royle
1882 P. graminifolium Hk.f.
1883 P. verticillatum All.
1884 Smilacina purpurea Wall.
1885 Streptopus simplex Don
1886 Theropogon pallidus (Kunth) Maxim.
1887 Trillidium govanianum (Don) Kunth

Asparagaceae

1888 Asparagus adscendens Roxb.
1889 A. curillus Buch.-Ham ex Roxb.
1890 A. racemosus Willd.

Smilacaceae

1891 Smilax aspera L.
1892 Smilax glaucophylla Klotz.
1893 Smilax ocreata DC.
1894 S. indica Vitm.
1895 S. vaginata Dcne
1896 S. macrophylla

Commelinaceae

1897 Commelina benghalensis L.
1898 C. diffusa Burm.f.
1899 C. paludosa Bl.
1900 C. suffruticosa Bl.
1901 Cyanotis cristata (L.) Schult. F.
1902 C. vaga (Lour.) Schult.f.
1903 Murdania nudiflora (L.) Brenan
1904 M. scapiflora (Roxb.) Royle
1905 M. spirata (L.) Bruckn.

Juncaceae

1906 Juncus bufonius L.
1907 J. concinnus Don
1908 J. elegans Royle ex Don
1909 J. glaucus Ehrh. ex Sibth.
1910 J. grisebachii Buchen.
1911 J. himalensis Klotz. & Garcke
1912 J. leucanthus Royle ex Don
1913 J. leucomelas Royle ex Don
1914 J. membranaceous Royle ex Don
1915 J. monticola Steud.
1916 J. sphacelatus Dcne.
1917 J. triglumis L.
1918 Lujula campestris (L.) DC.
1919 L. spicata DC.

Arecaceae

1920 Phoenix humilis Royle
1921 Trachycarpus takil
1922 Wallichia densiflora Mart.

Araceae

1923 Acorus calamus L.
1924 Arisaema concinnum Schott
1925 A. consanguinium Shott.
1926 A. flavum (Forsk.) Schott
1927 A. intermedium Bl.
1928 A. jacquemontii Bl.
1929 A tortuosum (Wall.) Shott
1930 Colocasia affinis Shott
1931 C. esculenta (L.) Schott
1932 C. fallax Schott
1933 Gonatanthus pumilus (Don) Engl.
1934 Plesmonium margaritiferum (Roxb.) Schott.
1935 Pothos catheartii Schott.
1936 Remusatia hookeriana Schott
1937 R. vivipara (Roxb.) Schott.
1938 Rhaphidiophora glauca (Wall.) Schott
1939 Sauromatum pedatum (Willd.) Schott.
1940 Sauromatum venosum (W. Ait.) Kunth
1941 Typhonium diversifolium Wall. ex Shott.

Lemnaceae

1942 Lemna minor L.
1943 Lemna perpusilla Torr.

1944 Spirodela polyrrhiza (L.) Schleid.

Potamogetonaceae

1945 Potamogeton crispus L.
1946 P. natans L.
1947 P. pectinatus L.

Eriocaulaceae

1948 Eriocaulon cinereum R. Br.
1949 E. nepalense Prescott

Juncaginaceae

1950 Triglochin maritimum L.
1951 T. palustre L.

Cyperaceae

1952 Bulbostylis barbata (Rottb.) Cl.
1953 B. densa (Wall. ex Roxb.) Hand.-Mazz.
1954 Carex atrata L.
1955 C. atrofusca Schkuhr. Var. angustifructcus Kuk.
1956 C. cruciata Walhlenb.
1957 C. crucenta Nees
1958 C. haematostoma Nees
1959 C. infuscata Nees
1960 C. lehmannii Drejer.
1961 C. maritima Gunner.
1962 C. nivalis Boott
1963 C. mysourus Nees
1964 C. nubigena Don
1965 C. obscura Nees
1966 C. orbicularis Boott
1967 C. parva Nees
1968 C. rostrata Cl.
1969 C. setigera Don
1970 C. setosa Boott
1971 C. stracheyi Boott ex Cl.
1972 C. supina Wahlenb.
1973 Cyperus alulatus Kern.
1974 C. brevifolius (Rottb.) Hassk.
1975 C. compressuss L.
1976 C. cuspidata Kunth
1977 C. difformis L.
1978 C. digitatus Roxb.
1979 C. globosus All.
1980 C. iria L.
1981 C. metzii (Hochst) Mattsb. & Kuk.
1982 C. niveus Retz.
1983 C. nutans Vahl
1984 C. pangorei Rottb.
1985 C. paniceus (Rottb.) Boeck.
1986 C. pilosus Vahl
1987 C. pumilus L.
1988 C. rotundus L.
1989 C. squarrosum L.
1990 C. tenuispica Steud.
1991 C. triceps Endl.
1992 Carex wallichiana Spreng.,
1993 Carex winterbottomii Cl.
1994 Eleocharis palustris R. Br.
1995 Eleocharis atropurpurea (Retz.) J. & K. Presl.
1996 Eleocharis congesta D. Don
1997 Eriophorum comosum Wall. ex Nees
1998 E. microstachyum Boeck.
1999 Fimbristylus complanta (Retz.) Link
2000 F. dichotoma (L.) Vahl
2001 F. miliacea (L.) Vahl
2002 F. ovata (Burm.f.) Kern.
2003 F. squarrosa Vahl
2004 Kobresia capillifolia Cl.
2005 K. duthiei Cl. ex Hk.f.
2006 K. hookeri Boeck.
2007 K. laxa Nees.
2008 K. nepalensis (Nees) Kuk.
2009 K. nitens Cl.
2010 K. royleana Boeck.
2011 Kyllinga brevifolia Rottb.
2012 Mariscus sumatrensis (Retz.) Rayn.
2013 Pycreus diaphanus (Schr. ex Roem .& Schult.) Hooper & Koy.
2014 Pycreus sulcinux (Cl.) Cl.
2015 Scleria levis Retz.
2016 Scirpus cernum Vahl
2017 S. lacustris L.
2018 S. mucronatus L.
2019 S. planifolius Gnmm.
2020 S. setaceous L.

Poaceae

2021 Agropyron canaliculatum Nevski
2022 A. duthiei Mild.
2023 A. semicostatum Nees ex Steud.
2024 A. thosmonii Hk.f.
2025 Agrostis gigantea Roth
2026 A. griffithiana (Hk.f.) Bor
2027 A. munroana Aitch. & Hemsl.
2028 A. pilosula Trin. Var. royleana (Trin.) Bor
2029 A. stolonifera L.
2030 A. subaristata Aitch. & Hem.
2031 Apluda mutica L.
2032 Aristida cyanantha Nees ex Steud.
2033 Arthraxon lancifolius (Trin.) Hochst.
2034 A. nudus (Steud.) Hochst.
2035 A. prionodes (Steud.) Dandy
2036 Arundinella bengalensis (Spreng.) Druce
2037 A. nepalensis Trin.
2038 A. pumila (Hochst. ex A. Rich.) Steud.
2039 A. setosa Trin.
2040 Arundo donax L.
2041 Avena fatua L.
2042 Bambusa arundinacea (Retz.) Willd.
2043 Bothriochloa intermedia (R. Br.) A. Camus
2044 B. bladhii (Retz.) Blake

2045 B. parviflora (R. Br.) Ohwi
2046 Brachiaria distachya (L.) Stapf
2047 B. racemosa (L.) Stapf
2048 B. reptans (L.) Gardn. & Hubb.
2049 Brachypodium sylvaticum (Huds.) P. Beauv.
2050 Briza media L.
2051 Bromus himalaicus Stapf
2052 B. inermis Leyss.
2053 B. ramosus Huds.
2054 B. tectorum L.
2055 B. unioloides HBK
2056 Calamagrostis emodensis Griseb.
2057 C. pseudopharagmites (Hall.f.) Koeler
2058 Capillipedium assimile (Steud.) A. Camus
2059 Chimnobambusa falcata (Nees) Nakai
2060 C. jaunsarensis (Gamble) Bahadur & Naithani
2061 Chloris dolichostachya Lagasca
2062 Chrysopogon aciculatus (Retz.) Trin.
2063 C. gryllus (L.) Trin.
2064 C. serrulatus Trin.
2065 Coix gigantea Koening ex Roxb.
2066 Coix lacryma-jobi L.
2067 Colpidium himalaicum (Hk.f.) Bor
2068 Cymbopogon distans (Nees) Wats.
2069 C. jwarancusa (Jones) Schult.
2070 C. martinii (Roxb.) Wats.
2071 C. stracheyi (Hook.f.) Raizada & Prain
2072 Cynodon dactylon (L.) Pers.
2073 Cyrotococcum accrescens (Trin.) Stapf
2074 Dactylis glomerata L.
2075 Dactyloctenium aegyptium (L.) P. Beauv.
2076 Danthonia cumminsii Hk.f.
2077 Dendrocalamus hamiltonii Nees & Arn. ex Munro
2078 Dendrocalamus strictus (Roxb.) Nees
2079 Deschampsia caespitosa (L.) Beauv.
2080 Deyeuxia arundinacea (L.) Beauv.
2081 D. holciformis (Jaub. & Spach.) Bor
2082 D. pulchella (Griseb.) Hk.f.
2083 Digitaria abludens (Roem. & Schult.) Veldk.
2084 Digitaria ciliaris (Retz.) Koel.
2085 Digitaria cruciata (Nees ex Steud.) A. Camus
2086 D. granularis (Trin. ex Spreng.) Henr.
2087 D. setigera Roth ex Roem. & Schult.
2088 Echinochloa colonum (L.) Link
2089 E. crusgalli (L.) P. Beauv.
2090 E. frumentacea Link
2091 E. indica (L..) Gaertn.
2092 Elymus dasystachys Trin.
2093 E. nutans Griseb.
2094 Eragrostiella nardoides (Trin.) Bor
2095 Eragrostis atrovirens (Desf.) Trin. ex Steud.
2096 E. diarrhena (Schult.) Steud.
2097 E. japonica (Thunb.) Trin.
2098 E. nigra Nees ex Steud.
2099 E. pilosa (L.) P. Beauv.
2100 E. poaeoides P. Beauv.
2101 E. trichodes (Nutt.) Wood
2102 E. unioloides (Retz.) Nees ex Steud.
2103 Erianthus filifolius Nees ex Steud.
2104 E. ravennae (L.) P. Beauv.
2105 E. rufipilus (Steud.) Griseb.
2106 Eulalia hirtifolia (Hack.) A. Camus
2107 E. mollis (Griseb.) Ktze.
2108 Eulaliopsis binata (Retz.) C.E. Hubb.
2109 Festuca gigantea (L.) Vill.
2110 F. kashmiriana Stapf
2111 F. modesta Steud.
2112 F. nitidula Stapf. ex Hk.f.
2113 F. valesiaca schleich. ex Gaud.
2114 Garnotia tenella (Am. ex Miq.) Jan.
2115 Hackelochloa granularis (L.) O. Ktze.
2116 Helictotrichon pratense (L.) Pilfer
2117 H. virescens (Nees ex Steud.) Henr.
2118 Hierochloa laxa R. Br. ex Hk.f.
2119 Hemarthria compressa (L.) R. Br.
2120 Heteropogon contortus (L.) P. Beauv.
2121 Imperata cylindrica (L.) P. Beauv.
2122 Ischnochloa falconeri Hk.f.
2123 Koeleria cristata (L.) Pers.
2124 Lolium perenne L.
2125 L. temulentum L.
2126 Melica scabirrima (Nees) Hk.f.
2127 Microstegium ciliatum (Trin.) A. Camus
2128 M. nudum (Trin. A. Camus
2129 Miscanthus nepalensis (Trin.) Hack.
2130 Muhlenbergia himalayensis Hack. ex Hk.f.
2131 M. husgelii Trin.
2132 Neyraudia arundinacea (L.) Henr.
2133 Oplismenus burmannii (Ret.) P. Beauv.
2134 O. compositus (L.) P. Beauv.
2135 O. undulatifolius (Ard.) P. Beauv
2136 Oryzopsis aequiglumis Duthie
2137 Panicum antidotale Retz.
2138 P. miliare Lamk.
2139 P. psilopodium Trin.
2140 Paspalidium flavidum (Retz.) A. Camus
2141 Paspalum dilatatum Poir.
2142 Paspalum scrobiculatum L.
2143 P. paspaloides (Michx.) Scribn.
2144 Pennisetum flaccidum Griseb.
2145 Pennisetum glaucum (L.) R. Br.
2146 P. orientale L.C. Rich.
2147 P. purpureum Schumach.
2148 P. typhoides (Burm.f.) Stapf & Hubb.
2149 Phacelurus speciosus (Steud.) Hubb.
2150 Phalaris minor Retz.
2151 Phleurn alpinum L.

2152 Phragmites Karka (Retz.) Trin. ex Steud.
2153 Poa alpina L.
2154 P. angustifolia L.
2155 P. annua L.
2156 P. jaunsarensis Bor
2157 P. nemoralis L.
2158 P. nepalensis Wall. ex Duthie
2159 P. polycolea Stapf
2160 P. pratensis L.
2161 P. pseudamoena Bor
2162 P. stapfiana Bor
2163 Pogonatherum crinitum (Thunb.) Kunth
2164 P. paniceum (Lamk.) Hack.
2165 Polypogon fugax Nees ex Steud.
2166 P. monspeliensis (L.) Desf.
2167 Saccharum benghalense Retz.
2168 S. spontaceum L.
2169 Setaria glauca (L.) P. Beauv.
2170 S. homonyma (Steud.) Choiv.
2171 S. paniculifera (Steud.) Fourn.
2172 S. tomentosa (Roxb.) Kunth
2173 S. viridis P. Beauv.
2174 Sorghum halepense (L.) Pers.
2175 Sporobolus diander. (Retz.) P. Beauv.
2176 S. fertilis (Steud.) W.D. Clyton
2177 Sporobolus indicus (L.) R.Br.
2178 S. piliferus (Trin.) Kunth
2179 Stipa roylei (Nees) Mez.
2180 Thamnocalamus falconeri Hk.f. ex Munro
2181 T. spathiflora (Trin.) Munro
2182 Themeda anathera (Nees ex Steud.) Hack.
2183 T. arundinacea (Roxb.) Ridley
2184 T. triandra Forsk.
2185 Thysanolaena maxima (Roxb.) O. Ktze.
2186 Tripogon filiformis Nees ex Steud.
2187 T. trifidus Munro ex Stapf
2188 Trisetm aeneum (Hk.f.) R.R. Stew.
2189 T. spicatum (L.) Richt.
2190 Vulpia myuros (L.) Gmel.

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1. Pangtey YPS, Samant SS, Rawat GS. 1998. *Contribution to the Flora of Pithoragarh District (Kumaun Himalaya)* in Himalayan Research and Development, Vol 7 (I & II).

2. Murti SK, Singh DK, Surendra Singh, BSI. *Plant Diversity in Lower Gori Valley, Pithoragarh, U.P.*

Pteridophytes

Adiantaceae

1 Adiantum capillus-veneris Linn **
2 Adiantum caudatum, L. *
3 Adiantum edgeworthii Hook **
4 Adiantum incisum Forssk
5 Adiantum lunulatum Burm **
6 Adiantum pedatum Linn **
7 Adiantum venustum D.Don **
8 Anogramma leptophylla(Linn.)Link
9 Coniogramme affinis Wall. ex Hieron
10 Coniogramme caudata(Wall.ex Ettingsh)Ching in Christ
11 Coniogramme fraxinea(D.Don)Diels
12 Coniogramme indica Fee
13 Coniogramme intermedia Hieron

Angiopteridaceae

14 Angiopteris erecta(Forsk.)Hoffm

Aspleniaceae

15 Asplenium ramosum Hope (D.)
16 Asplenium schimperianum Hochsi
17 Asplenium sparsum, Don (D.)
18 Asplenium cheilosorum Kunze ex Matt.
19 Asplenium dalhousiae Hook.
20 Asplenium ensiforme Wall. Ex Hook
21 Asplenium fontanum (Linn.) Bernh.
22 Asplenium gueinzianum Mett. Ex Kuhn
23 Asplenium nidus Linn.
24 Asplenium septentrionale (Linn.) Hoffm.
25 Asplenium adiantum-nigrum Linn.
26 Asplenium aethiopicum (Burm. F.) Becherer
27 Asplenium alternans, Wall. *
28 Asplenium aridum Bak. *
29 Asplenium barbigerum Hook. *
30 Asplenium blanfordii Hope (D.) *
31 Asplenium boryanum Bak. (D.) *
32 Asplenium brunonianum Hook. *
33 Asplenium calcaratum Hook. (D.) *
34 Asplenium ceterach Linn
35 Asplenium cochleatum Don *
36 Asplenium crenatum Bak. *
37 Asplenium ensiforme, Wall. *
38 Asplenium filix-mas Rich. (Gamble) *
39 Asplenium gracilescens Hook. (D.) *
40 Asplenium hirtipes Hook. (P.W.M.) *
41 Asplenium hirtipes Hook. (P.W.M.) *
42 Asplenium kingii Hope (D.) *
43 Asplenium marginature Wall. (D.) *
44 Asplenium molle Desv. (Dav.) (Hope) *
45 Asplenium molliusculum Wall. (Bl.) *
46 Asplenium nidus, L. (D.) *
47 Asplenium occultum Hope (P.W.M.) *
48 Asplenium odontoloma Moore *
49 Asplenium oicutarium Bak. *
50 Asplenium pandum Hope (D.) *
51 Asplenium papilio Hope. *
52 Asplenium parallelogrammum Kze. Forma Khasiana (D.) forma patentissima forma fibrillosa (Dav.) (D.) *
53 Asplenium planicaule Wall. *
54 Asplenium repens Hope *
55 Asplenium rutamuraria Linn. **
56 Asplenium sarelii Hook ex Blakiston
57 Asplenium septentrionale, Hoffm. *
58 Asplenium seriato-denatum Hope (Dav.) (D.) *
59 Asplenium tenuifolium Don
60 Asplenium trichomanes Linn **
61 Asplenium unilaterale, Lamk. (Hope) (D.) **
62 Asplenium varians Wall.ex Hook. Et Grev
63 Asplenium viride hudson
64 Asplenium viride, Huds. *
65 Asplenium xylodes Kze. *
66 Asplenium yoshinage Makino
67 Asplenium yunnanense Franch

Azolaceae

68 Azolla pinnatta R. Br. **

Blechnaceae

69 Blechnum orientale Linn **
70 Woodwardia unigemmata(Mak.)Nakai

Characeae [Algae]

71 Chara coronata Ziz.
72 Chara foetida R. Br.

Cheilanthaceae

73 Cheilanthes albomarginata Clarke **
74 Cheilanthes anceps Blanford
75 Cheilanthes brevifrons (Khullar) Khullar
76 Cheilanthes dalhousiae, Hook. (Hope) **
77 Cheilanthes dubia Hope
78 Cheilanthes duthiei, Bak. (D.) *
79 Cheilanthes farinosa sensu Blanford **
80 Cheilanthes rufa D.Don **
81 Cheilanthes subvillosa, Hook. (D.) **
82 Cryptogramma brunoniana Wall. Ex Hook. Et Grev
83 Cryptogramma stellari(Gmel.)Prantl
84 Cryptogramme crispa, R. Br. *

Cyatheaceae

85 Alsophila spinosa

Davalliaceae

86 Araiostegia pseudocystopteris (Kze.) Copel.
87 Araiostegia pulchra (Don) Copel.
88 Araiostegia beddomea (Hope) ching *
89 Davallia beddomei, Hope (D.) *
90 Davallia hirta, Kaulf. *
91 Davallia immersa, Wall. *
92 Davallia membranulosa, Wall. *

93 Davallia platyphylla, Don (P.W.M.) *
94 Davallia pseudo-cystopteris, Kzc. *
95 Davallia tenuifolia, Sw. *
96 Davallia trichomanoides B1.
97 Leucostegia immersa (Wall) Presl
98 Paradavallodes membranulosum (Wall ex. Hook)Ching

Dennstaedtiaceae

99 Dennstaedtia scabra(Wall)Moore
100 Emodiopteris appendiculata
101 Microlepis strignosa [Thunb.] Presl
102 Microlepis firma Mett.
103 Monachosorum subaigitatum (B1.)

Dryopteridaceae

104 Athyrium anisopterum Christ
105 Athyrium atkinsoni Bedd.
106 Athyrium attenuatum(Clarke)Tag
107 Athyrium attenuatum(Clarke)Tag
108 Athyrium drepanopterum(Kunze)R.Br.ex Milde
109 Athyrium duthiei(Bedd) Bedd
110 Athyrium falcatum Bedd
111 Athyrium fimbriatum(Wall.)Moore
112 Athyrium flabellulatum(Clarke)Tardieu
113 Athyrium foliolosum Wall.ex Sim
114 Athyrium kumaonicum Punetha
115 Athyrium mackinnoni(Hope) C.Chr
116 Athyrium nigripes(Bl.)Moore
117 Athyrium pectinatum(Wall.ex Mett)Moore
118 Athyrium proliferum Moore
119 Athyrium puncticaule(Bl.)Moore
120 Athyrium rupicola(Hope)C.Chr
121 Athyrium schimperi Moug. Ex Fee
122 Athyrium setigerum C.Chr
123 Athyrium tenellum Hope
124 Athyrium tenuifrons Wall.ex Sim
125 Athyrium wallichiana Ching
126 Bolbitis virens Wall. Ex schott.
127 Diplazium dilataum Bl
128 Diplazium esculentum(Retz) Sw.ex Schard
129 Diplazium frondosum(Clarke)C.Christ
130 Diplazium heterophlebium(Mett .ex Hook .et Baker)Diels
131 Diplazium lobulosum(Wall)Presl
132 Diplazium spectabile(Wall.ex.Mett) Ching
133 Dryoathyrium boryanum(Wild.)Ching
134 Elaphoglossum stelligerum [Wall ex Baker]Moore ex alston et Bonner
135 Lunathyrium allantodioides(Bedd)Ching
136 Lunathyrium japonicum(Thumb.)Kurata
137 Tectaria coadunata (Smith) Christ
138 Tectaria dubia (Bedd.) Ching

Equisetaceae

139 Equasetum arvense L.
140 Equasetum debile, Roxb.
141 Equasetum diffusum, D. Don
142 Equisetum arvense Linn
143 Equisetum debile Roxb ex Vaucher
144 Equisetum diffusum D. Don

Gleicheniaceae

145 Gleichenia dichotoma Willd.
146 Dicranopteris linearis (Burm.f)Undrew.var. hirta Kaur et Punetha
147 Dicranopteris linearis(Burm.f.)Undrew

Grammitidaceae

148 Ctenapteris subfalcata(Bl.) Kunze

Hymenophyllaceae

149 Crepidomanes insigne(Bosch) Fu,
150 Mecodium javanicum(Spr.) Copel
151 Mecodium polyanthos(Sw.)copel
152 Mecodium exertum(wall. Ex Hook
153 Vandenboschia schimidiana(Zenker ex Taschner)Copel
154 Hypodematium crenatum(Forrsk.)Kuhn

Hypolepidaceae

155 Hypolepis punctata(Thumb.)Mett.ex.Kuhn
156 Pteridium aquilimum (Linn.) Kuhn var.wightianum Tryon

Lindsaeaceae

157 Lindsaea cultrata(Willd)Sw

Loxogrammaceae

158 Loxogramma involuta(Don)Presl
159 Loxogramma lanceolata (Sw).

Lycopodiaceae

160 Lycopodium hamiltonii, Spreng
161 Lycopodium setaceum D. Don
162 Lycopodium annotinum Linn.
163 Lycopodium cernuum Linn
164 Lycopodium clavatum L.
165 Lycopodium clavatum Linn.
166 Lycopodium hamiltonii Spreng
167 Lycopodium setaceum
168 Psilotum riquetrum Sw.

Lygodiaceae

169 Lygodium circinnatum(Burm.)Sw
170 Lygodium flexuosum(Linn.)Sw
171 Lygodium japonicum(Thunb.)Sw

Marsileaceae

172 Marsilea minuta Linn.

Oleandraceae

173 Nephrolepis auriculata [Linn.] Trimen,
174 Nephrolepis cordifolia Presl *
175 Nephrolepis volubilis J. Smith (Hope) *
176 Oleandra wallichii (Hook) Presl **

Ophioglossaceae

177 Botrychium lunaria(Linn)
178 Botrychium ternatum(thumb.) Sw
179 Botrychium daucifolium Wall. Ex Hook. Et Grey

180 Botrychium lanuginosum Wall. *
181 Botrychium lunaria Sw. *
182 Botrychium ternatum Sw. *
183 Botrychium virginianum Sw. (Gamble) *
184 Botrypus virginianus(Linn.)Holub
185 Botrypus lanuginosus(Wall. exHook. Et Grev)Holub
186 Helminthostachys zealanica(Linn.)Hook
187 Ophioglossum gramineum Willd
188 Ophioglossum nudicaule Linn. F
189 Ophioglossum petiolatum Hook
190 Ophioglossum reticulatum Linn
191 Ophioglossum vulgatum Linn

Osmundaceae

192 Osmunda claytoniana Linn. **
193 Osmunda laytoniana L. *
194 Osmunda regalis Linn

Parkeriaceae

195 Actinopteris radiata
196 Ceratopteris thalictroides(Linn.) Brengn **

Polypodiaceae

197 Pyrrosia stictica(Kunze)Holtt
198 Pyrrosia adnascens [Sw.] Ching.
199 Pyrrosia beddomeana(Gies.)Ching
200 Pyrrosia flocculosa (Don)Ching,
201 Pyrrosia mannii(Gies)Ching
202 Pyrrosia subfurfuracea(Hook) Ching
203 Polypodium adnascens, Sw. **
204 Polypodium amoenum, Wall. *
205 Polypodium arubescens Wall. *
206 Polypodium auriculatum Wall. (Hope) *
207 Polypodium clathratum Clarke (T.) *
208 Polypodium cyrtolobum, J. Smith *
209 Polypodium distans Don (Hope) *
210 Polypodium drypopteris L. (D.) *
211 Polypodium ebenipes, Hook. *
212 Polypodium fissum, Bak. *
213 Polypodium flocculosum, Don *
214 Polypodium juglandifolium, Don *
215 Polypodium lachnopus, Wall. *
216 Polypodium lachnopus, Wall. *
217 Polypodium lachnopus, Wall. *
218 Polypodium late-repens Drotter *
219 Polypodium lehmanni Mett. (D.) *
220 Polypodium lineare, Thanb. *
221 Polypodium lineatum, Colebr. *
222 Polypodium malacodon, Hook. *
223 Polypodium membranaceum Don *
224 Polypodium multilineatum, Wall. *
225 Polypodium ornatum Wall. (C.) *
226 Polypodium phegopteris L. (D.) (Macbeod) *
227 Polypodium proliferum, Presl. *
228 Polypodium propinquum, Wall. *
229 Polypodium punctatum, Thunb. *
230 Polypodium rivale, Mett. *
231 Polypodium simplex, Sw. *
232 Polypodium stewartii, Clarke *
233 Polypodium subfalcatum, Bl. *
234 Polypodium urophyllum Wall. (C.) *
235 Polypodium xylobum, Wall.Psilotaceae *
236 Psilotum nudum(Linn.)P. Beauv. Pteridaceae
237 Onychium contiguum Hope
238 Onychium frgile Verma et Khullar
239 Onychium lucidum(Don)Spr
240 Onychium siliculosum(Desv.)Chr
241 Onyschium japonicum, Kze. *
242 Onyschium multisectum, F. Henderson *
243 Pteris wallichianum Agardh.
244 Pteris aquilina L. *
245 Pteris biaurita Linn **
246 Pteris cretica L. *
247 Pteris cretica Linn
248 Pteris dactylina Hook. (Trotter) **
249 Pteris digitata Wall. *
250 Pteris excelsa, Gaud, (W.) (T.) **
251 Pteris longifolia L. *
252 Pteris nepalensis H.Lto
253 Pteris quadriaurita Retz **
254 Pteris stenophylla Wall et Grev.
255 Pteris subindivisa Clarke
256 Pteris subquinata Wall. Ex Agardh
257 Pteris subquinata, Wall. **
258 Pteris vittata Linn
259 Pteris wallichiana, Agardh. *

Selaginellaceae

260 Selaginella bryopteris(Linn.)Baker
261 Selaginella caulescens Spr
262 Selaginella caulescens, Spring. **
263 Selaginella chrysocaulis(Hook et Grev)spr **
264 Selaginella chrysocaulos Spring.
265 Selaginella indica(Milde)Trayon
266 Selaginella involvens(Sw)Spr
267 Selaginella pallidissima Spring. **
268 Selaginella pallindissima Spr
269 Selaginella plumosa Baker
270 Selaginella plumosa, Baker **
271 Selaginella rupestris, Spring. (D.)
272 Selaginella yemensis Spring

Sub-family: Dryopterioideae

273 Arachniodes aristata(Forssk.)Holtt
274 Arachniodes coniifolia(Moore)Ching
275 Cyrtomium caryotideum(Wall.ex Hook et Grev.)Presl
276 Dryopteris acuto-dentata Ching
277 Dryopteris barbigera(Moree ex Hook.)Kutze
278 Dryopteris caroli-hopei Fraser-Jenkins
279 Dryopteris chrysocoma(Christ)C.Chr
280 Dryopteris cochleata(Ham.ex Don) Chr

281 Dryopteris conjugata Ching
282 Dryopteris juxtaposita Christ
283 Dryopteris nigropaleacea(Fraser-Jenkins)Fraser-Jenkins
284 Dryopteris panda(Clarke)Christ
285 Dryopteris pulcherrima Ching
286 Dryopteris ramosa(Hope)C.Chr
287 Dryopteris redactopinnata panigrahi et Basu
288 Dryopteris serrato-dentata(Bedd.)Hayata
289 Dryopteris sparsa(Ham. Ex Don)Ktze
290 Dryopteris wallichiana(Spr) Hyl
291 Perenema cyatheoides Don
292 Polystichum manmeiense (Chirst) Nakaike
293 Polystichum mehrae Fraser-Jenkins et Khullar
294 Polystichum neo-lobatium Nakai
295 Polystichum nepalense (Spr.) Christ
296 Polystichum obliqtam (Don) Moore
297 Polystichum piceo-paleaceum Tagawa
298 Polystichum prescottianum (Wall, ex Mett.) Moore
299 Polystichum prescottianum (Wall, ex Mett.) Moore var. castaneum Clarke
300 Polystichum squarrosum (Don) Fee,
301 Polystichum stimulans Presl,
302 Polystichum subapiciflorum Hay
303 Polystichum thomsonii (Hook)Bedd.
304 Polystichum wilsonii Christ
305 Polystichum bakerianum(Atkin .ex Clarke)Diels
306 Polystichum discretum(Don)Smith
307 Polystichum duthiei(Hope)Christ
308 Polystichum lachenense(Hook.)Bedd
309 Polystichum lengipaleatum Christ
310 Polystichum lentum (Don) Moore
311 Woodsia andersoni (Bedd.) Christ
312 Woodsia elongata Hook
313 Woodsia alpina (Bolton) Gray
314 Woodsia elongata, Hook. *
315 Woodsia hyperborea, R. Br. (D) *
316 Woodwardia radicans, Sm. *

Thelypteridaceae

317 Ampelopteris prolifera(Retz.)Copel,
318 Arthromeris lehmanni(Mett.)Ching
319 Arthromeris lungtauensis Ching
320 Arthromeris wallichiana(spr.) Ching
321 Christella appendiculata(Presl)Holtt.
322 Christella arida(Don)Holtt.
323 Christella dentata(Forssk.) Brownsey et Jermy
324 Christella kumaunicum Holtt.
325 Christella papito(Hope.)Holtt.
326 Christella parasitica(Linn)Lev
327 Colysis pothifolia(Don)Presl.
328 Cyclogramma auriculata(Smith) Ching
329 Drynaria mollis(Bedd.) Smith
330 Drynaria propinqua(Wall.ex Mett.)Smith
331 Drynaria tibetica Ching et Wu
332 Glaphyropteridopisis erubescens(Hook) Ching
333 Lepisorus scolopendium(Don)Mehra et Bir
334 Lepisorus amaurolepida(Sledge)Bir et Trikha
335 Lepisorus amaurolepida(Sledge)Bir et Trikha var.longifolius Bir et Trikha
336 Lepisorus bicolor Ching
337 Lepisorus cantortus(Christ)Ching
338 Lepisorus jakonensis(Blanford)Ching
339 Lepisorus kashyapii(Mehra)Mehra
340 Lepisorus kuchenensis(Wu)Ching
341 Lepisorus lelopteris(Kunze)Bir et Trikha
342 Lepisorus nudus(Hook)Ching
343 Lepisorus pseudonudasChing
344 Lepisorus scolopendrium(Don) Mehra et Bi
345 Lepisorus scolopendrium(Don) Mehra et Bir var.mortonianus(Bir et Trikha)
346 Lepisorus tenuipes Ching et Khullar
347 Macrothelypteris ornata(Wall ex Bedd.) Ching
348 Metathelypteris gracilescens(Bl.) Ching
349 Microsorum membranaceum(Don)Ching
350 Microsorum zippellii(Bl)Ching
351 Pangtey et Punetha comb. Nov.(Lepisorus excavatus(Bory)Ching,
352 Phegopteris connectilis(Michx.)Watt
353 Phymatopteris malacodon(Hook.)Pichi Sermolli
354 Phymatopteris oxyloba(Wall.exKunze)Pichi Sermolli
355 Phymatopteris ebenipes(Hook.)PichiSermolli
356 Phymatopteris hastata(Thunb.)Pichi Sermolli
357 Phymatopteris sterwartii(Bedd.)Pichi Sermolli
358 Phymatopteris stracheyi(Ching)Pinchi Sermolli
359 Pneumatopteris truncata(Poiret) Holtt
360 Polypodiastrum argutum (Wall. Ex Hook.) Ching
361 Polypodioides lachnopus(Wall.ex Hook.) Ching
362 Polypodioides amoena(Wall.ex Mett.)Ching
363 Polypodioides microrhiza(Clarke ex Baker)Ching
364 Polypodioides subamoena(Clarke)Ching
365 Pronephrium penangianum(Hook.) Holtt
366 Pronephrium nudatum(Roxb.) Holtt
367 Pronephrium repandum(Fee)Holtt
368 Pseudocyclosorus canus(Baker) Holtt ex Grimes
369 Pseudocyclosorus tylodes(kunze) Ching

370	Pseudophegopteris levingel(Clarke) Ching	
371	Pseudophegopteris pyrrhorhachis (Knuze) Ching	
372	Stenogramma pozoi(Lagasca) K.Iwats	
	Vittariaceae	
373	Vittaria flexuosa Fee	
374	Vittaria lineata Sw.	*
	Family Name not known	
375	Acrostichum crispatulum Wall. (Bl.)	*
376	Cystopteris fragilis, Bernh.	*
377	Cystopteris montana, Link (D.)	*
378	Dicksonia appendiculata, Wall.	*
379	Dicksonia scabra, Wall. (Hope)	*
380	Gymnogramme andersoni, Bedd.	*
381	Gymnogramme involuta, Hook.	*
382	Gymnogramme javanica, Blume	*
383	Gymnogramme javanica, Blume	*
384	Gymnogramme levingei, Bak. (D.)	*
385	Gymnogramme totta, Schlecht.	*
386	Gymnogramme vestita, Hook.	*
387	Gymnopteris vestila(Wall) Underw	*
388	Hymenophyllum exsertum, Wall.	*
389	Hymenophyllum polyanthos, Sw.	*
390	Lygodium japonicum Sw.	*
391	Lygodium pinnatifidum Sw.	*
392	Nothochlena marantae, R. Br.	*
393	Notholaena marantae Br.	*
394	Pellaea nitidula(Wall) Bak.ex Hook. Et. Bak	*
395	Pellaea hastata(Thumb.) Prantl	*
396	Pellea calamelanos, Link	*
397	Pellea gracilis, Hook.	*
398	Pellea nitidula, Bak. (Bl.) (D.)	*
399	Sphenomeris chinensis(Linn) Maxon	*
400	Spheropteris barbata, Wall. (P.W.M.)	*
401	Trichomanes Filicula, Bory	*
402	Trichomanes pyxidiferum, L.	*

References:

1. Pangtey YPS, Punetha N. 19?? *Pteridophytic flora of Kumaon Himalaya - An Update List*. Western Himalaya , Vol. I. Environment. Gyanodaya Prakashan, Nainital.
2. Strachey, R 1852. Plants of Kumaun and of the Adjacent Portions of Garhwal and Tibet. Based on collections made by Strachey and Winterbottom. Revised By Duthie JF. Ms Bishen Singh Mahendra Pal Singh Dehradun.

*: Collection Made by Strachey and Winterbottom,

**: common in both references

Mosses

1		Actinothuidium hookeri (Mitt.)Broth.
2		Anacolia sinensis Broth.
3		Anectangium Roylei Mitt.
4		Anectangium Stracheyanum Mitt.
5		Anectangium Thomsoni Mitt.
6		Anomobryum filliforme)Dicks.)Solms
7		Anomodon acutifolius Mitt.
8		Anomodon tristis Sull.
9		Aongstroemia sp.
10		Atrichum flavisetum Mitt.
11		Atrichumobtusulum(C.Muell.)Jaeg.
12		Barbula gracilenta Mitt.
13		Barbula nigrescens Mitt.
14		Barbula recurvifolia Mitt.
15		Barbula subpellucida Mitt.
16		Barbula vinealis Bird.
17	**	Bartramia halleriana Hedw.
18	*	Bartramia leptodonta Wils.
19		Bartramia pomiformis Hedw.
20	*	Bartramia subpellucida Mitt.
21		Bellibarbula kurziana Chen
22		Brachymenium bryoides Hook Sehwaegr
23		Brachythecium buchananii(Hook.)Jaeg.
24		Brachythecium cameratum (Mitt.)Jaeg.
25		Breutelia dicranaceae (C.muell.)Mitt.
26		Brothera leana(Sull)C.Muel.
27		Bryoerythrophyllum recurvirostrum (Hedw.)Chen
28		Bryoerythrophyllum wallichii Coen
29		Bryum alpinum With
30	**	Bryum argenteum L.
31		Bryum bicolor Dicks
32		Bryum capillare Hedw.
33	*	Bryum filiforme Dicks
34	*	Bryum giganteum Hook
35	*	Bryum hemisphaericarpon C. Mitt.
36	*	Bryum nepalense Mitt.
37		Bryum paradoxum Schwaegr
38		Bryum pseudotriquetrum Schwaegr
39		Bryum retusifolium Card.&Vard.
40	*	Bryum roseum Schr.
41	*	Bryum turbinatum Hedw.
42	*	Bryum warneum Bland
43		Calliergonella cuspidata (Hedw.) Loesk.
44		Campylopus gracilis (Mitt.) Jaegi
45		Campylopus sp.
46		Collema saturninum Ach.
47		Cratoneuron commutatum (Hedw.) Roth
48		Cratoneuron filicinum (Hedw.) Spruc.
49		Cryphea concavifolia Mitt.
50		Cryptoleptodon flexuous (Harv.) Ren & Card.
51		Cyatophorum intermedium Mitt.
52		Desmatodon gemmascens Chen
53	*	Desmatodon involutus Mitt.
54		Desmatodon latifolius (Hedw.)Brid
55	*	Desmatodon Laureri Wils
56	*	Desmatodon Wallichii Mitt.
57		Dicranum bonjeani De Not
58	**	Dicranum himalayanum Mitt.
59		Dicranum majus Turn
60	*	Dicranum reflexifolium C. Mitt.
61		Dicranum scoparium Hedw.
62		Didymodon nigrescens(Mitt.)K.Salto
63		Distichum capillaceum(Hedw.)B.S.G.
64		Ditrichum flexicaute(Schwaegr.)Hamp.
65		Ditrichum heteromallum (Hedw.)Briz.
66	*	Dodymodon laxifolius Mitt.
67		Drepanocladus aduncus(Hedw.)Warnst.
68		Drepanocladus exannulatus (B.S.G.)Warnst.
69		Drepanocladus uncinatus (Hedw.)Warnst.
70	**	Encalypta ciliata Hedw.
71	*	Encalypta rhabdocarpa Schw.
72		Encalypta sp.
73		Entodon plicatus C.Muell.
74		Eurhynchium riparioides(Hedw.)Richs.
75		Fabronia minuta Mitt.
76		Fissidens bryoices Hedw.
77		Fissidens gradifrons Brid.
78	*	Fissidens nobilis Griff.
79		Fissidens sp.
80	*	Fissidens sylvaticus Griff.
81	*	Fissidens taxifolius Hedw.
82	*	Fissidens viridulus wahl.
83	**	Funaria hygrometrica Inill.
84	*	Funaria leptopoda Grif
85		G.Sm.(ePogonatum alpinum(Hedw.)Roent.)
86		Glyphomitrium tortula Mitt.
87		Grimmia alpicola Hedw.
88	*	Grimmia apoaarpa Hedw.
89		Grimmia donniana Sm.
90		Grimmia pulvinata (Hedw.)Sm.
91	*	Grimmia subsecunda Mitt.
92		Gymnostomiella vernicosa(Hook.)Fieisch
93		Hedwigia attenuata Mitt.
94		Hydrogonium gracilentum(Mitt.)Chen
95		Hylocomium himalayanum (Mitt.)Jaeg.
96	*	Hymenostylium aurantiacum Mitt.
97	*	Hymenostylium curvirostre Lindcub.
98		Hymenostylium recurvirostrum(Hedw.)Dix
99		Hyophila involuta(Hook.)Jaeg.
100		Hyophila spathulata (Harv.)Jaeg.
101	*	Hypnum argentatum Mitt.

102	*	Hypnum buchanani Hook
103	*	Hypnum cameratum Mitt.
104	*	Hypnum commutatum Hedw.
105		Hypnum cupressiforme Hedw.
106	*	Hypnum filicinum L.
107	*	Hypnum kamounense Harv.
108	*	Hypnum obtusulum Mitt.
109	*	Hypnum plumosum Sw.
110	*	Hypnum rusciforme Wies.
111	*	Hypnum salebrosum Hoffm
112		Leptodontium flexifolium(Dick ex Wien.)Hampe
113	*	Leptotrichum himalayanum Mitt.
114	*	Leptotrichum inclinatum Mit
115	*	Leptotrichum molliculum, Mitt.
116		Leskea assimilis Mitt.
117		Leskea cymbifolia Mitt.
118		Leskea haplohymenium Mitt.
119		Leskea ramuligera Mitt.
120		Leskea scopula Mitt.
121	**	Leskea wallichiii Mitt.
122		Leucodon secundus Mitt.
123		Macromitrium moorcroftii (Hook. & Grev.)Schwaegr.
124		Macromitrium rigbyanum Dix.
125		Macrothamnium macrocarpum (Reinw. & Homsch.)Fleisch.
126		Meteoriopsis reclinata(C.Muell.)Fleish.
127		Meteorium acuminatum Mitt.
128		Meteorium aureum Mitt.
129		Meteorium squarrosum Mitt.
130		Mielichoferia himalayana Mitt.
131		Mniadelphus humifusus Wils
132		Mniobryum ludwigii (Schwawgr.)Loesk
133	*	Mnium heterophyllum (Hook.)Schwaegr
134	*	Mnium lycopodioides Schwaegr
135		Mnium nietneri C. Mitt.
136		Mnium trichomanes Mitt.
137		Neckera crenulata Hare
138		Neckera Stracheyana Mitt.
139		Octoblepharum albidum Hedw.
140	*	Orthotrichum hookeri Wils.
141		Papillaria fuscescens(Hook)Jaeg.
142	*	Philonotis falcata Mitt.
143		Philonotis fontana(Hedw.)Brid.
144		Philonotis turneriana Mitt
145		Pieurozium schreberi (Brid.)Mitt.
146		Plagiomnium integrum (Bosch.& Lac.)Kop.
147		Plagiomnium rostratum (Hook.)Kop.
148	*	Plagiothecium denticulatum (Hedw.)B.S.G.
149		Plagiothecium nemorale(Mitt.)Jaeg.
150		Pogonatum aloides P.B.
151	*	Pogonatum cirratum(SW.)Brid.
152	*	Pogonatum contortum(Brid.) Lesq
151	*	Pogonatum fuscatum Mitt.
152	*	Pogonatum himalayanum Mitt.
153		Pogonatum fuscatum Mitt.
154	*	Pogonatum himalayanum Mitt.
155		Pogonatum himalayanum Mitt.
156		Pogonatum microstomum Brid.
157		Pogonatum urnigerum(Hedw.)P.Beauv.
158		Pohlia elongate Hedw.
159		Pohlia sp.
160		Polytrichastrum alpinum(Hedw.)
161		Polytrichum perichaetiale Mont.
162		Ptilium crista-castrensis(Hedw.)De Not
163		Ptychomitrium rhacomitrioides Dix.
164		Rhacomitrium subsecundum(Hook .& Grev.) Mitt.
165		Rhacomitrium canescens (Hedw.)Brid
166		Rhacomitrium crispulum (Hook f.&Wils.)Hook .f &Wils
167		Rhacomitrium fusoscens Wils
168		Rhacomitrium himalayanum(Mitt.)Jaeg.
169		Rhizomnium horikawae (Nog.)Kop.
170		Rhodobryum roseum(Hedw.)Limpr.
171		Rhytidiadelphus triquetrus(Hedw.)Warnst.
172		Sphagnum ovatum Hampe
173		Stereodon caperatus Mitt.
174		Stereodon condensatus Mitt.
175		Stereodon gardneri Mitt.
176		Stereodon macrocarpus Mitt.
177		Stereodon pallidulus Mitt.
178		Stereodon plicatus Mitt.
179		Stereodon prorepens Mitt.
180		Stereodon serrula Mitt.
181		Stereodon taxirameus Mitt.
182	*	Stereodon tenius Mitt.
183		Syntrichia princeps (De Not.)Mitt.
184	*	Tayloria indica Mitt.
185		Tayloria subglabra(Griff.)Mitt.
186		Tayloria tenella Mitt.
187		Tetraplodon mnioides (Hedw.)B.S.G.
188		Thiuidium sp.
189		Thuidium glaucinum (Mitt.)Bosch& Lac.
190		Timmia megapolitana Hedw.
191		Tortella fragilis(Hook. & Wils.)Limpr.
192		Tortella tortuosa(Hedw.)Limpr.
193		Tortula amplexifolia Mitt.
194		Tortula anomala Mitt.
195		Tortula squarrosa Brid.
196		Trachyphus bicolor Reinw.&Hornsch.
197		Trachypodopsis serrulata (P.Beauv.)Fleisch
198		Trachypus crispatulus Mitt.
199		Trachypus blandus Mitt.

200 Trematodon capilitifolius Muell.
201 Webera elongata Schw.
202 Zygodon viridissimus (Dicks.)R.Br.

** : Common in both list, * : Strachey list

Reference :

1. Strachey, R 1852. Plants of Kumaun and of the Adjacent Portions of Garhwal and Tibet. Based on collections made by Strachey and Winterbottom. Revised By Duthie JF. Ms Bishen Singh Mahendra Pal Singh Dehradun
2. Tewari SD, Pant G, Joshi S and Airi S. High altitude (above Timber -line) Bryoflora of Kumaon Himalaya.. In High Altitudes of The Himalaya

Liverworts

1		Anastrophyllum sp.
2		Aneura pinguis (L.) Dum.
3		Bazzania praerupta (Reinw. Etal.) Trev.
4		Bazzania sp.
5		Blepharostoma Trichophyllum (L.) Dum.
6		Chandonanthus hirtellus (Web.) Mitt.
7		Chiloscyphus polyanthus (L.) Corda.
8		Conocephalum conicum(L)Lindo.
9		Dumortiera denudata Mitt.
10		Fimbriaria khasiana Mitt.
11		Fossombronia himalayensis Kash
12	*	Frullania aeolotis Nees
13		Frullania pyriflora St.
14	*	Frullania retusa Mitt.
15		Frullania sp.
16		Herbertus Sp.
17		Jamesoniella nipponica Hatt.
18	*	Jungermannia Ariadne Tayl.
19		Jungermannia gollanii St.
20	*	Jungermannia polyrhiza Hook.
21	*	Jungermannia rubida Mitt.
22		Lejunia nepalensis Steph.
23		Lejunia tuberculata, Steph.
24		Lepidozia reptans (L.) Dum.
25		Lophocolea cuspidata Nees
26		Lophocolea minor Nees
27		Lophocolea bidentata (L.) Dum.
28		Lophozia sp.
29	*	Marchantia linearis Lindenb
30	*	Marchantia nitida Lehm
31		Marchantia palmata Nees
32	*	Marchantia plaleacea Bert.
33		Marchantia polymorpha L.
34		Metzeria leptoneura Spruc.
35	*	Metzgeria furcata, Nees
36		Pellia endiviaefolia (Dicks.) Durn.
37		Plagiochasma appendiculatum L.
38		Plagiochila chinensis Steph.
39	*	Plagiochila nepalensis Lindeno
40	*	Plagiochila semidecurrens Lehm.
41		Plagiochila sp.
42	*	Plagiochila subintegerrima Nees
43		Porella macroloba St.
44		Porella gracilima Mitt.
45	*	Porella laevigata, Lindenb.
47	*	Ptycanthus striatus Nees
48		Ptychanthus striatus (Lehm. & Epiphytic Lindb.) Nees
49		Radula complanata (L.) Dum.
50	*	Radula complanata, Dumort.
51		Reboulia hemispherica (L.)Raddi
52		Riccardia multifida (L.) Gray.
53	*	Riccia fluitans L.
54		Riccia warnstorfii Limpr.
55		Sauchia sponglosa Kash
56		Scapania sp.
57		Scapania undulata (L.) Dum.
58		Stephensoniella brevipedunculata Kash.
59		Trichoocolea Tomentella (Ehrh.) Dum.
60		Tritomaria exsecta Schiffn.

References:

Tewari SD, Pant G, Joshi S and Airi S. High altitude (above Timber -line) Bryoflora of Kumaon Himalaya. In High Altitudes of The Himalaya.

Gymnosperms

1. Abies spectabilis (D.Don) Mirbel (*A.webbiana* Lindley)
2. Abies pindrow Royle
3. Juniperus psuedosabina Fisch. & Mey.
4. Juniperus communis L.
5. Juniperus recurva Buch.-Ham. Ex D.Don
6. Juniperus macropoda Boiss.
7. Taxus baccata L. subsp. Wallichiana (Zucc.) Pilger
8. Tsuga dumosa (D. Don) Eichler (*T. brunoniana* (Wallich) Carriere)
9. Pinus wallichiana A.B. Jackson (*P. excelsa* Wallich ex D. Don, *P. griffithii* McClell., *P. chylla* Lodd.) (non-local)
10. Pinus roxburghii Sarg. (*P. longifolia* Roxb. exLambert)
11. Pinus patula Schl. & Cham. (non-local)
12. Cedrus deodara Roxb. ex D. Don) G. Don DeoDer (non-local)
13. Cupressus torulosa D.Don
14. Ephedra geradiana Wallich ex Stapf
15. Mammals of the Gori river basin

Mammals of the Gori River Basin

S.no	Common Name	Scientific Name
	Primates	
1	Rhesus macaque	*Macaca mulatta* (Zimmermann)
2	Common Langur	*Presbytis entellus* (Dufresne)
	Cats	
3	Common Leopard	*Panthera pardus* (Linnaeus)
4	Snow Leopard	*Panthera uncia* (Schreber)
5	Leopard Cat	*Felis benghalensis* (Kerr)
6	Marbled Cat	*Felis marmorata* (Martin)
7	Jungle Cat	*Felis chaus* (Guldenstaedt)
	Civets	
8	Himalayan Palm Civet	*Paguma larvata* (Hamilton-Smith)
	Mongooses	
9	Common Mongoose	*Herpestes edwardsii* (Geoffroy)
	The Dog Family	
10	Jackal	*Canis aureus* (Linnaeus)
11	Red Fox	*Vulpes vulpes* (Linnaeus)
12	Wild Dog	*Cuon alpinus* (Shaw)
	Bears	
13	Himalayan Black Bear	*Selenarctos thibetanus* (G. Cuvier)
	Weasels	
14	Himalayan Yellow Throated Marten	*Martes flavigula* (Boddaert)
15	Himalayan Weasel	*Mustela sibirica* (Pallas)
16	Common Otter	*Lutra lutra* (Linnaeus)
	Insectivores	
17	Moles	*Talpa micrura* (Hodgson)
18	Ground Shrew	*Suncus murinus* (Linnaeus)
	Bats	
19		Hipposideros sp. (?)
	Rodents	
20	Hodgson's Flying Squirrel	*Petaurista magnificus* (Hodgson)
21	Himalayan Marmot	*Marmota bobak* (Muller)
22	Field Mice	Mus sp. (?)
23	Common House Rat	*Rattus rattus* (Linnaeus)
24	Brown Rat	*Rattus norvegicus* (Berkenhout)
25	Voles	*Alticola roylei* (Gray)
26	Indian Porcupine	*Hystrix indica* (Kerr)
	Hares, Mouse Hares	
27	Himalayan Mouse Hare	*Ochotona roylei* (Ogilby)
28	Indian Hare	*Lepus nigricollis* (F. Cuvier)
	Wild Sheep and Goats	
29	Blue Sheep	*Pseudois nayaur* (Hodgson)
30	Himalayan Tahr	*Hemitragus jemlahicus* (H.Smith)

	Goat - Antelopes	
31	Serow (Donkey Deer)	*Capricornis sumatraensis* (Bechstein)
32	Goral	*Nemorhaedus goral* (Hardwicke)
	Deer	
33	Sambar (Jedow)	*Cervus unicolor* (Kerr)
34	Barking Deer	*Muntiacus muntjak* (Zimmermann)
35	Musk Deer	*Moschus moschiferus* (Linnaeus)
	Pigs	
36	Wild Pig	*Sus scrofa* (Linnaeus)

References for Mammal Listing:

1. Prater, S.H. 1971. *The Book of Indian Animals*. BNHS and OUP, Mumbai , India.
2. Rawat, G.S and Sathyakumar. 1998.Status of Mammals, Birds and Their Habitats in the Panchahuli Region, Kumaon Himalaya, in Report on Scientific and Ecological Research - Panchachuli Multidimensional Expedition - 1998. Sapper Adventure Foundation. The Corps of Engineers, Indian Army.

Birds of the Gori River Basin

S.no	Common Name	Scientific Name
	Hawks, Eagles, Vultures	**ACCIPITRIDAE**
1	Northern Goshawk	Accipeter gentilus
2	Eurasian Sparrow Hawk	Accipeter nisus
3	Golden Eagle	Aquila chrysaetos
4	Upland Buzzard	Buteo hemilasius
5	Black Shouldered Kite (Black Winged Kite)	Elanus caerulus
6	Lammergeier	Gypaetus barbatus
7	Himalayan Griffon Vulture	Gyps himalayenis
8	Bonelli's Eagle	Hieraaetus fasciatus
9	Black Eagle	ictinaetus malayensis
10	Red Headed Vulture (King Vulture)	Sarcogyps calvus
11	Crested Serpent eagle	Spilornis cheela
12	Changeable Hawk Eagle	Spizaetus cirrhatus
13	Mountain Hawk Eagle (Hogdson's Hawk Eagle)	Spizaetus nipalensis
	Falcons	**FALCONIDAE**
14	Common Kestrel	Falco tinnunculus
	Cormorants	**PHALACROCORACIDAE**
15	Cormorant	Phalacrocorax sp.
	Pheasants, Partridges, Quails	**PHASIANIDAE**
16	Chukor	Alectoris chukar
17	Common Hill Partridge	Arborophila rufogularis
18	Cheer	Catreus wallichi
19	Black Fracolin	Francolinus francolinus
20	Snow Partridge	Lerwa lerwa
21	Monal	Lophophorus impejanus
22	Kaleej	Lophura leucomelana
23	Koklas	Pucrasia macrolopha
24	Himalayan Snow Cock	Tetraogallus himalayensis
25	Satyr Tragopan	Tragopan Satyra
	Swans, Geese, Ducks & Whistling Ducks	**ANATIDAE & DENDROCYGNIDAE**
26	Eurasian Wigeon	Anas penelope
27	(Unidentified Duck / Geese)	Anas sp.
	Woodcocks and Snipes	**SCOLOPACIDAE: Subfamily SCOLOPACINAE**
28	Snipe	Gallinago spp.
29	Eurasian Woodcock	Scolopax rusticola
	Pigeons & Doves	**COLUMBIDAE**
30	Snow Pigeon	Columba leuconota
31	Hill Pigeon	Columba rupestris
32	Rock Pigeon	Columbia livia
33	Mountain Imperial Pigeon	Ducula ducula
34	Eurasian Collared Dove	Streptopelia decaoto
35	Spotted Dove	Streptopelia ochinensis
36	Oriental Turtle Dove	Streptopelia orientalis
37	Wedge Tailed Gree Pigeon	Treron sohenura

	Rails, Gallinules and Coots	**RALLIDAE**
38	Crake	Rallinia spp.
	Parrots	**PSITTACIDAE**
39	Plum headed Parakeet (Blossom Headed)	Psittacula cyanocephala
40	Slaty Headed Parakeet	Psittacula himalayana
41	Rose Ringed Parakeet	Psittacula krameri
	Swifts	**APODIDAE**
42	White Throated Needle tail	Hirundapus caudacutus
43	Alpine Swift	Tachymarptis melba
44	White Rumped Needle tail	Zoonavena sylvatica
	Owls	**STRIGIDAE**
45	Spotted Owlet	Atena brama
46	Eurasian Eagle Owl (Horned Owl - Great)	Bubo bubo
47	Spot Bellied Eagle Owl (Forest eagle Owl)	Bubo nipalensis
48	Collared Owlet	Glaucidium brodiei
49	Asian Barred Owlet	Glaucidium cuculoides
50	Scops Owl	Otus scops
51	Mountain Scop owl	Otus spilocephalus
52	Brown Eagle Owl	Strix leptogrammica
	Nightjar	**CAPRIMULGIDAE**
53	Grey Nightjar	Caprimulgus indicus
	Barbets	**CAPITONIDAE**
54	Blue Throated barbet	Megalaima asiatica
55	Great Hill barbet	Megalaima virens
	Woodpeckers	**PICIDAE**
56	Brown fronted Woodpecker	Dendrocopos auriceps
57	Himalayan Woodpecker	Dendrocopos himalayensis
58	Himalayan Flameback	Dinopium shorii
59	Sap Sucker - Rufous Bellied WoodPecker	Hypopicus hyperythrus
60	Speckled Piculet	Picumnus innominatus
61	Black Naped Green Woodpecker (grey headed)	Picus canus
62	Greater Yellownape	Picus flavinucha
63	Scalybellied Green Woodpecker	Picus squamatus
	Hoopoes	**UPUPIDAE**
64	Common Hoopoe	Upupa epops
	Rollers	**Coraciidae**
65	Indian Roller	Coracias benghalensis
	Large Kingfishers & Pied Kingfishers	**HALCYONIDAE AND CERYLIDAE**
66	White Breasted Kingfisher	Halycon smyrnensis
67	Crested Kingfisher	Megaceryle lugubris
	Cuckoo's	**CUCULIDAE**
68	Eurasian Cuckoo	Cuculus canorus
69	Indian Cuckoo	Cuculus micropterus
70	Lesser Cuckoo	Cuculus poliocephalus
71	Oriental Cuckoo (Himalayan Cuckoo)	Cuculus saturatus
72	Large Hawk Cuckoo	Hierococcyx sparverioides

	Leafbirds	**IRENIDAE**
73	Orange Bellied Leafbird	Chloropsis hardwickii
	Shrikes	**LANIIDAE**
74	Grey Backed Shrike (TibetanShrike)	Lanius tephronotus
	Jays, Crows & Magpies	**CORVIDAE**
75	Common Raven	Corvus corax
76	Large Billed Crow (Jungle Crow)	Corvus marrorhynchos
77	House Crow	Corvus splendens
78	Grey Treepie	Dendrocitta formosae
79	Eurasian Jay	Garrulus glandarius
80	Black Headed (Throated) Jay	Garrulus lanceolatus
81	Yellow Billed Chough	Pyrrhocorax graculus
82	Red Billed Chough	Pyrrhocorax pyrrhocorax
83	Red Billed Blue Magpie	Urocissa erythrorhyncha
84	Yellow Billed Blue Magpie	Urocissa flavirostris
	Orioles, Cuckooshrikes, Trillers, Minivets, Flyctacher -Shrikes	**TRIBE: ORIOLINI**
85	Blackwinged Cuckooshrike	Coracina melaschistos
86	Maroon Oriole	Oriolus trailii
87	Long Tailed Minivets	Pericrocotus ethologus
88	Scarlet Minivet	Pericrocotus flammeus
	Bulbuls	**PYCNONOTIDAE**
89	Black Bulbul	Hypsipetes madagascariensis
90	Red Vented Bulbul	Pycnonotus cafer
91	White Cheeked (Himalayan) Bulbul	Pycnonotus leucogenys
	Babblers, Flycatchers, Warblers, Thrushes and Chats	**MUSCICAPIDAE**
	Babblers	***TIMALIINAE (Sub Family)***
92	White-browed Fulvetta	Alcippe vinipectus
93	Great Parrotbill	Conostoma oemodium
94	Cutia	Cutia nipalensis
95	White Throated (Collared) laughingthrush	Garrulax albogularis
96	Chestnut-Crowned laughingthrush	Garrulax erythrocephalus
97	White Crested Laughingthrush	Garrulax leucolophus
98	Streaked laughingthrush	Garrulax lineatus
99	Spotted laughingthrush	Garrulax ocellatus
100	Striated laughingthrush	Garrulax striatus
101	Variegated laughingthrush	Garrulax variegatus
102	Rufous (Black Capped) Sibia	Heterophasia capistrata
103	Chestnut Tailed Minla (Bar throated Siva)	Minla Strigula
104	Black Throated (Nepal) Parrotbill	Paradoxornis nipalensis
105	Scaly Brested Wren Babbler	Pnoepyga albiventer
106	Rusty-cheeked Scimitar Babbler	Pomatorhinus erythrogenys
107	Streak-Breasted Scimitar Babbler	Pomatorhinus ruficollis
108	White browed (Redwinged) Shrike Babbler	Pteruthius flaviscapis
109	Whiskered (Yellow Naped) Yuhina	Yuhina flavicollis
110	Stripethroated Yuhina	Yuhina gularis
	Flycatchers	***MUSCICAPINAE (Sub Family)***
111	Grey Headed Canary Flycatcher	Culicapa ceylonesis
112	Verditer Flycatcher	Eumyias thalassina
113	Snowybrowed Flycatcher	Ficedula hyperythra
114	Rufous-gorgeted Flycatcher	Ficedula strophiata

115	Ultramarine Flycatcher	Ficedula superciliaris
116	Sooty Flycatcher	Muscicapa sibirica
117	Little Pied Flycatcher	Muscicapa westermanni
118	Small Niltava	Niltava macgrigoriae
119	Rufous-bellied Niltava	Niltava sundara
	Fantails , Drongoes & Monarchs	**DICRURINAE (Sub Family)**
120	Bronzed Drongo	Dicrurus aeneus
121	Spangled Drongo	Dicrurus hottentottus
122	Ashy Drongo	Dicrurus leucophaeus
123	Black Drongo	Dicrurus macrocercus
124	White Throated Fantailed Flycatcher	Phipidura albicollis
125	White Browed Fantailed Flycatcher	Rhipidura aureola
126	Yellow Bellied Fantailed Flycatcher	Rhipidura hypoxantha
	Warblers	**SYLVIINAE (Sub Family)**
127	Spotted Bush Warbler	Bradeypterus thoracicus
128	Yellowish-bellied Bush Warbler	Cettia acanthizoides
129	Grey-side Bush Warbler	Cettia brunnifrons
130	Aberrant Bush Warbler	Cettia flavolivacea
131	Chestnut Crowned Bush Warbler	Cettia major
132	Tickell's Leaf Warbler	Phylloscopus affinis
133	Lemon Rumped Warbler	Phylloscopus chloronotus
134	Sulphur Bellied (Olivaceous) Leaf Warbler	Phylloscopus griseolus
135	Hume's Warbler	Phylloscopus humei
136	Ashy Throated Warbler	Phylloscopus maculipennis
137	Large-billed Leaf Warbler	Phylloscopus magnirostris
138	Western Crowned Warbler	Phylloscopus occipitalis
139	Buff Barred Warbler	Phylloscopus pulcher
140	Blyth's Leaf Warbler	Phylloscopus reguloides
141	Greenish Warbler	Phylloscopus trochiloides
142	Golden Spectacled Warbler	Seicercus burkii
143	Grey-Hooded Warbler	Seicercus xanthoschistos
	Tesia	**ACROCEPHALINAE (Warbler Sub Family)**
144	Chestnut-headed Tesia	Tesia castaneocornata
	Prinias	**CISTICOLIDAE (Sub Family)**
145	Striated Prinia	Prinia criniger
146	Ashy Prinia	Prinia socialis
	Thrushes and Chats	**TURDINAE (Sub Family):**
147	Chestnut Bellied Rock Thrush	Monticola rufiventris
148	Blue Whistling Thrush	Myiophomus caeruleus
149	White Collared Black Bird	Turdus albocinctus
150	Grey Winged Blackbird	Turdus boulboul
151	Tickells Thrush	Turdus unicolor
152	Mistle Thrush	Turdus viscivorus
153	Scaly Thrush	Zoothera dauma
154	Long Tailed Thrush	Zoothera dixoni
155	Plain backed Thrush	Zoothera mollissima
	Chats	**Tribe Saxicolinin**
156	White Capped Water Redstart leucocephalus	Chaimarronis
157	Oriental Magpie Robin	Copsychus saularis
158	Black Backed Forktail	Enicurus immaculatus

159	Spotted Forktail	Enicurus maculatus
160	Little Forktail	Enicurus scouleri
161	Indian Blue Robin	Lucinia brunnea
162	White Tailed Robin	Myiomela leucura
163	Blue Capped Redstart coeruleucephalus	Phoenicorus
164	Black Red Start	Phoenicorus ochruros
165	Blue Fronted Red Start	Phoenicurus frontalis
166	Plumbeous Water Redstart	Rhyacornis fuliginosus
167	Grey BushChat	Saxicola ferrea
168	Golden Bush Robin	Tarsiger chrysaeus
169	Orange Flanked Bush Robin	Tarsiger cyanurus
170	White Browed Bush Robin	Tarsiger indicus
	Dippers	**CINCLIDAE**
171	Brown Dipper	Cinclus pallasii
	Starlings and Mynas	**STURNIDAE**
172	Common Myna	Acridotheres tristis
173	Jungle Myna	
	Wrens	**TROGLODYTIDAE**
174	Winter Wren	Troglodytes troglodytes
	Accentors or Hedge Sparrows	**PRUNELLIDAE**
175	Alpine Accentor	Prunella collaris
176	Robin Accentor	Prunella rubeculoides
177	Rufous Breasted Accentor	Prunella strophiata
	Nuthatches and Wall Creeper	**SITTIDAE**
178	Velvet Fronted Nuthatch	Sitta frontalis
179	Himalayan (Whitetailed) Nuthatch	Sitta himalayensis
180	Wall Creeper	Tichodroma muraria
	Tree Creepers	**CERTHIIDAE**
181	Eurasian Treecreeper	Certhia familiaris
182	Himalayan (Bar-Tailed) Treecreeper	Certhia himalayana
	Penduline Tits, Tits and Long Tailed Tits	**PARIDAE & AEGITHALIDAE**
183	Black Throated (Red Headed) Tit	Aegithalos concinnus
184	White Throated Tit	Aegithalos niveogularis
185	Fire Capped Tit	Cephalopyrus flammiceps
186	Coal Tit	Parus ater
187	Grey Crested Tit	Parus dichrous
188	Great Tit	Parus major
189	Spot Winged tit	Parus melanolophus
190	Green-backed Tit	Parus monticolus
191	Rufous Vented Tit	Parus rubidiventris
192	Rufous Naped Tit	Parus rufonuchalis
193	Yellow cheeked Tit	Parus spilonotus
194	Black-Lored Tit	Parus xanthogenys
195	Yellow Browed Tit	Sylviparus modestus
	Swallows and Martins	**HIRUNDINIDAE**
196	Barn Swallow	Hirundo rustica
	Flowerpeckers, Sunbirds and Spiderhunters	**NECTRAINIIDAE subfamily: NECTARINIINAE**
197	Nepal Yellow Backed (Green tailed) Sunbird	Aethopyga nipalensis
198	Mr's Gould's Sunbird	Aethopyga gouldiae

199	Fire Tailed Sunbird	Aethopyga ignicauda.
200	Black Throated Sunbird	Aethopyga saturata
201	Crimson Sunbird	Aethopyga siparaja
202	Fire -Breasted Flowerpecker	Dicaeum ignipectus
203	Purple Sunbird	Nectarinia asiatica
	Pipits and Wagtails	**PASSERDAE subfamily: MOTACILLIDAE**
204	Rosy Pipit	Anthus roseatus
205	Olive Backed Pipit	Anthus hodgsoni
206	Upland Pipit	Anthus sylvanus
207	Tree Pipit	Anthus trivialis
208	White Wagtail	Motacilla alba
209	Grey Wagtail	Motacilla cinerea
210	Yellow Wagtail	Motacilla flava
211	White Browed Wagtail	Motacilla maderaspatensis
	White-Eyes	**ZOSTEROPIDAE**
212	Oriental White Eye	Zosterops palpebrosus
	Sparrows and Snow Finches	**PASSERIDAE subfamily: PASSERINAE**
213	House Sparrow	Passer domesticus
214	Eurasian Tree Sparrow	Passer montanus
	Finches	**FRINGILLIDAE**
	Chaffinches	**FRINGILLINAE (Sub Family)**
215	Yellow-breasted Geenfinch	Carduelis spinoides
216	Common Rosefinch	Carpodacus erythrinus
217	Nepal Dark (Darkbreasted) Rosefinch	Carpodacus nipalensis
218	Plain Mountain Finch	Leucosticte memoricola
219	Black and Yellow Grosbeak	Mycerabos icteriodes
220	Collared Grosbeak	Mycerobas affinis
221	Spot Winged Grosbeak	Mycerobas melanozanthos
222	Red Headed Bullfinch	Pyrrhula erthrocephala
	Buntings	**EMBERIZIDAE**
223	Rock Bunting	Emberiza cia
224	Chestnut-eared Bunting	Emberiza fucata
225	Crested Bunting	Melophus lathami

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1. Ali, Salim and Ripley, Dillon S. 1995. *A Pictorial Guide To The Birds of the Indian Subcontinent.* BNHS and OUP, Mumbai, India.
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6. Rawat, G.S and Sathyakumar. 1998.Status of Mammals, Birds and Their Habitats in the Panchahuli Region, Kumaon Himalaya, in Report on Scientific and Ecological Research - Panchchuli Multidimensional Expedition - 1998. Sapper Adventure Foundation. The Corps of Engineers, Indian Army.

The Fish Fauna of the Kali River

Anguillidae

1 Anguilla bengalensis bengalensis (Gray)

Clupeidae *Sub Family Alosinae*

2 Gudusia chapra (Hamilton-Buchanan)

Notopteridae

3 Natopterus chitala (Hamilton-Buchanan)

4 Notopterus notopterus (Pallas)

Cyprinidae *Sub Family Cyprininae**

5 Catla catla (Hamilton-Buchanan)

6 Chagunius chagunio (Hamilton-Buchanan)

7 Cirrhinus mrigala mrigala (Hamilton-Buchanan)

8 Cirrhinus reba (Hamilton-Buchanan)

9 Cyprinon semiplotum (CmClelland)

10 Labeo boga (Hamilton-Buchanan)

11 Labeo calbasu (Hamilton-Buchanan)

12 Labeo dero (Hamilton-Buchanan)

13 Labeo dyocheilu (McClelland)

14 Neolissochilus hexagonolepis (McClelland)

15 Puntius sarana sarana (Hamilton-Buchanan)

16 Puntius ticto (Hamilton-Buchanan)

17 Tor putitora (Hamilton-Buchanan)

18 Tor tor (Hamilton-Buchanan)

19 Chela labuca (Hamilton-Buchanan)

20 Salmostoma acinaces (Valenciennes)

21 Securicula gora (Hamilton-Buchanan)

22 Amblyphryngodon mola (Hamilton-Buchanan)

23 Aspidoparia morar (Hamilton-Buchanan)

24 Danio devario (Hamilton-Buchanan)

25 Esomus danricus (Hamilton-Buchanan)

26 Parluciosoma daniconius (Hamilton-Buchanan)

27 Schizothoraichthys labiatus (McClelland)

28 Schixothorax plagiostomus (Heckel)

29 Schizothorachthys progastus (Mcclelland)

Garrinae

30 Crossocheilus latius latius (Hamilton-Buchanan)

31 Gara annandalei (Hora)

32 Garra gotyla gotyla (Gray)

33 Psilorhynchus sucato (Hamilton-Buchanan)

Balitoridae *Sub Family Balitorinae*

34 Balitora brucei (Gray)

35 Homaloptera bilineata (Blyth)

Nemacheilinae*

36 Nemacheilus beavani (Gunther)

37 Nemacheilus botia (Hamilton-Buchanan)

38 Lepidocephalus guntea (Hamilton-Buchanan)

39 Somileptes gongota (Hamilton-Buchanan)

Botiinae

40 Botia almorhae (Gray)

41 Botia lohachata (Chaudhuri)

Bagridae

42 Aorichthys seenghala (Sykes)

43 Mystus cavasius (Hamilton-Buchanan)

44 Mystus vittatus (Bloch)

Siluridae

45 Ompok bimaculatus (Bloch)

46 Wallagu attu (Schneider)

Schilbeidae *Sub Family Ailinae*

47 Ailia coila (Hamilton-Buchanan)

Schilbeinae

48 Clupisoma garua (Hamilton-Buchanan)

49 Eutropiichthys vacha (Hamilton-Buchanan)

50 Pseudeutropius atherinoides (Bloch)

Amblycipitidae

51 Amblyceps mangois (Hamilton-Buchanan)

52 Bagarius bagarius (Hamilton-Buchanan)

53 Gagata cenia (Hamilton-Buchanan)

54 Glyposternum maculatum (Regan)

55 Glypothoras cavia (Hamilton-Buchanan)

56 Pseudecheneis sulcatus (McClelland)

Clariidae

57 Clarias batrachus (Linnaeus)

Heteropneustidae

58 Heteropneustes fossilis (Bloch)

Belonidae

59 Xenentodon cancila (Hamilton-Buchanan)

Synbranchidae

60 Monopterus (Amphipnous) chuchia (Hamilton-Buchanan)

Ambassidae

61 Chanda nama (Hamilton-Buchanan)

Nandidae *(Sub Family Nandinae)*

62 Nandus nandus (Hamilton-Buchanan)

Badinae

63 Badis badis (Hamilton-Buchanan)

64 Sicamugil cascasia (Hamilton-Buchanan)

Gobiidae *Sub Family Gobiinae*

65 Glossogobius giuris (Hamilton-Buchanan)

Anabantidae

66 Anabas testudineus (Bloch)

Belontiidae *Sub Family Trichogasterinae*

67 Colisa faciatus (Schneider)

Channidae

68 Channa marulius (Hamilton-Buchanan)

69 Channa punctatus (Bloch)

Mastacembelidae

70 Macrognathus aral (Bloch & Schneider)

71 Mastacembelus armatus (Lacepede)

Tetradontidae

72 Tetradon cutcutia (Hamilton-Buchanan)

Sisordae*

73 Glyptothorax cavia [Hamilton- Buchnan]

* One Species in each of these families were recorded in Gori river [Glyptothorax Sp., Nemacheilus Sp. & Schizothorax sp.]

Reference:

1. Shrestha, Tej Kumar, 1995, *Fish Catching in the Himalayan Waters of Nepal*. Pub. Mrs Bimala Shrestha, Kathmandu, Nepal

Agriculture Crops Cultivated in the Gori Basin

S.No	English Name	Local Name	Botanical Name	Family	Varieties	
	Cereals, Pseudo-Cereals & Millets					
1	Paddy (Upland)	Dhan	*Oryza sativa*	Poaceae	31	Naluwa; Dhulia; Dudh Jadandh; Sirmodiya; Kafalvihar; RR-8, Usarwala, Bhutkya, Bawachalal, Bakkutoli, Nandhan, Jaronti, Jharuwa, Tiliya, Bonya, Chotya, Rajmati, Jhinni (B)[1], Khajya (B), Roti, Kapila, Chinbhuri, Phaguwa, Bakuwa, Bawanaya, Kaljada (B), Shali, Thadaradi, Musiyaghehun, JungliDhan
	Paddy (Lowland)	Dhan	*Oryza sativa*	Poaceae	16	Baeesh Number; Kashmiri; Jamali; Thapchinni (B); Jumadi, Pant-10, Pant-11, Taichun, Toli, Bare, Jumati, Itidhan, Dana Basmati, Batriya, Chinafore, Shyamjira
2	Wheat	Gehun	*Triticum aestivum*	Poaceae	18	Jussi, Dabati, Kalyan Sona; Kalageun; Dhaulghun; Hira, Sunhra, Dhaulya, Kala, Bhavari, Lidya, Jhuriya, Chatta, Vikas, Dumatriya, Ramti, Girwa, Koimbatore-234
3	Barley	Jau	*Hordeum vulgare*	Poaceae	8	Thul, Nan, Kala, Safed, Mulikhatri, Mota, Barik, Dhaul
4	Durum Wheat	Neppal	*Triticum durum*	Poaceae	1	
5	Maize	Makka	*Zea mays*	Poaceae	6	Murli, Timsiya; Shankar, Bagdara, Ganga, Bhunkot
6	Finger Millet	Mandua	*Eleusine coracana*	Poaceae	14	Timsya, Tyuli, Parvati, Master, Kalamandua, Pyoli, Bahuli, Nakftod, Dhaul, Lamkathi, Lahuli, Dhalmyoli, Kalagumari, Ptonti

Sr.	English Name	Local Name	Botanical Name	Family	Varieties	
7	Oat	Jai	*Avena sativa*	Poaceae	1	
8	Little Millet	Shavan	*Panicum sumatrense*	Poaceae	1	
9	Proso millet	Cheena	*Panicum miliaceum*	Poaceae	2	Dudhwa; Lal
10	Celestial Barley	Uwa-Jau	*Triticum himalayense*	Poaceae	2	Chota; Bada
11	Italian Millet	Kauni	*Setaria italica*	Poaceae	1	
12	Pearl Millet	Bajra	*Pennisetum typhoides*	Poaceae	1	
13	Sorghum	Jowar	*Sorghum vulgare*	Poaceae	1	
14	Buckwheat	Phaphar	*Fagopurum tatricum*	Polygonaceae	1	
15	Buckwheat	Palthi	*Fagopurum esculentum*	Polygonaceae	1	
16	Amarantha	Chuwa	*Amaranthus tricolor*	Amarantaceae	2	Lal, Safed
17	Amarantha	Chaulai	*Amaranthus blitum*	Amarantaceae	1	
	Oil Yielding Plants					
1	Black Mustard	Kali Sarson	*Brassica nigra*	Cruciferae	2	
2	Indian Mustard	Rai	*Brassica Junacea*	Cruciferae	1	
3	Yellow Mustard	Pili Sarson	*Brassica compestris*	Cruciferae	1	
4	Rape	Toda	*Brassica napus*	Cruciferae	1	
5	Seasum	Til	*Seasamum indicum*	Cruciferae	1	
6	Flax	Alsi	*Linum usitatissimum*	Cruciferae	1	
2	Soybean	Soybean	*Glycine max*	Papilionaceae	1	
7	Groundnut	Mungfali	*Arachis hypogea*	Papilionaceae	1	
8	Perilla	Bhangira	*Perilla frutescens*	Labiatae	1	
	Pulse Crops					
1	Lentil	Masur	*Lens esculentum*	Papilionaceae	1	
2	Gram	Chana	*Cicer arietinum*	Papilionaceae	1	
3	Horse Gram	Gahad	*Dolichos uniflorus*	Papilionaceae	1	
4	Soybean	Bhat	*Glycine max*	Papilionaceae	3	Kala Bhatt, Safed Bhatt, Nepali Bhatt

Sr.	English Name	Local Name	Botanical Name	Family		Varieties
5	Kidney Bean	Rajma	*Phaseolus vulgaris* Nila Chotta	Papilionaceae	5	Safed, Jhalyan, Lal, Chotta lal,
6	Black Gram	Urd	*Vigna mungo*	Papilionaceae	1	
7		Guransh	*Phaseolus torosus*	Papilionaceae	1	
8		Riansh	*Vigna catinga*	Papilionaceae	2	Kala, Safed
9	Green Gram	Mung	*Vigna radiata*	Papilionaceae	3	Sayas; Dhaulmas; Kalamas
10	Garden Pea	Matar	*Pisum sativum* var. *arvense*	Papilionaceae	1	
11	Field Pea	Kalon	*Pisum sativum*	Papilionaceae	1	
12	Pigeon Pea	Arhar	*Cajanus cajan*	Papilionaceae	1	
	Spices					
1	Chives	Jambu	*Allium strachii*	Alliaceae	1	
2	Chives	Dhunwar	*Allium ascalonicum*	Alliaceae	1	
3	Garlic	Lahsan	*Allium sativum*	Alliaceae	1	
4	Menth	Pudina	*Mentha virdis*	Labitae	1	
5		Kirkiriya	*Cinnamomum tamala*	Lauraceae	1	
6	Red Pepper	Khursani	*Capsicum annuum*	Solanaceae	1	
7	Caraway	Thoya	*Carum carvi*	Umbelliferae	1	
8	Coriander	Dhaniya	*Coriandrum sativum*	Umbelliferae	1	
9	Turmeric	Haldi	*Curcuma longa*	Zingiberaceae	1	
10	Ginger	Ada	*Zingiber offcinale*	Zingiberaceae	1	
	Other					
1	Indian Hemp	Bhang	*Cannabis sativa*	Cannabinaceae	1	
2	Tobacco	Tambaqu	*Nicotiana tabacum*	Solanaceae	1	
3	Sugarcane	Ganna	*Saccharum officinarum*	Poaceae	1	

Vegetables Cultivated in the Gori River Basin				
S.No.	**English Name**	**Local Name**	**Botanical Name**	**Family**
1.	Onion	Pyaz	*Allium cepa*	Alliaceae
2	Arum	Gaderi	*Colocasia antioquorum*	Araceae
3	Yam	Pidon	*Colocasia himalensis*	Araceae
4	Indian Shot		*Canna indica*	Cannaceae
5	Spianch	Palak	*Spinacia oleracea*	Chenopodiaceae
6	Chenopodium	Bathuwa	*Chenopodium album*	Chinopodiaceae
7	Cauliflower	Phul Gobi	*Brassica oleracea*	Cruciferae
8	Cabbage	Bandh Gobi	*Brassica oleracea*	Cruciferae
9	Turnip	Saljam	*Brassica rapa*	Cruciferae
10	Mustard	Lai	*Brassica sp.*	Cruciferae
11	Garden Cress	Haling	*Lepidium sativum*	Cruciferae
12	Raddish	Mulli	*Raphanus sativa*	Cruciferae
13	Musk Melon	Kharbuza	*Cucumis melo*	Cucurbitaceae
14	Cucumber	Kakri	*Cucumis sativus*	Cucurbitaceae
15	Ash gourd	Kumin	*Cucurbita hispida*	Cucurbitaceae
16	Red Pumpkin	Kaddu	*Cucurbita maxima*	Cucurbitaceae
17	Pumpkin		*Cucurbita pepo*	Cucurbitaceae
18	Bottle gourd	Lauki	*Lagenaria siceraria*	Cucurbitaceae
19	Ribbed gourd	Torai	*Luffa acutangula*	Cucurbitaceae
20	Bittergourd	Tita karela	*Momordica charantia*	Cucurbitaceae
21	Serpent gourd	Chachinda	*Trichosanthus anguina*	Cucurbitaceae
22	Yam	Tarur	*Dioscorea globosa*	Dioscoreaceae
23	Dioscorea	Gaithi	*Dioscorea kumaonensis*	Dioscoreaceae
24	Fenugreek	Methi	*Trigonella foenum-graecum*	Paplionaceae

S.No	English Name	Local Name	Botanical Name	Family
35	Moth Beans		*Vigna aconitifolia*	Paplionaceae
26	Beans	Shimi	*Phaseolus sp.*	Paplionaceae
27	Chilli	Mirch	*Capsicum annuum*	Solanceae
28	Capsicum	Simla Mirch	*Capsicum sp.*	Solanceae
29	Tomato	Tamatar	*Lycopersicum esculentum*	Solanceae
30	Brinjal	Baigan	*Solanum melongena*	Solanceae
31	Potato	Alu	*Solanum tuberosum*	Solanceae
32	Coriander	Dhania	*Coriandrum sativum*	Umbelliferae
33	Carrot	Gajar	*Daucus Carota*	Umbelliferae
Fruit Plants in the Gori River Basin				
1	Mango	Aam	*Mangifera indica*	Anacardiaceae
2	Pappaya	Papita	*Carica papaya*	Caricaceae
3	Gooseberry	Aonla	*Emblica officinalis*	Euphorbiaceae
4	Walnut	Akhrot (2 varieties.)	*Juglans regia*	Juglandaceae
5	Pecannut	Pecan Okhar	*Carya illinoiensis*	Juglandaceae
6	Grapes	Angoor (2 varieties.)	*Vitis vinifera*	Lythraceae
7	Banana	Kela (2 varieties)	*Musa paradisica*	Musaceae
8	Guava	Amrood	*Psidium gujava*	Myrtaceae
9	Java Plum	Jamun	*Syzgium cumini*	Myrtaceae
10	Pomegranate	Anaar	*Punica granatum*	Punicaceae
11	Apple	Seb	*Malus punica*	Rosaceae
12	Peach	Aru (2 Varieties)	*Prunmus persica*	Rosaceae
13	Almond	Badam	*Prunus armenica*	Rosaceae
14	Himalayan Cherry	Payyan	*Prunus cerasoides*	Rosaceae

S.No	English Name	Local Name	Botanical Name	Family
15	Pear	Naspati	*Prunus communis*	Rosaceae
16	Plum	Plum	*Prunus domestica*	Rosaceae
17	Lime	Nimbu	*Citrus aurantifolia*	Rutaceae
18	Pomelo	Mahanimbu	*Citrus decumana*	Rutaceae
19	Lemon	Pahari Nimbu	*Citrus limon*	Rutaceae
20	Hill lemon	Chookh	*Citrus maxima*	Rutaceae
21	Citron	Jamir	*Citrus medica*	Rutaceae
22	Mandarin	Santra	*Citrus reticulata*	Rutaceae
23	Sweet Orange	Malta	*Citrus sinesis*	Rutaceae
24		Athanee	*Citrus sp.*	Rutaceae
25	Edible Chestnut	Khan Pangar	*Castenea sativa*	Sapindeceae
26	Litchi	Litchi	*Litchi chinensis*	Sapindeceae

Wild Economic Plants of Lower Gori Valley											
S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
1	*Abies spectabilis*								Y		
2	*Abrus precatorius L.*							Y			
3	*Acacia catechu (L.f.) Willd.*		Y			Y		Y	Y		
4	*Acer oblongum*				Y					Y	Flower
5	*Achyranthes aspera L.*							Y			
6	*Acorus calamus L.*							Y			
7	*Adhatoda zeylanica Medic.*							Y			Charcoal in gun powder
8	*Adiantum capillus-veneris L.*							Y			
9	*Aegle marmeoles (L.) Corr.*					Y		Y	Y	Y	Fruit Pulp
10	*Aesculus indica*								Y		Nuts used in soap making
11	*Agave cantula Roxb.*			Y							Hedge
12	*Ageratum conyzoides L.*							Y			
13	*Albizia chinensis (Osbek) Merr.*	Y			Y	Y					
14	*Albizia lebbeck (L.) Benth.*		Y			Y	Y		Y	Y	
15	*Allium strachii*									Y	Stem and Leaves; used as spice
16	*Alnus nepalensis D. Don.*					Y			Y		
17	*Alstonia scholaris (L.) R.Br.*							Y			
18	*Amaranthus spinosus L.*				Y						
19	*Ampelocissus latifolia (Roxb.) Planch.*							Y		Y	

S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
20	*Anagallis arvensis L.*							Y			Fish poison
21	*Anisomeles indica (L.) Kuntze*							Y			
22	*Apluda mutica L.*				Y						
23	*Argemone mexicana L.*				Y			Y			Seed oil in soap
24	*Arisaema tortuosum.*							Y		Y	Bulbs
25	*Artemisia nilagirica (Clarke) Pamp.*							Y			
26	*Artemisia vulgaris*									Y	Leaves
27	*Asclepias curassavica L.*							Y			
28	*Aseculus indica*								Y		Soap making; Bee log hives
29	*Asparagus racemosus L.*							Y		Y	Young Stems, Tubers
30	*Asplenium adiatum-nigrum*									Y	Leaves and soft stem
31	*Bacopa monnieri (L.) Pennell*							Y			
32	*Bauhinia vahlii Wt. & Arn.*			Y	Y					Y	Leaves as plates
33	*Bauhinia variegata L.*				Y	Y		Y		Y	
34	*Berberis asiatica Roxb. Ex DC.*	Y					Y		Y		Fruits
35	*Berberis lycium Royle*	Y					Y		Y		
36	*Betula alnoides*					Y			Y		
37	*Betula utilis*								Y		

S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
38	*Boehmeria rugulosa*				Y	Y					
39	*Boerhavia diffusa L.*							Y			
40	*Bombax ceiba L.*	Y		Y	Y	Y		Y	Y	Y	
41	*Bridelia verrucosa Haines*	Y			Y	Y				Y	
42	*Brugmansia suaveolens Bercht & Presl.*							Y			
43	*Butea monosperma (Lamk.) Taubert*		Y		Y	Y	Y	Y			Leaves as plates
44	*Caesalpinia bonduc (L.) Roxb.*							Y			
45	*Callicarpa arborea Roxb.*							Y			
46	*Callicarpa macrophylla Vahl*							Y		Y	
47	*Calotropis procera (Willd.) Dryand ex W. Ait.*							Y			
48	*Cannabis sativa L.*			Y				Y		Y	Leaves intoxicating, Seed used in Chutney
49	*Cardiospermum halicacabum L.*							Y			
50	*Carissa opaca stapf ex Haines*									Y	
51	*Carpinus viminea*	Y				Y					

S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
52	*Carum carvi*									Y	Seeds, spice
53	*Casearia tomentosa Roxb.*			Y							
54	*Castanopsis tribuloides*					Y					
55	*Celtis australis*				Y				Y	Y	Fruit
56	*Centella asiatica (L.) Urban*							Y			
57	*Chaerophyllum villosum*									Y	Tubers
58	*Chenopodium album L.*									Y	Leaves (Vegetables)
59	*Chenopodium ambrosioides L.*							Y			
60	*Chonemorpha fragrans*										
	(Moon) Alston			Y							Ornamental
61	*Chrysopogon gryllus (L.)*										
	Trin. Subsp echinulatus										
	(Nees) Cope				Y						Roof thatching
62	*Cinnamomum tamala*										
	(Buch.- Ham) T. Nees &										
	Eberm.		Y		Y						Condiment
63	*Cissampelos pareira L. var.*										
	hirsuta							Y			
64	*Citrus medica L.*							Y		Y	
65	*Cleome viscosa L.*										Seeds in Curries
66	*Clerodendrum serratum (L.) Moon.*						Y		Y		

S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
67	*Coix lacryma- jobi L.*			Y							
68	*Colebrookea oppositifolia Smith*							Y			
69	*Commelina benghalensis L.*				Y					Y	Leaves, Tender Shoots
70	*Cordia dichotoma Frost.f.*			Y				Y		Y	
71	*Coriaria nepalensis Wallich*			Y							
72	*Corylus colurna*									Y	Nuts
73	*Cotoneaster baccilaris*		Y				Y				
74	*Cupressus torulosa*								Y		
75	*Cynodon dactylon (L.) Pers.*				Y						
76	*Dalbergia sissoo Roxb. ex DC.*		Y			Y	Y			Y	
77	*Datura metel L.*							Y			
78	*Debregeasia velutina*				Y	Y					
79	*Delbergia sissoo*								Y		
80	*Dendrocalamus strictus*				Y					Y	Tender shoots
81	*Desmodium tilaefolium*		Y				Y				Charcoal for blacksmithy; Staking runner beans
82	*Dicranopteris linearis (Burm.) Underw var. subferruginea*			Y							
83	*Didymocarpus pedicellata R. Br.*							Y			

S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
84	*Dioscorea alata*									Y	Tubers
85	*Dioscorea bulbifera L.*							Y		Y	
86	*Diploknema butyracea (Roxb.) Lam.*	Y		Y	Y	Y	Y	Y			Edible oil
87	*Drymaria diandra Blume*				Y			Y			
88	*Duchesnea indica (Andr.) Focke*							Y		Y	
89	*Eclipta prostrata (L.) L.*							Y			Used in Hair oil
90	*Ehretia laevis Roxb.*				Y	Y					
91	*Elaeagnus umbellata*									Y	Berries
92	*Embelica officinalis*							Y		Y	Fruits
93	*Engelhardtia Spicata Leschen. ex Blume*					Y					Bark used as Tan, Leaves as Fish poison
94	*Ephedra gerardiana*							Y			
95	*Erythrina suberosa Roxb.*	Y		Y		Y		Y			
96	*Eulaliopsis binata (Retz.) Hubb.*			Y	Y						
97	*Eulophia pratensis*									Y	Tubers
98	*Fagopyrum esculentum*									Y	Leaves, Seeds
99	*Ficus benghalensis L.*										Cultural
100	*Ficus cunia*				Y						
101	*Ficus microphylla*									Y	Fruit
102	*Ficus nerifolii*				Y						

S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
103	*Ficus palmata Forssk.*				Y	Y				Y	Fruits
104	*Ficus religiosa L.*							Y			Sacred tree
105	*Ficus roxburghii*				Y						
106	*Fraxinus micrantha*	Y							Y		
107	*Gardenia turgida*							Y		Y	Leaves, Young Shoots
108	*Glochidon velutinum*				Y	Y					
109	*Grewia optiva J.R. Dsrumm. Ex Burrett*	Y		Y	Y				Y		
110	*Heliotropium strigosum Willd.*							Y			
111	*Hippophae rhamanoides*									Y	Fruit for Pickles
112	*Holboellia latifolia*									Y	Fruits
113	*Hydrocotyle rotundifolia DC.*							Y			
114	*Ichnocarpus frutescens (L.) R.Br.*			Y				Y			
115	*Ilex excelsa*				Y	Y					
116	*Impatiens balsamina L.*							Y			Seed oil for curing wood
117	*Indigofera heterentha Wallich ex Brandis*				Y					Y	
118	*Ipomoea nil (L.) Roth*							Y			
119	*Jasminum grandiflorum L.*										Ornamental
120	*Jatropha curcas L.*							Y			Seed Oil and Fencing

S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
121	*Juglans regia*		Y						Y	Y	Nuts
122	*Lactuca dissecta D.Don*				Y					Y	
123	*Lannea coromandelica (Houtt.) Merr.*	Y				Y	Y		Y		Paper pulp
124	*Leea asiatica (L.) Ridsdale*									Y	
125	*Litsea monopetala (Roxb.) Pers.*				Y	Y		Y			
126	*Lygodium japonicum (Thunb.) Sw.*							Y			
127	*Macaranga pustulata King ex Hook.f.*					Y					Wood used for fencing huts
128	*Machilus sp.*					Y			Y		
129	*Maesa montana A.DC.*							Y		Y	Fruits as fish poison
130	*Mallotus philippensis (Lam.) Muell.- Arg.*			Y		Y	Y		Y		
131	*Martynia annua L.*							Y			
132	*Mazus pumilus (Burm.f.) Steenis*							Y			
133	*Medicago lupulina L.*				Y						Green manure
134	*Meliosoma pungens*		Y				Y				
135	*Melothria heterophylla (Lour.) Cogn.*								Y		
136	*Michelia kisopa*					Y					

S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
137	*Micromeria biflora (Buch.- Ham.ex D. Don) Benth*							Y			
138	*Millettia extensa (Benth) Benth. Ex Baker*				Y	Y	Y		Y		Leaves as fish poison
139	*Mirabilis jalapa L.*			Y					Y		
140	*Morchella Sp.*									Y	Whole Mushroom (Vegetable)
141	*Morus alba L.*				Y	Y		Y		Y	
142	*Morus serrata Roxb.*		Y			Y				Y	Fruits
143	*Mucuna nigricans (Lour.) Steud.*							Y			
144	*Mucuna pruriens (L.) DC.*							Y		Y	
145	*Murraya koenigii (L.) Spreng.*									Y	Leaves for flavouring curries
146	*Myrica esculenta Buch.- Ham. ex. D. Don.*		Y					Y		Y	
147	*Nasturtium officinale R.Br.*									Y	
148	*Neolitsea pallans*					Y			Y		
149	*Nepeta hindostana (Heyne ex Roth) Haines*							Y			
150	*Nephrolepis cordifolia (L.) Presl.*									Y	
151	*Onychium siliculosum (Desv.) C. Chr.*							Y			

S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
152	*Opuntia monocantha (Willd.) Haw.*									Y	
153	*Origanum vulgare L.*							Y			
154	*Osyris wightiana Wallich ex Wight*							Y			Leaves as substitute for tea
155	*Ougeinia oojenensis (Roxb.) Hochr*	Y			Y	Y			Y		
156	*Peperomia tetraphylla (Forst.f.) Hook.f. & Arn.*							Y			
157	*Perilla frutensens (L.) Britt.*									Y	Edible oil from seeds
158	*Phoenix humilis Royle ex Becc. & Hook.f.*								Y		Fruit
159	*Phyllanthus emblica L.*			Y		Y		Y		Y	
160	*Physalis minima L.*									Y	
161	*Phytolacca acinosa*									Y	Leaves (vegetables)
162	*Pieris roxburghii*					Y					
163	*Pinus roxburghii Sargent*	Y				Y	Y	Y	Y	Y	
164	*Pistacia khinjuk Stocks*				Y	Y		Y			
165	*Plantago erosa Wallich*							Y			
166	*Pleurospermum angelicoides*							Y		Y	Roots; Spice
167	*Poa annua L.*				Y						
168	*Polygonum barbatum L.*		Y					Y			Leaves used in curries
169	*Porana paniculata Roxb.*										Ornamental

S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
170	*Portulaca oleracea L.*							Y		Y	
171	*Pothos cathcarti Schott*							Y			
172	*Pouzolzia zeylanica (L.) Bannet*							Y			
173	*Prinsepia utilis Royla*									Y	Edible oil; Root for charcoal
174	*Prunus cerasoides D.Don*									Y	Walking sticks
175	*Prunus cornuta*	Y				Y			Y		Fruit
176	*Prunus nepalnesis*			Y					Y		Fruits
177	*Prunus puddum*				Y	Y					
178	*Prunus undulata*	Y			Y						
179	*Pueraria tuberosa (Roxb. ex Willd.) DC.*								Y		
180	*Pyracantha crenulata (D. Don) M. Roem.*	Y				Y			Y		Fruits
181	*Pyrus pashia Buch.-Ham. ex D.Don*	Y				Y			Y		Walking sticks, Staking for runner beans
182	*Quercus dilatata*				Y	Y			Y		Roof beams
183	*Quercus glacua Thunb.*	Y			Y	Y			Y		Charcoal
184	*Quercus leucotrichophora A.Camus*	Y			Y	Y					Charcoal

S. No.	Name	Uses									
		Agricu tural imple-ments	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medi cinal	Timber	Wild edibles	Other uses/ Part Use
185	*Quercus semecarpifolia*				Y	Y			Y		
186	*Ranunculus arvensis L.*							Y			
187	*Ranunculus muricatus L.*							Y			
188	*Ranunculus sceleratus L.*							Y			
189	*Reinwardtia indica Dumort.*							Y			
190	*Remusativa vivipara (Roxb.) Schott*							Y			
191	*Rhamnus triqueter (Wallich) Brandis*	Y	Y					Y			
192	*Rheum emodi*		Y						Y		Roots
193	*Rhododendron arboreum*	Y				Y		Y			Making bee log hives, Flowers
194	*Rhus parviflora Roxb.*							Y		Y	Dried leaves as tobacco
195	*Ribes alpestre*									Y	Fruits
196	*Ricinus communis L.*							Y			Castor oil from seeds
197	*Rosa brunonii Lindl.*										Perfume from flowers
198	*Rosa macrophylla*									Y	Fruits
199	*Rubia manjith Roxb. Ex Flem.*		Y					Y			
200	*Rubus ellipticus Smith*									Y	
201	*Rubus lanatus*									Y	Fruit

S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
202	*Rubus niveus Thunb.*									Y	
203	*Rubus paniculatus*									Y	Fruit
204	*Rumex dentatus L.*		Y					Y			
205	*Rumex hastatus D.Don.*									Y	
206	*Rumex nepalensis Spreng.*							Y			
207	*Sapindus mukrossi*		Y								Seeds in Soap Making
208	*Sapium insigne (Royle) Benth ex Hook.f.*										Leaves and stems as poison
209	*Sapium sebiferum Roxb.*					Y					Oil wax
210	*Sarcococa saligna (D.Don) Muell.-Arg.*							Y			
211	*Saurauia napulensis DC.*				Y	Y				Y	
212	*Shorea Robusta Roxb. ex Gaertn.f.*	Y			Y	Y	Y	Y	Y		
213	*Sida acuta Burm.f.*							Y			
214	*Sida cordifolia L.*	Y				Y					
215	*Sinarundinaria falcata (Nees) Chao & Renvoize*	Y			Y	Y					Stems for making baskets
216	*Solanum erianthum D. Don*							Y		Y	
217	*Solanum nigrum L.*							Y		Y	

S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
218	*Solanum surattense Burm.f.*							Y			
219	*Solanum viarum Dunal*							Y			
220	*Stephania glabra (Roxb.) Miers*							Y			
221	*Sterculia villosa Roxb. ex Smith*			Y	Y	Y	Y		Y		
222	*Symplocos chinensis*					Y					
223	*Syzygium cumini (L.) Skeels*	Y	Y			Y		Y	Y	Y	Fruits
224	*Tabernaemontana divaricata (L.) R.Br.*		Y								Ornamental
225	*Taraxacum officinale Web*				Y						
226	*Taxus baccata*							Y	Y	Y	Bark in tea making
227	*Terminalia alata Heyne ex Roth*	Y	Y		Y	Y		Y			
228	*Terminalia bellirica (Gaertn.) Roxb.*		Y		Y	Y		Y	Y		
229	*Terminalia chebula*				Y				Y	Y	Fruit
230	*Thysanolaena maxima (Roxb.) Kuntze*			Y							Soft brooms
231	*Tinospora cordifolia (Willd.) Hook.f. & Thoms.*							Y			
232	*Toona ciliata M. Roem.*		Y			Y			Y		
233	*Toona serrata*	Y				Y			Y		

S. No.	Name	Uses									
		Agricultural implements	Dye & Tans	Fibre & Flosses	Fodder	Fuel	Gums & Resins	Medicinal	Timber	Wild edibles	Other uses/ Part Use
234	*Trichosanthes cucumerina L.*							Y			
235	*Trichosanthes dioica*							Y		Y	Fruit
236	*Tridax procumbens L.*							Y			
237	*Urtica dioica L.*							Y		Y	Tender Leaves
238	*Vanda testacea (Lindl.) Reichb.f.*							Y			
239	*Verbascum thapsus L.*							Y			
240	*Viburnum cotinifolium*	Y									
241	*Viola canesens Wallich*							Y			
242	*Viscum album L.*							Y			
243	*Vitex negundo L.*							Y			Stems for baskets
244	*Wallichia densiflora Mart.*				Y					Y	
245	*Woodfordia fruticosa (L.) kurz*		Y		Y	Y	Y	Y		Y	Flowers
246	*Wrightia tomentosa (Roxb.) Roem.& Schult.*		Y					Y			
247	*Xeromphis spinosa (Thunb.) Keay*							Y			Fruits as soap
248	*Zanthoxylum armatum DC.*	Y						Y			Used as spice, Dried seeds powder as tooth powder

A BIODIVERSITY LOG AND STRATEGY IN OT DOCUMENT

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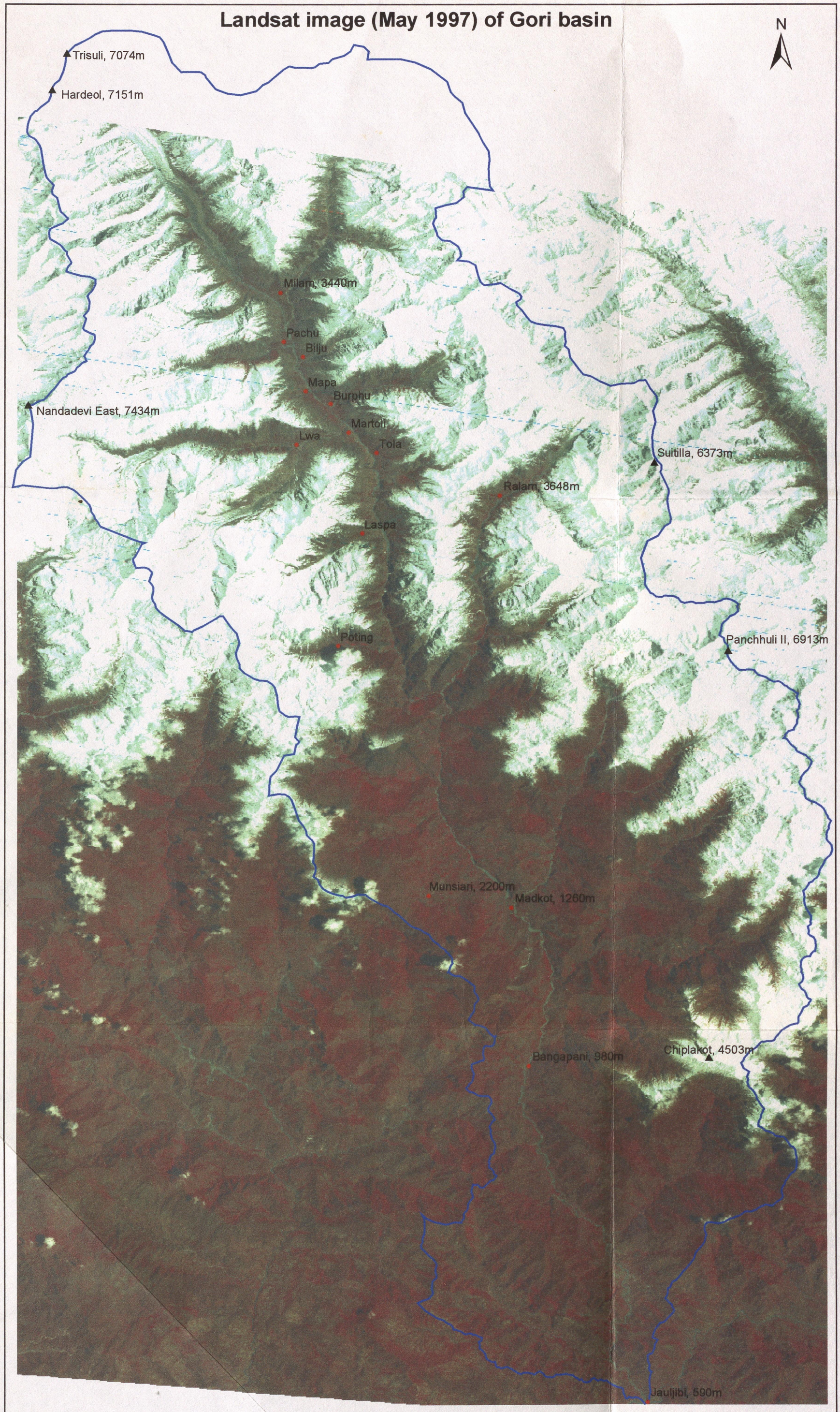
Landsat image (May 1997) of Gori basin



VAN PANCHAYAT AND RESERVED FOREST AREAS OF GORI RIVER BASIN, PITHORAGARH DISTRICT, UTTARANCHAL

TIBET

CHAMOLI DISTRICT

Darma Basin

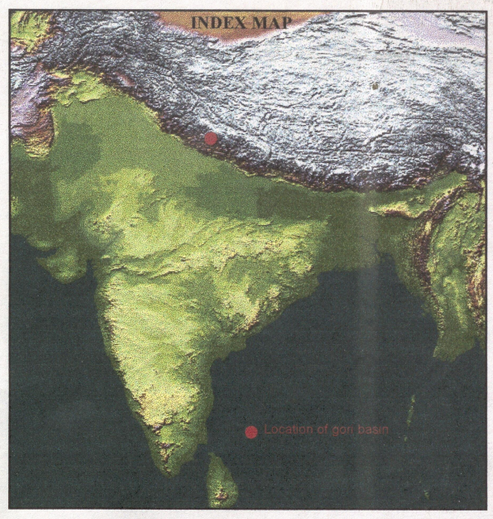
NEPAL

Milam Van Panchayat (outside Gori Basin)
Total Area - 405 sq. km.

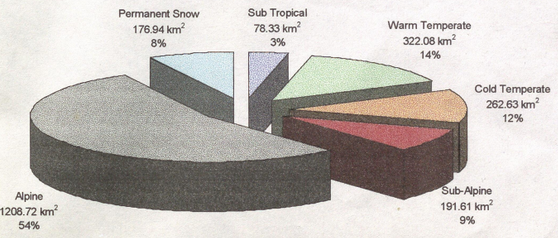
Chalab, 6160 · Kholi, 5712 · Trisuli, 7074 · Hardeol, 7151 · Unta Dhura, 5377 · Darcho, 6145 · Nanda Gond, 6315 · Nital Thaur, 6236 · Shangchu, 5961 · Mangron, 6565 · Deo Damia, 6632 · Bamchhu, 6302 · Syakaram, 6258 · Latu Dhura, 6389 · Milam, 3440m · Panchu Dhura, 4800 · Panchu · Ganaghar · Bilju · Mapa · Burphu · Mapa Dhura, 5296 · Nanda Lapak, 5782 · Nandadevi East, 7434 · Martoli · Lawan · Tola · Martoli Dhura, 4586 · Shamjang Dhura, 4520 · Rilkot · Sumtu · Khilanch · Kuchela Dhura, 6250 · Shalia Dhura, 5287 · Nanda Kot, 6861 · Laspa · Shalang Dhura, 5653 · Laspa Dhura, 4500 · Bankatiya, 5643 · Laspa Dhura, 5895 · Dang Thyal, 6050 · Poting · Plansang, 4965 · Silwa Dhura · Jumia RF · Athansi RF · Jimia RF · Khalia RF · Madkani RF · Khalia Danda, 3747 · Munsiari, 2200m · Madkot, 1260m · Golfa RF · Hum RF · Thamri, 3185 · Bangapani, 980m · Thakla RF · Khatpatia Dhura, 2533 · Jaljibi, 620m

Kalganga Dhura, 6215 · Bamba Dhura, 6334 · Chiring We, 6559 · Suli Top, 6300 · Burphu Dhura, 6145 · Nichu Dhura, 4966 · Suitilla, 6373 · Ralam, 3648m · Shipu/ Ralam pass · Tithutia, 5252 · Shipu, 5255 · Gelding, 5029 · Rajrambha, 6531 · Panchhuli I, 6390 · Panchhuli II, 6913 · Panchhuli III, 6312 · Panchhuli IV, 6334 · Panchhuli V, 6437 · Halsyun, 5120 · Bainti, 6072 · Ngangling, 6041 · Sapa Dhura, 4202 · Nagni Dhura, 5032 · Dhundhar, 4532 · Nagni Dhura, 3097 · Kauliban, 3244 · Umsi, 3455 · Dharatidhura Pass, 3435 · Guindhura Pass, 3905 · Maram Chula, 3433 · Baljori, 3855 · Thalpakharka, 3265 · Sitapanikharka, 2603 · Chiplakot, 4503 · Najurdhar Pass, 4365 · Daphia Dhura, 2569 · Nagni, 3808 · Nari Dhura, 2904 · Deopa, 2318 · Ghan Dhura, 2501 · Sunasam, 2203 · Jarpani RF · Ghandhura east RF · Ghandhura west RF · Majtham RF · Dhaphiadhura RF · Sirtham RF · Payan RF · Askot, 1639

Rivers: Timphu Gad · Pachhu Gad · Bilju Gad · Burphu Gad · Martoli Gad · Lwa Gad · Tola Badi Gad · Sumtu Gad · Laspa Gad · Poting Gad · Jajalkhola Gad · Pitli Gad · Pehal Gad · Kuti Gad · Rata Gad · Senar Gad · Bhiliangad · Thamri Gad · Rekda Gad · Gangarura R · Ghungar Gad · Jaunli Gad · Jara Gad · Gadsa Gad · Bhar Gad · Meshkal R. · Meher Gad · Kuthiya Gad · Chhina Gad · Bheri Gad · Malyadhaur Gdn. · Kutka Gantera · Jimba Gadhera · Pantsi Gad · Rodi Gad · Shilpani Gad · Rachla Gad · Balati Gadhera · Pyunshani Gad · Kalabaland Gl. · Burphu Gl. · Sankalpa Gl. · Yamchar Gl. · Tringi Gl. · Goankha Gl. · Rata Gl. · Bamlas Gl. · Ikualari Gl. · Billanlari Gl. · Surajkund Gl. · Milam Gl. · Mangron Gl. · Pachhmi Bamchhu Gl. · Syakaram Gl. · Timphu Gl. · Pachhu Gl. · Nanda Ghungti Gl. · Lwa Gl. · Shalang Gl. · Laspa Gl. · Poting Gl. · Uttari Balati Gl. · Dakhni Balati Gl. · Panchchuli Gl. · Bainti Gl. · Rula Gl. · Kulka Gl. · Jimba Gl. · Kwalgang Gl.



Lifezone distribution



VAN PANCHAYAT AREA
(Refer to VP ID for location on map)

VP ID	VP Name	Area(in ha.)	VP ID	VP Name	Area(in ha.)	VP ID	VP Name	Area(in ha.)
1	Milam	44215.30	46	Telkot	3.78	93	Dharnigaon	492.31
1	Milam (Towards Girthi ganga)	40508.00	47	Papri 1	148.89	94	Dakhim	81.65
2	Bilju	1611.10	48	Papri 2	41.76	95	Bangapani	96.20
3	Ganghar	1729.21	49	Reetha	5.09	96	Jara-Jibuli	1275.11
4	Mapa	813.28	50	Harkot	792.45	97	Lumti	100.87
5	Burphu	6461.01	51	Matena	141.30	98	Maitoli	205.11
6	Tola	1287.30	52	Malupati	18.05	99	Gogai	20.25
7	Sumdu	2421.80	53	Chauna	96.92	100	Kanar	71.14
8	Khilanch	2198.58	54	Madkot	75.64	101	Kanar-Tejam	625.05
9	Lwa	11685.60	55	Dobri-Narki	19.83	102	Baram	16.26
10	Martoli	5501.22	56	Waiga	23.08	103	Sanghaltar	71.94
11	Rilkot	649.20	57	Chulkot	9.03	104	Kauli	289.74
12	Laspa	4902.69	58	Ringu	80.11	105	Toli	225.34
13	Laspa Darti	391.51	59	Athansi Lagga Ringu	251.61	106	Imkhola 1	169.21
14	Poting	5689.77	60	Khata	95.89	107	Imkhola 2	6.31
15	Saibhat	671.62	61	Gaila Khata	76.36	108	Payan-Pauri	59.84
16	Polu	379.16	62	Gaila Talla	13.42	109	Ghatkuna	141.08
17	Jimia	669.37	63	Gaila Malla	13.45	110	Basaura	54.18
17	jimia (Towards Jakhula Nala)	682.69	64	Patharkot	36.54	111	Balmara	78.78
18	Kwiri	1663.76	65	Dolma	85.95	112	Tham	82.33
19	Kwiri-Jimia	668.02	66	Walthi Rapti Bata	207.87	113	Garali	297.10
20	Ralam	26021.50	67	Golma Kotalgaon	56.34	114	Jamtari	153.33
21	Paton	2006.95	68	Kanalka	26.99	115	Bazarkuta (Marura)	58.67
22	Buin	119.78	69	Imla	151.39	116	Khetar Kanyal (Kirauli)	311.80
23	Kultham	179.71	70	Josha	576.51	117	Dunakot	107.48
24	Ugrali - Phalayanti	172.74	71	Dunamani	874.94	118	Boragaon	36.47
25	Uchhaiti	18.86	72	Alam	89.32	119	Raitoli	29.94
26	Dhilam	145.37	73	Bata	115.46	120	Baigaon	25.57
27	Dhuratoli	41.50	74	Umdanda	90.69	121	Airi-Barnagaon	43.45
28	Phapa	65.69	75	Nirtoli	105.12	122	Mahargari	39.08
29	Bhatkura	12.81	76	Tanga	140.64	123	Panthalali	54.10
30	Bothi	35.35	77	Bindi	80.74	124	Sirtoli	91.15
31	Basantkot	65.63	78	Tomik	1149.89	125	Hunra	167.23
32	Dhapa	193.04	79	Bauna	2070.42	126	Banku	228.20
33	Suring	91.51	80	Golpha	2210.31	127	Khetar Bhandari (Sera)	171.29
34	Suring Ladi Pyangti	509.42	81	Pharvakot	349.93	128	Dhaniakhan	211.92
35	Shankh Dhura	88.08	82	Lodhi	370.10	129	Pamsiari	80.60
36	Sarmoli-Jainti	36.31	83	Sirtola	314.48	130	Kaini (Hat Kaini)	134.10
37	Jalath	45.97	84	Sera	69.98	131	Merthi	8.58
38	Darkot	80.72	85	Khartoli	663.34	132	Nakot Sainipatal	37.42
39	Talla Dummar	70.63	86	Shiling	465.60	133	Dewal	194.35
40	Ranthi-Charkham	14.30	87	Shiling-Khartoli	278.91	134	Kholiyagaon	38.52
41	Ghorpatta	139.88	88	Darma	300.82	135	Khariyani	133.25
42	Ghorpatta Malla	18.26	89	Mani Dhami Basani	116.47	136	Darti	80.85
43	Sevila	5.84	90	Mawani Dawani	17.18	137	Jogura	42.52
44	Kaithi	11.10	91	Mankot gharuri	202.43			
45	Teli	5.95	92	Madarma	143.90			

RESERVED FOREST AREA OF GORI WATERSHED

Sl. No.	RF NAME	Area (in ha.)
1	Athansi RF	1819.79
2	Madkani RF	1276.20
3	Jimia RF	353.17
4	Khalia RF	1962.01
5	Golfa RF	1413.88
7	Hum RF	696.81
9	Thakla RF	198.86
10	Dhaphiadhura RF	2967.15
11	Ghandhura east RF	3358.60
12	Majtham RF	2686.74
13	Ghandhura west RF	1888.40
14	Jarpani RF	14.29
15	Payan RF	490.61
17	Sirtham RF	407.67

Legend

Elevation (Meters)
- Above 5500
- 5000 - 5500
- 4500 - 5000
- 4000 - 4500
- 3500 - 4000
- 3000 - 3500
- 2500 - 3000
- 2000 - 2500
- 1500 - 2000
- 1000 - 1500
- 587 - 1000

- Van Panchayat Boundary
- Reserved Forest Boundary
- Place
- Peak (Height in Meters)
- River
- Pass

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