sequence. The algorithm is designed in such a way that the user can upload a single protein sequence or all the protein sequences of a particular gene. The present study reveals that the three-dimensional structures are similar in all three similar sequence repeats identified in a particular protein structure. In order to understand better the sequence–structure relationship, a detailed data-mining study is planned to identify and correlate similar sequence repeats and their three-dimensional structures in all 90% non-homologous protein structures. Such a study would be of use to structural biologists and those who are interested in molecular modelling. In addition, we plan to construct an integrated knowledgebase of similar sequence repeats available in various sequence databases (SWISS-PROT, PIR and Genome database).

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Comparative studies on species richness, diversity and composition of *Anogeissus latifolius* mixed forests in Phakot and Pathri Rao watersheds of Garhwal Himalaya

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The floral diversity is fascinating because of species richness and diverse community structure. Species richness, diversity and composition of plant species were examined in *Anogeissus latifolius* mixed forests of Pathri Rao and Phakot watersheds in Garhwal Himalaya. Both the watersheds have their own diverse characteristics. A part of Pathri Rao is fully protected as it is part of Rajaji National Park situated in the Siwalik Forest Division, whereas forests in Phakot watershed are reserve forests. Various land-use categories such as cultivated land, scrubland and orchards under fruit trees are available within Phakot watershed.

In this study, a total of 87 species were recorded in Pathri Rao among which 27 were trees, 21 shrubs and 39 herbs whereas a total of 92 species, with 24 trees, 23 shrubs and 45 herbs were present in Phakot watershed. The tree species richness was slightly higher in Pathri Rao whereas shrub and herb diversity was higher in Phakot watershed. Poaceae and Fabaceae were found to be the dominant families in Pathri Rao whereas Poaceae and Asteraceae were the dominant families in Phakot watershed. The study revealed that distribution and species richness pattern in Phakot and Pathri Rao watersheds were more or less similar.

Keywords: *Anogeissus latifolius*, biodiversity, Himalayan watersheds, species richness.

HIGH biodiversity favours ecological stability, whereas accelerating species-loss could lead to collapse of the ecosystem. Biodiversity is essential for human survival and economic well-being and for the ecosystem function and stability[1]. Human domination of earth's ecosystem, which is markedly reducing the diversity of species in many habitats worldwide is also accelerating species extinction[2]. The Himalaya embodies diverse and characteristic vegetation distributed over a wide range of topographical variations. Himalayan watersheds are under constant threat of mass wasting and erosion caused by depletion of forest cover, unscientific agronomic practices, and degradation of land which have created an overall adverse impact, disturbance and imbalance in the ecosystem. It is to be emphasized that 70–80% of the hill population

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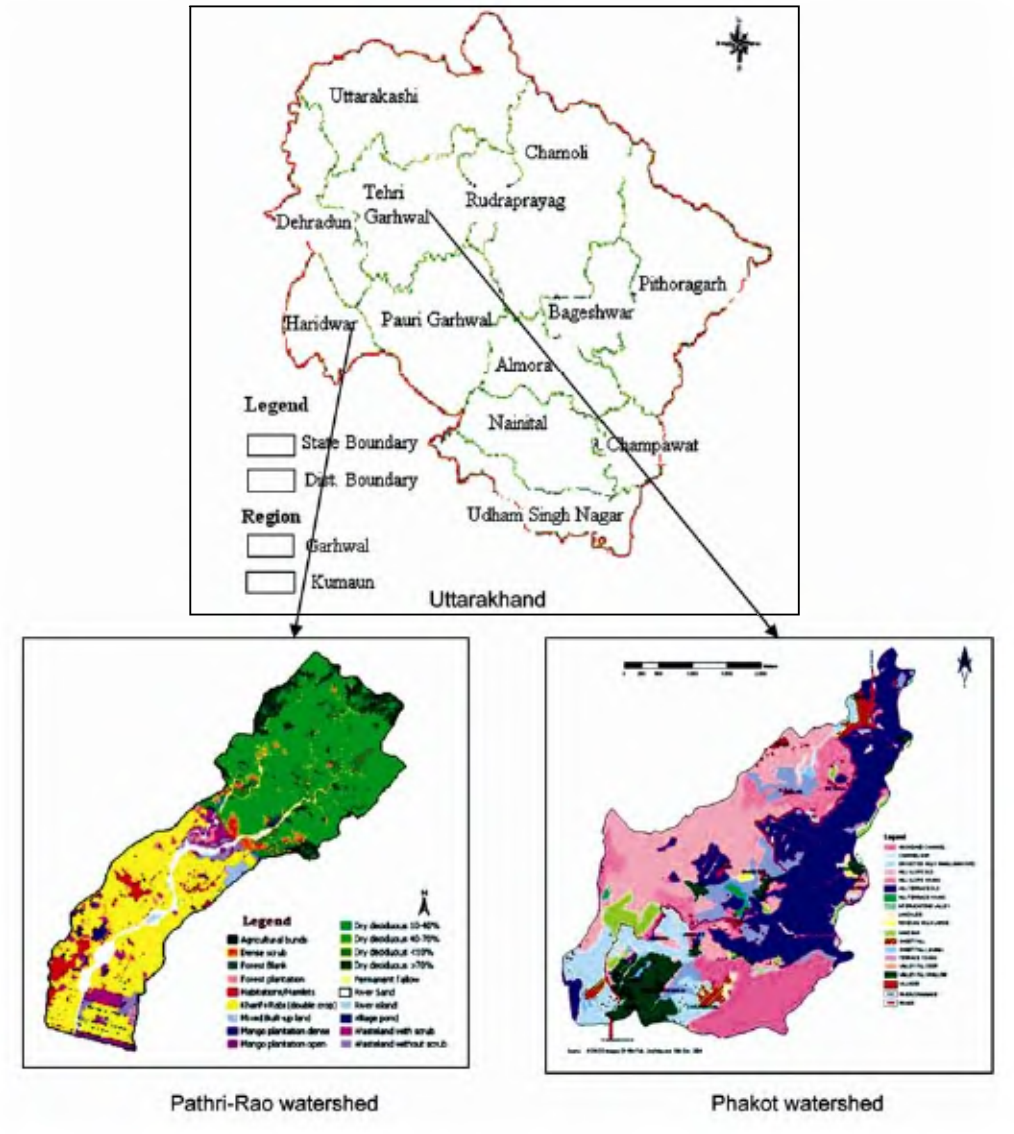

Figure 1. Map of study area.

depends on land resources for livelihood. Forests play a vital role in Himalayan watersheds where the economic structure and social organizations are built around the primary relationship with natural resources[3]. Therefore, the study of watersheds for proper management is of paramount importance. Watershed approach in the Himalayan region has been widely used in understanding land improvement measures[4]. However, the development has not achieved the desired pace due to lack of information at the watershed level. Determining the quantity of natural resources and its planned use for sustainable development is an important aspect for present and future days. If natural ecosystems and their functions are to be kept in equilibrium condition, then there is a need to have correct assessment of natural resource availability. The species composition of an area changes over time. It is also known that forest cover affects the pattern, quantity and quality of water discharge from watershed. For proper management of a forest, a study on forest inventory is the first requirement. Hence, an attempt has been made to compare the vegetation parameters and estimate the tree, shrub and herb diversity, composition and species richness of *Anogeissus latifolius* mixed forests of Pathri Rao and Phakot watersheds.

The study was conducted in two watersheds namely: Phakot in Tehri district and Pathri Rao in Haridwar district of Garhwal Himalaya, Uttarakhand during 2005–2006 (Figure 1). Phakot watershed represents Central Himalayan mountains and covers an area of 1466 ha with elevation ranging from 600 to 2000 m asl but *A. latifolius* forest lies between 600 and 1100 m asl. In Phakot watershed, various land use categories such as cultivated land, scrubland and orchards under fruit trees are available. Pathri Rao watershed represents lower Shiwalik hills and

Table 1. Tree species and their corresponding families in the study area

Species	Family	Pathri Rao	Phakot
Acacia catechu (L.f.) Willd	Mimosaceae	–	+
Acacia farnesiana (L.) Willd	Mimosaceae	–	+
Adina cordifolia (Roxb.) Hook. F.ex Brandis	Rubiaceae	–	+
Aegle marmelos (L.) Correa	Rutaceae	+	–
Ailanthus excelsa (Roxb.)	Simaroubaceae	+	–
Albizia lebbeck (L.) Benth	Mimosaceae	+	–
Anogeissus latifolius (DC) Richard	Combretaceae	+	+
Bauhinia malabarica Roxb.	Cesalpiniaceae	+	–
Bauhinia semla Wunderlin	Cesalpiniaceae	–	–
Bauhinia variegata L.	Cesalpiniaceae	+	–
Bombax ceiba L.	Bombacaceae	+	–
Casearia elliptica Willd	Flacourtiaceae	+	–
Careya arborea Roxb.	Barringtoniaceae	+	–
Cassia fistula L.	Caesalpiniaceae	+	+
Cassine glauca (Rottboell) Kuntze	Celastraceae	+	–
Cordia dichotoma Forster f.	Ehretiaceae	+	–
Diospyros montana Roxb.	Ebenaceae	–	+
Ehretia laevis Roxb.	Ehretiaceae	+	–
Engelhardtia spicata Leschenault ex Blume	Juglandaceae	–	+
Eucalyptus tereticornis Smith	Myrtaceae	+	–
Erythrina variegata L.	Fabaceae	–	+
Flacourtia indica (Burm.f.) Merrill	Flacourtiaceae	–	+
Grewia asiatica L.	Tiliaceae	–	+
Grewia serrulata DC	Tiliaceae	+	–
Holarrhena pubescens (Buch-Ham.) Wallich ex G. Don	Apocynaceae	+	–
Holoptelea integrifolia (Roxb.) Planchon	Ulmaceae	+	–
Lannea coromandelica (Houttuyn) Merrill	Anacardiaceae	+	+
Litsea monopetala (Roxb.) Persoon	Lauraceae	–	+
Macaranga pustulata King ex Hook.f.	Euphorbiaceae	–	+
Mallotus philippensis (Lam.) muell.	Euphorbiaceae	+	+
Moringa oleifera Lam.	Moringaceae	–	+
Olea glandulifera Wallich ex G. Don.	Oleaceae	–	+
Ougeinia oojeinensis (Roxb.) Hochreutiner	Fabaceae	+	+
Pinus roxburghii Sargent	Pinaceae	+	–
Rhamnus triqueter (Wallich) Lawson.	Rhamnaceae	–	+
Sapium insigne (Royle) Benth. Ex Trimen	Euphorbiaceae	–	+
Schleichera oleosa Willd	Sapindaceae	+	–
Shorea robusta Roxb. Ex gaertner f.	Dipterocarpaceae	+	+
Syzygium cumini (L.) Skeels		+	+
Terminalia alata Heyne ex Roth	Combretaceae	+	+
Terminalia bellirica (Gaertner) Roxb.	Combretaceae	+	+
Terminalia chebula Retz	Combretaceae	–	+
Ziziphus mauritiana Lam.	Rhamnaceae	+	–

covers an area of 4391 ha, with elevation ranging from 300 to 700 m. A part of it is protected forest and lies in Rajaji National Park. Physiographically, both areas are characterized by hillocks, escarpments, flat basins and flat topped ridges.

Stratified random sampling method was used for collecting the vegetation data. The vegetation was analysed by laying quadrats and the size of the quadrats was determined by species area curve[5]. Seventy-six sample plots were studied for both the watersheds. Data on trees were analysed in 10 × 10 m plots, shrubs in 3 × 3 m plots nested within 10 × 10 m plots and herb species in 1 × 1 m plots. Vegetation data were quantitatively analysed for density, frequency and abundance using standard methodologies[5–7]. Different diversity indices were computed by using biodiversity pro (verse) software[8].

Mixed forests of both the watersheds are dry-deciduous but the phytosociological characters differ because of their different aspects and positions. In both the watersheds, *A. latifolius* was the dominant tree species followed by *Mallotus philippensis*, *Acacia catechu*, *Lannea coromandelica* and *Shorea robusta*. In case of shrub species, *Maurya koenigii* was found dominant, followed by *Lantana camara* in Phakot. Among herbs, *Chrysopogon fulvus* was dominant in both the watersheds followed by *Cassia tora* in Pathri Rao and *Apluda mutica* in Phakot.

A total of 179 species were recorded, of which 27 trees, 21 shrubs and 39 herbs were present in Pathri Rao

Table 2. Shrub species and their corresponding families in the study area

Species	Family	Pathri Rao	Phakot
Adhatoda zeylanica Medikus	Acanthaceae	+	+
Artemisia roxburghiana Wallich ex Besser	Asteraceae	–	+
Asparagus racemosus Willd	Liliaceae	+	+
Bauhinia vahlii Wight & Arn.	Caesalpiniaceae	–	+
Barleria cristata L.	Acanthaceae	+	–
Boehmeria platyphylla D.Don	Urticaceae	–	+
Carissa congesta Wight	Apocynaceae	+	–
Carissa opaca Stapf ex Haines	Apocynaceae	+	+
Cajanus scarabaeoides (L.) du Petit Thouars	Fabaceae	+	–
Catunaregam uliginosa (Retz. Sivarajan)	Rubiaceae	+	–
Colebrookia oppositifolia J.E. Smith	Lamiaceae	+	+
Cryptolepis buchananii Roemer & Schultes	Asclepidaceae	–	+
Eupatorium adenophorum Sprengel	Asteraceae	–	+
Flemingia fruticulosa Wallich ex Benth	Fabaceae	+	–
Helicteres isora L.	Sterculiaceae	+	–
Holmskioldia sanguinea Retz	Verbenaceae	–	+
Lantana camara L.	Verbenaceae	+	+
Milletia extensa (Benth.) Baker	Fabaceae	–	+
Murraya koenigii (L.) Sprengel	Rutaceae	+	+
Naringi crenulata (Roxb.) Nicolson	Rutaceae	+	–
Nyctanthus arbor-tristis L.	Oleaceae	–	+
Premna barbata Wallich ex Schauer	Verbenaceae	+	+
Prinsepia utilis Royle	Rosaceae	–	+
Pteracanthus angustifrons (C.B. Clarke)	Acanthaceae	–	+
Rhus parviflora Roxb.	Anacardiaceae	–	+
Sida acuta Burm. f.	Malvaceae	+	–
Sida cordifolia L.	Malvaceae	–	+
Smilax aspera L.	Smilacaceae	+	+
Spermadictyon sauveolens Roxb.	Rubiaceae	–	+
Tephrosia purpurea var. pumila Baker	Fabaceae	+	–
Thespesia lampas (Cav.) Dalzell & Gibson	Malvaceae	+	–
Woodfordia fruticosa (L.) Kurz	Lythraceae	+	+
Ziziphus oenoplia (L.) Miller	Rhamnaceae	+	+
Ziziphus nummulari Burm. f. Wight & Arn	Rhamnaceae	+	–

Table 3. Herb species and their corresponding families in the study area

Species	Family	Pathri Rao	Phakot
Achyranthes aspera L.	Amaranthaceae	+	+
Aerva sanguinolenta (L.) Blume	Amaranthaceae	+	+
Ageratum conyzoides L.	Asteraceae	+	–
Anaphalis adnata Wallich ex DC	Asteraceae	–	+
Andropogon munroi C.B. Clarkei	Poaceae	–	+
Apluda mutica L.	Poaceae	–	+
Artemisia capillaries Thumb	Asteraceae	–	+
Aster peduncularis Wallich ex Nees	Asteraceae	–	+
Brachiaria ramosa (L.) Stapf	Poaceae	+	–
Brachiaria villosa (Lam.) A. Camus	Poaceae	–	+
Bidens biternata (Lour.) Merrill & Sherff	Asteraceae	–	+
Bidens pilosa L.	Asteraceae	–	+
Boerhavia diffusa L.	Nyctaginaceae	–	+
Boerhavia pusilla (Wallich) DC	Rubiaceae	+	–
Bothriochloa bladhii (Retz.) Blake	Poaceae	+	–
Cajanus mollis (Benth) Van der Maessen	Fabaceae	+	–
Cassia tora L.	Caesalpiniaceae	+	–
Chloris dolichostachya Lagasca	Poaceae	+	–
Chenopodium album L.	Chenopodiaceae	–	+
Chrysopogon fulvus (Sprengel) Chiovenda	Poaceae	+	+
Circium wallichii DC	Asteraceae	+	–
Circium verutum (D. Don) Sprengel	Asteraceae	+	–

(*Contd.*)

Table 3. (*Contd.*)

Species	Family	Pathri Rao	Phakot
Cissampelos pareira L.	Menispermaceae	–	+
Crotalaria albida Heyne ex Roth	Fabaceae	+	–
Crotalaria calycina Schrank	Fabaceae	+	–
Crotalaria medicaginea Lam	Fabaceae	–	+
Crotalaria juncea L.	Fabaceae	–	+
Cynodon arcuatus J.S. Persl ex C.B. Presl	Poaceae	+	–
Cynodon dactylon (L.) Persoon	Poaceae	+	+
Cyperus niveus Retz	Cyperaceae	–	+
Cyperus pangorie Rottboell	Cyperaceae	+	–
Desmodium triflorum (L.) DC	Fabaceae	–	+
Dioscorea pubera Blume	Dioscoreaceae	+	–
Eragrostis atrovirens (Desffontaines) Trinius ex Steudel	Poaceae	+	–
Eragrostis tenella (L.) P. Bea ex Roe & Schultes	Poaceae	+	–
Eriophorum comosum Wallich ex Nees	Cyperaceae	+	+
Eulaliopsis binata (Retz.) Hubbard	Poaceae	+	–
Euphorbia hirata L.	Euphorbiaceae	–	+
Evolvulus nummularius (L) L.	Convolvulaceae	+	–
Filago hurdwarica (Wallich ex DC)	Asteraceae	–	+
Fimbristylis bisumbellata (Retz.) Link	Cyperaceae	–	+
Gerbera gossypina (Royle) G. Beauv	Asteraceae	–	+
Hemarthrina compressa (L.f.) R. Br	Poaceae	+	–
Heteropogon contortus L.	Poaceae	+	–
Heteropogon melanocarpus (Elliott) Benth	Poaceae	–	+
Imperata cylindrica (L) P. Beauv	Poaceae	–	+
Ipomoea hederifolia L.	Convolvulaceae	–	+
Justicia quinqueangularis Koenig ex Roxb	Acanthaceae	–	+
Leucas lanata Benth	Laminaceae	–	+
Leucas mollisssima Wallich ex Benth	Laminaceae	–	+
Lindenbergia indica (L.)	Scrophullariaceae	–	+
Mimosa pudica L.	Mimosaceae	–	+
Nepeta hindostana (Roth) Haines	Laminaceae	+	–
Oplismenus burmanii (Retz) P. Beauv	Poaceae	+	–
Oplismenus compositus (L.) P. Beauv	Poaceae	–	+
Origanum vulgare L.	Lamiaceae	+	–
Oxalis corniculata L.	Oxalidaceae	+	+
Parthenium hysterophorus L.	Asteraceae	+	+
Peperomia pellucida (L.) Kunth	Piperaceae	+	–
Perilla frutescens (L.) Britton	Lamiaceae	–	+
Phyla nodiflora (L.) Greene	Verbenaceae	+	–
Portulaca oleracca L.	Portulaceae	–	+
Pogonatherum crinitum (Thumb.) Kunth	Poaceae	+	–
Potentillia supine L.	Rosaceae	–	+
Rosularia adenotricha (Wallich ex Edgew.)	Crassulaceae	+	–
Rosularia rosulata (Edgew.) Ohba	Crassulaceae	–	+
Rungia pectinata (L.) Nees	Acanthaceae	+	–
Saccharum bengalensis Retz	Poaceae	+	+
Saccharum spontaneum L.	Poaceae	+	+
Salvia nubicola Wallich ex Sweet	Lamiaceae	–	+
Scutellaria scandens Buch-ham. Ex D.Don	Lamiaceae	–	+
Sida cordata (Burm.f.) Borss. Waalk	Malvaceae	+	–
Setaria barbata (Lam.) Kunth	Poaceae	+	–
Sonchus aspera (L.) Hill	Asteraceae	–	+
Stellaria media (L.) Villars	Caryophyllaceae	–	+

and 24 trees, 23 shrubs and 45 herbs were present in Phakot watershed. However, only 30 species were found common in both watersheds. A total of 50 families were recorded in both the watersheds, out of which 28 families were common, 12 families were exclusively present in Phakot and 11 families only in Pathri Rao. A total of 80 genera were found in *Anogeissus* mixed forests of Pathri Rao and 78 genera in Phakot watershed. The tree species richness was slightly higher in Pathri Rao whereas shrub and herb richness was higher in Phakot watershed (Tables 1–3). Overall richness was higher in Phakot watershed (Tables 4–6).

Table 4. Family-wise contribution of two watersheds to genera and species

Family	Pathri Rao Genus	Pathri Rao Species	Phakot Genus	Phakot Species
Acanthaceae	3	3	2	2
Amaranthaceae	2	2	2	2
Anacardiaceae	1	1	3	3
Apocynaceae	2	2	1	1
Asclepidaceae	0	0	1	1
Asteraceae	3	4	10	11
Baringtoniaceae	1	1	0	0
Basellaceae	0	0	1	1
Bombacaceae	1	1	0	0
Caesalpiniaceae	1	2	2	2
Caryophyllaceae	0	0	1	1
Celastraceae	1	1	0	0
Chenopodiaceae	0	0	1	1
Combretaceae	3	5	5	5
Convolvulaceae	1	1	1	1
Crassulaceae	2	2	1	1
Cyperaceae	3	3	2	2
Dioscoreaceae	1	1	0	0
Ehretiaceae	2	2	0	0
Euphorbiaceae	2	2	3	3
Fabaceae	6	7	4	5
Flacourtiaceae	1	1	0	0
Geraniaceae	1	1	1	1
Hippocastanaceae	1	1	0	0
Lamiaceae	3	3	6	5
Liliaceae	1	1	1	1
Lythraceae	1	1	1	1
Malvaceae	2	2	1	1
Meliaceae	1	1	0	0
Menispermaceae	1	1	1	1
Mimosaceae	2	2	3	3
Moringaceae	0	0	1	1
Myricaceae	0	0	1	1
Myrtaceae	1	1	1	1
Nyctanginaceae	1	1	1	1
Oleaceae	0	0	2	2
Pinaceae	1	1	0	0
Piperaceae	1	1	0	0
Poaceae	15	18	7	9
Rhamnaceae	2	2	3	3
Rosaceae	0	0	1	1
Rubiaceae	2	2	1	1
Rutaceae	3	3	1	1
Scrophulariaceae	0	0	1	1
Smilaceae	1	1	1	1
Sterculiaceae	1	1	0	0
Symploacaceae	0	0	1	1
Theaceae	1	1	1	1
Tiliaceae	1	1	1	1
Ulmaceae	1	1	0	0

Table 5. Ratio of species, genus and family

Forest	Genus: species	Family: species	Family: genus
Pathri Rao Forest	1.10	2.21	2.00
Phakot Forest	1.01	2.04	2.02

Table 6. Species richness in Phakot and Pathri Rao watersheds

Forest types	Species richness (no. of species) Tree	Shrub	Herb	Total
Pathri Rao Forest	27	21	39	87
Phakot Forest	24	23	45	92

Table 7. Diversity indices for Pathri Rao and Phakot watersheds

Index	Tree Pathri Rao	Tree Phakot	Shrubs Pathri Rao	Shrubs Phakot	Herbs Pathri Rao	Herbs Phakot
Shannon J	0.77	0.74	0.76	0.67	0.76	0.81
Simpsons	0.13	0.13	0.16	0.18	0.10	0.07
Berger Parker	0.31	0.21	0.31	0.29	0.21	0.14

The best represented families in these forests were Poaceae (22 species), Asteraceae (14 species), Fabaceae (11 species), Laminaceae, Combretaceae (7 species each), Rhamnaceae (6 species), Cyperaceae, Acanthaceae, Mimosaceae, Crassulaceae, Rubiaceae, Rutaceae, Anacardiaceae, Malvaceae (3 species each), Convolvulaceae, Apocynaceae, Oleaceae, Ehretiaceae, Tiliaceae (2 species each) and the rest of the families were represented by one species each (Tables 1–4).

Highest Shannon diversity for trees was recorded for Pathri Rao (0.77). Shannon diversity for shrubs was also highest for Pathri Rao (0.76) but herb diversity was highest (0.81) for Phakot watershed. Saxena and Singh[9] have recorded diversity (0.74–3.10) for shrub layer in Kumaun Himalaya. Simpson index for trees was similar for both watersheds. Knight[10] reported an average Simpson's index value of 0.06 for tropical forests. For shrubs, Simpson's index was higher for Phakot watershed. Berger Parker values of tree, shrub and herb were highest for Pathri Rao watershed (Table 7).

The proportions of family to species (2.21) and genera to species (1.10) were higher in Pathri Rao watershed whereas the proportion of family to genera (2.02) was higher in Phakot watershed (Table 5).

Both the watersheds form the same type of forest, i.e. *Anogeissus latifolius* mixed forests. Species richness was determined as the number of species per unit area. Higher species richness for tree was recorded in Pathri Rao and for shrubs in Phakot watershed. Herb richness was highest for Phakot watershed. The distribution of plant species in both the watersheds depends largely on altitude and climatic variables like temperature and rainfall, which are the determinants of the species richness. Although Fabaceae and Asteraceae were the dominant families in Pathri Rao and Phakot watersheds respectively, Poaceae was co-dominant in both the watersheds. The distribution and richness pattern in

Phakot and Pathri Rao watersheds were more or less similar.

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Petrology and geochemistry of Proterozoic olivine tholeiite intrusives from the Central Crystallines of the western Arunachal Himalaya, India: evidence for a depleted mantle

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A number of plugs and dykes of mafic rocks are encountered between Se La and Jung areas of the Central Crystalline rocks of western Arunanchal Himalaya. These mafic intrusives are emplaced within the Paleoproterozoic high to medium grade schists and gneisses of Se La Group. These mafic rocks are metamorphosed and composed of hornblende (~70%) and plagioclase showing granoblastic texture. Geochemically they show olivine tholeiitic characteristics. Appreciable amount of normative hypersthene and olivine is present in all samples. The geochemistry of high-field strength (+ rare-earth) elements suggests that these mafic rocks are co-genetic and derived from olivine tholeiite melt generated from a depleted lherzolite mantle source. These mafic rocks show very close geochemical similarities with mafic rocks reported from the western Himalaya. The satellite imageries suggest that these mafic intrusive rocks are exposed at intersection of major lineaments. The association of these mafic rocks with major lineaments, mostly fault planes, advocates that these originally deep seated intrusions have been upthrown and exposed along the fault planes.

Keywords: Arunachal Himalaya, depleted mantle, geochemistry, Kameng, mafic rocks, olivine tholeiite, Proterozoic.

EASTERN parts of the Himalaya – particularly western Arunachal Himalaya, i.e. West Kameng region and Tawang – are geologically least studied in comparison to other parts of the Himalaya. Although the Geological Survey of India has done geological mapping work, very little published work is available[1–4]. Most of these work present geological framework of the western Arunachal Himalaya with little information about the mafic magmatic rocks[5]. Limited petrological and geochemical data on mafic rocks from the Higher Himalayan Central Crystallines is available. Only few occurrences of depleted mantle derived mafic magmatic rocks emplaced within the Higher Himalayan Central Crystallines are reported from Vaikrita[6] and Bhagirathi–Yamuna valleys[7,8] of the western Himalaya. Thus, detailed study on such rocks in a Precambrian terrain may play an important role in understanding crustal evolution. In this communication, we report new occurrences of Proterozoic olivine tholeiitic mafic intrusive rocks emplaced within the Palaeoproterozoic Se La Group Central Crystallines and present preliminary results on their field-setting, petrology and geochemistry.

The study area lies north of the Main Central Thrust (MCT) and forms a part of Higher Himalayan Metamorphic Belt (Figure 1 *b*). Rocks of the area represent the Central Crystallines in the western Arunachal Himalaya where they have been designated as Se La Group[3,4] of early Palaeoproterozoic age. The Se La Group in the study area is represented by high-grade schists and gneisses of the Galensiniak Formation and metasediments including graphite-bearing schists of the Taliha Formation[4]. During the present investigation, many mafic intrusive rocks were observed from the Central Crystalline rocks, particularly exposed between Se La and Jung areas (Figure 1). These mafic rocks mainly occur as small plugs (~10–20 m radius). Few small dykes (~100–200 m in length and 2–5 m in width) are also encountered. These

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