DHOTREY MEDICINAL PLANTS CONSERVATION AREA (MPCA)

WEST BENGAL

Spatial Distribution Map of Dhotrey MPCA in West Bengal

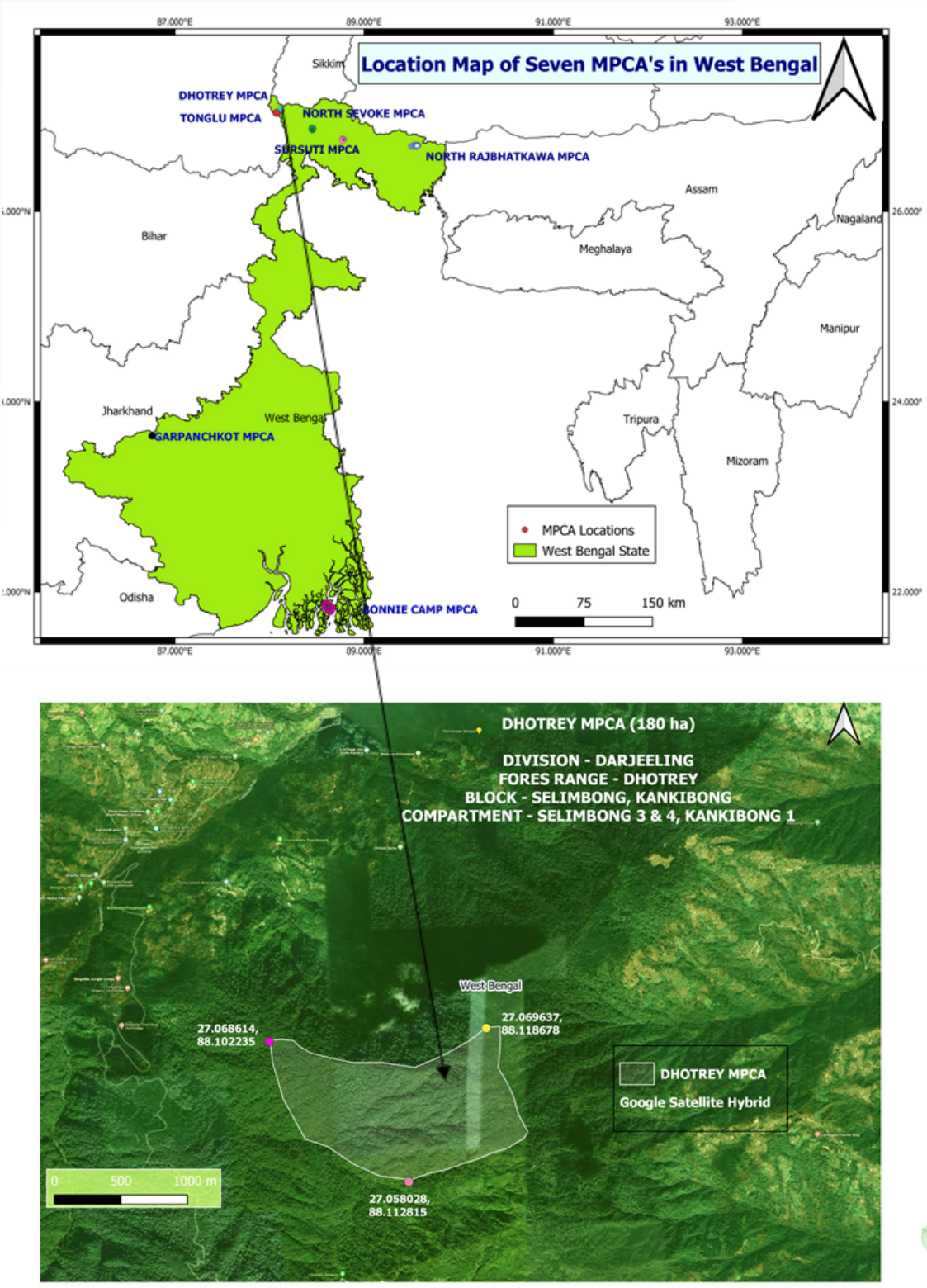


Fig. No.1: Spatial distribution Map of Dhotrey demarcating the area under the MPCA.

MPCAs as an inventive tool for Forest Biodiversity Conservation in West Bengal

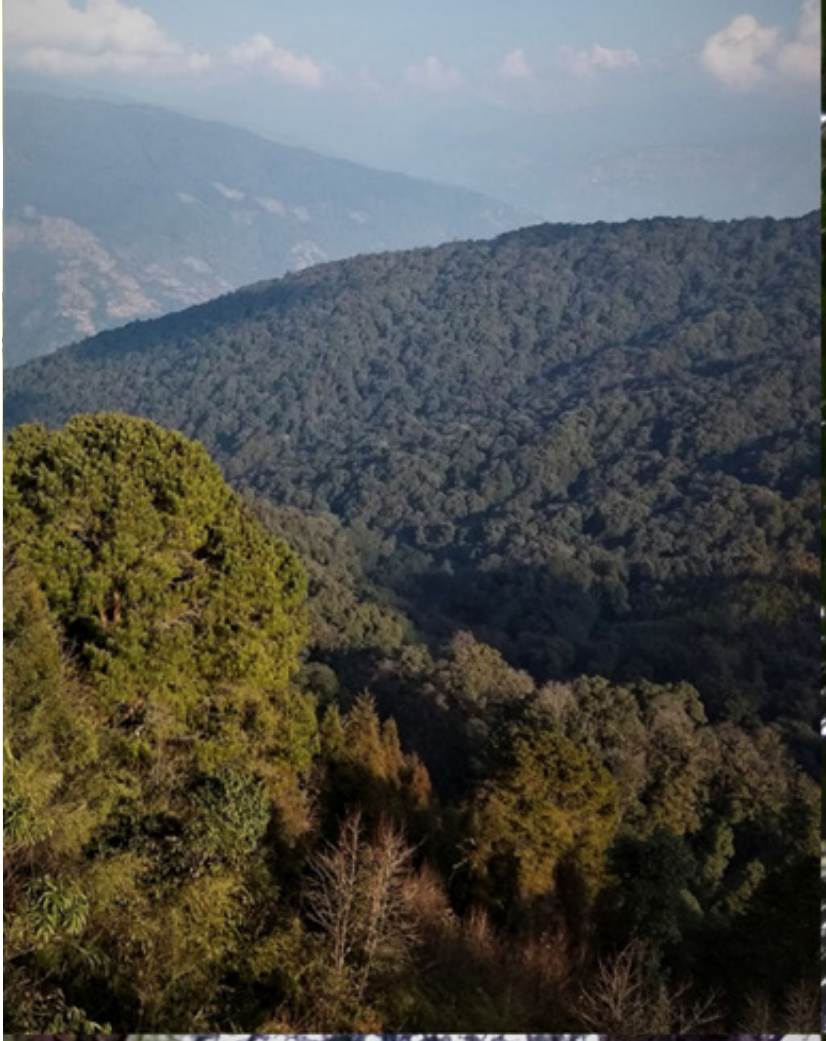
The state of West Bengal is blessed with varied phytogeography that allows it to host a diverse range of plants and animals. The state has 11, 879 sq. km of forested area of which 39.50% is under protected area network. In 2007-09, seven (7) Medicinal Plant Conservation Areas (MPCAs) were established in the State for promoting Conservation of Medicinal Plants and Traditional Knowledge for enhancing health and livelihood security of the surrounding indigenous communities. In the face of global warming and climate change the MPCA's can act as buffers for carbon sequestration, habitat protection, gene pool conservation, health and poverty issues and other ecosystem services. Each MPCA can act as a permanent plot for future assessments on impact of climate change on forest ecosystems. Awareness regarding the objectives and presence of the MPCA is of paramount importance to meet the Global Sustainable Development Goals (SDGs) of UN. A pictoral guide book of the medicinal plants of the MPCA's and their IUCN status is a prerequisite for facilitating the conservation initiatives of every MPCA.

Of the 7 MPCA's in the State of West Bengal; three were established in North Bengal, namely North Sevoke , Sursuti and North Rajabathkhawa; two in Darjeeling Hills namely Dhotrey and Tonglu MPCA and two in South Bengal namely Bonnie Camp in Sundarbans and Garpanchakot in Purulia.

The Dhotrey MPCA has an area of 180 ha in the Dhotrey Forest Range of Selimbong, Kankibong Block of Darjeeling.

Table 1. Community, Phytogeographic, Climatic, Edaphic and Administrative profile of Dhotrey MPCA.

Community	
The people residing adjacent to the MPCA are mostly Nepali and Bengali communities.	The major livelihood sources are farming, animal husbandry, forest dept daily wage labour, small business, eco-tourism guide, teaching, government jobs
Phytogeography	
Lat- N 27^0 03' Long- E 88^0 04' Forest Type – As per Champion & Seth's Classification: 11B- Northern Montane Wet Temperate Forests	Dominant tree species (as per IVI values) *Quercus pachyphylla* *Magnolia campbellii* *Eurya japonica* *Rhododendron arboretum* *Symplocos cochinchinensis laurina* *Rhododendron barbatum* *Rhododendrom falconeri* *Quercus lamellosa* *Quercus thomsoniana*
Climatic Condition	
Temperature in oC Max – 21 Min – 8.7 Average Rainfall (mm) 3624.2 unit	Spring- January to February Summer- March-May Sout West Monsoon- June-September. Winter –October to January
Edaphic Condition	
Soils are sandly loam, Red and yellow podzolic soil.	
Administration	
The MPCA comes under Biodiversity and Wildlife Conservation and Preservation Working Circle.	This Working Circle coordinates research , extension, land use, soil conservation, planning and educational activity through specialized agencies and line departments.




The Dhotrey MPCA harbours 312 medicinal plants. About 5 plants of this group are under the IUCN threatened category. A large number of plants have been reported as rare in this MPCA (Table 2)

Table 2: Medicinal plants of conservation concern in Dhotrey MPCA.

Sl. No	Sc. Name	Family	Habit	Status
1	*Arisaema concinnum* Schott	Araceae	Herb	Rare
2	*Berberis thomsoniana* C.K.Schneid.	Berberidaceae	Shrub	Rare, Vulnerable
3	*Castanopsis hystrix* Miq.	Fagaceae	Tree	Rare
4	*Cinnamomum bejolghota* (Buch.-Ham.) Sweet	Lauraceae	Tree	Rare, Vulnerable
5	*Cynoglossum lanceolatum* Forssk.	Boraginaceae	Herb	Rare
6	*Elaeocarpus sikkimensis* Masters	Elaeocarpaceae	Tree	Rare
7	*Geranium donianum* Sweet	Geraniaceae	Herb	Rare
8	*Hedychium thyrsiforme* Sm.	Zingiberaceae	Herb	Rare
9	*Heracleum wallichii* DC.	Apiaceae	Herb	Rare
10	*Hydrocotyle himalaica* P.K.Mukh.	Araliaceae	Herb	Rare
11	*Hypericum hookerianum* Wight &Arn.	Hypericaceae	Shrub	Rare
12	*Ilex sikkimensis* Kurz	Aquifoliaceae	Tree	Rare
13	*Impatiens cathcartii* Hook.f.	Balsaminaceae	Herb	Rare
14	*Impatiens discolor* DC.	Balsaminaceae	Herb	Rare
15	*Lactuca decipiens* Hook.f. & Thomson ex C.B.Clarke	Asteraceae	Herb	Rare
16	*Lobelia seguinii* H.Lév. &Vaniot var. *doniana* (Skottsb.) Wimmer	Campanulaceae	Herb	Rare
17	*Magnolia doltsopa* (Buch.-Ham. ex DC.) Figlar	Magnoliaceae	Tree	Rare
18	*Mahonia japonica* (Thunb.) DC.	Berberidaceae	Shrub	Rare
19	*Maianthemum fuscum* (Wall.) La Frankie	Asparagaceae	Herb	Rare
20	*Panax pseudoginseng* Wall.	Araliaceae	Herb	Rare, critically endangered
21	*Piptanthus nepalensis* (Hook.) Sweet	Fabaceae	Tree	Rare
22	*Rhaphidophora glauca* (Wall.) Schott	Araceae	Climber	Rare
23	*Rhododendron falconeri* Hook.f.	Ericaceae	Tree	Rare
24	*Rubus rosifolius* Sm.	Rosaceae	Subshrub	Less common
25	*Strobilanthes pentastemonoides* (Nees) T. Anderson	Acanthaceae	Herb	Rare
26	*Swertia chirayita* Roxb. ex. Fl. Karst	Gentianaceae	Herb	Rare, critically endangered
27	*Symplocos lucida* (Thunb.) Zuccarini	Symplocaceae	Tree	Rare
28	*Synotis tetrantha* (DC.) C. Jeffrey &Y.L. Chen	Asteraceae	Herb	Rare
29	*Thunbergia lutea* T.Anderson	Acanthaceae	Climber	Rare
30	*Tripterospermum volubile (D. Don)* H. Hara	Gentianaceae	Climber	Rare

Rare (<50 plants), Less common (< 100 plants), Common (<500 plants), NR (Newly Recorded).

In Dhotrey MPCA there is a rich assemblage of many species of *Rhododendron* (5 species), *Rubus* (10 species , (Symplocos (5 species) and others. *Swertia chirayita* and *Panax pseudoginseng* that are in the IUCN critically endangered category are growing in small populations in the MPCA. The MPCA acts as a genepool for these species of high conservation concern. On the other hand *Taxus wallichiana* that is listed as critically endangered species in the IUCN Red Data book is commonly found with a good population of the species in the Dhorety MPCA.

The community adjacent to the Dhotrey MPCA collect fuelwood, fruits and medicinal plants from the areas adjoining the MPCA. The medicinal plants growing in the neighbourhood of the MPCA are used for treating ailments such as epilepsy, cancer, jaundice, diabetes, fever, joint pain, bone fracture, skin disease, arthritis, ulcer, stomach ailment and as food item (Table 3).

Table No. 3: Traditionally used medicinal plants in the neighbourhood of the Dhotrey MPCA.			
Botanical name	Local Name	Medicinal use	Local use/ traded
Abies densa	Chharreyasalla	Leaves powder in urinary infection, epilepsy	Locally used
Actinidia callosa	Thekiphal	Fruits used to prepare local drinks used for cough and cold; used against asthma and in dysentery; fruits eaten by Red panda	Locally used
Artemisia vulgaris	Tite pat	Leaves used in blood pressure; cough and cold; nose bleeding; as skin oil, nose bleeding, oil for joint pain	Locally used
Berberis aristata	Kesari	Leaves used in diabetic problem; barks used in jaundice	Locally used
Daphne bholua	Lokhoti	Barks used as decoction against constipation	Locally used
Evodia lunu-ankenda	Khanakpa	Bark used in kidney problem; fruits used in gastritis, cough, fever and body ache	Locally used
Hemiphragma heterophyllum	Kakmala	Roots and fruits in tonsillitis	Locally used
Heracleum wallichii	Chimphing	Roots used in diarrhoea; root paste in burn and skin damage	Locally used
Hydrocotyle asiatica	GolePatta/Atanijhar/ Gore thapray	Leaves in tonsillitis and sore throat	Locally used
Lyonia ovalifolia	Angeri	Leaves applied for skin disease and itching	Locally used
Nasturium officinale	Simrayo	Leaves boiled and given in T.B. and chest pain; in jaundice; leaf juice given in tuberculosis	Locally used
Oxalis acitocella	Chari Amilo	Leaves in dysentery	Locally used
Panax-pseudo ginseng	Salaney	Rhizome in good health and aphrodisiac	*Locally used, traded*
Potentilla polyphylla	Mulajhar	The plant roots used against urinary disorder; used in blood dysentery	Locally used
Pteris excelsa	Gaikhure Unew	Fruits given in bone fracture	Locally used
Rhododendron arboreum	Lali Gorus	Flowers used in removing fish bone stuck to the throat; used to prepare squash and local drinks	Locally used
Rubia manjith	Manjito	The tuber is used against bird flu and chicken disease	Locally used
Smilax elegans	Kukurdani	Roots used in cough, fever, body ache, joint pain; Leaves and flower eaten in gastritis, body pain; fruits in high altitude sickness and acidity	Locally used
Sorbus vestita	Tenga	Fruits used in respiratory problems; improves digestion	Locally used
Stephania hernandifolia	Tambarke	Whole plant used in fever	Locally used
Swertia chirayita	Chiroto	Plant used for stomach ailment.	Locally used
Taxus wallichiana	Dhangre Salla	Bark used in treating cancer, joint pain, decoction of leaves in body pain; decoction given in high blood pressure	Locally used
Zanthoxylum alatum	Boke Timur	Fruits used in headache and anti-gastritis; fruit is leech repellent	Locally used

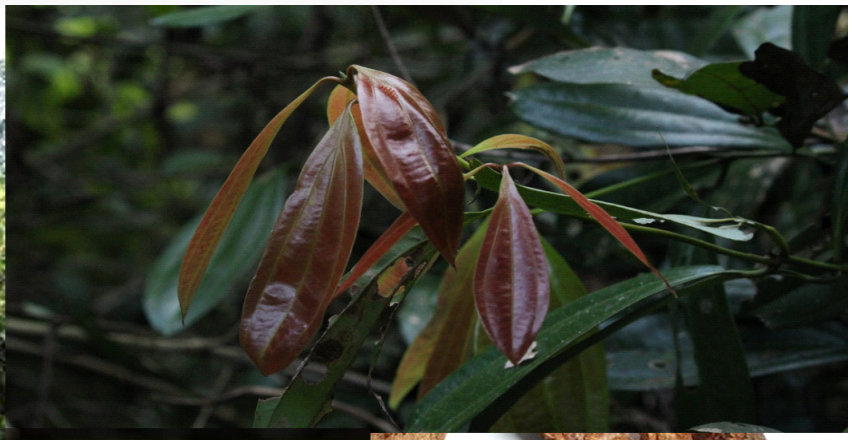
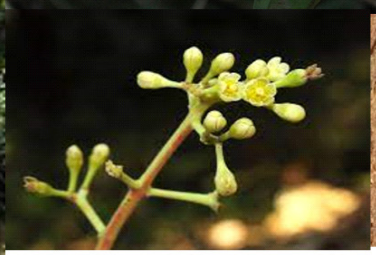
The plants that are in the critically endangered category such as *Swertia chirayita* and *Panax pseudoginseng* and *Taxus wallichiana* are also used locally and traded for their medicinal purposes. Awareness among the ground level workers of the forest department and the local community can help in the conservation of these species in the MPCA and its surrounding.

Swertia chirayita and *Panax pseudoginseng* that have rare occurrence in the MPCA along with other species with small population size require attention of all stake holders. The Dhotrey MPCA acts as a genepool for such endangered species. The Dhotrey MPCA could be the cradle of speciation of the genus *Rubus* with a large number of species. Alternate livelihood sources can be generated by the local people by creating home nurseries of such medicinal plants. Further value addition to medicinal plant part can reduce extraction pressure on the local biodiversity and also improve local economy. The MPCA can act as a major ecological and economic tool for the sustainable development of surrouding areas specially with respect to various ecosystem services.

Berberis aristata DC.

Common Name	Indian berberry, Daruharidra
Family	Berberidaceae
Habitat and Distribution	*B.aristata* is found in the temperate and sub-tropical regions of Asia, Europe, and America. It is native to the Himalayas in India and in Nepal. It is also naturally found in the wet zone of Sri Lanka.
Ecology:	*B.aristata* grows usually in relatively open areas in a community having an association of *Daphnae papyraceae, Rubus spp, Rhododendron griffithi, Eurya japonica, Symplocos glomerata, Yushania maling* etc,
Threat status	Vulnerable (VU) in West Bengal
Description	This is an erect spiny shrub, ranging between 2 to 3 m in height. It is a woody plant, with bark that appears yellow to brown from the outside and deep yellow from the inside. The bark is covered with three-branched thorns. The leaves are arranged in tufts of five to eight and are approximately 4.9 cm long and 1.8 cm broad; flowers are complete, bisexual, polysepalous, with 3 large and 3 small sepals, and polypetalous, with 6 petals in total and have 6 stamens, 5-6 mm long; berries are approximately 7 mm long, 4 mm in diameter.
Flowering and fruiting	The flowering starts in mid-March and lasts throughout the month of April.
Uses	The fruits are eaten often as a dessert. The roots are used for making an alcoholic drink. The plant as a whole is a good source of dye and tannin. It is used as an antibacterial, antiperiodic, antidiarrheal and anticancer and it is also used in the treatment of ophthalmic infections. Its stem, roots, and fruits are used in Ayurveda.
Trade information	1204MT roots traded per year.
Propagation and cultivation	Propagation by Seeds. In natural conditions, seeds are dispersed by gravitational dispersal mechanism, birds, other animals and by humans.

Cinnamomum bejolghota (Buch.-Ham.) Sweet


Common Name	Dalchini, Ramtejpat
Family	Lauraceae
Habitat and Distribution	India, Bangladesh, Cambodia, China South-Central, China Southeast, East Himalaya, Hainan, Laos, Myanmar, Nepal, Andaman and Nicobar, Thailand, Vietnam. It grows well in mountainous region with high humidity and rainfall.
Ecology:	They are partially shade tolerant, but matured trees grow well in full sunshine. Foragers include honeybees, butterflies, wasps, flies and ants visit flowers and helps in pollination.
Threat status	Vulnerable (VU) in West Bengal
Description	A small to large trees with aromatic bark and leaf. Branches opposite; the young ones smooth, and somewhat four-cornered; obtusely tetragonous, red-brown when dry , Buds small, ovoid; Leaves generally two at a node, glabrous, 20-30 cm long, very coriaceous elliptic-oblong obtuse acute or acuminate 3-nerved, nerves not impressed above; Panicles very large and stout and corymb; flowers greyish yellow, small, numerous, often crowned at the end of the panicle; stamens and ovary sparsely hairy or glabrous; fruits small 0.8 -1.2 cm long, ellipsoid or subglobose, succulent with rounded lobes, smooth when ripe, black, one celled, one seeded.
Flowering and fruiting	February to November
Uses	Bark is used in folk medicine in the treatment of inflammation and as antihelminthic and diuretic.; also used as condiments.
Trade information	Leaves and barks are locally used, and sold in the local market.
Propagation and cultivation	Propagated with seeds from ripe fruits and from cuttings; seeds are briefly viable;

Panax pseudoginseng Wall.

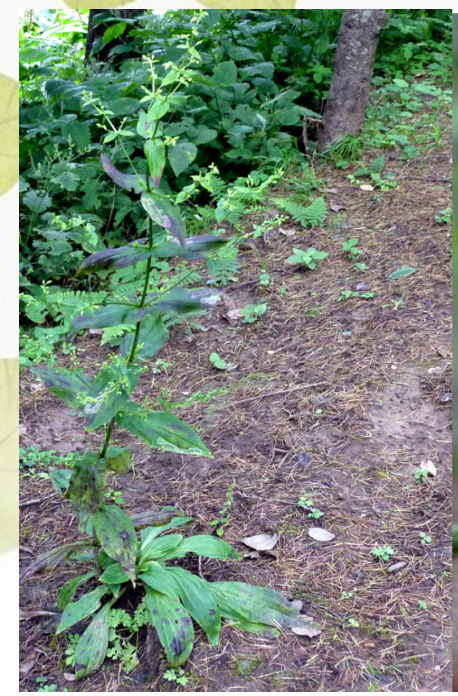
Common Name	Ginseng
Family	Araliaceae
Habitat and Distribution	Nepal, Bhutan, China. In India, this species is found in Himalayas, and N.E. India especially Sikkim, North of West Bengal, Arunachal Pradesh, Manipur and Meghalaya. In Western Himalaya, it is recorded from the Pithoragarh district in Uttarakhand.




Ecology:	It is found in the temperate mountainous regions;
Threat status	Critically Endangered (CR) in West Bengal
Description	It is a perennial erect herb growing up to 40-70 cm tall at a slow rate. Rootstock horizontal, tuberiferous. Leaves whorled at the apex; leaflets 3-5 , double toothed along margins. Flowers unisexual, fruits red and reddish black.
Flowering and fruiting	Flowering occurs during May to June
Uses	Leaves, fruits and flowers are used to make medicine however, roots and rhizome is used commonly; taken to stop nose bleeding, cough; used in case of anal fissures; it is used as **antioxidant and revitalizer.**
Trade information	The roots and rhizomes are collected and sold in the mandis (market in Siliguri).
Propagation and cultivation	Propagated with seeds but takes around 120-130 days for germination;

Swertia chirayita (Roxb. Ex Fleming.)H. Karst.

Common Name	Swertia chirayita (Roxb. Ex Fleming.)H. Karst
Family	Gentianaceae
Habitat and Distribution	India, Nepal, Bhutan; indigenous to the temperate Himalayas from Kashmir to Darjeeling to Arunachal Pradesh.
Ecology	The presence of nectaris supports cross pollination.
Threat status	Critically Endangered (CR) in West Bengal
Description	Annual and perennial herbs. It is an erect annual herb up to 1.2 m tall. Stems are profusely branching and cylindrical in lower and middle parts; leaves are simple broadly lance shaped about 10 cm long 3 cm broad, 5 nerved. Flowers are greenish yellow tinged with purple, borne on large panicle inflorescences; fruits are capsules, egg shape with many seeds.




Flowering and fruiting	August to September; Fruiting October to December
Uses	**Chronic fever, malaria**, anemia, bronchial asthma, hepatotoxic disorders, liver disorders, **hepatitis, gastritis, worms**, blood purification and diabetes are among the many medicinal uses.
Trade information	This is one of the highly traded medicinal plants having a domestic consumption of around 400-700 MT per year.
Propagation and cultivation	Propagated with seeds.

Taxus wallichiana Zucc.


Common Name	Yew, Talisapatra, Dhyangre Sallah
Family	Taxaceae
Habitat and Distribution	The Himalayan region and areas of Southeast Asia are home to this species; countries such as Afghanistan, India and Southwest China hourbours fair population.
Ecology:	Growing in montane, temperate, warm temperate, and tropical sub-montane to high montane forests that may be deciduous, evergreen, or of mixed character, the species prefers a fairly wide range of environments.
Threat status	Critically Endangered (CR) in West Bengal and Endangered (EN) Globally (G)
Description	It is a medium-sized evergreen coniferous tree that can reach a height of 10 meters; stem having dark reddish grey bark and profuse branching. Leaves are linear, 2-3 cm long 0.3 cm broad, flat, curves spine-tipped leathery dark glossy green. Male and female cones are usually borne on separate trees. Male cones are 5-6 mm long with empty bracts and the axis ending in a round cluster of stamens; female cones are solitary and axillary and each consisting of few imbricate scales.
Flowering and fruiting	Flowering March to April and seed ripens from September to November
Uses	*Taxus wallichiana* is used for making tea and used as antibacterial and antifungal. Taxol extracted from the leaves and barks widely used in the treatment of breast, ovarian and lung cancers. In Arunchal Pradesh, local people feed their cattle for better milk production.
Trade information	This is one of the highly traded medicinal plants of India. The estimated consumption rate is around 200 MT per year.
Propagation and cultivation	Vegetative propagation by stem cuttings; Seed germination is good in natural condition.

Zanthoxylum armatum DC.

Common Name	Timur, winged prickly ash, rattan pepper
Family	Rutaceae
Habitat and Distribution	It is found in Pakistan, Bhutan to Southeast Asia and up to Korea and Japan. In India it is found in Kashmir, West Bengal and throughout North East India.

Ecology:	The plant is visited by the bees and many other pollinators for collection of nectar.
Threat status	NE in West Bengal; Least Concern (LC) (G)
Description	This species is an aromatic, deciduous,woody climber, a spiny shrub growing to 3.5 metres in height; subsessile, opposite leaves of lanceolate, obovate or elliptic shape. Branchlets and leaves have prickles/spines. The rachis of the leaves is pubescent glabrous or rust-colored and has wings to 6 mm on each side; the anthers of the male flowers are yellow before anthesis; and the gynoecium of the female flowers is 1-3-carpelled. Fruit follicles are purplish-red, about 4-5mm in diameter, while the seeds are black and 3-4mm in size.
Flowering and fruiting	Flowering in March to April. Fruiting in June-September
Uses	The fruits are used as a condiment in curries. The fruits are said to be **astringent, digestive and stimulant**; paste made from the immature fruits is applied for toothache; leaves, stem, bark, fruits, seeds and roots are used in indigenous medicine preparation against various diseases like **asthma, bronchitis, indigestion, varicose veins, diarrhea.**
Trade information	Fruits are collected and sold in the local market.
Propagation and cultivation	Propagated with seeds and terminal stem cuttings.

Castanopsis hystrix Hook. & Thomson ex A. de Candolle, J. Bot.

Common Name	Indian Chest nut, Patle Katus, Chinkapin
Family	Fagaceae
Habitat and Distribution	The tree is found in subtropical broadleaved evergreen forests, ranging from the eastern Himalayas of Nepal, Bhutan, and northeastern India, across Indochina i.e. Cambodia, Laos, Myanmar, Thailand, Vietnam, southern China i.e. Fujian, Guangdong, Guangxi, Guizhou, Hainan, southwestern Hunan, southeastern Tibet, and southern Yunnan province, and Taiwan. It ranges up to 2400 meters elevation in the Himalayas, and up to 1600 meters elevation in southern China.
Ecology:	They grow well in medium (loamy) and heavy (clay) soils and prefer mildly acid and neutral soils. It can grow in semi-shade (light woodland) and prefers moist soil. The species is monoecious and is pollinated by wind and flies.
Threat status	Not Evaluated (NE)

Description	It is evergreen monoecious tree growing to 30 m having a broadly rounded crown. Young shoots purple brown; yellow brown small lamellate waxy scales like trichomes; leaves are lanceolate to obovate elliptic ; female inflorescence solitary in leaf axil , ca 15 cm , cupule globose, 2.5-4 cm in diam. Splitting in to 4 segments, base of some connate into bundles, nut one per cupule, broadly conical.
Flowering and fruiting	Flower from April to June, and the seeds ripen from October to November.
Uses	Wood- hard. Used for construction, fencing, fuel etc. leaves are collected for stall feeding of the cattle. Fruits /nuts roasted and eaten locally.
Trade information	Wood is collected and traded as fuel wood as well as timber for furniture;
Propagation and cultivation	Propagated with seeds.

Gaultheria hookeri C.B.Clarke

Common Name	Veitchiana
Family	Ericaceae
Habitat and Distribution	Eastern Nepal to South Central China
Ecology:	Occurs in subtropical rainforests (400 m elevation) to alpine meadows (4500m elevation).
Threat status	NE
Description	A low evergreen shrub forming a dense, rounded tuft, and spreading by underground stems but sometimes erect and up to 6 ft high; branchlets clothed with minute down, with which are intermixed long bristles. Leaves of hard texture, half as wide, oblong or slightly obovate, rounded or broadly tapered at the base, abruptly narrowed at the apex to a short glandular tip, shallowly toothed, the teeth often bristle-tipped, upper surface much wrinkled, dark glossy green, conspicuously net-veined, without down, lower surface at first furnished with bristles which partially fall away, leaving it harsh to the touch. Flowers densely packed in axillary racemes, 1 in. or more long, white.
Flowering and fruiting	Flowering June to August and fruiting September to October

Uses	Leaves are applied for **rheumatism and pain** relief
Trade information	Oil extracted and traded
Propagation and cultivation	Propagated with seeds and grows well in moist acidic soil

Heracleum wallichii DC.

Common Name	Chimping
Family	Apiaceae
Habitat and Distribution	Found in open slopes, 1800- 4100 meters. Distributed in Nepal to Bhutan range.
Ecology:	The plant is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for growth in light (sandy), medium (loamy) and heavy (clay) soils with mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil; the plant is self-fertile.
Threat status	NE
Description	It is a perennial growing plant. Pubescent, biennial or perennial herb, to 2 m tall; leaves oblong ovate in outline, pinnate; pinnae 5-7 , margin serrate; flowers in both terminal and lateral umbels, white creamy; fruits compressed, elliptic or sub-ovate
Flowering and fruiting	Flowering June-July and Fruiting August-September.
Uses	Seeds, fruits and roots are used in preparation of medicine. The root is **aphrodisiac and tonic**.
Trade information	The roots, seeds and fruits are collected and sold in the local market. Heracleum wallichii is mixed with other species such as *H. candolleanum, H. lanatum* and *H. rigens* and traded.
Propagation and cultivation	Propagated by seed during mid to late spring or early autumn..

Magnolia campbellii Hook.f. & Thomson

Common Name	Magnolia
Family	Magnoliaceae
Habitat and Distribution	This species grows well in the sheltered valley in the Himalayas; eastern Nepal, east to southwest China, south to northern Myanmar.
Ecology:	Pollination is entomophilous i.e., by insects. This species is domesticated as ornamental plant due to its breathtaking beautiful and fragrant flowers.
Threat status	Least Concern (LC) (G)
Description	*Magnolia campbelli* is a medium-sized to large deciduous tree growing to 30 m, rarely to 45 m tall, with smooth grey bark. Leaves simple, alternate, entire, up to 10-23 cm long and 4.5 to 10 cm broad; buds enclosed in large convolute stipules which are connate in pairs, where stipules are free or adnate from petiole; flowers are very large 15-25 cm diameter, with 12-16cm tepels which vary from white to dark pink. After opening, the innermost tepels remain erect while the other spread widely. Magnolia species flowers are complete, bisexual, i.e., with functional male (androecium) and female (gynoecium), including stamens, carpels and ovary.
Flowering and fruiting	February-October.
Uses	Cultivated as ornamental plant. Bark is used to treat **asthma, blood problems, headache.**
Trade information	This plant is propagated and sold in the plant nurseries.
Propagation and cultivation	Propagated by seeds sown in Autumn. Seed must go through the process of stratification in order to germinate.

Paris polyphylla Sm.

Common Name	Satuwa, Daiswa paris, Svetavaca,
Family	Liliaceae
Habitat and Distribution	Native to China, Taiwan, the Indian Subcontinent, and Indo-china.
Ecology:	It is a slow-growing perennial and thrives in green, wet soil in full or partial shade. It shows healthy growth as well as reproduction in undisturbed area with canopy covers over 80%. This plant grows well in in well drained rich humus soil in a community of many key associated species such as *Quercus sp, Taxus wallichiana, Aconitum* and *Smilax species*.
Threat status	Endangered (EN) in West Bengal; Vulnerable (VU) (G)
Description	This plant can reach a height of 90 cm and a width of 30 cm. It has a single whorl of leaves beneath a bloom with two whorls. It is a perennial herb of 10-60 cm tall; rootstock thick, creeping, Leaves in a whorl at the summit of stem, lance shaped, Flowers solitary in centre of leaf whorl , out tepals green ; inner ones yellow or purple green, Capsules 4-5 valved, yellow brown; Seeds scarlet, shining.
Flowering and fruiting	Flowering April to May and matured fruits and seeds in October to November.
Uses	rhizomes are used in **liver cancer,** in burns , cuts , diarrhea, dysentery, **fever and stomachache**; It is also utilised as a decorative plant in gardens under deciduous trees;
Trade information	It is one of the highly traded medicinal plants; dried rhizomes are sold as high as Rs 4000/ kg
Propagation and cultivation	Rate of seed germination is low in natural condition; propagated with seeds and vegetative propagation by rhizome cuttings.

Rubia cordifolia L.

Common Name	Manjistha, Manjit
Family	Rubiaceae
Habitat and Distribution	It grows throughout the hilly subtropical to sub-temperate regions of India, between 300 m and 2000 m altitudes and forests of Pakistan, China, Korea, Japan and Mongolia.
Ecology:	It prefers loamy soils with good moisture.
Threat status	NE
Description	It is a climber with 4 angled, sharp-edged branchlets; it can grow to 1.5 m in height. The evergreen leaves produced in whorls of 4-7 starlike around the central stem. It climbs with tiny hooks at the leaves and stems. The flowers are small (3–5 mm across), with five pale yellow petals, in dense racemes; fruits small (4–6 mm diameter) red to black berries. The roots can be over 1 m long, up to 12 mm thick.
Flowering and fruiting	Flowering during June to August and fruiting September to October
Uses	The red dye extracted from the *Rubia cordifolia* plant used as a textile dye. It is also used as a colourant, especially for paint. The roots of Rubia cordifolia are also the source of a medicine used in Ayurveda; bitter, antiseptic, styptic, anodyne, depurative, and hypotensive drug. The plant is also used against **blood dysentery, inflammations, and urino-genital disorders**.
Trade information	It is one of the highly traded medicinal plants and the consumption by the domestic herbal manufacturing company is around 450-550 MT per year.
Propagation and cultivation	The seeds are collected during December and January; propagated through seeds and two-node root cuttings; preferable to use seeds for large-scale cultivation, considering the cost factor and high rate of germination.

Zanthoxylum oxyphyllum Edgew.

Common Name	Prickly ash
Family	Rutaceae
Habitat and Distribution	It is found in Bhutan, NE India, Myanmar and Nepal. In India it is found in Uttar Pradesh, West Bengal, Sikkim , Manipur, Meghalaya and Arunachal Pradesh.
Ecology:	The plant is visited by the bees and many other pollinators for collection of nectar.
Threat status	NE
Description	A slender scrambling shrub or small tree which is highly aromatic. Prickles are usually hooked;old leaves subglabrous and 11-19-foliolate; leaflet blades alternate or opposite, lanceolate or rarely ovate, abaxially gray when dry, oil glands numerous, mid vein impressed adaxially, secondary veins anastomosing near margin, reticulate veinlets ridged when dry, base cuneate, margin serrulate, apex acuminate. Inflorescences terminal, cymose-corymbose, to 30-flowered. Perianth in 2 series. Sepals 4, purplish green; rudimentary gynoecium 2-4-parted, lobes linear in male flowers; fruits follicles purplish red, oil glands impressed when dry, apex beaked.
Flowering and fruiting	Flowering: April-May. Fruiting: August-September
Uses	Young shoots are cooked and used as a vegetable. The fruits are used as a condiment in curries. The fruits are said to be astringent, **digestive and stimulant**; paste made from the immature fruits is applied for toothache; the bark, especially the **root bark, is tonic and aromatic.** It is used in the treatment of rheumatism, dyspepsia, colic and fever.
Trade information	Fruits and leaves collected and sold in the local market.
Propagation and cultivation	Propagated with seeds and terminal stem cuttings.

UTILITY OF THIS PICTORIAL GUIDE

Dhotrey MPCA comes under the Darjeeling District which is bestowed with enormous gifts of nature. This whole area falls in the Eastern Himalayan region that makes it an important biodiversity rich zone. This unique ecosystem harbours the most important and magnificent forest having rich genepools of many threatened species. It has immense value with respect to various ecosystem services such as climate regulation, carbon sink, soil reclamation, water supply, nutrient cycling, pollination, recreation, aesthetic value and livelihood for many local communities.

This guide booklet will help one to know about the important plants, their global distribution, medicinal uses, issues related to various threats to these plants and the dependence of local communities on the forest resources such as food, fuelwood, fodder, medicines, honey and many other non-timber forest products (NTFPs).

This book also provides a glimpse of the MPCA in a nutshell. It will allow quick identification of important medicinal plants through their photographs for the field staff from the Forest Department. The list of threatened and less commonly occurring species provides a blue print to the Forest Department for short listing species of conservation concern. The list of traditionally used medicinal plants can promote the sharing of traditional medicinal knowledge among the younger generation of residents neighbouring the MPCA, as well as for researchers, foresters, traders and others. The list of dominant tree species according to their Importance Value Index (IVI) gives a fair idea of the structure and composition of the community and tree species in the MPCA. Finally, this guide book can create awareness regarding the importance of MPCA and facilitate informed Biodiversity Conservation action programs of West Bengal.

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Edited by Dr. Biswarupa Ghosh, Dr. Debabrata Saha, *ITSCEED*, Kolkata,
Compilation by Ms. Oindrila Ganguly, Ms. Dipika Jani, Ms. Niharika Das, *ITSCEED*, Kolkata

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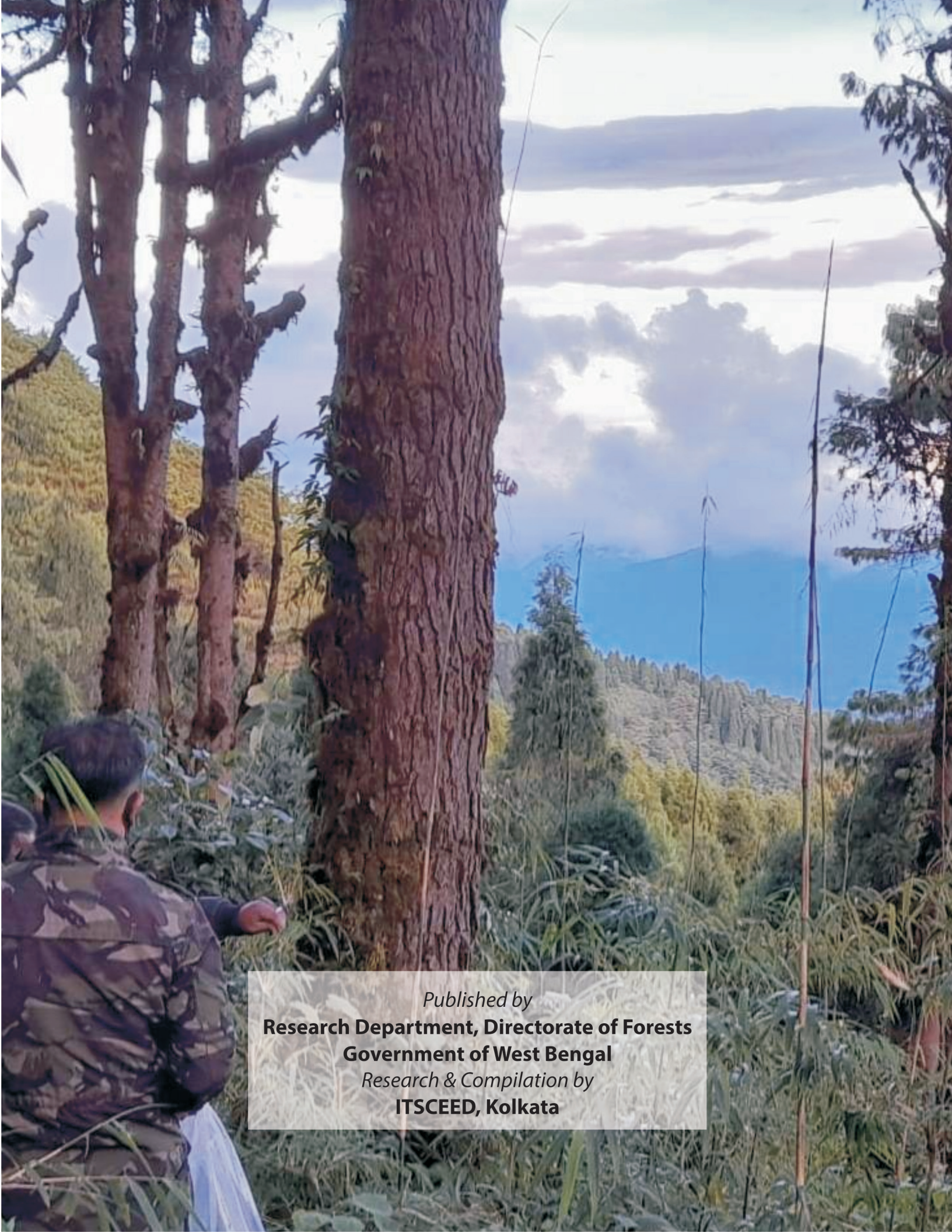

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