

## A SKETCH OF THE VEGETATION OF JALPAIGURI DISTRICT OF WEST BENGAL

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The district of Jalpaiguri lies at the foot of the hills south of Kalimpong division of Darjeeling district and of western part of Bhootan. This is a plain country with the exception of the Buxa hills at the north eastern part which occupy less than a hundredth part of a total area of 6,234.13 sq. km. These hills are the southern out-spurs of the hills of Bhootan and at Sinchula attains an elevation of 3,000 m. The hills on the north of the district usually rise abruptly from the plains while on some places the ground is slightly undulating at the foot of the hills.

This flat submontane country known as the Western Duars is made up of alluvium with deposits of coarse gravels near the hills, sandy clay and sand along the course of the rivers and fine sand consolidating into clay in the rest of the district. The beds of Buxa hills consist of variegated slates, quartzites and dolomites, and the low hills on the south belong to the upper tertiary strata.

The rivers and streams of the Jalpaiguri district are very numerous. The most important of these are the Tista, the Jaldhaka, the Torsa, the Raidak and the Sankosh. The tributaries of these rivers, particularly of the Tista are also as formidable and mighty as the main rivers. They all emerge from the hills of Bhootan, Sikkim and of Darjeeling district, and rise and fall with great rapidity. Near the hills the riverbeds are full of boulders, and owing to the porous character of the soil many rivers sink below the surface near the hills, appearing again a few miles further down. The great volumes of water coming out of the hills with terrific force often change their courses and their banks are consequently ill-defined. The topography of the district, its history and economics changed several times in the past due to the whims of these mighty rivers.

The rainfall is rather heavy in this district and more so on the north-eastern parts. The monsoon current flows northwards and is deflected towards the west in the northern Bengal so that the prevailing direction of the wind at Jalpaiguri during the rains

is east or southeast. The rainfall data at different stations in the district is shown below :

Station	Annual average
Jalpaiguri	3319.1 mm
Kalchini	3865.5 mm
Alipur	3796.5 mm
Falakata	3120.5 mm
Kumargram	4242.8 mm
Buxa	5323.1 mm
Nagrakuta	3809.3 mm

The average rainfall of the district is 3925.1 mm (154.33").

The summer is rather hot excepting at Buxa Cantonment and the temperature attains its maximum limit in April. In the town of Jalpaiguri the mean maximum temperature for that month is 31.7°C although temperature record of 40°C is not at all unusual.

A damp warm climate as is met with in the district of Jalpaiguri, usually favours the formation of a wet evergreen forest, but this is found only in small patches, while tropical semievergreen forests, moist Sal forests, riverine Khair-Sisoo forests and the savannah forests are the different types of forests met with in that area.

Troup (1921) distinguishes two broad types of savannahs as the low-level and high-level savannahs. The low-level savannahs occupy low lying moist grounds containing a dense growth of tall grasses like *Phragmites karka* Trin., *Saccharum procerum* Roxb., *Erianthus elephantinus* Hk.f., *Anthistiria gigantea* Cav., *Saccharum spontaneum* Linn. etc. There are scattered trees on such savannahs and these are chiefly *Albizia procera* Bth., *Salmalia malabarica* Schott. et Endl. *Bischofia javanica* Bl., *Syzigium cerasoides* (Roxb.) Raizada and *Butea monosperma* O. Ktz. In the riverine alluvial savannahs *Dalbergia sissoo* Roxb. is dominant. The high level savannahs are situated on well drained soils where *Narenga porphyrocoma* (Hance) Bor is dominant. Other grasses in these tracts are *Saccharum arundinaceum* Retz., *Arundinella decempedalis* (O.K.) Janos., *Eulalia fastigiatus* Nees,

*Cymbopogon nardus* (L.) Rendl. and *Imperata cylindrica* (L.) A. P. Beauv. These tracts favour growth of Sal, while the low-level savannahs are unsuitable in that respect.

The origin of the savannahs was due to the changing of the courses of the rivers, due to fire and abandoning of cultivated lands. The roaring torrents while emerging out of the hills, being no longer confined to the narrow vallies, sweep away whatever falls on their way. And as they changed their courses almost every year in the past, they cut out sandy and stony beds often a mile broad. Wherever silt deposit formed on the riverbeds, tall grasses appeared followed by a few herbaceous and shrubby plants and scattered trees covering the wasteland with a savannah type of vegetation. *Dalbergia sissoo* Roxb. and *Acacia catechu* Linn. gradually predominated and as associates of these two *Salmalia malabarica* Schott. & Endl., *Albizia procera* Bth., *Randia dumetorum* Lamk. and *Albizia odoratissima* Bth. established themselves. In such riverine forests, as the trees increased in number the grasses were killed out and other deciduous species of trees grew up, e.g., *Wrightia tomentosa* Roem., *Dillenia pentagyna* Roxb., *Sterculia villosa* Roxb., *Terminalia crenulata* Roth, with *Shorea robusta* Gaertn. the king of timbers. But these savannahs fell preys repeatedly to fire which cleared the grounds for formation of fresh savannah. However fire-resisting species such as *Shorea robusta* Gaertn., *Careya arborea* Roxb., *Dillenia pentagyna* Roxb., *Syzygium cerasoideum* (Roxb.) Raizada, *Salmalia malabarica* Schott. & Endl. and a few others gradually invade the savannahs and slowly establish themselves killing out the grasses.

If fire protection is provided this process is accelerated. Here the most characteristic of the invasive trees is *Macaranga denticulata* Muell.-Arg., *Trema orientalis* Wall. and *Callicarpa arborea* Roxb. appear simultaneously, and *Alpinia allughas* Rosc.—a tall herb of the Zingiberaceae spreads very rapidly. Other deciduous trees such as *Sterculia villosa* Roxb., *Litsaea polyantha* Juss., *Terminalia belerica* Roxb., *Gmelina arborea* Roxb., *Salmalia malabarica* Schott. & Endl., *Toona ciliata* Roem., *Lagerstroemia parviflora* Roxb., *Dillenia pentagyna* Roxb., *Careya arborea* Roxb. etc. soon occupy the place of the grass forming a mixed deciduous forest with *Shorea robusta* Gaertn.

Presence of sufficient moisture convert the deciduous forest to an evergreen by helping to establish such trees as *Amoora rohituka* W. & A., *A. spectabilis* Miq., *Meliosma simplicifolia* Walp., *M. pinnata* Maxim., *Turpinia pomifera* DC., *Phoebe lanceolata* Nees, *Litsaea*

*sebifera* Pers., *L. citrata* Bl., *Cinnamomum obtusifolium* Nees, *C. cecicodaphne* Meisn., *Actinodaphne obovata* Bl., *A. angustifolia* Nees, *Cryptocarya amygdalina* Nees, *C. floribunda* Nees, *C. griffithiana* Wt., *Polyalthia simiarum* Bth. & Hk. f., *Saccopetalum longiflorum* Hk.f. & T., *Casearia kurzii* C. B. Cl., *Vatica lanceaeifolia* Bl., *Walsura tabulata* Hiern., *Elaeocarpus varuna* Buch-Ham., *E. rugosus* Roxb., *Dysoxylum procerum* Hiern., *D. hamiltoni* Roxb., *D. binectariferum* Hk.f., *Chisocheton paniculatus* Hiern., *Chukrasia tabularis* A. Juss., *Lophopetalum fimbriatum* Wt., *Kurrimia pulcherrima* Wall., *Pithecellobium angulatum* Bth., *Pygeum acuminatum* Colebr., *Tetrameles nudiflora* R. Br., *Symplocos spicata* Roxb., *S. caudata* Wall., *S. ramosissima* Wall., *Ehretia acuminata* R. Br., *Vitex heterophylla* Roxb., *Knema longifolia* Warb., and a few others. Shrubs like *Phlogacanthus thyrsoiflorus* Nees, *Morinda angustifolia* Roxb., *Casearia vareca* Roxb., *Micromelum pubescens* Bl., *Coffea bengalensis* Roxb., different species of *Ixora*, *Clerodendron* and *Bridelia* etc. with *Leea*, *Piper*, *Phyllanthus* and different species of Ferns form a dense undergrowth. Extensive climbers like *Spatholobus roxburghii* Bth., *Croton caudatus* Geisel., *Mucuna macrocarpa* Wall., *Milletia auriculata* Baker, *Mezoneurum cucullatum* W. & A., *Cissus*, *Smilax* and *Dioscorea* help to make the canopy more compact.

A special type of vegetation is met with in some places and this is *Convolvulus Mictium* a name given by J. M. Cowan (1929) and described as Creeper jungle by Gamble (1895). A typical *Convolvulus Mictium* has large trees scattered at wide distances with the entanglement of herbaceous or semiherbaceous creeper beneath. *Argyreia*, *Porana*, different species of *Ipomoea*, *Milletia*, *Smilax*, *Mucuna*, *Luffa*, *Paderia* and the recently introduced *Mikania* are the common creepers. There are also several scandent *Acacias*, different species of *Capparis*, *Dalbergia stipulacea* Roxb., *Holmskioldia*, *Zizyphus apetala* Hk. f., *Munronia wallichii* Wt., *Malastoma malabathricum* Linn. and a few species of *Glochidion*. *Asplenium esculentum* Presl. is the commonest fern; and in damp situation different species of Aroids, *Musa*, *Pandanus* and *Calamus guruba* Roxb. are to be found. The trees that grow in the area usually have light seeds and belong to the species: *Premna mucronata* Roxb., *Trema orientalis* Wall., *Callicarpa arborea* Roxb. and different species of *Bridelia*. These are usually short lived trees with which a few evergreen type of trees which live longer gradually appear. Such trees are *Amoora wallichii* King, *Michelia champaka* Linn., *Acrocarpus fraxinifolius* W. & A. and *Duabanga son-*

*neratioides* Buch.-Ham. which may in the long run convert a *Convolvulus Mictium* to an evergreen forest. The *Convolvulus Mictium* is formed on lands cleared by burning or felling for cultivation and later abandoned, and the stability of their formation is ascribed to the aggressiveness of the climbers.

In addition to the canes found in creeper jungles there are cane brakes in the evergreen type of forests on the eastern parts of the district. These are composed mainly of *Calamus leptospadix* Griff., *C. flagellum* Griff., *C. tenuis* Roxb., *C. inermis* T. And. and *C. guruba* Roxb. *Daemonorops jenkinsianus* Mart. belonging to the same group of Rattans is also found in such forest.

In damp situations a graceful palm forms small societies, and this is *Pinanga gracilis* Bl. which is frequently gregarious. Other palms growing wild are *Caryota urens* Linn. and *Phoenix sylvestris* Roxb., while *Areca catechu* Linn., is abundantly cultivated in villages and towns.

There are bamboo groves with *Dendrocalamus hamiltoni* Nees & Arn. as the common species. *Cephalostachyum capitatum* Munro, *Pseudostachyum polymorphum* Munro, *Bambusa pallida* Munro, *B. vulgaris* Schrad., *B. tulda* Roxb. are other bamboos found in the forests. Bamboo groves are also found near villages where *Bambusa balcooa* Roxb., *B. tulda* and *B. vulgaris* are common.

Near villages many fruit trees are found in cultivation, e.g. *Mangifera indica* Linn., *Artocarpus heterophyllus* Lamk., *Syzygium cumini* (L.) Skeels, *S. jambos* (L.) Alston, *S. samarangens* (Bl.) Merr. & Perr., *Annona squamosa* Linn., *A. reticulata* Linn., *Carica papaya* Linn., *Psidium guajava* Linn., *Litchi chinensis* Sonner., *Euphoria longan* Steudel, *Citrus grandis* Osbeck and other species of *Citrus*, *Limonia acidissima* Linn., *Spondias dulcis* Willd., *S. mangifera* Willd., and *Musa*. Other trees growing in and around villages, selfsown or in cultivated condition are different species of *Ficus*, *Moringa oleifera* Lam., *Anthocephalus cadamba* Miq., *Azadirachta indica* A. Juss., *Holarrhena antidysenterica* Wall., *Erythrina stricta* Roxb., *Salmalia malabarica* Schott. & Endl., *Artocarpus lakoocha* Roxb., *Saraca indica* Linn., *Tamarindus indica* Linn., etc. Common shrubs in the villages are *Vitex negundo* Linn., *Coffea bengalensis* Roxb., *Tabernaemontana coronaria* Burk, *Glycosmis arborea* (Roxb.) DC., *Clerodendron infortunatum* Gaertn., *Jatropha curcas*, Linn., *J. gossipifolia* Linn., different species of *Ixora*, *Euphorbia pulcherrima* Willd. ex Klotz., *Urena lobata* Linn. etc. In the outskirts of the jungle and in village shrubberies grows a dangerous stinging plant, *Laportae*

*crenulata* Guad., a slight touch of the leaves of which with the skin produces a severe burning sensation and pains to the place of contact and this spreads rapidly to other parts of the body causing high fever with restlessness to the victim. This plant is more common in the eastern part of the district. On open grounds and on road-sides two other recently introduced plants, *Lantana aculeata* Linn., a thorny shrub with beautiful small yellow or red flowers in corymbs and *Eupatorium odoratum*, a tall herb with purplish flowers are replacing the indigenous shrubby and herbaceous weeds. *Hyptis suaveolens* Bth. is also gregarious on somewhat moist ground. Another obnoxious weed is gaining ground gradually and this is *Eryngium foetidum* Linn., an umbellifer which has established itself in Assam, coming from further east. This has sharp and stiff spine tipped leaves and bracts and dichotomous branches. *Cassia alata* Linn., a shrub with large pinnate leaves and beautiful yellow bracts and flowers is common near rail stations and also elsewhere in open places. This is a reputed medicinal plant.

The gardens occupy a major area of the district totalling about 133,696.5 acres, and form a characteristic feature of the vegetation. The uniform tea-bushes, with their tops pruned to the same level have tall slender *Albizias* scattered in between, for imparting partial shade. Trees most commonly used for this purpose are *A. chinensis* Merr., *A. procera* Bth., *A. lebbek* Bth. and *A. moluccana* Miq. *Dalbergia assamica* Bth. is also used for the same purpose. An exotic shrub *Crotalaria anagyroides* H. B. & K. is often planted in tea gardens for enriching the soil. With this *Cajanus cajan* (L.) Mill. and *Tephrosia candida* DC. are also grown. In some tea garden Tung trees are in cultivation. These are mostly planted on the boundaries and along roads inside the gardens. The species found are *Aleurites fordii* Hemsl. and *A. montana* Wilson.

Among the cultivated field crops rice is most important and approximately 464,300 acres of land are under rice cultivation. Jute has of recent years, become next in importance; and as in other districts of the state 2 species are cultivated, viz., *Corchorus capsularis* Linn. and *C. olitorius* Linn. Then come potato and the betel vine. Maize is also cultivated on a large scale.

The district can boast of some good highways which link different parts of the district to one another as well as to other important towns and cities in the adjoining district. As shade trees along these roads the following are generally found: *Samanea saman*

Station—JALPAIGURI

Lat. 26°32'N

TABLE GIVING CLIMATOLOGICAL DATA FOR JALPAIGURI

Long 88°45'E

Height about M.S.L. 271 ft

		AIR TEMPERATURE °F.														HUMIDITY		CLOUD AMOUNT		RAINFALL						Mean wind speed	WEATHER PHENOMENA					
MONTH	Pressure Mean at station level	Mean Dry Bulb	Mean Wet Bulb	Mean (of)		Mean (of)		Extreme			Relative humidity	Vapour pressure	All clouds	Low clouds	Mean monthly total	Mean No. of rainy days	Total in wettest month with year	Total in driest month with year	Heaviest fall in 24 hours	Date and Year	No. of days with											
				Daily Max.	Daily Min.	Highest in the month	Lowest in the month	Highest recorded	Date and Year	Lowest recorded											Date and Year	Precipitation 0.1" or more	Thunder	Hail	Dust Storm		Squall	Fog				
		mb.	°F	°F	°F	°F	°F	°F	°F	%	mb.	Tenths of sky	in		in	in	in	in		m.p.h.												
JANUARY	I	1007.8	56.0	54.3	74.4	50.0	78.1	45.4	84	1	41	14	89	13.7	1.7	0.5	0.31	0.7	2.07	0	1.40	31	0.9	1.0	0.5	0	0	0	1.6			
	II	1004.0	68.5	59.6	...	...	...	...	1931	...	...	1937	57	13.4	1.8	0.9	...	...	1922	...	...	1889	...	...	...	...	...	...	...			
FEBRUARY	I	1005.5	59.8	57.0	76.9	53.8	83.1	46.0	88	28	36	3	83	14.5	2.1	2.2	0.67	1.4	3.97	0	1.83	18	1.3	4	0.9	0	0	0	2			
	II	1001.8	72.4	61.9	...	...	...	...	1931	...	...	1905	53	14.0	3.3	2.3	...	...	1934	...	...	1914	...	...	...	...	...	...	...			
MARCH	I	1002.3	68.3	63.0	85.2	60.3	92.7	52.0	97	20	46	1	73	17.0	1.9	1.4	1.27	2.3	6.33	0	2.70	7	1.8	3	2	0	0.2	0	0.1			
	II	997.8	80.9	65.3	...	...	...	...	1931	...	...	1906	40	15.9	2.1	1.4	...	...	1912	...	...	1926	...	...	...	...	...	...	...			
APRIL	I	999.6	73.7	69.6	89.5	68.1	98.6	60.5	104	11	51	2	73	22.0	3.3	1.7	3.69	5.5	10.47	0	4.90	28	2.4	7	0.2	0.6	0	1.0	...			
	II	994.6	88.6	71.7	...	...	...	...	1931	...	...	1905	42	18.5	2.0	0.9	...	...	1911	...	...	1911	...	...	...	...	...	...	...			
MAY	I	997.1	78.5	74.6	89.5	72.6	96.0	66.6	103	9	61	1	82	27.1	4.8	5.0	11.82	13.1	32.02	4.02	6.34	31	2.5	17	9	0.6	0.7	0.1	0			
	II	992.7	84.9	76.2	...	...	...	...	1899	...	...	1910	66	26.7	4.3	3.4	...	...	1892	...	...	1920	...	...	...	...	...	...	...			
JUNE	I	993.9	80.1	75.7	88.6	75.7	94.4	71.0	98	2	67	1	89	20.7	6.0	5.4	25.94	19.1	47.60	9.25	2.8	2.1	24	9	0	0.1	0	0	0			
	II	989.5	84.9	79.5	...	...	...	...	1927	...	...	1900	78	31.6	5.4	4.0	...	...	1908	...	...	1903	...	...	...	...	...	...	...			
JULY	I	992.1	81.0	79.0	88.6	77.5	94.3	74.3	99	31	72	9	91	32.4	6.6	6.8	32.22	22.3	47.31	11.45	15.37	8	2.0	25	8	0	0	0	0			
	II	989.1	84.6	79.9	...	...	...	...	1933	...	...	1933	80	32.5	6.2	5.1	...	...	1926	...	...	1892	...	...	...	...	...	...	...			
AUGUST	I	993.7	80.9	78.7	88.8	77.3	94.0	73.9	99	9	70	26	90	32.4	6.2	5.0	25.27	20.4	51.01	4.50	8.66	22	1.7	25	8	0	0	0	0			
	II	990.5	84.9	79.9	...	...	...	...	1933	...	...	1918	80	32.3	5.8	4.0	...	...	1906	...	...	1896	...	...	...	...	...	...	...			
SEPTEMBER	I	997.6	79.8	77.6	88.1	75.9	93.4	72.1	97	19	70	17	90	30.9	5.5	4.8	21.27	16.4	52.17	5.84	13.69	13	1.5	21	8	0	0	0	0			
	II	994.1	83.7	78.7	...	...	...	...	1933	...	...	1929	79	31.0	5.7	4.0	...	...	1902	...	...	1886	...	...	...	...	...	...	...			
OCTOBER	I	1002.6	75.8	72.9	86.7	70.3	91.2	63.3	96	1	60	31	86	26.1	2.9	1.8	5.56	5.5	21.10	0.18	9.62	1	1.2	5	1.2	0	0	0	0.1			
	II	998.9	81.7	74.7	...	...	...	...	1926	...	...	1927	71	25.9	3.0	2.0	...	...	1924	...	...	1935	...	...	...	...	...	...	...			
NOVEMBER	I	1006.3	67.3	64.1	82.0	60.3	85.9	55.0	90	2	49	25	83	18.9	1.4	0.9	0.49	0.8	5.81	0	3.65	8	1.0	0.7	0.2	0	0	0	0.2			
	II	1002.6	74.8	67.6	...	...	...	...	1932	...	...	1914	67	19.7	2.1	1.5	...	...	1932	...	...	1928	...	...	...	...	...	...	...			
DECEMBER	I	1008.1	58.7	56.5	76.7	53.2	78.9	48.0	84	1	42	18	87	14.5	1.2	0.3	0.17	0.4	2.27	0	2.12	25	0.8	0.3	0.2	0	0	0	0.6			
	II	1004.5	69.5	62.4	...	...	...	...	1931	...	...	1918	65	15.9	2.2	1.3	...	...	1932	...	...	1932	...	...	...	...	...	...	...			
Annual Total or Mean	I	1000.5	71.8	68.7	84.6	66.4	98.1	44.5	104	...	36	...	85	23.3	3.6	3.0	128.63	107.9	168.99	67.70	15.37	...	1.6	133	54	0.8	1.6	0.1	6			
	II	996.7	79.7	71.5	...	...	...	...	...	...	...	...	65	23.0	3.6	2.6	...	...	1938	...	...	1891	...	...	...	...	...	...	...			
No. of Year	I	50	50	50	50	50	50	50	50	...	50	...	50	50	50	50	55	55	55	55	55	...	48	10	10	10	10	10	10			
	II	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...			

Values from climatological Tables of observatories in India

Based on observations from 1886 to 1940

(Jacq.) Merr., *Artocarpus heterophyllus* Lamk., *Alstonia scholaris* R. Br., *Sweitenia mahogini* Linn., *Ficus religiosa* Linn., *F. rumphii* Bl., *Dalbergia lanceolaria* Linn., *D. sissoo* Roxb., *Albizia procera* Bth., *A. lebbek* Bth., *Lagerstroemia speciosa* (L.) Pers., *Melia azedarach* Linn., *Azadirachta indica* A. Juss., *Syzygium cumini* (L.) Skeels, *Cassia siamea* Lam., *Delonix regia* Raf., *Kleinhovia hospita* Linn., *Pongamia pinnata* (L.) Merr., *Peltophorum pterocarpum* Back. ex K. H. and *Putranjiva roxburghii* Wall.

The soil in the district is more or less porous throughout and therefore waterlogged areas are almost absent. Only on the southern parts there are a few marshy places which do not dry up completely in summer. The common Hydrophytes on such places are: *Nymphaea stellata* Willd., *Jussiaea repens* Linn., *Ludwigia parviflora* Roxb., *Nymphoides cristatum* O. Ktz., *N. indicum* O. Ktz., *Hydrolea zeylanica* (L.) Vahl, *Ipomoea aquatica* Forsk., *Limnophila heterophylla* Bth., *Hydrilla verticillata* Royle, *Ottelia alismoides* (L.) Pers., *Nemachandra alternifolia* Thw., *Monochoria hastataefolia* (L.) Solms., *M. vaginalis* Presl. ex Kunth., *Pistia stratiotes* Linn., *Lemna paucicostata* Hegelm., *Sagittaria sagittifolia* Linn., *Alisma plantago* Linn., *Najas foveolata* A. Br., *Scirpus articulatus* Linn., *Eichornea crassipes* (Mart.) Solms., *Azolla pinnata* Linn., and *Marsilea quadrifida* Linn. *Eichornea crassipes* is often found on running water where the current is not so strong. Submerged in

shallow running water grows *Cryptocoryne retrospiralis* F. ex W., while *C. spiralis* Fischer is found on the edges.

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