

Plant diversity with especial reference to important medicinal plants in the Bhogdoi river of Jorhat, Assam, North East India

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Abstract

Biodiversity represents the variety and abundance of life expressed at the genetic, population, species and ecosystem levels, cultivated and natural, terrestrial and marine. North East India is one of the mega biodiversity zones, it provides the essential goods for the survival of human beings. The objectives of this study were to determine the distribution pattern and number of occurrences and uses of medicinal plants nearby areas of the Bhogdoi river, Assam. A total number of 154 medicinal plants were recorded from this area. Some of the important medicinal plants were *Euphorbia nerifolia*, *Alternanthera sessilis*, *Houttuynia cordata*, *Oxalis corniculata* etc. We have also observed the soil condition in which the medicinal plants occur along with their habitat condition. The study also revealed the ecological balance of the study area was disturbed due to maximum utilization of natural resources and high number of human populations.

Keywords: Biodiversity, medicinal plants, poaceae, herb

Introduction

India is one of the richest biodiverse country among the twelve major countries abounding in world biodiversity. So far 1, 26,188 species have been recorded from India [1]. North Eastern region (NER) of India is one of the unique landmarks from the floristic point of view. North East India comprises of 8 states and has a predominantly humid subtropical climate with hot, humid summers, severe monsoons and mild winters, which supports diverse flora and fauna, especially in terms of medicinal and aromatic plants [2]. These plants have been used by people for the treatment of various diseases and other useful purposes. Assam, a constituent state of India, characterized by diverse features such as floodplains, marshes, scattered hillocks, folded hill ranges, old plateaus and a well-diversified flora and fauna. The climatic condition of Assam is monsoon climate with a hot and wet summer and a cool and dry winter. Ecology of Assam is unique for growing a large number of fruits, vegetables and well known for its tea plantation, rice cultivation, rich diversity in several grain legumes. In Assam Evergreen areas are under Jorhat, Lakhimpur, Dhemaji, Dibrugarh, Sibsagar, Tinsukia, and extend as far as up to Panchnadi in the north bank and Golaghat district. Assam is the homeland of various ethnic tribes and castes like Bodo, Mishng, Karbi, Dimasha, Rabha, Garo, Deuri, Tiwa, Sonowal, Manipuri, etc. Traditionally, Assam is rich in horticultural production due to its diverse and unique agro-climatic condition which is conducive for growing a wide range of horticultural crops like various fruits, vegetables, flower spices, nuts, tuber crops and medicinal and aromatic plants. The terrestrial natural ecosystems of Assam are mainly forest ecosystem covering the hills and the plains. Assam can be divided into three major physiographic regions-Brahmaputra valley, the hills of Karbi Anglong and North Cachar, the Barak valley. Flooding of the valleys during the rainy season is a common hazard in Assam. The Bhogdoi, an important south bank

sub-tributary of the Brahmaputra river, is prone to cause floods. The Bhogdoi river harbours habitats for various aquatic and terrestrial medicinal plants and animals, which provides various livelihood options for the native people. Many highly valuable medicinal plants were now declined due to continuous exploitation and destruction of plants irrespective of medicinal value [3, 4]. These medicinal plants, possess various phytochemicals which are valuable for making drugs to combat any emerging disease [5]. This paper emphasized on the present status and loss of plant diversity of the Bhogdoi river with the following objectives:

1. To determine the distribution pattern highly valuable plants in this region.
2. The use of locally available medicinal plants for the treatment of various diseases like diarrhoea, jaundice, diabetes, dysentery, high blood pressure, skin diseases etc.,
3. To find out the causes of loss of plant species in the Bhogdoi river.
4. To provide a remedial suggestion, strategy and action plan to conserve plant diversity, sustainable use of biological resources, including medicinal plants.

Materials and Methods

Study site and climate

There are 33 districts in Assam. Among them, Jorhat is the 4th most populated city of Assam and "The last Capital of the Ahom Kingdom". Jorhat has been a vibrant place and is a perfect mixture of tradition and modernity. The total geographical area of Jorhat district is 2,859.35 sq km. Jorhat is situated in the Upper Brahmaputra Valley of Assam. The mean annual rainfall of the district is 2,029 millimetres (79.88 in). The present study was conducted in nearby areas of the Bhogdoi River, Assam during 2019 to 2020 (Figure 1). The study area was selected and divided into different regions for the sake of convenience and systematic study.

1. Bhogdoi river Puja dubi area (From Itakhuli area AT road), Jorhat
2. Kasor goral Garamur area, Jorhat

Bhogdoi is a perennial river coming down from the foothills of Assam-Nagaland border into the plains of Assam and finally pours into the Brahmaputra. Bhogdoi River lies in the eastern part of the Brahmaputra Valley with an area of 543.98 sq. Km. Its geographical location is in between 26028' N to 26049' N latitude and 94003' E to 94028' E longitude. It is bounded by Brahmaputra River in the north and Mukokchung district of Nagaland in the south. In its east, there is Sivsagar district and in the west, Kakodonga river. The Bhogdoi River is a sub-tributary of Brahmaputra. It has its source at Long Samtang of Mukokchung (Naga Hills) and is falling down at Kakadonga River in North-west of Jorhat flowing for 160 km through the Jorhat town. The climate of the region is tropical having a hot and humid summer (averaging 37.0 °C during June-July) and cool winter (averaging 13.0 °C during December-January). The study site occupied by several of medicinal plants and its soil pH ranges from 5.0-5.8.

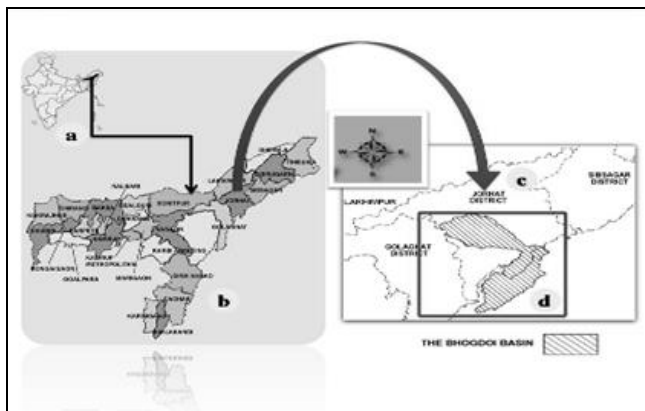


Fig 1: Map of study area: (a) Map of India, (b) Map of Assam, (c) Map of Jorhat, (d) Location of Bhogdoi river

Methodology

Observational survey of the vegetation was made and different plants such as herbs, shrubs and trees were recorded. Medicinal plants were surveyed thoroughly visual observation and by using list-count quadrat. A total of 25 quadrates of 1m x 1m were taken and the plant species present in every strand are recorded. Further, the total numbers of plant species were recorded as follows: (a) Sl. No. (b) Scientific name (c) Vernacular name (d) Family (e) Habit (f) plants species were categorized on the Population range: A= >300; B= 150 –300; C= 50 –150; D= <50; -- = Species not found (Table 1). The plant diversity changed with the climatic condition in both summer and rainy seasons. During our field visits, total number of plant species and photographs of some important medicinal plant species were recorded. Data on the use of medicinal plants were collected through interviewing the local people of study sites. Information on uses of medicinal plants and causes of declining in species abundance have been collected mainly from knowledge, attitudes and practices survey with the help of local medicine men and aged and experienced people. Data on each of medicinal plant have been recorded as follows: (a) Sl. No. (b) Scientific name (c) Parts used (d) Mode of Use (Table 2).

Results and Discussion

The survey of plant species, of Bhogdoi river was carried out from April 2019 to September 2020. During this study, a total of 154 species have been recorded, out of which 124 species from nearby urban areas of Bhogdoi river (site-1) and 131 species from Kasor goral rural site (Site-2). Some of the common species are *Hydrocotyle rotundifolia*, *Erecthites valerianefolia*, *Spilanthus acmella*, *Ipomoea aquatic*, *Stephania hemandifolia*, *Oxalis corniculata*, *Paederia foetida*, *Torenia bicolor* etc. Table 1 contains 154 identified plant species with (a) Sl. No. (b) Vernacular Name (c) Scientific name (d) Family (e) Habit (f) plants species were categorized on the Population range found in two study sites. Figure 2 shows a graphical analysis of plant diversity of study areas. From Table 2, it was noted that the frequently occurring families in the studied areas are Asteraceae, Poaceae, Araceae, Amaranthaceae, Arecaceae, Polygonaceae, Cyperaceae, Euphorbiaceae etc. Poaceae becomes the largest family contributing 12 species and Asteraceae occupies the second position with 10 species. Figure 3 shows the Graphical representation of the frequently occurring & highest occurrence of 10 families in the study.

Table 1. Plant species recorded at two study sites with their population range

Plant species				Population range found in two study sites	
Scientific name	Vernacular Name	Family	Habit	Site 1	Site 2
<i>Acroorus calamus</i> L.	Boch	Araceae	H	D	--
<i>Adhatoda vasica</i> Nees.	Tita bahek	Acantheceae	S	--	C
<i>Aegle marmelos</i> Correa.	Bel	Rutaceae	T	D	--
<i>Ageratum conyzoides</i> L.	Gondhowa bon	Asteraceae	H	C	C
<i>Alocacia indica</i> (Lour.) Koch.	Man kachu	Araceae	H	D	D
<i>Alocacia odora</i> (Roxb.) Koch.	Dohi kachu	Araceae	H	--	D
<i>Alpinia allughas</i> (Retz.) Rosc.	Tora	Zingiberaceae	H	B	--
<i>Alstonia scholaris</i> (L)R.Br.	Chotiana	Apocyanaceae	T	C	D
<i>Alternanthera philoxeroides</i> (Mart)Griseb.	Nol-duba	Amaranthaceae	H	--	B
<i>Alternanthera pungens</i> Kuth.	Pani khutura	Amaranthaceae	H	B	C
<i>Alternanthera sessilis</i> (L) R. Br.ex DC.	Matikanduri	Amaranthaceae	H	A	A
<i>Amaranthus gangeticus</i> L.	Morisa	Amaranthaceae	H	--	D
<i>Amaranthus spinosus</i> L.	Hati Khootura	Amaranthaceae	H	--	C
<i>Amaranthus viridis</i> L.	Khootura sak	Amaranthaceae	H	B	A
<i>Andropogon aciculatus</i> Retz.	Bongooti	Poaceae	H	A	A
<i>Aquilaria malaccensis</i> Lamk.	Sasi	Thymelaeaceae	T	--	D
<i>Areca catechu</i> L.	Tamul	Arecaceae	T	D	B
<i>Artocarpus heterophyllus</i> Lam.	Gosh Kathal	Moraceae	T	--	B
<i>Arundo donax</i> L.	Nol	Poaceae	H	D	A
<i>Averrhoa carambola</i> Linn.	Kordoi	Oxalidaceae	T	--	D
<i>Axonopus compressus</i> (SW.) Beauv	Carpet grass	Poaceae	H	B	A

<i>Azadirachta indica</i> A. Juss.	Neem	Meliaceae	T	--	D
<i>Bambusa balcooa</i> Roxb.	Bholuka bah	Bambuseae	T	B	--
<i>Bambusa tulda</i> Roxb.	Jati bah	Bambuseae	T	--	A
<i>Borassus flabellifer</i> L.	Tal goch	Arecaceae	T	--	C
<i>Bougainvillea spectabilis</i> Willd.	Baganbilash	Nyctaginaceae	T	--	D
<i>Bryophyllum pinnatum</i> Roxb.	Doopor tenga	Crassulaceae	H	--	D
<i>Butea monosperma</i> (Lam.) Taub	Ranga polash	Papilionaceae	T	D	D
<i>Caesalpinia pulcherrima</i> (L.) Swartz.	Krishna chura	Caesalpinaceae	T	D	D
<i>Caladium bicolor</i> (Aiton) Vent	Racta kosu	Araceae	H	C	C
<i>Calamus tenuis</i> Roxb.	Jati bet	Arecaceae	S	--	C
<i>Callistemon citrinus</i> (Curtis.) Stapff.	Botol brush	Myrtaceae	T	--	D
<i>Carcia papaya</i> L.	Amita	Caricaceae	T	D	C
<i>Caryota urens</i> L.	Sewa goch	Arecaceae	T	D	D
<i>Cassia fistula</i> L.	Sunaru goch	Caesalpinaceae	T	D	C
<i>Centella asiatica</i> (L) Urban.	Bor manimooni	Umbelliferae	H	A	A
<i>Chenopodium album</i> Linn.	Jil mil hak	Chenopodiaceae	H	A	A
<i>Cicer arietinum</i> L.	Boot mah	Papilionaceae	H	--	A
<i>Citrus acida</i> Roxb.	Kagzi nemoo	Rutaceae	S	--	D
<i>Citrus decumana</i> L.	Robab tenga	Rutaceae	T	D	D
<i>Cleome viscosa</i> L.	Boga bhutmula	Capparidaceae	S	B	C
<i>Clerodendrum viscosum</i> (Jack.) Sieb. Ex Steud.	Dhopat tita	Verbenaceae	S	A	A
<i>Cocos nucifera</i> L.	Narikol	Arecaceae	T	D	B
<i>Coffea benghalensis</i> Wall. et. Roxb.	Chagoli phool	Rubiaceae	S	B	C
<i>Colocasia esculenta</i> (L) Schott.	Pani kachu	Araceae	H	B	C
<i>Commelina benghalensis</i> Linn	Konasimolu	Commelinaceae	H	B	A
<i>Crinum pratense</i> Herb.	Bon nahoru	Amaryllidaceae	S	B	D
<i>Crotalaria juncea</i> L.	JhunJhunia	Papilionaceae	S	D	C
<i>Cucumis sativus</i> L.	Tioh	Cucurbitaceae	A.T.H	C	--
<i>Curcuma aromatica</i> Salisb.	Bon halodhi	Zingiberaceae	H	D	--
<i>Curcuma longa</i> Linn.	Halodhi	Zingiberaceae	H	--	D
<i>Cuscuta reflexa</i> Roxb.	Akashi lota	Convolvulaceae	P.C	A	A
<i>Cynadon dactylon</i> (L) Pers.	Dubori bon	Poaceae	H	A	A
<i>Cyperus pilosus</i> Vahl.	Harkota bon	Cyperaceae	H	D	B
<i>Cyperus rotundus</i> Linn.	Mutha grass	Cyperaceae	H	B	C
<i>Dalbergia assamica</i> Benth.	Bor medeluwa	Papilionaceae	T	--	D
<i>Datura stramonium</i> L.	Boga dhotura	Solanaceae	S	--	D
<i>Delonix regia</i> (Boj.) Raf.	Radhachura	Caesalpinaceae	T	D	D
<i>Desmodium laxiflorum</i> DC.	Biyonee habota	Papilionaceae	H	B	C
<i>Digitaria sanguinalis</i> (L.) Scoop.	Aarala bon	Poaceae	H	D	D
<i>Dillenia indica</i> L.	Ou tenga	Dilleniaceae	T	D	D
<i>Diplazium esculentum</i> (Retz.) Sw.	Dhekia	Woodsiaceae	H	A	B
<i>Drymaria cordata</i> Willd.	Laijaboree	Caryophyllaceae	H	A	A
<i>Eichhornia crassipes</i> (mort) solms	Bih-meteka	Pontederiaceae	H	B	A
<i>Eleusine indica</i> (L.) Gaertn.	Bobosha bon	Poaceae	H	B	A
<i>Embilica officinalis</i> Geartn.	Amlakhi	Euphorbiaceae	H	D	B
<i>Erecthites valerianefolia</i> DC.	Bonkopah	Asteraceae	S	A	B
<i>Eugenia jumbolana</i> Lam.	Kola jamu	Myrtaceae	T	D	D
<i>Eupatorium odoratum</i> L.	Germani bon	Asteraceae	S	C	A
<i>Euryle ferox</i> Salisb.	Nikori	Nymphaeaceae	H	A	A
<i>Ficus rumphii</i> Bl.	Jori-Pakori	Moraceae	T	D	D
<i>Fimbristylis globulosa</i> (Retz.) Kunth.	Murfula bon	Cyperaceae	H	C	A
<i>Gardenia angusta</i> (L.) Merr.	Togor	Rubiaceae	S	--	D
<i>Gnaphalium polycaulon</i> Pers.	Kopahee gutiya	Asteraceae	H	A	A
<i>Gynandropsis gynandra</i> (L.) Brig.	Bhutmula	Capparidaceae	S	B	A
<i>Heliotropium indicum</i> L.	Hatihur	Boraginaceae	H	D	B
<i>Houttuynia cordata</i> Thunb.	Mochundori	Saururaceae	H	C	B
<i>Hydrocotyle javanica</i> Thunb.	Manimuni	Apiaceae	H	A	A
<i>Hydrocotyle rotundifolia</i> Roxb.	Saru manimuni	Apiaceae	H	A	A
<i>Impatiens roylei</i> Walp.	Bijolkoreeya	Balsaminaceae	H	B	A
<i>Imperata cylindrica</i> (L.) Beauv	Ulukher	Poaceae	H	A	A
<i>Ipomoea aquatica</i> Forssk.	Kolmow	Convolvulaceae	H	A	A
<i>Jussiaea repens</i> Linn.	Panikhutura	Onagraceae	H	A	A
<i>Kyllinga brevifolia</i> Rottb.	Keya bon	Cyperaceae	H	A	A
<i>Lantana camera</i> L.	Goo-Phool	Verbenaceae	S	A	A
<i>Leersia hexandra</i> SW.	Leersia	Poaceae	H	A	--
<i>Lemna minor</i> L.	Soru puni	Lamnaceae	H	A	A
<i>Leonurus sibiricus</i> L	Ronga dorun bon	Lamiaceae	H	B	D
<i>Leucas aspera</i> Spreng.	Boga dorun Bon	Lamiaceae	H	B	B

<i>Livistona jenkinsiana</i> Griff.	Tokou	Arecaceae	T	C	B
<i>Lygodium microphyllum</i> (Cav) R.Br.	Lota dhekia	Lygodiaceae	C.F	A	A
<i>Macaranga denticulata</i> Muell-Arg.	Jaglou	Euphorbiaceae	T	D	D
<i>Mallotus albus</i> Muel-Arg.	Moroleeya gos	Euphorbiaceae	T	B	C
<i>Manilkara zapota</i> (L.) van Royen	Chpeta	Sapotaceae	T	B	D
<i>Marsilea quadrifolia</i> L	Pani tengesi.	Marsileaceae	H	A	A
<i>Melastoma malabathricum</i> L.	Phutuka	Melastomaceae	S	A	A
<i>Melia azedarach</i> L.	Ghora neem	Meliaceae	T	D	--
<i>Melochia corchorifolia</i> L.	Bon mora	Sterculiaceae	S	B	B
<i>Mesua ferrea</i> L.	Nahar	Clusiaceae	T	--	D
<i>Mikania micrantha</i> H.B.&K.	Prem lota	Asteraceae	H.C	A	A
<i>Mimosa pudica</i> L.	Lajuki lota	Mimosaceae	H	A	A
<i>Mollugo pentaphylla</i> L.	Hetakpora	Molluginaceae	H	C	B
<i>Momordica dioica</i> Roxb.	Saru bhatkerala	Cucurbitaceae	A.C	C	--
<i>Monochoria hastaeifolia</i> Presl.	Pani meteka	Pontederiaceae	H	A	A
<i>Murraya koenizii</i> (L) Spreng.	Nora singha	Rutaceae	T	--	D
<i>Musa chinensis</i> Sweet.	Jahaji kol	Musaceae	T	D	B
<i>Musa gigantea</i> Duthie.	Bhimkal	Musaceae	T	--	D
<i>Nyctanthes arbor-tristis</i> L.	Sewali phool	Oleaceae	T	--	D
<i>Ocimum sanctum</i> L.	Tulsi	Lamiaceae	S	--	B
<i>Oxalis acetosella</i> L.	Bor tengesi	Oxalidaceae	H	B	A
<i>Oxalis corniculata</i> L.	Saru tengesi	Oxalidaceae	H	A	A
<i>Paederia foetida</i> L.	Bhedai lota	Rubiaceae	C	A	A
<i>Panicum trypheron</i> Schult.	Bhatur gah	Poaceae	H	B	--
<i>Parthenium hysterophorus</i> L.	Parthenium	Asteraceae	H	A	A
<i>Paspalum conjugatum</i> Berg.	Kunja ghans	Poaceae	H	C	--
<i>Peperomia pellucida</i> (L.) H.B.K.	Panounuwa	Piperaceae	H	C	--
<i>Phyllanthus fratemus</i> L.	Bon amlakhi	Euphorbiaceae	H	B	--
<i>Phyllanthus niruri</i> L.	Bon amlakhi	Euphorbiaceae	H	B	B
<i>Pistia stratiotes</i> L	Bor puni	Araceae	H	A	B
<i>Plantago major</i> L.	Hingapat	Plantaginaceae	H	D	--
<i>Plumeria acuminata</i> Ait.	Gulas	Apocyanaceae	T	--	D
<i>Plumeria rubra</i> L.var <i>acutifolia</i>	Ranga gulas	Apocyanaceae	T	D	--
<i>Polygonum chinense</i> L.	Modhu holing	Polygonaceae	H	A	A
<i>Polygonum hamiltonii</i> Spreng.	Bor beyhu	Polygonaceae	H	B	--
<i>Polygonum hydropiper</i> L.	Patharua bihlongoni	Polygonaceae	H	B	B
<i>Polygonum nepalense</i> Meissu	Pani jaluk	Polygonaceae	H	B	--
<i>Polygonum strigosum</i> Br.	Mouhoral	Polygonaceae	H	A	--
<i>Pouzolzia indica</i> Gaud.	Borali bokua	Urticaceae	H	A	A
<i>Psidium guajava</i> L.	Modhuri am	Myrtaceae	T	D	C
<i>Ricinus communis</i> L.	Era goach	Euphorbiaceae	T	C	B
<i>Rorippa indica</i> (L. Hiren).	Bon sorioh	Cruciferae	H	A	--
<i>Rubus moluccanus</i> L.	Jetuli poka	Rubiaceae	H	C	C
<i>Rumax maritimus</i> L.	Torobouara	Polygonaceae	S	B	--
<i>Saccharum spontaneum</i> L.	Kohua bon	Poaceae	H	A	--
<i>Sagittaria trifolia</i>	Jathipoteeya	Alismataceae	H	A	A
<i>Scoparia dulcis</i> L.	Cheniguti bon	Scrophulariaceae	H	A	B
<i>Sida rhombifolia</i> L.	Hunboreeyal	Malvaceae	S	B	--
<i>Solanum indicum</i> L.	Tita bhokuri	Solanaceae	S	A	B
<i>Spilanthus acmella</i> L.	Piraja	Asteraceae	H	A	A
<i>Spomoea carnea</i> Jacquin	Amar lota	Convolvulaceae	S	A	A
<i>Sporobolus fertilis</i> (Steud.) Clayton	Sorai Gah	Poaceae	H	B	C
<i>Stephania hemandifolia</i> Walp.	Tubuki lota	Menispermaceae	A.T	A	A
<i>Syzygium kurzii</i> (Duthie) Balak.	Bogee Jamu	Myrtaceae	T	D	--
<i>Tabernaemonta divaricata</i> (L) R. Br.	Nitya phool	Apocyanaceae	S	--	B
<i>Tamarindus indicus</i> Linn.	Teteli	Caesalpiniaceae	T	D	D
<i>Terminalia citrina</i> Roxb.	Hilikha	Combretaceae	T	D	D
<i>Torenia bicolor</i> Dalz.	Toronee bon	Scrophulariaceae	H	A	A
<i>Torenia flava</i> Ham.	Toronee bon	Scrophulariaceae	H	A	A
<i>Triphonium trilobatum</i> L shott.	Chema Kochu	Araceae	H	D	B
<i>Vernonia cinera</i> Less.	Hohodevi	Asteraceae	H	B	A
<i>Vitex negundo</i> L.	Posotia	Verbenaceae	T	--	B
<i>Wedelia calendulacea</i> Less.	Bhimraj	Asteraceae	H	--	B
<i>Xanthium strumarium</i> L.	Agora	Asteraceae	S	D	D
<i>Zizyphus jujuba</i> Lam.	Bogori	Rhamnaceae	T	D	D

Note: Population range: A= >300; B= 150 –300; C= 50 –150; D= <50; -- = Species not found.

Habit: T= Tree; S= Shrub; H= Herb; A. T= Annual twinner; H.C= Herbaceous climber; A.T.H= Annual trailing herb; A.C= Annual climber; C. F= Climbing fern; P.C = Perennial climber.

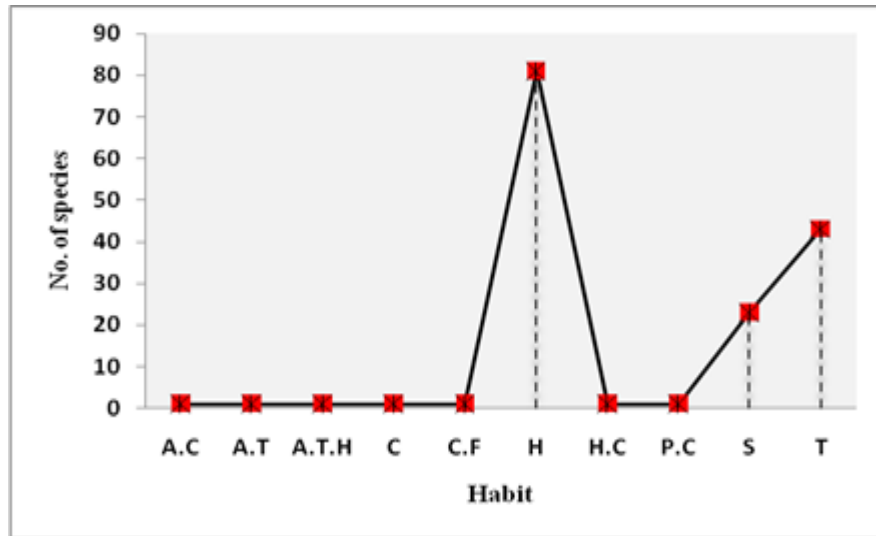


Fig 2: Graphical Analysis of various habit of the Bhogdoi river (T= Tree; S= Shrub; H= Herb; A. T= Annual twinner; H.C= Herbaceous climber; A.T.H= Annual trailing herb; A.C= Annual climber; C. F= Climbing fern; P.C = Perennial climber.)

Table 2: Ten dominant families with their species in two study sites

Families	Number of plant species	Name of the plant species
Poaceae	12	<i>Arundo donax, Axonopus compressus, Cynadon dactylon, Digitaria sanguinalis, Eleusine indica, Imperata cylindrica, Leersia hexandra, Panicum trypheron, Paspalum conjugatum, Saccharum spontaneum, Sporobolus fertilis</i>
Asteraceae	10	<i>Ageratum conyzoides, Erechthites valerianefolia, Eupatorium odoratum, Gnaphalium polycaulon, Mikania micrantha, Parthenium hysterophorus, Spilanthus acemella, Vernonia cinera, Wedelia calendulacea, Xanthium strumarium</i>
Araceae	7	<i>Alocacia indica, Alocacia odora, Caladion bicolor, Colocasia esculenta, Pistia stratiotes, Triphonium trilobatum, Acrorus calamus</i>
Polygonaceae	6	<i>Polygonum chinense, Polygonum hamiltonii, Polygonum hydropiper, Polygonum nepalense, Polygonum strigosum, Rumax maritimus</i>
Euphorbiaceae	6	<i>Embilica officinalis, Phyllanthus fratemus, Phyllanthus niruri, Macaranga denticulate, Mallotus albus, Ricinus communis</i>
Arecaceae	6	<i>Areca catechu, Borassus flabellifer, Caryota urens, Cocos nucifera, Calamus tenuis</i>
Amaranthaceae	6	<i>Alternanthera philoxeroides, Alternanthera pungens, Alternanthera sessilis, Amaranthus gangeticus, Amaranthus spinosus, Amaranthus viridis</i>
Papilionaceae	5	<i>Cicer arietinum, Desmodium laxiflrum, Crotalaria juncea, Butea monosperma, Dalbergia assamica</i>
Rutaceae	4	<i>Aegle marmelos, Citrus decumana, Murraya koenzii, Citrus acida</i>
Rubiaceae	4	<i>Paederia foetida, Rubus moluccanus, Gardenia angusta, Coffea benghalensis</i>

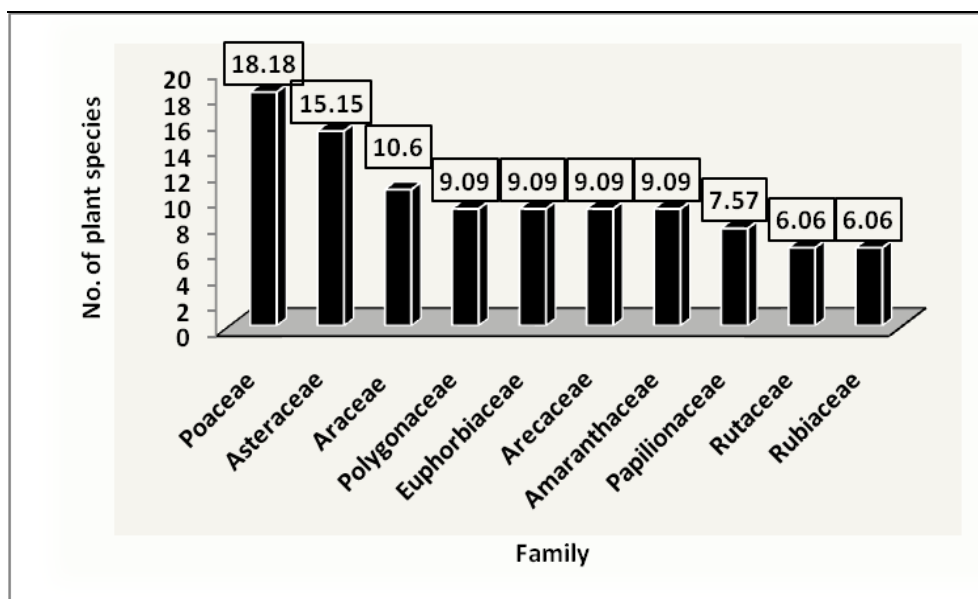


Fig 3: Graphical Analysis of ten dominant families of the Bhogdoi river, Assam

The information collected during the survey covering about 21 medicinal plants belonging to 14 families (Table 3).

Table 3: Commonly used medicinal plants by the local people of study area for the treatment of various diseases

Scientific name	Parts used	Ailments
<i>Acrorus calamus</i> L.	Rhizome	Asthma, cough, sore throat, Bronchial catarrh and fever
<i>Adhatoda vasica</i> Nees.	Leaves, roots, flowers, bark and fruits	Cough, fever, tonsillitis, headache, body ache, asthma
<i>Aegle marmelos</i> Correa.	Fruit, leaf	Dysentery, diarrhoea, stomach troubles
<i>Altementhera sessilis</i> (L) R. Br.ex DC.	Whole plant	Prevent acidity, dysentery, diarrhoea, snake bite
<i>Azadirachta indica</i> A. Juss.	leaves, barks	Malarial fever, wounds, ulcers, burning sensation, tumor, vomiting dyspepsia, intestinal worms, cough, bronchitis, diabetes, inflammation, leprosy, tuberculosis, boils, blood purifier, scabies, eczema and other skin diseases
<i>Centella asiatica</i> (L) Urban.	Whole plant	Stomach pain, wounds, cuts etc. dysentery, liver trouble, nerve disorder, blood purifier, leprosy and skin diseases.
<i>Citrus acida</i> Roxb.	Fruit, leaf	Small pox, chicken pox, skin diseases, insect repellent, dyspepsia, vomiting, bleeding & spongy gums.
<i>Curcuma longa</i> Linn.	Rhizome	Anti-inflammatory, digestive stimulator, pain-killer
<i>Houttuynia cordata</i> Thunb.	Root, leaf	Stomach ache, cholera, dysentery, skin diseases.
<i>Hydrocotyle rotundifolia</i> Roxb.	Whole plant	dysentery, diarrhoea, brain tonic
<i>Ipomoea aquatica</i> Forssk.	Whole plant	Antiseptic in cuts and wounds, control bleeding, eye trouble
<i>Leucas aspera</i> Spreng.	Leaf	Stop internal bleeding, dysentery, liver, stomach troubles
<i>Murraya koenigii</i> (L) Spreng.	Root, leaf, bark	Anthelmintic, diarrhoea, dysentery, skin eruptions
<i>Oxalis acetosella</i> L.	Leaf	Arthritis, gout, kidney stones, dispel boils, abscesses, wounds
<i>Oxalis corniculata</i> L.	Whole plant	stomach pain, dysentery, eye trouble, stop bleeding
<i>Paederia foetida</i> L.	Whole plant	Abdominal pain, rheumatic pain, liver, kidney trouble & diarrhoea.
<i>Solanum indicum</i> L.	Root, leaf	Cough, asthma, toothache, vomiting
<i>Vitex negundo</i> L.	Shoot, leaf	Painkiller, dysentery, catarrhal fever, heaviness of head
<i>Wedelia calendulacea</i> Less.	Leaf	Skin disease, hair tonic
<i>Embilica officinalis</i> Geartn.	Fruit, root, bark	Anaemia, jaundice, piles, cough, stomach and eye trouble
<i>Ocimum sanctum</i> L.	Leaf, root	Malarial fever, gastric diseases of children, liver disorders, chronic fever, dysentery, cough, dyspepsia, vomiting problem

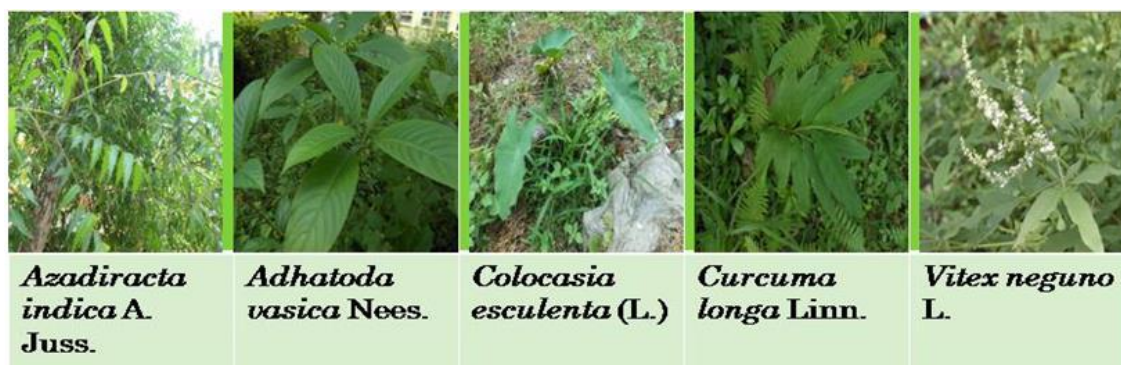


Fig 4: Photograph showing of some of the important medicinal plants from study area

Causes of loss of plant diversity in the Bhogdoi river was mainly due to destruction of biodiversity by various biotic and abiotic factors such as

- Population growth and density
- Overgrazing
- Flood and bank erosion
- Increases the uses of agrochemicals in agricultural fields
- Nearby areas of the river used as market place.
- Religious cultural practices in the river
- Fishing
- Road construction
- Sandy Soil

Present study revealed that the Bhogdoi river is rich in plant diversity. It was observed that plants species has a tremendous significance in both livelihood and health

management. Table 3 has shown some of the important medicinal plants and their tremendous medicinal value for various health treatments (Figure 4). According to the World Health Organization (WHO), 80% of the rural population in developing Asian and African countries utilizes locally available medicinal plants for their primary healthcare needs. About 90% of the medicinal plants of India are found in forest habitats, while only 10% of the medicinal plants are distributed among other landscape elements like open grasslands, agricultural pastures, wasteland and in and around freshwater bodies, etc [6, 7]. Present investigation showed the floristic composition of the Bhogdoi river area which continuously declined due to various reasons. The trees, herbs, shrubs, climbers are not abundantly distributed, a few species were only found in the study area. Variation in distribution was mainly due to human activities like cutting plants, clearing of the areas for

construction of home, market, overgrazing etc. Variation in distribution was also due to several other factors like soil conditions, vegetative propagation, quality and dispersal of seeds, temperature, pressure, light, humidity etc. local people of this area uses different medicinal plants for the treatment of diarrhoea, jaundice, diabetes, dysentery, high blood pressure, skin diseases etc. we have suggest them that the proper use of herbal medicine in the required dose is very important. Generally, they don't have any side effect but sometimes overdose becomes harmful for our health.

Conclusion

Traditional use of medicinal plants passed through oral communication, passed from one generation to next. Numerous research works have been done on the field of herbal medicine of the above-mentioned medicinal plants which make significant contributions to the drug development programme. Scientist, researcher, practitioners, and students should come forward and promote such kind of natural resources for future use of mankind and conservation.

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