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Impact Of Disturbance On Phytodiversity In Undisturbed and Disturbed Catchment Areas Of Serlui River In Vicinity of Serlui-B Hydrel Project, Mizoram, North-East India

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ABSTRACT: The present study was conducted to assess the phytodiversity and economical importance of plant species in the undisturbed and disturbed zones of Serlui-B hydrel project which is being constructed on Serlui river in Kolasib district of Mizoram, India. The present study records a total of 82 species belonging to 41 families and 71 genera from both the selected study sites. 70 species belonging to 39 families and 63 genera were found in the undisturbed site whereas 37 species belonging to 16 families and 34 genera were observed in the disturbed site. The similarity index calculated was found to be 0.24 between the undisturbed and disturbed stands. Effect of disturbance along the disturbance gradient and a decrease in species diversity and distribution was recorded. Construction of dam has led to removal of majority of the dominant tree species with secondary growth. The results also indicate that the species dominant at the disturbed site maybe tolerant to stress and able to survive under such harsh influence of disturbance. On the other hand, species sensitive to the disturbance shows poor growth rate and some species were totally eliminated from the disturbed site due to the increased stress caused due to the degree of disturbance.

Keywords: Phytodiversity; Disturbance; Serlui-B Dam; Serlui River

INTRODUCTION

Biodiversity provides immense economic, ethical and aesthetical benefits and is vital for human survival and also for the function and stability of the ecosystem (Singh, 2002; Raghubanshi, 2009). Loss of biodiversity is occurring on a global scale due to human activity which is one of the major causes of wild biodiversity loss (WCMC, 1992). Some of the major causes of biodiversity loss include habitat destruction, over exploitation, pollution and species introduction (UNEP, 2001). One of the foremost threats to biodiversity is habitat loss and fragmentation. Fragmentation leads to replacement of large areas of native forest by other ecosystems leaving isolated forest patches, with deleterious consequences for most of the native forest biota causing serious impact on species as well as ecosystem processes (Murica, 1995; Weinbauer and Rassoulzadegan, 2007). Introduction of species and altered disturbances rates may lead to increase in local biodiversity, but loss or modifications of

habitat, tends to decrease species richness and heterogeneity (Lubchenco et al., 1991). One of the major causes of habitat destruction is the construction of dams in the river valleys. Construction of hydroelectric power project on the river ecosystem have several benefits as power, irrigation, tourism, industrial development etc., but from the biodiversity aspects it leads to a changing pattern in the biological and ecological conditions of the rivers which causes alteration in the floral and faunal characteristics, microorganisms and land use pattern near the dammed site (Ogbeibu and Oribhabor, 2002; Sharma, 2006; Bhatt *et al.*, 2011). An immense portion of the river valleys having distinctive phytodiversity get submerged in these power projects (Bahuguna *et al.*, 2011) leading to a complete alteration of a terrestrial habitat into an aquatic ecosystem (Gaur, 2007) thereby engulfing the productive agricultural areas, which amplifies the hardship of the local populace (Bhatt, 1997).

Sparse information prevails on the impact of Serlui-B hydrel project on the ecosystem. Recent studies have been carried out to determine the impact of Serlui-B hydrel project on the water quality of Serlui river (Sunar and Mishra, 2016). Under the perspective of the precedent aspect, the present study has been taken up to assess the effect of disturbance on vegetation composition in the selected study sites (undisturbed and disturbed stand) in the catchment area of Serlui river in vicinity of Serlui-B hydrel project.

MATERIALS AND METHODS

Description of Study area

Mizoram is one of the eight state of the North-east India, situated in the extreme end of the Himalayan range covering a total area of 21,087km² and is extended between 92°15'-93°26'E longitude and 21°58'-24°35'N latitude. The altitude ranges from 500 to 2157m. Mizoram is under the direct influence of monsoon, with heavy rainfall from May-September and an average rainfall of 245cm/year (Sharma *et al.*, 2001).

The Serlui-B dam is built on the Serlui river situated in the Bilkhawthlir village in Kolasib district



of Mizoram, India (Fig-1). The dam is a 51 meters (167 feet) earth-fill embankment dam with a length of 293 meters (961ft) (PHE, 2012). The dam creates a reservoir catchment area of 53 square kilometers with life storage capacity of 453.59 cubic million and the installed hydrocapacity is 12MW. The catchment area is 397 square kilometers with an annual rainfall of 3028.6mm (PHE, 2012).

The area of present study include the catchment area of Serlui river and a total of two study sites (Undisturbed and Disturbed, Fig-2 & 3) in vicinity of Serlui-B hydel project were selected. Plant diversity in the catchment area of Serlui river has been documented for the first time from taxonomical, ecological and ethnobotanical point of view.

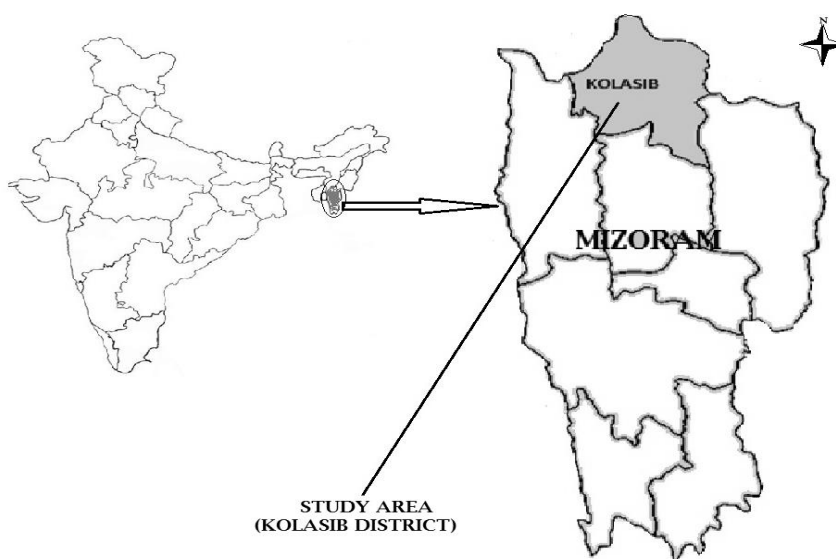


Fig 1: Map showing location of study area



Fig 2: Undisturbed forest patch in catchment area of the reservoir



Fig 3: Disturbed area showing the submerged zone 1-2 (Deb 1981 & 1983); Plants of Mizoram University Campus, Aizawl Mizoram (Lalchuanawma & Lalramnghinglova, 2010); Plant Diversity of Assam (Barooah & Ahmed, 2014). Taxonomical classification- genera and species within the family are treated alphabetically and the names of the families are arranged according to the Bentham and Hooker's system of classification (1862-1883). Additional information about the vernacular names and their utility values were collected from primary and secondary sources for each plant species. The ethnobotanical

Data Collection and vegetation analysis

Extensive field surveys were conducted to assess the plant diversity of the study area. The specimens of each species were collected and the plant species were identified taxonomically by using various regional floras via., Flora of Assam, Vol. 1-5 (Kanjilal *et al.*, 1934); Flora of Mizoram, Vol.1 (Singh *et al.*, 2002); Flora of British India, Vol. 1-7 (Hooker, 1872-1879); Forest Flora of Meghalaya, Vol. 1-2 (Haridasan & Rao, 1985-1987); The Flora of Tripura State, Vol.



important plants were identified with the help of following books viz., Tribal Ethno-botany of Mizoram (Mahanti,1994), Tualchhuak Damdawi-Indian System of Medicine (Chawngkunga, 1996); The Medical Plants of North-East India (Kumar, 2002), Flora of Mizoram, Vol. 1 (Singh et al., 2002); Ethno-Medicinal Plants of Mizoram (Lalramnghinglova, 2003); The book of Mizoram Plants (Sawmliana, 2013) and Herbal Wealth of North-East India (Bhutani, 2008).

The similarity index between the selected study sites was calculated using Sorenson's similarity index (1948).

$$\text{Sorenson index of similarity 'S'} = \frac{2C}{A+B}$$

Where, C= species common in both the stands

A= species common in stand A

B= species common in stand B

RESULTS AND DISCUSSION

The results of the study conducted are placed in Table 1. The present study records a total of 82 species belonging to 41 families and 71 genera from both the selected study sites. Asteraceae was the dominant family with 15 species, followed by Poaceae (6 species) and 4 species each Amaranthaceae, Fabaceae, Malvaceae, Solanaceae, and Verbenaceae. Of the 41 families, 27 represented by single species. A total of 70 species belonging to 39 families and 63 genera were found in the undisturbed site, whereas 37 species belonging to 16 families and 34 genera were observed in the disturbed site (Fig- 4). It was noticed that, 25 species belonging to 12 families

and 24 genera were found common in both the study sites (Fig-4).

The common families recorded in both the stands were Amaranthaceae, Asteraceae, Costaceae, Fabaceae, Lamiaceae, Malvaceae, Melastomaceae, Mimosaceae, Oxalidaceae, Poaceae, Polygonaceae and Scrophulariaceae. Some of the species like *Acer laevigatum*, *Albizia chinensis*, *Amomum dealbatum*, *Artocarpus heterophyllus*, *Bauhinia variegata*, *Begonia inflata*, *Caesalpinia cucullata*, *Cyclosorus extensa*, *Homalomena aromatica*, *Lygodium scandens*, *Solanum nigrum* were seen only in the undisturbed stand on the other hand species like *Abelmoschus moschatus*, *Amaranthus spinosus*, *Conyza lanceolaria*, *Dichrocephala integrifolia*, *Imperata cylindrica*, *Kyllingia monocephala*, *Lantana camara*, *Physalis maxima*, *Ziziphus jujuba* were confined only to the disturbed stand. From the study conducted, a successive decrease in the number of species was observed with the increase in the degree of disturbance.

Similarity index (Sorenson 1948)

Sorenson's index of similarity is the variation of plant species across the different study sites in the study area. Some of the species common in both the stands were *Achyranthes aspera*, *Ageratum conyzoides*, *Bidens pilosa*, *Cassia alata*, *Chromolaena odorata*, *Costus speciosus*, *Galinsoga parviflora*, *Mikania micranta*, *Mimosa pudica*, *Scoparia dulcis*, *Urena lobata*. Majority of the species common in both the stands belonging to families Asteraceae, Fabaceae and Poaceae. The similarity index calculated was found to be 0.24 between the undisturbed and disturbed stands.

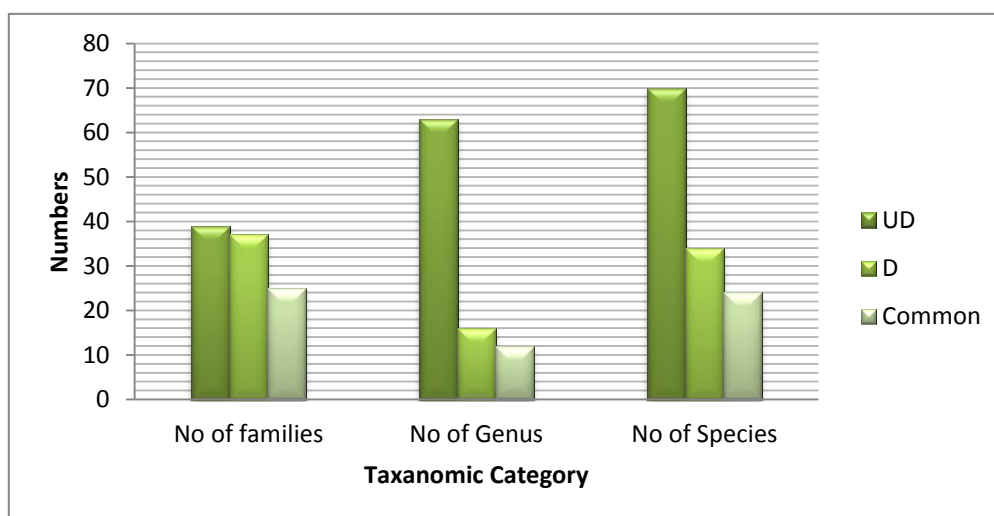


Fig 4- Graph showing plant community attributes in undisturbed and disturbed stand.

**Table 1- List of plant species present in the undisturbed (UD) and disturbed (D) catchment area of Serlui river in vicinity of Serlui-B hydel project and their utility values**

Sl.	Scientific Name	Family	Local Name	Habit	UD	D	Plant parts used	Medicinal value
1	<i>Abelmoschus moschatus</i> Medic.	Malvaceae	Uichhuhlo	Herb	-	+	Roots, Seeds and Bark	The roots and leaves are boiled and the water is administered for syphilis. The crushed root is applied externally on wounds/ulcers to suck the pus out. Powdered seeds are taken with water for throat pain.
2	<i>Acer laevigatum</i> Wall.	Aceraceae	Thing-khim	Tree	+	-	Wood	Wood is used for buildings, firewood etc.
3	<i>Achyranthes aspera</i> Linn.	Amaranthaceae	Ui-hlo/BuChhawl	Herb	+	+	Whole plant	The juice of the leaves is applied on boils and piles. Infusion of the plant is taken for dysentery and colic. Juice of leaves is applied on skin ulcers and wounds of dogs. Flowering spikes with sugar is given to people bitten by mad dogs.
4	<i>Achyranthes bidentata</i> Blume	Amaranthaceae	vang-vat-tur	Herb	+	-	Whole plant	The leaves are eaten cooked as vegetable. The plant is used as diuretic and astringent, urination, suppressed menstruation, painful urethritis etc. Juice of the leaves is applied on sore caused by leech bite.
5	<i>Acmella uliginosa</i> (Sw.) Cass	Asteraceae	An-sa-te	Herb	+	+	Whole plant	It is used as a vegetable and for pig feed.
6	<i>Ageratum conyzoides</i> L.	Asteraceae	Vailen-hlo	Herb	+	+	Roots and leaves	Decoction of roots taken orally for tuberculosis. Juice of the leaves applied on fresh wounds as haemostatic.
7	<i>Albizia chinensis</i> (Osborne) Merr.	Mimosaceae	vang	Tree	+	-	Gums, bark, leaves and wood	The gum is applied on forehead to cure headache. Infusion of bark is used as lotion for skin burn and scabies. Bark is used to poison fish. Leaves as cattle fodder.
	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Len-hling	Herb	-	+	Whole plant	Tender leaves eaten cooked as vegetable and also for pig feed. Roots, leaves, stem and flowers are used in



Sl.	Scientific Name	Family	Local Name	Habit	UD	D	Plant parts used	Medicinal value
8								<p>medicine.</p> <p>Juice of plant is used as antidote in snake bite.</p> <p>The roots are rubbed on grindstone and dipped into a cup of water and then drunk for hemorrhage.</p> <p>The leaves are boiled and the water is drunk for difficult urination.</p> <p>Juice of crushed leaves is used to stop bleeding from the nose.</p> <p>Juice of twigs in combination with <i>Bacopa monnieri</i> is used for headache and hemicranias.</p>
9	<i>Amaranthus viridis</i> Linn.	Amaranthaceae	Zamzo	Herb	+	+	Whole plant	<p>The leaves are eaten cooked as vegetable.</p> <p>Leaves are used as emollient and also used for feeding pigs.</p>
10	<i>Amomum dealbatum</i> Roxb.	Zingiberaceae	Aidu	Herb	+	-	Roots, leafy shoots/ stem and fruits.	<p>The young shoots and buds are eaten cooked or fried.</p> <p>The plant is used for the cure of enlargement of liver.</p> <p>Stem for tying purpose.</p> <p>Leaves for fermenting cooked soyabeans.</p> <p>Fruits are sweet and edible.</p>
11	<i>Anthocephalus cadamba</i> (Roxb.) Miq	Rubiaceae	Banphar	Tree	+	-	Wood, leaves and fruit	<p>The timber is used for plywood, light construction, pulp and paper, boxes and crates, dug-out canoes, and furniture components.</p> <p>Kadamb tree leaves are used for curing diabetes.</p> <p>Fruits are eaten by animals.</p>
12	<i>Artocarpus heterophyllus</i> Lam.	Moraceae	Lam-khuang	Tree	+	-	Whole tree	<p>Wood is used for furniture, building etc.</p> <p>Pulp of the fruit is edible.</p> <p>Young fruit and seeds is used as vegetable.</p> <p>Decoction of root is useful in fever, diarrhoea, asthma and sterility in women.</p> <p>Leaves for fever, skin diseases, wounds, boils, etc.</p>
	<i>Bauhinia variegata</i> L.	Caesalpiaceae	Vaube	Tree	+	-	Bark, wood, leaves and root	<p>Wood is used for tool handles, firewood, charcoal etc.</p> <p>The leaves, tender fruit,</p>



Sl.	Scientific Name	Family	Local Name	Habit	UD	D	Plant parts used	Medicinal value
13								flowers and flower buds are eaten as vegetable. Decoction of roots given in dyspepsia. Decoction of bark/leaves is taken orally for diarrhoea and is useful in menstrual disorder, intestinal worms, piles, diabetes, diarrhoea and dysentery.
14	<i>Begonia inflata</i> (Clarke)	Begoniaceae	Sekhupthur	Herb	+	-	Whole plant	The plant is boiled with the bark of <i>Engelhardtia spicata</i> Leschn. Ex Bl. and the water is drunk against piles disorder and dysentery. The plant is eaten raw against food allergy e.g.: fish. The white roots are boiled in water and the water is taken as effective remedy against genito-urinary problems.
15	<i>Bidens pilosa</i> L.	Asteraceae	Vawkpuithal	Herb	+	+	Whole plant	Aerial parts of the plant is boiled and taken orally for diarrhoea and dysentery. Juice of the leaves is employed to treat eyes and ear infections and skin in general. Leaves are cooked for pig feed and also eaten by cattles and horses.
6	<i>Blumea balsamifera</i> (L.) DC.	Asteraceae	Buarthau	Shrub	+	+	Whole plant	Decoction of the leaves is given orally in asthma cough, diuretic and externally during bath to reduce oedema. The exudate is used in tooth decay. Decoction of the stem and root given orally in common cold. The plant is also used as fish poison.
17	<i>Caesalpinia cucullata</i> Roxb.	Caesalpinaceae	Hling-vawn/hling-khang	Climber	+	-	Unknown	Unknown
18	<i>Callicarpa arborea</i> Roxb.	Verbenaceae	Hnahkiah	Tree	+	-	Bark, leaves, wood, white powder or pruinose of young shoots	Juice of the inner coat of the bark is effectively used as haemostatics on cuts. Decoction of bark and leaves is used for diabetes, cholera, dysentery, diarrhoea, internal bleeding, colic and stomach ulcer. Leaves used for



Sl.	Scientific Name	Family	Local Name	Habit	UD	D	Plant parts used	Medicinal value
								preparing fermented soyabeans. Wood is used as firewood.
19	<i>Canarium strictum</i> Roxb.	Burseraceae	Berawthing	Tree	+	-	Bark, fruit and resin	The bark is boiled in water and the water is used for bathing as an effective cure for skin rash caused by the sap of <i>Drimycarpus racemosus</i> (Roxb.) Hook.f. Infusion of bark or fruit is taken orally for colic. 2-5 fruits are eaten against water-brash. The resin is used as an adhesive for fixing daos in the handle. The burning smoke of the resin is used to ward off mosquitoes.
20	<i>Cassia alata</i> L.	Fabaceae	Tuihlo	Shrub	+	+	Leaves	Pastes of leaves mixed with salt is rubbed with a slice of brinjal on the ringworm or other related skin diseases and then bandaged.
21	<i>Castanopsis indica</i> (Roxb.ex Lindl) A.DC.	Fagaceae	Se-hawr	Tree	+	-	Wood, leaves and fruit	Woods is used for buildings, furniture, axe handle, firewood etc. The leaves are used for cigarettes, and the nut are eaten by man, wild pigs, bears, squirrels etc.
22	<i>Castanopsis tribuloides</i> (Sm.) A.DC.	Fagaceae	Thing-sia	Tree	+	-	Wood, stem, nuts	Wood used for house posts, firewood and charcoal. Juice of the stem is recommended for infection in mouth of children. The nuts are eaten by man, wild animals like bears, monkeys etc.
23	<i>Chromolaena odorata</i> L.	Asteraceae	Tlangsam	Shrub	+	+	Leaves	The juice of the leaves is applied externally on fresh wounds as haemostatic.
24	<i>Cissus repens</i> Lam.	Vitaceae	Hruipawl	Climber	+	-	Whole plant	The leaves are used as a vegetable and also chewed as a cure for teeth set on edge through eating acid fruits. Paste of the roots mixed with little salt is useful as a poultice for tumours, and decoction of the roots, stem and leaves for inflamed kidneys. The plant is also used for fig feed.



Sl.	Scientific Name	Family	Local Name	Habit	UD	D	Plant parts used	Medicinal value
25	<i>Clerodendrum infortunatum</i> L.	Verbenaceae	Phuihnamchhia	Shrub	+	-	Root and leaves	The roots and twigs are boiled and the water is drunk for diarrhoea and dysentery associated with fever and vomiting/nausea. Infusion of leaves is used for washing hair against dandruff. The leaves are tonic and used in malaria, scorpion sting and snake-bite. The roots or leaves are boiled and the water is used for bathing in case of scabies and other skin diseases, and also used for washing hair to eliminate scurf.
26	<i>Colocasia esculenta</i> (Linn.) Schott.	Araceae	Dawl or Bal	Herb	+	-	Whole plant	The corm, stem and young leaves are eaten as vegetables. The acrid juice is applied to wounds and bee-sting. The whole plant is used for pig feed and the corm is also eaten by wild boar, porcupine, etc.
27	<i>Conyza bonariensis</i> (L.) Cronquist	Asteraceae	Buar-zen	Herb	+	-	Leaves	The leaves are useful in rheumatism. Tender leaves are sometimes eaten as curry.
28	<i>Conyza lanceolaria</i> (Roxb.) Druce	Asteraceae	Buarze	Shrub	-	+	Leaves	The tender leaves are eaten cooked as vegetable. The leaves are recommended for stomach ulcer, indigestion, asthma, T.B., chronic dysentery etc. The juice of the leaves is also applied externally to scabies, skin diseases, sores, dandruff etc. Juice of leaves is applied on animal sores and ulcers.
29	<i>Costus speciosus</i> (Koenig) Sm.	Costaceae	sumbul-sen	Herb	+	+	Rhizome and seeds	Cold infusion of the rhizome is taken orally for kidney trouble and leprosy. Juice of rootstock is taken for stomatitis. Juice of crushed rhizome is taken for catarrhal fever. The powdered seed mixed with local liquor is taken against malaria.



Sl.	Scientific Name	Family	Local Name	Habit	UD	D	Plant parts used	Medicinal value
								Young shoots are boiled and salted and taken as vegetable.
30	<i>Crotalaria linifolia</i> Linn.	Fabaceae	Unknown	Herb	+	+	Not known	Not known
31	<i>Crotalaria pallida</i> Aiton	Fabaceae	Ram-tum-thang	Shrub	+	+	Roots and leaves	The plant is used to treat urinary problems and fever. A Poultice of the roots is applied to swelling joints. Leaves are taken to expel intestinal worms.
32	<i>Curculigo capitulata</i> (Lour.) Kuntze	Hypoxidaceae	Phaiphek	Herb	+	-	Roots and immature stem	Juice of roots is taken orally for stomachache and headache. Grounded paste of the immature tender stem is applied on deep cuts and wounds as effective haemostatic.
33	<i>Cyclosorus extensa</i> Naud.	Thelypteridaceae	Limbirsi	Herb	+	-	Leaves	Leaves are used in treatment of backpain.
34	<i>Cynodon dactylon</i> (L.) Pers	Poaceae	Phaitual hnim	Herb	+	+	Whole plant	Leaves are used as fodder; it is good for lawn grass and soil stabilizer. Whole plant, fruit, leaves and root are used to treat piles, painful urination, vomiting tendency, vomiting with blood, blood dysentery, failure of pregnancy, sore tongue, minor cuts, sinusitis, liver cirrhosis, indigestion, burning during urination, body swelling, uterus infection, night ejaculation etc.
35	<i>Dichrocephala integrifolia</i> (L.f) Kuntze	Asteraceae	vawk-ek-a-tum-tual	Herb	-	+	Whole plant	It is used for dyspepsia, indigestion, as an antiphlogistic, and as an antiemetic. The tender shoots are used as poultice for insect bites and stings. The leaves are eaten by rabbit and rats. Decoction of flower bud is used as diuretic.
36	<i>Dicranopteris linearis</i> (Burm.f) Underw	Gleicheniaceae	Katchat-var	Herb	+	-	Whole plant	The plant is used to expel intestinal worm, to treat boils, ulcers, and wounds. Leaves are woven into matting. Rhizomes are used as a source of edible starch.
37	<i>Diplazium</i>	Athyriaceae	Cha-kawk	Herb	+	-	Whole	Whole plant is used for



Sl.	Scientific Name	Family	Local Name	Habit	UD	D	Plant parts used	Medicinal value
	<i>esculentum</i> (Retz) Sw.						plant	skin disease. The young fronds are stir fried as vegetable or used in salad.
38	<i>Eleusine indica</i> (L.) Gaertn	Poaceae	Unknown	Herb	+	+	Roots	Roots are considered sudorific and used in liver complaints, wounds and boils.
39	<i>Eupatorium perfoliatum</i> L.	Asteraceae	Unknown	Herb	+	-	Not known	Used in treating dengue fever.
40	<i>Euphorbia hirta</i> L.	Euphorbiaceae	Zawhte-hlo	Herb	+	-	Whole plant	The plant is eaten cooked as vegetable, and also used as a cure for bronchial asthma, cough, stomach-ache, diarrhoea, dysentery, kidney stones and to increase mother's breast milk. The milky juice is applied on wounds and sores.
41	<i>Galinsoga parviflora</i> Cav.	Asteraceae	Sazu(Pui) chaw	Herb	+	+	Leaves, stem and flowering shoots	Extract of leaves with salt is given in fever, diarrhoea and vomiting. Leaves of this plant, along with those of <i>Ageratum conyzoides</i> , <i>Drymaria cordata</i> , and ginger are grounded into a paste and applied as a remedy for snake-bite by the Khasis and Jaintias of Meghalaya. The leaves, stem and flowering shoots are eaten raw or cooked as a pot herb. Juice of the plant is applied to new wounds.
42	<i>Galinsoga quadriradiata</i> Ruiz & Pavon	Asteraceae	Unknown	Herb	+	-	Whole plant	It is used as an antidote to snake bite. Leaf juice is used to stop bleeding. The herb is rubbed on the skin against nettle stings.
43	<i>Gnaphalium luteo-album</i> L.	Asteraceae	Unknown	Herb	+	-	Leaves	Leaves astringent, vulnerary, diuretic, febrifuge, haemostatic, cholagogue.
44	<i>Gynura conyza</i> Cass.	Asteraceae	Buar-ze	Herb	+	+	Leaves	Decoction of leaves is used in tuberculosis, cancer dysentery, stomach ulcer, asthma, jaundice etc. Juice of leaves is applied externally in chronic or obstinate ulcer, scabies, fresh wounds, and skin diseases and as a shampoo for treatment of dandruff.



Sl.	Scientific Name	Family	Local Name	Habit	UD	D	Plant parts used	Medicinal value
45	<i>Homalomena aromatica</i> Schott.	Araceae	Anchiri	Herb	+	-	Petiole and rhizome	The petiole is taken as vegetable. Juice of the whole plant is used as skin lotion in skin diseases. Juice of the roots or stalk is roped into the ear for healing otorrhoea. The stalks are eaten by tortoise. Burnt smoke of dried rhizome is used as mosquito repellent. Rhizomes are used in manufacturing perfumes. Dried rhizomes are used in preparation of tobacco and snuff.
46	<i>Hydrocotyle asiatica</i> L.	Apiaceae	Lambak	Herb	+	-	Leaves, roots	Leaf juice is given orally in diarrhoea and applied externally on the swollen parts of the body. Decoction of the root is taken orally daily in beriberi, dysentery and peptic ulcers. Decoction of the dried leaves is given orally in the treatment of hypertension. The dried powdered leaf is mixed with mustard oil and applied as an ointment on the chest in coughs. The leaf juice mixed with honey or sugar is given orally as a blood purifier and as a sedative.
47	<i>Ichnanthus vicinus</i> (Bailey) Merr.	Poaceae	Unknown	Herb	+	+	Leaves	Leaves are used as fodder.
48	<i>Imperata cylindrica</i> (L.) Raeusch.	Poaceae	Di	Herb	-	+	Leaves, roots	Leaves are commonly used for thatching. The roots are used for wounds, diarrhoea, dysentery, expelling thread worms and other worms from the body.
49	<i>Ipomoea hederifolia</i> L.	Convolvulaceae	Ni-pui-par	Herb	+	-	Root, leaves, nectar	The root is used medicinally. Leaves are browsed by barking deer, serow etc. Flower nectar is sucked by birds.
50	<i>Kyllingia brevifolia</i> Rottb.	Cyperaceae	Pisum-bur	Herb	-	+	Whole plant	Used as fodder.
51	<i>Kyllingia monocephala</i> Rottb.	Cyperaceae	Artelubawk	Herb	-	+	Unknown	Unknown



Sl.	Scientific Name	Family	Local Name	Habit	UD	D	Plant parts used	Medicinal value
52	<i>Lantana camara</i> L.	Verbenaceae	Shilong flangsam	Shrub	-	+	Whole plant	Decoction of the whole plant is used externally as antitetus agent. Also given orally in rheumatism and malaria.
53	<i>Lepidagathis incurva</i> F.Ham. ex D.Don	Acanthaceae	vangvattur	Herb	+	-	Leaves	The leaves are crushed and the juice is applied on leech bite.
54	<i>Leucas aspera</i> (Willd.) Link	Lamiaceae	Unknown	Herb	+	+	Leaves	Used as a common pot herb to develop resistant against diseases.
55	<i>Lygodium scandens</i> (L.) Sw.	Lygodiaceae	Dawnzem	Herb	+	-	Unknown	Unknown
56	<i>Melastoma malabathricum</i> L.	Melastomaceae	Builukhampa	Shrub	+	+	Whole plant	Fruits are edible. The leaves are used for cuts, diarrhoea, and dysentery. The whole plant is used for high blood pressure.
57	<i>Melocana baccifera</i> (Roxb.) Kurz	Poaceae	Mautak	Herb	+	+	Stem and wood	The outer skin is scraped off and applied on cuts as haemostatic. Culm and leaves is used for house construction and thatch roofs. Wood is used as fuelwood. Mature rhizome as tool handle. Young shoot is eaten as food.
58	<i>Mikania micranta</i> Kunth	Asteraceae	Japan-hlo	Herb	+	+	Leaves	The juice of the crushed leaves is used as an effective haemostatic in cuts and wounds externally. The leaves are boiled and the water is drunk against diarrhoea and dysentery associate with fever. The leaves are locally used for pig feed.
59	<i>Mimosa pudica</i> L.	Mimosaceae	Hlonuar	Shrub	+	+	Roots, leaves	Infusion of root is taken orally for the removal of stones in the kidney/gall-bladder. Dried leaves are smoked as cigarettes to remove tooth worms from the mouth. Juice of the fresh leaves is applied on boil.
60	<i>Mirabilis jalapa</i> L.	Nyctaginaceae	Artukhuan	Herb	+	-	Roots, leaves	The leaves are applied to boils, phlegmons and whitlow, as a maturant. Decoction of the tuberous roots is used for curing fever and diabetes.



Sl.	Scientific Name	Family	Local Name	Habit	UD	D	Plant parts used	Medicinal value
								The leaves are used externally for itching and also for pig feed.
61	<i>Oxalis corniculata</i> (L.)	Oxalidaceae	Siak-thur	Herb	+	+	Leaves	Fresh leaves made into curry are said to improve the appetite and digestion of dyspeptic patients. The plant is used in fevers, diarrhoea and dysentery and externally for removing warts and eyes diseases. The stalks and leaves are also used for fodder.
62	<i>Paederia foetida</i> L.	Rubiaceae	Vawih-uih-hrui	Climber	+	-	Leaves and Stem	The whole plant is regarded as a specific for rheumatic affections. Juice of the crushed leaves is used for diarrhoea and dysentery. The stem and leaves are also chewed for relief in toothache and gum boils.
63	<i>Physalis maxima</i> (Mill)	Solanaceae	Unknown	Herb	-	+	Leaves, fruits	It is used as tonic, diuretic and laxative in inflammation, enlargement of the spleen and as a helpful remedy in ulceration of the bladder. The leaves are crushed and applied over snakebite. Fruits of this plant are used to cure spleen disorders and is said to be appetizer, bitter diuretic, laxative and tonic. Juice of the leaves mixed with mustard oil and water is a remedy for earache.
64	<i>Polygonum persicaria</i> L.	Polygonaceae	Unknown	Herb	+	+	Leaves, shoot	It is used against diarrhoea and infections. Leaves and young shoots are eaten as vegetable. A yellow dye can be produced from this plant.
65	<i>Polygonum punctatum</i> Elliott	Polygonaceae	Unknown	Herb	+	-	Unknown	Unknown
66	<i>Pteridium aquilinum</i> (L.) Kuhn.	Polypodiaceae	Katchat	Herb	+	-	Rhizome and fruits	Rhizomes and fruits are used in treatment of chronic visceral and spleen troubles.
67	<i>Rhus semialata</i> Murray	Anacardiaceae	Khawm-hma	Tree	+	-	Wood, Fruits, Leaves	Wood is used for fence posts and gun powder charcoal. Decoction of leaves is recommended for colic,



Sl.	Scientific Name	Family	Local Name	Habit	UD	D	Plant parts used	Medicinal value
								diarrhoea and dysentery. The leaves are boiled and the water is used for bath in case of suffering from measles. Juice of the crushed leaves is also applied on rashes. The fruits are eaten by man, squirrels, and birds like bulbuls, red jungle fowl etc.
68	<i>Saccharum ravennae</i> L.	Poaceae	Unknown	Herb	-	+	Leaves	Young leaves are used for cattle fodder.
69	<i>Scoparia dulcis</i> L.	Scrophulariaceae	Perhpawng-chaw	Herb	+	+	Whole plant	The aerial part are crushed and mixed with water, strain and taken for renal disorder, jaundice, and genito-urinary trouble. Infusion of plant is taken orally as an effective remedy for diarrhoea and dysentery associated with stomach ache. Decoction of roots is taken against fever; it is also used for the removal of stones in gall bladder. Juice of crushed leaves and paste is applied on burns, sores and ulcers. Juice of leaves is used as haemostatic.
70	<i>Sida acuta</i> Burm. f.	Malvaceae	Khing-khieh	Shrub	+	-	Stem, roots, leaves	The stems yield a good fibre, and the branchlets are used as brooms. Roots are used for nervous and urinary diseases, fever and common stomach ailment. Tender leaves are eaten as vegetable.
71	<i>Sida rhombifolia</i> L.	Malvaceae	Kel-chawngi-mai	Shrub	+	-	Root, leaves	The root and leaves are good in urinary complaints, discharges and strangury, useful in fever, heart diseases burning sensation.
72	<i>Smilax lanceifolia</i> Roxb.	Smilacaceae	Kaiha	Shrub	+	-	Roots	Fresh root juice is taken for cure of rheumatism.
73	<i>Solanum indicum</i> L.	Solanaceae	Tawkte	Shrub	+	-	Fruits, root	The unripe fruit are eaten as vegetable. The root and fruits are used in asthma, dropsy, dysuria, fever and colic. The crushed fruits are also applied to scabies, burns, boils, bites of snakes, centipede, and



Sl.	Scientific Name	Family	Local Name	Habit	UD	D	Plant parts used	Medicinal value
								scorpion. Flowers and fruits is also eaten by barking deer.
74	<i>Solanum khasianum</i> C.B. Clarke	Solanaceae	At-hlo	Shrub	-	+	Fruits/seeds	The fruit or seeds are used for toothache. Eaten by cattle and barking deer.
75	<i>Solanum nigrum</i> L.	Solanaceae	Anhling	Shrub	+	-	Whole plant	Infusion of plant is prescribed for liver problems and dropsy. Leaves and tender shoots is eaten as vegetable.
76	<i>Solena heterophylla</i> Lour.	Cucurbitaceae	Nawh-Phuai	Climber	+	-	Fruits, leaves, roots	The tender leaves, tuberous roots and fruits are edible. The fruit is used as soap for washing clothes, and the fibrous fruit as brush for pots and plates etc. The leaf juice is applied to parts inflamed due to the application of the juice of marking nut. Decoction of root is recommended for treating malaria, diabetes etc. and the seeds as a purgative.
77	<i>Tadehagi triquetrum</i> (L.) H. Ohashi	Fabaceae	Ui-fawm-ar-ring	Shrub	+	-	Leaves	The leaves are used as tea leaves. Decoction of leaves is used in dysentery and flatulence.
78	<i>Tinospora cordifolia</i> (Willd.) Miers	Menispermaceae	Theisawntlung	Climber	+	-	Stem, leaves	The stem juice is taken orally as antipyretic. Decoction of the dry stem is given orally as an aphrodisiac. The juice of the leaf and stem is taken orally as a diuretic and in gonorrhoea.
79	<i>Urena lobata</i> L.	Malvaceae	Se-hnao	Shrub	+	+	Roots, bark	Infusion of roots is taken as diuretic. Decoction or pounded roots is applied for rheumatism. Cold water extract of bark is given orally as stomachic and analgesic.
80	<i>Vernonia patula</i> (Dryand.) Merr	Asteraceae	Unknown	Herb	+	-	Whole plant	The plant is tonic, stomachic, astringent, and strong. Decoction is used to promote perspiration in febrile condition, is given in diarrhoea, dropsy, cough stomachache colic. Juice of the plant is useful in piles, malaria and incontinence of urine in children.



Sl.	Scientific Name	Family	Local Name	Habit	UD	D	Plant parts used	Medicinal value
								The flowers are used in conjunctivitis, fever and rheumatism, also given in cough, leucoderma, and other chronic skin diseases.
81	<i>Vitex peduncularis</i> Wall. ex Schauer	Verbenaceae	Thingkhawihlu	Tree	+	-	Wood, leaves, bark	Wood is used for firewood, charcoal, etc. Infusion of the bark/leaves is used against black water fever, malarial fever, jaundice, typhoid, stomach ulcer, and stones in kidney.
82	<i>Ziziphus jujuba</i> Mill.	Rhamnaceae	Bo-rai	Tree	-	+	Wood, fruits	Wood is used for house construction, gunstocks, tool handles, firewood, and charcoal. The leaves are lopped for fodder. The fruits are eaten by man, bears, small Indian civets pigeons etc.

CONCLUSIONS

Diverse plant species of ecological importance were found in the undisturbed site. Majority of the plant species recorded during the present study were used for variety of purposes ranging from food, fodder, medicinal, firewood etc. by the local villagers. A changing pattern in the structure of the plant community was observed in response to the disturbance due to construction of Serlui-B dam. With the increase in the intensity of disturbance a decrease trend in the diversity and distribution of species was seen. Construction of dam has led to removal of majority of the dominant tree species with secondary growth or weedy species. The results also indicate that the species dominant at the disturbed site maybe tolerant to stress and able to survive under such harsh influence of disturbance. On the other hand, species sensitive to the disturbance shows poor growth rate

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and some species were totally eliminated from the disturbed site due to the increased stress caused due to the degree of disturbance.

The comprehensive study indicates that species rich communities of the Serlui river catchment area has not only reduced in area but also has become less diverse and poor in species richness due to the construction of the dam. Therefore, significant measures are required to conserve the intact forest patches left in the catchment area of Serlui river in vicinity of the hydel project so that the high rate in the loss of biodiversity and disappearance of the species rich community is terminated.

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