

An ethnobiological survey and the impact of different environmental and anthropogenic factors on the livelihood of biological dwellers of Garhbeta -II block of Midnapur Sub-division of Paschim Medinipur District of West Bengal.

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ABSTRACT

Ethnobiological use of different botanical and zoological lives in the livelihood of inhabitants of Garhbeta -II block of Paschim Medinipur District of West Bengal is a symbol of heritage and tradition. A survey was carried out to notify how far the different environmental and anthropogenic impacts like pollution, climate change, habitat destruction, resource depletion adversely effects on biodiversity, ecological habitat, ecological niche of the ethnobotanical and ethnozoological i.e., ethnobiological dwellers. Growth pattern of naturally grown biological dwellers and the cultivated ones abruptly fall due to synchronizing development of urbanization as a symbol of modern civilization. Gradual rising of temperature shows its direct effect on different biological population characters. To prevent the habitat loss of biological resources, their essentiality in the Globe should be spread out to all of us especially to the reluctant youngsters through documentation. This documentation will also provide and enrich data in TKDL, PBRs. Among large plants and animals' diversity in the said area, selected biological dwellers were taken into consideration for their documentation of different traditional uses and their present life-threatening position with proper causes in the light of ecology. Future sustainable approach to the path of civilization was also taken into consideration.

Key Words - Biological dwellers, ethno-biology, ecological habitat, ecological niche TKDL, PBRs.

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INTRODUCTION

Our selected study area i.e., Garhbeta -II block is situated in Paschim Medinipur district of West Bengal. It is the part of the belt of the Chotanagpur Plateau that gradually slopes down towards the east, creating an undulating surface with infertile, lateritic soil. The landscape changes from dry deciduous forest to marshy wetlands gradually from west to east. The selected area covered 90% with alluvial soil and remaining 10% with alluvium soil

as it seems naturally. The area is elevated from sea levels 38 metre. The major scheduled tribe community is santal here according to 2011 census. The Paschim Medinipur district has a forest cover of 1,71,935 ha, among them Garhbeta II block has forests that cover 15,712 ha, which is about 10% of the reporting area (State Forest Reports 2012). The forest of this area is characterized by tropical dry deciduous forest and major species are *Shorea*

robusta Gaertn.(Dipterocarpaceae) (Sal), *Tectona grandis* L.f.(Lamiaceae)(teak), *Vachellia nilotica* (L.)P.J.H.Hurter & Mabb.(Fabaceae)(Babla), *Madhuca longifolia* (J.Koenig ex L.)J.F.Macbr. (Sapotaceae)(mahua) and *Phyllanthus emblica* L.(Phyllanthaceae) (amlaki) etc. Sal is the dominant species in terms of ecological, environmental and socio-economic aspect.

MATERIALS & METHODOLOGY

The data adopted for this study is qualitative only in nature. A semi-structured questionnaire was prepared based on previous literature and expert opinions of India's pioneer ethnobotanists (Jain and Rao,1977, followed by Mahto and Kumar, 2002). The data were collected by using the questionnaire, observations, interviews, and information from community elders and the knowledgeable ones about the distribution of forest resources, species composition, NTFPs (non-timber-forest-products) utilization and their other medicinal or economic benefits. The whole area especially the santal tribal dominated areas according to 2011 census are taken into consideration of target survey. For the collection of traditional ethno-medicinal and traditional ecological knowledge (TEK) based data required permission from the relevant authorities *i.e.*, Rural Panchayats were taken prior to survey. Moreover, it has also been obtained permission from the interviewees. A random choice with agreed interviewees was used for household survey in sparsely dispersed house in nature. The opinion survey involved community elders who have a strong association with the traditional uses of forest resources and indigenous methods of forest preservation. Among the total respondents, there was some males and others were female. It is noteworthy that female members of selected households were questioned more frequently in case of NTFPs because women are the main collectors as well as carriers of NTFPs in the study area. Again, in this area the number and knowledge of respondents were higher in case of male than female regarding the matter of ethno-medicinal issues. The concentration of tribal population and

literacy rate were collected from the Census of India (2011).

The common semi-structured questionnaire method for ethnomedicinal survey is as under (Jain and Rao,1977, followed by Mahto and Kumar, 2002): -
Proforma: Information from the Herbal Healers/ medicine men:

Date of visit:

1. Name:
2. Age: 3. Sex: 4. Experience in years:
5. Clan:
6. Education:
7. Address:
8. Specialization if any?
9. Self Started or Hierarchical:
10. No. of such persons in the locality:
11. Position they hold in the society:
12. Patients come from which area?
13. Number of patients treated by him till now:
14. From where plant materials are collected (forest/Wetlands/Garden/Cultivated land/Hat/Bazaar/Shop)?
15. Beside plant materials which other items is used for treatments?
16. Which type of preparation is used to apply the patients (self-made/others made/laboratory made/raw plant parts)?
17. Do you prefer collection of specific drugs on some specific days?
(i) Morning (ii) Noon (iii) Evening/Night (iv) No moon/Full moon (v) Any day
18. Do you follow any special offerings /hymes before presenting the prepared medicines to the patients? Would your advice or like to direct them in any way?
19. Interaction with patients:
20. Mode of treatment:
21. Plants used in medicine:
22. Local name/Botanical name/Parts used:
23. Treatments of Ailments:

RESULT & DISCUSSION

The traditional ethno-medicinal uses of the documented plants in the selected studied area are listed minutely in the following table.

Sl. No.	Scientific name	Family	Local name	Parts used	Application in diseases
1.	<i>Shorea robusta</i> Gaertn.	Dipterocarpaceae	Sal	1. Bark 2. Resin 3. Leaves 4. Seeds	1. Resin is used to heal wound due to burning. 2. Bark decoction is used to heal any chronic wound 3. Seeds are mixed with bee wax to maintain skin health. 4. Leaf decoction is used to treat piles, skin diseases.
2.	<i>Tectona grandis</i> L.f.	Lamiaceae	Segun	1. Bark, 2. flowers	1. Bark paste is applied on belly to treat dyspepsia. 2. Flowers are useful for diabetic patients.
3.	<i>Vachellia nilotica</i> (L.)P.J.H.Hurter & Mabb.	Fabeceae	Babla	1.Bark, tender shoot 2.Seed	1. Tender shoot is rapidly used as an astringent in gum bleeding, toothache. 2. Bark and Seed are used in severe gastritis, diarrhoea
4.	<i>Madhuca longifolia</i> (J.Koenig ex L.)J.F.Macbr.	Sapotaceae	mahua	1.Flower 2.Seed oil 3.Seed cake	1. Flowers are traditionally used as aphrodisiac, expectorant and used in country liquor. 2. Seed oil is used as cooking oil by local tribals, in soap formation. 3. Seed cake is used as a soil improver, organic manure.
5.	<i>Phyllanthus emblica</i> L.	Phyllanthaceae	amlaki	Fruit	1. Raw fruit is used to increase hepato-protective activity in human, to control diabetes, used to treat uncontrolled hair fall and premature hair greying.
6.	<i>Buchanania lanzan</i> Spreng.	Anacardiaceae	Piyal	1.Leaves 2.Gum 3.Bark 4.Seed	1. Leaves used as digestive tonic. 2. Gum used in diarrhoea, intercostal pain. 3. Bark is used in diarrhoea, intestinal infection. 4. Seeds are used as aphrodisiac.
7.	<i>Butea monosperma</i> (Lam.)Taub.	Fabaceae	Palash	1. Seeds 2. Flowers 3. Bark 4. Leaves	1. Seed powder and seed decoction is used as vermifuge to come round from intestinal worms. 2. Flower extract is used to maintain skin health and skin glowing. 3. Bark decoction is used as an astringent in dysentery and menstrual pain. 4. Leaves are applied as an external paste to boils, skin irritations.
8.	<i>Diospyros melanoxylon</i> Roxb.	Ebenaceae	Kendu	1. Leaves 2. Bark 3. Flower 4. Fruit 5. Seed	1. Leaf decoction is used as carminative, laxative. 2. Bark decoction is used as an astringent in dysentery and diarrhoea, dyspepsia. 3. Dried flowers are used to treat leucorrhoea. 4. Seed decoction is used to treat tachycardia/palpitation in heart. 5. Raw Fruits are eaten by tribals to regulate bile discharge.
9.	<i>Terminalia arjuna</i> (Roxb.ex DC.) Wight&Arn.	Combretaceae	Arjun	1. Bark	1.Bark paste is widely used to regulate hypertension, chest pain. 2.Bark is used externally as an astringent in eczema, psoriasis.
10.	<i>Terminalia belerica</i> Roxb.	Combretaceae	Bahera	1.Fruit 2.Fruit powder 3.Seed oil	1. Raw fruit are widely used as laxative, to manage sore throats. 2. Fruit powder and seed oil are applied to promote hair follicle growth, premature greying of hair.
11.	<i>Terminalia chebula</i> Retz.	Combretaceae	Haritaki	1.Fruit	1.Raw fruit is used as a mild purgative and as laxative, managing diabetes and cardiovascular health and also as an anti-ageing agent for skin.
12.	<i>Holarrhena pubescens</i> Wall.ex G.Don	Apocynaceae	Kurchi	1.Bark 2.Seed	1. Bark is widely used in chronic dysentery and diarrhoea. 2. Seeds are anthelmintic, used to treat chronic amoebiasis
13.	<i>Semecarpus anacardium</i> L.f.	Anacardiaceae	Vela	1.Fruit	1.Externally used in skin rashes, sciatica, paralysis.

14.	<i>Butea superba</i> Roxb.	Fabaceae	Lata palash	1.Root	1.Root extract is widely used as aphrodisiac and maintain neuro-protective impairment.
15.	<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Buno alu	1. The bulbils i.e. aerial tubers 2. Leaves	1. Leaves are used as an analgesic to manage rheumatism. 2. Tuber extract is widely used in psoriasis, eczema.
16.	<i>Acacia catechu</i> (L.f.) Willd.	Fabaceae	Khair	1.Plant shoot	1. The shoot is widely used in toothache, mouth ulcers. 2. Widely used as an astringent in burnt areas.
17.	<i>Aegle marmelos</i> (L.) Correa	Rutaceae	Bel	1. Fruit 2. Seed 3. Leaf	1. Unripe fruit is used for curing gastro-intestinal trouble. 2. Seed extracts are widely used to manage diabetes. 3. Leaf extract is mixed with honey used as febrifuge.
18.	<i>Anogeissus latifolia</i> (Roxb.ex DC.) Wall.ex Bedd.	Combretaceae	Dhaba	1. Bark 2. Gum	1. The bark decoction is used for the treatment of diabetes management, as an astringent in wound healing. 2. The Gum exudate is widely used in hepato-protective trouble.
19.	<i>Artocarpus heterophyllus</i> Lam.	Moraceae	Kanthal	1. Fruit 2. Leaves 3. Seed 4. Bark	1. Fruit is used as seasonal immune booster. 2. Leaf extract is used to manage diabetes. 3. Seeds are used as diuretic agents. 4. Bark extract is used to treat extensively in diarrhoea.
20.	<i>Ficus hispida</i> L.f.	Moraceae	Dumur	1. Fruit 2. Leaf 3. Bark 4. Latex	1. Fruit is used to treat dysentery, stomach ulcers. 2. Leaf extract is widely used to manage blood sugar levels. 3. Latex is used as galactagogue. 4. Bark decoction is used in hepatitis.
21.	<i>Ficus religiosa</i> L.	Moraceae	Ashathwa	1. Stem bark 2. Leaves 3. Fruits and seeds 4. Milky latex	1. Bark powder is widely used to manage diabetes. 2. Leaf paste is used in managing skin acne, pimples and sun burnt. 3. Powdered Fruits and seeds are widely used as laxative. 4. Milky latex is used in skin wounds.
22.	<i>Ficus benghalensis</i> L.	Moraceae	Bat	1. Bark 2. Leaves 3. Latex 4. Aerial root	1. Latex is used to treat pimples, acne. 2. Bark extract is used to treat diabetes. 3. Leaf paste is widely used to boost innate immunity. 4. Aerial root is used in toothache, caries.
23.	<i>Ficus racemosa</i> L.	Moraceae	Jaggya dumur	1. Bark 2. Fruit 3. Leaves 4. Latex	1. Decoction of bark is widely used in diabetes. 2. Unripe fruit is used as carminative. 3. Leaf paste is used in dysmenorrhoea. 4. Latex is applied to treat blisters.
24.	<i>Gmelina arborea</i> Roxb.	Lamiaceae	Gamar	1. Fruit 2. Leaves 3. Bark 4. Flower	1. Fruit is used as diuretic and aphrodisiac. 2. Leaves are used as carminative. 3. Bark decoction is used to manage diabetes. 4. Raw flower paste is used in improving skin glowing.
25.	<i>Acacia auriculiformis</i> A.Cunn.ex Benth.	Fabaceae	Akashmoni	1. Leaves 2. Bark	1. Leaf extract is widely used to treat skin rashes. 2. Bark paste is used skin infection, managing blood sugar level.
26.	<i>Eucalyptus globulus</i> Labill.	Myrtaceae	Eucalyptus	1.Essential oil	1. Essential oil is widely used to reduce anxiety, stress, skin trouble, respiratory congestion, neuralgic pain.
27.	<i>Andrographis paniculata</i> (Burm.f.)Wall.	Acanthaceae	Kalmegh	1.Leaves	1.Leaf extract is widely used in hepato-protective management, boosting the immune system.
28.	<i>Bombax ceiba</i> L.	Malvaceae	Simul	1. Bark 2. Flower 3. Leaves 4. Gum	1. Bark decoction is used to alleviate stomach pain. 2. Leaf paste is used to treat acne and pimple. 3. Gum is used as an astringent to dysentery. 4. Raw flower is used to treat menstrual pain.
29.	<i>Strychnos nuxvomica</i> L.	Loganiaceae	Kuchila	1.Seed	1. Detoxified seeds are used to treat extensively in gastro-intestinal trouble, neuralgic pain.

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30.	<i>Dalbergia sisso</i> Roxb.ex DC.	Fabaceae	Shishu	1. Leaves 2. Bark	1. Leaf paste is used as an expectorant, febrifuge. 2. Bark decoction is used as an anthelmintic.
31.	<i>Hemidermus indicus</i> (L.)R.Br.ex Schult.	Apocynaceae	Anantamool	1. Whole Plant	1. Plant extract is used as diuretic, colic, psoriasis.
32.	<i>Smilax zeylanica</i> L.	Smilacaceae	Kumarika	1. Leaves	1. Leaf paste is used to treat eczema, rheumatic pain.
33.	<i>Dendrocalamus Nees</i>	Poaceae	Bansh	1. Leaf 2. Young shoot	1. Leaf decoction is used to come round from cough, asthma, improve bone health. 2. Young shoot extract is extensively used for managing diabetes, hypertension.
34.	<i>Clerodendrum viscosum</i> Vent.	Lamiaceae	Bhant/ Ghentu	1. Leaves 2. Young shoot	1. Leaf juice is widely used as laxative, in scorpion stings. 2. Young shoot decoction is used in toothache, menstrual problems.
35.	<i>Datura stramonium</i> L.	Solanaceae	Dhutura	1. Leaf 2. Seed 3. Bark	1. Dried leaves smoking acts as an anti-asthmatic agent. 2. Oil made from bark is used to reduce arthritis, gout. 3. Seed are brewed to treat neuralgic pain.
36.	<i>Schleichera oleosa</i> (Lour.) Oken	Sapindaceae	Kusum	1. Bark 2. Leaves 3. Seed oil	1. Bark paste is used as an astringent to come-round from skin acne, pimples. 2. Seed oil has extensive external use in headache, rheumatic pain. 3. Leaf extract is used in jaundice, gastritis.
37.	<i>Saraca asoca</i> (Roxb.)De Wilde	Fabaceae	Ashoke	1. Bark 2. Leaf 3. Flower 4. Seed	1. Bark decoction is widely used to regularize menstrual trouble, leucorrhoea. 2. Dried flowers are used to treat dyspepsia, abdominal ulcers. 3. Leaf decoction is externally used to treat rheumatic pain.
38.	<i>Asparagus racemosus</i> Willd.	Asparagaceae	shatamool	1. Root	1. It acts as galactagogue, to manage gastric ulcers, as an immunity booster.
39.	<i>Solanum surattense</i> Burm.f.	Solanaceae	Kanta begun	1. Fruit 2. Leaves 3. Seed	1. Leaf extract is diuretic, used in dysuria. 2. Crushed fruit paste is used externally in pruritus. 3. Crushed seeds are used in toothache and swollen gums.
40.	<i>Swietenia macrophylla</i> King	Meliaceae	Mehagoni	1. Seed 2. Bark 3. Leaf	1. Seed extract is used to treat diabetes, hypertension. 2. Bark decoction is used as an analgesic in rheumatism, skin eczema. 3. Leaf extract is used in indigestion.
41.	<i>Swietenia mahagoni</i> (L.)Jacq.	Meliaceae	Mehagoni	1. Seed 2. Bark 3. Leaf	1. Seed decoction is used to treat diabetes. 2. Bark decoction is used as an astringent in managing dysentery pain. 3. Leaf paste is used as an emollient to skin haemorrhage.
42.	<i>Anthocephalus cadamba</i> (Roxb.)Miq.	Rubiaceae	Kadam	1. Bark 2. Leaf 3. Fruit	1. Bark decoction is highly used in managing diabetes. 2. Leaf paste is used as poultices to wounds and ulcers. 3. Raw fruit is used as a galactagogue.

Some wild common zoological dwellers of the selected area are-

The different types of common birds found here are crow (*Corvus* sp.), different parrots (Psittaciformes), Shalik (*Acridotheres* sp.) Moyna (*Gracula* sp.), Bulbul (*Pycnonotus* sp.), Babui (*Ploceus philipinus*), Phinge (*Dicrurus* sp.), different Kingfishers, different Bak pakhi. (*Ardea* sp., *Ardea* sp., *Egretta* sp.), Saras (*Antigone* sp.), Junglefowl (*Gallus* sp.), chhatare (*Argya* sp.). The different types of mammals found here different monkey (infraorder Simiiformes), elephant (*Elephas* sp.), fox (*Vulpes* sp.), dog (*Canis* sp.), cat (*Felis* sp.), rabbit (*Oryctolagus* sp.), rat (*Bandicota* sp.), mole (order

insectivore), bat (order-Chiroptera). The different reptiles present here are garden lizards like *Calotes* sp., *Mabuya* sp., *Varanus* sp., different poisonous and non-poisonous snakes. The common amphibia are order anura (toads and frogs) have found. Among the non-chordates, some mollusks are found like, snails both aquatic and terrestrial, mussels. In case of annelidans earthworms are very abundant, leech in swampy areas found in large scale. Arthropodans are in high variety along with large number in insects' fauna, centiped, milliped, Colembola, mite etc.

The forest-based earnings are one of the primary economic sources for local communities due to a

lack of job opportunities in the state for a long years, a deficiency of economic development, poor literacy rate mainly in scheduled caste and scheduled tribe population, scantiness of production opportunities for agricultural development and the last but not least is climate change in environment mainly due to synchronizing development of urbanization for the last 12 to 15 years. Therefore, due to multiple socio-economic factors most of households of below poverty line in this area are compelled to be involved in NTFP collection as part of their livelihoods. Recently in India, a NTFP harvesting strategy is becoming important in order to increase the earnings for Scheduled Tribes who are dependent on NTFP harvesting (Parihari and Chatterjee, 2015). There have been numerous of studies regarding the NTFPs based economy of this area (Ghosal, 2011; Shit and Pati, 2012; Dolui *et al.*, 2014; Parihari, 2018) and it has been highlighted that tribal people have been collecting forest products from the time of their ancestors. This reliance on NTFPs is ongoing because they are very close to nature, they have the legal rights to utilize forest resources, and they have traditional ecological knowledge in the collection of various NTFPs and use them for subsistence and commercial purposes (Ghosal, 2014; Parihari, 2018). Therefore, they differ from other forest-dependent rural communities in India in terms of utilization of NTFPs. In 1976, the National Commission of Agriculture (NCA) recommended the scientific study and utilization of NTFPs from community forests to increase the overall well-being of forest dwellers (Jewitt, 2002). The Government of West Bengal and India has also taken an initiative to promote NTFPs collection from community forests and to protect forests from illegal timber extraction technically after the invention of Joint Forest Management. From this viewpoint, the selected study area lagging behind to implements these initiatives. So, it is necessary to understand the inherent inertia that hinders the productivity and utilization of NTFPs.

Interaction between abiotic and biotic factors in ecosystem-

The different environmental factors that affect largely on biological dwellers among many others are light, rainfall and water, temperature, soil pH, soil texture, soil organic matter, available O₂, CO₂ in air. As each biological dweller thrives and adapts only at a specific range of temperature, extreme rise of it, directly alters its metabolic regularity.

Rainfall is an essential evil to all biologicals. Climate change in Globe alters the rainfall pattern in the noted site here as others. So, all the natural native inhabitants of autotroph and heterotroph both compel to struggle for existence in their normal life cycle pattern. Due to synchronous development of modern civilization, modern technologies including different modern home appliances density of different air pollutants increases and results acidic rain which alters pH of soil, water where-ever it falls. Alteration of pH also has to face all biologicals in a thrive as each of all live in a specific pH parameter i.e., either acidic or alkaline or neutral. Lights of a certain wavelength is essential for photosynthesis, photoperiodism, phototropism of greens and also regulates the biological rhythms for all livings. Excessive rising of temperature, alteration of density of different greenhouse gases particularly carbon dioxide adversely effect on intensity of wavelengths of light and thus biological clocks differ. (Isabelle M Côté *et al.*, 2016)

Interaction between different biotic factors in ecosystem-

As all the biologicals including autotrophs and heterotrophs are sequentially interrelated through food chain and food web. If any trophic level of ecosystem is afflicted through an individual the whole intercalated system would be disturbed or disrupted. (Isabelle M Côté *et al.*, 2016)

Interaction between different all biotic factors with decomposers or Nature's scavengers in ecosystem-

When plants and animals die or excrete waste, decomposers (i.e. saprophytic bacteria and fungi) at break down these complex organic compounds. The decomposers breakdown this by detritus food chain into simple inorganic nutrients (such as

nitrites, phosphates, and carbon dioxide). These released nutrients come back into Nature. Now, they are then reabsorbed newly by the roots of aquatic/terrestrial macrophytes or by phytoplanktons to build new organic matter through Bio-Geo-Chemical Cycle.

Any localized mini-cycle acts as a mirror how the greater Global biosphere sustains itself, ensuring that how does the essential life elements (like carbon, nitrogen, and phosphorus) are constantly recovered and reused likely. (Isabelle M Côté *et.al.*,2016)

CONCLUSION

The small-scale survey based on ethnobiological documentation and ecological study will immensely help to enrich data in TKDL (Traditional Knowledge Digital Library) and PBR's (Peoples Biodiversity Registrar). In case of primary IPR (Intellectual Property Rights) like patents, our documentation will help a better recognition to the primary/concerned herbal practitioner. Lastly, the small-scale initiative will also clearly depict the present ecological/environmental scenario specially in connection of climate changing issues. Lastly awareness towards sustainable uses of any natural resources is essential for our safe and livable / habitable environment/Globe in future.

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