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Influence of climate change on the biodiversity of the medicinal plants for the sustainability of the Santal and Lodha tribal people in the district Paschim Midnapore, W.B., India

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Abstract

Frequent changes in the climatic conditions have an influence in controlling the atmospheric temperature. There occurs some seasonal fluctuations which result in high temperature, irregular rain falls, scarcity of food materials. Immunity power of the people is gradually reduced due to lack of some food items e.g., mushroom, wild type of potatoes, some types of fresh water jeol fishes and aquatic benthic organisms etc. which were available in the forest areas and small ponds from the villages of the state of West Bengal, INDIA. For this reason, the poor people and especially Santal and Lodha tribal people of the District Paschim Midnapore, W.B., are suffering from some uncommon diseases. The Tribal Medicine men of this area are facing severe problems in controlling the diseases as they are not getting the proper ingredients available from the medicinal plants collected from the nearby forests and local places. But it seems that it may be due to urbanization, deforestation and changing climatic conditions, the rare medicinal plants are gradually being eliminated from the forests.

Keywords: Urbanization, deforestation, medicine men, tribal people, immunity power

Introduction

Climate change is a burning problem in recent time. It is a biggest threat to the world's environment with devastating consequences for humans, animals and ecosystems. The impact of climate change on human life is manifold. No one can deny the other important associated factors like industrialization, deforestation, technological and other economic facets which are coupled with the changing life of the people.

The Intergovernmental Panel on Climate Change (IPCC) [1] reported that world temperature had become higher at the Earth's surface than any preceding decade since 1850. These changes are likely to affect plant ecology via direct (e.g., drought and heat wave effects on photosynthesis, respiration, transpiration and phenology) and indirect (e.g., fire regime, parasites and diseases, litter quality and decomposition) effects [2, 1, 3] and likely to increase plant mortality and extinction risk in many areas [1].

Atharvaveda (around 1200 BC), Charak Samhita and Shusrut Samhita [4] (1000-500 BC) are the main classics that gives a detailed description of over 700 herbs. Herbal medicines are becoming popular worldwide due to its growing recognition of natural products being cheaper and without any side effects. Demands for medicinal plants are increasing in both developing and developed countries. As per WHO estimate, about 80% of the population in the developing countries depends directly on plants for its medicine [5, 6]. Out of 20,000 medicinal plants listed by the WHO globally [7] India's contribution [8] is 15 – 20%. In India, about 2,000 drugs used are of plant origin [9]. Continuous exploitation of several medicinal plant species and substantial loss of their habitats have resulted in the population decline of many high value medicinal plant species over the years [10, 11]. The degree of threat to natural populations of medicinal plants has increased because more than 90% of medicinal plant raw material for herbal industries in India and also for export is drawn from natural habitats [12]. The primary threat to medicinal plants is those used by human beings that affect any kind of biodiversity [11, 13].

In India, numerous ethnic people are living in different atmosphere. Each group bears indigenous knowledge which are enriched with heritages of biodiversity. The names of some plants have also been mentioned in the ancient literature like Vedic period (4500 BC-1000 BC),

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Upanishads (1100-600 BC), Mahabharata and Puranas (700 – 400 BC). Even in the 21st Century, although medical science have developed to a certain level, still scientists cannot ignore the uses of medicines from some plants collected by the Medicine men of various ethnic communities maintaining the better life of the community.

In this context the district Paschim Midnapore is enriched with various types of ethnic people and unusual presence of rare flora and fauna. Some important flora are present within this district, which are used by the ethnic people for their remedial properties. Although various types of ethnic communities e.g., Santal, Munda, Lodha, Sabar etc. are there but the present topic has been considered using Santal and Lodha tribal people. In spite of various medical facilities provided to the tribal people in the rural areas, they sometimes depend on nature and medicine men of their own. They can easily express their own difficulties to their medicine men. But due to the gradual changes of the climatic conditions, some of the plants which were used as the source of medicines are gradually decreasing. Consequently, the people who were engaged as the medicine men in these localities gradually losing their interest to provide medicines for some common diseases. So the present topic has been considered to point out the nature of diversity of various flora and their interactions with two ethnic communities especially the Santal and the Lodha.

Research Design

Area

Paschim Midnapore is situated in the South Western side of West Bengal. It is bounded by Bankura and Purulia district in

the North, Mayurbhanj and Balasore districts of Orissa in the South, Hooghly and Purba Midnapore district in the East and Singhbhum district of Jharkhand and Purulia district of West Bengal in West.

People

For the present study the Narayangarh block of Paschim Midnapore has been selected. This block is declared as Integrated Tribal Development Block (ITDB) where more than 75% tribal people of different ethnic stocks are living. Paschim Midnapore. The dominating tribes of this area are mainly the Santals, the Lodhas, the Mundas/Bhumij etc. Excepting these there are also other tribal people like the Koras, Mahalis, Hoos etc. Out of these tribal people the Lodhas and the Santals have been selected for the present study.

Studied People

This study has been conducted on two ethnic groups - the Lodhas and the Santals of Paschim Midnapore of West Bengal. The wife of head of the family is considered for the purpose. In this way 50 Lodhas and 50 Santals from different families of various villages of the Narayangarh Block have been chosen for the study. Besides a few medicinal men locally known as Gunins, are also considered

Study area

The present study was undertaken in some blocks of the district Paschim Midnapore, West Bengal, INDIA. Geographically it lies between 21° 47" and 23° N latitude and between 86° 40" and 87° 52" E longitude.

Table 1: Study Area within some Gram Panchayat of the District Paschim Midnapore, W.B.

Sl. No.	Name of the G.P	Name of the Villages	Name of the Tribal People	Total Family	Total Sample Family
1.	Makarampur	Binai (Purba)	Santal	26	18
2.		Daharpur	Lodha/Sabar	109	58
3.		Jotirampur	Lodha/Sabar	95	60
4.	Kunarpur	Kunarpur	Santal	25	13
5.	Kashipur	Metyal	Santal	15	10
6.		Markunda (Paschim)	Santal	30	23

The Santals

Agriculturists

The Santal community belongs to the Austro-Asiatic group. The Santal society is patriarchal and the dominance of the males is found in every affair of life. Most of the people belong to the Santal Community are agriculturists. In India, the people, especially the tribals, living in forest or its adjoining areas, since long past, maintaining their health with the help of their ethno-medicinal knowledge. One such tribe of eastern India whose tradition of ethno-medicine practices is the Santals. The Santals are the 3rd largest tribes of India, spread over a wide area in Bihar, Orissa and West Bengal. Some of them are migrated to Tripura, Assam and Bangladesh as plantation laborers in tea gardens.

The Lodha: hunters and gatherers

The Lodhas of West Bengal are one of the ex-criminal tribes of India. The Lodhas are strictly endogamous family. Poor socio-economic conditions compel them to live in nuclear families. Baram or Garam is the chief deity of the woods. Big Sal tree (*Shorea robusta*) or Mahua tree (*Madhuca latifolia*) or Mango tree (*Mangifera indica*) is the dwelling place of Baram. The good spirit and evil spirit always take part in their community affairs. The spirit-doctor called Ojha or Gunin also plays an important role in their society.

Materials and methods

The present study deals with some medicine men of two tribal communities. They are the Santal and the Lodha present within three Gram Panchayats e.g., Mokrapur, Kunarpur and Kashipur of the District Paschim Midnapore, West Bengal, India. Time to time the authors met with the distinguished medicine men and common people of these two districts regarding the health status of the people of that area. Sometimes they were interviewed to know the traditional knowledge regarding the types of medicines prepared from various types of plant products and other ingredients. The medicine men were also interrogated about the difficulties faced for the preparation of medicines. The medicine men expressed their present problems for the non-availability of the plants from the nearby forest due to temperature fluctuation, deforestation and development of new Urban settings. The common people of these areas were also asked about the effectiveness of the medicines provided by their own medicine men of their locality. They are also asked about the changing climatic conditions of the locality.

Expectations of the Medicine Men of the District Midnapore

1. The Medicine men/women of this district are very experienced. Most of them are uneducated and do not

- know about seasonal fluctuations in the Earth. Sometimes the temperature of the season is very hot. Due to the increased temperature people gradually become sick. There is a risk of dysentery and diarrheal disease within the people of this area. The jeol fishes and some benthic organisms from the ponds are not usually available for the shortage of water during summer months.
- Temperature fluctuations lead to occasional storms, cyclones and floods. Due to these situations the growth of plants are severely affected. The medicine men of these areas cannot find the specific plants for various types of diseases.
 - Due to population pressure and separate attitude of the Government, forest areas are being destructed. For this

reason growth of medicinal plants are badly affected.

- Due to decreasing rainfall the ponds are dried up and scarcity of water in the major problem during sunny days. Different types of skin diseases and water borne diseases affect the health of the poor tribal people.
- Due to changing weather conditions, spreading of some mosquito borne diseases are very frequent. The medicine men cannot cope with proper medicines to cure the patient affected by mosquitoes as the required plants are not available from the forests.

Results

The relevant data collected by the researcher have been plotted in the tabular form (Table 1).

Table 2: Medicinal Plant Studies by the Medicine men/women of the Santal and Lodha Tribal People to treat some common diseases in the district Paschim Midnapore, West Bengal

Name of some common Diseases	Local Name of the plants	Scientific name	Family	Remark
a) Loose Motion	Sal tree (root)	<i>Shorea robusta</i> Roxb. Ex Gaertn. f.	Dipterocarpaceae	
	Iswarimul (root)**	<i>Aristolochia indica</i> L.	Aristolochiaceae	not common
	Tulsi (leaves)	<i>Ocimum tenuiflorum</i> L.	Lamiaceae	
	Black Pepper	<i>Piper nigrum</i> L.	Piperaceae	
	Anantamul (Root)**	<i>Hemidesmus indica</i> (L.) R. Br.	Asclepiadaceae	
b) Cough & Cold	Vasaka plant (leaves)	<i>Adhatoda zeylanica</i> Medic.	Acanthaceae	
	Zinger (Root extract)	<i>Zingiber officinale</i> Rosc.	Zingiberaceae	
	Tulsi (leaf extract)	<i>Ocimum tenuiflorum</i> L.	Lamiaceae	
	Manasa plant (leaf extract) **	<i>Euphorbia neriifolia</i> L.	Euphorbiaceae	not common
c) Fever	Seuli tree (extract of leaves)	<i>Nyctanthes arbor-tristis</i> L.	Oleaceae	
	Vasaka Plant (leaf extract)	<i>Adhatoda zeylanica</i> Medic.	Acanthaceae	
	Kalmegh plant (extract of leaves)	<i>Andrographis paniculata</i> Wall. Ex Nees	Acanthaceae	
d) Vomiting	Sal tree (bark extract)	<i>Shorea robusta</i> Roxb. ex Gaertn. f.	Dipterocarpaceae	
	Arjun tree (bark extract)	<i>Terminalia cuneata</i> Roth	Combretaceae	
	Kundri plant (leaf extract) **	<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	not common
a) Bleeding	Pasukedar plant (extract of leaves)**	<i>Curcuma aromatica</i> Salisb.	Zingiberaceae	rare
	Tulsi plant (extract of leaves)	<i>Ocimum tenuiflorum</i> L.	Lamiaceae	
	Bisalyakaranani (extract of leaves)**	<i>Barleria lupulina</i> Lindl.	Acanthaceae	rare
	White akanda (gum of plant)**	<i>Calotropis gigantea</i> (L.) R. Br. ex. Ait	Asclepiadaceae	
f) Jaundice	Anantamul (extract of root)**	<i>Hemidesmus indicus</i> (L.)R.Br.	Asclepiadaceae	not common
	Neem (extract of leaves)	<i>Azadirachta indica</i> Ajuss.	Meliaceae	
	Turmeric (extract of root)	<i>Curcuma domestica</i> Valetton	Zingiberaceae	
	Arhar plant (extract of leaves)	<i>Cajanus cajan</i> (L.) Millsp.	Papilionaceae	

Discussion

Climate change is a global problem that has vast implications for ecosystems around the world, many of which are still unknown. Climate impacts in India are not uniform all over the country. Those of low socio-economic status will likely to be the most affected by the health impacts of climate change, as they have the least adaptive capacity to cope with the situation. The present study deals with the impact of climate change on the medical and other associated problems within the Santal and Lodha tribal community of some blocks of the Districts of Paschim Midnapore. Once upon a time the medical facilities within the tribal people were very poor. But now-a-days some changes have been noticed regarding their health status. In spite of the facilities, the tribal people of the district Paschim Midnapore depend on their medicine men of their own locality. Because they have a good faith on their local medicine men. The medicine men of this area are facing severe

problems due to non-availability of various ingredients required for the preparation of medicines from the plant products.

During the time of field survey the Medicine men of two Tribal communities of the district were thoroughly interrogated regarding the medicines used for some common diseases, e.g., fever, cough and cold, vomiting, bleeding, loose motion and Jaundice. From the interview report it is quite evident that the medicines of the two tribal communities are more or less uniform except some new products. During the time of interrogation they reported that due to lack of some ingredients within the plants, the diseases cannot be cured properly. It may so happen that it may be due to less amount of rainfall, increasing atmospheric temperature and some other factors also. The people cannot express the exact unknown reasons. For these reasons the availability of food materials, less production of crops, less production of fishes and other

products the people are not getting sufficient food for survival. Immunity power of the people are decreasing day by day. Number of diseases are gradually increasing. New types of mosquito borne diseases are gradually growing and spreading rapidly. The Medicine men/women cannot find the proper medicines due to lack of some plants which were grown within the forest in earlier times. Some of the plants which were used as medicines, eg., Iswarimul, Anantamul, Manasa, Kundri, Pasukedar, Bisalyakarani plants are not commonly available in the neighboring forests. The unavailability of the plants may be due to some factors related to changing temperature and other conditions of the atmosphere. Montag and colleagues [14] determined that cultural, familial, and traditional knowledge aspects are affected by climate change. These aspects have an impact on the life of the tribal communities (Climate and Traditional Knowledges Workgroup, CTKW) [15, 16]. Gorokhovich et al. [17] also incorporated these aspects in their research relating to tribal communities affected by climate change.

In spite of all the hazards, the Medicine men/women of the tribal communities cannot leave their age old medical practices. Sometimes they can procure the plants from the forest clad areas but they cannot understand the improper action of the medicines. They cannot understand the exact reason. It may so happen that due to the changing climatic conditions, the constituents of the plants may be changed. With the poor knowledge of the medicine men, the exact reason can not be explained at present. So for the scientific explanation, the plants should be thoroughly checked, analyzed, and proper experimentation should be conducted and documented.

Conclusion

Due to fluctuation of temperature frequent changes occur within the atmosphere. The rapid climatic changes have an impact on a wide variety of organisms, including various types of animals and plants species. High temperature, occasional irregular rains, cyclonic weather, flood and fluctuating humidity within the atmosphere lead to several diseases within the poor tribal people of the district Paschim Midnapore, West Bengal, India. The medicine men in this area are facing severe problems due to unavailability of some rare medicinal plants for the preparation of medicines. The exact reason cannot be explained at present but it may be due to changes in the climatic situation of this area.

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