Chapter 17
Tribal Health and Sustainable Development: Traditional Knowledge Practice and Medicinal Plant

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Abstract  Sustainable livelihood ensures proper human development providing with the basic necessities of everyday life. India is a country of multi-ethnic groups having more than 500 tribal communities along with different religious groups. Among these tribal groups more than 80% people live in different forest environment. Forest environment-based tribal communities fulfil most of their basic needs from the surrounds. In general, these tribal people preserve good notions of health among them as per their perceptions. Overtime they are facing crisis due to non-sustainability of production, consumption and uses of forest goods. Bestowing to the welfare approach adopted since independence for the tribal communities, a special human value loaded attitude is shown to them for shielding their human rights, however, protection of their rights in nature has continuously being ignored. However, sustainable development helps to preserve the natural resources from the environment for its economic growth and social viability from present generation to future generation. To be more precise, the tribals are the sources of the indigenous knowledge of the medicinal plants used for healing and curing diseases for better living and solving problems of day to day life. Therefore, medicinal plants should be protected and be used by them for sustaining their rights as humans. In this article, by emphasizing on the significance of the sustainability of medicinal plants and its importance in tribal life, the authors focus on an alternative development method which can improve the social environment in general and the tribal development in particular.

Keywords  Sustainable development · Tribal health · Indigenous knowledge · Alternative development

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Introduction

Rio Earth Conference in 1992 observed a real global problem which is alarming before us due to environmental degradation, depletion of natural resources, deforestation, natural catastrophe, etc. As a result, sustainable development is a new paradigm shift of economic development. Sustainable development stands for protecting the needs not only of the present generation population but also it fulfils the needs of future generation. To meet this end, the new strategy of alternative measures is as how to sustain our forest-based environment. But it is really difficult, a long trajectory path has already been travelled, many of our traditional wisdom are also out of reach. Forests being the main supplier of raw material for attaining developmental goals have always remained the centre of focus of planners. Moreover, the extreme poverty of the tribes often forces them to cut down mercilessly the trees from the jungles, even the urban dwellers also encroach the forest for their dwelling and harvesting purpose. As a result, the healthy life of the jungle dwellers is no longer prevailing.

There is no denying fact that the tribal people are enriched with their indigenous knowledge and traditional wisdom. Specially the undivided Midnapur District of West Bengal has been referred as a fertile field of medicinal plants (Pakrashi and Mukherjee 2001). They live in nature, use natural resources and enjoy nature for maintaining their life and livelihood. From time immemorial they know how to protect themselves from different types of diseases and ailments. As a result, they go to their Gunins (medicinal men) who collect and prepare different types of medicines by collecting different types of medicinal plants and its roots, leaves, fruits, etc. These tribal people are often considered as the reservoir of our traditional knowledge and wisdom. Throughout the country, the tribals have their own distinct pristine culture separated from the others. The indigenous knowledge about medicinal plants and its uses help the tribal group to sustain their society, environment and economy (Dasgupta and Sarkar 2005; Joshi 1993).

Sustainable Development and Tribal Health

Human beings are at the centre of concerns for sustainable development. They are entitled to enjoy a healthy and productive life in harmony with nature (Principle of the Rio Declaration Environment and Development). Even though the processes related to sustainable development are not so easy in our present-day society but for better understanding of sustainable development, a balanced and integrated analysis from the point of Sustainable Development Triangle: economic, social and environment is considered to become a serious thought for us.

The significance of medicinal plants for sustainable human health cannot be overlooked. These plants have healing/therapeutic properties in one or any of their organs. The use of these plants is increasing worldwide. They are used in several conditions to augment and maintain human health. In sustainable human health management,
medicinal plants have played a vital role which has led to the growing interest in alternative therapies and therapeutic use of plants (Akinyemi et al. 2018).

The term ‘health’ is a part of bipolar conceptualization. It is opposed to ‘disease’ at the other pole. The term assumes a connotation in the common parlance which refers to the balanced state of body and mind. The World Health Organization (WHO) seeks to define health as ‘a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity’.

Good health stands for good society. But country like India has been facing several hydra-headed problems of its people since Independence where health problem is not an exceptional one. The colonial administration purposefully made a clear-cut distinction between tribal and non-tribal. Majority of the tribal groups throughout the country till today are facing different types of problems which are not directly linked with the medical issues but other associated factors like environmental degradation, illiteracy, lower age at marriage, high mortality, malnutrition, conservative outlook in relation with the supernatural power, etc., also make an overall impact on the tribals’ body and mind. Article 21 of the Constitution rightly points out that ‘no person shall be deprived of his life or personal liberty except according to procedure established by law’. So it denotes that maintaining good health of a person is one of the fundamental rights. As a result, good health not only deals with medical care of an individual but also it depicts an integrated overall development of a society with its cultural, economic, educational, social and political aspects.

The poor tribal people are till today socio-economically lagging from the mainstream of population. They live in different rural areas not far from the jungles (Bhowmick 1991, 1994; Mahapatra 1994; Sachchidananda 1994). The rich biodiversity has enabled them to sustain their life for many years. As a result, the tribes are now in transition (Atal 2015; Manna and Ghosh 2016; Manna and Sarkar 2016). The dualities of tradition and modernity create many social, economic and cultural threats in their life of which climate change is a central one. Biodiversity is people’s resource especially for the poor of the third world countries. They have to depend on the natural resources for food, shelter and other essentialities of everyday life.

Climate change (Kannan and James 2009; Pelling 2011; Wapner and Elver 2016) is undoubtedly one of the most transformative issues of the twenty-first century. Unlike previous environmental problems, the effects of climate change are global in scope and cut across many different sectors. As such, climate change is not a singular task that can be left to any one specialized agency. The United Nations Framework Convention on Climate Change (UNFCCC) is just one piece of the puzzle and its efforts to mitigate and adapt to climate change were not intended to substantively address biodiversity concerns (Roberts 2010).

Climate change is not new, and species have traditionally responded to such change over evolutionary time scales. But the key question today is how organisms will respond to the current apparently rapid rate of anthropogenic climate change (Root et al. 2003; Round and Gale 2008).
Member states express their commitment in the 2030 Agenda for Sustainable Development to protect the planet from degradation and take urgent action on climate change. The Agenda also identifies, in its paragraph 14, climate change as—

One of the greatest challenges of our time’ and worries about ‘its adverse impacts undermine the ability of all countries to achieve sustainable development. Increases in global temperature, sea level rise, ocean acidification and other climate change impacts are seriously affecting coastal areas and low-lying coastal countries, including many least developed countries and Small Island Developing States. The survival of many societies, and of the biological support systems of the planet, is at risk.

Sustainable Development Goal 13 aims to ‘take urgent action to combat climate change and its impact’, while acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.

India is a poor rural-based developing country where majority of the rural people directly depend on climate-sensitive sectors like agriculture, forests and fisheries. These sectors need natural resources like water, biodiversity, mangroves, coastal zones, grasslands for their subsistence and livelihoods. (Further, the adaptive capacity of dryland farmers, forest dwellers, fisher folk and nomadic shepherds is very low). Climate change is likely to impact all the natural ecosystems as well as socio-economic systems as shown by the National Communications Report of India to the UNFCCC.

Munasinghe (1992, 1994) proposed the term sustainomics to describe ‘a transdisciplinary, integrative, comprehensive, balanced, heuristic and practical meta-framework for making development more sustainable’. Sustainability and development can be studied through this approach which stands for ‘science of sustainable development’. Such a synthesis will need to draw on a wide range of core disciplines from the physical, social and technological sciences. Methods that bridge the economy–society–environment interfaces are especially important. Environmental and resource economics attempt to incorporate environmental considerations into traditional neoclassical economic analysis (Freeman 1993; Teitenberg 1992). Costanza et al. (1997) rightly point out that recently ecological economics deals with environmental problems emphasizing the importance of key concepts like the scale of economic activities. In this context, the present study has focussed on the various uses of the medicinal plants by the tribal people where indigenous knowledge of the tribal people is seen. So it is one form of ‘Sustainable Development Triangle’ which emphasizes to restore traditional tribal economy strengthening social networking within the natural environment which is a new societal paradigm of the sustainable development.

Sustainomics is also related to recent initiatives on a ‘sustainability transition’ and ‘sustainability science’ (Clark 2000; Parris and Kates 2001; Tellus Institute 2001). Newer areas of ecological science such as conservation ecology, ecosystem management and political ecology have birthed alternative approaches to the problems of sustainability, including crucial concepts like system resilience, and integrated analysis of ecosystems and human actors (Holling 1992).
In this context, we may refer to neologism which focuses attention explicitly on sustainable development and avoid the implication of any disciplinary bias or hegemony. For example, both biology and sociology can provide important insights into human behaviour which challenge the ‘rational actor’ assumptions of neoclassical economics (Gintis 2000; Robson 2001).

The substantive trans-disciplinary framework underlying sustainomics leads to the balanced and consistent treatment of the economic, social and environmental dimensions of sustainable development (as well as other relevant disciplines and paradigms). Balance is also needed in the relative emphasis placed on traditional development versus sustainability. Sustainable development itself involves every aspect of human activity, including complex interactions among socio-economic, ecological and physical systems. The scope of analysis needs to extend from the global to the local scale, cover time spans extending to centuries, and deal with problems of uncertainty, irreversibility and non-linearity. The sustainomics framework seeks to establish an overarching design for analysis and policy guidance, while the constituent components provide the ‘reductionist’ building blocks and foundation.

**Sustainable Development: Man–Nature Relationship**

Survival of human beings basically depends on environment in which they dwell. Development of mankind is closely associated with the environment. Hence, environment and development are interdependent. Relationship between man and environment has been point of discussion for a long time by the anthropologists who engaged themselves to understand man relationship with environment (Vidyarthi 1963; Mukherjee and Mukherjee 1971; Moghadam et al. 2015).

The symbiotic relationship between man and nature was never constant but has been changing constantly. Man was ‘nature homospecy’ since its inception. The tribal people have gained a lot of empirical knowledge and experiences to live in forest with its natural resources. The traditional wisdom is based on the intrinsic understanding that man and nature are dependent to each other and their coexistence make the society vibrant and useful. This eco-centric view develops a distinctive attitudes and typical behaviour patterns for accepting plants, animals, lands, water and other natural resources available in their everyday life. The tribals have the wisdoms of vast indigenous knowledge about flora and fauna used by them to meet their basic primary needs of food, shelter and well-being. Their belief systems, social, economic and rituals activities are intricately interwoven around forest and its neighbourhood. In their daily life, they never kill an animal, a bird or cut the tree or plant with which they claim totemic affiliation (Bhargava 2002; Choudari 2007; Guha 1983; Kulkarni 1987; Manna 2000).
The livelihoods of tribes are greatly impacted due to the effects of population explosion and their regular exploitation over natural resources resulting to depletion and deterioration of forest environment.

**Indigenous People and Indigenousness**

Indigenous knowledge (hereafter ‘IK’) is rooted in the lived experiences of indigenous peoples; these experiences highlight the philosophies, beliefs and educational processes of tribal communities. Indigenous people come to know things by personal observation and interactions in their daily lives (Berger 1987; Flavier 1995; Warren 1990).

In contemporary discourses ‘indigenous peoples’ primarily refer to ethnic groups that have historical ties to groups that existed in a territory prior to colonization or formation of a nation-state. These groups of people are sometimes considered as the original inhabitants of a country having a distinct cultural heritage of its own. In many cases, they live a segregated life away from the so-called mainstream of the population.

Traditional herbal medicines are rooted in indigenous knowledge systems. These cognitive systems play a crucial role in decision making with respect to the use of medicinal plants resources and are embedded in the lifestyle of the local community (Astutik and Kimengsi 2019).

Xaxa (1999) opines that the notion of “indigenousness” is a political construction rather than an empirical reality. Following the same line of argument Kujur (2010) analyses:

The Adivasis’ consciousness has come about to promote their rights and privileges because their very survival is at stake. They are the victims of exploitation and alienation at all levels. Hence in the absence of a mechanism or powers to safeguard their interests, a new form of identity or indigeneity is crystallizing among the tribes across India. The people now use the notion of indigenousness to identify and define themselves in differentiation from the non-tribal population.

Current discussions of ‘indigenous peoples’ take place against the background of three conceptual frameworks that emerged after World War II: Human Rights, collective rights, and the rights of aboriginal peoples (Bowen 2000). According to Bowen (ibid.), current debates within this conceptual framework concern ‘the legitimacy of religious or other cultural norms as sources of individual rights or limits on rights claims’. The empirical foundation of this kind of formulations can be found in different kind of customary laws existing across the world.

Now pertinent question that comes to the fore is: ‘who are the indigenous peoples of India?’ In 1987 Indian Council of Indigenous and Tribal Peoples was established. This prestigious organization is also indirectly linked with the United Nations. After a thorough analysis of the historical backgrounds and socio-cultural peculiarities of the communities concerned, the organization conclusively said that the ‘scheduled tribes’ of India fall in the said category (Das 2001).
The tribals had developed a distinct and particular way of life in remote forests, hills, deserts—far away from the so-called mainstream of the population—in a word in the zones of less interaction. Many sociologists and anthropologists believe that they were comparatively self-sufficient in the lap of the nature.

**Objectives**

This paper has tried to focus on the several issues related to Tribal Health and Sustainable Development. These are as follows:

1. to examine how do the tribal people use different types of medicinal plants to make them free from diseases and ailments.
2. to point out various problems faced by the tribal people due to climate change and environment degradation.
3. to focus on a new societal paradigm relating to sustainable development of the tribal health through using medicinal plants for curing and preventing diseases which is one of the burning issues of the present-day society.

Naturally a development with sustainability of the environment may be one of the visions or strategies of the environmental sociologists in contemporary society.

**Study Areas and Methods**

Indigenous communities have preserved their traditional knowledge on the uses and management of wild plant resources (Rajbhandari et al. 1995; Coe and Anderson 1999; Manandhar 1994, 1995, 2002). The traditional wisdom regarding the use of medicinal plants is not only useful for conservation of cultural traditions, but also for community health care and development of some new drugs for the common people (Pei 2001; Gazzano et al. 2005).

With the rapid growth of science and technology tremendous changes have taken place in everyday life of the people throughout the world. India is not an exception. The loss of traditional knowledge and culture of human life is due to loss of plant species as these irreversible changes not only affect their material cultures but non-material cultures have also been affected by these processes of change. Humans are no longer simply members of homogeneous group. They are the integrated part of the complex cultures. Till today most of them are dependent on nature, utilizing their environment and ecology with the help of technology. Even today they combat against their ill health and other crisis situation with their indigenous methods of utilizing their natural resources (Haldar et al. 2008).
In India, there is a diversity of various ethnic groups. It is known that more than 500 different tribes and other ethnic groups (Jain 1991) and their combined population comprise more than 7.5% of the total population of the country. In this context, Paschim Midnapore is enriched for its ethnic population as jungles, hills, forests, etc., are the natural habitat of these people. Five ethnic groups have been selected for the present study. They are the 1Lodhas (hunters and gatherers), the 2Santals (mainly agriculturists), the 3Mundas (agriculturists), the 4Mahalis (bamboo workers) and the 5Bhumij (agriculturist and hunting-forest products gatherers). These tribal people are the autochthones group of Paschim Midnapore in West Bengal and they have very close association with nature.

From the age-old times, different plants have been used as sources of medicines by the tribals. They have good faith on the traditional system of herbal medicines and they also rely on it. According to the World Health Organization (WHO), nearly 80% of the people depend upon traditional medicines for primary healthcare need. The tribal people of the Paschim Midnapore have also shown a great belief on the traditional knowledge of medicine (Manna 2003). The medicinal plants are usually collected from the nearby forests of the district. They prepare the medicines from

| Characteristics          | Lodha   | Santal   | Munda   | Mahali  | Bhumij  |
|--------------------------|---------|----------|---------|---------|---------|
| Age (in years)           |         |          |         |         |         |
| 19–25                    | 13 (26.00) | 7 (14.00) | 10 (20.00) | 10 (20.00) | 9 (18.00) |
| 26–32                    | 36 (72.00) | 37 (74.00) | 34 (68.00) | 35 (70.00) | 32 (64.00) |
| Above 32                 | 1 (2.00)  | 6 (12.00) | 6 (12.00) | 5 (10.00) | 9 (18.00) |
| **Total**                | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** |
| Education                |         |          |         |         |         |
| Illiterate               | 24 (48.00) | 18 (36.00) | 21 (42.00) | 21 (42.00) | 23 (46.00) |
| I–IV                     | 16 (32.00) | 25 (50.00) | 24 (48.00) | 20 (40.00) | 21 (42.00) |
| IV+                      | 10 (20.00) | 7 (14.00)  | 5 (10.00)  | 9 (18.00)  | 6 (12.00)  |
| **Total**                | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** |
| Occupation               |         |          |         |         |         |
| Agricultural labour/labour | 50 (100.00) | 49 (98.00) | 49 (98.00) | 24 (48.00) | 49 (98.00) |
| Basket maker             | 0       | 0        | 0       | 26 (52.00) | 0       |
| Others                   | 0       | 1 (2.00) | 1 (2.00) | 0       | 1 (2.00) |
| **Total**                | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** |
| Monthly income (Rs.)     |         |          |         |         |         |
| 2000–5000                | 49 (98.00) | 47 (94.00) | 50 (100.00) | 49 (98.00) | 50 (100.00) |
| Above 5000               | 1 (2.00)  | 3 (6.00)  | 0       | 1 (2.00)  | 0       |
| **Total**                | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** |
| Types of family          |         |          |         |         |         |
| Joint family             | 11 (22.00) | 10 (20.00) | 7 (14.00) | 11 (22.00) | 8 (16.00) |
| Nuclear family           | 39 (78.00) | 40 (80.00) | 43 (86.00) | 39 (78.00) | 42 (84.00) |
| **Total**                | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** | **50 (100.00)** |

Figures in the parentheses indicate percentages
Source Field study conducted by the authors in 2012
several plant species and apply to the common people for remedial purposes. These medicine men belong to five ethnic groups—the Lodha, Munda, Santal, Mahali and Bhumij and they use various plant species for the cure of same type of diseases or different types of diseases. So there is diversity in the method of preparation and the uses of plants as folk medicines. (The present study shows highlight the various uses of herbal medicines prepared by the medicinal men/medicine men (Gunin) from different plant sources with their indigenous knowledge and methods of using these medicines for curing several types of diseases by the five ethnic groups of the district Midnapore, West Bengal, India.)

In this article five tribal communities the Lodha, Santal, Munda, Mahali and Bhumij are taken into consideration for knowing their impact of changing biodiversity on their everyday life specially related to their health. 50 households of each community who are living in nearby 6 Arabari jungle ranges (Belti jungle extends from Hiji to Keshiary—a wide forest range belonging to Paschim Midnapore) are surveyed in the year 2012 in detail.

Table 17.1 depicts the five important socio-economic characteristics of the five sample tribal groups of Paschim Midnapore, West Bengal. Age, Education, Occupation, Income and Family type are considered as the important variables for knowing their socio-economic status. It is really interesting that all five tribal groups show a similar trend of socio-economic life situation of their daily life. Majority of them belong to Nuclear Type of families and most of them are day labourers. Majority of the tribals’ monthly income Rs. 2000–5000 and around 40% tribals are illiterate. The similar trends of socio-economic characteristics of the similar tribes of Paschim Midnapore are also observed in different studies done by P. K. Bhowmick 1963, 1994 and S. Manna 2010. Significant changes in their socio-economic life are not observed even in this study done in the year 2012. So these ethnic groups are till today maintaining their traditional ways of life in spite of so many development projects which are carried out by the different governmental agencies since independence.

In Table 17.2, 25 tribal medicine men from 5 tribal communities viz. Lodha, Santal, Munda, Mahali and Bhumij of Midnapore District, West Bengal have been studied. These tribal medicine men live in 7 villages under 4 Gram Panchayats of Midnapore District. The study reveals that these different medicinal men (Gunins) from different ethnic groups are enriched with their traditional wisdom or knowledge relating to curing diseases with the help of their age-old traditional-based knowledge. Each ethnic group has developed its own medicinal men (Gunin/Priest) within the community itself. But these medicinal men from various ethnic groups are engaged with curing different diseases not only for their own community members but the other sick men of different caste groups and all ethnic groups of the local villages.
Table 17.2  Village wise distribution of tribal medicine men/medicinal men

| Panchayat      | Village     | No. of the medicine men | Community |
|----------------|-------------|--------------------------|-----------|
| Daharpur       | Daharpur    | 02                       | Lodha     |
|                |             | 07                       | Munda     |
| Santarangi     |             | 04                       | Munda     |
|                |             | 01                       | Bhumij    |
|                |             | 01                       | Mahali    |
| Makrampur      | Borageria   | 02                       | Santal    |
|                | Makrampur   | 01                       | Munda     |
|                |             | 01                       | Bhumij    |
| Makrampur      | Pichabani   | 01                       | Mahali    |
|                |             | 01                       | Munda     |
|                | Joli Padima | 02                       | Munda     |
|                |             | 01                       | Mahali    |
| Dahjuri IV     | Dahijhuri   | 01                       | Lodha     |
| Total 4        |             | 7                        | 25        | 5          |

Source Field study conducted by the authors in 2012

Table 17.3 shows that 64.00% sample medicinal men belong to the age group between 50 years and 60 years above. In general, they are selected as village leaders or priests by their own community members due to possessing some charismatic traits. The women in tribal societies are not allowed to act as Ojhas (medicinal men); generally they men are assigned to this particular role. Traditionally, in all tribal communities the aged male members are preferred though in some cases younger members are also allowed to serve the community members as medicine men. The age distribution of the traditional medicine men is described in Table 17.3.

Majority of the children in all communities (Table 17.4) are highly affected by Cough, Cold, Fever, Vomiting, Itching, Loose motion, Jaundice, Bleeding and Snake bite. On the other hand, the adult men and women are generally affected by Jaundice, Cough, Cold, Fever, Vomiting, Itching, Loose motion, Bleeding, Snake bite and Arthritis on a regular basis. For their regular and easy measure, they primarily depend on the local medicine men (Gunins) who produce the herbal medicines with their traditional knowledge and wisdom. Their positive awareness is also expressed regarding the acceptance of allopathic treatment by the establishment of rural health centres and the positive role of ICDS. These types of diseases are very common among the tribal people of this region observed by the study conducted Bhowmick (1990) in his Chapter 13 article—Socio-cultural and Environment Factors of Health: A Micro Study in a Similar Ecology.
Table 17.3 Age wise distribution of the tribal medicine men

| Community | 20–29 (years) | 30–39 (years) | 40–49 (years) | 50–59 (years) | 60+ (years) | Total |
|-----------|---------------|---------------|---------------|---------------|------------|-------|
| Munda     | 2 (8.00)      | 1 (4.00)      | 2 (8.00)      | 5 (20.00)     | 5 (20.00)  | 15 (60.00) |
| Santal    | –             | 1 (4.00)      | –             | 1 (4.00)      | –          | 2 (8.00)   |
| Lodha     | –             | –             | 1 (4.00)      | –             | 2 (8.00)   | 1 (4.00)   |
| Mahali    | –             | –             | 1 (4.00)      | 2 (8.00)      | –          | 3 (12.00)  |
| Bhumij    | –             | 1 (4.00)      | –             | –             | 1 (4.00)   | 2 (8.00)   |
| Total     | 2 (8.00)      | 3 (12.00)     | 4 (16.00)     | 8 (32.00)     | 8 (32.00)  | 25 (100.00) |

Figures in the parentheses indicate percentages

Source From the field study by the authors

But gradually there is a declining tendency of the use of medicinal plants by the tribal people of the District Paschim Midnapore, West Bengal, India. It may be due to lack of knowledge about herbal medicine, malpractice of the ‘Ojha’ and scarcity of medicinal plants due to deforestation and acquisition of lands for industry and human habitation.

Reaction on Climate Change and Degradation of Biodiversity

The tribal people of the sample villages have been facing severe problems in their daily life due to climate change and degradation of biodiversity which affect their socio-economic life. To know it in detail the sample populations (250 Tribal Head of the Households) have been asked to point out their perceptions and reactions on climate change which they have noticed within the last 10 years. Irrespective of their ages and the ethnic variations all of them positively respond their strong feelings towards climate change. All of them have raised their voices regarding changing climate. They have said that temperature is increasing every year due to deforestation, industrialization, urbanization and climate change. Consequently, homeostatic condition of the biodiversity is disturbed. As a result, the children are badly affected with various diseases. Modern medicines are often out of reach among them. Traditional medicines are over time eroding due to climate change impacting on biodiversity.

They have also noticed the seasonal changes which affect their normal rhythmic life. They have pointed out about the late running of the seasons; i.e. a few seasons are merged together. Late appearance of rainy season disturbs the traditional crop pattern that affects the biodiversity in greater extent. Traditional crop productions are discontinued as, for example, the Aman crop (one type of seasonal paddy) production is now totally vanished and, in its place, the high yield variety paddy seeds are supplied by the local government for more production by taking less time. Late
Table 17.4  Diversity in the use of medicinal plants by the different tribal people of the district Paschim Midnapore, W.B., India

| Disease     | Groups                        | Name of the tree (root/leaf/flower/bark/fruit) | Scientific name          |
|-------------|-------------------------------|-----------------------------------------------|--------------------------|
| Cough and   | All five tribal groups        | Basak plant (extract of leaves)               | *Adhatoda zeylanica* Medic. |
| Cold        |                               | Tulsi plant (extract of leaves)               | *Ocimum tenuiflorum* L.  |
|             |                               | Manasa plant (extract of leaves)              | *Euphorbia neriifolia* L.|
|             | Specific tribal groups        | Mango tree (extract of leaves)                | *Mangifera indica* L.    |
|             |                               | Karanja tree (extract of seed)                | *Pongamia pinnata* (L.) Pierre |
|             |                               | Ginger (extract of root)                      | *Zingiber officinale* Rosc. |
| Fever       | All five tribal groups        | Tulsi plant (extract of leaves)               | *Ocimum tenuiflorum* L.  |
|             |                               | Seuli tree (extract of leaves)                | *Nyctanthes arbor-tristis* L. |
|             |                               | Basak plant (extract of leaves)               | *Adhatoda zeylanica* Medic. |
|             |                               | Kalmegh plant (extract of leaves)             | *Andrographis paniculata* Wall.ex Nees |
|             | Specific tribal groups        | Challa plant (only bark)                      | *Holoptelea integrifolia* Planch. |
|             |                               | Valia plant (gum of the fruit)                | *Semecarpus anacardium* L.f. |
| Fever       | Specific tribal groups        | Apang tree (extract of root)                  | *Achyranthes aspera* L.  |
|             |                               | Iswarimul (extract of root and leaves)        | *Aristolochia indica* L.  |
|             |                               | Amrul (extract of leaves)                     | *Oxalis corniculata* L.  |
| Headache    | All five tribal groups        | Ghrita Kumari (extract of leaves)             | *Aloe barbadensis* Mil.  |
|             | Specific tribal groups        | Karala plant (Munda and Bhumij)               | *Momordica charantia* L. |
|             |                               | Mahul plant (extract of bark)                 | *Madhuca indica* J.F.Gmel. |
|             |                               | Helenchya plant (extract of leaves)           | *Enhydra fluctuans* Lour. |
|             |                               | Guava tree (extract of root)                  | *Psidium guajava* L.     |
|             |                               | Garlic plant (extract of root)                | *Allium sativum* L.      |
|             |                               | Mustard (extract of seed)                     | *Brassica nigra* (L.) Koch |

(continued)
Table 17.4 (continued)

| Disease     | Groups                      | Name of the tree (root/leaf/flower/bark/fruit) | Scientific name |
|-------------|-----------------------------|-----------------------------------------------|-----------------|
| Vomiting    | All five tribal groups      | Arjun tree (extract of bark)                  | Terminalia cuneata Roth |
|             | Specific tribal groups      | Lemon tree (extract of fruit) (Munda and Bhumi) | Citrus limon (L.)Burm.f. |
|             |                             | Kundri tree (extract of leaves) (Lodha)       | Coccinia grandis(L.) Voigt |
|             |                             | Piplas tree (extract of leaves) (Munda and Santal) | Litsea glutinosa (Lour.) C.B.Robins. |
|             |                             | Gaisira (extract of root) (Santal)            | Asparagus racemosus Willd. |
|             |                             | Jam tree (extract of root) (Lodha)             | Syzygium cuminii(L.) Skeels |
|             |                             | Iswarimul (extract of root) (Munda)           | Aristolochia indica L. |
|             |                             | Kasmila (extract of root) (Lodha)             | Lannea coromandelica (Houtt.)Merr. |
|             |                             | Akanda Katha (extract of bark) (Munda and Santal) | Stephania hermandifolia Walp. |
|             |                             | Sal tree (extract of bark) (Lodha and Santal) | Shorea robusta Roxb.ex Gaertn.f. |
| Bleeding    | All five tribal groups      | Tulsi plant (extract of leaves)               | Ocimum tenuiflorum L. |
|             | Specific tribal groups      | Pasukedar plant (extract of root) (Lodha and Santal) | Curcuma aromatica Salisb. |
|             |                             | Dudhi Lata (gum of plant) (Lodha and Munda)   | Ichnocarpus frutescens R.Br. |
|             |                             | Latapata plant (extract of leaves) (Lodha)    | Mikania cordata (Burm.)B.L.Robinson |
|             |                             | White Akanda (gum of plant) (Lodha)           | Calotropis gigantea(L.)R.Br.ex.Ait |
| Bleeding (continue) | Specific tribal groups | Durba Ghas (extract of leaves) (Munda and Mahali) | Cynodon dactylon(L.) Pers. |
|             |                             | Bisallakarani (extract of leaves) (Munda)    | Barleria lupulina Lindl. |
| Loose motion | Specific tribal groups      | Sal tree (extract of bark) (Lodha)            | Shorea robusta Roxb.ex Gaertn.f. |

(continued)
| Disease | Groups                   | Name of the tree (root/leaf/flower/bark/fruits) | Scientific name                        |
|---------|--------------------------|-------------------------------------------------|----------------------------------------|
| Itching | All five tribal groups   | Nargi plant (only stem) (Santal)                | Eupatorium odoratum L.                 |
|         |                          | Dhulimera plant (only stem) (Lodha)             | Clerodendrum indicum (L.) O.Ktze.      |
|         | Specific tribal groups   | Bon Chakunda (extract of leaf) (Santal)         | Cassia alata L.                        |
|         |                          | Nengus tree (only root) (Lodha)                 | Mucuna prurita Hook.                   |
|         |                          | Karanja tree (boiled leaves) (Munda and Santal) | Pongamia pinnata (L.) Pierre           |
|         |                          | Kasmila (extract of bark) (Lodha and Santal)    | Lannea coromandelica (Houtt.) Merr.    |
|         |                          | Karanja tree (boiled leaves) (Munda, Santal, Bhumij) | Pongamia pinnata (L.) Pierre |
|         |                          | Chatina plant (Mucilage of Plant) (Lodha)       | Alstonia scholaris (L.) R.Br.          |
| Jaundice| Specific tribal groups   | Apang tree (extract of fruit) (Lodha and Munda) | Achyranthes aspera L.                 |
|         |                          | Arhar tree (extract of leaves) (Munda and Santal)| Cajanus cajan (L.) Millsp.             |
(continued)
### Table 17.4 (continued)

| Disease          | Groups                          | Name of the tree (root/leaf/flower/bark/fruit) | Scientific name                                      |
|------------------|---------------------------------|-----------------------------------------------|-----------------------------------------------------|
|                  |                                 | **Bon Jamir (extract of fruit)** (Santal)     | *Citrus limon* (L.) *Burm.f.*                       |
|                  |                                 | **Tungur (extract of leaves)** (Lodha)        | *Cajanus cajan* (L.) *Millsp.*                      |
|                  |                                 | **Anantamul (extract of root)** (Lodha and Santal) | *Hemidesmus indicus* (L.) *R.Br.*          |
|                  |                                 | **Pipul (extract of root)** (Munda)           | *Ficus religiosa* *L.*                            |
|                  |                                 | **Neem (extract of leaves)** (Lodha)          | *Azadirachta indica* *A.Juss.*                    |
|                  |                                 | **Tumeric (extract of root)** (Santal)        | *Curcuma domestica* *Valeton*                      |
|                  |                                 | **Seuli (extract of root)** (Santal)          | *Nyetanthes arbor-tristis* *L.*                   |
|                  |                                 | **Durba Ghas (extract of leaves)** (Lodha)    | *Cynodon dactylon* (L.) *Pers.*                  |
| Arthritis        | All five tribal groups          | Satamuli plant (extract of root)              | *Asparagus racemosus* *Wild.*                     |
|                  | Specific tribal groups          | Marrie gold (extract of leaves) (Munda and Santal) | *Tagetes erecta* *L.*                           |
|                  |                                 | Apang tree (extract of root) (Lodha and Munda) | *Achyranthes aspera* *L.*                       |
|                  |                                 | Bisallakarani (extract of leaves) (Lodha and Santal) | *Barleria lupulina* *Lindl.*                  |
|                  |                                 | Jai Bahadur (extract of leaf) (Lodha)         | *Arisaema tortuosum* *Schott*                    |
|                  |                                 | Gulanancha (extract of root) (Munda)          | *Tinospora cordifolia* (Willd.) *Miers ex Hook.* *et Thoms.* |
| Snake bite       | All five tribal groups          | Patal garu (extract of root)                  | *Rauvolfia tetraphylla* *L.*                     |
|                  | Specific tribal groups          | Bisallakarani (extract of leaves) (Santal)   | *Barleria lupulina* *Lindl.*                      |
|                  |                                 | Pasu Kedar (extract of root) (Munda and Santal) | *Curcuma aromatica* *Salisb.*                  |
|                  |                                 | Shankachura (extract of leaf) (Lodha)         | *Sansevieria trifasciata* *Prain*                |
|                  |                                 | Chandor plant (extract of root) (Munda and Bhumij) | *Rauvolfia tetraphylla* *L.*              |
|                  |                                 | Sibjata (extract of leaves) (Lodha and Mahali) | *Sansevieria roxburghiana* *Schult.f.*           |

(continued)
monsoon and decreasing rainfall, due to global warming, affect the local vegetables. Green local vegetables are not adequately found, in addition new hybrid varieties of vegetables are produced. It demands high pesticide and organic fertilizers. Local fishes and water bodies animals like small geol fishes (Siluriformes), crabs (infraorder brachyura), mollusks (Mollusca) of various types and different types of local prawns (Dendrobranchiata) are not available as earlier.

Biodiversity is not simply a crisis due to disappearance of species but it also threatens the livelihood of millions of people in general and the tribes in particular. Protection, conservation and regeneration of natural resources are the best solutions to achieve the sustainable environment. Indigenous knowledge systems are also much beneficial for the sustainable livelihood of a local community in the balanced environment situation. The interior tribes still live relatively in isolation of hills and forests.

**Policy Implications**

Since Independence, the tribal people are not at per developed with the other non-tribals due to their poor socio-economic status and backwardness. Poor infrastructure in economy and society is one of the most important barriers for economic development.

Framing different policies approved by the Government and Non-Government Organizations may save these vulnerable groups of our society. A few suggestions are as follows in relation to sustainable development of the tribal health by restoring natural resource-based medicinal plants.

- The medicinal plants should be restored with the help of the local government and concerned authority. Forests have to be preserved for maintaining

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### Table 17.4 (continued)

| Disease | Groups | Name of the tree (root/leaf/flower/bark/fruits) | Scientific name |
|---------|--------|-----------------------------------------------|-----------------|
| Lal Manasa (extract of root and leaf) (Lodha) | | Synadenium grantii Hook.f. |
| Arum (Mankochu) (extract of root) (Munda) | | Alocasia indica (Roxb.) Schott |
| Neem tree (extract of root) (Santal) | | Azadirachta indica A. Juss. |
| Bichuti Pata (extract of leaves) (Lodha) | | Fleurya interrupta Gaudich. |
| Ginger (extract of root) (Munda) | | Zingiber officinale Rosc. |

*Source* Field study conducted by the authors in 2012
healthy life not only for humans but also for the animals and biological species which will help to maintain the homeostatic condition of the nature. This traditional health practice is known as “Living Bio-health Culture” which is very important specially at this juncture (Post-7COVID-19) when we are trying to establish ‘Self Reliant Bharat’. As it is known to us that at the dawn of civilization human beings have been relying on Herbal Medicine having its strong immunity power.

- Conservation of medicinal plants largely depends upon forest protection and management where tribal medicine men of the local areas are the fittest persons for proper identification of the local medicinal plants. Local Panchayats should identify the local Gunins and record their names. These local Gunins of respective areas should be honoured for their knowledge and Wisdom. Like other folk artists they should be provided a monthly ex gratia for incentive.
- They should be trained on quality preparation of medicine by standardized technique to strengthen their practice and to prove authenticity in their field. With this attempt. The young expertise will come in forward and will able to sustain their economy. Nearly 80% of the rural folk show their intention to accept herbal medicine for their common disease and ailment.
- Tribal people of the respective villages should be encouraged to establish ‘Home Herbal Garden’ and side by side Forest Department of respective forest areas may open ‘Medicinal Plant Nursery’. Recently WHO also involves in this process (2004). National Bureau of Plant Genetic Resources (1995) has already started their identification of the herbal medicines from different forests.
- The integration of the knowledge and patronage at the government level is needed to save them from extinction. Medicinal men should be allowed to sell their medicine in open market after judging their authenticity. For this reason, government should take measures for legal recognition of them as indigenous health care practitioners.
- Forest should be protected from the traders who are meant for marketing and commercialization of those medicinal plants and who have been damaging and killing mercilessly the medicinal plants of the forest.

**Conclusion**

From this study it is very clear that the tribal people throughout the country are facing many challenges to overcome the problems of their daily life. They are now in transition. Forest-based economy fails to fulfil their needs as they have loosened their right to use the forest of their own. From earlier time to till date they have some affinity with forest. Most of them like to accept medicinal plants for getting rid of diseases. Many plants are very common plants which they have accepted for healthy living. The five tribes from the common ecology have shown more or less the same responses in relation to using the medicinal plants. Variations are also there but the plants are common with their various uses in the same locality.
The study also shows that the tribals are facing tremendous crisis due to climate change and environmental degradation. The tribals have to adjust with the changing climate. Most of the time, they are not ready to get their traditional food items. New environments have already destroyed their healthy flora and fauna. They are now gradually accepting the new ways of life with full of discomfort and dissatisfaction.

Sustainable development is now a global as well as local political agenda. Globally different issues related to climate change are a concerned matter. In general, the poor people of developing countries are the worst sufferer, as many of them have to depend directly on nature or forest products. Industrialization, urbanization, technological development, climate change, etc., make the life of the forest dwellers vulnerable. Their vulnerability is also stated by them through this study.

The tribal people like to maintain a bridge between tradition and modernity. On the one hand, they want to restore their indigenous knowledge through sustainability. On the other hand, government provides them modern medical facilities for the betterment of their quality of life. But they are not in good position to accept it. So the alternate strategy, i.e., the sustainable development through the restoration of medicinal plants is only an alternative development project considered to be effective development model for the poor tribal people. According to them jal (water), jamin (land) and jungle are now adversely used by the so-called development agencies, as a result, climate change is the outcome of it. So they want to save natural resources like water, forest, land. The tribal people throughout the country irrespective of their distribution in various parts of the country, still they are claiming themselves as the original inhabitants of the forest or jungles. They maintain a spontaneous dual relationship with the plants and animals of the forest. In time of crisis, they depend on forest. They collect fruits, foods, fodder and different types of medicinal plants and use them in their day to day life. They use the local herbal medicines prepared by the local Gunins or medicinal men by those collected plants, herbs, roots leaves, fruits, etc., and the medicinal men keep them comfortable creating soothing environment for their nourishment.

Naturally, by protecting their medicinal plants as well as encouraging the Gunins (medicinal men) a healthy sustainable relationship between men and nature could be developed which may be referred as alternative development strategy among them.

But with the name of development, the tribal people have to be withdrawn from their original inhabitants and day by day they are becoming the foreigners. The medicinal men are also becoming alienated from the uses of plants and in many cases the uses of medicinal plants are totally prohibited as the middlemen create hindrances by ensuring their rights on those medicinal plants. In this way, body and minds of tribals are gradually alienated from their nature. Developing sustainable economy which can give them support and security and makes them stable and healthy with eco-friendly relationship. Time has come to overview the situation where sustainable development is only the strategy of alternate development. We are hopeful that new rays of light will sweep away the darken phases of tribal life. Gradually with the tune of development with the sustainability, dancing faces of tribal people will be seen as
a new societal paradigm shift of modern socio-cultural and political agenda of the contemporary society.

End Notes

1. **The Lodhas**
The Lodhas of West Bengal were one of the ex-criminal tribes in India. But now they are identified as denotified community. In earlier days the Lodhas were engaged in hunting and food gathering economy. They fully depended on forest and forest products. But that situation did not continue forever. The primitive people were once brought up around the forest which provided them the raw materials of their livelihood as well as the joys and sorrows of their lives. They were automatically tuned with the forest environment but gradually they have been alienating from the forest by losing their free entry into it. Eventually, they have started working as agriculture workers and engaged themselves in cultivation. The Lodhas are strictly endogamous family. Poor socio-economic conditions compel them to live in nuclear families.

2. **The Santals**
The Santal community belongs to the Austro-Asiatic group. The Santal society is patriarchal and the dominance of the male is found in every affair of their life. They are in general bilingual. They are mainly involved in agricultural work. Originally the Santals were nomadic in nature and they roamed about from place to place in search of food and shelter. With the passage of time they gradually settled and established their permanent habitat in different parts of our country.

3. **The Mundas**
The Mudas hold a unique position in the tribal map of India. The name ‘Munda’ was coined by their ancient Hindu neighbours. The Munda call themselves as *Horoko* (men). The Munda tribe consists of an elder and younger branch and the Munderi-speaking people are called Kolarians. Generally the Mundas live in villages and most of them are agriculturists. Their society is patriarchal and patrilineal. The Mundas have belief in the potent evil powers of witch.

4. **The Mahali**
The word ‘Mahali’ was originated from the two words: ‘Mah’ means bamboo and Ali means specialized. Etymological the word ‘Mahali’ indicates those people who are specialised in bamboo work. They are also known as traditional bamboo workers. They have many tribal attributes of their own. Mahalis have greater tribal affinity to that of the Santals and they have also originated from the big Santal or Hor race. At present they are cultivators. They participate in agriculture in different ways as owner—cultivator, share-cropper, contract-cultivator and also agricultural labourer. Traditionally, they mainly prepared bamboo baskets which were used by the betel leaf dealers in large quantities to pack the leaves for disposal.
5. **The Bhumij**

The Bhumij are one of the non-Aryan Hinduised tribes found in Manbhum, Singhbhum districts of Bihar and Midnapore and Bankura districts of West Bengal. They are the original inhabitants of Dhalbhum, Barabhum and bagmundi estates of Bihar. They are chiefly located in the area between the Kasai and Subarnarekha rivers of Paschim Midnapore.

The etymological meaning of the term ‘Bhumij’ or ‘Bhumija’ means ‘born of the soil’. During that time perhaps the immigrant Hindus might give the name ‘Bhumija’ as they were the early settlers of the land. The Bhumij of the Jungle Mahals were the terror of the surrounding districts and were under the nick name ‘Chuar’. Their outbreaks were called ‘Chaaris’. In most of the cases they were under the Chiefs of local area.

6. **Arabari** is the name of a forest range of West Midnapore, West Bengal. It is bordered with the Dalma range of East Singhbhum and Jharkhand. This forest range covers Midnapore area of West Bengal—Jangalmahal, Lodhasuli, Salboni, Godapiasal, Gurguripal, Hoomgarh, Goaltore, Gohaldanga, Tetulmuri, Bhadutala, Ranjha, Lalgarh, Chandrakona, Khasjangal, Dhamkura, Joypur, etc. The main flora of the forest range is the Sal trees. The participating villagers including local tribes are given exclusive rights to use all minor forest products of the Sal trees, kendu leaves, dry twigs, seeds, etc. for their daily use.

7. **COVID 19** is a life-threatening dangerous virus appeared from the province of Wuhan, China, at the end of December 2019. Gradually the people of whole world are badly affected through it as it is pandemic in nature. 7 June 2020 morning news display that the number of total deaths in the world is more than 4 Lac. But surprisingly, we would like to say that on first week of May 2020, a few villages Kukai, Keshiary, Daharpur, Bakhrabad, etc. of Paschim Midnapore have been observed during the time of providing relief, it has been found not a single tribal family is affected with the virus in spite of villagers poor living. They are totally abstained from repeated hand washing, wearing masks, maintaining social distancing, etc., which are literally impossible for them. A further detailed study is needed but the present observation justifies that these population have some distinct cultural traits and strong immunity to fight and protect them from the deadly poisonous virus COVID 19.

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