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Research Report

Bio-resource Utilization for Food and Medicine: A Case Study of a Primitive Tribal Group of Jharkhand, India

Dipankar Chatterjee[1*], Rudrajit Sarkar[2]

[1]*School of Agriculture and Rural development, Ramakrishna Mission Vivekananda University, Ranchi Campus.*
** Corresponding author, Email: dipcha123@gmail.com*
[2] *School of Agriculture and Rural development, Ramakrishna Mission Vivekananda University, Ranchi Campus.*

Abstract - This paper is an endeavour to define and describe the diversity contained in circumstances surrounding the *Sauria Paharia* food and medicine system and the wealth of knowledge of their local environment. *Sauria Paharia* is one of the nine primitive tribal groups of Jharkhand. This hill tribe still practice shifting cultivation and have a definite system of knowledge transmission pattern of resource utilization over the generations. The present research is an outcome of an in-depth study carried out in a purposively selected uni-ethnic village of Pakur district of Jharkhand. The village is inhabited by only 22 household of Sauria Paharia comprising of 108 souls. Despite their insignificant numerical strength, the community has evolved a very comprehensive system of food management that not only help in sustaining their nutritional requirements but also ensure their medicinal necessities. The data were mainly collected with the help of structured schedule followed by open ended interview in a group and individually as well. Participant observation becomes handy during trail walk through the forest accompanied by few 'expert' villagers in identifying critical resources that are used by the villagers during the distress period like drought or during crop failure. With regard to the medicinal plant knowledge key informant interview was conducted to understand and document the folk medicine system. Local medicine-man (*Guru*), who mainly prepare medicine from different parts of plants, administers the treatment in their traditional way was interviewed. The data on dietary intake pattern, food availability, pattern of harvest, key food preparation have been categorized and described in the paper. Finally the article argues the importance of sustaining the knowledge of such small scale community to ensure the conservation of critical resources for the benefit of mankind.

Key Words: Food system, Indigenous Knowledge, Critical resource conservation, *Sauria Paharia*, Jharkhand.

Introduction

Food, in the first instance, is what grows on farms, comes from the sea, is gathered from the jungle, is sold in the market, and appears on our tables at mealtimes. However, as a cultural phenomenon, food is not simply an organic product with biochemical qualities that may be utilized by living organisms to sustain life; rather, food is both the substance and symbol of social life, a means by which people communicate with each other, and, an embodiment of that communication itself (Foster and Anderson 1978). In fact, Anthropologists have long been interested in diets, especially in the sociocultural determinants of food; the nutritional and medical consequences of particular consumption patterns, which include pattern of food; and the changing patterns of food production and markets, also, the awareness of the socioeconomics of hunger, famine and food aid (Pottier 1996). Basically, the study of food in anthropology can be distinguished into two major approaches: the anthropology of food and, nutritional anthropology. The former focuses on the symbolic or structural analyses of food; and the latter is based on ecological theory and considers human dietary behaviour and requirements within its environmental context, including the physical and social environment (Quandt 1996).

People must be fed, sheltered, and protected if they are to live and reproduce the species and the culture. Mintz (1996) explains how food, as a primary societal need, takes on numerous meanings:

> For us humans, then, eating is never a ―purely biological‖ activity (whatever ―purely biological‖ means). The foods eaten have histories associated with the pasts of those who eat them; the techniques employed to find, process, prepare, serve, and consume the foods are all culturally variable, with histories of their own. Nor is the food ever simply eaten; its consumption is always conditioned by meaning. These meanings are symbolic, and communicated symbolically; they also have histories. These are some of the ways we humans make so much more complicated this supposedly simple ―animal activity.

So even though food is central to our survival, it plays varying role(s) in society and culture. It has thus been interpreted from numerous perspectives within anthropology (Messer 1984; Mintz and Du Bois 2002). Linguistic anthropologists have analysed ―ethno-classifications of food species and have called attention to ―food codes as social markers of class, caste, or ethnicity (Douglas 1984). Cultural materialists have argued that food-related shifts in ecology can be traced to changes in political-economic power (Harris 1979). Archaeologists have traced population growth and the rise and fall of

civilizations against transformations of food species, production and processing technologies, and water management (Flannery 1973). Medical and nutritional anthropologists have combined scientific and folkloric analysis to map changing diets and their health consequences, interconnecting food and nutrition at individual, household, community, national, and global levels (Pelto et. al. 1989).

Food systems are cultural mechanisms for meeting basic human nutritional needs. Food system sustainability requires avoiding long-term depletion of the natural resource base and maintaining the distribution of essential nutrients to people (Bodley 2001). A society‘s food system is both central and interconnected to the rest of society. Accordingly, frameworks to interpret food systems are microcosms of frameworks for interpreting the ways humans transform their natural environment. Several studies (Mintz and Du Bois 2002; Veeck 2000; Khor 1994) demonstrate how humans as individuals, in communities, and comprising societies are continually making decisions on resource use that profoundly affect the condition of the surrounding environment. But forces that drive environmental change emanate from a variety of socio-natural sources. It is more common to conceive of them as either from the human environment, such as demand for food or other resources, or from the natural environment, such as climatic change or natural disasters.

The idea of a food system, is a convenient means of conceptualizing the relationship between the different forces—markets, elites, public policy, climate, biochemical research experiments, etc.—acting upon the food flows from producer to consumer. It refers to a chain of interconnected activities that take place in order to get food from the environment to people, including food production, processing, distribution, marketing, and the knowledge and customs surrounding food and food consumption (Bryant et.al. 2000). The food system concept necessarily connects 1) natural processes used in food production and their ecological sustainability and 2) socio-spatial power relations and networks (both individual and organizational) that mobilize social labour, control resources, engage the world of symbols, ideas, and impact household reproductive potential and patterns of maintenance. In this regard, primary objectives of our global institutions are to determine strategies to cope with the impacts of environmental change on food systems and to assess the environmental and socio-economic consequences of adaptive responses aimed at improving food security (Ericksen 2007). As defined at the World Food Summit (1996), food security is when all people, at all times, have physical

and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

Tribal people form an important component of the natural ecosystem in which they are in a multiplex relationship among population of organisms for sustaining their livelihood within their habitat (Anani 1999). The bio-resources which forms a major component of the natural resource, occupy a central position in tribal culture and economy. The tribal way of life is very much influenced by the nature right from the birth to death. Since tribal communities live in close proximity with biodiversity rich landscapes, they have evolved local specific and novel livelihood strategies based on their indigenous knowledge. This knowledge was passed on through generations and it played an important role in the conservation and sustainable use of biodiversity (Chatterjee and Das 2013; Kapoor 1996). The traditional food systems of Indigenous Peoples touch the full spectrum of life in ways that modern food systems do not. Their food systems contain treasures of knowledge from long-evolved cultures and patterns of living in local ecosystems. The dimensions of nature and culture that define a food system of an indigenous culture contribute to the whole health picture of the individual and the community – not only physical health but also the emotional and spiritual aspects of health, healing and protection from disease (Kuhnlein et al. 2009). But it is too a true fact that, these systems are becoming increasingly more affected by the forces operating from outside the community. The culturally incompatible technological intervention by the development agencies results in taking them to vulnerable situation like poverty, discrimination and marginalization.

Understanding the food systems of tribal peoples and improving or strengthening these systems in the context of nutrition and health pose unique challenges. It is well recognized that traditional foods and dietary diversity within an ecosystem can be powerful sources of nutrients and, thus, better health (Messer 1984). In view of their habitat and dietary habits, tribal peoples often distinguish themselves from other population groups. Their food patterns are influenced by environmental constraints and vary from extreme deprivation in lean seasons to high levels of intake of several foods during harvest and post-harvest periods (Shipton 1990). Tribal food-related practices and patterns are highly influenced by their traditions and environment; consequently, understanding the wide diversity of food systems of tribal peoples and improving and strengthening these systems in the context of nutrition and health merit attention. Hundreds of tribes exist in different parts of India, a good example of indigenous

populations with a vast diversity in their cultures, traditions and environments. There is a rich habitat of natural foods in Indian tribal environments that need to be used to promote food security, nutrition and health. However, challenges of geography, agricultural technology, cultural habits, lack of formal education, poor infrastructure, including health care facilities, and poverty lead to development of poor nutrition and health. This article provides a case study of the Sauria Paharia tribe from the Pakur district, in Jharkhand, Eastern India with reference to food and medicinal practices for sustaining life in a hostile environment.

Food and medicine among tribes: earlier studies

Medicine as well as food is indispensable to human life; both almost control our daily life. Definitely, our lives are full of culturally shaped notions about food. Culture defines health, so does it set dietary instructions for maintaining health, and preventing and curing sickness (Foster and Anderson 1978). Comprehensive, anthropological monographs on food systems are lamentably rare. Audrey Richards's (1939) *Land, Labour and Diet in Northern Rhodesia* still remains the model for the field; she and an interdisciplinary team examined food production, preparation, exchange, preferences, symbolism, consumption, and nutritional consequences. Some indigenous people has the tradition of eating raw leaves, young inflorescences, tender stalks and other plants' part as medicine/nutrient supplement in their diet since time immemorial (Yumnam and Tripathi 2012; Cabuy et al. 2012). Most tribes have their ethnic foods made from cereals either with pulses or without pulses, some dishes made entirely from pulses, foods based on green vegetables or fruits or other items like tubers or milk based on the availability (Sharma and Singh 2012). Thus these diets are taken both in raw and cooked state (Sorayya et al. 2012; Singh et. al. 2012). There is a large number of emergency food especially plant species i.e. foods used in scarcity period prevailed in indigenous communities (Jain and Tiwari 2012). Young, edible bamboo shoots of some specific species form a traditional delicacy in many communities (Sahu et al. 2012; Devi and Kumar 2012). Fish and meat are dried to be consumed later in areas with water body (Armaan and Basu 2012). Wild mushrooms are found in food culture of some tribes (Johnsy et al. 2012; Tanti et al. 2011). There is a great role of wildlife in the livelihood of forest dependent communities. Rural People have historically used wildlife primarily for subsistence, religious and commercial purposes (Peres 2000).

The history of the use of plants in medicine can be traced back to the ancient civilisations or pre-rigvedic times. The earliest written record of the preparation and use of medicine from plants is in the *'Rigveda'*. It is not surprising that many early workers concentrated on herbal medicine or Traditional Medicinal knowledge (Sunderland 1999). Hermandery (1968) studied the flora and fauna of Mexico in relation to man and wrote a comprehensive account in 16 folio volumes. This is the first official record of a scientific expedition in history and is still a useful source of study (De 1968).

Ethnobotanical knowledge of medicinal plants has been among tribal communities from ancient times (Kandari et al. 2012). An organised study of ethnobotany in India was started by Atkinson (1882) by publishing 12 volumes of the Gazetteer of Northwest provinces of India. Bodding (1927) published his notes on the system of medicine practiced by Santals one of the largest tribes in India numbering about three million. Bodding's work is very significant in the sense that he spent nearly thirty years with the Santals. Majumdar (1927) made an exhaustive scrutiny of literature on Indian medicine. As a part of NTFP, medicinal plants serve the purpose of both sustainability and economic income (Kamble et al. 2011; Panda and Sangram 2012; Khuroo et al. 2011). Among the various plant species, some are in serious threat and needed to be documented (Joshi et al. 2011). The indigenous people has own system of plant classification or taxonomy, concept of disease as well as own medicinal system or healing practices (Komaromi 2009; Balangcod and Balangcod 2011; Negi et al. 2011; Goodman and Redclift 1991). Most of them still rely more on these practices rather than modern medical system. The knowledge of medicinal plant of tribal people in Dumka district (which is neighbour district of study area) has been documented in a research of Mondal et al. (2012).

Research setting and methods

The study was carried out among the primitive tribal community named Sauria Paharia (Maler), who are considered as the first inhabitants of Santal Parganas division of Jharkhand, currently residing in north of Rajmahal hills. They speak Malto language and live on hills or hill slopes. The Sauria houses are mostly thatched/tiled huts with two rooms supported on pillars of poles, with a main pillar at the centre. Their rectangular shaped house is erected north and south. There is only one room in the house which serves the purpose of Bedroom, Kitchen room, guest room, store room and dining room etc. That room is bounded with a veranda. It consists of more than one door, the number of which

varies from two to three. The society is patrilineal in tradition. Living in a difficult terrain, cultivation on Tanr land, with little or no education, healthcare facilities, drinking water, etc. their economy is much below the lowest minimum required for a decent living. At many places it has been a case of poverty and penury in the land of plenty. Their daily necessities are met either by the weekly markets or by the middlemen or hawkers (*pheriwalas*). They are seen mainly during harvest season, when Saurias have reaped their crops. Due to the restrictions imposed by state and ever-shrinking forests and hill resources their livelihood is under stress and survival is at stake. Dominant development models of change operative through the introduction of administrative machinery, democratic experiment and concept of welfare have definitely broken the stagnation of Sauria Paharia community but it also decaying their age-old practices which seems to be more sustainable in such remote locations.

This article is based on data generated from a fieldwork of more than four months on the Sauria Paharia community of Jharkhand to understand the relevance of Indigenous Knowledge for sustainable development in a localized context. The previous studies (Halder and Roy 1998) on Sauria Paharia community focus on the outcome and importance of induced development but undermine the inherent process of endogenous development model. In order to document the different resources available in the area and related knowledge as well as to identify the role of those resources in livelihood and survival in hostile situation, a case study was carried out in a small village named Durio located in the Karmatanr Panchayat, Litapada Block, Pakur District, Jharkhand, India. The village is situated in a very interior location and inhabited by only 22 households.

The research has been carried out in different phases. Initial period of research proved to be difficult because of hilly terrain and suspicious attitude of the respondents that gives the impression of a culture whose members constitute what Adler and Adler (Adler and Adler 2002) described as reluctant respondents who are not only hard to find but even harder to secure for permission to study. However employing a ‘local boy’ as field guide negotiates this predicament. The ‘local boy’ plays a role of passive translator rather engaging directly in the interview process. The authors being long participants in the studied community choose to authenticate their observation by self-reflexion and subsequent cross-checking of their observation to minimize the error of understanding. Moreover, prior to the 'real' field work, few informal meetings and interviews were carried out with some key people and potential key informants in block and village to explore more on baseline information regarding the study. The data was mainly collected

with the help of structured schedule followed by interview in a group and individually as well. Participant observation becomes handy during trail walk through the forest accompanied by few 'expert' villagers in identifying critical resources that are used by the villagers during the distress period like drought or during crop failure. The villagers identified that resource as an 'emergency' food. With regard to the medicinal plant knowledge key informant interview was conducted to understand and document the folk medicine system. Local medicine-man (*Guru*), who mainly prepare medicine from different parts of plants, administer the treatment in their traditional way was interviewed. The data on dietary intake pattern, food availability, pattern of harvest, key food preparation have been categorized and described in the paper. The data on indigenous practices were collected through open ended interview and guided observation by the field guide. Almost every member of the village incorporating male, female, adult and young were interviewed independently to find the distribution of knowledge in the community. The study was principally guided by qualitative methodology, however data were numerically coded and categorical variable values were presented quantitatively. The findings were validated by focused group discussion and peer group meeting.

The food system: types, availability, nutrition and preparation

The case study on Sauria Paharia food system draws extensively on ethnographic studies that were based primarily on participant observation and interviews with the dwindling group of elderly, native informants who still were knowledgeable regarding their food culture. To determine the foods normally consumed, data were collected through field visits and a rigorous food consumption survey by visiting each household, estimated by 24 hours recall method. Scientific names, common names, and food preparation were documented. All foods were then classified in terms of their nutritional supplement and source of availability.

The diets of Sauria Paharia primarily consist of cereals and pulses. Normally, food is eaten twice daily (*dotem*), on around 11-12 a.m. and another in the evening before it gets dark and in total privacy. The villagers take boiled rice (*bhat*) two times in their diet. Besides rice, only one curry or soup is prepared. The content of that curry depends upon availability of pulse, vegetable, fruit or meat. Frequently consumed pulses include *kulthi, arhar, sutli, ghangra*, and cowpea. Leafy vegetables are also common in their diet options that are available in abundance in the neighboring hills and forest. Most common

vegetables are Green papaya, lablab beans, Pumpkin (*Jar kunde*), Gourd (*Loldu*), Potato, Tomato, Brinjal, Cole crops, Drumstick etc. Bamboo shoots and wild mushroom are also collected during the season of availability for consumption. Hardly any respondent of these villages told that they consumed milk despite they domesticate buffaloes and cows. Although all the Sauria Paharia are non-vegetarian and extremely fond of consuming fleshes of animals and birds, yet the consumption of meat is limited to only ceremonial and festival days.

Traditional Food Types

Other than the traditional food items, like the rice, wheat, millets, etc. Sauria Paharia have a treasure house of knowledge about potential food plants from the surrounding land and forests. These include leaves, stems, bark, roots, fruits of wild plants and a number of animals and insects gathered as food items. The area is very rich in various types of edible and non-edible items found abundantly in the nearby jungles. Nature has provided plenty of edible plants from which leaves, roots, fruits, flowers, seeds, tuber, etc. are taken as food. They collect those edible plants for their own consumption and other uses. If there is any excess quantity of collected materials, they sell those in the market or exchange with grocery items of daily needs from local grocers.

Fifty eight plant materials having edible value generally consumed by the Sauria Paharia were identified and tabulated (Table 1). Foods were classified into food groups based on domesticated and collected types, and the numbers of food per group are shown in Figure 1.

The study reveals that all the domesticated items under floral category, are either cultivated in *Jotbari*, terrace or in hill. But among the collected ones, most are available in forest. Among them, most fruits and vegetables are collected by men, and rest items like leafy vegetables and flower are gathered by women. Fruits and vegetables are usually sold in the market while the leafy vegetables and flowers are collected for household consumption. Wild animals are hunted by men in a group for the consumption of flesh though this activity is occasional. Women collect mushroom from the forest and they became experts in identifying poisonous mushroom. Women usually embark to the Sal forest for mushroom collection when the maize plant attains the knee height (i.e. during August to September). This type of seasonal indicator was noticed in some other tribes too (Mao and Hynniewta 2011). Mango, jackfruit and wild banana are available on hill top in plenty. Leafy vegetables are available in abundance in monsoon (July- August) and subsequently flower is available in winter (October- November). Leafs sprout after first

rainfall after which first harvesting is done. When leafs become older and inedible, a pruning is done and new twigs are harvested again. The wild animals are available throughout the year but they are hunted in the summer.

Table 1: Sauria Paharia traditional food list (58 species)

	Scientific name	Common/English name	Local name	Seasonality	Preparation
Flora	**Fruits- domesticated**				
	Ziziphus jujube	Plum	*Ber*	Feb-Apr	Raw, pickled, dried, cooked
	Mangifera indica	Mango	*Tatgeh*	Apr-Jul	Raw, ripen, pickeled, condiment, drink
	Phoenix sylvestris	Date Palm	*Khejri*	Annual	Raw, juice, mollases
	Carica papaya	Papaya	*Papata*	Annual	Raw, ripen, cooked
	Psidium guajava	Guava	*Sapari*	Aug-Nov	Raw, ripen
	Fruits- collected				
	Artocarpus heterophyllus	Jackfruit	*Kaltare*	Feb-Aug	Ripen, cooked
	Tamarindus indica	Tamarind	*Tetli*	Apr-May	Raw, pickled
	Aegle marmelos	Bael	*Kotre*	Apr-Jul	Raw, drink
	Musa balbisana	Wild Banana	*Kauro kaldi*	Annual	Ripen, cooked
	Borassus flabelifer	Palm	*Talu*	Apr-Jul	Ripen, sprouted
	Annona squamosa	Sweetsop	-	Aug-Oct	Ripen
	Diospyrous melanozylon	Kend	*Telo*	Apr-Jun	Ripen
	-	Pusre	*Baru*	Apr-Jun	Ripen
	Flower- domesticated				
	Moringa oleifera	Drumstick	*Kanjuri*	Annual	Fried, mixed curry
	Flower- collected				
	Bauhinia variegate	Kachnar	*Komo*	Oct-Nov	Fried
	Leafy vegetables- domesticated				
	Moringa oleifera	Drumstick	*Kanjuri*	Annual	Fried, boiled
	Brassica napeustris	Rapeseed	*Rayyi*	Jul-Oct	Fried
	Leafy vegetables- collected				
	Bauhinia variegata	Kachnar	*Komo*	Apr-Aug	Fried, boiled
	-		*Margari*	Apr-Jul	Fried, cooked, boiled
	-		*Kachnapupudu*	Apr-Jul	Cooked
	-		*Tisgo*	Apr-Jul	Fried, cooked
	-		*Khorgo*	Apr-Jul	Fried
	-		*Berbayo*	Apr-Jul	Fried, cooked
	-	Susni	*Sursuni*	Apr-Jul	Fried, boiled
	-		*Jirli*	Apr-Jul	Fried, cooked
	-		*Makri*	Ma-Jul	Fried, cooked
	-		*Danno*	Apr-Jul	Fried
	-		*Karatzo*	Apr-Jul	Fried, cooked
	-		*Jingani*	Apr-Jul	Fried, cooked
	-		*Sanjori*	Mar-Jul	Fried, cooked
	Other vegetables- domesticated				
	Cucurbita moschata	Pumpkin	*Jarkunde*	Nov-Aug	Fried, cooked
	Moringa oleifera	Drumstick	*Kanjuri*	Annual	Cooked, fried
	Lagenaria leucantha	Gourd	*Loldu*	May-Aug	Cooked, mixed soup
	Lycopersicum esculentus	Tomato	*Tisrabathango*	Annual	Mixed curry, condiment

	Solanum melongena	Brinjal	*Achbathango*	Aug-Nov	Mixed curry, fried, boiled
	Other vegetables- collected				
	-		*Amra*	Apr-Jul	Condiment
	Bombusa arundinacia	Bamboo	*Masdu*	Jul-Sep	Mixed curry
	Momordica dioica	Kankrol	*Kankro*		Fried, mixed curry
	-	Wild mushroom	*Oussudu*	Aug-Oct	Cooked, fried
	Pulses- domesticated				
	Vigna sinensis	Cowpea	*Kosroi*	Annual	Soup, boiled
	Macrotyloma uniflorum	Kulthi	*Kurthi*	Annual	Soup
	Cjanus cajan	Arhar	*Lahiri*	Annual	Soup
	-	Sutli	*Sutri*	Annual	Soup, boiled
	-		*Ghangra*	Annual	Soup, boiled
	Cereals- domesticated				
	Oryza sativa	Paddy	*Kaisso*	Annual	Boiled, puffed, flatted
	Zea mays	Maize	*Gangai*	Annual	Powdered(Sattu),boiled
	Pennise tumtyphoides	Pearl millet	*Bazra*	Annual	Boiled, powdered
	Sorghum vulgare	Sorghum	*Jowar*	Annual	Boiled, crushed
Fauna	**Fauna- domesticated**				
	Gallus gallus domesticus	Chicken	*Erru*	Annual	Cooked (meat & egg)
	Bos indicus	Cow	*Ouzu*	Jul-Nov	Cooked, (meat &milk)
	Capra aegagrus hircus	Goat	*Erre*	Annual	Cooked
	Sus sp.	Pig	*Kisu*	Annual	Cooked
	Ovis aries	Sheep	*Bedi*	Annual	Cooked
	Fauna- collected/hunted				
	Rattus sp.	Rat	*Osgey*	Dec-May	Roasted
	Columbidae	Pigeon	*Karwa*	Annual	Cooked
	-	Wild chicken	*Erru*	Mar-Jun	Fried, cooked, roasted
	Sus sp.	Wild swine	*Kisu*	Mar-Jun	Cooked, roasted
	-	Fish	*Minu*	Jul-Oct	Fried, cooked, roasted
	-	Honeybee	*Ishgudu*	Annual	Raw

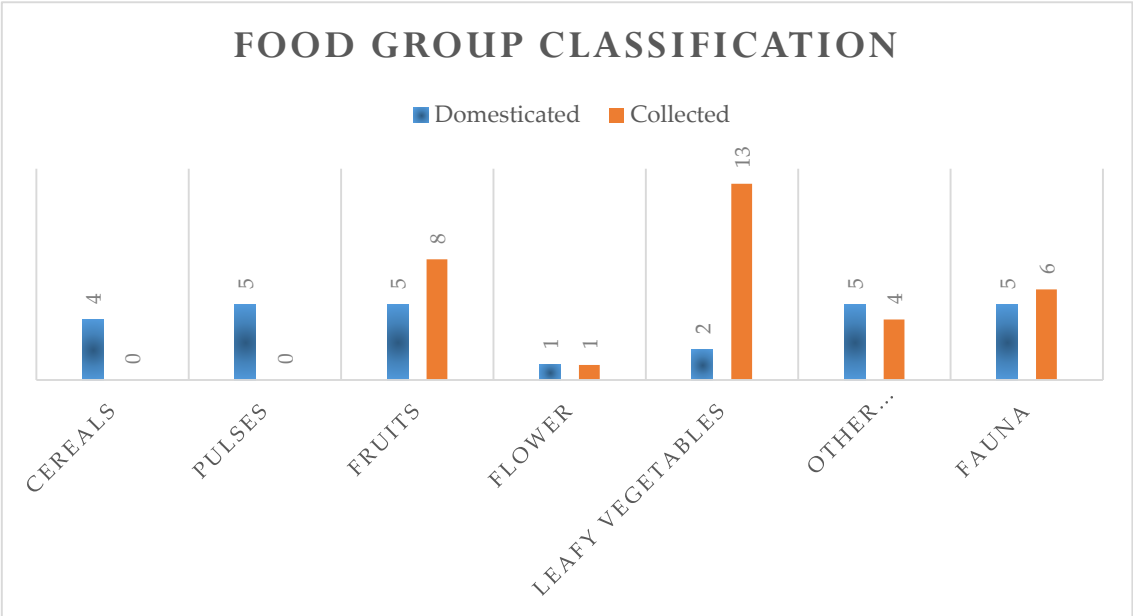

Fig. 1: Food group classification of Sauria Paharia traditional food list

Figure 1 shows that more than one forth items come under leafy vegetables. It is followed by the total sum of fruit items and fauna items. Least items were found in flowers as well as cereals. The staple foods are mostly domesticated while items required for eating in occasions are mostly collected.

Seasonal Availability of Food

Mostly rice is available for round the year as it is cultivated in almost every household. They usually take their own cultivated rice that is traditional variety. The rice availed from Public Distribution System (PDS) is not preferred by them. In case of non-availability of the cultivated rice, either the PDS distributed rice is taken or rice is borrowed from neighbours. Similarly maize and pearl millet are easily available as these are cultivated in the village. Pulses are almost regularly taken unless it is sold entirely to middleman. Fishing is carried out in monsoon when the stream and pond are filled with water. Similarly chicken, egg, mutton are prepared on occasions like festivals, social ceremonies etc. But during the slash and burn season and sowing of cowpea, the villagers organize a feast every day after operation in each field. This continues for the entire sowing season until every family sown their crop in hill forest.

For this, animal like goat, cow and pigs are slaughtered and meat is cooked and distributed among villagers involved in this operation. The family, whose crop is sown, is liable for this. The meat is distributed in equal proportion and the quantity is depended upon size and number of animals. For example, beef is distributed as 1 kg per family and mutton is distributed as 500 gm. per family. Nowadays cow is less slaughtered in Durio than earlier because of the adoption of Christianity by the entire village as a religion. Rather goat and pig are sacrificed. Therefore most amount of non-veg diet is consumed by them in monsoon season. The villagers buy potato, tomato (*Tisrabathango*), brinjal (*Achbathango*), cauliflower, cabbages etc. based on availability and purchasing capacity. Wild mushroom, bamboo shoot, fruits for making condiments are seasonally available. Besides pulses, leafy vegetables are found the most in their diet. Among these leafy vegetables most are seasonally available and some like drumstick are available round the year. Most spices are not available in the village. Those are bought either from market or from the grocery shop.

Nutritional Component in Traditional Food

The availability of key nutrients in the diet of Sauria Paharia was analysed from their traditional food list. It is interesting to note that the dietary intake include Vitamin A and Vitamin E rich items that are available in huge amount in green leafy vegetables which are most frequently consumed. Generally, fruits are a favourite among the Sauria Paharia. In summer, mango and guava were the most frequently eaten fruits. Papaya was noted as eaten throughout the year. Fruits supply the necessary Vitamin B and Vitamin C as nutritional supplements. The traditional food system prescribes these to the unhealthy persons for making the essentials nutrients available. Though meat, egg and fish are consumed less, but frequent consumption of pulses supplement the protein requirements.

Table 2: Nutrient availability in traditional foods

Nutrient compounds	**Traditional foods**	**Total**
Vitamin A	Milk, Egg, Leafy vegetables(16 types), pumpkin, papaya	20
Vitamin B	Milk, mushroom, Cereals(3 types), Meat(5 types), Dry beans, banana, fig	13
Vitamin C	*Amra*, tomato, summer fruits (10 types)	12
Vitamin E	Honey, Date palm, maize, oil, green leafy vegetables(16 types)	20
Carbohydrates	Cereals (4 types), pulses (3 types), honey	8
Protein	Meat (7 types), fish, egg, milk, mushroom, pulses (4 types), cereals(2 types)	17
Fat	Oil, meat(4 types)	5
Fibre	Mushroom, fruits(3types), vegetables(4 types), meat	9

The staple foods of Sauria Paharia provide them carbohydrate and vegetables provide other minerals and fibre. Occasionally consumed mushroom, bamboo shoot and meats provide them essential fibre. One important thing is observed in this hill tribe that is that there is no case of obesity in the village inhabitants. In fact, it is not found in neighbouring and adjoining villages too. It is due to balanced fat consumption in their diet and regular hard work. The availability of Vitamin A and Vitamin E is most observed.

Other food items containing protein and other vitamins are also in the diet of the Sauria Paharia people.

Principal Food Items: Preparation and Preservation

The villagers cooked and ate their food in much privacy. An outsider or stranger is prohibited to enter in their cooking area. It is linked with the belief of existence of 'Dakin' or 'Evil spirit' or 'Eye', which may manifest anger through loss of appetite, sickness, convulsions etc. and can even take life of the person also. Food is cooked traditionally on *Chulla* in earthen vessels. It was done with a belief that food does not get spoiled in these vessels. Few families also started using non-earthen vessels for cooking. Food is generally cooked twice in a day. Before cooking, a house-lady cleans the entire house and washes the utensils and her hands to remove bad effect due to evil spirit etc. Preparations of some key foods are given below,

Rice and rice boiled water: As rice is their staple food, they try to keep the traditional rice for round the year. The dirt and stones are removed and washed with water. Food is cooked traditionally on oven in earthen, copper or stainless steel vessels. After preparation both rice and the rice boiled water is consumed. The villagers are aware about the nutritional value of rice boiled water based on traditional wisdom. Villagers consider *Okhlee* (grinder) grinded rice-boiled water (*Maad*) has more nutritional value than the rice availed from PDS (Public Distribution System). They take the former one in diet and sometimes feed to animals too.

Pulse soup: The various soups of this type are cowpea soup (*kosroi daal*), *kulthi* daal, *arhar daal, sutli daal, ghangra daal* etc. Among them *kulthi daal* is mostly consumed. Sometimes bean seeds are boiled with other vegetables. Usually the pulse is boiled after washing for almost half an hour on the oven. Usually no cover is put over the container. Before taking out from oven, salt and turmeric powder is mixed. Then dried chili, onion and garlic are fried with heated oil on *kadai* (frying pan). Sometimes leafy vegetables like drumstick and its flower too (if available) are mixed with the boiled pulse before taking out after boiling. It is done for nutritional as well as taste enrichment.

Vegetable curries: Vegetables are washed and fried on oil. Required spices are mixed and boiled after mixing water. Mushroom is too prepared after washing a little. Almost all leafy vegetables are prepared after boiling. They do not use green chili in curry as it is not available in the locality. Garlic and onion are put in almost all vegetables as spice. As only one curry is prepared for eating with boiled rice, generally it is soupy and easy to eat with.

Boiled potato: Potato is boiled in vessel during boiling rice. Having separated from rice, it is pilled, crushed and mixed with chopped onion. Next, oil is heated either in spoon or in a charcoal. The heating of oil in charcoal is an indigenous technique. In this method, a burning piece of charcoal or fuelwood is put on the crushed potato and oil is poured over the charcoal. The oil automatically get heated. Then it is again covered with rest potato. Now the charcoal is removed and the potato is mixed with salt and chili which is ready to be served. While serving food to some externals or relatives, usually a bowl is given which contains dried chili, cut onion and salt.

Substitute foods: In summer the villagers face food scarcity as the rice gets short. Therefore need for alternative foods are felt. These foods are prepared either from maize or some other course cereals. These items are also consumed during acute drought. Since, last few decades the necessity of such foods seems decreasing because of the intervention of PDS delivery mechanism. *Gangijagu* or *makai bhat* is a type of food commonly used as an alternative of rice. It is taken mostly in monsoon and sometimes in summer also. It looks like cake. To prepare *Gangijagu*, firstly maize is crushed in wooden grinder (*Okhlee*) followed by boiling in hot water for half an hour till a white soft paste like consistency is reached. After that salt is added and dried up in a plate to make it solid. This dish is prepared from a special indigenous variety named *potio gangai*. Similarly *Bazrajagu* is prepared in this way with *bazra* (pearl millet). Here too the grinded *bazra* is boiled in water and salt is added for taste. Other important substitute foods are cake of *bazra* and maize (*pitha*), boiled maize, roasted maize, powdered fried maize, and fried *bazra*. Besides honey (*ishgudu*) of wild bee that makes their comb in socket of big tree like *Karki*, *Mahua* and Mango are consumed at the time of distress. Boys identify the tree and observe the movement of bees. Whenever the bee goes out or the tree cut down on some occasion e.g. for timber or firewood, the youths take out the comb from inner stem and eat that. It tastes sweet and less concentrated than honey from domesticated bee.

The Sauria Paharia uses traditional methods of food preservation or they consumed prepared foods within the same day or the following day for breakfast. Harvested foods are preserved for periods of drought or scarcity. Preservation methods include drying, roasting and the use of cow manure. Cereals and legumes are preserved in bamboo baskets coated with cow manure. These containers were left in the sun to dry and then were filled with the seeds or grain. The manure helps to repel any insects from infesting the seeds or grain. Grains are naturally dehusked in a wooden grinder called *Okhlee*. Maize is crushed into powder and preserve for the future. Few families used the leaf of Sindwar (*Mishdari*) to preserve cereals. Drying was the most effective method of preservation among the Sauria Paharia. Animal flesh usually dried under the sun, by

piercing it with sharp knives. Once it is well heated, it was stored by being wrapped in cloth and kept in bamboo baskets. When required, it would be taken out, cut into pieces and added to curries. Mushrooms were also dried and stored in jute sacks. Dried palm is crushed and mixed with water which serves as a good health drink during summer that prevents sunstroke.

The food system explained above reveals that bio-resources form an important part of their diet. Therefore, it can be said that they are very much dependent on the bio-resources. These edible items are important for their livelihood and also for their very existence.

Bio-resources and ethno-medicinal practices

Ethnomedicine is the belief and practice relating to health and diseases that are products of indigenous cultural knowledge of the particular communities. Some notable progress has been made in the field of ethno-medicinal research on the tribes of Jharkhand by various scholars (Mondal and Chowdhury 2012; Halder and Roy 1998; Mahto 2011; Upadhyay 2004; Mishra and Gupta 2002; Banajata 2008) during last few decades and still many tribes are awaited to be explored ethno biologically in this region of India. The Sauria Paharia of Santhal pargana region use their traditional knowledge in health care system where herbs, plants and roots of some trees and plants locally available are used for curing the ailment. They have indigenous method of treatment for different kinds of diseases with the help of local herbal medicines. Villagers of the remote localities are still relaying their traditional medicines for the alleviation of the local ailments. During the village stay it was observed that the Sauria Paharia people do not bother much about their diseases. But in cases when it hampers everyday activities or shows no sign of relief from the household remedial measures, or if it seems to become acute or chronic then only experts in the field of medicine or the Gurus are consulted for relief (Halder and Roy 1998). They believe that the diseases are caused by the evil influence of malevolent spirits. So, they consider the disease can be cured by spiritual remedies. The Guru is the person who has the knowledge of spiritual world as well as medicinal value of herbs and the ability to root out the disease. The Guru thus performs the curing process starting from diagnosis to treatment with various measures. However in Durio only one person is holding the knowledge of such indigenous healing system. They mostly use herbals and sometime an admixture of plants and mineral substances coupled with local rituals. Some

important medicinal plants used by the Sauria Paharia for curing different diseases and its administration process are given in the table 3.

Table 3: Medicinal plants and their use for human health

Sl No	Herbs/Plants/ Items	Disease	Administration
1.	*Chitgyee*	Back pain	Root is crushed and small pill are formed. Placed on the portion of pain and get cured for 5-6 years
2.	*Mahachiti (*Kalmegh*)*	Skin disease	Small pills are formed and orally taken
		Fever/Cold	Mixed with bargo and orally taken
		Gastric	Mixed with other forest herbs and taken orally
		Senselessness (Bi-Mirgi)	Stem and leaf is crushed, mixed with boiled water and orally taken. Oil is massaged too
		Blood purifier	Oral (overnight soaked water taken in empty stomach)
3.	*Kiri*	Toothache	Stem sap(milk)and cowdung ash separately applied
4.	Drumstick	Headache	Bark and root is crushed and mixed with garlic and applied on forehead
5.	*Chalaki Kiru*	Brain	Oral or nasal (grinded root after sieving and soaked in water)
6.	*Tupu*	Abdomen	Oral (Grinded root solution)
7.	*Pel Mandru*	Pain in limbs	Externally applied with oil
8.	*Mahaage*	Skin, pain	Leaf extract Externally applied
9.	*Kiro*	Cut or wound by snake bite	Local (flower or seed juice) Oral (upper part fruit juice)
		Fracture	Locally applied
10.	*Otaro Ko*	Cut wound	Leaf extract is locally applied
11.	*Kasari*	Blood dysentery	Leaf extract orally taken
12.	*Siju (Cactus)*	Scorpion bite	Grinded root and water solution externally applied
		Fishing	Grinded root-water paste mixed in pond water
13.	*Kapahi*	Urinary	Oral (grinded leaf and water solution)
14.	*Rogho chela*	Jaundice	Oral (grinded bark and water)
15.	*Chhatni*	Fatigue	Oral (grinded bark and water)
16.	*Karalya*	Brain	Powdered seeds solution orally taken
17.	*Donda*	Abdomen pain	Oral (grinded bark and water solution)
18.	*Beru*	Snake bite	Crushed leafs Externally applied
19	*Bel*	Dysentery	Seeds are crushed and orally taken
20.	*Sonaru*	Hard stomach	Grinded young bark hot water solution orally taken
21.	*Bargo*	Stomachache	
22.	*Saura*	Pain, headache	Oral (Saura and Chatni bark grinded water solution)
23.	*Aachkukra Aali*	Septic wounds	Plant stem pasted and locally applied
24.	*Khujli manu*	Itches	Ground leaf paste locally applied
25.	*Adjore*	Bone fracture/ injury	Local (Grinded herb root paste applied over the tied props supporting the bone)
26.	Salt	Stomach	Oral intake of water solution prepared by Guru/Ojha
27.	*Mahuage*	Stomache	Grinded leaf globules taken orally thrice a day
28.	*Komo*	Urinary system	Oral (root powdered in water and mixed with hot water)
29.	*Aaru*	Fishing	Fruit is crushed and mixed in pond water

Table 4: Medicinal plants and their use for other purpose

Sl No	Herbs/Plants	Disease	Administration
1.	*chitru*	Stomachache of cow, goat (veterinary)	Fruit grinded with water is orally taken
2.	*Manjepa*	Injury of cow	Local (grinded root-water paste)
3.	*Urre mannu*	Crop disease (Insecticide)	Root water paste
4.	*Nerpalli*	Crop disease	Sprinkled over crops dried leaves mixed with neem

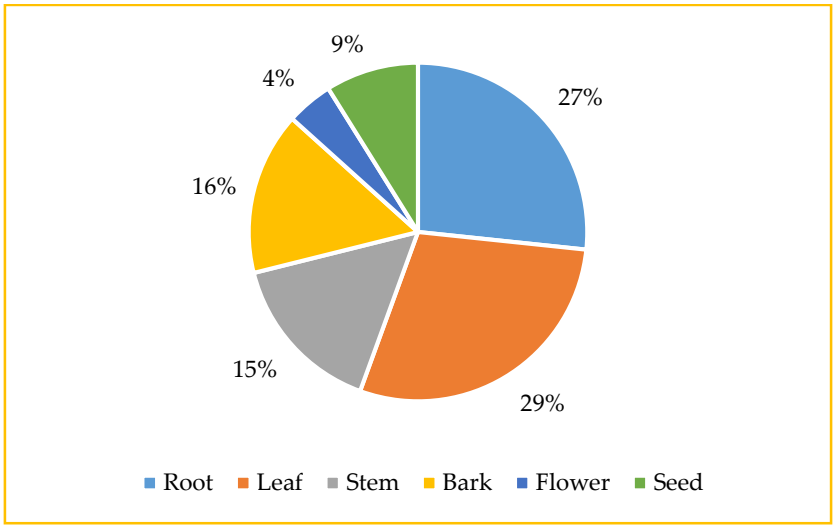

Fig. 2: Parts of plant used as medicine

Besides human illness, herbal medicines are also used for crop protection and treatment of domesticated animal. The plant part used for the medicinal purposes as shown in the figure 2 entails the predominance of root and leaf followed by bark are used for treating illness. However such indigenous practices are threatened as bio-resources on which they are dependent are depleting due to the disappearance of customary cultural practices. Despite external forces, the small scale community like Sauria Paharia is still retaining some of the customary practices to manage the local resources in a sustainable way that ensures their survival in such a remote and hostile environment.

Resource management practices: strategy for survival

The ecological knowledge of Sauria Paharia is intensely associated with the resource use and management pattern which have been studied in this research with the help of different social research tools. These resources have been widely classified as land, plant, forest, water etc. Since time immemorial, indigenous peoples like Sauria Paharia have developed and applied several resource management techniques and have orally passed them from one generation to the next. These activities take place during different seasons and periods. They may not be applied uniformly in plains and in forest areas but the general principles are the same no matter the locality. They present an enormous wealth of knowledge to be tapped in our quest for sustainable livelihood. This knowledge spans from management of land, soil, plant, forest, genotype conservation etc.

Land management

Farming is the primary occupation of the community. Shifting (*Qaaldu*), Upland (*Jotbari*) and plough terrace cultivation are the three types of farming practices carried out by the villagers. Land is managed traditionally in all three farming areas. Shifting cultivation is done in a piece of land holding for 3-4 years. The land is selected with keeping view on slope and ease of access to cultivate. After a spell of cultivation, it is left for 8-10 years to grow the trees. In this cultivation cowpea is cultivated in the first year, which allows fixing nitrogen in soil. *Jotbari* cultivation is observed for almost all the year except the hot summer months when water is not available at all. In summer that land is used as grazing land for cattle too. Besides cultivation, the land is used for threshing, winding etc. There are some trees and shrubs in *Jotbaris*. On the other hand, in lowland terrace, water management is done by directing water flow on the basis of altitude.

The above chart describes the approximate land use percentage in the village. Hills and hill slope is used for shifting cultivation, collection of plant and animal products, hunting and other forest produce. Forest in foothill and barren land is used for collection of major and minor forest produces, grazing in rainy season as well as for human defecation. Lowland and midland is used for paddy cultivation in monsoon season by making terrace. The grazing land situated in outer side of the village is used in grazing of cattle and goat. *Jotbari* is associated with the respective houses which provide grains,

pulses and vegetables. Playground has recently been formed where the young male members play football in the evening. Habitation portion is not very large as only 22 households are there and almost all of them have only one or two rooms. Animals are kept in extra rooms i.e. cowshed.

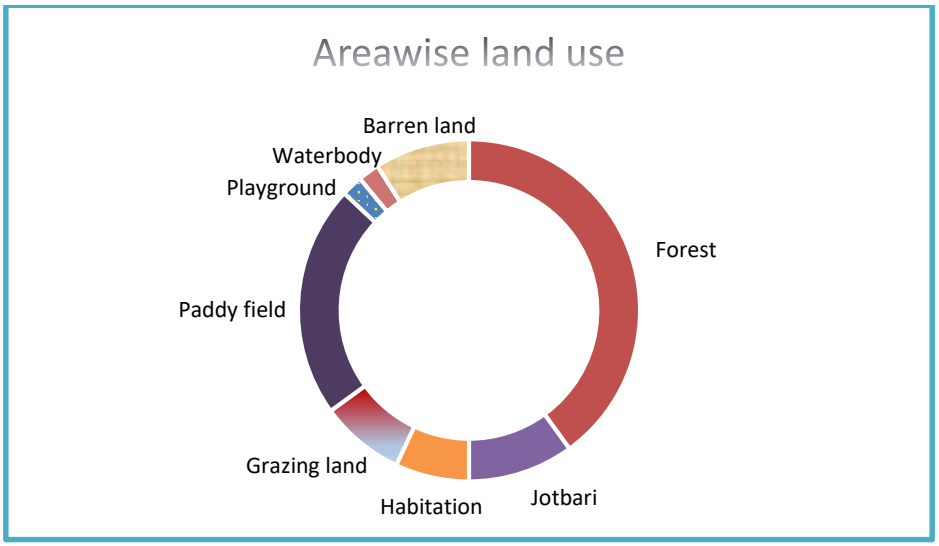

Fig. 3: Approximate land use pattern in *Durio* village

Soil perception and use

In *malto* dialect soil is called *kadju* or *kaju*. Basically there are four types of soil available and identified by them which have different use.

Table 5*:* Indigenous soil classification of Sauria Paharia

Name	**Color**	**Source**	**Uses**
Kaiso Kaju	Red	North-west hill	Paddy cultivation, smearing wall during house construction
Chottor Kaju	White	Other villages	Applying in hair, wall polishing
Marogro Kaju	Black soil	Hill, *Jotbari*	Cultivation of gram, lathyrus (Khesari), Lentil
Podiyo Kaju	Whitish grey	*Jotbari*	Maize, cowpea cultivation
Danga Kaju	Yellow soil	*Gadpari* village	Wall and fence smearing

Indigenous varieties and their preservation

Starting from shifting cultivation, the varieties of crops are totally of indigenous origin. Therefore that has a good demand in local market and often marketed to other provinces. Such varieties have an essential role in the livelihood of Sauria Paharia. Such variety has better capacity to resist drought and repel pest attack. Indigenous cowpea varieties are *Badr badai*, *Ashwin badai* and *Mota kosroi*. Similarly varieties for maize are *Satia Makai* and *Ikhjo gangai*; pearl millet include *Sarve bajra* and *Moto bajra*; paddy are *Kasudu*, *Bismonia*, *Kaladhan*, *Motachingul*, *Danga Kaisso* and *Jitey*. Other crops like *Arhar*, *Sutli*, *Kulthi*, *Shalakati* and fruits are also of indigenous origin. In fact except 2-3 varieties of paddy, all crops are cultivated from indigenous genotype resources. The seed is stored with specific techniques. In most cases seeds for next season are stored with *Sindwar/Nisindhra* (Mishdari) leaves. For this purpose the leaves are dried, crushed and mixed with crop and kept in Jute Sack.

Plant management

Plants have their use in providing food, shelter, fresh air and daily use materials. The villagers are well aware about the role of plants in their livelihood and they employ their traditional knowledge in managing this valuable resource. The specific use of plants in different food items, construction items, medicine, land and water management, toothpick, fuelwood, cotton, fence etc. is identified by the respondents. The exploitation of these resources is guided by distinct customary laws of the community based on household and community requirements. Lac cultivation was done before some years in the plants of plum, palash etc. but that has been stopped. Fruit trees like guava, papaya, tamarind, plum produce most fruits in summer. Some trees like *kondra* produce leafy vegetables and that is pruned to sprout more young leafs. Fuelwood are mostly collected in summer and winter season from living plants by cutting dry branches and by cutting the entire dead plants and trees.

Forest resource management

The villagers of Durio exploit a range of major and minor forest produces in three main seasons. Most harvesting of minor forest products makes the resource use pattern more sustainable.

Table 6*:* Forest resource use pattern

Forest Produce	**Harvesting season**	**Utilization**
Timber	All round the year	Stem for construction, furniture
Fuelwood	Winter/ Summer	Fuel for consumption/ Sale
Fodder	Rainy season	Feeding cattle
Fruit	Summer mostly	Consumption/Sale
Flower	Spring/summer	Consumption/Sale
Medicine	All round the year	Root, leaf, fruit, flower for consumption
Leafy vegetable	Monsoon	Consumption
Mushroom	Monsoon	Consumption
Silk-cotton	Winter	Sale
Rope	Spring	House construction
Birds	Summer	Sale
Honey	Spring/ Summer	Consumption
Snake	Summer	Showing to earn
Animals (Hunting)	Summer	Consumption
Bidi/Kend	Summer	Leaf for sale/ fruit for consumption
Bamboo	All round the year	Consumption/ sale

The collection of different produces is done at certain stage of maturity of that resource. Construction and repairing of house requires timber and bamboo that can be procured from the forest after receiving permission from the traditional panchayat. Other goods have no such restriction. The respective expert section collects them and makes use. As forest is the common property, anyone having the ability can harvest the minor forest products from anywhere. But, it is taken care that the particular species of certain plant, animal or mushroom is conserved.

The Sauria Paharia of Jharkhand largely depends on the bio-resources for their economic life. People's bio-cultural knowledge about the bio-resources has made them sustain their living through the ages. Bio-resources form an important part of the religious life of the people. They worship the nature nature viz. hills, mountains, rivers, sun, moon, etc. as these provide the various requirements of the people. Such old age practices have

led to the preservation of natural resources to a greater extent in the past. But, due to influx of modernization they are converting to more organized religions like Christianity which are fading the ethnic belief systems associated with the nature.

Elements of acculturation

Religious conversion in the Sauria-Paharia tribe occurs in the name of integration and assimilation. All the villagers of the Durio as well as some adjoining villages converted to Christianity in the year 1995. The primary transformation through it was on the core cultural behavior. It is because, the belief and faith of a community drives to formation and change in the folk song, folk dance, folk tale, as well as tools of material culture. These are the product of human mind that is largely governed by the belief. Seasonal migration influenced the villagers in adopting dominant cultural traits. The pattern of change influenced from seasonal migration was mainly on lifestyle and consumption status. The influence on dress is noticed mostly on males. The language obtains many new words from Hindi, English and Bengali. Music is gradually governed by old and new Bollywood Hindi songs, Bengali, Bhojpuri and Nagpuri songs. The use and spread of mobile cellular phones is too impact of this event. Monetary evaluation of labor work replaced the barter economy system to some extent after migration. Apart from these two factors, formal education is too an actor of globalization and affects transition of culture widely.

The pattern of transformation in this regard can be traced in the transition in language, cultural preference, health and sanitation, material culture, farming and sports etc. The population of Durio became more comfortable with the national language Hindi, mainly because their interaction with the teachers teaching in Hindi. Development intervention entered both through governmental and non-governmental institutions. First initiative was taken by Christian missionaries in British period. In last decade government sponsored programs on infrastructure development (both on community and household level), health and sanitation awareness, poverty alleviation etc. were implemented by District, Block and Panchayat authority as well as local NGOs or in collaboration with UNICEF. Transition in culture is observed in all three types of farming practices. Programs on infrastructure development helped to construct new metaled roads which enriched the access to market.

Conclusion

The present study reveals that for the sake of living in the hostile environment, people use their old age indigenous knowledge where natural bio-resources as well as natural phenomena play an important role in shaping their life-ways. Indigenous peoples' cultures are dynamic and responsive to the changing cultural landscapes. The sustenance in a hostile environment encompasses economy, environment and resource use, social equity, food and medicine system, material culture and it is governed by the indigenous knowledge of the community i.e. their accumulated experience, wisdom, and know-how. These collectively influence to form the culture of a community like Sauria-Paharia. Similar to the all tribes that comes into contact with rest part of the globe as well as comprehensively understand the changes in own social laboratory, the living culture of the studied community is also changing and adapting to external or internal forces.

Religious conversion in the Sauria Paharia tribe occurs in the name of integration and assimilation. All the villagers of the *Durio* as well as some adjoining villages converted to Christianity in the year 1995. Seasonal migration influenced the villagers in adopting dominant cultural traits. The pattern of change influenced from seasonal migration was mainly on lifestyle and consumption status. Development intervention entered both through governmental and non-governmental institutions also altered their traditional farming practices.

A traditional element is one of the most important characteristics that make culture of the Sauria Paharia unique and distinctive. The method of cultivation, making wooden crafts, health care practices, management of immediate natural resources will not be available anywhere else. This indigenous knowledge may appear small, but they could make a big difference to the people's spirits, pride and identity.

We are in a dilemma. For instance, while we are trying very hard to keep our ancestors' knowledge that is rich in heritage and culture through the transfer from generation to generation, we find, at the same time that the scenario is the other way round. It is certainly not easy to maintain such knowledge since the younger generations are migrating to urban area to earn hard cash for their livelihood. This situation causes the knowledge to retain in the heart of the older generation in villages without any effort

to transfer them. This is a real case when we can hardly find the younger generation who are knowledgeable of the traditional/herbal medicine, traditional hunting, craft making and so forth. Hence, the paper is significant for the forest dwellers to assess the level of bio-resource utilization and framing strategies for sustainable utilization of forest resources in future continuum. At the same time the grass root agencies and government machinery also should take a step to develop more real life sustainable projects as an effective move towards enhancing public's awareness on the importance of sustainability in the built environment.

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