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Abstract
This article deals with how Chukti Bhunjia tribe of Orissa negotiates with their ecosystem to ensure that agricultural production and livelihood are sustainable. This study shows that the reasons behind continuation of traditional agriculture are the life experience with the traditional methods and cultural acceptance that not only make them economical but help in managing the ecosystem and natural resources management, and in procuring good production. However, a few of them have started adopting modern agriculture due to the influence of outsiders, including NGOs, they still follow the traditional methods and system. But such conventional intervention, to some extent, has rooted the culture, belief, taboo and knowledge out from practice. Also, despite the influence of mainstream agriculture, traditional agriculture still remains a practice and a system for many traditional agriculturist communities. From the study, it is argued that traditional knowledge, however, has been gaining momentum in contemporary development framework due to its ecological value; the successive agricultural policies fail to recognise traditional knowledge and, thus, it has been under threat particularly after the adoption of neo-liberal policies on agriculture in the form of introducing mechanised agricultural system and chemical fertilisers. Thus, given the contemporary debate of food crisis, ecological devastations and decline of traditional knowledge, there is a need to bring the culture back into agriculture through policy implementation. Also, given the decline of traditional knowledge, including agricultural, may be due to anti-development forest policies, there is urgent need to integrate the traditional knowledge with modern knowledge at
Agricultural sector plays very important role in the socio-economic development of a region. Thus, focus has been given to this sector by the government for increasing production not only to feed the growing population and challenge food insecurity but to increase its gross domestic product (GDP). In India, particularly, the government is trying to boost its agricultural production through various ventures—largely after the Green Revolution—such as introduction of hybrid variety of seeds, technologies, methods, and so on. Besides, only to compete with global economy, India has been adopting western policies of liberalism and globalisation in the form of large-scale capital investment, agricultural subsidies, agricultural policies, research, and so on, only to ensure agriculturalist communities for good production and GDP growth. Despite these, agricultural production in some states is reportedly decreasing. This is many times attributed to low rainfall (consequent to climate change), decline of agricultural land, decline of agricultural productivity, and so on. These, therefore, are indirectly conceived as causes for starvation death, hunger and famine due to their effect on production and threat to traditional varieties of crops. However, these are theoretically occurred because of lack of people’s capability, political economy of food entitlement and accountability and transference of food distribution policies (Bedi and Shiva, 2002; Kumar, 2004; Deaton and Dreze, 2009; Patnaik, 2005; Sen, 1981, 1985; Williamson, 2001). The evidence of farmers’ suicide in many states too shows the failure of the agricultural production. As Singh observes that ‘after sixty years of massive investment of capital on this sector, people are yet to agriculturally benefit as many have no adequate food supply’ (2000: 47). The failure of agricultural production is also evident from the farmer suicide in many parts of India that is many times attributed to the influence of capital-intensive agriculture (Bedi and Shiva, 2002).

In continuation to adaptation of new agricultural technologies and agricultural policies in India, there is a fact that only to increase food production for global economic completion or larger GDP, Indian farmers are encouraged to adopt conventional agricultural technologies, which most of the rural farmers cannot afford to purchase and those who purchase cannot always manage. That is, the conventional agricultural has not trickled down the rural farmers rather than widening.
the gulf among them. Thus, given this critique of the conventional agriculture, both agricultural scientists and social scientists think of ‘alternative agriculture’ not only to challenge the concepts of ‘growth’, ‘capital formation’ and ‘liberalisation’, which remain main notions behind conventional agriculture—supported even by the successive agricultural policies—but also make agriculture sustainable and free from market orientation. The term ‘alternative agriculture’ here has been used interchangeably with indigenous agriculture, traditional farming, traditional agricultural knowledge, and so on, practiced by tribal people.

Before going into detail about how traditional agricultural knowledge, helps growing food in a sustainable manner and enhances people’s livelihood at a micro-level, let me clarify what traditional knowledge is. In common parlance, it is understood as the traditional way of life pertaining to the life support system that is passed down from generation to generation about the relationship of living being (including humans) with one another and with their environment (Gadgil and Berkes, 1991; Berkes 1993) or how people view, document and use the natural resources (Berkes and Gadgil, 1993). However, there is no universally accepted definition of traditional knowledge. The definition given by Micheal D. Warren is largely used by scholars. He defines it as:

...local knowledge unique to a given culture or society. It contrasts with the international knowledge system generated by universities, research institutes and private farms. It is regarded as the basis for local decision making in agriculture, pastoralism, food preparation, health care, natural resource management, and a host of other activities staying very close to the nature. (Warren, 1993)

It is named differently when applying to specific contexts. For example, when we analyse this knowledge in animal health care, it is known as ethnoveterinary, in agriculture, it is traditional agricultural knowledge and so on. According to Rajsekaran (1993), it is a systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments and intimate understanding of the environment in a given culture. The knowledge system of any communities is stored in people’s memories and activities and expressed in their stories, song, folklores, proverbs, dance, myths, cultural value, beliefs, rituals, community laws, local language (Rajsekharan 1993; Berkes et al. 1995, 2000; Silliote 1998; Gopalan and Reedy, 2006). Local people, including farmers, local artisans and cattle keepers, are the custodians of this knowledge (Ellen and Hariss 2000).

Traditional Agricultural System: Theoretical Consideration

The theoretical polemic of ‘traditional agriculture’ is understood as the embodiment of local agricultural practice, knowledge and meanings of the farmers concerned that embrace how they variously express, negotiate, and share the
meanings and relationships embedded in their soils, ecologies, cuisines, and practices. Scholars view that it is based on the cognition approach of the practitioners and the practice that takes ‘local people’s view’ at the point of departure (Cernea, 2005; Chambers, 1980; McCorkle, 1989; Netting, 1993; Rhoades, 1983; Singh, 2000). Haverkort (1995) defines traditional agricultural practices as ‘agricultural production where technologies being used depend completely on local resources and have, over time, developed a wide range of site specific technologies embodied in the culture of the people in a certain area’ (p. 34). The rationality of indigenous/traditional agriculture lead to the assumption that farmers’ indigenous and traditionally based knowledge and technologies are always well adapted to their environments, that farmers are always capable of adjusting to changes, and therefore serves as the model for sustainable agricultural development (Srivastava et al. 1996; quoted in Cleveland 1998. p. 335). Netting (1993) views that ‘traditional cultivators are more sustainable than commercial and industrial agriculture’ (p. 144) and ‘may be more vital and necessary to our future than we realise’ (p. 334). The studies on traditional agriculture show that the practice operates outside of the capital intensive and high external input approaches (Howes and Chamber, 1979; Rhoades, 1983; Rajsekaran, 1993; Cernea, 2005) that includes not only the local adaptations and cultural values but increases yield as well (Soleri and Cleveland, 1993; Crevello, 2004). Further, the kind of agricultural practice, however, does not encourage growth in food production. The associated sustainable nature of the practice helps people to grow food sustainably that, in turn, helps in ecological restoration and natural resources management. A peculiarity of traditional agriculture is that the system works along with ‘culture’, ‘value’, ‘trad-ition’, ‘decision making’, and epistemology of ‘knowledge’, some of which have been crystallised into stable structures, institutions and organisations (Richards, 1993; Brodt, 2001; Cernea, 2005). This type of agricultural practice, thus, can be called as ‘culturally organised system of agriculture and food production’.

In recent years, documentation of traditional wisdom or rural people’s knowledge—that has been ignored long—has gained significant attention worldwide due to its highly potential environmental concerns and sustainability—health, agriculture, food, pastoralism, and so on (Rechards, 1989; Warren, Slikkerveer and Brokensha, 1994; Warren, Slikkerveer and Titilola, 1989). Various dimensions of this wisdom have been studied at great length in academia and development in order to incorporate the knowledge into, say for example, agricultural systems, health system, participatory development, and so on, even by the local agencies working at the grass-roots level. Studies made both in India and other parts of the world show the overwhelming importance of indigenous knowledge, both economically and environmentally. In the area of agriculture, a somewhat holistic perspective on traditional knowledge system has recently been developed to conceptualise both intellectual and material components of the local setting; (a) concept, perception, beliefs, cosmologies; (b) attitudes; (c) practice, experiences, skills, technologies; (d) artifacts; (e) seeds, plants, crops; (f) institutions,
procedures and processes used by a particular group, community or society in relation to agricultural food production and natural resources management (Slikkerveer, 1994).

The existing literatures provide us the importance of traditional agriculture in various dimensions of development. Scholars find the importance of traditional agriculture practice in maintaining and enhancing soil quality automatically pushing to higher production of crops (Rhodes, 1983; Richards, 1985; Oldfield and Alcorn, 1991; Warren and Rajsekaran, 1993; Talawar and Singh, 1994; Dialla, 1994; Crevello, 2004; Jeeve, Laloo and Mishra, 2006) and thus become capable of supplying output of foods greater than energy. It also forms a sophisticated part of livelihood of the people practicing it due to its cost-effectiveness and climatic-resistant technologies (Mini, 2005) as opposed to mechanised agricultural practice, which is capital intensive, leading to informal credit, price volatility and farmer suicide. Thus, the traditional knowledge includes three aspects—environmental, economic and social—that can be achieved on a greater understanding of how different agricultural systems affect the environment, how humans perceive the environment and environmental feedback in response to their agricultural systems, and how these perceptions affect values, knowledge and behaviour. The present article in this context deals with the agricultural system of Chuktia Bhunjia tribe of Orissa, which perhaps is fitted into the theories described above. Also the intervention of conventional methods and technologies has negatively affected the traditional agricultural practice and, to some extent, rooted the culture out from agriculture that were earlier substantially providing livelihood to local people and was ecologically viable. So keeping the merits of traditional knowledge, there is a need to bring the culture back into agricultural practices in order to solve the problems that emerge due to mechanised agriculture and to make agriculture sustainable.

This article has been divided into nine headings. The introductory section overviews the functional background of traditional agriculture in contributing major challenges to ecological degradation and food production. The next section only sketches the geographical location of study area and introduces the people under study. After the methodology section, attempt has been made to understand the land use and cropping pattern of Chuktia Bhunjia—the studied community—showing their preference of cultivation to ascertain crops procurement and future challenges. Their main agricultural practice—shifting cultivation and wet-rice cultivation—have been described systematically along with the process, methods and technologies generally used in agricultural practice. The next section—Between Broadcasting to Harvesting—details as to how the community protects the crops from different misfortunes anticipated during cultivation. The harvesting process and knowledge on preservation of seeds have been described in a separate section, followed by rituals and festivals associated with agricultural processes that make us clear about the sustainability. The concluding part raises debates on agricultural crisis in the face of failure of successive agricultural policies to integrate traditional knowledge with modern knowledge that could perhaps help
local people to survive sustainably given their extinction of traditional knowledge system. Also, the lack of marketing has affected the marketing of their knowledge system. So, this paper supports integrating these two knowledge systems.

Field Area and People

Sunabeda Wildlife Sanctuary is a newly created sanctuary located in the western part of Nuapada district (the erstwhile Khariar Zamindari of Central Province), bordering Chhattisgarh state (See Map 1). It is situated between 82°20’ and 82°34’ north latitude to 20°24’ and 24°44’ east longitude, and harbours a great diversity of florals and faunas. It is spread over a total of 600 sq.kms combining both buffer and core areas. There are 64 villages within the sanctuary, out of which 34 are revenue villages and the rest are identified as encroached villages. Tribal communities such as Gonds, Bhunija, Paharia have been residing interior to the sanctuary along with other communities like Kultha (agriculturists), potter, blacksmith, Goud (pastoralist) and scheduled caste communities, who are said to have migrated to the sanctuary during the 1970s.

Bhunija is one of the 62 tribal groups found in the state of Orissa. They are also distributed in Bindranawagarh and Dhamtari sub-division of Raipur district of newly formed Chhattisgarh state. In Orissa, they largely inhabit the Sunabeda Wildlife Sanctuary but have a close affinity with the Bhunija of Chhattisgarh. They are divided into two broad social groups: Chinda Bhunjia and Chuktia Bhunjia. Each division has its own moiety (got): Nitam and Markam. Each moiety is subdivided into a number of clans (Barag) and each Barag has got a specific designation associated with a particular totemic object. Members of the same Barag (Dudhbhai) consider them as descended from same ancestor, due to worship of same deities and thus an endogamous group. Chinda Bhunjias, who are otherwise known as Oriya Bhunjia, are found in and around the plain area, apart from the Sunabeda Wildlife Sanctuary. They are called so because they follow the culture very similar to general Oriya culture. The Chuktia Bhunjias, on the other hand, exclusively inhabit the Sunabeda Wildlife Sanctuary along with other communities such as Kultha, Paharia and Gonds.

According to a survey by Chuktia Bhunjia Development Agency (CBDA) (2001), they inhabit 16 villages (nine revenue and seven hamlets) of the sanctuary comprising 519 households. Their total population is 2,174 consisting 1,085 (49.91 per cent) males and 1,089 (50.09 per cent) females. Their sex ratio is 1004. Out of the total population, 758 (34.87 per cent) persons are literate constituting 559 (51.52 per cent) males and 199 (18.27 per cent) females. They are Kolahrian group (Russel and Hiralal, 1916) who speak their own dialect, ‘Bhunjia’ (mixture of Oriya and Chhattisgarhi), among themselves and use regional language for inter-group communication. Chuktia Bhunjia family is nuclear in type. Their economy is forest-based, shifting cultivation being the major source of livelihood supplemented by collection of minor forest produces. They also practice rain-fed
Map 1. Map of Nuapada District
Source: www.nuapada.nic.in/maps.asp
rice cultivation, which is said to have been adopted in settled ways with the influence of CBDA and non-tribals who migrated to the sanctuary during the 1970s. Majority of them do not have authorised land and live on encroached ones. They practice the animism kind of religion and worship gods and goddesses, including their ancestral spirits and natural objects. Their festivals are mostly related to agriculture practices and minor forest produce collection. Goddesses Sunadei is the propitiate deity who is worshipped in every house of the Chukti Bhunjia.

**Methodology**

This study was conducted among the Chukti Bhunjia tribe of Sunabeda Wildlife Sanctuary from May to December, 2005, to explore and document their traditional agricultural knowledge, so as to analyse the sustainability of both agriculture and livelihood vis-à-vis the agricultural practice of Chukti Bhunjia. The villages exclusively inhabited by Chukti Bhunjia were selected for the study. While documenting their agricultural knowledge, different beliefs, rituals and festivals associated with agriculture were collected in order to develop a framework of how their agricultural practice can be better understood in terms of sustainable food production and how they manage their agricultural resources for food security. The data for this study were gathered through participant observation and interviews to selected farmers. Both male and female farmers between 25–70 years of age were interviewed to gather the information. As the wet-rice cultivation has become the dominant form of agriculture among the Chukti Bhunjia, this article describes more on wet cultivation intertwined with traditional practices to comprehend the ethics of agricultural sustainability. A few focus group discussions were also conducted to find out the universality of practice and perception on agriculture.

**Land Type and Cropping Pattern**

Before narrating the agricultural practices of Chukti Bhunjia in detail, let me explain their landholding pattern in order to give a glimpse of land relations that can only support production function of agricultural land and land rights. It then validates the practice of traditional farming. Here landholding refers to the land over which the individual or a family possesses permanent hereditary right in any capacity, as owner occupancy tenant or hereditary tenant, and so on. The possession of the right to cultivate, the inheritance of land, is governed by law or custom. Under this framework, the landholding pattern of Chukti Bhunjia is determined by kinship and marriage patterns of the members. After marriage, the son establishes his own family of procreation, separating from his family of orientation and builds a separate household near his father’s or in the same village. The land remains undivided so long as the father is alive. The land is cultivated by all the
members of the household, and each member gets their individual share. Once, all
the brothers marry, the father’s properties, generally land, is equally divided
among the brothers. The female members and widows do not get any share of the
property. So among Chuktia Bhunjia, the unit of landholding is neither a single
person nor a nuclear family but rather a group or number of nuclear family tied by
patrilineal descent.

Also, by staying in wildlife sanctuary, the Chuktia Bhunjias get opportunities
to encroach forest land for cultivation. Traditionally, some households have en-
croached some patch of land within the forest area that later became legally held
by the owner. However, most of the households till date have no legalised agricul-
tural land. Those who had occupied certain land in core zones of the sanctuary lost
it due to the declaration of this sanctuary as a ‘tiger project’. The common land in
this agriculture includes only grazing land and ponds that remain under the con-
trol of the forest department. They classify land on the basis of topography as aat
(unbunded upland), ber na/behli (bunded mid-land) and bahal (bunded high land).

All these are again classified on the basis of location, soil colour, texture and the
water-retaining capacity and specific land is used for some specific crops. behli
and bahal are always viewed in the form of shallow land (doli) having high water
retaining capacity (Figure 1). The methods and techniques use for cultivation also
differ from crops to crops often cross-cutting with different crops.

Figure 1 shows the type of agricultural land used by Chuktia Bhunjia of
Sunabeda wildlife sanctuary. The Chuktia Bhunjias, on the basis of water retain-
ing capacity, classify land into two broad types: (a) sukha-ji min (dry land); and
(b) bahal-ji min (wetland). The former does not have good water-retaining capac-
ity and thus crops that require less water are cultivated, whereas the latter easily
absorbs water and keeps water for longer time. They use this land for rice cultiva-
tion. It is also observed that the water-retaining capacity of soil too depends on the
topography of land. For example, aat does not hold water for long time as behli
as. They also use the term tipri, depending on the size of the bihali or bahal land.
If these are small and located in low water resistance zones, then only it is known
as tipri; whereas large lands with high water retaining capacity are called bahal-
doli. In the study area, bahal-doli is generally observed beneath terrace land. They
prefer to grow short-duration paddies in tipri, whereas bahal-doli is preferably
used for long-duration paddies. When land remains unploughed or uncultivated—
could be due to the stony nature of the soil—they call it paria.

On the basis of soil texture, they classify land as belsu (sandy soil), mal (sticky
land), darli (stony field) and rengtha gada (stony field). Belsu land is used for
cultivating millets such as gurji (Setaria italica), kodo (Paspalum scrobiculatum)
and rias (Sesamum indicum). Mal land is seldom used for cultivation (details have
been described in the section on wetland rain-fed cultivation). They generally
grow jute and rias in aat with mal texture. However, these days, local varieties
of paddies are found cultivated by them. Rengtha gada are not suitable for cul-
tivation due to lack of water-retaining capacity, so this is left for grazing. Darli
land is, however, not suitable for growing crops; they apply cow dung to make
Figure 1. Land, Soil Types and Cropping Pattern
it productive. They generally grow millets such as *jandhla* (*Zea mays*), *khed-jandhla* (*Sorghum vulgare*); and pulses such as *kandul* (*Canjanus cajan*), *semi*, (*Canavalia ensiformis*), *jhunga* (*Vigna unguiculata*) and jutes on this kind of a soil.

The Chuktia Bhunjias also classify the land on the basis of soil colour as (a) *kalamet* (black soil), (b) *bhurbhuria* (black soil with low texture), (c) *khari* (black with less texture), (d) *ratamet* (red soil) and (e) *chhuimet* (white). The first two are considered fertile whereas the last two are not cultivable and are used for cultural purposes and splashing houses. Land use for shifting cultivation (*bewar*) is known as *dehi*, where they grow millets such as *madia* (*Eleusine coracan*), *birhi* (*Phaseolus mungo*) and pulses like *kulath* (*Macrotyloma uniflorum*), *kandul* (*Canjanus cajan*), *junga* (*Vigna unguiculata*), jutes and local varieties of paddy of short duration. So a kind of mixed cropping is practiced in *dehi*. Kitchen garden (*biar*) is also an ecological and traditional land use system among Chuktia Bhunjia, which involves multiple benefits involving management of useful plants species for family consumption. They grow vegetables like *biagan* (*Solanum melongena*), tomato (*Lycopersicum esculentum*), chillies (*Capsicum annum*), *semi* (*Canavalia ensiformis*), *jada* (*Ricinus communis*), *kaker* (*Cucumis sativus*), *Batlakanda* (*Eulophia nude*), *jhunga* (*Vigna unguiculata*), and so on, in their kitchen garden. A few of them are also reported to cultivate medicinal plants for emergencies. They also decompose cow dung in their kitchen garden to make it more fertile.

**Agriculture as a Practice and a System**

The Chuktia Bhunjias generally practice both shifting cultivation and rain-fed rice cultivation. Both the kinds of systems have been described here in order to show how the agricultural practice is sustainable without disturbing the production capacity of the soil and crops due to its agro-forestry nature and also the culture of the Chuktia Bhunjia itself.

**(a) Shifting Cultivation**

Shifting cultivation (*bewar*) is an important form of livelihood among the Chuktia Bhunjia. Though the Forest Department has imposed restriction on shifting cultivation within the sanctuary, they still continue it due to the fact that it is the subsistence source for their economy and livelihood. The land used for shifting cultivation is known as *dehi*. Each household holds some patch of *dehi* both in core and the buffer areas of the sanctuary. The selection and preparation of *dehi* is greatly woven into their culture and belief. It is started only after Aamjatra/Holi (described in the section agricultural festival and sustainability) celebrated in the month of March–April. They cut all the thorny bushes, shrubs and trees found in the selected patches with axe. They select the land on the basis of soil colour,
however, land with fewer trees and shrubs are obvious criteria for selection. It becomes easier for them to clear and prepare the land in a timely manner. The fruit-giving and religious trees are purposely left in the selected patches. The cut branches of trees are left there to remain dry. They bring the timbres home and these are used for house construction, furniture, fuel wood, and so on. Once the branches left in the field are completely dried, they burn these in order to make the land fertile and productive. They often burn cow dung in the selected patches that they believe make the land fertile due to its compost component and rich source of nutrient. They believe that the burning of plants or cow dung too kill the pests that are believed dangerous for crops.

In the first monsoon or assad (June–July), the Chuktia Bhunjias till the field with traditional plough and animal power. They remove the weeds and grasses grown in the field and sometimes keep the grasses in the land boundary. Then they sow different kinds of millets such as madia (Eleusine coracan), khedjandhla (Sorguam vulgare), jhunga (Vigna unguiculata), and pulses such as birhi (Phaseolus mungo), kandul (Canjanus cajan), rias (Sesamum indicum), jutes, and so on, all together. They sometimes sow the above mentioned millets quietly separately but in the same field. Then again they till the land less deeper so that the seeds are covered with soil. They sometimes, depending on the rainfall, sow some seeds such as semi (Canavalia ensiformis), maka (Zea mays), jhunga (Vigna unguiculata) and so on, into holes without tilling the field.

The Chuktia Bhunjia, however, prefer mixed cultivation—madia (Eleusine coracan) is one of the most nutritious cereal crops grown in dehi, followed by maka (Zea mays), semi (Canavalia ensiformis), jhunga (Vigna unguiculata) and kandul (Canjanus cajan). They first grow the seedling (palha) for this cultivation. It is grown along with the millets mentioned above but not in mixed form. Once it becomes ready to plant, generally in the month of July–August, they pluck it. The same patch of land is then tilled with plough during moderate rains and the seedling is transplanted by people.

The Chuktia Bhunjia opine that the cultivation of millets does not require much effort and care when being cultivated in dehi, which is perceived as rich in nutrients and fertility. They only visit the field to check for germ infection, if any, and to protect the crops from wild animals and birds. It is reported that, as there is no seed diversity among them, they generally rotate the same crops. In short, the crops cultivated in a year may not be repeated; rather it is preferred to grow it in alternative years in the same field due to the fact that crop rotation is believed to rejuvenate the soil nutrients. They prefer to grow, say for example, khedjandhla (Sorguam vulgare), jhunga (Vigna unguiculata) and birhi (Phaseolus mungo) in a regular fashion. It is also found that when the crops grown in the dehi are over, they prefer to cultivate semi (Canavalia ensiformis), tomatoes, chillies, brinjal, and so on, for their own consumption. So, a kind of crop rotation is observed in bewar. It is reported that a dehi is used for a maximum period of five to six years and when the yield begins to decrease, they move to a new patch of forest to
repeat the same process and allow the abandoned land to recuperate. After some years, they return to the same field and continue the same process.

(b) Rain-fed Wet Rice Cultivation

As mentioned earlier, the Chuktia Bhunjia is a hunter-gatherer tribe with *bewar* as the main form of agriculture. It is said that they, however, started cultivating paddy in a settled way only by observing the non-tribal migrants to Sunabeda Wildlife Sanctuary during the 1970s; it did not affect their culture and methods of agriculture. In short, they still continue the practice of wet-rice cultivation with the same traditional tools, technologies and methods followed by beliefs, rituals and festivals as in *bewar*. It is since the last five to six years that a few of them are cultivating modern varieties of paddies being provided by the community blocks and Chuktia Bhunjia Development Agency (CBDA) but with same technologies and impetus used during *dehi* cultivation. It is also reported that since the establishment of CBDA in 1994, they, albeit, were provided with a few hybrid variety of paddies for cultivation, they often consumed it or sold in the village shop. Now due to the intervention of both government and civil societies (NGOs), they cultivate rice both on the plain land (*aat*) and on shallow land (*doli*). The rice cultivation on both kinds of fields has been discussed here. To the majority of Chuktia Bhunjia, the cultivation of traditional varieties of seeds which are grown in short duration such as *lachei, kalikhuji, jhuli, sakri, and so on*, are still predominately cultivated in each land.

The Chuktia Bhunjia do not follow any norms regarding the first tilling of agricultural land—especially to *doli*—albeit, rice cultivation involves many rituals and festivals. They clean the field, only before monsoon, by removing stones and thorny bushes growing in the field. If any new land is converted to *doli*, a similar process of shifting cultivation is followed. They do not hire labour for it rather, if necessary, ask their son-in-law(s) and other relatives to help in a reciprocal way.

As the study area is arid and low rainfall area monsoon only lash their agriculture. The Chuktia Bhunjias till the land only in first monsoon, once or twice according to requirements and that too depends on the soil texture. They throw out the weeds growing from field or kept in boundary. They perceive that the weeds grown in the field absorb the entire nutrients from the soil and affect the growing plants. The rice cultivation on *aat* is different from that on *doli*. The differences between these two is that the former type of land is used for short-duration paddies (locally called *aatdhan*), whereas the latter is specifically used for long-duration paddies. The cultivation of rice on both the land requires rain but in varying degree. For example, when they cultivate rice on *doli* they first close all the bunds to store the water for moisture, which is initially required for the germination of seeds. On the other hand, rice cultivation on *aat* does not require much water because they prefer to cultivate short-duration paddies, which itself does not require much water. Paddies cultivated on both kinds of land again require tilling of the land just before broadcasting of the seeds. An elderly male
member of the family broadcasts the seeds by holding them in a basket, only after offering a handful of seeds to the earth goddess in a corner of the field. When they prefer to grow rice on sandy aat, they first clear the field by removing stones and un-required materials like thorny bushes from the field. They too fist-till the field twice or thrice, depending on the texture of the soil. Then, after sowing the seeds, they again till the field in order to cover the seeds with soil. They do not till the land so deep that it may cause delaying of plants after which they level the field with a leveller, made up of either sal (Shorea robustas) or palsa (Butea monosperma) plant.

There are two methods of broadcasting paddy (dhanbuna) among the Chuktia Bhunjia:

1. Khurdabuna
2. Upperbuna

In the first method, they fist-till the land once or twice depending on the texture and weeds found. Then after sowing the seeds in the field, they again till the land using animals, and sometimes depending on the texture of soil they level the seeds only to cover the seeds. This method is mostly observed in bhurbhuria soil. The second method is observed only during heavy rainfall. When farmers are unable to till the land properly and soil get stuck in the plough during tilling, they adopt this method. In this method, they first close the bunds of the field around and till the field so as to soften the soil. Then they sow the seeds over it. They do not till the field again as done in first method. This kind of method is generally observed when they cultivate seeds in sticky soil (malmet). They perceive that if the land is tilled again, the seeds get stuck in the soil and this affects their growing, or may even completely decompose the seeds.

The Chuktia Bhunjias also cultivate rice by transplantation method. The paddies of long duration are found cultivated in this method that starts with the seedling (palha). They grow seedling in belsu aat that becomes easier for them to pluck. They first till the field twice. The land is then planed with a leveller (kapar), after which they broadcast the seeds and till the land again. They avoid tilling the land deeper, which they perceive may cause delaying of the seedling sprouting. A day before transplanting, they prepare the field. They close the entire bunds (phar) of the field to store the rain water. They remove the weeds grown in the field and sometimes small thorny bushes are left there to decompose in the field, which the Chuktia Bhunjia perceives becomes good manure and helps in growing the plants. Due to small land holding family members constitute the important labour force, however, the exchange of labour between families at village level is also visible. They also pluck the seedlings a day before transplanting. Before plucking the seedling, an old female member of the household pours a little milk in the east of the seedling field as an offering to the earth goddess and plucks two/three plants before allowing others to pluck. After plucking handful of seedlings, they tie these in paddy straw kept for this purpose. The tied seedling is called jhura.

They first wash the *jhuras* so as to remove the soil attached with these. Before transplanting, they till the field twice or thrice to soften the soil. They dispatch all the stored water. It is observed that before allowing others to transplant, the head of the household offers a little raw cow milk, a coconut, and liquor to Goddess *Chorokhuten* for good yields and then transplants two or three seedlings.

### Between Broadcasting to Harvesting

It is observed that, unlike other farmers, Chuktia Bhunjia farmers take care of each and every crop grown in the field, starting from control of soil moisture to protection of plants from any kinds of diseases. They believe that crops grown in dehi need not much care because soil biomasses in dehi automatically maintain and enhance soil fertility and help in growing the crops properly. They only protect the crops from pests and wild animals by making temporary boundaries of their dehi. They make the land boundary by placing branches of different plant species such as *Lawsonia inermis*, *Lantana camara*, *Dendrocalamus strictus* and *Vite nirgundo*, often erecting an effigy made of paddy straw. They guard their crops both during day and night. Both male and female guard the crops, accompanied by children. They often construct a temporary hut in their agricultural fields to stay there for watching over the crops. Once the plants start procuring seeds, they start staying in crop field even at night to protect their crops from wild animals.

As a majority of Chuktia Bhunjia practice dehi cultivation in the hill slope there is always a fear of soil erosion and soil fertility. They view that higher the intensity of slope, greater is the soil erosion. They control soil erosion and fertility by certain traditionally adopted methods such as mulching, making bunds, growing of grasses in the boundaries, placing small stumps in the bunds, horizontal ploughing across the slope, and so on. They also construct trenches so that the run-off water goes out of the trenches without hampering the crops. They sometimes make hays at the end of the patch to dispatch the water through it, though the making of terraces is a predominating form of controlling soil erosion. In case of high rainfall, they make bunds to avoid the running of water through the crops field.

On the other hand, paddies being the important subsistence product of Chuktia Bhunjia, they always take care of paddy crops for more production. So in the first sight of their knowledge system, they balance the moisture of their crop field by traditional methods, which in fact depend on the soil texture and rainfall. When the plants become half feet tall, they store the rainwater which they believe necessary to keep the soil damp for a long time. Further, when the plants reach a feet in height they tilt the land again to soften the soil. They believe that it helps grow the paddy faster and plants make bunches thereafter. This is known as *bihida*. During this time, they dispatch all the stored water to balance the moisture.
The Chuktia Bhunjia farmers also know that proper moisture of land is a pre-requisite for the proper germination of seeds and also proper growth of the plants. So they keep the land moisture balance before and after broadcasting of seeds by various methods. They are of view that excess moisture and lack of moisture are negative indication of seed germination or seeds may get destroyed. For example, before harvesting, they till the land twice or thrice in order to remove the excess moisture. On the day of broadcasting, they again till the land, and sow the seeds after which they again till the land at required levels. Depending on the land texture, they level it with a leveller (kapar). It is also a fact that land moisture is dependent on the type of soil and the way the land is being tilled. If the land is tilled too deep, then there may be the possibility of keeping the moisture for a long duration. For example, bhurbhuria and kalamet keep the moisture for long time whereas malmet, which is high textured soil, keeps the moisture for very short periods due to its hard soil particle. It is found that the Chuktia Bhunjia farmers grow crops as per the length and degree of soil moisture. They experience that long-duration rice requires high moisture and short-duration crops need low moisture. They are of the opinion that in highly moistured soil, seeds are not sown until moisture decreases to desired levels. In such cases, they try to remove excess water from the field only in order to balance the land moisture.

The Chuktia Bhunjias pray to many deities before and after the agricultural processes. Various rituals and festivals are found associated with their agricultural practices and consumptions of cultivated crops. They pray to God Bhima (rain god) and Chorohkutein (goddess of harvest) for good production, albeit, Sunadei is believed to be the proprietary deity. They celebrate Asadkhena in August–September, meant for plucking weeds (bhata) found in the crop fields. This festival is otherwise known as Gangadi Jatra. It is because Goddess Gangadi is worshipped during this festival. They offer rice, local liquors and sacrifice hen and male goats to her for good yield and to protect the crops from diseases.

It is observed that the Chuktia Bhunjias of Sunabeda wildlife sanctuary possess good knowledge of curing diseases affecting crops both in cultural ways and at a functional level. They apply both organic pesticide and religious methods to control the diseases. For example, after bihida crops are generally affected by insects (baki), the Chuktia Bhunjias commonly spray ash in the field, which they believe works as insecticide. Similarly, farmers fix a branch of bhelwa (Semacarpus anacardium) in the agricultural field on the day of lunar escape, which is also believed to work as both pesticide and insecticide. Most of the farmers also catch spider (makra) and leave it in their agricultural fields, which they believe kills the insects. When the crops are affected by unknown diseases, they cure it by religious ways. In such cases, some elder members of the village, including the village headman, pujhari and kotria remain on a fast for a day and ask all the elder members of the village to assemble at the Sunadei temple during night. They bring a leaf cup of rice and ghee with them, which they later mix. Each of them offers a fist of rice and wine in the name of important village deities to protect the crops from this misfortune. It is known as Jagar.
Cultural Technologies, Harvesting and Preservation of Seeds

Technologies play a very vital role in agricultural practices. Unlike other agriculturist communities, Chuktia Bhunjias use different types of tools and technologies in their agricultural practice, starting from preparation of the field to harvesting and preservation of seeds as have been discussed in this section. The most visible agricultural tools of Chuktia Bhunjia are plough, animal power, sickle, paddy straw (biat), ropes, leaves, branches of certain trees, ash, cow dung, basketries, and so on. The plough is either made of babul (bamur) or sal (Shorea rubusta) tree. The ropes used to tie the bullocks are made of jute. They use axe and spade in preparing agricultural fields. The Chuktia Bhunjia broadcast the seeds by holding these in a baskets made of bamboo. They apply cow dung abundantly to the soil to increase its fertility; however, a few of them have started applying modern fertilisers available in the market. The traditional good manure and fertilisers are made through the traditional method of decomposition. That is, they first decompose cow dung in their fields or kitchen gardens for two to three years. This decomposes into a fertiliser. Then before the monsoon, both males and females take that decomposed fertiliser to their own agricultural field and proportionally apply to their field. They cut the crops with sickle (hasia). Before cutting the crops, they offer raw cow milk and liquor, in a corner of the crop field, to the deities who are believed to protect the crops all the ways. Then the owner of the crops cuts a few plants before allowing people to harvest.

The harvested paddies are kept accordingly in space therein which are later bundled by tying the crops with ropes made of paddy straws (biat). The bundles are then brought to khala with a stick made of bamboo or teak. Khala is the place where the farmers separate the paddy from straw with the help of animal power. They fix a wood on the ground. Six to seven bullocks are tied with a rope (deie) to move around the paddy so that the seeds separated from the straw. It is known as maden. They separate the pure seeds out by spinning (demara). The cleaned seeds are then exposed to sunlight in order to remove the water content in it and then are directly preserved by packing the seeds for next use. The seeds to be consumed or marketed are stored separately from the cultivable seeds. Crops such as paddy, kodo (Paspalum scrobiculatum), gurji (Panicum colonus), madia (Eleusine coracan) are sometimes harvested by these methods. The harvesting of pulses is different from that of paddies. In the former, they generally do not pluck or cut the whole plants, rather root parts of the plants are left there, which they believe may decompose and become good manure. They believe that the root part of the plants is rich in nutrients and helps in growing the plants in the subsequent cropping. They remove the seeds from pulses like birhi (Phaseolus mungo), kandul (Canjanus cajan), rias (Sesamum indicum) simply by striking it against a stick. Similarly, the seeds of jhunga (Vigna unguiculata), maka (Zea mays), khedjandhla (sorguum vulgare) are simply separated out by hand.
The Chuktia Bhunjia adopt various methods of seeds preservation that differ from seeds to seeds. They first expose the seeds to sunlight to remove the water content. They preserve kodo (*Paspalum scrobiculatum*), gurji (*Panicum colonus*), madia (*Eleusine coracan*), and so on, in the bag made of paddy straw (*pura*). The quantity of seeds in a *pura* varies from 10 to 20 *mann* (1 *mann*=approx. 5 Kgs). After keeping the required amount of seeds, the *pura* is made air-tight to make it insect free and that becomes usable in the next crop. They often preserve the pulses such as birhi (*Phaseolus mungo*), kulath (horse gram), leher (*Cajanus cajan*) in this method, albeit, always storing these in leaf bags by applying *lim* (*Azadirachta indica*) leaves and ash. The bags are then made air-tight to protect the seeds from germs and insects. They also store the grains and pulses in baskets (*kunli*) after plastering its outer and inner surface with cow dung so to make it air tight. After keeping some grains, they firmly close the opening of the bags with *Tectona grandis* leaves. The Chuktia Bhunjias also preserve their forest produces such as tendu (*Diospyros melanoxylon*), tamarind (*Tamarindus indica*), chahar (*Buchnania lanzan*), mahul (*Madhuca indica*) in leaf bags made of *sial* (*Bauhinia vahlii*) or *palsa* (*Butea monosperma*) only after exposing these to sunlight. They firmly close the opening of the bag with the same leaves. The bags are then hung over the hearth, believing it protects from small insect (*surikira*). Sometime millets like maka (*Zea mays*) and khedjanha (*Euphorbia pulcherrima*) and so on are simply hung over the hearth.

**Agricultural Festivals and Sustainability**

Sustainability, as said earlier, can be comprehended with different perspectives such as agricultural sustainability, food sustainability, ecological sustainability, and so on. It is referred to in terms of the process of ‘meeting the need of present generations without compromising the ability of future generations to meet their own needs’ (World Commission on Environment and Development, 1987: 43). The Chuktia Bhunjia agricultural practice, in particular, enhances all these kinds of sustainability that are enforced by certain rituals and festivals. The first agricultural festival of Chuktia Bhunjia being observed is Aamjatra or Holi which is celebrated in the month of Jeth (March–April). This festival is meant for the preparation of *dehi* land and for eating minor forest produces like mango (*Madhuca indica*), chahar (*Buchnania lanzan*), kendu (*Diospyrus melanoxylon*), and so on. On the fixed day, both children and young of each village pull a chariot made of *palsa* (*Butea monosporoma*) flowers in the village lane, which indicates the celebration of this festival. The chariot is considered the seat of Goddess Sunadei. The same evening, male members of each village assemble at Sunadei temple. They collect some dried wood to make a triangular hut exactly, known as *holi*. They fix a branch of *semel* (*Combax ceiba*) tree in the middle of *holi*. The *pujhari* worships the village deities inside it. During this time, one of the members closes its entrance by covering it with braches of trees or dried wood. The *pujhari*’s son starts the *holi*
fire immediately. Once the *pujhari* comes out by any means, the head of the village cuts the fixed *semel* branch with an axe and a chicken is left in the fire as an offering to the deities. This festival symbolises the setting fire of dried wood and bushes for *bewar* or *dehi* cultivation.

*Chaitra* is another agricultural festival celebrated by Chuktia Bhunjia in the month of April–May. On the fixed date, male member(s) from each household gather at a sacred grove called *Lingdeo*, where they worship God Ling, located on the outskirts of the village. The *pujhari* worships all the gods and goddesses there on behalf of the villagers by offering liquor, rice, coconut and by sacrificing a hen and a male goat. At the end of the festival, the *pujhari* asks people to prepare a symbolic form of agricultural field, a plough and two bullocks, which they make with small branches and leaves of *bard* (*Ficus benghalensis*) tree, respectively. He (*pujhari*) tills the land with these symbolic plough and bullocks as in real life and others fill water in the symbolic agricultural field. Some people pour water over the *pujhari* as if it is raining. He worships gods and goddesses for good rain and good harvesting. He also acts like he is broadcasting paddy, transplanting seedlings and catching fish and shell as the farmers do in real life. In the evening, they again assemble at same place, bringing a new white cloth with them. The meat of sacrificed animals is equally distributed among the households. The *pujhari* then gives a handful of paddy taken from his home to everybody which they broadcast in their own agricultural land on *akshitritiya* day.

*Nuakhai* is also another important festival of the Chuktia Bhunjia, celebrated in the month of *Bhodo* (August–September) with great amusement. This festival is specially meant for eating newly grown crops of the year. It is celebrated collectively or clan wise but on the same day with great fraternity. Before the festival, they wash their clothes, houses, utensils and every household material and throw out all the old mud pots. On the fixed date, the male members of the household go to the jungle to bring newly grown *kurei* (*Holoptelea integrifolia*) leaves to make leaf cups and plates. They offer newly grown paddy to their deities in the leaf utensils only. A member of each household goes to the agricultural field to bring new paddy or often asks others if paddy is not cultivated by the household. The female members of the household convert the paddy into *chihra* with their traditional husking tool (*deki*). Each individual family comes to the elder brother’s house with a plate of rice, *chihra* and a leaf cup of ghee which the elder brother offers to the deities on behalf of all brothers/families. Then, each member eats the *chihra* and later also gives some to the livestock.

The Chuktia Bhunjias also celebrate Chauldhua/Pithori in the month of *Dial* (October–November) to wash the new crops before eating, which shows their respect towards crops. Until this festival is celebrated, no one is allowed to wash the newly harvested paddy before eating. They too celebrate a ritual locally called *Choro*, generally at the end of the harvesting, in the crop field in respect of Goddess Chorokhuten, who is believed protect the crops in all ways. They invite the *pujhari*, elder male members of village, and a few clan members. The *pujhari*
worships the goddess on behalf of the family. They offer local liquor, hen and a male goat to appease the goddesses. Then the meat of sacrificed hens and goats is cooked and eaten by all of them.

**Discussion and Conclusion**

The description on the agricultural practice of Chuktia Bhunjia shows that their agricultural practice is very simple—which is agro-forest based. The technologies used for agriculture are made of forest resources that make their practices ‘cost-effective’ and economical. Further, the agro-forest based agriculture along with use of biomasses and organic manures enhance soil fertility and encourage good agricultural production. Also, both male and female farmers of this community possess good knowledge of their agricultural practice and the use of agro-technologies.

Given that this community practices sustainable agriculture, questions may arise as to why they are still poor? To this, we present the fact that their landholding size is small.

The use of traditional methods, technologies and cultural acceptance of indigenous agricultural system practiced by Chuktia Bhunjia shows that it enables people to survive sustainably not only within an ecosystem but also helps manage biodiversity and soil degradation. On the other hand, looking at the importance of traditional agriculture, non-affordability, lack of knowledge of mechanised agro-technologies and its management, we find some important factors particularly on the question of integrating traditional knowledge with modern knowledge. Will not it devastate the culture and livelihood? The argument upon the ignorance of traditional system and influence of market economy behind it has been a debate as to why and how the system could integrate with modern knowledge. Unlike Chuktia Bhunjia, other farming communities have been practicing similar kinds of systems, if not exact, using agro-forest based materials in agricultural production.

As mentioned earlier, CBDA is running various development schemes and programmes for the socio-economic development of Chuktia Bhunjia. The programmes, particularly to agricultural development, are related to provision of hybrid paddy distribution, cash crops cultivation, distribution of harvesting machine, chemical fertilisers, and so on. But the Chuktia Bhunjia hardly accept the encouragement of using chemical fertilisers, and mechanised technologies. Thus, it is not the merits of traditional agricultural practice behind the preference of Chuktia Bhunjia to continue with the traditional system rather than the life experience of the people with local system and ecosystems.

Shifting cultivation is one of the important economic activities of the Chuktia Bhunjia. The sharing of common land and labour between families makes their activity more economical. It is important to mention that living in a multi-caste village with some proportion of non-tribals, the Chuktia Bhunjia hardly found
sharing their labour with them (non-tribals). It explains their decision regarding their networking of social relationships, which is unbiased with non-tribal exploitation. The Chuktia Bhunjia, staying with non-tribals, who are said to have migrated to the sanctuary during the 1970s, gradually following them agriculturally, which is found due to forest laws and stagnant landholding (due to ban on land encroachment). So with limited land, they have been adopting to a settled form of agriculture. In this context, looking at the traditionally practiced shifting cultivation, the degree and range of shifting cultivation has declined among them, which the Chuktia Bhunjia claim to be subsistence in nature.

Again, given the justification of traditional agricultural practice of Chuktia Bhunjia, particularly to shifting cultivation, if we compare with the agricultural practice of non-tribal in the sanctuary, including that of methods and technologies they use, these differ from each other. For example, when the tribal practices it, they try to control soil erosion and enhance soil fertility by means of mulching, in which they use different tree species and grasses, which makes them economical. On the other hand, the same practice by a non-tribal is done by the cementing method. Similarly, the use of chemical fertiliser in mechanised agricultural practice destroys the crops and creates new diseases and such as practice is clearly opposed to the use of organic manure and natural pesticides that automatically enhance soil fertility.

Critically, the banning of shifting cultivation in Sunabeda Wildlife Sanctuary, particularly after the declaration of this sanctuary as ‘tiger project’, has violated the Forest Right Act of central government. Instead, it is reported that the forest department mandated people living in core areas to leave and settle in existing revenue villages in buffer zone areas. In this process, apart from the Chuktia Bhunjia community, Paharias could be more affected, who completely reside in the core zone of the sanctuary. Thus, such kind of an attempt by the government only empowers the forest department rather than the indigenous tribal and forest dwellers. The Forest Right Act, which envisages preserving the culture of indigenous and tribal people, is not only violated by such intervention but also causes the decline of traditional knowledge systems, particularly of ecological knowledge.

More importantly, given the importance of traditional agricultural knowledge on enhancing soil fertility and food production, the paradoxical question may arise as to why hunger and malnutrition are largely reported from tribal areas? To this fact, hunger and malnutrition are not necessarily linked with food production, rather than the intake of nutritious food that could perhaps only be ensured by the government through different pro-poor nutritious services, in particular, and the capability of income-generating opportunities. The successive agricultural policies talk much about the land reform, land distribution, cash cropping, adaptation of mechanised agricultural technologies, and so on, but various studies show it would help if we preserve traditional agricultural system due to its highly ecological value. In this line, when we deal with agrarian crisis links with increasing
farmer suicide, it is only the stagnant or failure of agricultural production due to monsoon and climate change to which the traditional methods sustainably challenge the causes. Thus, such kinds of agricultural practice enhance sustainable food security.

Given traditional agriculture as a way to challenge food insecurity and ecological deterioration or biodiversity conservation, or the challenge to growth and capital formation, it is hardly reckoned by policy makers and rather viewed as ‘unscientific’. Even the successive agricultural policies do not cover the whole gamut of knowledge systems inherent among tribals. For example, the review of new agricultural policy particularly in Orissa, show that it aims at enhancing productivity of major crops, shifting the emphasis from ‘subsistence’ agriculture to profitable commercial agriculture and facilitates long-term investment in agriculture by public and private sectors and by public-private partnership ventures, particularly in the post-harvest management, marketing, agro-processing and value addition (Government of Orissa, 2010: 11: 80). Any attempt by policy makers can help in integrating such knowledge with modern knowledge so that the tribal stakeholders can benefit out of it, particularly given the lack of market access of their knowledge. The sharing out of it can enhance their livelihood strategies. However, the question of complete devastation of such knowledge is still raised among the critics on the question of anticipating and identifying potential benefits to be accorded to the tribals.

To conclude, the traditional agricultural practice in fact help people in negotiating with the ecosystem, but gradually has been neglected under the influence of modernisation, and globalisation, particularly after the neo-liberal period. This knowledge system has sustainably been providing tribal people a way of livelihood in the form of food and in food security matters. The inherent traditional knowledge, including that of agricultural knowledge, has helped people maintain their livelihood resources and ecosystem in a sustainable way. Besides, the successive agricultural policies fail to recognise such valuable knowledge that needs to be a policy challenge. Thus, keeping ecological deterioration and climate change in mind, such kinds of knowledge systems can be adopted in order to challenge the vulnerability of food production and to conserve biodiversity and natural resources. It is because ‘growth’ and the capitalistic model of development cannot solve the problem of inequality and vulnerability. It can only be linked to the market economy. Unlike Chuktia Bhunjia, there may be many communities practicing such kind of agriculture, if not exact. So policy makers must aware of such practices during formulating any agricultural policy that not only help the agricultural communities, including tribals, in preserving their cultural practice and value but also help them grow food in a more ecological way. It can only make any agricultural policy successful. Finally, given the decline of such knowledge, due to the influence of outsiders, there is a need to integrate the knowledge system with the modern knowledge so that the local people can be benefited in the form of getting a share from it that in turn can make their life sustainable.
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