

SHIFTING CULTIVATION IN ODISHA AND CHHATTISGARH: RICH AGRO-BIODIVERSE SYSTEMS UNDER RISK

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Tribal communities have lived closely with nature, hunting, gathering and managing natural resources to meet their needs. Shifting cultivation is one such practice that has helped certain tribal groups to be food secure and has also been a repository of agro-biodiversity. Regardless of the above, mainstream development ideas have mostly rejected these practices and facilitated their conversion to mainstream agriculture. The thrust of market-based 'mainstream development' government-funded programmes of land development, plantation and other 'livelihood development programmes implemented by NGOs' is increasingly affecting the way of life of tribals. This article studies shifting cultivation practices by two Particularly Vulnerable Tribal Groups (PVTGs) in two districts, showing the uniqueness of shifting cultivation systems. These systems combine socio-culture, knowledge of traditional farming systems, and bio-physical characteristics of the locality. Yet in both the study areas, in Odisha and Chhattisgarh, agro-biodiversity is decreasing.

Introduction

In the 21st Century, indigenous or tribal people are increasingly finding themselves under pressure to assimilate into a globalized market economy, placing stress on their traditional subsistence livelihoods, negatively influencing their cultural practices, and compromising their wellbeing. In India, Particularly Vulnerable Tribal Groups (PVTGs) – earlier referred to as Primitive Tribal Groups – are facing adversity and change due to environmental instability, globalization, cultural and socio-economic marginalization, and standardised or inappropriately designed government policies. Be it the Kondhs, Kandhas, Dongarkondhs or Baigas, these PVTGs face a real challenge to continue with their traditional livelihoods, impacted as they are by externally-driven policies, actions and actors. These tribes have historically relied on shifting cultivation agriculture; the collection of forest products; hunting, trapping and gathering; animal husbandry; and of late on wage labour for sustaining their lifestyles. These practices have been intertwined with their social and cultural practices.

Shifting cultivation and its impact on the environment is a contested debate. Shifting cultivation has been the backbone of livelihoods for many hill tribes across the globe but it has also

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attracted the attention of environmentalists for its slash and burn practices that are supposed to be contributing to global warming (see also Biswal & Kumar, 2013). In an explicit effort to counter the dominant development discourse, indigenous knowledge scholars like Dove (2006) argue that indigenous peoples possess unique systems of knowledge that can serve as the basis for more successful development interventions. For this reason, forest and hill tribes and their traditional knowledge have received a great deal of attention. For instance, their knowledge systems were invoked in principle 22 of the 1992 Rio Declaration. As per the Convention on Biological Diversity (which opened for signatures at the 1992 Rio summit), “traditional knowledge refers to the knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation” (CBD, no date). A challenge that the world community seems no closer to achieving, almost 25 years after the Rio summit, is to achieve a balance between development and maintenance of natural systems, and to ensure the integrity and stability of forest ecosystems and the services they provide.

Shifting cultivation in Eastern India

A globally applicable definition of shifting cultivation is difficult to determine (Thrupp, Hecht, & Browder, 1997). In Eastern India it involves clearance of forest on hill slopes (usually before March), drying and burning of debris (February to Mid-April before the onset of the monsoon) and cropping. After harvest, land is left fallow and farmers repeat the process on a new plot designated for shifting cultivation in the upcoming year. The earlier cultivated land remains fallow and vegetative regeneration takes place till the plot is reused again. The regenerated vegetation can be re-burned during the cycle, adding nutrients to the soil for future cropping. The practice of biomass burning reduces weeds, pests, and microbe populations, and thus crop diseases. The cycle used to range from 20 to 30 years, but with increased demand on land this cycle has come down to between three and 10 years.

The relationship between the time the land is cultivated and the time it is fallowed are critical to the stability of shifting cultivation systems. In a stable shifting cultivation system, the fallow is long enough for the rejuvenation of natural vegetation to the state that it was before it was cleared, and for the soil to recover to the condition it was before cropping began. Stable shifting cultivation systems are closely adapted to micro-environments and carefully managed by

farmers during both the cropping and fallow stages. Shifting cultivators may possess a highly developed knowledge and understanding of their local environments and of the crops and native plant species they exploit. Shifting cultivation is a land-use practice that reflects indigenous knowledge accumulated through centuries of trial and error, an intricate balance between product harvest and ecological resilience, and an impressive degree of agro-diversity (Cairns & Garrity, 1999).

The shifting cultivation system persists due to its compatibility with the socio-physical environment characterised by a sparse population, specific forms of community land tenure system, undulating topography, poverty, meagre resources, etc. All such cultures are intimately linked with the mode of subsistence. The environment, local conditions and value systems are invariably connected with the agricultural practices that have evolved in the area. A wide variety of cultivated crops and wild plants are managed by shifting cultivators. Descola (1994) shows that one plot can contain more than one hundred species per hectare. Dove (1993) gives the example of the Kantu in Kalimantan, Indonesia, who plant over 44 varieties of rice, averaging 17 per household. Many rice varieties are grown by shifting cultivators in parts of Asia and Africa too (*ibid.*). In Bangladesh, farmers cultivate more than 40 species in the jhums. There also exists wide genetic diversity (more than 20 varieties/cultivars of rice) within the species. Besides the agro biodiversity, farmers also use about 50 wild plant species as food plants (Alam & Mohiuddin, 2009).

Methodology of the study

The objectives of this article are to assess the extent and characteristics of agro biodiversity in shifting cultivation practices, to understand the significance of shifting cultivation for local communities, and to examine the overall stability and sustainability of shifting cultivation. The study area was located in Kabirdham district of Chhattisgarh inhabited by the Baiga, and Kandhamal and Rayagada district of Odisha inhabited by the Kondh. In 2015, the following research methods were employed, which included a review of existing studies and documents. In the field, focus group discussions (FGDs) were held with a group of practicing farmers covering a number of topics such as the nature/extent of shifting cultivation, conservation of forests, consumption/ production pattern, role of the state and mining lobby in weaning farmers away from shifting cultivation, relevant information on education, occupation, avenues of livelihood, customs, traditions, cultural practices, and traditions relating to shifting cultivation. A questionnaire survey

was prepared and data was collected from 20 households from each of the two districts. Some other respondents were interviewed to understand their social, cultural and other practices related to shifting cultivation. Field observations by transect walk through the shifting cultivated fields were undertaken, and observations were shared and triangulated with the farmers. Discussions at the community level helped understand resource use and management, community organization, socio-cultural issues and perception of shifting cultivation.

Results: Shifting cultivation by the Kondh in Odisha

The Kutia Kondh form a 'primitive section' of the great Kondh tribe of Odisha (Dash, 2006). They reside in the Belghar area of Balliguda sub-division in Kandhamal district and the Lanjigarh area of Kalahandi district (ibid.). In Kandhamal district the Kutia Kondh refer to the practice of shifting cultivation as *podu* or *gudiachaas*. Kandhamal is a tribal district where almost 86 percent of the land is owned by the state, with 75 percent of the land categorized as forest land. 66 percent of rural households own just 7 percent of the district's land (Kumar, Choudhary, Sarangi, Misra, & Behera, 2006). The study team visited three Kondh villages in Kandhamal: (a) Mundalpadar village, a hamlet of seven households, (b) Ushabali village comprising of 41 households, and (c) Khaliya Munda comprising of around 50 households. Khaliya Munda's farmers were abandoning the practice of shifting cultivation and the team felt it would be useful to study this to understand the reasons for the shift.

The Kutia Kondh have the following types of lands: lowland paddy fields, homesteads and land under shifting cultivation. In Kandhamal the customary land tenure for shifting cultivation lands was that these lands belonged to the village. The lands were distributed according to the size, work capacity and need of the families and reverted back to the community after every cycle (Kumar, Choudhary, Sarangi, Misra, & Behera, 2005). In both Odisha and Chhattisgarh, poor implementation of land settlement surveys and the unilateral declaration by the government of its ownership of forest resulted in tribals getting less and even unviable landholdings. Large tracts under shifting cultivation were declared as government forests. Furthermore, and over time, tribal intermediary tenure holders were replaced by non-tribal tenure holders.

In Kandhamal, historically Dongar Khasras (a temporary right to farm slope land given to the Dongaria Kondh) had been prepared but without occupancy rights; "Board of Revenue was forced to provide for the provision of Dongar Khasra in the Kalahandi ex-

state area” (Kumar, Choudhary, Sarangi, Misra, & Behera, 2005, p. 47). It was decided not to settle rights over these lands and thus the “vast shifting cultivation areas passed to the exclusive ownership of Revenue Department or Forest Department” (ibid.). Among the Kutia Kondh, traditional rituals/festivals are used to select a forest patch for shifting cultivation in January/February. Vegetation is cleared and people often take away some amount of timber for their household purposes. In the next month (i.e. February/March) the patch is burnt; usually stumps and roots are left unburnt. Seeds (mostly coarse cereals, oilseeds, vegetables) are sown through dibbling using hand implements in April/May. Cultivation is continued for a few (two or three) years at the end of which the site is abandoned and the community shifts to another site. The community returns to the site for another round of shifting cultivation after about eight to ten years. The oft reported shortening of the *podu* cycle to between 2-5 years (Ranjan & Upadhyay, 1999) was not observed by the study team in Kandhamal.

In the shifting cultivation patches, the trees were cut 2-4 feet above the ground to ensure coppicing. Selective retention of some trees, like *mahua* or mango in burnt patches was not observed, perhaps because these species were not there in the first place. The people said that they practice shifting cultivation only in middle slopes and not in lower or upper slopes. The people are able to produce a total of 15 varieties of cereals, pulses and oilseeds, down from 47 varieties as reported by two local NGO representatives (Sabitri Patnaik and Satya Patnaik, personal communication, April 10, 2015). Most people stated that they collected fruits/nuts to eat from some indigenous forest plants; some of these plants (*kusula*, *kueri*) are not available or cannot thrive in settled agriculture areas. As per a study in the area, “in districts like Gajapati and Kandhamal, less than 10% land is owned by tribals. At the same time, per household land ownership among tribal households is extremely low at 1.12 acres per household” (Kumar, Choudhary, Sarangi, Misra, & Behera, 2005, p. 2). The extremely low landholdings could very well be an important factor behind the people’s dependence on land under shifting cultivation. Our observation was that the holdings were not as meagre as the above mentioned study suggests that on an average each household has around 1-2 ha of land under shifting cultivation and also 1 ha under settled cultivation. On the latter they usually sow *khandagiri* or Lalat varieties of paddy and in this way are able to be food secure throughout the year.

In some villages, the Forest Department has helped the people obtain their *patta* (land title) which gives tenurial rights for shifting cultivation lands in the lower slopes. Following the enactment of the

Forest Rights Act (FRA), 2006 most households from Belghar, partly with support from local NGOs and Forest Department staff, have 'voluntarily' moved away from shifting cultivation. This has also put an end to the day-to-day state policing they faced when doing shifting cultivation (Venu Majhi, personal communication, April 10, 2015). For example, the seven households in Mundalpadar village, Kandhamal district have each got their FRA *patta*, of a little less than 1 ha each. In Ushabali village half of the households have received such FRA plots. Many people go for MGNREGA work, get a daily wage of around 100 rupees; however they have been faced with delay in payments, often of over a year. In Khaliya Munda village a diversion-based irrigation system was promoted through a local NGO. Some households from this village had shifted to Udaigiri and were tilling about 50 to 60 acres there; however with the passing of the FRA, 2006 they had returned to their village hoping to claim their forest *patta*.

Men from these communities are keen on alternative non-farm based sustenance, yet they do not want to lose their usufruct and access rights to the forest, including their right to practice shifting cultivation. Women do not agree to both the options preferred by men. Women felt that the labour required from them in shifting cultivation, not less than 10 to 11 months of a year, was too high and hence they preferred settled agriculture. Shifting cultivation is often projected as less labour intensive as compared to other forms of cultivation, thus a more realistic, gender-wise assessment of labour requirement in shifting cultivation is required.

Apart from shifting cultivation the Kutia Kondh collect the seeds of *sal* trees, and before the pre-monsoon showers, collect *sal* leaves to make plates; collect *tendu* leaves (which are on the decline) during April-May for *bidi* making; and collect *mahua* flowers (which are destroyed in untimely rains). Most people, especially women and the elderly, felt that there had been a decline in the quality of their lifestyle over time. People said that the state has been increasingly asserting its primacy over erstwhile *gudia* lands. Yet on the health impact of shifting cultivation the women were inconclusive. Largely they felt that mortality rates have improved in their community, but lamented that people used to have sturdier health because of better nutritional standards in the past. Some people lamented that the youth of the community are increasingly unable to identify the useful species, and are unaware of the seasons of availability. Many young tribals migrate across India, as far as Tamil Nadu, as cheap (often semi-bonded) labour.

Most of the land cultivated by the Kutia Kondh on hill slopes was state land (Forest or Revenue Department land) or un-surveyed areas (deemed forests and land with over 10 percent slopes) where the rights of people had not been settled. The issue of non-settlement of rights of tribals on these lands a decade after the implementation of Forest rights act has been taken up NGOs in the area. These NGOs were working on securing/de-criminalising shifting cultivation because tribals had no alternative scheme. They agreed that the ecological aspects have to be understood carefully.

For example, Kumudjani from the village Duppi said that their village has 12 *padar* (hills). The community decides which hill will be cleared for shifting cultivation, but thereafter it is a family-based process of clearing, burning and sowing; although there is cooperation across households. Earlier on, with the increase in family members, new areas were brought under shifting cultivation; but now there are hardly any areas left, and there are also pressures from the Forest Department, while among the youths there seems to be some disenchantment towards this practice. Villagers have applied for individual forest rights, and some of them have been successful. Interestingly, while the villagers were applying for and receiving their rights from the government, at the same time the forest department was planting teak in their shifting cultivation fields. In Tidipadar, teak plantation were observed coming up in areas that once used to be shifting cultivation fields. Similar cases of plantation, without the villagers' consent, were reported by other villages in Belghar forest range (The Hans India, 2015).

Based upon a questionnaire administered to the members of the Kandha community in the villages of Beganpadar, Pipalpnga, Maduwa and Kana of Odisha's Rayagada district, average family size was 6.3 members, average landholding was 1.6 ha, and households had ownership records for only 60 percent of their land. On average, all the respondents practiced shifting cultivation on 1.5 acres (0.6 ha) in a three year cycle. They were growing diverse crops in the shifting fields, namely finger millet, fox tail millet, little millet, kidney beans, turmeric, red gram, green gram, and some tubers. In March-April the community works together to identify land within the village boundary, cut down small thorny shrubs, and thereafter cut down the trees except mango, tamarind, *mahua*, and *palmyra* (used for country liquor making). After a month of drying the cut wood, a small portion of logs are set aside for making temporary hutments (raised shelters) in the shifting fields, while the rest of the dried wood is burnt. Half of the un-burnt wood is then collected and used for fencing. During the first year of cultivation in a shifting

field, the main crop is finger millet along with a combination of other crops and *kandula* (a variety of pulse). No little millet is sown in the first year. Overall it's a multi-cropping cycle which fulfils alternative food requirements from August to February; yet still, the number of crops grown is quite less as compared to the villages in Kandhamal. The respondents said they grow cash crops like turmeric in their shifting fields, which is a change from the yesteryears. As we moved from Kandhamal to Rayagada, a variation in the practice of shifting cultivation, and the pressures felt by the community were observed.

Results: Shifting cultivation by the Baiga in Chhattisgarh

The Baiga are the forest-dwelling aboriginals of central India,

who claim to be the harbingers of the human race and history in India, as it emanated from the conjugation of the Nanga (nude) Baiga as the Indian Adam and the Nangi (nude) Baigin (female Baiga), as the Indian Eve, who were the rightful progenitors of Indians. Baigas always believed that they were the chosen few who were hand-crafted by God Himself and hence were the kings and rulers of the whole earth. They called God the *Bhagwan* or *Bada Dev* (big deity). They may have lived in Central India for at least for 20,000 years. They practiced *Bewar*, a shifting, slash and burn method of growing crops. And hence the non-Baigas called them *Beadias*, the practitioners of *Bewar* (The Peoples of the World Foundation, 2016).

Over the years the name *Bewadia* was distorted and became the derogatory name of *Baigadia* – those people who destroy land and forest by burning. Later they came to be known as the Baiga (ibid.).

The British rulers believed that if the nomadic Baigas' *Bewar* was restricted to a small area, they could exploit the forest resources of Central India. Hence they created a small reservation of 100 square kilometers in 1890 and called it Baiga Chak. The British bureaucrats diverted thousands of roving Baiga households from Mandla and Dindori district to that reserved area. Gradually through the efforts of the British administration and later after independence by the Indian administration the Baigas were dissuaded from undertaking *Bewar* (The Peoples of the World Foundation, 2016).

Since the 1950s “the geographical spread of the Baigas has reduced to about one third of their total initial spread” (ibid.). They're now found in three distinct geographical areas. “The largest grouping

of the Baiga lives within 250 km of Jabalpur city in Mandla, Dindori, Balaghjat and Seoni districts. The second largest grouping of the Baigas lives in Bilaspur, Kabirdham and Surguja districts of Chhattisgarh. The smallest geographical grouping of the Baigas exists in Sidhi, Rewa, Satna, Shahdol, Mirzapur and Sonebhadra districts of Baghelkhand region" (ibid.), i.e. in both Madhya Pradesh and Uttar Pradesh.

The study team visited Baiga tribal villages in three gram panchayats where the boundaries between settled cultivation and shifting cultivation (*bewar*) were blurred. Very little biomass was burnt here and much of the vegetation comes up well with the first rains, allowing the fertility of the land to improve. The practice here was more akin to having three patches of land of which two were kept fallow each year, with cultivation alternated among them. The loss to biomass was not as much as in the Odisha case. Forest canopy gaps were however evident in this case. The questionnaire survey brought forward that the average family size was between 5-6 members, while the average land holding was 9.9 acres with *bewar* lands forming nearly half of their landholding (an average area under *bewar* of 4.6 acres). In the *bewar* fields the Baiga sow a wide variety of seeds, including millets (*sikia, kang, kutki, sawa, mandiya, degra, jhurga, jhujhru*), pulses (Black Gram, *mung, bedra, salar*), and vegetables like *lauki* (gourds) and cucumber. The practice here was more akin to having three patches of *bewar* land of which two were kept fallow each year, with cultivation alternating among them. All the respondent families had applied for individual land rights under the provisions of the Forest Rights Act, 2006, yet 50 percent of the respondents said they have not yet managed to obtain any rights. Only one person was able to get the rights to land equal to 10 acres, while the rest got less than what they applied for.

Mukhi Ram from Bohil village under Agarpani gram panchayat said his family have been living in this forest area for generations (at least three that he can vouch for). He shared that although they had been living in the region, they were branded as encroachers by the Forest Department. Having seven members in his family to feed, Mukhi has 5 acres of agricultural land, 0.5 acre of homestead land, and around 5 acres of *bewar* (land under slash and burn cultivation). There is a clearly demarcated difference in their cultivation practices and crops sown for each of their land types. In the agricultural fields, depending upon the slope, water availability and soil depth, they cultivate *kodo, kutki, arhar* and paddy. On their homestead land they cultivate maize, *jowar*, and *arhar*, while some of them have also initiated some vegetable cultivation (traditional varieties of

tomato and *brinjal*). The *bewar* have the maximum varieties of crops: *kodo*, *kutki*, *kang*, *jowar*, *arhar*, *bedra*, *sawan*, *madya* (finger millet), *rawas*, and *dengra* (cucumber). In a 5 acre *bewar* field, based upon their estimation, they mix the seeds of all field crops. The seed rate is 5 kath (1 kath= 4 kg), so about 20 kg of seeds of different varieties are put together and broadcasted in a *bewar*. Some seeds thereafter, mostly vegetables including cucumber, are carefully dibbled in the *bewar*.

Mukhi Ram's household depends a lot on forest products, from *lac*, *char*, *mahua* seeds, *mahua* flowers, to various types of forest mushrooms. Even now, they barter these produce for vegetables with traders from the plains. Income from forest produce is a major contributor to their income, since in these areas there are hardly any opportunities of labour work. The household is mainly dependent upon public distribution system (PDS) rice as they get 35 kg per month for each family. This is insufficient as it lasts for 15-20 days, so Mukhi Ram's family consume the crops grown in their field, *bewar* and homestead. The female members of the family said but for *bewar* and the fields, they would go to bed hungry. From the survey schedule, average production from *bewar* was found to be 435 kg per household, contributing 42 percent of overall production. As not all households have agricultural fields, *bewar* is a very important source of food security. Currently the cycle from fallow to cultivation on *bewar* has come down to six years. The women did report that they share more of the burden than men in *bewar* cultivation. Both men and women cut down the shrubs, though only men fell larger trees. They do not cut down *char* trees (as these have economic value), *kusum*, *mahua* and any other useful tree. The men bring home slightly bigger logs, which are generally partially burnt/unburnt, to use as household fuel, for house repair and construction. Some logs are also used as fencing and to prepare their temporary shelter in the *bewar* field.

Table - 1. Comparative Analysis Between Agricultural Fields and *bewar*

Characteristic	Agricultural fields	<i>Bewar</i> (slash and burn cultivated, or shifting cultivation area)
Ownership	Forest department	Forest department
Area	5 acres	5 acres
Crops grown	<i>Kodo</i> , <i>kutki</i> , <i>arhar</i> , paddy	<i>Kodo</i> , <i>kutki</i> , <i>kang</i> , <i>jowar</i> , <i>arhar</i> , <i>bedra</i> , <i>sawan</i> , <i>madya</i> (finger millet), <i>rawas</i> , <i>dengra</i> , <i>sikia</i>
Seed rate	20 kg <i>kodo</i> seeds, or 10 kg of <i>kutki</i>	20 kg of mixed seeds in 5 acres

Production risks	Generally assured but varies based upon rainfall	Can be very erratic, but is mostly balanced by high number of crops
Labour	Labour requirement in fixed labour cycles	Low on labour requirement but needs a lot of time for protection from wild animals: generally a full time involvement of at least one member of the family for 6-7 months
Production	Higher but not very clearly spelt out	5 bags in all, for all the crops put together
Cropping cycle	Annual	2 years and then a fallow of 5-6 years
Nutrient application	No such initiative undertaken	Slash and burn in their opinion contributes to enriching the soil. Other benefits of burning, in their perspective, was that since the <i>bewar</i> has very less soil, burning also adds to the soil volume, creates a favourable (insect-pest free) ambience for germination, and also drastically controls growth of grass and other weeds

The issues central to the life and livelihood of the Baiga include ownership of land, and lack of cultivable agricultural land. For example, Mukhi Ram is cultivating 5 acres of agricultural field, 0.5 acre of homestead, and another 5 acres of *bewar*, but has been given only 0.17 ha of land under his FRA, 2006 application for individual rights. Lack of availability of land in the plains has led the Baiga to innovate and cultivate on steep slopes using slash and burn. This practice of *bewar* provides them food, nutrition and as such, has been an integral part of their culture. Yet with an increase in pressure from the Forest Department, the Baiga has been limited to a small area which has reduced the period of time for regeneration and the potential for expansion (as required for increasing numbers of households).

A mixed crop of millets, pulses and oilseeds grown in the uplands and medium lands is one traditional practice that will increase resilience in the context of climate uncertainties. Mixed cropping is also more suited to the food habits of the locals as well as the ecological conditions. The system of mixed cropping enables the Baiga to cultivate cereals, leafy vegetables, pulses and oil crops together in a limited area, depending on mon-soon rain. By virtue of their age-old indigenous knowledge on the viability of seeds, which are used for sowing in the following season, healthy cobs or seeds are selected and stored each season, thereby enhancing the genetic potential of the crop. For example, healthy cobs are left in the field so as to allow them to dry to the maximum to make sure that no moisture is left in the seeds. Seed material for sowing and the grains for consumption are preserved in traditional granaries made up of

bamboo coated with red soil and thatched with local material. This indigenous practice has saved many traditional varieties of cereals, millets and legumes in the region. Knowingly or unknowingly this practice has enabled them to maintain, preserve and conserve the seed material. Leaves of a few botanicals, particularly *neem* and *vitex*, are used as insect and pest repellents. Seeds of legumes are preserved along with their pods thereby preventing fungal or bacterial infection. Owing to the above practices, the genetic strains could be conserved by the Baiga for generations, if not centuries, which is itself of great value (to humanity).

Conclusion

Historically tribal communities have lived closely with nature, hunting, gathering and managing natural resources to meet their needs. Shifting cultivation is one such practice, even though proponents of sedentary agriculture view it as a primordial form of agriculture. There are a number of constraints, problems or obstacles to switching over from shifting cultivation to settled agriculture, such as uncertain land tenure, lack of adequate capital for investment, lack of irrigational facilities and non-suitability of land. Many past efforts of the government to wean away cultivators from shifting cultivation have met with little success as the people are socio-culturally attached with the practice. While the Forest Department has exercised its right over the forest, with increasing population of the practicing communities the challenge to maintain the carrying capacity has forced these communities to look for other options. The extent of area under shifting cultivation is slowly declining, due to the land use regulations of the authorities, population growth, other sources of livelihoods, migrant work, supply of food grains from the public distribution system, and the institutional promotion of plantation crops like coffee and rubber.

The thrust of market-based 'mainstream development' government-funded programmes of land development or plantation and NGO-implemented livelihood development programmes is increasingly affecting the way of life of tribals in some areas, bringing about a change in aspirations among the youth, while there are also threats of cultural invasion from other practices. All of these have been bringing about a slow but definitive change in tribal areas, more specifically on the practice of shifting cultivation. Changes over the years have exposed tribals to problems in their lives and livelihoods, impacting their social-cultural practices. Secure tenurial rights are essential for the tribals, moreover for the PVTGs, as their access to their habitat is very critical to their life and food security.

Recognising claims over their habitat can support local people in their efforts of food sovereignty, to have better access to food, control over their own diets, and improve the nutritional quality of their food intake.

Even with the increase in population and no new areas for expansion, the diverse set of nutritious produce from shifting cultivation areas contributes around 40 percent of the food needs for any family. Shifting cultivation has many advantages over sedentary agriculture in terms of climate resilience, as it includes a diverse set of crops mostly requiring low to moderate water supply. The other advantage is of low pest infestation, as the process of burning biomass before cropping reduces soil borne pests, and even the practice of mixed cropping decreases pest attacks. Ecologically the practice scores higher than sedentary agriculture with its high diversity of crops, no use of chemicals, and the practice of fallow periods in between facilitating growth of forest species. The reduction in fallow period in shifting cultivation has brought down the overall biomass production, while the demands for fencing, firewood and housing has reduced the amount of biomass being burnt. During their fallow period, areas under shifting cultivation regenerate into open forests with lots of undergrowth in some locations, though invasive species like lantana are taking ground. This means that the claims of loss of nutrients from top soil, burning of biomass and other ecological impacts of shifting cultivation are exaggerated.

Given the uniqueness of shifting cultivation systems, because of a combination of socio-culture, knowledge of traditional farming systems, and bio-physical characteristics of the locality, there is a marked variation in existing conditions of the practice in the two locations, Odisha and Chhattisgarh. There are a few common threads as well as subtle variations across the two areas. In particular, the management practice is individually operated and managed in Kabirdham (Chhattisgarh), but individually managed with community decision-making in Kandhamal. In Kandhamal district the fallow period is higher than in Kabirdham but the variation in number of crops is high in both districts. A common thread across both regions is the lack of tenurial rights and strong interest for the food grains grown in shifting cultivation areas. The Forest Department's incursion into the shifting areas is highest in Kandhamal due to its strong push for plantations. Although shifting cultivation continues to play a critical role in maintaining the lives and livelihoods of tribals, there seems to be a limited understanding of the practice. With the impact of market forces, institutional efforts for change, and growing aspirations of the youth, there is bound to be a lot more changes to this practice in the years to come.

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