

TRADITIONAL ECOLOGICAL KNOWLEDGE AND CONTINUATION OF SWIDDEN CULTIVATION: A CASE STUDY OF THE DONGRIA KONDH OF NIYAMGIRI HILLS, ODISHA

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Abstract: Previous researches have emphasized on potential contribution of Traditional Ecological Knowledge (hereafter, TEK) to cope with challenges from global environmental changes. This research studies the contribution of TEK in building long-term practices of swidden cultivation. Here, the research discusses (1) the knowledge, belief, practices, culture and ideas that Dongria Kondh apply to continue their swidden cultivation from the past to till date. Hence, the result shows (2) how the traditional swidden cultivation helped Dongria Kondh for their subsistence in the past; while it has also helped the same community for their sustainable development and economic welfare as well. However, the article shows the transformation of a subsistence farming system into a sustainable economic agriculture, though the traditional steps of the farming system have remained unchanged.

Keywords: Swidden Cultivation, Dongria Kondh, Traditional Ecological Knowledge, Subsistence Farming System, Sustainable Development.

INTRODUCTION

Kondh are widely known in the ethnographic world for their earlier insidious practices of human sacrifice and female infanticide. They are the largest tribal group of Odisha in terms of numbers. The Kondh live in the different area of Kandhmal, Rayagada, Koraput, Bolangir and Boudha districts and are known as Kondh, Kandha, Kond or the Khond according to the usage of the term in vogue in different places in which they live. Gradually, they have divided themselves into separate endogamous units and have developed considerable cultural and economic diversity. Broadly, the Kondh are divided into four categories i.e. Desia Kondh, Jharania Kondh, Kutia Kondh and Dongria Kondh, based on the state of economic development and geographical location (Ota, 2008). Of the four categories, Desia Kondh and Jharania Kondh are the sections, who have left their hill and settled down in the plain land to pursue plain land cultivation, while Kutia Kondh and Dongria Kondh live on the hill slopes. Among the hill dweller Kondh, the Kutia Kondh is considered as the weakest section, who leads a isolated life of poverty on the hill top, but the Dongria Kondh are considered as swidden cultivator and they are less primitive and have improved livelihood condition than the Kutia Kondh.

The Dongria Kondh live on the top of the Niyamgiris, a rugged mass of the hill ranges situated on the borders of Rayagada- Gunpur sub-division of Rayagada

District. This particular group stands out due to their skill in Swidden cultivation on the hill slope. They are also recognized as one of the Particularly Vulnerable Tribal Groups (PVTGs) of Odisha. According to the government of India, Particularly Vulnerable Tribal group is a classification created with the purpose of enabling improvement in the conditions of certain communities with particularly low development indices.

The majority of Dongria Kondh are seen in the Niyamgiri Hill Ranges, which encompasses three Community Development Blocks, namely, Kalyansingpur, Muniguda and Bissamcuttack. Among the others, the Dongria Kondh under Bissamcuttack block are widely dependant on their horticultural products while at the same time, they continue growing their traditional staple crops on the hill slopes or swidden field (SCSTRTI, 2006). Among all, the Dongria Kondh particularly who live in the Kurla village under Bissamcuttack block, are taken into account to know their continuity of swidden cultivation even after they have been facilitated with various governmental and non- governmental plans and programmes for their livelihood development.

It is true that government has provided various facilities to improve the health, education, and livelihood system of the Dongria Kondh through various developmental schemes. But still they resist as their ethnicity and ecology do not allow them to adopt any other occupation on the hilltop (Majhi and Naidu, 2011). Therefore, swidden cultivation has been practiced by them from decades since this cultivation provides varieties of crops to the indigenous people for their subsistence, even though they are under different environmental uncertainties. But from last six decades, the intervention of various governmental and non-governmental tribal developmental plans and programmes into the Dongria Kondh community have imposed Dongria Kondh to improve their livelihood system by introducing market economy system frequently (Nayak, 1988). As a result, the farmers who focused on traditional crops for their subsistence became more curious to cultivate cash crops for their economic development particularly. But still they continued primitive means of livelihood known as swidden cultivation or shifting cultivation without adopting the other modes of livelihood options. Hence, here the article discusses the unique skill of Dongria Kondh that they have applied to continue their cultivation on Swidden land under any environmental circumstances. Here, the swiddening is not only being practiced by the Dongria Kondh for their subsistence, but also is continued for their sustainable development as well. Here, the sustainable development defines the socio-economic development of the community without harnessing the usefulness of resources for future generation (Agyei, 2016). However, the article focuses on that particular swidden cultivation that has been transformed into a sustainable economic agriculture from subsistence farming system (Fawzy and Shaymaa, 2020), while the traditional methods of the farming system have remained unchanged. Here, the traditional farming system such as land classification, land

distribution, plotting of hill lands, site selection and preparation of swidden plots, stages of swidden cultivation, rotation of crops, generation gap and food habits, rotation of plots, organization of work teams, beliefs, rituals and cultures associated with the swidden cultivation of Dongria Kondh have been taken into the discussion to prove the continuation of the swidden cultivation of Dongria Kondh on the hill slopes under any circumstances without facing any emerging difficulties.

The Dongria Kondh of the Niyamgiri Hills were selected for my PhD research work. Fieldwork was conducted over the course of one year in the Niyamgiri Hills, which is the abode of the Dongria Kondh of Rayagada district of the Odisha State. This included three months of preliminary visit in the year 2017 (month June) and later intensive fieldwork was done for nine months from September 2017 to June 2018. Several shorter visits were made to the areas before completing the writing up the PhD thesis. Fieldwork was conducted mainly by employing traditional ethnographic methods such as, participant observation, interviews and group discussion etc. This study is heavily based on empirical data collected from the field and supplemented by secondary sources.

DISCUSSION

Introduction of monetary system into the Dongria Kondh non monetary economy, by various developmental programs has played an important role in changes of Dongria Kondh ecology, cultivation practices, cropping patterns, land plotting system, food habits, labour system, cultural practices and belief system. Not only this, the increased development has also increased the challenges of existence for tribal people (Aparajita, 1994). They explained that their need for money some years ago was minimal, only for a few essentials like clothes, salt, dried fish, and marriage expenses and for celebrating some community festivals. But now the dependence on money has increased over the years, largely due to the inflated prices of available market products and other commodities. However, still they have been enduring the same livelihood source to combat the increasing challenges of their society. So here, the paper discusses the methods and practices of swidden cultivation from the past to the present that has helped Dongria Kondh to maintain their livelihood and improve their economic condition without over-exploiting the natural resources at the same time.

Ecology

Swidden cultivation is the primary means of earning livelihood for the Dongria Kondh. Since ages they have been practicing swidden cultivation using slash and burn method where the vegetation on the hills are slashed and burnt and the plots are cultivated with a mixture of crops. No ploughing, no irrigation and no use of advanced tools and technologies are the important considerations for which the Dongria Kondh prefer this practice as an ecological adaptation to such hilly

environment. In spite of several advantages, the practices of swidden cultivation are very hard and demand adequate labour. However, it is an ecological adaptation due to the lack of adequate plain lands in the hilly areas. These swidden plots are considered to be fertile lands due to the decomposition of forest litter. A plot is usually cultivated for two to three years and then abandoned for fallow to regain fertility. Likewise people continue cultivating the traditional crops either in a new or in an alternate fertile swidden for their sustainability. Gradually, when they needed much crops for trading, they started to over-exploit the same swidden land for a longer period than usual. Consequently the soil lost its fertility. Facing this situation, the Dongria Kondh tried to find out alternatives which resulted in a technical shift from swiddening to horticulture (Jena et al, 2002). Though the horticulture was seen in the past, it was not practiced in the swidden field to get commercial products. At present, both types of cultivation are done in the swidden plot, while first one allows growing traditional crops for subsistence, the second one shows the interest for cash crops and it not only fulfills the monetary need of the people, but also helps to conserve the natural resources at the same time.

Hills and Land classification

Though Dongria Kondh have classified their land into two categories topographically, still there is sub-classification of lands according to the variation of cultivating crops. Lands on the hill slopes where only the traditional crops are cultivated are known as *neta*, while the hillock, especially on which the natural fruits orchards are seen, are known as *bada*. Likewise, vegetables cultivated in the hilly lands or kitchen gardens near to the settlement are also known as *bada*. However, *neta* or the swidden fields are located at variable distance from Dongria Kondh settlements. Some may be very close to the settlement and some are at a far-off place. Whereas the kitchen gardens are found both on the hill slopes and close to the settlements and the orchards are mostly located on the hill slopes either near to or far off the settlements according to the availability of the land. According to the Dongria Kondh, earlier they used to cultivate traditional swidden crops and vegetables for their subsistence, while they used to trade minimal surplus crops of it and other naturally grown fruits from the nearest natural orchards to get some essential basic goods and market products for themselves at a minimal level.

However, gradually when they started to trade more cultivated crops to earn money for their livelihood improvement, they used their land system differently. By the time, more than half of the *neta* used to cultivate cash crops by the Dongria Kondh for their economic development. And these particular *neta* were named as horticultural land (*bada*). Now people have started cultivating varieties of cash crops on swidden land, basically the products which have high market value in their locality. Not only the economic benefits, the horticulture crops also needed less labour and low nutrient soil in comparison to the traditional swidden crop.

Likewise, still swidden cultivation is being practiced by the Dongria Kondh for their subsistence while horticultural crops provide them economic profits. However, due to the adoption of horticulture in a large scale, all varieties of wasteland and barren lands of Niyamgiri hills could be utilized properly.

Land Distribution

At the time the Dongria Kondh settled in the Niyamgiri hill ranges, they divided the land into two categories such as: habitable plot and swidden plots. The distribution is called *basa bati* (area distribution). In those days, classifications such as habitable space or agricultural lands had not been valid. In the course of time, the people cleared forest patches in order to cultivate the land. The hill areas were converted into swiddens lands which were distributed among the households residing in nearby settlements. This is called *neta bati* (swidden distribution). Thus, *basa bati* came to define the distribution of surrounding land irrespective of the type it represented, while *neta bati* refers specifically to the distribution of swidden land. Likewise, they started village-wise distribution. In which, there is always a boundary between two villages. Keeping the boundary in view, hills are distributed among respective village communities. People of a single clan or of different clans residing in the village can occupy a hill land, convert it to swidden plots and impose their right on such lands.

To emphasize legitimate claim over the land in the 1950s, the village communities looked for a proper and rational distribution of land. The entire land possessed by the whole community in a village was distributed both clan-wise and *punja*-wise. As in most of the villages there are more than one clan, the village land was distributed among the different clans keeping in view the number of families in each clan. Each clan has four *punjas* that is *jani*, *mandal*, *pujari* and *bishmaji*. The land possessed by a clan in the village is further sub-divided among these four *punjas* under the clan. By the time when the dependency of Dongria Kondh on swidden plot increased, families of each *punjas* started acquiring more land to get more yield. Consequently, they found shortage of land as every family used to acquire acres of land, one family of each *punja* could possess maximum land in one hill or even the entire hill. But when a family occupied an entire hill, it was not convenient for other families of the same *punja*, who settled on the hill afterwards, to make swidden plots in the same hill. Therefore, they had to make plots on distant hills and this condition compelled clan heads to make rational distribution of a hill land among different families belonging to different clans and *punjas*. Thus, hill lands were first distributed among clans, then *punjas*, then families. However, some patches of land were kept as buffer land to be distributed to new families who may come from outside, irrespective of their clan membership.

Swidden cultivation is a cultivation that cannot be done in the same plot continuously, so in this case if any family needs more land, further grant of land

is made possible through the village level decision-making body where *jani* and *mandal* allot the required land on lease, if it is available in the nearby forest. Because these two *punjas* get highest share as they provide extraordinary service to the community performing the rituals and satisfying the supernatural beings for the welfare of the community. In case of non-availability, they are provided available forest slopes in the distant hills, if these lands are not possessed by any other village. Hence, this distribution system provides maximum opportunities to cultivate varieties of crops such as traditional crops that sustain people and the cash crops that empower low-income families to improve their welfare. After all, this is the distribution system which made convenient to use all varieties of land for cultivation and help Dongria Kondh to continue their swidden cultivation without compelling them to choose any other sources of income.

Plotting of Hill lands and Denomination

Earlier, hill slopes are chosen on the basis of their suitability for cultivation. According to the Dongria Kondh, the hills slopes are divided into two varieties of cultivable plots; i.e., vertical swidden plot (*nellu pati*) and horizontal swidden plot (*nellu padi*). In the past, most of the lands were divided horizontally as people cultivated only traditional crops for subsistence, which needed only fertile soil and almost same weather condition to be grown up. On the other hand, the physical condition of the hill sometimes demands horizontal partition. In case the hill has wider slopes, such plotting is made. In such plots mainly cereals and millets are grown. In this case, the people of a *punja* prefer to acquire land in the mid part or lower part of the hill mainly because such parts are more fertile than that of the upper part and it provides good qualities of food for subsistence. Gradually, when people focused on subsistence economy, they started cultivating varieties of cash crops which needed different ecological units to be grown up. Consequently, the preference for the vertical plots is mostly considered on ecological basis.

Unlike the horizontal plots, in a vertical plot, different kinds of crops can be grown at different altitudes as it provides varieties of weather and soil condition to grow different cultivable crops. In this particular plotting system the water flows smoothly from the upper part towards the lower part and water logging can be avoided according to the suitability of the various crops. For example, arrowroot, *kabang* and ginger can be grown towards the upper part as these need well-drained sandy soil, while turmeric and banana can be cultivated towards the lower part of the hill since these crops need soft soil and shady weather. On the other hand, this method of plotting system protects the cultivated crops from the jungle animals since the crops are cultivated in the middle part of the hills; the crop loss is not seen by the jungle animals because the animals which graze over the crops usually come from the uphill. However, in the horizontal arrangement of plots, it gets difficult to avoid crop loss due to the jungle animals. Again, Dongria Kondh

believe that a better harvest results from seasonal crops, if these are grown between two dense vegetation patches. Hence, still both varieties of plotting systems are seen though most of the swidden land are plotted vertically to get varieties of cash crops with conserving the fertility and moisture of the soil at a time. Some wide hill slopes are plotted horizontally to continue traditional crop cultivation as well. Likewise, Dongria Kondh continues swiddening as they are getting both sustainable crops and cash crops sufficiently to manage their livelihood.

Site selection and Preparation of swidden plots

In the past, when Dongria Kondh wished to cultivate a new patch of forest which was neither cultivated nor possessed by anybody earlier, they searched the ecological suitability of the plot as it required moist soil, undergrowth and bushes. Next the cultural condition is taken into the consideration, where the forest should have a *Dharani* altar established by earlier settler. Then, comes the economic consideration according to which the hill should have enough cultivable land to be divided among all the families in a village or a group of families of bigger size who wish to cultivate it. Here, the economic consideration is taken at last because earlier the farmers focused on growing food that are sufficient for them to give adequate amount of food themselves. But gradually Dongria Kondh started to focus on economic consideration as most subsistence farmers now participate primarily in trade to fulfill their needs of local market products. But still they follow the cultural and religious condition because it is believed that if the cultural consideration does not go in their favour, the other two conditions become meaningless. On the other hand, a *Kaman* type of forest is never cleared, as these kinds of big trees helps to keep the soil soft, moist and fertile, that exactly the swidden cultivation needs. However, clearing such varieties of huge trees are also quite expensive according to the Dongria Kondh. It is believed that most of the forest deities are living inside the *Kaman* forest and to clear it, their permission is needed. It is always believed that the supernatural entities if approached in the right manner they can decide everything beneficial for the Dongria Kondh. These are the reasons; they choose *jada* type of forest not only to cultivate the traditional crops, but also to grow the cash crops on the swidden plot. Likewise, the traditional swidden cultivation provides agricultural products to survive, while the new way of swiddening helps people to develop their economic condition without destructing the natural resources.

Stages of Swidden cultivation

A series of activities are involved in the swidden cultivation. According to the Dongria Kondh after selection of new swidden plot slashing of vegetation on the swidden is done in the month of February-March as it requires long time to convert a *jada* forest patch to a swidden. If they choose old fallow land, then the slashing process is done in the month of March-April because the fallow land was cultivated

earlier, the vegetation growth is less and hence required less labour and time to complete the work. This process is called *neta tudunga* cutting of swidden or *heledi tudunga* “cutting of branches and twigs”. Next to this, the slashes are collected at one or more places and it is left for few days to dry. This process is known as *padad kina* or heaping. During this time people keep engaging themselves in clearing the floor of the hill slope until the slashes dries up. When the *heledi* (slashes) becomes dry people set fire to it; that is known as *nani rundna* or setting fire. The *heledi* remains unburnt is called *beatede heledi* or leftover slashes. Next to this, the left over slashes is collected, heaped and burnt again, that is known as *kandi pergana* or burning of remnant slashes. With this, the final clearing is completed. Next to this, *neta katkana* or land supervision is done to check the suitability of soil for sowing seeds. After, hoeing a mixture of seeds called *atpa bicha*, are broadcasted, put in dibbled holes or sometimes sowing of crops is done phase wise, this process is known as *bicha matamu*. This process is usually done during the month of May-June. In the month of July- August, the first weeding of the cultivated swidden is done which is known as *huda rena* or weeding. There may be one or more weedings done from the first cropping to early harvest. Harvesting or *hika kakna* are done by the Dongria Kondh phase wise, although almost all varieties of crops get mature by the month of October- November, the harvesting period extends till January-February. According to Dongria Kondh this practices are only done to harvest the traditional crops for their sustainability. However, at present to earn some money people show greater interest towards horticulture. Therefore, every swidden fields are partly converted in to the horticultural field and people have started planting the horticultural plants in the swidden plots in these days. Thus, in most of the cases, both horticultural and swidden cultivation practices go together in the same plot. But the agricultural practice is seen differently in case of cash crop cultivation. In the swidden, the process is extremely laborious which starts with slashing and burning of forest vegetation followed by the cleaning of the plot, dibbling and hoeing, sowing, weeding and other mid-term agricultural operations before harvesting. But the horticultural practice does not involve so much activities and care. The plants are planted during rainy season and for some days the plants are carefully safeguarded by fencing to save them from herbivorous animals. Once, trees grow well; they do not need any further care. Likewise, still Dongria Kondh continue their swidden cultivation not only to sustain themselves, but also to improve their economic condition as well.

Rotation of crops

Dongria Kondh believe that the fertility of the soil of a newly cleared patch provides a better nutrient media for any crop for two years. After two years, further cropping on the same patch reduces the soil fertility. In this case they choose such unfertile plots from which good yields of traditional crops cannot be expected and they can

continue monoculture plantation on the same swidden plot at that time. Earlier Dongria Kondh usually cultivate traditional subsistence crops for two to three years continuously. Then they abandon the field for vegetation that helps to regain the fertility again. For example, in the first year they grow finger millet, cow pea, pigeon pea, *bajra*, *kating*, sesame and all varieties of tuber. While in the second phase they cultivate other crops except finger millet. But now they are cultivating cash crops such as pineapple, banana, citrus fruit, mango, turmeric, arrowroot, jackfruit etc. in the fallow land in case of shortage of land as horticulture does not need much fertile soil. Likewise, swidden cultivation has been continued by the Dongria Kondh till date without any difficulties.

Generation gap and Different food habits

In general, both younger and older generation cannot think of their existence without swidden cultivation. For older generation, the traditional crops on swidden provide them their staple food and other essential nutrients. As they have been habituated with their traditional food, they do not feel satisfied if they eat any other outside food. They believe that the food they cultivate are the more nutritious and provide enough energy to them to complete their laborious agricultural task easily. While the younger generation follow new food habits as they are getting rice and *dal* by the government, but still, they know the nutritious value of their traditional crops. On the other hand, the younger generation is much interested to do varieties of cash crops on swidden as the local climatic condition of the Niyamgiri hills has become suitable to grow horticultural products. However, it provides good income with less labour and financial investment and fulfils the other needs of the people. So, it is mostly observed that both the generations feel better with development in the swiddens.

Fallow period/ Rotation of plots

Except crop rotation, land rotation is found widely in this cultivation. The Dongria Kondh cultivate a land for two to three years continuously. Then they abandon the field for vegetation to grow. Usually, the people possess plots at five to six places. When one plot is abandoned, the second is cultivated and in this way, they shift from one plot to another. During this period, the vegetation in the swiddens grows to a certain height. According to the above rule, the land was cultivated continuously for three times or maximum four years at a time. A fallow period of five to six years was perceived to be enough for adequate re-growth of vegetation in the past. But at present, it is not perceived enough to re-growth of forest species, even though the land is abandoned for 10 to 12 years. They found only bushy plants grow abundantly, which are cut in time and by decomposing they become manure and add fertility to the soil. Though the quality of the soil has become low than earlier, still it helps to yield average traditional crops, while at the same time it has become more suitable

to grow new cash crops, as the horticultural crop does not need much fertile soil. Likewise, rotation of plots helps people to continue swidden cultivation easily.

Organization of work teams

Swidden cultivation is labour intensive as the hilly and mountainous lands require more hands than a family provides to carry out swidden cultivation. “Basically, being widened swidden cultivators they come to each other’s help during various agricultural operations... these tasks are not considered easy for a single household. Further, they have to be performed as early as possible within the scheduled time as seasons and suitable weather do not wait for them” (Nayak, 1989). This is the reason Dongria Kondh complete all their work by the help of co-operative labour without any wage payment. Still Dongria Kondh needs varieties of labour co-operatives such as *sha bati* (*mutha* level unit) and *punda bati* (village level funds). *Sha bati* is a co-operative labour system where different clan members join from different groups to complete the agricultural work. In case the preparation of new swidden or horticultural garden, when one is unable to get the co-operative labour from his own village, he/she usually goes for *mutha* level co-operative unit. But most of the swidden activities are done by the village members particularly. In the recent past if someone needed co-operative labour, he consults a group which is formed on the basis of gender, age-grade and age set. But now there no such groups is seen in their community as the younger generation does not keep interest to run their youth dormitories properly. At present one person from each household is joining in a group and helping each other by sharing their physical labour. Likewise, there is a sense of cooperation in that the neighbours and relatives always help out families that unable to do all the works due to illness or shortage of labour. The host family only provides meals to the working group and often pays off some cash i.e. 10 to 50 rupees, which is saved in their village fund and spent later during festivals and in any socio-cultural occasions. This is only seen when people cultivating old crops on the swidden. But in case of cultivation of new cash crops, the Dongria families do not need any kind of outside co-operative labour other than cooperation of own family. In these days Dongria Kondh are much interested to do horticulture as it needs less energy and money investment and also provides wholesome products for trade, people are managing their own horticultural activities independently with the help of their family members. In this case, one female member does all the household chores, while rest of the members goes to the field with their partners and children. After separation of an extended family brothers and sons continue to cooperate frequently in economic and ritual activities. And this is one of the reasons, Dongria Kondh have interested in swiddening widely. On the other hand, the mutual help among the community during swidden cultivation sustains the group solidarity.

Beliefs, Ritual and Culture associated with swidden cultivation

The gods and goddesses are believed to be responsible for protecting the crops from

insects, pests, nematodes, and disease and their favour is, therefore, sought through appeasement. Varieties of rituals are conducted during swidden cultivation. Among those rituals, *anja dakina* is the first ritual that is observed to appease *sita penu* (goddess of property) during felling and slashing period as a precaution against accidents. *Katla perpan* is observed next to get permission from *danda penu* (god of hill slope) basically during the time of collection of burned wood logs and poles. *Bicha hapnare* is an important annual ritual in worship of *sita penu* to get plentiful of harvest in that year. Again *mandiarani*, the grandest annual agricultural festival of Dongria Kondh, is observed to appease the *bima penu* (god of air) to protect the flowers of crops from destruction. *Jada tukuna* is an agricultural ritual that is conducted at the time of first harvest or at the different stages of growth of other crops. This is a thanks-giving ritual that is performed to appease the gods and goddesses collectively. Next to this ritual, *menda tada dakina* is performed, where *sita penu* and *kajayu penu* (gods and goddess collectively) are worshipped on the harvest ground at the time of reaping and stacking period to collect the crops from field safely. Then the important ritual known as *katpan yatra* is performed before the harvested crops are threshed. *Bali yatra* is conducted occasionally depending upon the financial status of the villages or if they found inadequate crops for the year, *dharani penu* (goddess of earth) is appeased by the hope of not to harm the crops. At the end of the agricultural season, *dharani penu*, the main deity of Dongria Kondh is worshipped through *meria* festival. This festival linked to cultivation, productivity and the fertility cult. According to the Dongria Kondh she is merciful and through this festival they ask to forgive if any mistake is made by them during the whole agricultural period. All the above festivals are observed by the Dongria Kondh from the past to till date as they believe these rituals always help them to get traditional crops sufficiently for their subsistence. But they never worship any kind of rituals for horticultural crops except mango and turmeric as they considered these are the two old horticultural crops they ever used to cultivate for their economy. They conducted *pidia pakna* to appease the *sita penu* who would give ample products of mango and *amba puyu dakina* basically to appease the deities i.e. *ajibudi* (goddess of disease) and *bima penu* (god of air) to protect the flowering of mango trees. Likewise, *hinga repu dakina* is one of the most important festival which is observed by the people to appease *darani penu* to get good amount and qualities of turmeric every year. Now many varieties of cash crops are being cultivated by the Dongria Kondh widely and there is no such specific festival associated with the crops and horticultural activities. But still, they cultivate it and harvest a good amount of products because their most basic assumption is that supernatural beings influence Dongria Kondh life. If they would be appeased perfectly, they will get plentiful harvest, conducive weather during the cropping season and protection from frequent natural disaster. And therefore, they worship and offer to those particular deities regularly, who are associated with the natural resources. These deities are

such as *niyamgiri penu* (god of Niyamgiri), *gangi penu* (Goddess of water), *bima penu* (god of air), *dharani penu* (god of earth), *danda penu* (god of hill slope), *piyu penu* (god of rain), *peni penu* (god of cold), *sita penu* (goddess of property). As a result, they get ample products from the swidden, whatever they wish to cultivate in their hilly areas. And this is the reason they still continue their swidden cultivation as the deities kept blessings on the Dongria Kondh and solve all the difficulties not only related to their agriculture, but also related to their health and welfare as well. Likewise, still they are harvesting adequate agricultural products from the swidden even if they are not performing the traditional agricultural rituals step by step in the horticultural field.

The following table discusses the methods and responses of the Dongria Kondh that have been applied by them to continue their *swidden* cultivation, though the cultivation has gradually gone towards the sustainable economic agriculture from the subsistence farming system.

Table - Methods Dongria Kondh apply to continue their Swidden cultivation.

Sl. No.	Methods	Responses to grow Swidden crops for their survival	Responses to grow Swidden crops for their sustainable development
01.	Land Classification	<i>Neta</i> (swidden land) was cultivated widely to get traditional crops such as pulses, millets and lentils. <i>Bada</i> (kitchen gardens) were cultivated moderately to get vegetables for domestic use, while <i>bada</i> (natural orchards) were seen widely as these <i>bada</i> products were exchanged in the weekly market for the fulfillment of other essential market products.	A huge part of the <i>neta</i> have been converted into <i>bada</i> (horticultural field) as people started to grow varieties of cash crops (fruits and spices) extensively to get good economic profit without investing much labour, money or and without harnessing the natural resources as these new varieties yielded sufficient crops under low fertile soil.
02.	Land Distribution	Earlier, Dongria Kondh cultivated their swidden land only for their survival. Therefore, they had enough land available near to their settlements and the lands were distributed clan-wise accordingly.	But, later as they acquired huge land property for horticulture it became insufficient for some of them. Finally, to get an equal amount of swidden land, Dongria Kondh distributed the land <i>punja</i> -wise and family-wise accordingly.
03.	Land Plotting and Denomination	In the past, most of the lands were divided horizontally as people preferred to cultivate traditional crops for their subsistence, which needed only fertile soil and almost same weather condition to be grown up.	When people focused on subsistence economy, they started cultivating varieties of cash crops which needed different ecological units and varieties of soil to be grown up. Consequently, the preference for the vertical plots is mostly considered on ecological basis.

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04.	Site selection and preparation of Swidden plots	In the past, when Dongria Kondh wished to cultivate a new patch of forest land, they used to see the ecological suitability, then cultural and at last the economical consideration was taken, because people cultivated their land only for their survival.	But gradually, Dongria Kondh started to focus on economic consideration as most subsistence farmers now participate primarily in trade to fulfill their needs of local market products. But still they follow the cultural and religious condition because it is believed that if the cultural consideration does not go in their favour, the other two conditions become meaningless.
05.	Stages of Swidden cultivation	In the swidden, the process is extremely laborious which starts with slashing and burning of forest vegetation followed by the cleaning of the plots, dibbling and hoeing, sowing, weeding and other mid-term agricultural operations before harvesting.	The horticultural practice does not involve much laborious activities and care. The plants are planted during rainy season and for some days the plants are carefully safeguarded by fencing to save them from herbivores. Once, trees grown well; they do not need any further care.
06.	Rotation of Crops	In the first year they grow finger millet, cow pea, pigeon pea, <i>bajra</i> , <i>kating</i> , sesame and all varieties of tuber. While in the second phase they cultivate other crops except finger millet. Then they abandon the field for vegetation that helps to regain the fertility again.	Now they are cultivating cash crops such as pineapple, banana, citrus fruit, mango, turmeric, arrowroot, jackfruit etc. in the fallow land in case of shortage of land as horticulture does not need much fertile soil and provide abundant yield to get economic benefits.
07.	Generation Gap and Different Food Habits	Older generation believe that the traditional crops they cultivate are the more nutritious and provide them enough energy to complete their laborious agricultural task easily. Therefore, the younger generation follows new food habits as they are being provided with rice and <i>dal</i> by the government, still, they know the nutritious value of their traditional crops.	Likewise, the Dongria Kondh also very much interested to grow varieties of cash crops on the swidden land as the local climatic condition of the Niyamgiri hills favour much to grow horticultural products. As the land get its fertility in quick succession. Therefore, it provides good income with less labour and financial investment and fulfils the other needs of the people. So, it is mostly observed that both the generation feel better with development in the swiddens.
8.	Fallow Period/ Rotation of plots	A fallow period of five to six years was perceived to be enough for adequate re-growth of vegetation in the past. Later, it was abandoned for 10 to 12 years to get the fertility of the soil back.	But now people are converting those swidden lands into horticultural land and are getting abundant cash crops for some years, instead of falling a land for longer period.

9.	Organization of work Team	<i>Sha bati</i> (<i>mutha</i> level unit) and <i>punda bati</i> (village level funds) are used to complete the Swidden cultivation.	Since, horticulture needs less energy and less labour, Dongria families do not need any kind of outside co-operative labour other than cooperation of their own family.
10.	Beliefs Rituals and culture associated with swidden cultivation	To cultivate old swidden crops, festivals associated with agriculture are observed by the Dongria Kondh from the past to till date. Because, they believe these rituals always help them to yield abundant crops from the swidden for their subsistence.	Except mango plantation, there is no particular ritual to be performed to get good yield from the horticultural fields. But still Dongria Kondh believe in concerned gods and goddesses to appease them through various annual rituals and festivals to get good yield from the field for their economic benefits.

CONCLUSION

Swidden cultivation is an ecological adaptation to such hilly environment. Therefore, Dongria Kondh always apply their indigenous knowledge to cultivate varieties of crops for their sustainability and economic development. Here, Dongria Kondh tried to find out alternatives which resulted in a technical shift from the swiddening to horticulture, which is done on the same swidden field where only the commercial crops are being cultivated to improve the livelihood condition of the Dongria Kondh without harassing the natural resources. Here the article has discussed the habitual ecology and traditional agricultural knowledge and ideas of Dongria Kondh such as; land classification, land distribution, plotting of hill lands, site selection and preparation of swidden plots, stages of swidden cultivation, rotation of crops, generation gap and food habits, rotation of plots, organization of work teams and beliefs, rituals and culture associated with the swidden cultivation of Dongria Kondh that have been used and modified by the indigenous people to continue their swidden cultivation without any emerging difficulties. Hence, the article has discussed the application of indigenous knowledge of Dongria Kondh that has helped Dongria Kondh farmer to continue their swidden cultivation from the past to till date while the same swidden cultivation or sustainable farming system is changing to improve the livelihood condition of the indigenous people.

References

- Agyei, F. K. (2016). Sustainability of Climate Change Adaptation Strategies: Experiences from Eastern Ghana. *Environmental Management and Sustainable Development* 05(2): 84-103.
- Aparajita, U. (1994). *Culture and Development: Dongria of Niyamgiri*. New-Delhi: Inter-India Publications.
- Fawzy, Z.F. and Shaymaa, I. S. (2020). Subsistence Farming Towards Sustainable Economic

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- Agriculture of Small Farmers in the Developing Countries. *NASS Journal of Agricultural Science* 2(0): 01-03.
- Jena, M. K., Pathi, P., Dash, J., Patnaik, K. K., and Seeland, K. (2002). *Forest Tribes of Orissa: Lifestyle and Social Conditions of Selected Orissan Tribes, Vol.1: The Dongria Kondh*. New Delhi: D.K. Print world (P) Ltd.
- Majhi, U and Naidu, T.S. (2011). *Living conditions and Education of Dongria Kondh Primitive Tribe: Issues, Problems and Prospects in Orissa State of India*. Germany: LAP Lambert Academic Publishing.
- Nayak, P. K. (1988). Tradition and Development in Tribal Orissa: A Case study of Dongria Kondh Developmental Agency. In B.B. Sachidananda et al (ed.), *Tradition and Development*, pp.79-94. New Delhi : Concept Publishing Company.
- Nayak, P.K. (1989). *Blood, Women and Territory: An Analysis of Clan Feuds of Dongria Kondhs*. New Delhi: Reliance Pub. House.
- Ota, A.B. (2008). *Dangria Kandha. Photos hand book on PVTGs Series vol.02*. Bhubaneswar: Scheduled Castes and Scheduled Tribe Research and Training Institute (SCSTRTI).
- SCSTRTI (2006). *The Kandha of Orissa: their Socio-cultural Life and Development*. Bhubaneswar: Scheduled Castes and Scheduled Tribe Research and Training Institute.

