Further Interpretation of the Microlithic Occurrences of South Koel River Basin, North Western Odisha

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Abstract: *The principal aim of this article is to re-examine the recent findings of Stone Age culture of the South Koel river basin of North-Western Odisha as well as its geological context of occurrences. The density of microlithic artifacts is exceptionally high in this region than the Paleolithic and Neolithic artifacts. Sites are recorded from the flat surface of the foothill region and from the upper gravel of the older alluvium deposition. Three successive periods of Stone Age culture have been recorded from this area, from the basal gravel one hand axe is recovered and microlith in association with two Neolithic artifacts have been reported from the upper gravel. In addition to this, an attempt has been made to understand the lifestyle of the indigenous people of this area through the open-ended semi-structural interviews which further emphasize the hunting-gathering practices of the local people.*

Keywords*: Stone Age culture, Palaeolithic tool, Neolithic tool, Microlith, Colluvium, Alluvium.*

Introduction

Lithic artifacts are the only reliable resource to portray the hominine behavior in Indian Subcontinent. Variation of lithic assemblages in Eastern India is bewildering in its own way. Especially in Odisha, the distribution of lithic assemblages and its characteristics are quite uneven from region to region, since 1939 (Dash 2006), exploration and excavation in different parts of eastern India yielded microlithic assemblages in association with the heavy-duty tool and Neolithic artifacts, but in common parlance, fewer regions in Odisha are

engrossingly confronted with microlithic occurrences only (Behera 2017). Additionally, traces of Aterian tanged point and bidirectional blade technology independently confirmed the versatility and correlation with the other lithic material record of North Africa and Levant (Behera 1989, 2017, 2019; Deep 2017,2019; Dehuri 2011; Mahapatra 1959, 1960; Mandal 2019; Mohanty 1993; Nanda 1985; Ota 1986; Padhan 2013, 2016, 2017; Tripathy 1972). Along with this, one of the factors is common among many microlithic occurrences of Odisha, such as the absence of potteries, which in turn suggests that all those Stone Ages belongings are representing an earlier stage of Stone Age culture in comparison to Bagor, Adamgarh, and Bhimbhetka (Nanda 1985). However, this article is going to postulate a coherent picture of micro-regional prehistory of South Koel River Basin which was never surveyed before. South Koel river basin of Sundargarh district is the motherland of different tribal population, such as Oraon, Munda, Bhuia, Kisan who are still practicing hunting and gathering for their daily needs. So, considering the local lithic technological organization, the emphasis is also given on hunting, gathering practices of the indigenous people of this region. In addition to this, regional geography and geomorphology were also taken into account to understand the context of the sites.

Area of Investigation

Sundargarh district is between latitude 21 degree 36′ N to 22 degrees 32′ N and longitude 83 degrees 32′ E to 85 degrees 22′ E. Sites which are located around the South Koel river basin are under the territory of Sundargarh district. Near about, forty-three percent land of this district is covered with dense mixed deciduous, vast, inaccessible forest with extensive river valleys and undulating tableland of different elevations which are broken up by rugged hill ranges (Mandal 2017, 2020). Long undulating tableland is varying within 213m (700ft) amsl with isolated peaks of considerable height. Hemgir plateau is at the western part of the Sundargarh subdivision. It is 315m (1150ft) high. The northern region of the Hemgir plateau is hilly in nature, while the southern portion is relatively plain with the minimum elevation of 216m (709ft) amsl. The eastern region of the Sundargarh subdivision is intervening between Chotanagpur Plateau and Mahabir hill range, elevation ranges are varying in-between 213m-305m amsl. The Panposh subdivision is broadly demarcated by a southeastern railway track which is running from east to west and divided the region into two physically distinct north and south zone. The northern region of the Panposh subdivision is formed by the broad valleys of South Koel, Sankh, and Deo River. Isolated hill ranges and a series of small ridges cover the bare land of this subdivision. The southern portion is comparatively much hilly and wooded. This region is

extending from the South Bisra to South Chirobeda and rises along the Singhbum boundaries. Most of the microlithic sites are recorded from this sector.

Climate

The climate of the Sundargarh district is sub-tropical. It is broadly divided into hot humid summer, high precipitation monsoon, and cold winter. The average temperature in the summer season increases to 45^0C and it decreases around 15^0C in the winter season. Average annual rainfall in Sundargarh district is 1657.1 mm. Humidity is generally high at monsoon but the driest part is winter and summer when relative humidity decreases as low as 16%.

Soil

Surface soil of the surveyed area, especially those sites which are located under Kuarmunda and Bisra block, basically cover with single to weakly granular red and black soil. The red color of the soil is mainly because of the presence of iron oxides. Ferruginous nodule concentrations have been observed in this soil.

Alluvium soil and Black soil also noticed in the different regions of the surveyed area. Texturally, the alluvium soil of the south Koel river basin is ranging from coarse sand to clay. Sign of paedogenesis observed on the surface of the alluvial soil. Black soil is present with red soil mainly on the lower horizon.

The Surveyed area can be divided into 3 groups on the basis of soil characteristic differentiation in upland and lowland.

Group I: This group includes lands which contain shallow sandy loamy soil with gravel and rock outcrops.

Group II: Undulating land covering with shallow to moderately shallow sandy loamy soil belongs in this category. Severe erosion with patches of rock outcrops is common.

Grop III: Soil of the foothill regions are included in this category. The steep slopes of the foothill are covered with coarse sandy loamy soil, which is shallow in-depth, and gravel concentration is very high.

Flora

Steep slopes of the hills are generally covered with deciduous dense mixed forest. Among them, Sal (Shorearobusta) is the dominant species. The other noteworthy trees are Asan or Sahaj (Terminaliatomentosa), Bija or Piasal (Pterocarpusmarsupium), Gambhari (Gmelinaarborea), Kusum (Schleicheratrijuga) and Anola (Phyllonthusemblica). The tree Mahua or

Mahula (Bassicalattifolia) and Mango (Magniferaindica) are commonly found in this area. Numerous edible roots are also present in this part of Orissa. Sundargarh district is the richest state in Odisha with ethnomedicinal plant and represents 40 ethnic tribal communities who exploit the edible plant resources; even today the tribal population of Sundargargh district uses a different variety of ethnomedicinal plants to cure diseases and gather roots, tubers, leaves, fruits, flowers to consume. This is not a "recent indigenous development; it is in practiced by few restricted people since time immemorial (Prusti and Behera 2017)". Indeed, they are still practicing small game hunting for their daily needs. Based on literature review and semi-structural interview of the villagers, the following table has been prepared to emphasize the hunting and gathering practices of the indigenous population of Sundargarh district.

Edible Plants:

Scientific Name of species	Family	Local Name	Life form	Habit	Use
Amaranthaus spinosus L.	*Amaranthaceae*	Kantaleutia	Herb	Annual	Consume as Vegetable
Bauhinia purpurea L.	Caesalpiniaceae	Kuliari	Shrub	Perennial	Shoots leaves and flower are used
Borassus flabellifer L.	Arecaceae	Tala	Tree	Perennial	Fruits are edible
Cassia tora L.	Caesalpiniaceae	Chako ara	Herb	Annual	Cooked tender leaves are used as vegetable
Portulaca oleracea L.	Portulacaceae	Balbalia	Herb	Annual	Leaves are used as a medicine and also consume as a food after roasted
Schleichera oleosa (Lour.) Oken	Sapindaceae	Kusum	Tree	Annual	Fruits are collected to consume

Medicinal Plants:

Botanical Name	Family	Local name	Habitat	Edible parts, Mode of consumption and Medicinal uses
Croton bonplandianus Baill	Euphorbiaceae	Ban mirchi	Herb	Edible parts are fruit and leaf. Sap is applied on wounds.
Desmodium triflorum (L.) DC.	Fabaceae	Kuradia	Herb	Dried powder of whole plant consume with roasted rice powder to cure bone fracture as well as paste of this plant mixed with egg and applied on fractured limb.
***Holarrhenaantidysenterica* Wall.**	Apocynaceae	Kutaj	Deciduous, laticiferous shrub	Seeds, root, leafs and bark are used as medicine, seeds and leaf extract is contain antibiotic properties (Ref). Roots are rubbed with few drops of water and applied on skin to neutralize the effect of snake poison (ref), bark is used for gastric problem, it is also use to treat Hyperglycemia.
***Calotropis gigantea* R.Br**.	Caselpinaceae	Kashinda	Shrub	Dried root powder consumed as antidote of snakebite and eczema.
***Adiantum philippense* L**.	Adiantaceae	Hamsapadi	Herb	Edible parts are dried rhizome. Fresh leaves are use for the treatment of dysentery**,** fronds extract used in fever, asthma, bronchitis dysentery, epilepsy, leprosy, ulcers, and erysipelas.

Cassia obtusifolia Linn.	Caesalpiniaceae	Takla or Chakunda	Shrub	Leafs are used as vegetable, the whole plant is pounded to make a fine paste and applied on the fractured portion of the limb, beside this, the whole plant is use to treat different ailment like piles, leucorrhoea, bronchitis etc.
Clerodendrum viscosum **Vert.**	Verbenaceae	Kharkhari	Perennial shrub	Fruit and roots are generally consume, root with black pepper are used to cure mouth ulcer, angular stomatitis and mumps.
Dioscorea bulbifera **L**	Dioscoreaceae	Pitakanda	Perennial vine	Root, rhizome and tuber are consumed and use to treat stomach ache and paste applied to wound and hydrocele.
Gymnemasy-Lvestre **(Retz) R. Br. ex Sch.**	Asclepiadaceae	Gudamari	Large climbing *shrub*	Dried and fresh leaf taken orally to maintain the blood glucose level and fresh juice of leafs and root past is used to treat intestinal worm and snake bite.
Holarrhena pubescens **(Buch-Ham) Wall.ex G.Don.**	Apocynaceae	Kerua	Shrub	Extract of bark is taken to cure blood dysentery
Ixora pavetta **Andr.**	Rubiaceae	Telakuri	Shrub	Bark extract consumed to cure Jaundice
Lawsoniainermis **L.**	Lytharaceae	Mehendi	Tall shrub	Root paste usually consume in empty stomach to cure jaundice.
Ocimumcanum **Sims.**	Lamiaceae	Ban Tulsi	Herb	Leafs are used for cough.

Ocimum gratissimum	Lamiaceae	Rama Tulsi	Herb	This plant is used for the treatment of cough, abdominal pain, upper respiratory tract infection, menstrual regulation.
***Paederia foetida* L**	Rubiaceae	Prasaruni	Climber	Root decoction with honey and leaf paste are usually taken to medicate indigestion, gastric problem and joint pain.
***Rauolfia tetraphylla* L.**	Apocynaceae	Patalagaruda	Shrub	Root decoction and roots are feed to heal snake poisonous effect and control blood pressure
***Ricinus communis* L.**	Euphorbiaceae	Gaba	Shrub	Root, seed, stem and bark contain different medicinal values and ingestion of seed oil with aloe juice can relief piles, root paste, stem and bark decoction are able to alleviate arthritis pain.
***Sesbania grandiflora* (L.) Poir.**	Fabaceae	Agasthi	Shrub	Fresh root decoction is taken as a anti fertility agent
***Tinospora cordifoliia* (Willd.) Hook.f. & Thoms**	Menispermaceae	Guluchi	Shrub	Stem and leaf are utilized. Stem powder is taken with honey to cure headache, stem and leaf is use to recover vomiting, cough, malaria and diabetes.
***Vitex negundo* L.**	Verbenaceae	Begunia	Deciduous shrub	Leaf and roots are edible part and also used to cure asthma, rheumatism and mouth ulcer.
***Withaniaso mnifera* (L.) Dunal.**	Solanaceae	Aswagandha	Perennial Shrub	Leafs and roots are usually consumed. Root powder and leaf juice are helped to recover asthma, cold and cough.

Woodfordia fruticosa (L.) Kurz.	Lytharaceae	Dhatuki	Small tree	Stem, flower and leaf juice are consumed. Medicinal property of this plant helps to cure diarrhea and its leaf juice use as a blood purifier.

Fauna:

The mixed Jungle of the Sundargarh district is the habitat of many species like elephant (Elephasmaximusindicus), tiger (Pantheratigris), hyena (Hynaediae), wild-dog, jackal and (Canisauieus) and Panther (Pantherapardus). Some freshwater fishes are Aplocheilus panchax, Oryzias melastigma, Oreochromis mossambicus, Gambusia affinis, Danio (B.) rerio and Esomus danricus**.**

Geomorphology

The rock formations of the Sundargrah district mainly represent the Gangpur and Iron-ore series of Precambrian age (Senapati and Kuanr 1975). The Gangpur series chiefly comprises mica-schist, phyllite, dolomitic marble, calcite, and quartzite. Mica-schist, limestone, Iron-ore series rocks are present sporadically in the entire area. The crushed conglomerate (Senapati and Kuanr 1975) and quartzite zone named as Raghunathpali conglomerate separates the Gangpur and Iron-ore zone from each other. Gondowanarock formations are well exposed to the west of the Ib river. Birmitrapur, Lefipara, Sundargarh, Dharuadihi, Jaraikela mainly represents rocks of the Gangpur series. Hills and ridges of the area are formed by the phyllites. Mica-schist, dolomite, and limestone especially occur below the alluvium context and are well exposed along the stream, river section, and foothill regions.

Sites are occurred in 2 distinct contexts, those are older alluvial context and colluvial context. Barring this, sites are also recorded from the steep slope of a fan/cone deposition.

Alluvial deposition

Microliths which are generally collected from the upper surface of the older alluvium depositions are located 2-5km far from the present-day river bed and it is 10-12m high with occasional lenses of gravel and pebble. Lower gravels are resting on bedrock, poorly cemented with calcium carbonate, and crudely bedded. Gravel deposition with sandyloamy matrix gradually become finer at the upper layer where the soil formation is evident, as the surface deposition bearing the sign of blocky peds (Mandal 2020) and fresh micro-lithic artifacts with weathered localized Gangpur rock which lead to the inference that it is an

older channel coarse depositional activity (Ghosh 1970) and cultural activity was taken place after the aggradational phase of the old river channel. Gully sections which are exposed by nullah are found within 5 to 6 km northwest and northeast from the modern river bank. It is comprised of flat to sub-rounded gravel and cobble of quartzite and phyllite, moderately sorted, poorly cemented by calcium carbonated and capped by reddish-brown sandy silt. The upper part of the silt shows the formation of soil and, apparently, becomes stable.

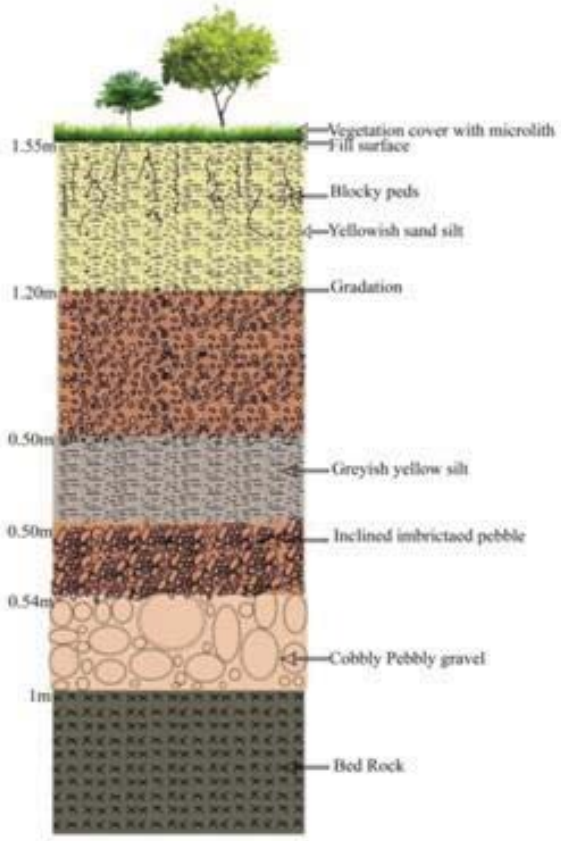


Fig 1: Stratigraphical Sequence of the Microlithic occurrence of an older alluvial section

Colluvial Deposition

Loose, unconsolidated sediments either both by sheet wash, rain-wash, and/or by the slow downslope creep were deposited at the pediment of the hill ranges. Schist and white Quartz outcrops are varying in size (5m-6m in height), and also

documented from the base of the hills. Microliths are found in and around these rocky outcrops in scattered condition. The surface is covered with yellowish, reddish to brownish sandy loam, clay loam soil, and weathered flat and rolled cobble and pebble. Presumably, the colluvial deposition is derived from Precambrian rocks of the surrounding hill ranges which are ranging from 497m-500m. In between the site Chainpur1 and Chainpur2 gravely silty colluvial deposit is developed at the pediment of the Bamni hill range and covers the upper surface of 1-1.5m thick moderately pedogenised reddish sandy silt deposition which is located around a small perennial nullah. Its lateral extent is less than 1 kilometer.

Regolith and Laterite

Foothill region and the bank of small bedrock stream channel cover with regolith. Regolith consists of laterites, mottled clay, sandy loamy to clay loamy soil, and colluvial to alluvial depositions. Laterite patches are documented on lower horizons which are ranging from 622ft-704ft AMSL.

Calcrete

Extensive formation of calcrete or calcium carbonate nodule found in association with white quartz, gneiss, and other local rocks on denudational surface, concentration is high in the northwestern part of the South Koel river basin whereas calcrete formation have not found in the eastern and Southeastern part of this region. This type of Pegoneniccalcrete is generally formed in the land surface where the slope angle is low, and it usually developed through the redistribution, mobilization, and relative accumulation of Caco3 within the soil profile



Fig 2: Calcrete with White Quartz Microlith from the Site Luchabahal1

Stone Tool Assemblage

Three generation gravel deposition has been noticed in older alluvium deposition (Mandal 2019). Heavily rolled Palaeolithic artifact (Fig.4) recorded from the

lower gravel and micro-lithic artifacts (Fig.3) in association with the Neolithic stone tool (Fig.4) are found from the upper gravel. Microlith assemblages are contained core, flake, blade, geometric end products, and debitage which clearly bear the resemblance of other microlithic occurrences of Eastern India (Mandal 2017, 2019, 2020).

The entire assemblages were examined carefully and every individual feature was recorded in a tabular form. It is intuitively clear from the assemblage analysis that during the time of the lithic reduction, every usable angle of the blade core was used to remove the desired flake, from one direction, from two directions, and sometimes from multiple directions. In case of flake, occurrence of core rejuvenation flakes and secondary flakes are (Fig 3) high in number, indeed, geometric end products are also furnished on flakes (Fig 3). Frequency of retouching is apparently high; retouching was performed through the lateral edges of the artifact as well as also attempted on the dorsal and ventral surfaces. Optimum use of the raw material is clearly reflected as the frequency of well-exploited cores are exceptionally high, even; a significant number of flake cores, such as single platform cores, multidirectional cores, and bifacial cores are also documented during the time of artifact assemblage. Along with this, retouching is also observed in multiple numbers of artifacts, including the discarded fluted cores, which further confirm this affirmation (Mandal 2018). Details of microlithic assemblages already summarize elsewhere (Mandal 2018, 2019, 2020,). Among other lithic evidence, such as hand axe (Fig.4) is prepared on quartzite and Neolithic artifacts are manufactured on quartzitic sandstone.

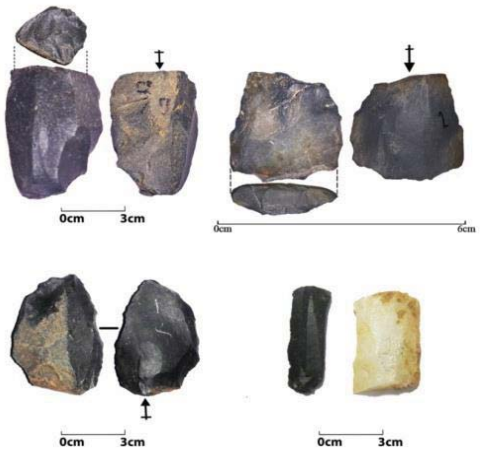


Fig 3: Microlithis from the South Koel River Basin: (1) Blade Core, (2) Flake, (3)Scraper, (4) Blade



Fig 4: Hand axe and Broken Neolithic Ring Stone from the Site Luchabahal and Sandalki

Discussion: This region is flooded by first and second-order streams which were originated from the hill ranges, but most of them are dry now. 34 sites are reported from the alluvial-colluvial context of this river basin and reported from the Kuarmunda, Panposh, Bisra, Birmitrapur, and Nuagaon blocks where local rock mainly comprises the Gangpur series of rock formation, such as conglomerate, quartzite, phyllite, schist, etc. In the older alluvial deposition, pebbly gravels are inter-layering with silts and clays, deposited by braided shallow streams (ephemeral or semiephimeral) sometime during the late Pleistocene (?) or Pleistocene-Holocene transitional phase (?).

Presence of pedogenic calcrete nodule in the semi-arid region on the Pleistocene sediment suggests that this region was going through minimal environmental changes where evapotranspiration is always higher than the annual precipitation (Raghavan *et al*., 1991). It is important to mention here that Holocene alluvium deposits of this river basin are completely free from calcrete nodule. Development of pedogenic calcrete nodule on alluvium deposit has been observed in Tarapheni valley, in the Midnapur district and this area receives 1600-2000mm rainfall per year which further suggests that climate was much arider than the present day (Basak et. al.1998). Further research on Southern India, in coastal Andhra Pradesh, shows similar evidence, calcrete is found on fluvio-aeolian deposit with microlithic artifacts at Agraharam which is located 10km north of Vishakhapatnam. Formation of pedogenic calcretes are also noted from the alluvial deposit of Tripura (Ramesh 1989). So these humid

and subhumid zones of eastern India suggest a relatively high degree of aridity where at present it receives 900-2000mm rainfall per year. Pedogenic calcrete formed in those areas where annual rainfall ranging between 500-700mm rainfall (Rajaguru and Mishra 1997: 30).

Apparently, occurrences of unabraided microlith in upper gravels and the general stratigraphy (Mandal 2017) of this region indicate later late Pleistocene age (?). Basal gravel needs to be more exploration to reconstruct the entire prehistory of this region. Laterite and ferricritised gravels need to be looked out for documenting pre late Pleistocene history of the region as ferricrete is extensively important to reconstruct the tropical geomorphology of an area. Ferricrete and laterite duricuts are extensively gain importance due to their association with iron-rich paleosols which helps to reconstruct the paleoenvironment (e.g. Bardossy 1981; Thomas1994; Tsekhovskii*et al*. 1995) of this region. The analysis of such materials within the geological record, together with appropriate mineralogical, geochemical, and isotopic studies can reveal a detailed story about past climate change and atmospheric conditions. Indeed, geochemical and isotopic analysis of proterozoic laterite from South Africa suggests not only an ancient oxidizing atmosphere but also a hot and humid climate at c.2Ga. Relatively, the presence of carbon isotope within these laterites may indicate the presence of early terrestrial vegetation (Gutzmer and Beukes 1998) of the selected research area.

Another important aspect is the limited range of hunting and gathering practices of the tribal population as the soil of this river basin is not so fertile. Ethno archaeological research might be fruitful to extract data about the use of landscape and can be tally with the probable settlement pattern of the prehistoric inhabitants.

However, it is needless to say, the major hindrance of this preliminary research work is the lack of multidisciplinary analysis of the available data which precludes our understanding about the lifestyle of prehistoric inhabitants of this region. Incorporation of different disciplinary technique from various perspectives is required to reconstruct a logically influential hypothesis on these findings.

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