

## INFLUENCE OF CULTURE ON TRIBAL HOUSING IN ODISHA: A CASE OF KISAN, ORAON, GOND AND KHANDA GAUDA.

AMBALIKA EKKA, SRINIVAS DAKETI

**Abstract:** Vernacular practices are going on for centuries together and this tradition is passed on, from generation to generation. Yet, vernacular practices vary from country to country, region to region depending upon the environmental and climatic factors etc. The different environmental aspects are the Physical factor, culture, social, economic factors are reacting together to give us the physical product which is the building/complex. This research paper deals with the four particular tribes i.e. "Kisan, Oraon, Gond and Khanda Gauda, of Karmabahal, Sundargarh District, Odisha". Tribal living perfectly portrays a well-balanced environment, a procedure that in no way upset the ecological balance. Each of the tribes is a distinctive community, either migrated from a different place or the original denizens of the land. The speciality of the Indian tribes lies in their customs, cultures, and beliefs and, in particular, the harmony in which they survive in unanimity with nature. This paper deals with a detail study on the aspects of tribal housing of "Kisan, Oraon, i.e. "Tribes in transition" which are in the process of modernisation, Gond and Khanda Gaud in Karmabahal village, Sundargarh District and how the culture has influenced the "Adivasis" to take initiatives towards building a vernacular built form to protect themselves from the harsh climate. To study the built forms whether it satisfies the sustainable concepts i.e. use of courtyards, windows, natural ventilation, verandas, whether the building is orientation to N & S direction, building materials used, proper sanitation and drinking water provision.

**Keywords:** Tribes, Tribal living Vernacular, built form, culture, sustainable concepts

**Introduction:** Vernacular buildings are the structures built by local people using locally available material and affordable technology to deal with the local and day-to-day needs [1]. The design of vernacular buildings is the outcome of the traditional knowledge based on trial and error approach. This type of architecture addresses the local climate constraints and shows maximum adaptability and flexibility. This provides uniqueness to these vernacular architectures and is often used as a symbol to represent a particular community or cultural setup [1].

**TRIBE-** The English word tribe has come from the Latin word 'tribus' which signifies a particular type of common and political organisation which is alive in all these societies. The name 'tribe' refers to a category of people and designates a step of development in human society. As a type of society the term signifies a set of typical features and as a point of advancement it connotes a definite form of social organisation. (Behura, 1990). Here it will be worthwhile to mention that "Adivasis" who have a unique identity and culture and practice their own self governances system, are included under Scheduled Tribe (STs). Government of India and census of India have been enumerating all tribal inhabitants and classifying them into 62 tribal groups. Amongst these Sundergarh district is one of the majority densely settled tribal regions in Odisha according to the "Revised paper presented in the Census Data Dissemination Workshop, "Status of Scheduled Castes and Scheduled Tribes in Odisha

(Community Wise): Census 2001" organised by Directorate of Census Operations, Odisha and SC ST Research and Training Institute, Govt. of Odisha, at Bhubaneswar on 29 August, 2007. Orissa tribes are strong, assiduous and simple hospitable tribes normally like to be reserved and maintain distance from the people of other communities, as they are too shy[3]. The major occupation of these tribes is agriculture and fishing and hunting. Men usually wear loin attire and women rap long stretch of cloth around them [3]. Women are adorned with ornaments like bangles, armllets, bracelets, necklaces, rings, hairpins etc usually made of silvers, aluminium, and brass [3]. The practice of tattooing is prevalent among women folk. Girls above 5 years are found with tattoo mark on their faces and hands [3].

**CULTURE-** A culture is a way of life of a group of people-the behaviours, beliefs, values, and symbols that they accept, generally without thinking about them, and that are passed along by communication and imitation from one generation to the next. Despite belonging to different linguistic divisions, the tribes of Odisha (Orissa) have many socio-cultural similarities, and together they characterize the notion of tribalism. Tribal societies share certain common characteristics and by these they are distinguished from complex or advanced societies. In India, tribal societies have remained outside the main historical current of the civilization for centuries. Therefore, they manifest cultural features signifying a primitive level of socio-cultural existence. Considering the general features of their eco-system, traditional

economy, supernatural beliefs and practices, and recent impacts of modernization, the tribes of Odisha (Orissa) can be classified into six types: hunting, collecting and gathering type, cattle-herder type, simple artisan type, hill and shifting cultivation type, settled agriculture type, and industrial urban worker type. Each type has a distinct style of life which can be best understood in the paradigm of nature, man and spirit complex, that is, on the basis of relationship with nature, fellow men and the supernatural. Vernacular buildings across the globe provide instructive examples of sustainable solutions to building problems. Yet, these solutions are assumed to be inapplicable to modern buildings. Despite some views to the contrary, there continues to be a tendency to consider innovative building technology as the hallmark of modern architecture because tradition is commonly viewed as the antonym of modernity (Mamun Rashida,<sup>1</sup> Dilshad Rahat Ara b,n. 2015).

**Research Methodology:** In this paper, the case study was conducted in order to illustrate sustainable features in existing eight buildings of tribal housing. The village Karmabahal consists of five hamlets and have houses which are more 100 years old and still in use. Specifically, this case study was carried out for finding out the available sustainable considerations such as compatibility of culture with respect to topographic and climatic conditions of the region. To do that the eight buildings was analysed in terms of individual floor plans, building form and orientation, construction materials and techniques, openings and shading in context to sustainability. The pictures were taken in this place in order to illustrate its features and form of the present.

**Karmabahal Village: A Tribal Settlement in Province of Odisha:** The Adivasi (aborigine), Vanabasi (forest dweller) and Girijana (mountain dweller) constitute 22.13% population of Orissa. The project is conducted in the Sundergarh district of Odisha state. Sundergarh, one of the 30 districts of Odisha, located in the northern extremity of Orissa, lies between 21°32' and 22° 32' north latitudes and 83° 32' and 85° 22' east longitudes. Total Geographical area of Sundergarh district is 9, 71,200 Hector. The population of the district is 2,080,664 and of this population, tribal constitute around 51% (Census of India, 2011). Sundergarh District is recognized as Industrial District in the map of Odisha. Still then more than 60% of the people earn their livelihood from agriculture & allied sector. Sundergarh District is coming under North Western Plateau Zone as per the Agro climatic zone of Odisha. Climate is hot & moist sub humid.



Figure 1. Map of India



Figure 2. Map of Odisha



Figure 3. Map showing Sundergarh District of Odisha



Figure 4. Location of Karmabahal village (Edited by Google Maps, 2014)



Figure 5. Five clusters of Karmabahal (Edited by Google Maps, 2014)

The settlement of this particular village is basically divided in small compact clusters in accordance to the language they speak. A major portion of the tribal habitat is hilly and forested. Tribal villages are generally found in areas away from the alluvial plains close to rivers. Most villages are uniethnic in composition, and smaller in size. Villages are often riot planned at all. Karmabahal is a small vernacular settlement and consists of five cluster of Sundargarh district. There are hills on the southern side. The climate, vegetation, parent rock, topography and other biotic factors have considerably influenced the genesis of soil. In this area red soil type is found. The village stands almost over a flat land.

**Culture and Architecture of Kisan, Oraon, Gond and Khanda Gauda Tribe:**

**Kisan (Kisan Para):** The settlement is somewhat compact having a linear, compact pattern. They are basically joint family and after the division of the

property the land is given to the individual family member but share the same, that does not have boundary wall. In some cases, it is found that as standard of living is changing people prefer to have individual house but sharing the land. "Kisan" mainly belongs to an agricultural community and cow, goat herding. They also gather, green leaves, fruits, mohua flowers and seeds mainly for their own use, kendu leaves for sale and have livestock's. Hunting and fishing have become pastimes. As regards household industries, women have knowledge of making mats and broomsticks from wild date palm leaves, while many men know brick-making and carpentry. But, in current scenario some villagers prefer to make and some do not prefer to make. Festivals and Rituals are Bihanbuna (Baisakh) - First sowing of seeds, Dusserha (Aswina) - Worshipping village deities, Nuakhai (Bhadrab) - Eating new rice.



Figure 6. Compact and Linear pattern



Figure 7. Ploughing of field



Figure 8. Making of broom

**Oraon (Oraon Para):** The Oraon are described as an agricultural society. They are basically joint family and after the division of the property, the land is given to the individual family member but share the same, that does not have boundary wall. Tradition on agricultural work is less surrounded by the Oraons, while the involvement working in mining, quarrying,

and the Bisu sikar (Baisakh) Ceremonial annual hunting, Fagu (Phalguna Naega) offers sacrifice before village deities Karama (Bhadrab) Ritual before village shrine, Sarhul Chaitra Ritual for using Sal flowers. They basically follow the Hinduism. At current scenario most of the villagers of "Oraon Para" are converted Christian.



Figure 9. Compact and Linear pattern



Figure 10. Worshipping to trees



Figure 11. Ceremonial annual hunting

**Gond (Gond Para):** The name Gond is extracted from the Telugu word 'Konda' which means hill. The Gonds, a warrior caste and conquerors of yesteryears, are spread out all over the hill tracts of central and south India. Before the Gond sow a field, some grain, fowls and pigs are sacrificed to the presiding deity. Blood from the sacrificed animals is sprinkled on the seeds which are distributed among the villagers, who

in turn sow them in their fields for luck. Agriculture, collecting minor forest produce, forging metal goods in cottage industries, fishing, hunting, and other primary sector activities are the main activities of Gonds. This cultural factors leads to an evolution of built form. Ratha Jatra and Nuakhai is the main festive.

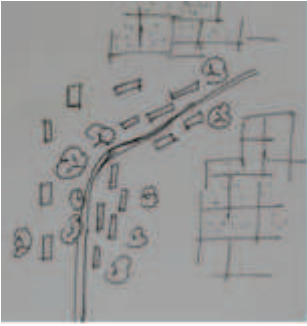


Figure 12. Compact and Linear Pattern



Figure 13. Hunting



Figure 14. Blood Sprinkled on the seed

**Khanda Gauda (Gontia Para):** The term Khanda Gauda has been derived from the words “Kond” meaning hill and Gauda meaning the village headman. Their family is nuclear. The dead are either cremated or buried and death pollution is observed for eleven days. They have their own traditional community council known as Samaj to deal with their customary norms and traditions. The language they speak is Kui (Dravidian) and Oriya (Indo-Aryan). Major Occupation is cow-herding, cultivation and agriculture. Festivals and rituals they celebrate are Gotha Puja, Raja, Kumar Purnima, Ratha Jatra, and Gamha Dola. They basically follow the Hinduism with admixture of Animism.



Figure 15. Compact and Linear Pattern



Figure 16. Cow-herding



Figure 17 Cultivation

**Analysis of Built Form of Four Communities:** The built form of this four are found to be a vernacular character with its unique architectural pattern. The study examines the vernacular features that are found in the eight houses with respect to the climate, building form that is (floor plans) and orientation, construction materials, opening and shading. Karmabahal has a tropical climate and receives high rainfall during Southwest monsoon (June – September) and retreating Northeast monsoon (December – January). Average annual rainfall ranges between 160 and 200 cm. The minimum and maximum temperatures are in the range of 7 C to 47 C with a mean minimum and maximum temperature range of 9.8 C to 39.2 C during coldest and hottest months. Thirty six percent of the geographical area of the district has semi-evergreen or tropical dry deciduous forest.

**Housing Typologies:** The houses selected for Kisan and Gond community is three in number, for Oraon and Khanda Gauda is one in number. The houses are built upon almost on flat land.

**Housing Typology of Kisan Community:**

Type-1



Figure 18. Plan



Figure 19. North Elevation



Figure 20. View from Entrance

Type-2



Figure 21. Plan



Figure 22. West Elevation



Figure 23. View from Entrance

Type-3



Figure 24. Plan



Figure 25. Section



Figure 26. View from Courtyard

Housing Typology of Oraon Community:

Type-4

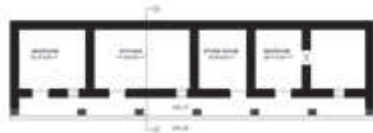


Figure 27. Plan



Figure 28. Section



Figure 29. Front view

Housing Typology of Gond Community:

Type-5



Figure 30. Plan

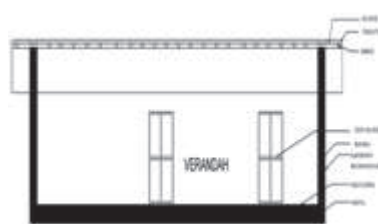


Figure 31. Section



Figure 32: North Elevation

Type-6

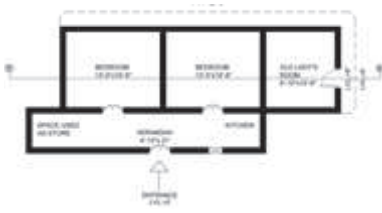


Figure 33. Plan



Figure 34. Section



Figure 35. East elevation

Type-7



Figure 36. Plan



Figure 37. View from Courtyard



Figure 38. West elevation

Housing Typology of Khanda Gauda Community:

Type- 8



Figure 32. Plan  
(Source: Author)



Figure 33. View from inside



Figure 34. South elevation

Table 1. Parameters of Culture and Architecture

| Parameter | Details             | Vernacular Architecture                                                                                                            |
|-----------|---------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Culture   | Characteristics     | Different cultures of tribal's are well defined.                                                                                   |
|           | Planning            | Settlement planning is per their lifestyle i.e. linear and compact pattern                                                         |
|           | Community living    | Chowk, courtyard for social interaction. Strong social binding.                                                                    |
|           | Aesthetics          | Paintings are integral part of architecture.                                                                                       |
|           | Livelihood          | Agriculture, goat & cow-herding, hunting, fishing, collecting minor forest produce and daily wages.                                |
|           | Site planning       | Planning as done as per topography and landscape.                                                                                  |
|           | Response to climate | Built form is evolved as per the climatic conditions of the region. All Plan form is in rectangular form.                          |
|           | Materials           | Locally available material like stone, mud, bamboo, hand-made fire baked terracotta tiles and bricks, rice husk and lime are used. |
|           | Laterite Stone      | Consumed from the hill. It is used in random rubble masonry for compound wall, foundation, and flooring.                           |

|              |                       |                                                                                                                                                    |
|--------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Architecture | Mud                   | Mud mortar used in random rubble masonry and brick wall, helps in acoustics and heat resistant.                                                    |
|              | Brick and Terracotta  | Brick is used for masonry walls, piers, Jaalis, etc. Terracotta is used in roofing tiles, roof gutters.                                            |
|              | Bamboo                | For its strength and flexibility widely used as structural skeleton, roofing structure, composite construction and utility items like baskets etc. |
|              | Sal wood              | Used as a structural component, in the construction of beams, rafter, trusses, doors, windows and furniture.                                       |
|              | Lime, coal & cow dung | Used as binding material, for plastering and fresco painting.                                                                                      |
|              | New materials         | Adapts new materials                                                                                                                               |
|              | Cost-effective        | Reduces labour cost and transportation cost.                                                                                                       |

Source: Author

Culture plays an important role in architecture which leads to the formation of a unique built form. As Karmabahal village, has a compact settlements with close-knit and lineage based communities is located near the forest and hill. The culture of the four communities is well defined. The settlement plan is determined by their lifestyle that is linear and compact. As per the socio-cultural part each cluster consists of chowks to interact with each other in the evening time after coming from field. In this paper, the livelihood of the four tribal communities is predominantly observed. Basically, the Kisan, Oraon, Gond (type7) community are traditional farmers and overall the four communities are food gathering people that is collecting the minor forest produce. Livestock's and agricultural land are the wealth of theirs and as they are settled tribes their houses are made up of comparatively durable and vernacular materials. The houses are built on high plinths and mostly have courtyard at the centre accompanied by verandas connecting to the sleeping room, kitchen, and store. The store room is large so as to keep the

paddy. "Puddug"- local name which is a container made of the rice straw. The rice straw is made into a thick of 10-15cm diameter rope and in circular form it is vertically spiralled and container is made. In this the paddy is kept and is protected. Locally available materials are used such as mud, laterite stone, lime, sal wood and bamboo are consumed from the hillock and forest present. Coal & cow dung are also found locally. 20years ago, these communities used to make brick and terracotta tiles for themselves not for an economy. Fire baked bricks, is used for masonry walls, piers, Jaalis, etc. Fire baked terracotta tiles are used in roofing tiles, roof gutters, rice husk and lime are used as binding material, for plastering and fresco painting. Coal & cow dung mix and lime plaster is used as paint to create an aesthetic appearance of the building which is found only in Kisan, Oraon, Gond (type-5, 6) and Gond (type-7), Khanda Gauda respectively. The materials used, are locally available hence reduces the cost of transportation and labour cost as construction is done by local people only.

**Findings and Discussion:**

**Table 2.** Parameters of spaces and sustainable concepts in built form

| Parameters       | Kisan |     |     | Oraon | Gond |     |     | Khanda Gauda |
|------------------|-------|-----|-----|-------|------|-----|-----|--------------|
|                  | Type  |     |     | Type  | Type |     |     | Type         |
|                  | 1     | 2   | 3   | 4     | 5    | 6   | 7   | 8            |
| Family structure | JF    | JF  | JF  | NF    | NF   | NF  | JF  | NF           |
| Spaces           |       |     |     |       |      |     |     |              |
| Living area      | Yes   | Yes | Yes | Yes   | No   | No  | No  | Yes          |
| Sleeping area    | Yes   | Yes | Yes | Yes   | Yes  | Yes | Yes | Yes          |
| Kitchen          | Yes   | Yes | Yes | Yes   | Yes  | Yes | Yes | Yes          |
| Store room       | Yes   | Yes | Yes | Yes   | No   | Yes | Yes | Yes          |
| Puja area        | No    | Yes | Yes | No    | Yes  | No  | No  | No           |
| Service area     | Yes   | Yes | Yes | Yes   | Yes  | Yes | Yes | Yes          |
| Toilets          | No    | No  | No  | Yes   | No   | No  | No  | No           |

|                                                |       |      |       |         |      |      |      |      |
|------------------------------------------------|-------|------|-------|---------|------|------|------|------|
| Open space for paddy harvest-ing activities    | Yes   | Yes  | Yes   | Yes     | No   | No   | Yes  | Yes  |
| Living space for livestock's (Type A)          | Yes   | Yes  | Yes   | No      | No   | No   | Yes  | Yes  |
| Living space for livestock's (Type B)          | No    | No   | No    | No      | Yes  | No   | No   | No   |
| <b>Sustainable concepts in the built forms</b> |       |      |       |         |      |      |      |      |
| Orientation                                    | -     | -    | -     | -       | -    | -    | -    | -    |
| Double roof                                    | No    | No   | No    | No      | No   | No   | No   | No   |
| Courtyard                                      | Yes   | Yes  | Yes   | No      | No   | No   | Yes  | No   |
| Verandas                                       | Yes   | Yes  | Yes   | Yes     | Yes  | Yes  | Yes  | Yes  |
| Windows                                        | Yes   | Yes  | Yes   | Yes     | No   | No   | No   | No   |
| Jaalis/vents                                   | Yes   | Yes  | Yes   | No      | Yes  | Yes  | Yes  | Yes  |
| Natural ventilation                            | Yes   | Yes  | Yes   | Yes     | Yes  | Yes  | Yes  | Yes  |
| Local materials                                | Yes   | Yes  | Yes   | Yes     | Yes  | Yes  | Yes  | Yes  |
| Drinking water                                 | Yes   | Yes  | Yes   | Yes     | Yes  | Yes  | Yes  | Yes  |
| Sanitation system                              | No    | No   | No    | No      | No   | No   | No   | No   |
| Longevity                                      | 35    | 120  | 100   | 100-110 | 30   | 150  | 105  | 50   |
| Maintenance (yearly)                           | Twice | Once | Twice | Once    | Once | Once | Once | Once |

Source: Author

Talking about sustainability, does it only refer to vernacular materials used in the built form to keep it sustained, for a longer period time? So, in this paper, this section deals with the documentation, which consists of the parameter of spaces and sustainable concepts in each housing typologies. Talking about the parameters, first thing comes to mind that, the number of occupants in each house is. From table-2, family structure of type-1, 2, 3 and 7 are joint families and type 4, 5 and 6 are nuclear families. Living areas are found only in those which are joint families to interact with families and with outsiders too. Sleeping area, kitchen, store rooms and service area are all the necessities of human life hence abide in all the housing typologies. As, male go to work early in the morning and then woman goes to work after sometime and they cook in the place provided along the veranda at one end because of the natural light enters through the vent and Jaalis. There is no need of artificial light. Puja areas are not found in type-1, 6, 7 and 8, Puja areas found in type-2, 3 and 5 is located at the courtyard. They have festive namely Bihanbuna (Baisakh) - First sowing of seeds, Dusserha (Aswina) - Worshipping village deities, Nuakhai (Bhadrab) - Eating new rice. Open space for paddy harvesting activities abides in the housing typology of Kisan, Oraon, Gond (type-7) and Khanda Gauda community as their main livelihood is agriculture and for housing typology Gond (type-5,6) as they are nuclear family and go for daily wages or work in small-scale

industries. Living space for livestock's (Type A) are found in housing typology Kisan Gond(type-7) and Khanda Gauda communities as previously mentioned livestock's are the wealth of the people so they treat as their own family members. Living space for livestock's (Type B) is found in Gond community (type-5) as they do cultivation and cow-herding. This shows, that how influence of culture leads to the formation of spaces in built forms. Now coming to the parameters of sustainable concepts none of the housing typologies follow the double roof structure. All are single storey building with slopping roof as it rains heavily during the month of (June-September). The village falls under the tropical climate experiences extreme hot in the month of April, May, June and extreme cold in the month of November, December and January and rains in the month of July, August and September. The courtyard abides in house typology of Kisan, Gond (type-7) as they joint family and it also acts as social-interaction space when rituals happen and are nuclear family. Verandas are found in all typologies and acts as buffer zones to obstruct heat from entering into the house and hence keeping the privacy of the occupants from the outside space. As summers are very hot, the hot air named "loo"- heat stroke, present makes the outside temperature harsh, so only housing typology of Kisan, and Oraon community have windows of size 2'x2', rest don't have. Natural ventilation is prominent in all houses through the Jaalis/vents. The provision of



drinking water has been provided by government to each cluster that is hand-pump. No sanitation system is observed in the village. Hence, from the above discussion the courtyards, verandas windows, Jaalis/vents, natural ventilation, use of local materials drinking water maintenance of the building and longevity almost leads to sustainable living in respect to of the occupants.

**Conclusions;** All the housing typology of the four communities somewhat leads to a sustainable living in respect to the parameters of the sustainable concepts but when we talk about the comfort level, are the occupants really comfortable in their own house? When having conversation with the occupants of the mentioned communities, they had complaint regarding the comfort level all over the year. During summer it's hot, unbearable and uncomfortable, in rainy days there is seepage of water from the roof and in winters its extremely cold but they manage with quills and sit in front of the bonfire

to keep themselves warm. October, November and March are the comfortable months for the occupants. This research paper concludes by learning and appreciating the principles of vernacular architecture with respect to the culture and finding out the difficulties of the occupants residing in the village and can be integrating in today's contemporary knowledge and technology with a better scope, but by studying the context where it can be applied hence making the indoor environment comfortable without hampering the culture of the place.

**Glossary:** Type 'A'- Space for livestock's is attached with the main living area of the house i.e. having wall on four sides with an opening on one side.

Type 'B'- Space for livestock's is detached from the main living area of the house i.e. semi open with thatched roof to provide shelter.

JF- Joint family

NF- Nuclear family

#### References:

1. Manoj Kumar Singh , Sadhan Mahapatra , S.K. Atreya, 'Thermal performance study and evaluation of comfort temperatures in vernacular buildings of North-East India', Building and Environment, vol. 45 (2010), pp 320-329
2. [http://odishaadivsimela.com/tribal\\_orissa.htm](http://odishaadivsimela.com/tribal_orissa.htm)
3. [http://www.orissadiary.com/orissa\\_profile/tribal/Gonds%20.asp](http://www.orissadiary.com/orissa_profile/tribal/Gonds%20.asp)
4. Culture Influence on Architecture, n.d., viewed 27 september 2015, [http://www.academia.edu/2064832/culture\\_and\\_architecture\\_form](http://www.academia.edu/2064832/culture_and_architecture_form).
5. A.Senthilrajan, Pest Control In Paddy Using Segmentation In Image Processing.; Engineering Sciences international Research Journal : ISSN 2320-4338 Volume 3 Issue 2 (2015), Pg 82-85
6. Behura, N. K. (2004). Tribes of Orissa. Bhubaneswar: Schedule Castes and Scheduled Tribes Research and Training Institute.
7. Mamun Rashida,1, Dilshad Rahat Ara b,n. (2015), Modernity in tradition: Reflections on building design and technology in the Asian vernacular, Frontiers of Architectural Research vol.4, pp. 46-55.
8. Letiecq & Bailey, 2004; Caldwell et al., 2005; Willging et al., 2006. Journal of Multi Disciplinary Evaluation, Volume 4, Number 8 October 2007 pp. 48.
9. Rns Murthy, Allu Revathi Devi, Review On The Maintenance Of The Built Forms From The Seepage Of Water.; Engineering Sciences international Research Journal : ISSN 2320-4338 Volume 3 Issue 2 (2015), Pg 86-88
10. Dayal, H, Noamani , F, Bagchi, D, Godsora, J, 2014, State of the Adivasis in Odisha, SAGE Publications India Pvt Ltd, New Delhi.
11. Ekka Nancy, 2013 'Impact of Modernisation on Tribal Religious Customs and Traditions: A case study of Rourkela'. National Institute of Technology, Rourkela.

\*\*\*

Ambalika Ekka/ Student (M.Arch-Sustainable Architecture)/  
School of Planning and Architecture/ Vijayawada/ AP/ India/  
Srinivas Daketi/ B.Arch/ M.Planning (Housing)/ Assistant Professor/  
Department of Architecture/ School of Planning and Architecture/ Vijayawada/ AP/ India/