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THE APATANI'S TRADITIONAL PRACTICES: A MODEL FOR SUSTAINABILITY

Meghana M, Pooja M Naik and Theju V Gowda
Assistant Professors
Department of Architecture, M S Ramaiah Institute of Technology
Bangalore, Karnataka, India

Abstract: The traditional knowledge systems followed by the indigenous people is vaguely highlighted in comparison with the current modern system. Regardless of new changes and inventions, the North-East Indian Apatani tribe continue to pursue their primitive lifestyle. The Apatani clan is one of the most progressive tribes in India. The land-use pattern, rice plus fish integrated farming technique, and natural resources management system, adopted by the Apatanis, is highly environmentally sustainable and economically efficient. Since their indigenous knowledge and ecological management practices, has been identified by UNESCO, it has been placed on UNESCO's Tentative List for World Heritage Sites. Not having been influenced by modernization, the efficient agricultural and traditional ecological conservation practices, holds a high value in the modern world. This paper explores the Apatani's sustainable traditional approach, towards land-use pattern and natural resources management, which serve as a base for sustainability practices in today's context.

Keywords: Apatani, Traditional Knowledge System, Rice Cum Fish Cultivation**,** Land Management, Resources Management, Conservation, Sustainability.

Introduction

The traditional agricultural practices and unique land-use management system by indigenous people, displays the harmonious relationship between humans and the surrounding natural environment (Koohafkan, and Boerma 2005, p. 80; Ghosh 2013). It has evolved under the various restrictions pertaining to the site, and in a way such that it adapts to the existing local conditions of the particular geographic area (Koohafkan, and Boerma 2005, p. 80). The traditional knowledge and skills of sustainable land-use practices, which has been passed on from generation to generation, requires the attention to be preserved and further developed (Koohafkan, and Boerma 2005, p. 80-83; Ghosh 2013).

In a modernized world of today, such agricultural systems are prone to certain challenges and threats like- globalisation, environmental issues, technological development and lack of support (Koohafkan, and Boerma 2005, pp. 80-84). Despite such advancements and problems, there still exists a small tribe in India- 'The Apatanis', who have been able to beat the contemporary changes and continue to pursue their original way of living (Gupta 2014a; Ghosh 2013; Menon 2012). The Apatani's are known for the traditional way of wet rice cultivation followed by pisciculture (breeding fish), through efficient natural resources management, which has proven to be extremely sustainable (Gupta 2014a; Ghosh 2013). One of the most distinguishing facts about this tribe is that, their customs, practices and traditions are not influenced by modernization (Menon 2012). The farming techniques require no animals or machines or any other modern tools to be carried out (Ghosh 2013; Menon 2012).

Due to its highly efficient method of agricultural practice and innovative way of conserving the ecology, the site has been placed on the Tentative List of UNESCO World Heritage Sites (UNESCO 2014; Gupta 2014b; Bhattacharya 2005).

Therefore, the statement for study, chosen in this paper is-

'The Apatani's Traditional Practices: A Model for Sustainability'

The following paper reveals more in-depth information on the efficient practices and traditional knowledge systems adopted by the Apatani community. Such an example, contrasts with the new modern system, and acts as a source of inspiration for environmentally sustainable practices.

Objectives of the Study

- To study the unique land use pattern, organic farming techniques, efficient natural resources management and economic sustainability accomplished by the Apatani's, which serve as a model for sustainability in the modernized world.
- To study the how the social and ecological significance favours in preserving and managing the ecosystem.
- To study how the Apatani's agricultural practices is not influenced by modern technology and continues to persist in the original way, even in the 21st century.

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Geographic Location and Description of the Site

The Apatani tribe reside in the Ziro Valley, which lies in the Lower Subansiri district of Arunachal Pradesh, in India (Gupta 2014a). The Ziro valley is part of the Eastern Himalayan lower range and is located in the north-eastern part of the country (UNESCO 2014). The area consists of 32 km^2 of agricultural land, 1058 km^2 plateaued area and is surrounded by mountain ranges which are approximately around 1500m above the mean sea level (UNESCO 2014; Lower Subansiri District n.d.). The Ziro Valley area is inhabited by roughly around 50,000 Apatani tribal people (Lower Subansiri District n.d.).

The surrounding region comprises of rolling hills, lush green forests while the flat lands are covered with paddy fields, bamboo plantations and millet plots, which is composed of brown and red hill soil (Gupta 2014a; Blackburn 2008, p.1; Inventory and Documentation of Tribal GIAHS in India n.d., p.15). In the midst of these valleys, a small river named Kele, flows, which fulfil the irrigation needs required for cultivation purposes (Reena and Nani 2014, p.1; Tangjang and Nair 2015, p. 547). The forest comprise of a wide diversity of valuable trees and plant species, bamboo and is the home to a variety of animal species like- tigers, panthers, boars, leopard, antelopes, cats, bear etc. (Lower Subansiri District n.d.).

The climatic condition is determined by the natural terrain of the Lower Subansiri region (Lower Subansiri District n.d.). Winters are cold, summers are warm and the annual average rainfall is around 2000mm (Inventory and Documentation of Tribal GIAHS in India n.d., p.15). The temperature ranges from 12-25 degrees in summer and -5-12 degrees in winter (Tangjang and Nair 2015, p. 547). The relative humidity is mostly high except it reduces to a certain extent during winter months (Lower Subansiri District n.d.). The winds are either strong or light, depending on the topography of the region- hillocks and flat land area (Lower Subansiri District n.d.).

The Apatani Tribe

The Apatani tribe is one of the most important ethnic tribes in north-east India and also one of the very few indigenous communities who still worship nature- the Sun and the Moon (UNESCO 2014; Gupta 2014b). Originally, they belong to the Tibeto Mongloid group (Reena and Nani 2014, p.1). They are perceived as one of the most dynamic tribes in India by many anthropologists (Menon 2012). They reside in compact villages, within the narrow valley, and mainly engage in cultivating wet rice and rarely practise hunting (Blackburn 2008, p.1, 32). The Apatanis also exhibit kinship and friendliness within the community and communicate with each other in their own traditional language-Apatani, which does not possess any script (Lower Subansiri District n.d.; Blackburn 2008, p. 13).

A variety of festivals and unusual rituals like animal sacrifice, are performed and celebrated throughout the year (Gupta 2014b; Menon 2012). The importance of celebrating these festivals is a hope to have a better cultivation and its protection from bad weather and animals, and also for the well-being of the general community (Lower Subansiri District n.d.). An unusual peculiarity about the Apatani's is the nose plug and facial tattoos on women, which has now faded away amongst the younger generation (Gupta 2014a). The main occupation of the Apatani's is agriculture- rice cultivation, which is a good example of an oral tradition (Lower Subansiri District n.d.; Blackburn 2008, p.8). Additionally, they also involve in pastoral activities like animal rearing, and some women engage in handicrafts like basket weaving (Lower Subansiri District n.d.).

Apatani area as a Cultural Landscape

The concept of Cultural Landscape is understood as "combined works of nature and of man" as mentioned in UNESCO's "Operational Guideline for the Implementation of the World Heritage Convention- 2008" (UNESCO 2008, p.85). The definition as per UNESCO's 'Operational Guideline for the Implementation of the World Heritage Convention- 2008', of an organically evolved cultural landscape and continuing landscape is stated below-

"Organically Evolved Landscape

Results from an initial social, economic, administrative, and/or religious imperative and has developed its present form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component features." (UNESCO 2008, p.86)

"**Continuing Landscape**

A continuing landscape is one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time." (UNESCO 2008, p.86)

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The Apatanis exhibit a well-developed valley cultivation system and display a unique land-use management with the combination of rice + fish on the same plot (Tangjang and Nair 2015, p. 548). The systematic and efficient agricultural techniques and ecological conservation, has developed in an informal way, over centuries of time (UNESCO 2014). The harmonious interdependence between man and nature combined with a social system, peculiar lifestyle, spiritual beliefs and other customs, defines the Apatani as a perfect example of a "Living Cultural Landscape." (Tangjang and Nair 2015, p. 548; UNESCO 2014).

Apatani Cultural Landscape on UNESCO's Tentative List

In the year 2005, UNESCO wanted to have the Apatani area inscribed on the World Heritage List, for its "'extremely high productivity' and 'unique' way of preserving the ecology" (Bhattacharya 2005) and with the intention of spreading the idea of such a practice (Bhattacharya 2005). UNESCO was impressed by unique farming techniques and ecology conservation measures adopted by the Apatani community (Bhattacharya 2005).

It was observed that Apatani's energy efficient method of rice cultivation was far more advanced when compared to the systems found in the U.S. and in Japan (Bhattacharya 2005). The energy efficiency is understood through the ratio of the labour input to the whole output (Bhattacharya 2005). While the ratio obtained for Japan and U.S. was 1.01, it was 1.70 in the Apatani area (Bhattacharya 2005)

The respective Criteria defining the Outstanding Universal Value of the Apatani site, as per the submission by the State Party is stated below- (UNESCO 2014)

"Criterion (iii): Ziro Valley bears exceptional testimony to the cultural traditions of the Apatani tribe that is responsible for maintaining the landscape more or less in the same state for centuries together. It is largely the strong traditional institutions, cultural practices and spiritual beliefs that have guided the Apatanis in their characteristic wet rice cultivation and management of other natural resources." (UNESCO 2014)

"Criterion (v): The settlement pattern of the Apatanis in the Ziro Valley is an outstanding example of a traditional human settlement in an upland area and of the fact that man's incessant struggle for survival makes it possible to make even most adverse environment habitable. The way the Apatanis have brought Ziro Valley to the present status is representative of their culture and belief systems that have been the guiding principle of all their activities. These systems themselves are examples of how they evolve out of interaction between man and environment. With globalization, ideological onslaught from outside the area, and subsequent changing values in the society, these systems are under serious threat. Though they have demonstrated its ability to adapt to the changing world, subtle changes are taking place, which has the potential to disrupt the very fabric of the system unless appropriate actions are taken in time." (UNESCO 2014).

The Apatani's traditional knowledge systems for ecological conservation, sustainable natural resource management, irrigation development, innovative land use pattern, sustainable agricultural practices, displays a perfect example of the interaction between man and nature, and possesses an important significance and value in today's era (UNESCO 2014). As an example of a living cultural landscape, the integrity and authenticity is defined through the intactness of the primitive traditions, rituals, practices, customs which still continues among the people, and by the continuity of indigenous sustainable cultivation methods despite the invention of modern technology (Ghosh 2013; Menon 2012; UNESCO 2014).

Sustainability Aspects and Practices

I.Rice and Fish Farming Technique

The wet rice cultivation was developed centuries ago by the Apotani- the ancestors of the Apatani clan (Rai 2005, p.65). The fertile flat valley land found in the Apatani plateau enabled them to utilize it for agricultural purposes (Reena and Nani 2014, p.2; Inventory and Documentation of Tribal GIAHS in India n.d., p. 14, 15). It is considered as one of the most highly developed systems in vernacular farming practises (Rai 2005, p.65). The concept of pisciculture- fish culture in paddy fields was initiated by the local government in 1965 (Menon 2012).

The system practiced here is known as Aji, which is rice cultivation combined with fish breeding in the same place and with millet scattered on the bunds (Rai 2005, p.66). Bunds are held by bamboo or wooden pieces in order to prevent the water from flowing out and retain the rich soil (Tangjang and Nair 2015, p. 549). These are installed on the site manually by the farmers without using advanced tools (Tangjang and Nair 2015, p. 549). A small trench of about 50cm in depth is created on the paddy land, in which fishes

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and water is placed (Tangjang and Nair 2015, p. 552). Screens made out of bamboo are placed to prevent the fishes from escaping (Inventory and Documentation of Tribal GIAHS in India n.d., p.16). During the monsoons, when the water level rises up, fishes move out of the pits and swim across the entire surface area and during the non-rainy season, they remain inside the pit (Rai 2005, p.66). This way, the paddy field and the fish benefit from each other in terms of nutrient supply and manure (Rai 2005, p.66; Tangjang and Nair 2015, p. 552,553).

The benefit of adding fish to the paddy field is that it favours the increase in oxygen level, soil nutrients, prevents soil degradation and keeps away other aquatic insects, thus enhancing and retaining the nutrients and energy needed for the rice (Tangjang and Nair 2015, p. 552). Additionally, the waste produced by fish acts as manure for the growth of rice seeds (Tangjang and Nair 2015, p. 553). This also indicates the mutual dependence and biotic interaction between rice and fish (Tangjang and Nair 2015, p. 554). Fish controls the harmful insects in the plot and has the advantage of taking shelter on the rice field and simultaneously, rice gets the necessary nutrients and provides adequate shade and suitable temperature for the fishes to survive (Tangjang and Nair 2015, p. 553,554).

Fertilizers like animal waste, burnt ashes, plants husks and burnt straws are used, which are completely organic in nature (Reena and Nani 2014, p.1). Therefore, the Apatani's agricultural system is seen as highly ecologically sustainable and economically self-sufficient (Rai 2005, p.70). It is also studied that they do not perform the slash and burn agricultural method, unlike most other places (Blackburn 2008, p.9). The traditional ecological system of farming is purely based in response to the natural environmental conditions and the local cultural context (Dollo et al. 2009, p.47).

II.Ecological Sustainability

The Apatani agricultural system requires nutrient wash-out from the hill slopes, which helps in retaining the soil fertility (Rai 2005, p.66). It is noticed that the granaries are located at a higher level, so that unwanted crop residue and waste gets drained out towards the field, which further benefits the soil fertility (Rai 2005, p.66). Other organic waste from villages are also utilised to sustain the soil fertility (Rai 2005, p.66). The fertility of soil is maintained by using recycled waste of rice, husk, straw, cattle etc. (Tangjang and Nair 2015, p. 554). Also, the streams which flow through the region already carry degraded organic nutrients which benefit the soil in terms of fertility (Tangjang and Nair 2015, p. 554). The terrace plot is levelled evenly using bunds made up of soil and supported by bamboo or wooden chips with a good irrigation system which minimizes the chances of soil erosion (Rai 2005, p.70). This depicts the organic way of land management which is devoid of any chemical fertilizers (Tangjang and Nair 2015, p. 554).

III.Irrigation Development

An efficient and complex water management system is structured for irrigating the paddy cum fish fields (Tangjang and Nair 2015, p. 549). The nutrient rich streams emerging out from the valley are tapered into a channel which divert into smaller channels and further branched out as feeder channels entering the paddy terraces (Rai 2005, p.70; Rainwaterharvsting n.d.). These channels comprise of pipes made out of bamboo or pine wood (Tangjang and Nair 2015, p. 549). The plot consists of an inlet and outlet point and due to the slope variation; the outlet point of the higher plot becomes the inlet point for the next immediate lower plot (Rainwaterharvsting n.d.). The feeder channels are connected through these outlets and therefore enable the flooding and draining of the land as and when needed (Rainwaterharvsting n.d.). A height of 10cm water level is maintained on the plot by controlling the bamboo outlet pipe (Rai 2005, p.70). Excess water is allowed to flow into the Kele River (Rai 2005, p.70). Such a system ensures the conservation of groundwater (Inventory and Documentation of Tribal GIAHS in India n.d., p.16). It serves as a multi-purpose system which irrigates the land, prevents soil erosion, conserves ground water and promotes fish culture (Nimachow et al. 2010).

IV.Sustainable Natural Resource Management

The traditional systems of rice cum fish farming, forest management, bamboo and pine plantation and conservation, and lastly, the efficient land and water management, depicts the sustainable natural resource management aspect (Tangjang and Nair 2015, p. 548). So, apart from the paddy cum fish cultivation, the Apatanis are known for successful resource management and conservation of nature (Dollo et al. 2009, p.43). Since the villages are situated in the centre of the forest hills, it's easier for the locals to access all the different land-use types and manage it efficiently (Dollo et al. 2009, p.44, 45). The land is divided as per its ecological significance into- forests, agricultural fields, bamboo grasslands and sacred groves (Dollo et al. 2009, p.44, 45).

The rural forestry practice helps in protecting the biodiversity and certain other socially and ecologically important species of plants and trees (Dollo et al. 2009, p.46). The forests are conserved and managed using the traditional measures and optimal use of resources is ensured (Dollo et al. 2009, p.46). The Apatanis mainly count on the plantations rather than the forest for their needs

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(Dollo et al. 2009, p.43). Bamboo forests and mixed vegetation of bamboo, pine and Nepalese alder are protected and managed by the Apatanis (Barua and Slowik 2015).

Some forests are also in the form of sacred groves, which are preserved and protected by the local community due to their social and religious beliefs (Murtem and Chaudhry 2014, p. 1). The sacred groves managed by the Apatani are called Lyago and consists of an underground water reservoir- Shukungh, used for drinking purposes (Murtem and Chaudhry 2014, p. 2). Cutting or using any of the plants or trees in the scared grove, is strictly forbidden and is considered as a bad sign if they still do so (Murtem and Chaudhry 2014, p. 2). Such a social belief and practice ensures the protection of natural resources (Murtem and Chaudhry 2014, p. 2).

It is also studied that the Apatanis do not follow shifting cultivation- Jhuming which prevents from creating a negative impact on the agricultural growth of the future (Dollo et al. 2009, p.43; Ali 2007, p.9). It enables the continuity of existence of the diverse species of trees and plants found in the region (Dollo et al. 2009, p.51).

V.Economic sustainability

The Apatani farming system is a good example of an economically self-sustaining society (Rai 2005, p.70). The double cropping system on the same plot without adding any additional supplement, benefits the community in terms of the economy (Reena and Nani 2014, p.4). Integrating fish culture along with production of rice, boosts the economic status of the community and provides additional income with minimal input charge (Reena and Nani 2014, p.2). The productivity of rice plus fish agro system is 3 to 4 times higher than that of the paddy produced in other regions of the state (Rai 2005, p.69). The energy efficiency is studied through the ratio of the input to the output (Rai 2005, p.69). It requires minimal input- labour, natural manure and seeds and the output received from the cultivation of rice + fish + millet is much higher (Rai 2005, p.69). It has been reported that introduction of fish in rice fields increases rice yields by about 8%-15% (Tangjang and Nair 2015, p. 550). The calculated average yields of rice and fish in the year 2015, was around 3,700 $kg \cdot ha^{-1}$ rice and about 550 $kg \cdot ha^{-1}$ fish (Tangjang and Nair 2015, p. 550).

VI.Not influenced by modernization

Highly influenced by evolution and technology, the current generation mainly comprises of the conventional means of resource management and adopts the modern approach for most agricultural practices (Ghosh 2013). This has led to misuse and abuse of natural resources (Ghosh 2013). But despite such progress taking place in the outside world, the Apatani continue to live in their traditional way and perform their agricultural practices in the original primitive form, without using chemical fertilizers and pesticides, offered by the modern system (Ghosh 2013; Tangjang and Nair 2015, p. 554).

The sustainable agricultural method used by the Apatani's, is not influenced by the use of machines, tractors, animals or other modern equipment (Ghosh 2013; Dollo et al. 2009, p.43). Agricultural job like sowing, tilling, ploughing and reaping is all performed manually (Gupta 2014a; Menon 2012). The Apatani's were offered, to grow a new variety of rice which would benefit them with higher yield by some agricultural specialists, but they refused to do, as this wouldn't taste as good as what they produced (Menon 2012). They have been successful in achieving the highest standards which even the modern systems have not been able to (Gupta 2014a; Bhattacharya 2005).

Literacy has spread across the Apatani population. Most youngsters and other people are educated and well-versed in English and Hindi (Blackburn 2008 p. 41; Menon 2012). Inspite of high literacy level prevailing amongst the community, people still continue with their agricultural practice and not deviate from it (Blackburn 2008, p. 42; Menon 2012). This displays as a good example for permitting the entry of new changes into the Apatani society and yet, not losing its core values (Menon 2012).

Suggestions and Conclusion

From the above study, it is undoubtedly clear that the Apatani's traditional agricultural and resource management practices are highly efficient and sustainable, which serves as a model for sustainability practices in today's era. Such an indigenous organic farming technique along with efficient management of natural resources has confirmed to be highly practical, environmentally friendly and economically sustainable (Tangjang and Nair 2015, p. 555). Such a traditional knowledge system can make a positive impact in other regions of the world (Dollo et al. 2009, p.51). Therefore, its value and potential has been identified by UNESCO, for it to be inscribed on the World Heritage List (Bhattacharya 2005; Ghosh 2013).

Having the site inscribed on UNESCO World Heritage List may eventually develop its own positive and negative impacts. Such an extraordinary example of an uncommon traditional farming and land-use techniques, will definitely gain more attention and recognition in the future. It will be safeguarded better and receive more support, nationally and internationally. On a global context, this would spread awareness and knowledge about the existence such a system even today, for others to learn from and practice

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(Bhattacharya 2005). Whereas on the other hand, considering the 'UNESCO World Heritage Site' tag in relation to tourism may result in a few changes in the long run. Hopefully, excessive tourism activities might not destroy the place which might result in the Apatanis changing their original profession or occupation and becoming more inclined towards tourism income. Also considering the fact that literacy rate has improved across the community, it has led the younger generation in losing interest in the agricultural practises, as their qualification pushes them towards the cities (Gupta 2014b). Therefore, it is a question on how far the younger generation will carry on with this tradition and pass it on to the next generation, for it to remain intact and to be preserved.

Lastly, as it is studied from above, that the Apatanis are not open to incorporating any new modern techniques or features for their cultivation purposes, there is probably some scope for improvement in this instance (Rai 2005, p.70). By integrating modern scientific approach with the traditional method may lead to even better and higher results, which could boost their economic condition (Ghosh 2013; Rai 2005, p.70). New changes may be allowed but such that the original values are retained.

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