

# Indigenous form of Paddy cultivation in Terrace and Jhum fields among the Nagas of Nagaland

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**Abstract-** Rice is considered as the staple food of the Nagas in Nagaland. The state has over 70 per cent of the total area under rice cultivation which contribute to about 75 per cent to the total food production in the state. Naga farmers had been practicing Jhum and terrace form of paddy cultivation. Jhum or slash and burn cultivation, is a form of cultivation carried out on the slopes of a hill. This is done by clearing a patch of land for cultivation and rice is planted intermixed with large number of other crops. Terrace form of paddy cultivation is confined to few areas particularly practised by The Angamis and the Chakesangs. This form of paddy cultivation is possible in areas with uninterrupted water supply. Zabo system of rice cultivation is popularly practised by the farmers of Kohima and Phek district in Nagaland. Zabo is a combination of paddy, livestock rearing and fish rearing based on the locally available resources. It has an efficient arrangement to conserve water in the catchment and to supply water to the rice field. The farmers of Kohima and Phek district also plant alder trees in the jhum plot. The underlying aim of planting alder trees is to regain the soil fertility in the degraded land. After the soil fertility is restored the patch of land is used for cultivation. The farming system as stated is an innovation of the people developed through experience, wisdom and skill. Recent studies show that they have sustainable base and are environmental friendly. Apparently due to lack of proper irrigation facilities agricultural cycle in Nagaland continue to follow monsoon rain. and the monsoon is not uniform throughout the year. In the wake of monsoon uncertainty achieving self sufficiency in the food production is challenging. Thus a blend of the local indigenous knowledge with the modern technology is emphasized.

**Index Terms-** Indigenous farming, Terrace cultivation, Jhum cultivation, Paddy, Soil degradation, Water Conservation.

## I. INTRODUCTION

The State of Nagaland falls between 25°60' and 27° 40' latitude north of the equator and between 93° 20' and 95° 15' longitude. The state is a hilly terrain and has a geographical area of 16,579 square kilometres. The state is within eastern Himalayan agro climatic zone. The state receives an average annual rainfall of 2000 mm to 2500 mm. It rains for seven months long period from April to October and the rest of the year do not receive much rainfall. The major precipitation occurs between July to September. Both perennial and non perennial streams, springs, and rivers are the source of water in the state.

The major junk of the population resides in the rural areas and depend on agriculture to meet the basic needs. Agriculture is

also the source of income to many people in the rural setting. Although people in the state also engages in other economic pursuit agriculture is the main economic activity. Apart from providing the food requirement and contributing to the economy agriculture is tied to the socio cultural life of the Nagas. Among the food grain paddy occupies a central place with cultural connotation. The festivals of the Nagas are celebration as pre harvest or post harvest of paddy. In Khezakenoma village in the Phek district of Nagaland a belief exist in the presence of a supernatural power in a particular slab of stone that on placing a paddy on it for drying multiplies the paddy. The Wanchos of Tirap district of Arunachal Pradesh protects the paddy and they believe that protection of paddy is essential to ensure security of other grains in the granary. Rice is also related to Goddesses. The Assamese Hindus believe that it is the goddess Lakhimi that brought rice to the earth. The Meities of Manipur regards Phoinobi as a rice goddess. The Adis Of Arunahal Pradesh believe in seeking favour from goddess Mopin . They believe that Goddess Mopin gave the seeds for cultivation and taught the method of sowing to their ancestor (Ngachan, Mohanty & Pattanayak, 2012)). In the context of Northeast India there is so much diversity in the manner rice is cultivated due to the differences in physical conditions such as soil and climate. The geographical terrain is not uniform in the region and consists of both the valley and the hill areas. The people have different ways of cultivating the paddy as per the convenience and the resources available to them.

Terrace and Jhum cultivation are the predominant form of cultivation in Nagaland. Jhum cultivation is the older form of cultivation as compared to the terrace form of cultivation. Terrace cultivation is a recent intervention and operating in few rural pockets in the state. Paddy cultivation in Nagaland is further categorised into wet terrace paddy cultivation, wet paddy cultivation and Jhum paddy cultivation. Wet paddy cultivation are confined in the valley areas of Dimapur district. The Wet terrace cultivation is prevalent in Kohima and Phek district while the Jhum paddy cultivation is practiced in most of the districts. Jhum cultivation involves clearing of plots by cutting and burning down of forests. This has resulted in deforestation and serious environmental problem. The soil fertility is compromised and water balance is disturbed owing to excess deforestation. Thus people are becoming increasingly concerned and are looking for alternative means of efficient cultivation. Terrace cultivation is receiving wide appreciation and people are beginning to embrace terrace cultivation. The lesson imparted on efficient farming by the farmers of Phek and Kohima district is the focus of the discussion in the paper. Thus this paper looks at the various practices developed and adopted in Paddy cultivation

in the hill areas of Nagaland over the years based on the experience and wisdom of the people.

## II. IMPORTANCE OF WATER IN INDIGENOUS FARMING

Agricultural sector is the largest consumer of water in the developing countries. Water supply to the crops is met through the exploitation of ground water reserve and the surface water. The growing demand for food due to overpopulation in the developing countries warrant to increase in food production through efficient water management. The amount of water required for crop production depend on the soil condition, the crop variety and other climate parameter such as temperature. In Nagaland Rice and Maize are the major crops and they also grow, millets, pulses, oilseeds, sugarcane, potato, and tobacco . The popular cash crops grown are tea, cardamom, jute, cotton, Potato and sugarcane. The vegetables grown are carrots, chillies, onions, spinach, cucumber, brinjal, tomatoes and mustard. In spite of the effort the state still rely on the food grains imported from other parts of the country. One of major factor is due to the inefficient farming practise such as Jhum cultivation. Jhum cultivation results in soil and water deterioration. Thus some of the farmers begin to develop interesting farming practise as an alternative to Jhum cultivation.

We shall have a look at some indigenous farming practise in northeast India with efficient water management. The Apatanis constitute one of the major tribe in Arunachal Pradesh. They have developed indigenous practise of paddy cultivation cum fish rearing . The Apatanis work manually with their hands and divert the Water arising from the natural streams through networks of channels to the paddy fields. A pit is dug in each of the terrace field and fingerlings are introduced into the pit. During monsoon when the water is abundant the fishes move out of the pit to the terrace. The fishes then return to the pit when water is lessened in the terrace during the non monsoon period. In course of their mobility they receive essential nutrients in the form of paddy manures. This practise is ecologically viable as the land under this farming is used for cultivation again and again. Thus the Apatanis fish cum paddy culture is a perfect exemplary of efficient water and soil management (Rai, 2005). The tribal farmers in Jaintia hills of Meghalaya practise bamboo drip Irrigation. In this system the locally available bamboo resource is employed and the water from the natural streams is diverted to the crops land with the help of bamboo culms. The water is allowed to flow down through gravity. This practise is neatly laid out in such a manner that the leakage and loss of water is prevented at all stages and the site remains productive. Area nut, Betel vines and black pepper are the crops irrigated under this system. Since water is carried in bamboo culms there is no need of clearing of forest for creating water channels. This practise greatly add to the environment (Jeeva, Laloo & Mishra, 2006) .

Rainfall is an important factor influencing the pattern of crops. The seasons in the state is classified into pre monsoon, monsoon and Post monsoon. Pre monsoon occurs between March to May and monsoon period is from June to September . Post monsoon period is between October to February. 60.73% of rainfall is received during monsoon. which falls to 12.17% in post monsoon (Kusre & Singh, 2012). Rainfall is required to replenish surface water or the aquifers. The naga farmers grow

their crops on the basis of the rain conditions. In fact the whole agricultural cycle in Nagaland is dependent on rainfall distribution. A good rainfall is also necessary for paddy cultivation. The cultivation of rice requires ploughing thoroughly and puddle with 3-5 cm of standing water in the field. The optimum depth of puddling is different for different types of soils. It is found to be around 10 cm in the clay and clay-loam types of soils. The purpose is to obtain a soft seedbed for the seedlings to establish themselves faster, to minimize the leaching losses of nutrients and thereby increase the availability of plant nutrients (Vermaagian, 2011). The total area in the state under irrigation is 61,152.39 hectares. Most of the villages are scattered and perched on the hilltop and the cultivators traditionally cultivate the hill slopes either by making terraces or Jhumming. Irrigation is provided only in terraced fields wherever the facilities exist to bring water from the sources by gravity system through M.I. Channels. Jhum paddy is dependent on natural rainwater and no effort has been made to store the rain water in the field. The food grain production in the state could be raised if the land under forest and Jhum land is brought under permanent (Government of Nagaland)

## III. PADDY CULTIVATION IN JHUM FIELDS

In Nagaland the major land use pattern is slash and burn cultivation or Jhum cultivation. In this form of cultivation the patch of land that is to be cultivated is cleared of forest. On completion of cultivation the land is left fallow for some years Once the nutrient is replenished in the fallowed land the cultivation is done again on the same plot. Shifting cultivation, provide a source of livelihood to many people in the rural setting. And the region remained unaffected with the advancement of agriculture made possible by use of modern technology. They normally do not use any chemicals to restore degraded soil. However some indigenous technique are practised in some parts of the state to enhance soil fertility. Most of the farming activities is carried out manually with the use of simple tools and implements. Apparently there is no proper arrangement of supplying water to the crops in the Jhum field and the fallow period is increasing with lack of efforts to enhance degraded soil.

The recent trend of increase in population lead to excessive demand for food. And the area under forest are continuously converted into crop land. As a result of soil degradation due to excessive cultivation the cropping period in Jhum land is reduced. In Nagaland area under Jhum is about 56.50 % and contribute 49.26 % to total rice production. Studies show that the productivity of paddy in wet Terrace cultivation is more than the Jhum cultivation. The lower productivity of paddy under jhum is attributable to non adoption of efficient rain water management, weeding, improper sowing, and lack of sound plant protection measures (Rathore, 2008). The practice of growing varieties of crops in Jhum land is not new to the people in this region. In Wokha district alone about 20 to 40 crops are grown on the same plot with paddy as the main crop. In Koio village under Chukitong block of Wokha district the farmers grow few cash crops on the same plot with cardamom as the main crop. The boundary demarcation is set by planting Tung (Aleurite Montana ). The farmers in the village also grow oil seed crop on the boundary. The passion fruit surrounds the main crop and it serves

as a fence to the crop. This practise is continuing for 20 years. This form of cultivation is done instead of shifting cultivation since Shifting cultivation is causing serious soil degradation. This form cultivation is helping the farmers in the village to improve their household income as well ( ICAR)

Owing to problem of soil degradation in Jhum land the farmers of Khonoma village of Phek district of Nagaland grow Alder trees in great numbers. The idea behind planting Alder tree is to restore the soil fertility and make the soil suitable for cultivation. The soil fertility is restored through the root nodules of Alder by fixing atmospheric nitrogen. Apart from this Alder trees also provide shed to plantation crops such as coffee and cardamom thereby enhances their yield. This practice is in vogue for the past 100 years in the village. In the Jhum land cultivation is possible for 2 years within a span of nine years. But on the restored land in Alder farming the farmer is able to cultivate twice in 4 to 5 years period. The Alder seeds are usually planted on the degraded land and the tree is allowed to grow undisturbed. Only when the Alder attains full growth then only it is pollarded. Having pollarded the leaves and twigs that remain are burnt which later on serves as manure to the soil. Pollarding is done once in every four to six years. During the process the bigger branches are cut off from the tree and are used up as fire wood while the root nodules restore the soil fertility and prevents soil erosion in slopes (Singh, 1992).

The other benefits could be found in the Alder foliage which is used as fodder for Mithun and other cattle. The region receive high amount of rainfall during monsoon and the rate of the surface run off is high. This washes away the top layer of the Soil causing soil erosion. The Alder based farming also check soil erosion. This deep root system provide stability to the soil that tend to slip and erode. It is particularly useful in landslide prone area since it helps to prevent landslides . Alder tree grow even in less fertile soil they they are planted in the degraded land. Inspite of the many benefit alder plantation offers Jhum cultivation still continue to be a predominant indigenous practice of farming in the state. Jhum cultivation is tied to the socio cultural ethos as mentioned and is not easy to erase from the lives of the people. Nevertheless Alder based farming holds great potential and this practise need to be given due recognition, validated and even expanded to the rest of the region for amelioration of Jhum lands (Rathore, et al, 2010).

#### IV. TERRACE FORM OF PADDY CULTIVATION

A Terrace is cut off from a sloped plane into successively receding flat surfaces or platforms that more or less appear like a staircase. They is formed in order to carry out farming activities in the form of bench terraces. Terraced field serves the advantage of reduced soil erosion and run off from the surface of the soil. It helps to retain water in the terraces that is used for growing crops such as rice. Zabo is an indigenous farming system devised by the people based on the available resources. This practise begin in Kikuma village of Phek district of Nagaland, The word "Zabo" means impounding of water and is a combination of forest, agriculture, livestock and fisheries management. The important aspect of the practise are efficient water and soil management and environmental protection thereby enhancing the crop productivity (Sharma & Sharma, 2004).

The top layer usually consist of the forest and the layer below the forest are the tanks specially constructed for the purpose of water storage from the catchment. The water along with soil from the catchment flows down and is stored in the tanks. Water from the main tank is released and it passes through animal yard. From the animal yard the dung and urine of the animals is carried to the field as manures. In case there is no available space for construction of tanks water from the catchment may be taken directly to the field. Ngachan, Mohanty and Pattanayak (2012) on their work on 'Status paper on Rice in Northeast India described the various components of Zabo farming system as follows:

*Forest land:* The catchment area is about 1.5 ha or more and it is kept under undisturbed by allowing the growth of natural vegetation on upstream side of the pond and to enhance water availability .

*Water harvesting system:* Adjacent to the catchment area, water harvesting ponds or tanks are constructed by means of digging to form earthen embankment. The size of the pond is usually kept as 24 x 10 x2 m'. Silt retention tanks are also constructed at several points before the runoff water actually reaches the main pond. In the Silt retention tanks the water is cleared of succulents, soil and leaves and they are taken to the field as manures. This is done annually as a part of maintenance of the water harvesting system.

*Cattle shed:* The family that owns a cattle maintain the yard through an enclosure fenced with ordinary woods and bamboo branches. The cattle yard is managed jointly by a group of farmers on leaving the cattle in the enclosure on rotation basis. Buffaloes are the common animals kept in the enclosure and as many as 20 to 30 buffaloes are placed in a yard for 10 to 15 days. The enclosure is constructed preferably below the water harvesting pond. Water from the run off washes away the manure in the form of cattle urine and dung to the field. Split bamboo channels are also used to direct the dung and urine from the cattle yard to the exact point in the field from where it further gets distributed in the field

*Agriculture land:* Rice field are located in the foothills that is at a lower elevation than the water-harvesting pond. The area of the rice fields varies between 0.2-0.5 ha. The manures that reach the rice field are green manure of leaves, dung and urine of cattle. The rice field is also devoid of use of any kinds of chemical fertilizers. Rice fields are thoroughly rammed at the time of puddling following different methods such as treading by human and cattle, wooden sticks and shoulder bunds with the use of paddy husks on the upstream side. Thus Zabo system undoubtedly is conservation based and can be a potential substitute to shifting cultivation but the difficulty lies in the fact that developing terrace farming in a hilly terrain like Nagaland could be challenging.

#### V. CONCLUSION

Indigenous farming systems occupies a special place in the life of the Naga farmers. It is based on local knowledge system and available resources. The indigenous practices such as Zabo and Alder farming is soil and water conservation oriented and is sustainable in the long run. But they are restricted to Kohima and Phek district and it needs to be promoted to other parts of Nagaland. This entails support and coordination between the

various concerned department, voluntary organization and the people for effective dissemination of knowledge and awareness. Since rice is a water intensive crop proper irrigation facilities need to be created and made available throughout the state. This will raise the food grain production enormously. Technological advancements enabled the people in different parts of the world to indulge in double cropping and attain self-sufficiency in food production. However most people in the region rely largely on the natural resource for meeting the basic needs. In spite of having bountiful natural resources the people have not been able to harness the most of it. Ignorance and careless handling of resource in many parts of the state resulted in much harm than benefit. Therefore an integrated understanding of the local knowledge and modern technology will best serve the people in the state.

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