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# Jhum Cultivation in Nagaland: "A Review of Inculpating a Traditional Farming System for Environmental Degradation

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Abstract- Nagaland is one of the states of India where shifting cultivation or Jhum is considered the predominant way of farming, The Culture of Nagas revolves around Jhum. But in recent times, most people or families who rely on Jhum are turning away from the traditional farming system for many reasons like preferring permanent farming over Jhum, switching to other businesses, migrating to cities/towns, and many more. Some international organizations, researchers, and central and state governments (India) are depicting Jhum as the chief environmental destructing force in Nagaland. Central and state governments are showing alternate ways of livelihood to deviate people from Jhum. The Jhum cultivation has not decreased drastically in Nagaland but fading away slowly the Jhum cultivation area across Nagaland and the number of families who depend on Jhum is not the same as they were at the beginning of the 21st century. Besides the reduction in Jhum cultivation, the environment is degrading rapidly in Nagaland. In this paper, we will analyse a few environmental factors like forest cover, groundwater levels, land desertification, usage of chemical pesticides, and monoculture farming and compare all factors statistically with the Jhum's presence in the state over the last few years and we discuss the responses related to those factors which we recorded on the ground from farmers, intellectuals of the village and a field assistant of the agriculture department. In the end, we suggested a few steps to preserve the traditional agriculture system and cease the developmental works which are hazardous to the fragile and unique ecosystem of Nagaland.

Keywords- Jhum cultivation, Shifting cultivation, Nagaland, Environmental degradation, Forest cover, Groundwater, Land desertification. Chemical pesticides. Monoculture, Farming.

# I. INTRODUCTION

Nagaland is one of the tribal dominant states of India. The state consists of sixteen districts inhabited by seventeen major tribes along with sub-tribes1. Shifting cultivation is the widespread and traditional way of agriculture in Nagaland. Shifting cultivation is also known as swidden agriculture or slash-and-burn agriculture in other

parts of the world, In Nagaland and other North-East states of India it is known as Jhum. The history of shifting cultivation can be traced back to about 8000 BC in the Neolithic period which witnessed the remarkable and revolutionary change in man's mode of production of food- from hunter-gatherers to food producers2. Shifting cultivation is prominent in the regions where tribal or indigenous people's presence is dominated demographically, Nagaland is not exempted. Shifting cultivation or

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Jhum traditionally has been culturally significant for the people of Nagaland. From land selection, to harvesting the crop and the fallow period everything is implemented by great wisdom in Jhum's way of farming. Firstly, the head of the village selects a plot of land for Jhum then the farmers slash and set the vegetation on fire. After fire they clear the land and sow the seeds, they sow many varieties of crops along with rice in a plot. Farmers build bunds to control soil erosion, bunds could be made of rocks, branches of trees, bamboo etc. Then finally after harvesting the crops, farmers repeat the farming process for two to three years until the soil starts losing its fertility, they abandon the plot for ten to fifteen years this period is known as the 'fallow period'. These days due to many factors the fallow period has shortened to five years on average. In the recent past, Jhum has been depicted as the main environmental destructor in Nagaland and all over the world, with governments asking tribal farmers to either switch to permanent monoculture farming or look for alternate livelihoods. Our questions are why to blame Jhum? Is permanent monoculture farming not destroying the environment? Why Indigenous knowledge has no scope in today's world? In this paper, we tried to discuss a few environmental factors like forest cover, groundwater levels, and land desertification with the changes in the Jhum cultivation area in Nagaland. We also discuss the growing consumption of chemical pesticides and a rapid shift to monoculture farming in Nagaland.

## **II. METHODOLOGY**

Our focus is to depict the statistical evidence of environmental changes or degradation in Nagaland by the factors that are ignored or sidelined, and Jhum cultivation is blamed every time. In this paper, we compared the land area under Jhum cultivation in Nagaland from the early years of this century with other factors which are related to the environment like Forest Cover, Groundwater levels, and Land desertification. We observed some changes in Nagaland's agriculture were initiated in the name of development. They are Chemical pesticide usage and Monoculture farming; these five factors will be analysed by statistical data and peoples' perceptions gathered during interviews. We gathered qualitative data by interviewing people from different backgrounds like farmers, an agriculture field assistant of the district agriculture department (Mokokchung), and an intellectual of the village. We recorded the interviewees' responses by asking questions related to changing scenarios of Jhum cultivation and permanent agriculture in Nagaland. We collected quantitative data from research papers and government websites, the data from the beginning of this century to the present. Our methodology is empirical.

#### Analyzing the factors

The five factors to be analyzed are-

- Land area under Jhum cultivation.
- Forest cover.
- Groundwater levels.
- Land desertification.
- Usage of chemical pesticides.
- Monoculture farming.

#### 1. Land Area under Jhum Cultivation

Jhum cultivation has been practiced for a very long time in Nagaland, but it has started declining from the beginning of this century due to many reasons like switching to other professions like stone quarrying, migrating to urban areas, permanent farming etc. According to the Forest Survey of India, the average Jhum cultivation land in Nagaland between the years 1988 and 1997 was 3900 sq. km. The area of land under Jhum cultivation from the early years of this century is mentioned in the table below.

Source Wastelands / tilds of maid			
Year	Land under Jhum cultivation (sq. km)	Land under Jhum cultivation (%) in total geographical area	
1988-97	3900*	23.52%	
2003	1116.6	6.70%	
2005-06	1239.09	7.47%	
2008-09	1414.53	8.53%	
2011-12	1287	7.76%	
2015-16	979.33	5.90%	
2017-18	947.37**	5.71%	

#### Table 1- Land under Jhum cultivation in Nagaland, Source- Wastelands Atlas of India

India.

\*\*The source of this figure is the Nagaland Annual Administrative Report 2017-18.

Note- The availability of data related to the land area of the Jhum cultivation in Nagaland is very limited in the public domains of the state and central governments. The present land area data from the year 2020 is unavailable.



Figure 1: Land area under Jhum cultivation in Nagaland.

The average land area between the years 1988 and 1997 was 3900 sq. km which came down to 1116.6 sg. km in the year 2003. The highest land area in this century (at least until 2017-18 data) is 1414.53 sq. km in the year 2008-09 and the lowest is 947.37 sq. km in the year 2017-2018. According to the figures, the land area under Jhum cultivation in the first two decades of this century has decreased to more than half of the land area in the late 90's. The percentage of Jhum cultivation in the total geographical area of Nagaland between 1988-97 was 23.52% and in the year 2017-18, it was 5.71%.

## 2. Forest Cover

Forest cover is defined by the Forest Survey of India as 'All lands more than 1 hectare in area, with a tree canopy density of more than 10 per cent, including tree orchards, bamboo, palms etc., occurring within the recorded forest and other government lands, private community or institutional lands, are included in the assessment of forest cover' 3. The

\*The source of this figure is the Forest Survey of forest cover of Nagaland from the year 2001 to 2021 is mentioned in the table below.

Table 2- Forest cover	<sup>·</sup> of Nagaland (sq. l	km)
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Year	Forest cover (sq. km)
2001	13345
2003	13609
2005	13665
2007	13463
2011	13318
2013	13044
2015	12996
2017	12489
2019	12486
2021	12251



Figure 2: Forest cover of Nagaland (sq. km)

According to FAO's Global Forest Resources Assessment deforestation is defined as 'The conversion of forest to other land use independently whether human-induced or not'. It further explains the permanent reduction of tree canopy cover below the minimum 10% threshold4. In Jhum cultivation forests are slashed temporarily then after two or three years of cultivation the field is abandoned for regrowth. These days the average regrowth or fallow period is reduced to 5 to 8 years whereas a few years ago it was between 10 to 15 years. The forest cover of Nagaland has significantly decreased in recent years. The total geographical area of Nagaland is 16579 sq. km, in the year 2001 the beginning of this century the forest cover was 13345 sq. km which was 80.5% of the total geographical area of Nagaland. In the year 2021, the forest cover was 12251 sq. km which means 73.9% of the total geographical area.

Nagaland lost 6.6% of forest cover in the last 20 years (2001-2021). Parallelly the status of Jhum cultivation was declining in Nagaland when the forest cover was shrinking. In recent years Nagaland has experienced heavy logging, especially illegal logging is on the pinnacle. Most of the people in the state have no source of heating and cooking other than wood. We recorded the response of a Jhum farmer aged 60 who said 'They do not cut trees in forests for fuel wood other than Jhum plots'. The other reason for the declining forest cover is permanent agriculture precisely cash crops. We interviewed a field assistant of the District Agriculture Department, He says 'The state government has reintroduced coffee plantations (organic) after almost 20 years of halt'. Other monoculture farming like palm oil is leaping up in the state.

## 3. Groundwater Levels

Groundwater levels depend on rainfall, soil's quality or capability to absorb, and groundwater usage. Nagaland's alarming groundwater levels forced the state government to make a law in 2022 by passing the bill in the assembly. All blame on Jhum cultivation for the soil erosion and alarming groundwater levels.

Table 3- Average	ge groundwater level	s of Nagaland
	(m bal).	

Year	Average	Year	Average
	groundwater		groundwater
	levels (m bgl)		levels (m bgl)
2001	4.26	2015	4.08
2003	3.33	2016	4.88
2007	3.73	2017	3.79
2008	3.47	2018	2.92
2009	5.2	2019	3.26
2010	3.85	2020	4.55
2011	5.74	2021	3.76
2012	4.68		
2013	5.85		
2014	5.35		

The less fallow period of up to 5 years is certainly a reason for soil erosion and fluctuating groundwater levels but does the land remain bare without the minimal vegetation cover in all these five years of

fallow period? If there is vegetation cover over the abandoned land during the fallow period, is that not holding the soil? Quality of soil is essential to maintain good groundwater levels. The average groundwater levels from the year 2001 to 2021 are listed in the table below.



Figure 3: Average Groundwater Levels (m bgl

The graph shows the average groundwater levels (meters below ground level) in Nagaland from the year 2001 to 2021, Groundwater levels are not uniform all over the state, rural areas can have higher groundwater levels than urban regions. Groundwater levels fluctuate over 20 years, The year 2013 has the highest groundwater level of 5.85 m bgl whereas the year 2018 has the lowest level of 2.92 m bgl. After 2014 there was no significant growth in groundwater level in the state until COVID-19 hit year 2020. Tribal farmers (permanent agriculture) aged 62 and 54 who live in plains mentioned that 'Groundwater availability has shrunk in plain areas since permanent agriculture needs more water than Jhum we are sensing water scarcity for our fields'. There is a strong necessity to go beyond blaming Jhum, comprehensive research must be done, and the data should be available in the public domain.

## 4. Land Desertification

Land desertification refers to land degradation in arid, semi-arid, and dry semi-humid areas resulting from various human impacts5, the land becomes less productive as one of the consequences. Deforestation is the dominant reason for land desertification in Nagaland. The state which sits in the Indo-Burma biodiversity hotspot (one of the 36 biodiversity hotspots in the world) is losing its

forest cover rapidly which results in Land desertification. The area under desertification for three periods between 2000 and 2020 is listed below.

Table 4- Land are	a under	desertification	in
1	Vagalan	d	

Year	al area under ssertification (ha)	Total eographical a of Nagaland (ha)	ercentage of and under ssertification (%)
	dé	g are	d p
2003-05	642304	1657900	38.74
2011-13	786678	1657900	47.45
2018-19	828943	1657900	49.99

Source- Table based on Desertification and Land degradation Atlas of India (assessment and analysis of changes over 15 years based on remote sensing), Space application centre, ISRO (2021).



Figure 4: Percentage of Land under desertification.

These figures are appalling for a state like Nagaland, in the early years of this century land under desertification was well below 40% of its total geographical land fifteen years down the line the figure almost touched the 50% mark. In just thirteen to fifteen years land under desertification increased by 11.25%. In the year 2018-19, almost

half of the land of Nagaland was under desertification, which means half of the land of the state is less productive. Jhum cultivation comes first when it is deforestation and land desertification but in the year 2017-18, the land area under Jhum cultivation was the lowest (947.37 sq. km) 5% of the total geographical area of the state. Mining and deforestation for timber have proliferated in recent years in Nagaland, even Jhum farmers are working in mines by relinquishing Jhum farming. Why the Land under desertification is peaking when the area under Jhum cultivation is shrinking?

## 5. Usage of Chemical Pesticides

It is not uncommon to use chemical pesticides in some parts of India, most of the crops in Northeastern states of India are organic due to their indigenous traditional way of farming. A few years ago in Nagaland, the usage of chemical pesticides was considered negligible, but the recent use of chemical pesticides in the state is perturbing. The usage is much less than in the other Indian states, but it is a matter of concern, The chemical usage is not only hazardous but also puts traditional natural methods in peril. In Nagaland, the sale and use of various chemicals and weedkillers are unregulated, anyone can buy any chemical off the shelf and use it as one pleases, without guidance about usage dosage, and monitoring6. The year-wise usage of chemical pesticides from the year 2017-18 is mentioned in the table below.

Table 5- Usage	e of chemical	pesticides	(tech.	grade)
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	1011.
Year	Usage of chemical
	pesticides (tech. grade)
	(in MT)
2017-18	20
2018-19	21
2019-20	19
2020-21	36
2021-22	41

Source- Directorate of Plant Protection, Quarantine & Storage, Department of Agriculture Cooperation, Ministry of Agriculture and Farmers Welfare.



Figure 5: Usage of chemical pesticides (tech. grade) in MT.

There are no records of chemical pesticide usage before 2017 for Nagaland in the public domain. In the year 2017-18, the usage reported was 20 MT and in 2021-22 it was 41 MT. The usage of chemical pesticides doubled in just four years in the state. 41 MT usage is much less when compared to the 13175 MT usage in Maharashtra. But in the Northeastern region, Nagaland's usage of 41 MT is the second highest in 2021-22 after Assam's usage of 428 MT. As usual, Meghalaya and Sikkim have gone organic with zero consumption of chemical pesticides from the year 2017-18 to 2021-22. We have seen many environmental and health-related consequences across India with chemical pesticides. In Nagaland, it may not be a problem now but if the usage increases every year the state must face severe consequences. The respondents whom we interviewed mentioned the rise of chemical pesticides in the state. Between the years 2010 and 45000 litres of 2019, Nagaland consumed Glyphosate (information gathered by filing RTI by Pesticide Action Network)7. India has put restrictions on the usage of glyphosate in the year 2022. Glyphosate is used to control weeds, but it has adverse effects on the environment. Too much reliance on chemical pesticides is not good for the unique biodiversity and the health of the people of Nagaland.

#### 6. Monoculture Farming

Monoculture farming is cultivating a single crop in an agriculture field, the same crop continues every year. In the long term, monoculture farming reduces soil fertility by wearing out the essential micro and macronutrients of the soil. That is the reason farmers use fertilizers (synthetic or natural) to improve soil fertility. In Jhum cultivation there is no space for mono culture, In Nagaland monoculture farming was not so prominent until cash crops were introduced in recent times. The state government reintroduced coffee plantations (organic) almost after 20 years of halt and palm oil plantations were started in the year 2015 for the welfare of farmers.

Table 6- Total	cultivated a	rea of palm	oil. Source-
Departm	ent of Agric	ulture (Nag	aland).

Year	Total Cultivated area of	
	palm oil (ha)	
2015-16	140	
2022-23	5423	

In the first year of palm oil cultivation, the total cultivated area was 140 hectares and in the year 2022-23, the area was 5423 hectares. The target of the state government is to cultivate palm oil in a land area of 15000 hectares. This palm oil project was planned and being implemented in the foothill regions of Nagaland. Worldwide many hectares of land were destroyed for palm oil plantations. In Mizoram, palm oil farmers are struggling to plantations due maintain to excess water requirements, loss of soil fertility, transportation, and other factors. Nagaland is situated in the Indo-Burma biodiversity hotspot; In the future, these types of monocultures have the potential to devastate the unique biodiversity of the state. The main reasons are deforestation, water availability, and usage of chemical fertilizers and pesticides. Excess usage of chemical pesticides for palm oil plantations has the potential to kill pollinators like bees which affects the crops of tribal people. To achieve the 15000 hectares palm oil plantation target in the state, what would be the magnitude of forests to be chopped? Farmers already sensing water scarcity for rice cultivation (permanent agriculture) where would the water for 15000hectare plantations come from in the future? Already the state is facing rapid loss of forest cover, and monoculture farming like palm oil and other

plantations could exacerbate the loss of biodiversity in the future.

# **III. CONCLUSION**

There is a popular answer to the reason for environmental degradation in Nagaland is Jhum cultivation. It has been shown as the major reason for environmental degradation but how valid is this reason? There is no argument that the fallow period has been shortened in recent years. Is Jhum cultivation the only major reason for deforestation and biodiversity loss, soil erosion and Land desertification?

Jhum cultivation is not the source of deforestation according to the definition of FAO, In Jhum cultivation forest is not slashed to convert the land permanently. By the year 2017-18, Jhum's land area was 5.7% and by the year 2015-16 abandoned Jhum's area was 4.1% (Wastelands Atlas of India) of the state's total area. Jhum cultivation's land area has been shrinking in Nagaland in recent years. At 7. the same time, the land area of deforestation, monoculture farming, and land desertification are soaring in the state. Other factors like logging for timber and mining are inevitable in recent years which are deteriorating the environment rapidly. The consumption of chemical pesticides could have significant effects on the biodiversity of Nagaland in the future.

The geographical conditions of Nagaland are very peculiar from the other states of India development paths could be different here. Governments should tend to preserve the traditional cultures of the state and implement schemes by that. Jhum cultivation binds people in that area and makes sure no one goes hungry after the harvest, everyone who works in the Jhum has a share. Jhum cultivation preserves traditional seeds, it encourages farming multiple varieties of crops at once. There is no place for chemical fertilizers and pesticides in Jhum. Jhum is not flawless, there are flaws but completely blaming Jhum for the backwardness of tribal people and environmental degradation is not fair. Jhum is an identity of Nagas it should not diminish.

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