



ENVIS NAGALAND

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CENTRE
FOR STATE
ENVIRONMENT
RELATED ISSUES

NAGALAND
POLLUTION
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ENVIS
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Editorial

Carbon sequestration is natural removal of carbon from atmosphere by soil and plants. It has also been described as any of the several processes for removal of excess carbon dioxide (CO₂) from atmosphere in an effort to mitigate global warming. Carbon sequestration can be termed as capture and long-term storage of carbon dioxide before it is emitted into atmosphere. One reason for the increase in atmospheric CO₂ concentrations is the change in land cover from natural forests which are the highest carbon store to other land uses, burning of forests, jhuming and urbanization.

Nagaland is a hilly State with mountainous terrain richly endowed with natural resources. Predominantly an agrarian State with 70% of its population engaged and dependent on agriculture, the two methods of cultivation practiced by the Naga tribes are Jhum or shifting cultivation and terrace cultivation. The traditional land use pattern of cultivation i.e., Jhum or shifting/slash and burn, is the method that is widely practiced and continues across Nagaland due to topographical terrain. Jhuming has its obvious disadvantages as large tracts of land are required for cultivation. The shifting cultivation is a traditional agricultural practice with high incidences of soil erosion and loss of fertility, due to the reduction of periodicity in the Jhum cycle. In order to mitigate the menace caused by jhuming, plantation crops can be taken up at an individual level or community level to boost the economy as well as to restore the ecosystem.

Plantation crops are perennial crops which act as natural sponges in capturing the CO₂ from atmosphere and storing in more stable form, i.e., bio mass. These crops are generally raised in high density multi species cropping system and thus increasing the potential for sequestering carbon. Besides providing nutritional and food security, plantation crops help in sequestering carbon from atmosphere and store them as bio mass for long period. The percentage of Carbon in plant tissues of plantation crops is in the range of 39-50% and they also provide in ameliorating the ill effects of enhanced greenhouse effect due to increased greenhouse gases. Plantation crops produce a large amount of biomass besides producing economic produces of commerce. They retain soil fertility, physical and chemical properties through decomposition of large volume of litter fall, pruning wastes etc.

This issue aims to create awareness on the importance of plantation crops in creating carbon sink and reducing shifting cultivation and the activities taken up by the Land Resources Department.

Shade Coffee Plantation a Possible Alternative to Reduce Shifting Cultivation Increasing Carbon Sink Area in Dimapur

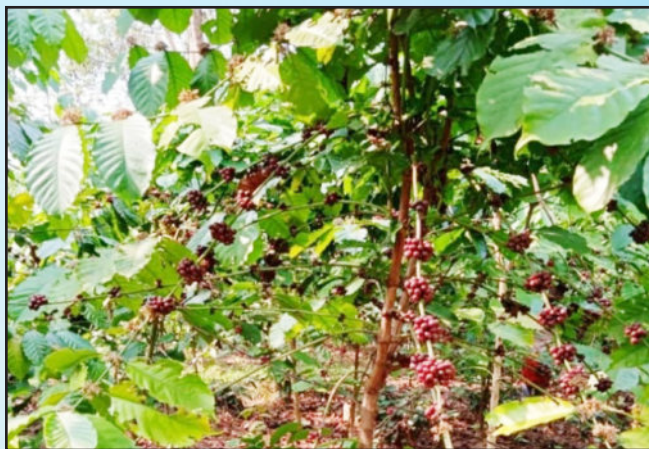
LAND RESOURCE DEPARTMENT
DIMAPUR; NAGALAND

It is evident by the coffee consumption countries throughout the globe that coffee is a valuable commodity. Coffee plantations are an important source of income and employment generation.

Besides this, direct impact on livelihoods of farming families, coffee cultivation offers several other elements of advantage. Coffee plantation helps to reduce soil erosion, it is a useful carbon sink as the plantations are grown under shade trees, helps to increase the ecosystem biodiversity particularly in systems with mixed cropping on small farms, it can provide a good habitat for many migrant birds and other animals, and it supports good watershed management.

The Land Resources Department Dimapur is implementing coffee (*Coffea canephora*), Rubber (*Hevea brasiliensis*) and arecanut (*Areca catechu*) development in the district with the objective of generating employment, adding income source to rural population, to mitigate the negative effects of climate change at micro-climate level and to increase ecosystem biodiversity.

These plantation crops are introduced to the farmers as alternative to shifting cultivation (a slash and burn system of agricultural farming practiced commonly among Naga tribes) to preserve, protect and rejuvenate/revive the ecosystem. *Coffea canephora* is introduced in the forest area, *Hevea brasiliensis* and *Areca catechu* are taken up in fallow land or wasteland area.



Implementing Process:

1. Site Selection

Achieving the goal of functional ecological economy relating to sustainable Development is mainly dependent on proper site selection. Technological input such as GIS based information and ground truth are given due consideration in identifying the location and other resources suitable for plantation. Certified seed coffee is purchased from Coffee Board of India for seedlings.

2. Community mobilization & Trainings







4. Market linkage:

These Plantation crops provide a functional ecological economy while maintaining and rejuvenating the ecosystem. These crops will generate sustainable income for the farmers for 3 to 6 decades and will discourage shifting cultivation which brings large destruction of ecosystem. In order to ensure regular marketing of their produce and products, the Department acts as a facilitator between the company or firm and the farmers.





To facilitate the market of coffee, the Land Resource Department has initiated the market linkage for farmers. The Government of Nagaland has signed a memorandum of understanding with the South African firm M/S Noble Cause Pvt. Ltd. Co to buy coffee for 30 years.

Status of Coffee Plantation in Dimapur:

The Land Resources department has initiated the coffee plantation in Dimapur under PMKSY WDC and NABARD programme. Since then, the department has developed 790 ha of coffee plantations in the district till 2021.

Projected Income Generation

Total Area Covered and Economics Table					
Total Area Developed (Ha)	Yield Dry wt. (Kg/Ha)	Rate (Rs/Kg)	Gross Income	Cost of Cultivation	Net Income
790	3060	100	24,17,40,000	72,52,200	16,92,18,000

The Major Coffee Growing Villages in Dimapur are:

Sl. No.	Name of Village	Block
1	Ghotovi	Niuland
2	Hovishe	Niuland
3	Kuhoxu	Niuland
4	Hozukhe	Niuland
5	Viheto	Niuland
6	S. Hetoi	Niuland
7	Tsiepama	Medziphema
8	Tsiepama Model	Medziphema
9	Piphema	Medziphema
10	Pherima	Medziphema
11	Zhuikhu	Medziphema
12	Medziphema Village	Medziphema
13	Nihoi	Dhansiripar
14	AK Industrial	Dhansiripar
15	Toshezu	Dhansiripar
16	Shikavi	Dhansiripar

Shade Coffee Plantation reduces shifting cultivation and create Carbon Sink

The Coffee growers in Dimapur are small and marginal farmers with small land holdings. The farmers are encouraged to preserve the forest and grow the coffee under diverse shades which enhance biodiversity, and grow without use of chemicals to produce organic coffee. This will encourage habitat conservation and create ecofriendly farms unlike the open sunlight coffee farms. It is worthwhile as the carbon footprint is reduced, and the potential income generation is increased while practicing sustainable agroforestry under shade coffee.

Agroforestry has importance as a carbon sequestration strategy because of carbon storage potential in its multiple plant species and soil as well as its applicability in agricultural lands and in reforestation. The potential seems to be substantial; but it has not been even adequately recognized, let alone exploited. Proper design and management of agroforestry practices can make them effective carbon sinks.

Trees and other plants sequester carbon by removing it from the atmosphere through photosynthesis and incorporating it into their tissues. Existing forests are carbon sinks and contain over half of the total carbon of the world. Carbon remains stored in plant tissue until released, in this case most often by burning and decomposition. Agroforestry systems, including shade coffee farms, that preserve forests are therefore acting as carbon sinks.

Reforestation also contributes to the sequestration of carbon, although the rate in which carbon is taken up and stored by plants varies among species, as well as where they are grown and if and how they are managed. This means that sun coffee farms converted to shade in which the appropriate tree species are planted and managed have the potential to effectively sequester carbon.

Carbon is also stored in leaf litter and other organic matter in the soil. Sustainable coffee agrosystems frequently rely on fallen leaves from their shade trees as well as the application of coffee skins and other organic matter for soil moisture retention and fertilization, providing another means in which these farms can contribute to carbon sequestration.

How much carbon can coffee farms store?

Although measuring carbon storage is difficult due to the multiple variables involved (even plots in the same region with similar tree species composition can vary in their storage capacity depending on microclimate, soil types, etc.), recent research has revealed some encouraging facts. A few examples are;

- In the tropics, potential carbon sequestration rates for smallholder, sustainable agroforestry systems range from 1.5 to 3.5 megagrams (tonnes) per hectare per year, or 2.1 billion megagrams annually worldwide.
- It has been estimated that each hectare of sustainable agroforestry in the tropics could potentially offset 5 to 20 ha of deforestation.
- Models have estimated a 5-year-old coffee farm shaded with two common Latin American tree species (*Erythrinapoeppigiana* and *Cordiaalliodora*) could sequester 5.3 megagrams per hectare.
- Soil carbon stocks in shade coffee were 60% of that expected in primary forest in Sumatra, versus 45% for sun coffee.
- In El Salvador, carbon sequestration values for various types of shade coffee management was estimated (in tons per ha per year): 174 for rustic shade to 77 for shade monoculture.

- A study of carbon stocks in Costa Rican coffee farms calculated aerial (above ground) carbon stocks ranging from 11 megagrams per ha for simple shade (one heavily pruned shade species) to nearly 32 for diverse shade.

Using these figures, a farmer with 10 ha in diversified shade coffee could receive a one-time \$3000 payment (based on previously carbon transactions for the country), as well as a reduction in expenses from chemical inputs and have timber and fruit for additional income. The payment is over three times greater than would be obtained for the carbon stocks in simple shade coffee systems.

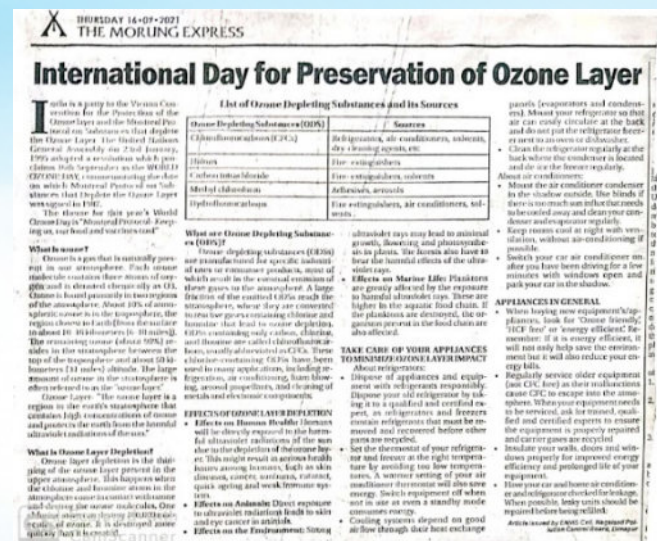
(Reference: *Coffee farms and carbon sequestration-By Julie Craves*)

WORLD OZONE DAY CELEBRATION

On the occasion of World Ozone Day 2021, posters and pamphlets on “**Things to know about Ozone layer**” were disseminated to the schools and college students and teachers through virtual mode (WhatsApp, Facebook, Twitter and NPCB website) to create awareness on the importance of Ozone Layer and its effect caused due to Ozone Depleting Substances (ODS).



Posters and Pamphlets of World Ozone Day



Article on ozone safe products and effects of Ozone Layer Depletion on human health, animals, marine life and environment was published in the local dailies on 16th September 2021 for public awareness.

ENVIS Hub Nagaland in collaboration with Nagaland Pollution Control Board had organized an Online Poster Making competition to commemorate World Ozone Day, 16th Sept 2021 for the higher secondary and under graduate students on the theme “**Montreal Protocol-Keeping us, Our food and Vaccines cool**”. Cash prize along with certificates were awarded to the winners of the competition.

The winners of the competition are:

1. Ms. Limakumla Jamir, B. Sc 1st Sem from Immanuel College, Dimapur
2. Mr. Taliyimba, B. Th 3rd year from Doulos Theological College, Dimapur
3. Mr. Leche Krome, Class 12 from Rüzühkhrie Govt. Hr. Sec. School, Kohima.



ENVIS Coordinator, Shri. K. Hukato Chishi, IFS with the winners of the Online Poster Making Competition during certificate ceremony.



Scanned Pictures of the winners of Online Poster making competition

COMMEMORATION OF 75 YEARS OF INDIA'S INDEPENDENCE - AZADI KA AMRUT MAHOTSAV

As per direction issued by the Ministry of Environment, Forests & Climate Change wherein various State Nodal Agencies (SNAs) were assigned specific weeks to carry out activities based on "Green Good Deeds" to commemorate 75 years of India's Independence (Azadi ka Amrut Mahotsav), various activities were carried out by Eco Clubs of Nagaland to celebrate the same. The first assigned week for the state of Nagaland was during May 14-20, 2021 and the second assigned week was from August 27-September 2, 2021.

Activities such as cleanliness drives, beautification of school campus, plantation, essay, slogan writing and painting activities, filling up of potholes to ease traffic congestion etc were conducted by Eco Clubs during the assigned weeks.



Making of flower stand using discarded waste materials by Eco Club of Brighter Academy, Dimapur



Beautification of Campus & Plantation by Eco Club of Don Bosco School Sechi-Zubza



Beautification of Campus & Cleanliness Drive by Eco Club of GMS Trongar A, Tuensang



Plantation by Eco Club of Schola Lojes School, Kohima



Filling up of potholes by Eco Cub of Highland Hall School, Naga United Village, Dimapur



Cleanliness Drive and Beautification of Campus by Eco Club of Duolos Theological College, Dimapur

As group physical activities were limited due to the ongoing pandemic, students from various schools planted flowers and tree saplings in the safety of their own homes, some pictures of which are highlighted below:



INDIA BIODIVERSITY AWARDS 2023 ORGANIZED BY NATIONAL BIODIVERSITY AUTHORITY (GOVT. OF INDIA)

Category 1 CONSERVATION AND SUSTAINABLE USE OF BIOLOGICAL	Category 2 INCENTIVIZING ACCESS AND BENEFIT SHARING	Category 3 BEST BIODIVERSITY MANAGEMENT COMMITTEE	Category 4 BEST PEOPLES' BIODIVERSITY REGISTER
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The Award comprises of a memento, a certificate and a cash prize of **Rs. 5 lakhs** each for winners under each category. Two certificates of appreciation will be given in each category along with a cash prize of Rs. 1 lakh each. The last date for receipt of applications is 30th November 2021. Application forms are available on National Biodiversity Authority website (<http://nbaindia.org/>)

All queries and feedback regarding this newsletter can be sent to:
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