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REASSESSING THE WOOD CHARCOAL PRODUCTION IN THE WAKE OF POPPY CULTIVATION MENANCE IN MANIPUR, INDIA

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INTRODUCTION:

Manipur's wood charcoal industry is one of the forest-based, unorganised sectors of the economy. Charcoal-making practices are empirical in nature with a built-in traditional wisdom inherited from one's ancestors (Saravanakumar, Haridasan, & Bai, 2006). In most hilly regions of Manipur, Jhumming cultivation coexists alongside the production of charcoal (Lalmuakima,2009). The two processes have a close relationship of supplementing the rural economy form the making the charcoal during the lean season. Charcoal, a traditional forest product, is primarily produced by rural poor and landless individuals, who collect fuelwood and trade it for additional income; nevertheless, the jhum cultivation approach necessitates a significant area of land for cultivation, vast area of land is clear by burning the forest which supplement the charcoal making raw materials. According to Bhist and Singhit (2011), the process of manufacturing charcoal in the state typically takes place between November and February, before the beginning of the jhum crop cultivation. Jhumihas after the post-harvest engaged in making charcoal from the remaining woods left in plot of land they had cultivated. Because of the strong demand in the state's urban and semi-urban areas, the production of charcoal is a particularly lucrative economic activity in the state (Kipgen&Thangsuanhang, 2020)

In the state of Manipur, wood charcoal has traditionally been utilised for a variety of functions, including but not limited to heating homes during the winter months, cooking, blacksmithing, goldsmithing, fish processing (the production of dry fish), small restaurants, hostels, incense stick making, extraction of calcium carbonate from lime stone and even the kitchens of the armed forces station in the state (Bhattarai,1998; Chitrabhanu, 2020; Khangsembou, 2018). This practice, which has deep roots in the region's socio-political landscape, is very significant not only for local livelihoods but also for its broader implications on sustainability and environmental stewardship. Charcoal production in Manipur, traditionally reliant on rudimentary methods, faces growing scrutiny due to its impact on deforestation and biodiversity, as informal operations often contribute to unsustainable practices that threaten local ecosystems (Sitlhou, 2020).

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OBJECTIVEOF THE STUDY

1. The study's main objective is to understand the importance of wood charcoal's energies to the broad spectrum of energy consumption in the state.
2. To analysis the possibility of re-establishing the wood charcoal making process scientifically instead of poppy cultivation which causes huge environmental problems.
3. To suggest the possible alternatives.

MATERIAL AND METHODS

The study is based on the primary and secondary data from the various sources, report of Manipur state remote sensing data, selected field survey of market prices in various charcoal sellers in Imphal valley. The data are analyzed and complied and presented in the form of table and charts for easy understanding.

MAKING OF THE CHARCOAL DEMAND

Charcoal is an age-old refined form of wood fuel and has been known from even before the dawn of recorded history. Wood charcoal is superior to wood due to its higher calorific value, lower ignition temperature, lower air pollution, and better smell (Paramasivan&Premadas, 2019). Charcoal is a cost-effective fuel for domestic use, but limited for industrial use in Asia. Converting wood into charcoal reduces weight and energy content, but also increases transportation costs. The conversion ratio varies, with a high 6:1 to low 4:1 ratio depending on the method. Traditional open pit kiln production may yield lower results (Bhattarai, 1998). Charcoal is favored as a substitute for biomass fuel because it offers enhanced socio-economic conditions, convenient and environmentally friendly usage, and is seen as a transitional option before resorting to conventional fuels. The majority of individuals living in rural areas are unlikely to change their current fuel consumption patterns as long as traditional sources remain easily accessible and readily available in Manipur.

USES OF CHARCOAL IN MANIPUR

Charcoal is primarily utilised in urban and semi-urban regions as a supplementary fuel source to wood or LPG during emergencies. These emergencies occur when the later fuels are unavailable in the market due to the uncertain political economy of the state, such as disruptions caused by strikes, blockades, or landslides that hinder the transportation of fossil fuels from other states. Charcoal is primarily utilised for providing heat in residential settings during the winter, as well as for boiling water and in roadside eateries. Typically, there is a higher demand for charcoal during the winter months in the state.

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Table No.1 District wise use of charcoal quantity and value in Manipur, 2011

District	(% of HH)	Quality used by HH(Kg)	Total No of HH	Total quality (kg)	Value (Rs)
Imphal East	27.28	46.70	18211	850454	8504540
Imphal West	22.50	40.00	16664	666560	6665600
Bishnupur	62.50	33.12	21075	718870	7188700
Thoubal	20.00	40.00	12138	485520	4855200
Chandel	44.00	60.00	8677	520620	5206200
Churachandpur	66.67	50.00	25331	1266550	12665500
Senapati	56.00	40.00	23923	956920	9569200
Tamenglong	18.30	40.00	3400	136000	1360000
Ukhrul	60.00	40.00	14080	704000	7040000
Total				6305494	63054940

Source: N.S. Bisht & S. Singsit, 2011

The above table shows that the maximum used of charcoal in the state is observed in Churachandpur where 66.67 percent of the household using it. It was followed by Bishnupur 62.50 percent, Ukhurul 60.00 per cent, Senapati 56.00 per cent, Chandel 44.00 per cent, Imphal East 27.28 per cent, Imphal West 22.50 per cent and Thoubal 20.50 per cent respectively.

INCREASES DEMAND FOR CHARCOAL

Charcoal is commonly considered a renewable energy source, leading to proposals to increase the international trade of renewables, including charcoal (Steenblik, 2005). Charcoal has numerous desirable qualities, including being nearly lead and sulfur-free, low in nitrogen and ash, highly flammable, and manageable in terms of handling and storage. One of the most practical alternative fuels in the current climate, where the cost of commercial fuels is sharply rising, is the creation of charcoal from locally accessible biomass. In developing nations, it is more appropriate for urban use than fuel wood and has promising potential as a rural income-generating enterprise (Saravanakumar, Haridasan, & Bai, 2006). It is also seen as a more cost-effective option in heavy industry (Feliciano-Bruzual, 2014, Norgate and Jahanshahi, 2011; Norgate and Langberg, 2009), creating significant opportunities to partially or fully replace fossil fuels with charcoal (Feliciano-Bruzual, 2014; Norgate and Jahanshahi, 2011). Despite of the electricity availability, global consumers still prefer charcoal due to its posi-tive association with food flavor and leisure activities (Drazu, Olweny, and Kazoora, 2015). Additional industries that heavi-ly rely on charcoal include automotive battery recycling (Kreusch et al., 2007), agriculture and carbon sequestration (Kalaba et al., 2013; Marsoem,), and water purification (Nishida et al., 2017). Charcoal is utilised for sintering and serves as a reduc-ing agent in the production of aluminum and silicon. It can directly substitute coke or coal in these processes due to its supe-rior energy efficiency (Sommerfeld & Friedrich, 2021). The production of solar cells

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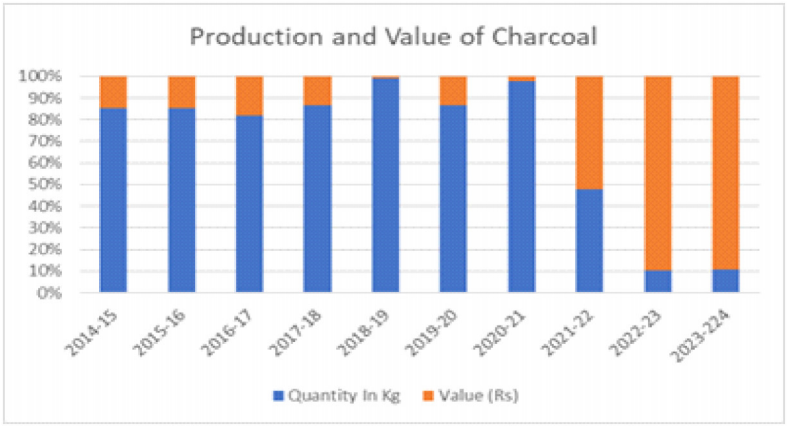
and panels depends on the availability of silicon. In order to reduce pollution, charcoal is used instead of fossil fuels to convert quartz into silicon (Troszack, 2021).

Fig. No.1



Source: Department of forest and Environment, Govt. of Manipur

The diagram no. 1 shows the relationship between the production and increased value of charcoal in Manipur for the last ten years. The price of a 35 kg. bag of charcoal in 2014-15 was Rs. 150 as the production capacity was around 85 percent due to the fluctuation of power supply, ban, blockade, and socio-political turmoil in the state, the production and price is related. The trend continues up to 2017-18. The trend suddenly changes in 2018-19 the production of charcoal is almost 99 percent one of the factors of this huge increased in production is due to preparation of land for the poppy cultivation. In 2019-20 the price of 35 kg bag of charcoal was Rs. 550. Again, the scenario in 2020-21 is the same with the preparation, cleaning and expansion of virgin forest area for poppy cultivation area cause quantum jump of production. The trend suddenly changes the production of charcoal decline almost half and price of charcoal jumps up to Rs. 900 per 35 kg. bags. In the next two years the production was very low hardly ten percent because of large area are under the poppy cultivation and price are 90 percent increased becoming Rupees1200 per 35kg bag of charcoal.

PRODUCTION OF CHARCOAL

Table No.2 Charcoal Production ('000 kg.)

District	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Imphal West and East	NA	26100	NA	NA	NA	NA
Kamjong	900	NA	10580	NA	NA	NA
Bishnupur	3600	39600	NA	NA	NA	NA
Tengnoupal	15900	12000	19360	NA	NA	NA
Chandel	132000	NA	9600	280	18060	NA
Thoubal	171000	114000	10322	52882	60360	20160

Thoubal	171000	114000	10322	52882	60360	20160
Churachandpur	888450	495600	205580	117040	134120	NA
Total	1211850	687300	255442	170202	218180	20160

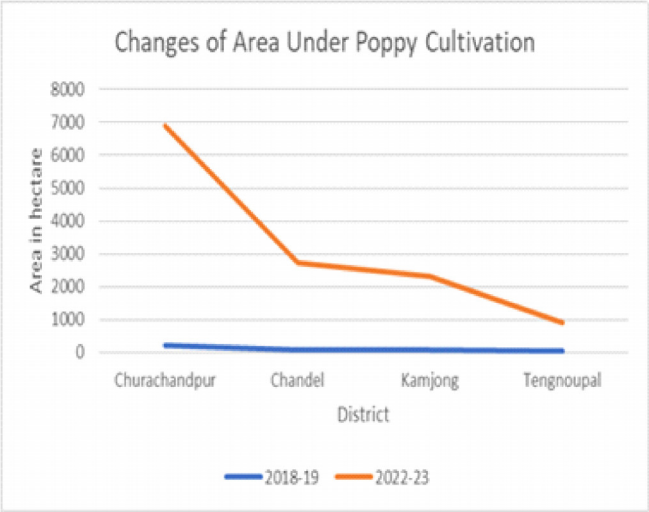
Source: Department of Environment and Forest, Govt of Manipur, 2024

Table No. 2 shows the production trend of the charcoal in the state from 2018-19 to 2023-24. Out of the total sixteen districts eight districts are producing charcoal in the last six years. The highest production district is found in the district of Churachandpur district having 73.31 percent, 72.1 percent, 80.48 percent, 80.48 percent, 68.75 percent and 61.47 percent respectively. The second highest producer of charcoal is recorded in Thoubal district14.11 percent, 16.58percent, 4.04 percent 31.07 percent and 27.66 percent. The Chandel district also shows decline trend of charcoal production from 2018-19 to 2023-24, having recorded 10.89 percent, 3.75 percent, 0.16 percent and 8.27 percent. The Tengnoupal District shows an increasing trend of production having 1.31 percent, 1.74 percent,7.57 percent of the last three years. Bishnupur district also shows an increasing trend of charcoal production in the last two years from 0.29 percent to 5.75 percent in 2018-19 to 2019-20. The both the Imphal West and East Districts shows declining trend of charcoal production from 3.88 percent to 2.5 percent. The above discussion shows that the production of charcoal is declining from the traditional core area to the lesser production areas of the state.

CHANGES IN PRODUCTION AREA

The changing trend of production pattern is may be influence by the Covid-19, changes of land use pattern, ethnic conflict which is started from the Kuki dominated area of Churachandpur from May 3, 2023.

Fig. No. 2



Sources: MARSAC and NAB, Department of Home, Govt. Manipur

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According to Manipur Remote Sensing Application Centre (MRSAC), the increased poppy cultivation is primarily done coincide with the Jhum (slash and burn) cultivation areas, which was earlier used for charcoal production for sustainability. Fig. 2 Shows the changing pattern of area under the poppy cultivation in the some of the earlier major charcoal producing districts of the state, namely Churachandpur district, Chandel district, Kamjong district, Tengnoupal district has shown the huge changes of land use under the poppy cultivation which cause the declining of charcoal production. In all the main charcoal producing districts, the changes of land from charcoal+ jhum practice to poppy + jhum is increasing. In the case of Churachandpur district from 220 acres in 2018-19 to 6688 acres of land under poppy in 2023-24, increasing almost 30. 4 times. The picture is almost same in the case of Chandel district from 90 acres in 2018-19 to 2637 acres of land under poppy increasing 29.3 times. Kamjong district has lesser degree of changes but in terms of changes of land it is still significant from 90 acres in 2018-19 to 2235 acres under poppy cultivation in 2023-24 changing 24.83 time. The case is same with Tengnoupal district having changes 35 acres in 2018-19 to 868 acres under poppy cultivation in 2023-24 increasing 24.8 times from the base year 2018-19. The Land Use Land Cover (LULC) changes from charcoal production area to poppy cultivation is phenomenal increased in the state, which ultimately affects the political economy of the state.

CHARCOAL VS POPPY CULTIVATION AND ENVIRONMENT

The LULC is changing in the charcoal producing districts of the state. Many scholars maintain that if the practice of Jhum and related practice especially charcoal making process is continue in a scientific methods and technologies, it is environmentally variable. The changes of LULC towards the poppy cultivation had more profound impact on environment because of excessive used of synthetic fertilizer. The biggest threat posed by rising levels of illicit poppy cultivation in Manipur is the fact that it could lead to the state being posited as a possible hub for drugs production, rather than just being a spot in the trafficking route (Sangpui&Kapngaihlian, 2021). Poppy cultivation has severe environmental impacts, including deforestation, land sinking, ground water contamination by chemical fertilizers. It also increases the risk of blue-baby syndrome, heart defects, low or infertility and newborn death. The absence of insects, burrowing animals, and sound in poppy-cultivated areas destroying local environmental niche, again it has also led to increased miscarriage among pregnant women (Singh, 2022). In comparison to poppy cultivation, it is far better to reestablish the charcoal making scientifically if we have to choose both the two evils. The charcoal trade must aim for sustainability, for example, through investment in mixed-species afforestation (Thomas et al., 2021), and plantations develop in the waste and swampy areas which cannot be used permanently. The use of structured, community-oriented wood

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fuel production has led to an enhancement in forest stock. The practice can enhance the land productivity, helping the management and production of charcoal to restore biodiversity. Adopting "renewable charcoal" production from responsible reforestation (Guinta and Munnion, 2020). Initiatives include reducing emissions, financial sustainability, resource access, and economic benefits. National frameworks, climate change mitigation efforts, and sharing of research and data are needed. Involvement of organized players for forest productivity, production technology and scope of private plantation.

SUSTAINABLE PRACTICE

Policies must consider both environmental and human needs. Individuals produce and sell charcoal primarily due to economic necessity, as it serves as a means of livelihood. The unrestricted availability of fuelwood from the forest draws unemployed individuals aiming to earn income through charcoal production and sales.

Enforcing a ban on charcoal production and promoting alternative fuels will be challenging, as it necessitates a shift in consumer mindset and economic conditions. The ban may significantly undermine the livelihoods of numerous charcoal producers and distributors. This is likely to stimulate an illegal trade in charcoal, exacerbating the already inadequate controls against corruption and regulatory evasion.

The sustainable transformation of the charcoal value chain possesses considerable potential for reducing global greenhouse gas emissions. It can be implemented at each stage of the value chain, especially in timber procurement and carbonization, as well as in transportation, distribution, and end-use optimization.

Current practice of production and distribution of charcoal in Manipur are needs to increasingly focusing on adopting sustainable charcoal production techniques. This includes the utilization of modern carbonization methods that enhances efficiency and reduce environmental impacts compared to traditional kilns. Sustainable practices not only help in minimizing emissions but also aim to repurpose agricultural by-products, contributing to a circular economy.

ECONOMIC ASPECTS

Charcoal production plays a significant role in the economy of Manipur, contributing to both local livelihoods and broader socio-economic dynamics. The market for charcoal, particularly during colder months, sees a marked increase in demand, as low income families often rely on it for heating, which drives up prices and impacts purchasing behavior. Recent reports indicate that the onset of winter season has exacerbated price surges due to heightened demand and stockpiling by retailers, forcing families to either purchase less charcoal or pay inflated prices (Doggart & Meshack, 2017).

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WAY FORWAD

As the demand for wood charcoal is very high and will be increases in future and even for prospect for export. The charcoal production in the state can be developed with scientific technology and approaches. Often many of the production site the replenishing of Woodstock is not done at all, this can be mitigated by encouraging the community forest-based production where the replanning is done in a proper way. Converting the waste and vast swampy land areas peripheral land into Woodstock for future uses. Besides there is a need for proper planning and market regulation for the production and distribution of charcoal by giving registered licensing policy in making especially training for less CO2 production and packaging and pricing. The practice is another viable alternative to the poppy plantation, which has more profound impact on environment. Another important benefit of the revitalizing this forest-based industry is large scale participation of women encouraging women empowerment and financial freedom (Devi &Singh, 2015)

CONCLUSION

The charcoal production sector is marked by inequitable market dynamics, with producers receiving disproportionately low margins relative to other stakeholders. The intricacies of the charcoal value chain, coupled with disjointed legislation affecting multiple sectors, intensify the difficulties encountered by local producers. The ambiguity in governance frequently results in exploitative practices that obstruct sustainable production and intensify resource over-exploitation.

The future of charcoal production in Manipur will likely be shaped by environmental considerations, technological innovations, and sustainable methodologies. As discourse regarding deforestation and environmental degradation escalates, this semi unorganised industry encounters mounting pressure to implement more sustainable charcoal production methods. Research is focused on employing viable alternative sources, such as rapidly growing trees and agricultural byproducts, to manufacture charcoal in a more ecologically sustainable way.

Additionally, advancements in charcoal production technology are arising, featuring the creation of efficient charcoal manufacturing machinery that reduces waste and enhances energy utilization. These advancements can improve the sustainability of the charcoal supply chain and diminishing the carbon footprint linked to conventional production methods. Moreover, policies designed to enhance sustainable charcoal production are increasingly essential. This encompasses initiatives to regulate the charcoal market, promote alternative energy sources, and diminish reliance on charcoal for domestic and industrial applications. The incorporation of these sustainable practices enables the sector to reduce its environmental impacts while also positively influencing the local economy through job creation

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and the support of community-based forest management initiatives.

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