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BOUNCING FORWARD: GEOMAPPING DRIVES RUBBER INDUSTRY GROWTH

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Introduction

Rubber is one of the crucial products in the Indian as well as the global market. It is an elastic substance consisting of a polymer called isoprene and hydrocarbon. Rubber is majorly found as solids in a milky fluid called latex. It can be either obtained naturally from rubber tree or synthetically extracted from natural gas or petroleum. It is one of the key materials used in the automobile and apparel industries. India is the 3rd largest producer and 4th largest consumer of natural rubber. Also, India is the 5th largest consumer of natural and synthetic rubber combined. Kerela is one of the top rubber producing states in India accounting for about 90% of India's total natural rubber output. 16% of total rubber production comes from North Eastern states like Assam and Tripura (Figure 1). Though rubber contributes only a fraction to agriculture's Gross domestic product it is of vital importance. Meanwhile Geo-mapping was introduced in Kerela by the Rubber Board to initially focus on 10 key Rubber growing districts and later to be expanded in states like Tamil Nadu and Karnataka. This was introduced to eliminate the export of rubber illegally through deforestation and to help farmers fetch better price for their produce in the International markets aligning with the European Union Deforestation Regulation (EUDR) compliance.

Geo-Mapping: Significance and requirement

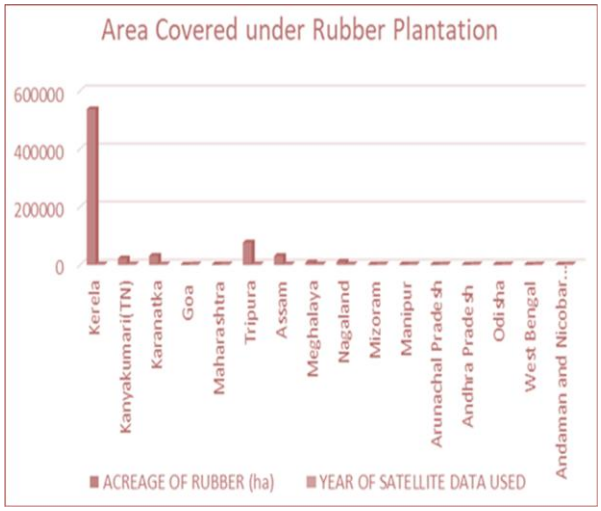

Figure 1. Area covered under Rubber Plantations

Data Source: Balan et al .2020, Figure Source: Author's Compilation

Geo mapping is an advanced software technology which creates maps using geographic data to map a particular area or

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region, its location, space etc. Geo-mapping of plantations uses GIS, GPS and remote sensing to map the boundaries of the farmer's field, land ownership details, area covered, habitat, its distribution and biodiversity of that particular region. It is also commonly used by large scale farmers owning to make precise agricultural planning in their farms. Geo-mapping is a momentous step taken by the Rubber Board of India to enhance farmer's revenue and rubber industry as a whole by giving their rubber products an easy access to various European markets for better prices.

The relevance of geo-mapping in rubber plantations is that, it is a key step in certifying natural rubber under the Indian Sustainable Natural Rubber (ISNR) body which aligns Indian rubber production in compliance with the EUDR (Figure 2). Primary goal of EUDR is to eliminate all the products obtained through deforestation. It was aimed to be implemented from December 31st 2020 onwards and comply with local regulations, but was formally accepted in 2023. In order to acquire ISNR certification certain criteria's like supply chain mapping, geo-mapping of plantation and traceability system development are mandatory. Along with this a validation document will also be issued based on legal check and risk assessment verifying that the products marketed through supply chain are deforestation free. This whole process of using advanced technology like geo mapping is being done by rubber board partnering with Trayambu Tech solutions Pvt.Ltd,Hyderabad. This is a significant step in initiating a deforestation free supply chain for rubber products strengthening the global trade.

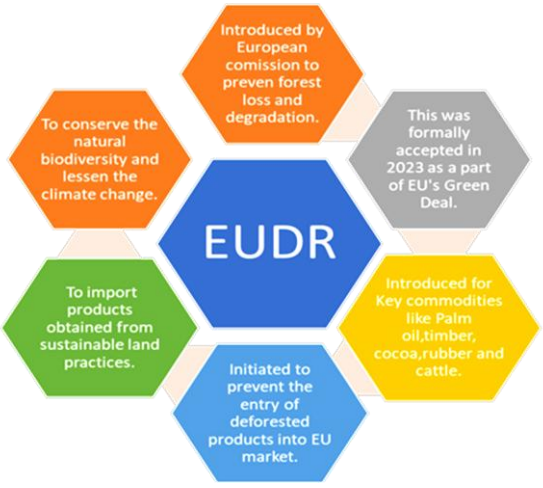

Figure 2. Objectives of EUDR
Source: Author's Compilation (2025)

Geo spatial distribution of Rubber Plantations in India

Fig 1 details about the rubber plantations distributed across India collected from 2013 to 2018. This data was obtained through satellite based mapping for the trees of age 3 years and above from different states of India. It covered a corresponding total area of 7,41,468 hectares of land. The graph given below illustrates the largest area covered under Rubber plantations (around 5,00,000 hectares) as Kerela and states like Andhra Pradesh, West Bengal and Goa occupies the least area under rubber plantations. In Tamil Nadu

Kanyakumari is the only district covering majority of rubber plantations. Among the North Eastern states Tripura has the largest area covered under rubber plantation.

COUNTRY	2020	2019	%GROWTH
Thailand	4372	4851	-9.9
Indonesia	3037	3301	-8
Vietnam	1222	1185	3.1
Cote d'Ivoire	950	808	17.6
China	693	813	-14.8
India	685	702	-2.4
Malaysia	515	640	-19.5
Other Countries	1534	1401	9.5
World Total	13008	13701	-5.1

Figure 3: Country wise production and consumption of Natural Rubber (2019-2020)
Source: The Rubber Board, Ministry of Commerce and Industry, GOI.

Figure 3 represents the country wise production of Natural rubber in (‘000 tonnes) which tells that the world Natural Rubber production during 2020 was 13.008 million tonnes compared to 2019 where the production was 13.701 million tonnes that is there is a decrease in the growth percentage.

COUNTRY	2020	2019	%GROWTH
China	5440	5497	-1
India	1040	1144	-9.1
USA	807	1003	-19.5
Thailand	764	800	-4.5
Japan	581	714	-18.6
Indonesia	574	625	-8.2
Malaysia	517	501	3.2
Brazil	345	402	-14.2
Rep.of Korea	298	354	-15.8
Other Countries	2344	2600	-9.8
World Total	12710	13640	-6.8

Figure 4. Country wise consumption of NR in (‘000 tonnes) of Natural Rubber (2019-2020)
Source: The Rubber Board, Ministry of Commerce and Industry, GOI.

Meanwhile the Figure 4 represents the Country wise consumption of NR in (‘000 tonnes) which tells that the world NR consumption decreased from 12.71 million tonnes in 2020 to 13.64 million tonnes in 2019. Hence the above data distinctly shows that both the consumption and production of Natural Rubber decreased globally and at the same time the growth rate detoriated in India as well. Despite the fall in production and consumption rate from 2019 to 2020, according to the recent report of Rubber Board, India’s Natural Rubber production during 2023-24 was 8,57,000 tonnes marking a significant growth of 2.1 percent compared to 8,39,000 tonnes in 2022-23. Also the domestic consumption of NR saw a robust growth of 4.9 percent reaching 1416000 tonnes compared to 1350000 tonnes in the previous year. So new initiatives like Geo mapping in rubber plantations would fetch better price for the farmer’s produce in the market and the area under rubber cultivation might also increase in the future. Few other initiatives and schemes launched by the Government of India through Rubber Board for promoting Rubber production are,

1. **Sustainable and Inclusive Development of Natural Rubber Sector 2017-18** - promotes production of rubber in a sustainable way to increase the farmer’s income.

2. **Rubber plantation Development scheme 2007-08 to 2011-12** - to increase area cultivated under rubber in Non traditional areas and to increase productivity.
3. **Rubber Group Planting Scheme** - This was introduced along with phase VI implemented from **2007-08 to 2011-12** to support the small scale farmers through group efforts.
4. **100% Foreign Direct Investment in Rubber Plantation 2015** - to attract various private and foreign investments in rubber plantations.
5. **National Rubber Policy 2019** - to ensure the quality, sustainability and productivity of rubber plantations and industries.

Geo mapping softwares and tools used in Rubber Plantations

GIS software and its uses	
ArcGIS	Monitoring and outlining of disease emergence, prediction of yield and land use.
QGIS	To check out,monitor and map the sustainable use of resources.
Maptitude	This software is used for monitoring, mapping the potential area for expansion and efficient planning.
Global Mapper, MapInfo Pro	It works similar to QGIS and Maptitude helps in sustainable use of resources for the growth of rubber.

Remote sensing software and its uses	
ENVI	It helps in visualizing, examining and displaying the remote sensing data.
GRASS GIS	This is also one of the remote sesing softwares which helps in analyzing and processing of images,map production and modelling.
Random Forest Algorithm	This tool works based on the textures of rubber plantations.

Satellites and its uses in geomapping	
Landsat (TM 7,8)	This satellite has been used for analyzing the growth, age of rubber tree and mapping them.
Sentinel -2	This satellite is majorly used to differentiate between the natural forest and rubber plantations.
IRS Satellites	These include satellites like Resource sat -1 LISS III,Resource sat-2 LISS III, Cartosat-1 Mono etc that is used in finding the potential areas for rubber cultivation.
MODIS	This satellite helps evaluating the water stress conditions in rubber plantations.

GIS softwares, remote sensing softwares and satellites are the most common tools used in geomapping of rubber plantations that majorly helps in monitoring and mapping of the plantations.

Conclusion

Establishment of geo mapping in rubber plantations offer rational approach towards rubber production, productivity and marketing. Despite the positive impact it has over the rubber sector this initiative also has limitations where geo tagging excludes the land lacking title deeds even though rubber farming has been practiced in that region for decades. But a request has been sent to the Rubber Board to allow geo tagging based solely on registration with the Board and not to demand title deeds. Nevertheless, it is undeniable that this industry has enormous potential in the future agricultural prospects. A robust and sustainable agricultural future is made possible for rubber plantations by launching advanced innovation technologies like Geo mapping.

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