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Potentiality of Bamboo Cultivation in South Konkan in Maharashtra: A Geographical Study

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Abstract

In this paper we study the potentiality of bamboo cultivation in South Konkan of Maharashtra in Ratnagiri and Sindhudurg district. In this region rainfall, temperature, humidity, slope, groundwater level and all climate is favourable for the bamboo cultivation. Although in the study region we see some limitations in bamboo farming because of awareness, technical issues, irrelevant information and attitude towards bamboo cultivation. If stack holders, farmers, skilled laborers, industrialists, governments, NGO, the value chain of these people developed in the proper direction, the bamboo industry will grow more than China in the world.

Introduction

Bamboo is known as Green Gold and Timber of Poor Man. Main features of bamboo are fast growing, cash crop, pensioner crop, green filler and versatile use in different fields. India has the second largest country in the world in bamboo resources where high rainfall, well-drained soil, slope and humidity are favourable conditions for bamboo cultivation. This condition is also seen in Ratnagiri and Sindhudurg district which is known as South Konkan of Maharashtra. Sustainable agriculture, rural development, and mitigation of climate change and soil erosion, most important Barren land development, bamboo cultivation is more important. So to see the potentiality of bamboo cultivation in South Konkan and study of geographical conditions is must.

Statement of Problem:

Even with suitable climate, physiography and soil, water resources for bamboo cultivation in South konkan of Maharashtra but the cultivators are not aware about precision precision and systematic cultivation. So the geographical study of bamboo cultivation in South Konkan of Maharashtra is essential to understand the potentiality and opportunities for development of bamboo cultivation in this region.

Scope of the Study:

In this research paper we study slope, soil type, physiography, groundwater level which is essential for bamboo cultivation. We also study the potentiality of bamboo cultivation in the study region. The study Mahal to Bombay cultivators, stack holders, researcher, and government also for expanding bamboo resources which are more important resources for future sustainable development.

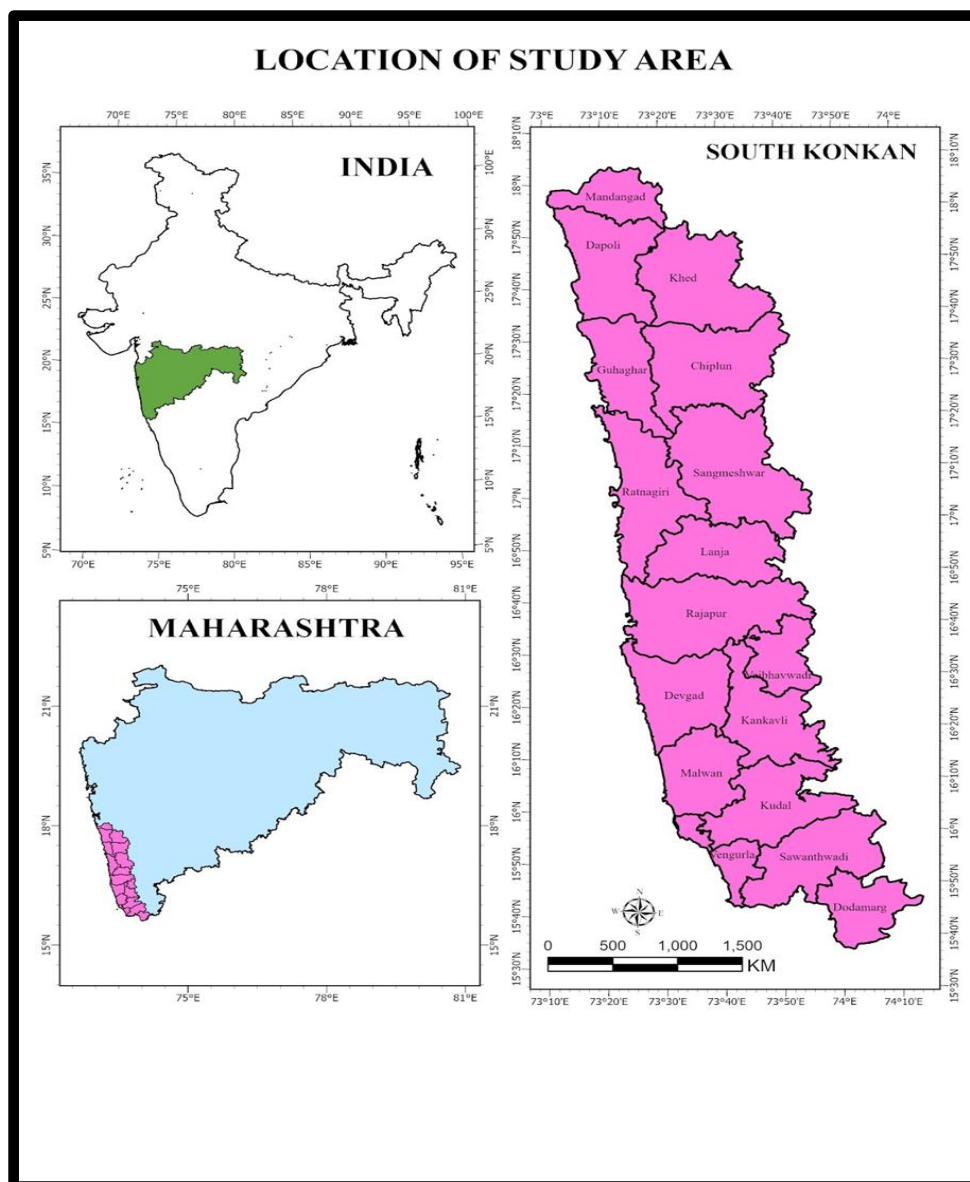
Objective of the Study:

To analyse the geographical potential for bamboo cultivation in the South Konkan region of Maharashtra.

Study Region:

The study area is located between 15°36' North to 18°50' North latitudes and 73°2' East and 74°13' East longitudes, comprising Ratnagiri and Sindhudurg district. It has a north-south extent of 450 km. and east-west extent of 65km., an average height of 1350 metres from the mean sea level and administratively is divided into 8 and 9 talukas respectively Sindhudurg and Ratnagiri. It covers 13295 sq. km. geographical area. (Figure No. 1.1)

Figure No. 1.1



Source: Survey of India, Konkan Region

Database:

The study is based on primary and secondary data sources but most of the concentration on primary data because of lack of availability of secondary data sources. The primary data is collected from field observation, questionnaire and the discussion with cultivators, agents, harvester. The secondary data collected from government offices, report and their record, district statistical handbook of Sindhudurg and Ratnagiri and different research articles.

Research Methodology:

In this study qualitative and quantitative methods are used. secondary data related to climate, rainfall, soil types, and land use patterns collected from government publications, research journals, and agricultural and forestry departments. Some data is also collected from district statistical handbooks and reports related to forestry and agriculture. Field survey conducted in selected villages to observe the pattern of bamboo cultivation and to understand cultivators experiences. To understand the geographical suitability for bamboo cultivation, important physical factors such as rainfall, temperature, soil type, slope, and natural vegetation and ground water level are analysed. To understand modern site suitability analysis using GIS-based spatial evaluation, Overlay Analysis Method ARC GIS Pro, land capability classification, remote sensing data, and agro-ecological zoning, different techniques are used to identify the best locations for crop cultivation. Descriptive analysis used to interpret the collected data. Tables, maps and charts prepared to present the geographical distribution and suitability areas for bamboo cultivation in the Study region.

Limitations:

The study is based on limited field observations and faces more problems regarding available secondary data sources. Any level of data regarding bamboo cultivation is not easily available. Resource and time constraints also restricted extensive field surveys across the entire region.

Discussion and Analysis:

To indicate levels of land suitability the soil texture map, groundwater level map, digital elevation model and slope maps are used to interpret land suitability for bamboo cultivation. All thematic layers assigned weightage to each feature of all layers and weighted overlay analysis method from the spatial analyst tool in ArcGIS Pro software is used to find out potential areas for bamboo cultivation of South Konkan. These are major parameters affecting the cultivation of fruit crops. The analysis of these maps is done at tehsil level. To indicate the effect of such factors and to obtain a clear picture of the suitability area for bamboo cultivation in South Konkan.

nurseries, agroforestry, and mixed plantations.

1. Weightage Assignment

The Weightage is assigned to each feature on a knowledge-based method and influencing factor of the feature. The value one is assigned to the less suitability and five, four and in some layer three is a high suitability. (Table No. 1.1)

Table No. 1.1 Classification of Weightage

Sr. No.	Thematic Layer	Percentage of Influence	Feature	Weightage
1	Soil Texture	35	Alluvium derived soil	1
			Clay Rich Lateritic Soil	2
			Lateritic Soil	3
2	Groundwater Level	15%	0 – 15	4
			15 – 30	3
			30 – 60	2
			60 - 90	1
3	Slope	25%	0 – 20	4
			20 – 40	3
			40 – 60	2
			60 - 90	1
4	Digital Elevation Map	25%	0 – 50	5
			50 – 100	4
			100 – 150	3
			150 – 200	2
			200 - 600	1

Source: Calculated by Overlay Analysis Method ARC GIS Pro

2. Distribution Pattern Of Suitability For Bamboo Cultivation In South Konkan

The prospective area for bamboo farming in South Konkan is depicted in figure no 1.2. The prospective area is divided into three groups: low, moderate, and high.

I. High suitability

The high suitability for bamboo cultivation is observed at western borders of study region due to low elevation, fine soil texture, low water table depth, gentle slope and well developed infrastructural facilities and eastern border area of forest covered and hilly region due to availability of barren soil. In which highest bamboo suitability is observed in Dodamarg, Sawantwadi and Kudal tehsils.

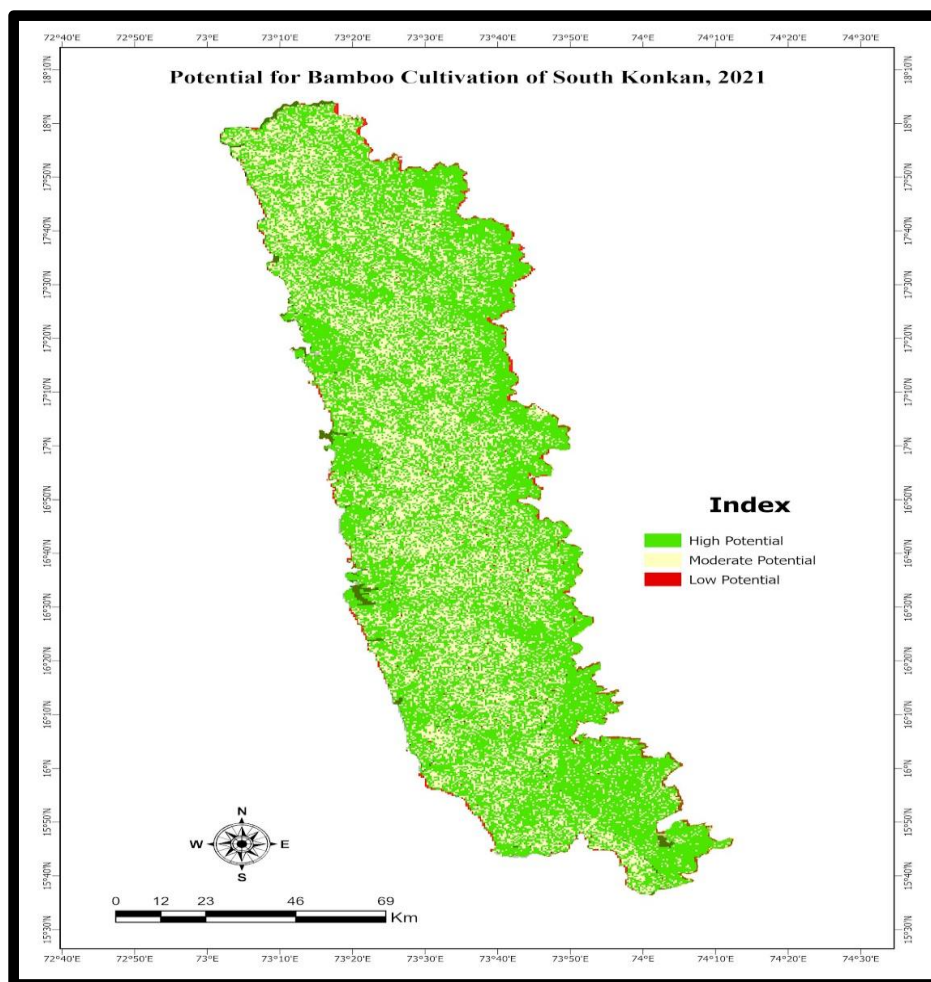
II. Moderate suitability

Moderate suitability for bamboo cultivation is observed in all over the study region. The moderate suitability region stretched from north to south in the central part of all the tehsils of south konkan due to moderate elevation, uniform slope, water table depth is also high in these tehsils but there are crop production associated with this region. Above all parameters are highly suitable for bamboo cultivation.

III. Low suitability

Low suitability for bamboo cultivation is very less part of south konkan, the study regions eastern marginal border have the low suitability areas which is spared over north to south in various patches of steep slope areas. The characteristics like very steep slope, deep groundwater level, high elevation of land which are not suitable for agriculture as well as to cultivate bamboo crops.

Figure No. 1. 2



Source: Calculated by Overlay Analysis Method ARC GIS Pro

Findings:

1. South Konkan soils are predominantly lateritic (40–60 cm depth), red loamy (60–90 cm), and alluvial soils (80–120 cm) along river basins. Lateritic soils provide good drainage, while alluvial soils retain moisture and nutrients. Bamboo species such as *Dendrocalamus Stocksii*, *Bambusa bamboos* and *B. vulgaris* show higher culm density and survival in soils deeper than 75 cm, making riverine and foothill zones highly suitable.
2. Terrain analysis shows that 55–65% of the region lies under gentle to moderate slopes (3–15%), which is optimal for bamboo due to balanced drainage and reduced erosion risk. Slopes exceeding 25%, mainly in Western Ghat escarpments, are less suitable unless terracing and contour bunding are applied.
3. Due to heavy monsoonal rainfall (3,000–3,600 mm/year), groundwater levels remain relatively shallow. In coastal plains and river valleys, water table depths range from 5–10 m bgl, while upland lateritic plateaus record 10–20 m bgl. This ensures adequate subsoil moisture for bamboo during dry months, minimizing irrigation needs.
4. South Konkan elevation ranges from 0 to 700 m above mean sea level, but bamboo cultivation performs best between 20 and 300 m. These elevations maintain mean annual temperatures of 24–32°C and high humidity (70–85%), which are crucial for rapid bamboo biomass accumulation.

GIS-based integration of soil depth (>75 cm), slope (<15%), groundwater depth (<15 m), and elevation (<300 m) identifies nearly 45–50% of South Konkan as highly suitable for bamboo cultivation, particularly in tehsils like Khed, Dapoli, Chiplun, Sawantwadi, and Dodamarg. Moderately suitable zones occupy lateritic plateaus requiring soil and moisture conservation measures. Applying district DEM, rainfall normals and soil maps (QGIS workflow) yields priority areas in mid-slope foothills (eastern Khed, Dapoli, Sawantwadi, Dodamarg, Kudal) and flags coastal saline strips and steep escarpments as low suitability.

Recommendation:

Bamboo cultivation should be promoted through government and cultivators awareness programs in the South Konkan region. Training programs and technical guidance should be provided to cultivators regarding precision bamboo cultivation. Research institutions and agricultural departments should also support the development of suitable bamboo varieties for the region. Establishment of bamboo-based industries and marketing facilities will encourage cultivators to adopt bamboo plantations. All authority should be given to the agriculture and forestry department for development of bamboo cultivation.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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