

10.48047/jocaaa.2023.31.04.69

Analysis of Agriculture land Utilization in Goa, India (2023): A Geospatial Approach

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Abstract

This study analyzes agricultural land utilization and cropping pattern shifts in Goa with a focus on the years 2001, 2012, and 2023 using a geospatial and statistical approach. Goa, though India's smallest state, exhibits diverse physiography comprising coastal plains, river basins, and hilly regions, which significantly influence its land-use dynamics. Findings reveal that in 2023, agriculture accounted for 48.5% of the total land area, followed by forests covering 36%. Paddy remains the dominant crop, occupying 55% of total cultivated land, while coconut plantations account for 27%. Legislative measures such as the Goa Restrictions on Transfer of Agricultural Land Act, 2023 and the Agro-tourism policy aim to curb farmland conversion and promote sustainable farming. Despite these interventions, agricultural decline continues, reflected in reduced paddy area and a significant drop in cashew production. Desai, S., & Kumar, P. (2015). The study concludes that effective policy implementation, coupled with sustainable land management, is essential for preserving Goa's agricultural landscape and ensuring long-term food security.

Key words: Agriculture, Geospatial, paddy, and Agro-tourism

1. Introduction:

Goa, the smallest state in India, is widely known for its scenic beaches, cultural heritage, and ecological richness. Desai, S., & Kumar, P. (2015). Beyond its tourism appeal, the state exhibits complex patterns of land utilization shaped by geography, demography, historical developments, and socio-economic transformations. Malik, M., & Jha, R. (2016), Bhagat, M., & Gupta, R. (2018). While agriculture has traditionally formed the backbone of the Goan economy—supporting a variety of crops such as paddy, coconut, cashew, and spices—recent decades have witnessed rapid land-use changes driven by urbanization, industrial growth, and tourism expansion. (Singh, R., & Saha, A. (2017).)

The year 2023 marked significant developments in land governance, with new regulations introduced to protect agricultural land and promote sustainable practices. This study provides an analytical assessment of Goa's agricultural land utilization and cropping patterns using geospatial, statistical, and secondary data sources. Sharma, S. (2020)

2. Research Objective:

The study was undertaken with the following objectives:

1. To analyze the agricultural land utilization trends in Goa for the year 2023.
2. To examine cropping pattern changes across 2001, 2012, and 2023.
3. To compare taluka-wise agricultural variations using geospatial interpretation.

3. Study Area:

Goa is located on the western coast of India between $15^{\circ}48'N$ – $14^{\circ}53'N$ latitudes and $74^{\circ}20'13''E$ – $73^{\circ}40'33''E$ longitudes, covering a geographical area of **3,702 sq. km**. The state's diverse physiographic divisions include coastal plains, undulating plateaus, river valleys, and the forested stretches of the Western Ghats. It is bordered by the **Arabian Sea** to the west, **Maharashtra** to the north, and **Karnataka** to the east and south. Goa's physical structure significantly influences its climate, agricultural productivity, and land-use patterns. Major rivers such as Mandovi, Zuari, and Sal nourish fertile alluvial tracts suitable for agriculture, while the eastern regions support dense forest cover and biodiversity.



Fig.1: Location Map of Goa with taluka.

3. Data Used and methodology:

This study relies entirely on secondary data obtained from:

- *Goa at a Glance 2022–23*
- *Directorate of Agriculture, Government of Goa (2023)*
- Other published government reports and statistical bulletins

Data were processed, tabulated, and represented through graphical and geospatial techniques to analyze distribution patterns, cropping concentration, and land-use composition.

4. Land utilization in goa

Goa's land utilization reflects a combination of agricultural activity, forest conservation, mining, industrial expansion, and tourism-driven development.

Major Land Use Categories

- **Agricultural Land:** Dominated by paddy, coconut, and cashew plantations; however, agricultural area is gradually declining due to conversion pressures.
- **Forest Area:** Approximately 33% of Goa is forested, forming an ecologically critical part of the Western Ghats and supporting wildlife sanctuaries like Bhagwan Mahavir, Cotigao, and Bondla.
- **Urban & Industrial Land:** Cities such as Panaji, Margao, Mapusa, and Vasco are experiencing rapid expansion, increasing pressure on agricultural land.
- **Mining Areas:** Talukas like Bicholim, Sanguem, and Quepem have extensive iron-ore and manganese mining zones.
- **Tourism Land:** Coastal regions continue to see large-scale land utilization for resorts, hotels, and entertainment facilities.

Table3.1: Land Use/ land cover Distribution in Goa

Sr.No	UL/LC Class	Area (ha)	Area (%)
1	Gross Cropped Area	169422	48.5
2	Fallow Land	8375	2.3975
3	Permanent Paster Land	1305	0.3736
4	Miscellaneous tree Crops	580	0.166
5	cultivable Waste land	44170	12.644
6	Forest Area	125473	35.919
	TOTAL	349325	100

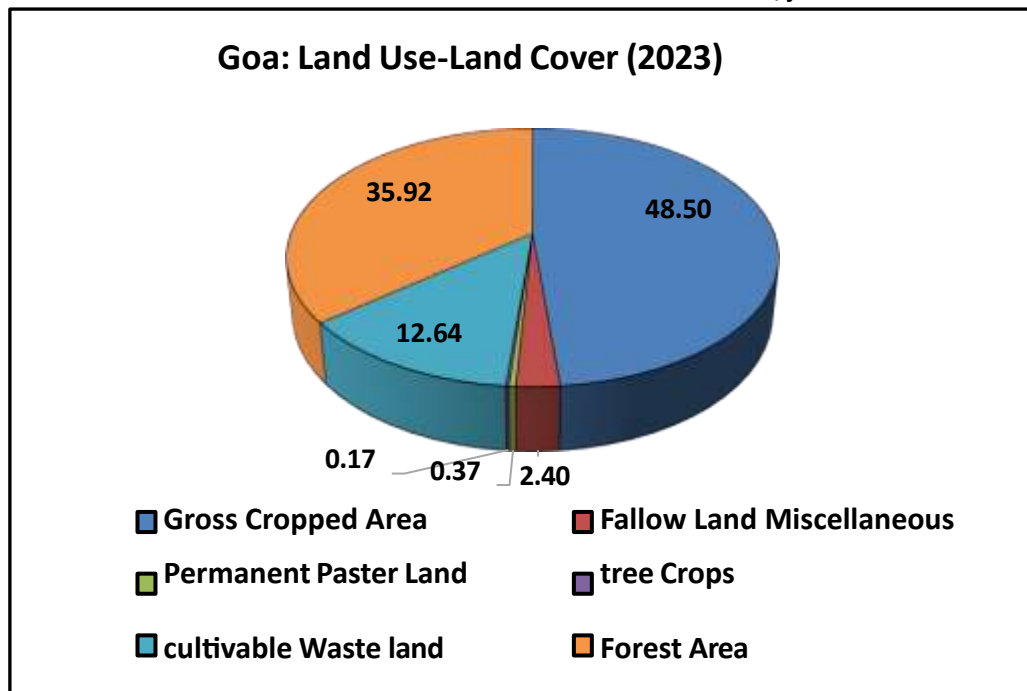


Fig.3.2: Goa: Land Use- Land Cover Distribution

Interpretation: Nearly half of Goa's land (48.5%) is under agricultural use, while forest cover accounts for 36%. About 15% falls under wasteland, fallow land, and pastures...

5. Agriculture land utilization in goa

The State introduced major policy measures to conserve farmland and ensure sustainable cultivation.

Key Policy Measures

a) Goa Restrictions on Transfer of Agricultural Land Act, 2023

This Act prohibits conversion or transfer of agricultural land to non-agriculturists except under regulated conditions. If cultivation does not commence within three years of permitted transfer, the land reverts to the Government.

b) Agro-Tourism Policy (2023)

To support farmers and diversify rural income, farmers with at least 4,000 sq. m of land are permitted to start agro-tourism units, demonstration farms, or farmer field schools. Strict zoning regulations help prevent agricultural land misuse.

Challenges

Despite policy support, agriculture continues to face pressures:

- Decline in paddy cultivation

- Sharp (~50%) drop in cashew production in 2023
- Labour shortages and rising land values due to tourism and real estate activities

Table3.2: Agriculture Land Utilization in Goa (2023)

Sr.No	Crop	Area (%)	Area (ha)
1	Sugarcane	1.09	1021
2	Paddy	55.48	51714
3	Ragi	0.21	200
4	Pulse	11.94	11130
5	Groundnut	3.86	3600
6	Coconut	27.40	25540
	TOTAL	100.00	93205

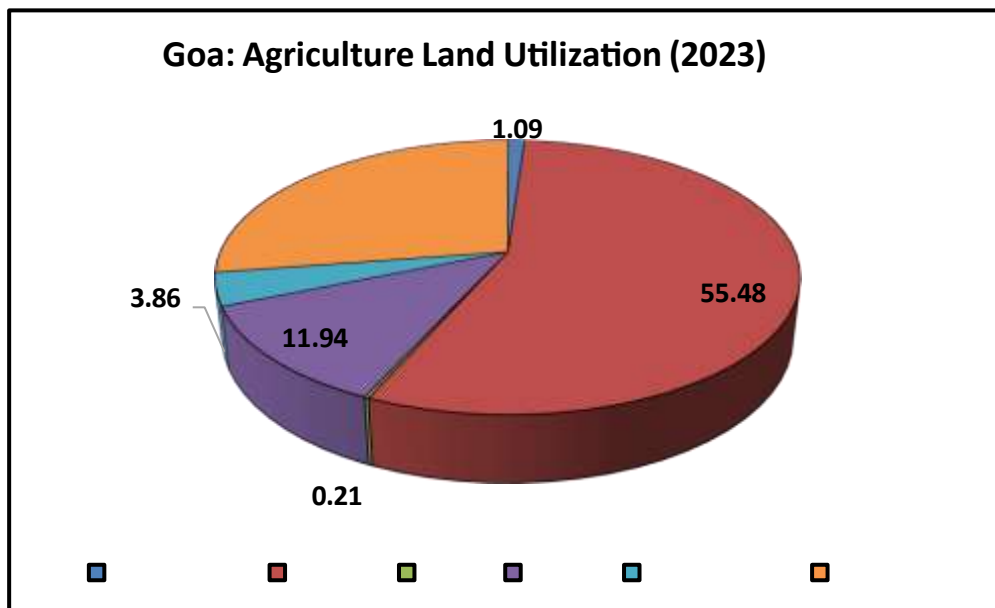


Fig.3.3: Goa: Agriculture Land Utilization Distribution (2023)

Interpretation: Paddy is the dominant crop, covering over half of the cultivated land (55%). Coconut plantations constitute another major land use (27%). Pulses, groundnut, ragi, and sugarcane occupy smaller proportions.

Conclusion

The analysis indicates that despite Goa's rapid urban and tourism-driven growth, agriculture continues to hold a significant share of land use. However, agricultural land faces increasing pressure from conversion, mining activities, and real estate development. Government initiatives introduced in 2023 provide a positive step toward safeguarding farlands, yet their success depends on strong implementation and addressing key challenges such as labour shortages, declining traditional crops, and market fluctuations. Effective, sustainable land management combined with geospatial monitoring is essential for ensuring the long-term resilience of Goa's agricultural sector.

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