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Geospatial Land Governance and Management through Digitalisation: A Study in Perspective to Real World's Land Developments in India

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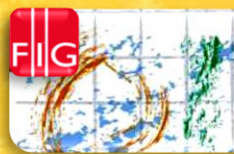


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Geospatial Info Digitalisation

- ❖ Geospatial information is forever related to geographic space. It signifies to immediate geographic world.
- ❖ Geographic space is the space of topography, land use land cover, cadastral, and other landscape features of geographic world.
- ❖ Geographic information systems technology is applied to manipulate objects in geographic space, and to obtain information from spatial facts (Goodchild, 1992).
- ❖ So, the geospatial information is a good definition of the space which is measured, described, and represented in its three dimensions and to be made available over and over again (Burrough and McDonnell, 1998).

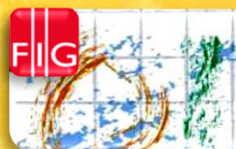


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Geospatial Digitalisation ...

- ❖ Geospatial data acquisition methods are as terrestrial GPS-surveys, aerial photogrammetry, satellite photogrammetry, laser scanning, photo interpretation, digital processing of remotely sensed images which are themselves competing each other in term of the excellence and expenses.
- ❖ These disciplines and technologies application must have been geared corresponding to the global, regional or local levels geospatial information digitalization for land resources mapping and management for solutions to the real world problems as land governance for betterment of humanity on this planet earth.
- ❖ Village Resource Centres (VRCs) – 461 in 22 states is the unique initiatives that uses Satellite Communication (SATCOM) network and Earth Observation (EO) satellite data in a judicious combination to address the needs of the local people in villages of the country, India.
- ❖ The cadastral mapping at the household's level of the villages is one of the important land resource mapping service connection with other services performed at the VRCs for land governance in the country, India.

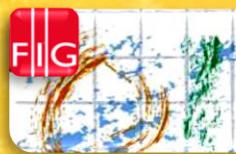


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Land Governance – Historical Background

- ❖ Land governance is a noteworthy matter of concern in the emerging economies and developing countries of the world like India.
- ❖ In agrarian economies, the land is most important assets of the people as *‘to own the land is the highest mark of esteem; to perform manual labour, the lowest’* (Myrdal, 1968).
- ❖ Genesis of the structure of power and authority in rural India can be traced to land over the centuries. There is an ever-changing relationship between land, power and people.

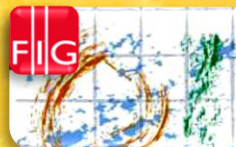


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Land Governance in Indo-Aryan Era

- ❖ RigVeda shows that among the Indo-Aryans, arable land was held in individual ownership or family ownership (Muller, 1949).
- ❖ The Land belonged to the person who cleared the forest and woodland and brought the land under cultivation.
- ❖ So, it appears that the principle of private property and private ownership of land has been recognised from ancient times, in India.
- ❖ Throughout the history, during the ancient period 1200 BC–1200 AD as well as during the recent period 1540 AD–1750 AD, the principal unit of land belong to village settlement, in India.
- ❖ Since land returns was the main source of state revenue, the village became the agency for collection and unit of revenue assessment.

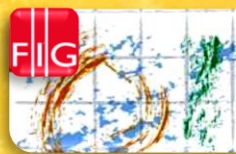


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Land Governance in British India

- ❖ The Britishers governed over land for long time, which is known as the colonial era, for over the centuries 1750 AD– 1947 AD over the country, India.
- ❖ The Permanent Settlement Regulation (PSR) in 1793 was introduced to record all rights in respect of land and to maintain an up-to-date record of land rights, which was completely failed to implement in the country.
- ❖ At the time of independence, in the country India, the land tenure systems preserved in three main categories, namely, the Zamindari, the Ryotwari, and the Mahalwari tenures. Each one of them were accounting about 57, 38 and 5 per cent of the total privately owned agricultural land.

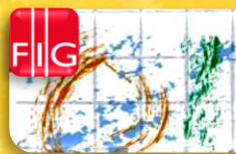


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Land Governance in Independent India

- ❖ The India became independent country of the world and adopted their own constitution on the 15th August 1947.
- ❖ For all round development of the country, the Planning Commission was set up by a Resolution of the Government of India in March 1950.
- ❖ The first Five-year Plan was designed and launched in 1951 and thereafter the two subsequent five-year plans were formulated till 1965, when there was a break because of the Indo-Pakistan Conflict.
- ❖ The Fourth Five-year plan was started in 1969. The Eighth Plan was finally launched in 1992 after the initiation of structural adjustment policies.

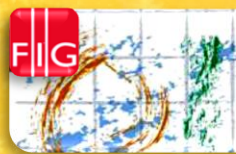


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Land Governance in Independent India

- ❖ During the first eight Plans the emphasis was on a growing public sector with massive investments in basic and heavy industries, but since the launch of the Ninth Plan in 1997, the emphasis on the public sector has become less pronounced and the current thinking on planning in the country, in general, is that it should increasingly be of an indicative nature.
- ❖ So, since the independence the main emphasis has been on industrialisation of the country, India. Because the agriculture has been treated as a symbol of economic backwardness. Along with the independence, however, the land reforms and agriculture development were paid more attention though the main focus during the plans was on the industrial sector development.

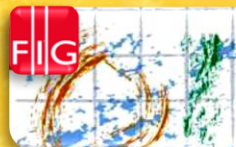


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Globalisation & Economic Development

- ❖ India is one of the fast developing and emerging economies countries of the world.
- ❖ There has been a continuous decline in the share of agriculture and allied sectors in the GDP from 14.6 per cent in 2009-10 to 13.9 per cent in 2013-14 at 2004-05 prices.
- ❖ Falling share of agriculture and allied sectors in GDP is an expected outcome in a fast growing and structurally changing economy.
- ❖ In order to keep up the momentum gained during the 11th Plan and achieve the targeted growth rate of 4.00 per cent during the 12th Five Year Plan have focused approach and schemes.

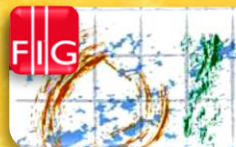


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Objectives of the Study

- ❖ Present research discover people's role in land governance, management and digitalisation for real world problems solutions for the country, India. In view of this, the main objectives of the present study are mentioned as follows:
 - i. to perceive historical background of land governance, management & digitalisation;
 - ii. to evaluate geospatial trends of natural resources utilization as land use land cover;
 - iii. to explore geospatial trends and patterns of agricultural land development;
 - iv. to examine geospatial trends and patterns of land governance by digitalisation;
 - v. to suggest suitable lessons learned from land governance and its management.
- ❖ So, the present research take into account the details of the issues and features of the land governance and management practiced over the periods since the beginning of the ancient time to the present in context to the national land development strategies while dealing with the latest plans and policies of the country, India.

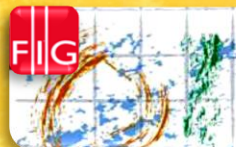


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Database of the Study

- ❖ Present study is based on the secondary data available from the different sources as the Agricultural Census, Agricultural Statistics, and Annual Reports etc. which are annually published by the Department of Agricultural and Cooperation, Ministry of agriculture and Ministry of Rural Development Government of India, Krishi Bhavan, New Delhi.
- ❖ Five Year Plans published by the Planning Commission, Government of India, Yojana Bhavan, New Delhi.
- ❖ National-level Land Use and Land Cover (LULC) mapping using multi-temporal Resourcesat-1 AWiFS data.
- ❖ LULC Atlas for India published by the National Remote Sensing Agency (NRSC), DoS, Govt. of India
- ❖ Information on wastelands and forests generated was also quantified during digitalisation of land use land cover mapping for the country, India as a whole by NRSC.

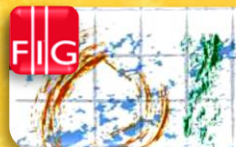


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Research Methodology

- ❖ Geospatial technologies are playing an important role in natural resources mapping, land governance and its management through big data digitalisation for sustainable development, at large.
- ❖ Indian Remote Sensing (IRS) satellite for different periods provides a variety of remote sensing-based solutions for all round development of the country as well as to the world.
- ❖ The Big Data computation requires statistical tools and techniques for summarization in form of final results. The empirical studies shows that there are statistical techniques used for land governance as Gini's Coefficient (GC) is used to measure the extent of concentration.
- ❖ This method measure of inequalities which is commonly used to gain an over-all view of the prevailing geospatial inequalities.

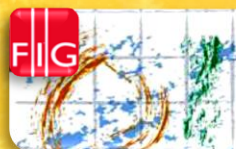


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Research Methodology ...

The statistical presentation of the equation used for calculation of the Gini's Co-efficient is described as follows:

$$G = \frac{1}{100 \times 100} = \left| \sum_{i=1}^n X_i Y_{i+1} - \left(\sum_{i=1}^n (X_i + 1 Y_i) \right) \right|$$

Where:

X_i and Y_i are the cumulative percentage distribution of the two attributes.

In other words, the X_i and Y_i are respectively the cumulative proportions of number of operational holdings and area operated up to the j th size class of holdings.

- ❖ So, the concentration of land holdings in terms of Gini's coefficient among different states have been worked out for the periods 1960-61, 1970-71, 1980-81, 1990-91, 2000-01, and 2010-11 for the country, India as a whole.

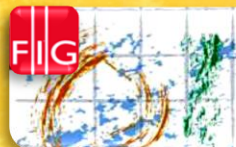


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Study Area

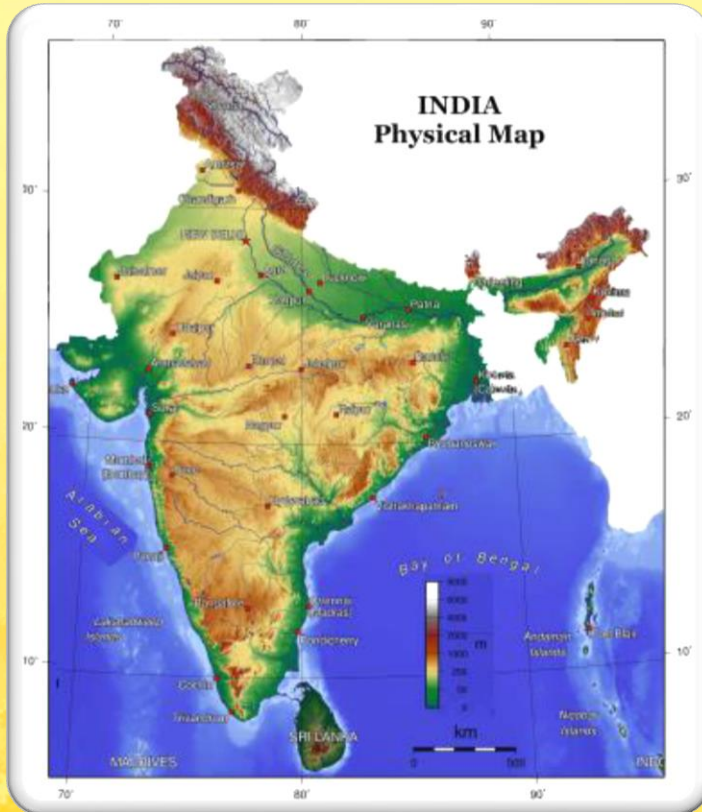


Figure 1: Physical Map, India.

Source: Col (2011) Census of India 2011, Primary Census Abstract, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

- ❖ India is situated to the north of equator, between the geographical extent of $08^{\circ} 04'$ and $37^{\circ} 06'$ north latitudes and $68^{\circ} 07'$ and $97^{\circ} 25'$ east longitudes.
- ❖ Physiographical features reveals that the lofty Himalayans covered with snow and glaciers are lying in the north.
- ❖ The Great Indo-Gangetic Planes with fertile land drained by navigable perennial rivers are lying below the Himalayas.
- ❖ The Peninsular India is geologically oldest stable landmass rich in mineral resources surrounded by seas as Arabian Sea, Bay of Bengal and Indian Ocean lying in the south as is evidenced by the Figure 1.

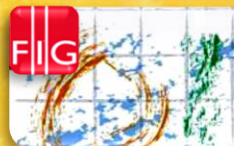


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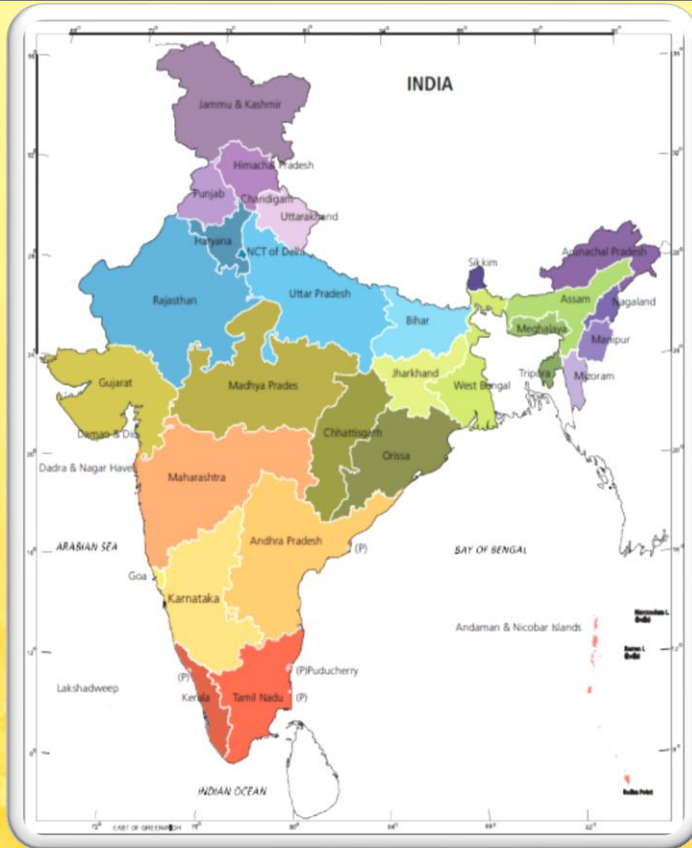


Figure 2: State level Divisions.

Source: Col (2011) Census of India 2011, Primary Census Abstract, Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India, New Delhi.

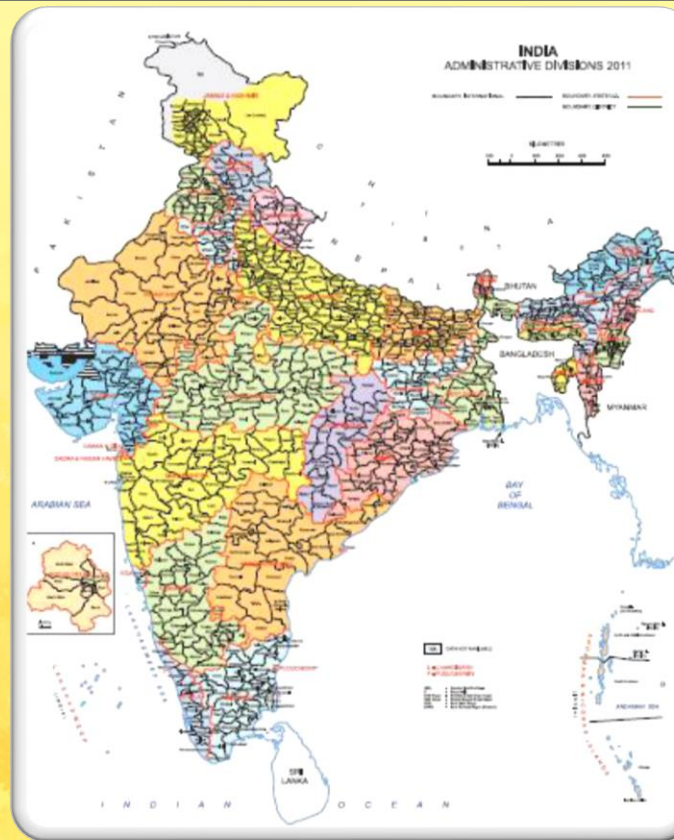


Figure 3: District level Divisions.

- ❖ Besides this, the States level as well as the districts level latest available administrative divisions at the states level and districts level based on the Census of India, 2011 are also presented in the Figure 2 and Figure 3, respectively.
- ❖ However, the Land information in terms of administrative divisions' statistics showed that there were 28 States which contains about 640 districts in 2011.
- ❖ Likewise, there were around 5,924 sub-districts which comprised by tehsils, talukas and blocks.
- ❖ In addition to this, there was a large number of villages which accounted for about 6,40,930 villages in the country, India during 2011.s

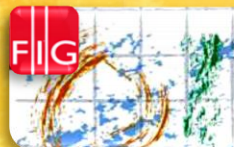


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Geospatial Trends of Land Utilisation

Sl No	Classification	1950-51	1960-61	1970-71	1980-81	1990-91	2000-01	2010-11	2011-12
I.	Geographical Area	328.7	328.7	328.7	328.7	328.7	328.7	328.7	328.7
II.	Reporting Area for Land Utilisation Statistics (1 to 5)	284.3	298.5	303.8	304.2	304.9	305.1	305.90	305.81
	1. Forests	40.48	54.05	63.92	67.47	67.81	69.62	70.01	70.02
	2. Not Available for Cultivation (A+B)	47.52	50.75	44.64	39.62	40.48	41.55	43.58	43.52
	3. Other Uncultivated Land Excluding Fallow Land (A+B+C)	49.45	37.64	35.06	32.32	30.22	27.71	26.16	26.10
	4. Fallow Lands (A+B)	28.13	22.82	19.88	24.75	23.36	25.03	24.60	25.38
	5. Net Area Sown (6-7)	118.8	133.2	140.3	140.00	143.00	141.2	141.56	140.80
	6. Total Cropped Area (Gross Cropped Area)	131.89	152.77	165.79	172.63	185.74	185.7	197.32	195.25
	7. Area Sown More Than Once	13.15	19.57	25.52	32.63	42.74	44.54	55.76	54.44
	8. Cropping Intensity *	111.1	114.7	118.2	123.3	129.9	131.6	139.0	138.7
III.	Net Irrigated Area	20.85	24.66	31.1	38.72	48.02	54.84	63.598	65.26
IV.	Gross Irrigated Area	22.56	27.98	38.2	49.78	63.2	75.82	88.630	91.53

❖ Natural resources in terms of the land use and land cover statistics for the periods beginning from 1950-51 to 2010-11 and 2011-12 is presented in the Table 1.

❖ It is evident that there is about 328.7 million hectares of geographical area or the land cover found exist since 1950-51 till to 2010-11, in the country, India

Table 1: Trends of Land Utilisation in India: 1950-51 to 2010-11 and 2011-12.

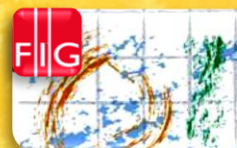


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Geospatial Trends of Land Utilisation ...

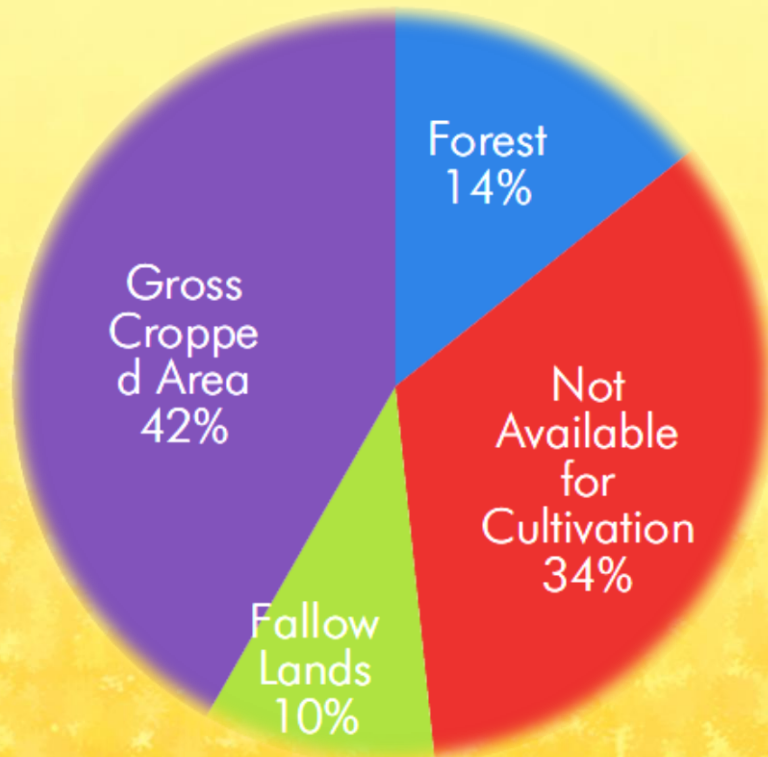


Figure 4: Land Use Land Cover: 1950–51.

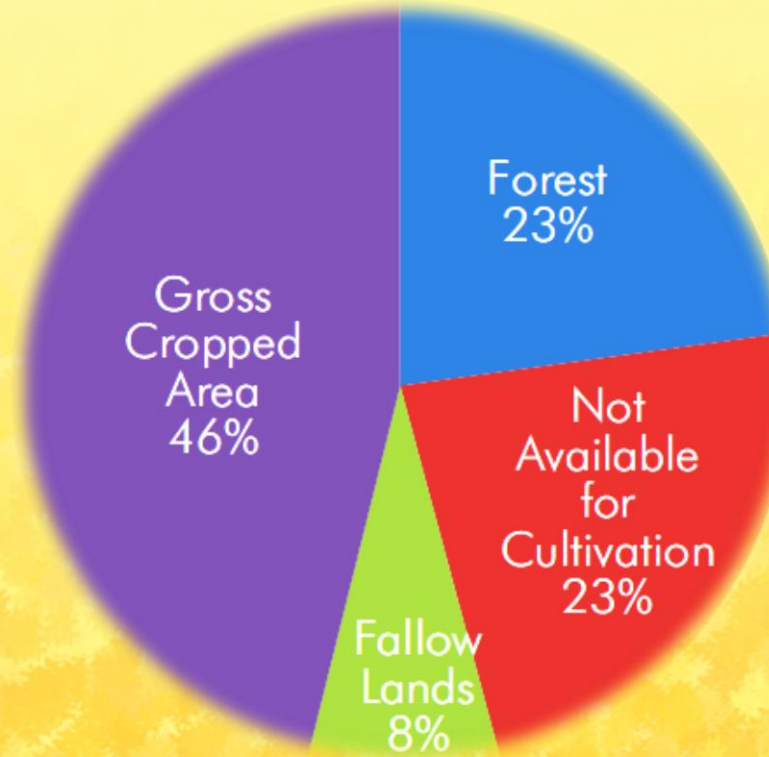


Figure 5: Land Use Land Cover: 2010–11.

There is found changing patterns of land use land cover over the periods beginning from 1950-51 till to 2010-11 in the country, as a whole which is also graphically evidenced by the Figures 4 and 5.

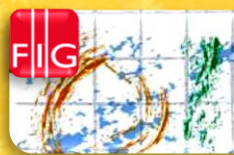


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Land Use and Land Cover

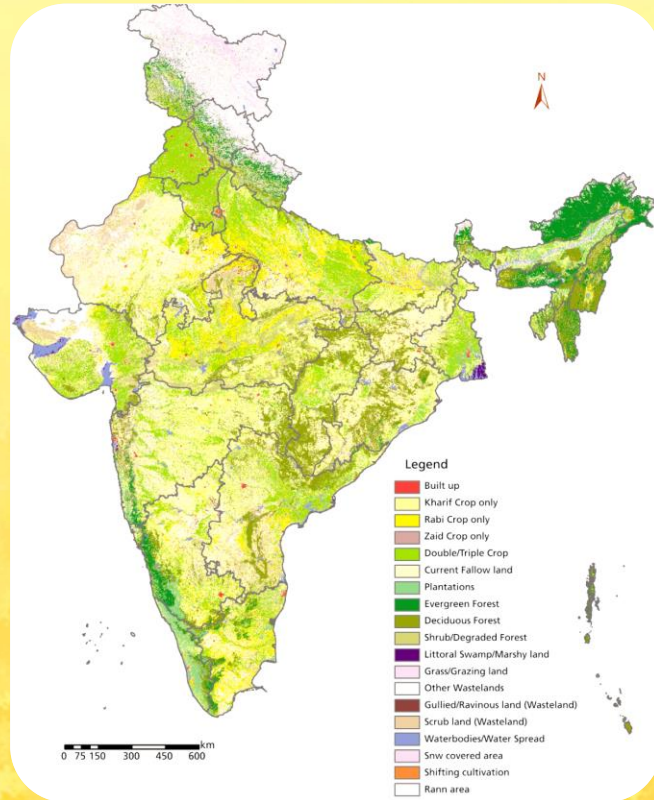


Figure 6: Land use Land Cover in India during 2007-08.

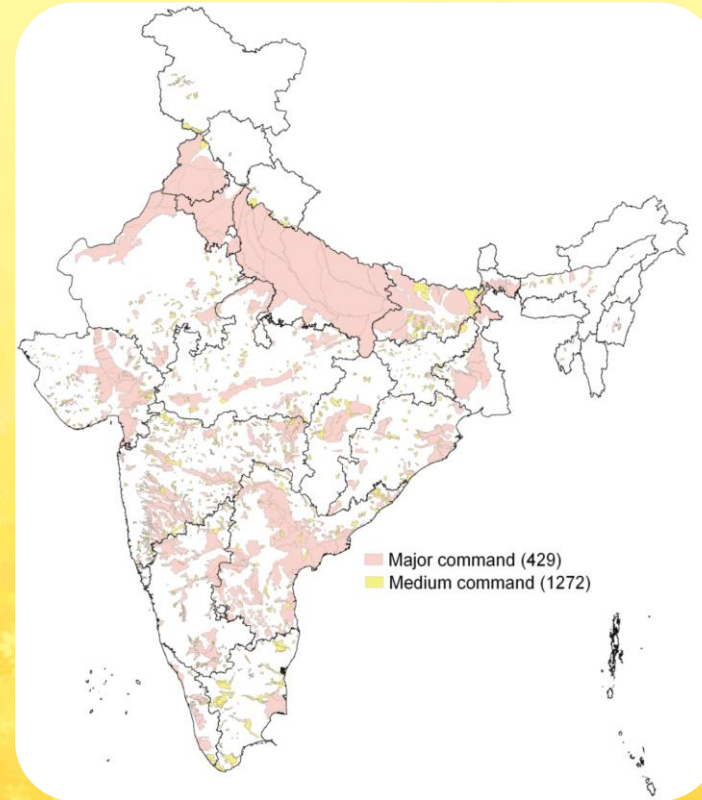


Figure 7: Major & Medium Irrigation Commands in India.

- ❖ National-level Land Use and Land Cover (LULC) mapping at 1:2,50,000 scale using multi-temporal Resourcesat-1 AWiFS data.
- ❖ Additionally, surface water bodies and snow/glaciers layer for entire country have also been generated.
- ❖ Number of major and medium irrigation commands are 429 and 1272, respectively.
- ❖ There are about 1701 major and medium irrigation commands covering 88895.620 thousand hectares, which is 27.04 per cent of the geographical area of the country, India.



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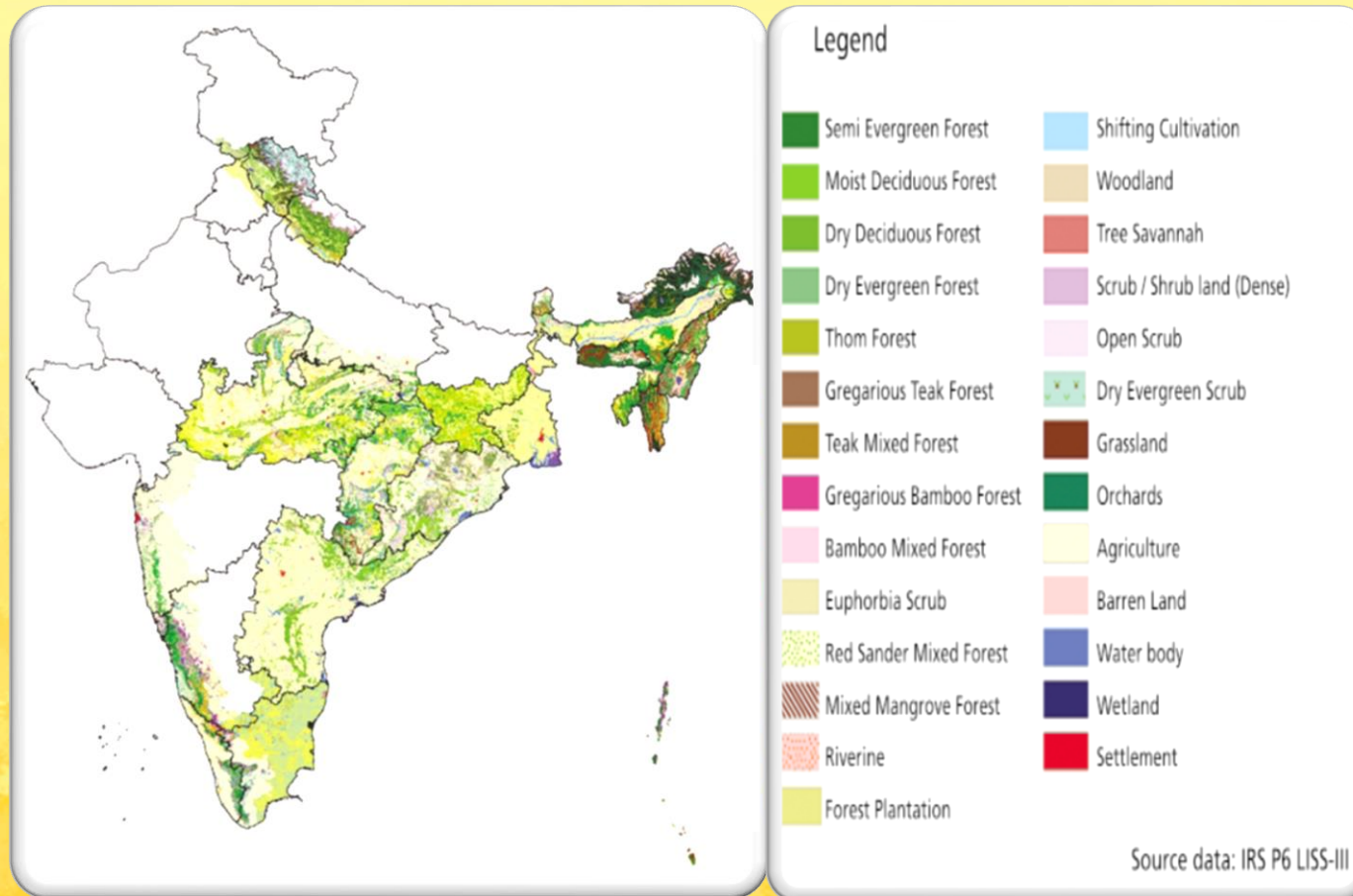
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Natural Vegetation Cover



- ❖ Vegetation type map provides information on spatial extent and distribution of single species dominated vegetation formations.
- ❖ The vegetation type maps also provide basic inputs for identification of species habitats.
- ❖ Vegetation type map will serve as a primary database for all types of ecological studies and would serve as benchmark for further studies.

Figure 8: Vegetation Types and Land Use in India during 2007–08.

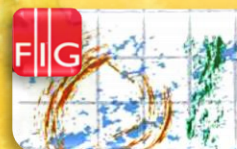


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Waterlogging & Soil Salinity

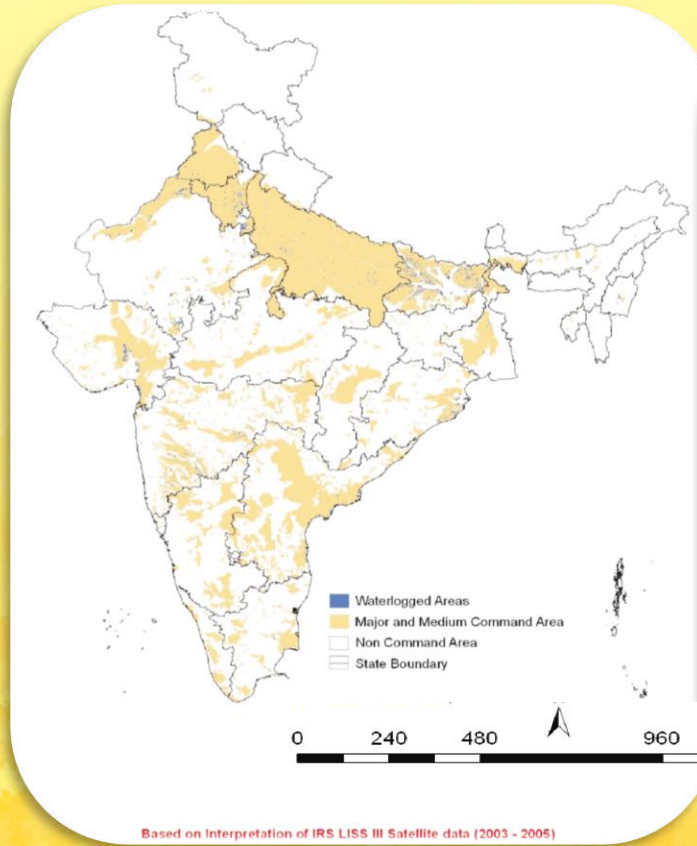


Figure 9: Waterlogged Area within Major & Medium Irrigation Commands in India.

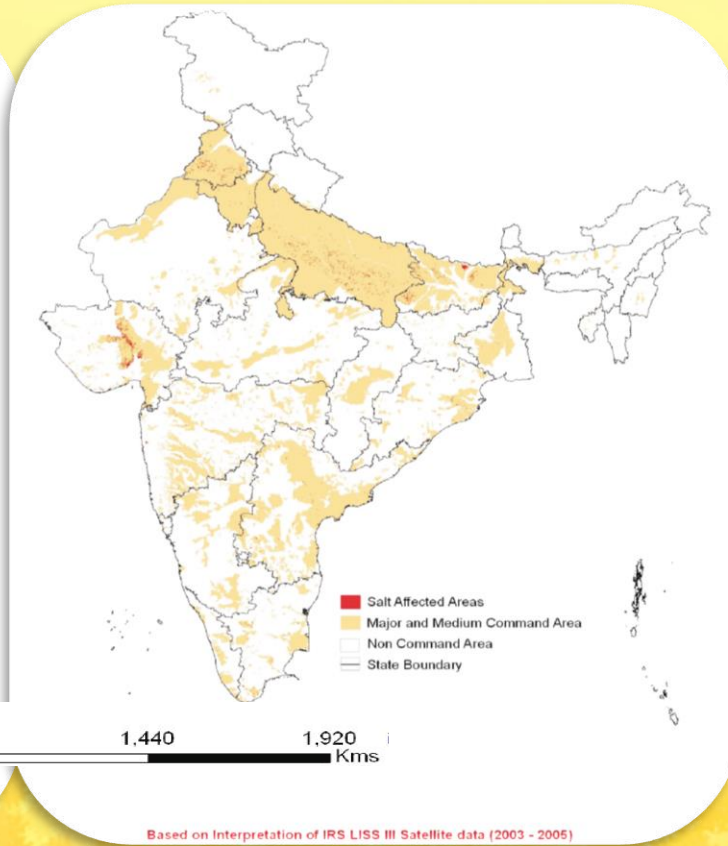


Figure 10: Salt Affected Areas within Major & Medium Irrigation Commands in India.

- ❖ Perennial and seasonal waterlogged areas have been mapped in this study.
- ❖ Land not available for cultivation due to waterlogging within major and medium irrigation commands in the country is 1719.279 thousand hectares which is 1.93 per cent of the command area.
- ❖ Perennial waterlogging covers 173 thousand hectares. Whereas seasonal waterlogging covers 1546 thousand hectares.
- ❖ Salt affected areas are lying in different states in the country within major and medium irrigation commands is 1034 thousand hectares which is 1.16 per cent of the command area. It covers 0.31 per cent of the geographical area of the country, India.

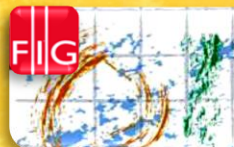


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Village Resource Centres – Cadastral Management

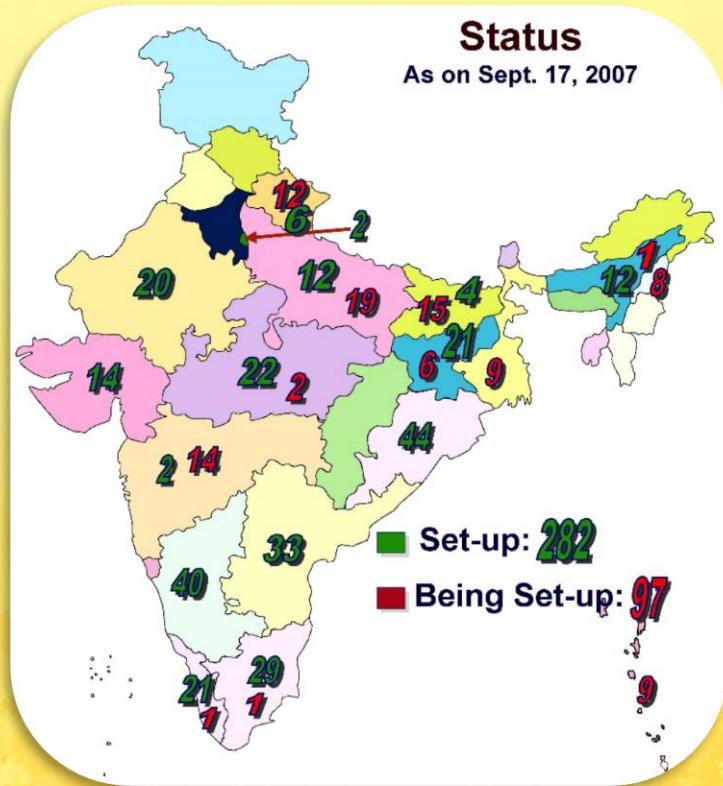


Figure 11: VRCs Centres in India



Figure 12: VRCs Satellite based Services

- ❖ Village Resource Centres (VRCs) is the unique initiatives that uses Satellite Communication (SATCOM) network and Earth Observation (EO).
- ❖ VRCs address the needs of the local people in villages of the country, India to reach out to the villages and provides cadastral mapping along with wide varieties of services.
- ❖ At present, there are about 461 village resource centres (VRCs) established in 22 states and union territories

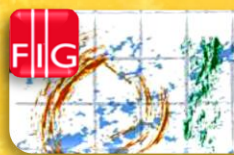


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Geospatial Trends of Agricultural Development

Five Year Plans	Duration	Year	Area	Production	Yield	% Area Irrigated
		1950-51	97.32	50.82	522	18.1
First Five Year Plan	1951-56	1951-52	96.96	51.99	536	18.4
Second Five Year Plan	1956-61	1956-57	111.14	69.86	629	18.2
Third Five Year Plan	1961-66	1961-62	117.23	82.71	706	19.1
Fourth Five Year Plan	1969-74	1969-70	123.57	99.50	805	23.7
Fifth Five Year Plan	1974-79	1974-75	121.08	99.83	824	26.5
Sixth Five Year Plan	1980-85	1980-81	126.67	129.59	1023	29.7
Seventh Five Year Plan	1985-90	1985-86	128.02	150.44	1175	31.4
Eighth Five Year Plan	1992-97	1992-93	123.15	179.48	1457	37.4
Ninth Five Year Plan	1997-02	1997-98	124.07	192.26	1552	40.8
Tenth Five Year Plan	2002-07	2002-03	113.86	174.77	1535	42.8
Eleventh Five Year Plan	2007-12	2007-08	124.07	230.78	1860	46.8
Twelfth Five Year Plan	2012-17	2012-13	120.16	255.36	2125	49.0

- ❖ Accordingly, the agricultural of any region is generally influenced by the number of factors such as the physical, institutional, infrastructural and technological factors.
- ❖ All these factors are individually or collectively responsible for the cropping patterns, level of agricultural development and agricultural productivity in an area or region.
- ❖ The institutional factors include the land tenancy, land tenure and land ownership.
- ❖ These factors have their performance on field size, field patterns, farming type, crop land use, crop association and productivity of crops.

Table 2: Trends of Agriculture Production in India: 1950-51 to 2010-11 and 2011 to 13.

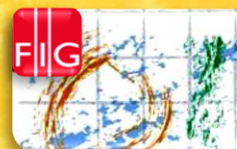


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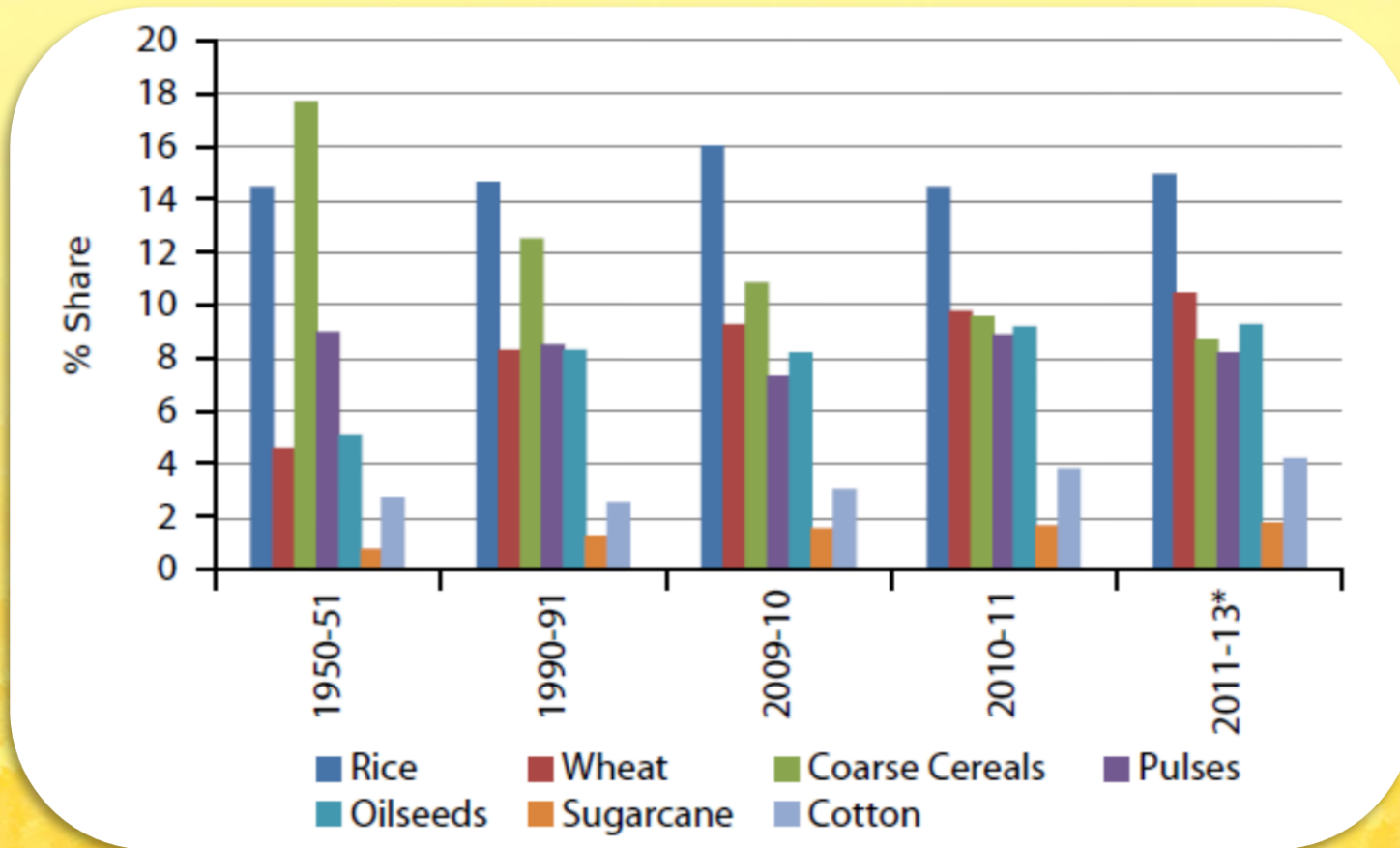
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Trends Land Use under Major Crops for India



- ❖ There was about 124.75 million hectares of area under cultivation in 1981-82 and the total output in that period was of 1,032 kgs. per hectare.
- ❖ It was resulted due to the green revolution during 1960's in the country, India.
- ❖ In continuation to this, there was recorded an increasing output, as it was about 2,079 kgs. per hectare achieved during the period of 2010-11.
- ❖ So, the trends of land use under major crops have also been found varying over the periods beginning from 1950-51 to 2011-13 as presented in the Figure 13.

Figure 13: Trends Land Use under Major Crops for India: 1950-51 to 2011-13.



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Land Governance – Operational Holdings

Category of Holdings	Number of Holdings			Area			Average Size of Holdings		
	2000-01	2005-06	2010-11	2000-01	2005-06	2010-11	2000-01	2005-06	2010-11
Marginal (Less than 1 hectare)	75408 (62.88)	83694 (64.77)	92356 (67.04)	29814 (18.70)	32026 (20.23)	35410 (22.25)	0.40	0.38	0.38
Small (1.0 to 2.0 hectares)	22695 (18.92)	23930 (18.52)	24705 (17.93)	32139 (20.16)	33101 (20.91)	35136 (22.07)	1.42	1.38	1.42
Semi-Medium (2.0 to 4.0 hectares)	14021 (11.69)	14127 (10.93)	13840 (10.05)	38193 (23.96)	37898 (23.94)	37546 (23.59)	2.72	2.68	2.71
Medium (4.0 to 10.0 hectares)	6577 (5.48)	6375 (4.93)	5856 (4.25)	38217 (23.97)	36583 (23.11)	33709 (21.18)	5.81	5.74	5.76
Large (10.0 hectares and above)	1230 (1.03)	1096 (0.85)	1000 (0.73)	21073 (13.22)	18715 (11.82)	17379 (10.92)	17.13	17.08	17.38
All Holdings	119931 (100.0)	129222 (100.0)	137757 (100.0)	159436 (100.0)	158323 (100.0)	159180 (100.0)	1.33	1.23	1.16

Table 3: Classification of Operational Holdings by Size Groups during 2000-01, 2005-06 and 2010-11

- ❖ The average size of agricultural holding in India is about 1.16 hectares in 2010-11.
- ❖ The Small & Medium holdings together accounted for about 84.97 per cent of the land holdings, respectively, in 2010-11 in the country, India as evidenced by the Table 3.
- ❖ Whereas the semi-medium holdings accounted for about 23.59 per cent of the land with holdings of 2.0 to 4.00 hectares in 2010-11.
- ❖ So, such marginal and small land holding are not seems to be viable economically.



Concentration Trends Operational Holdings

- ❖ In order to comprehend the trends of operational land holdings, the Gini's coefficient of concentration is used to obtain an overall measure of concentration in the size distribution of operational holdings for the country, India.
- ❖ The Gini's Coefficient values computed shows an increasing trends of the concentration of operational land holdings over for the periods 1960-61, 1970-71, 1981-82, 1990-91, 2000-01 and 2010-11 as presented in Table 5.
- ❖ In lieu of this, there is found an increasing trends of concentration at the states level in the country as is evidenced by the Gini's coefficient values which shows the degree of concentration in operational holdings which increased since 1960-61. Later on, such increasing trend has been slowed down since 1990-91 and further continued to decreasing over period's up to 2010-11 as evidenced by the Table 5.

Periods	1960-61	1970-71	1980-81	1990-91	2000-01	2010-11
Gini's Coefficients	0.583	0.586	0.629	0.641	0.624	0.602

Table 5: Trends in Gini's coefficient of concentration of operational holdings in India.

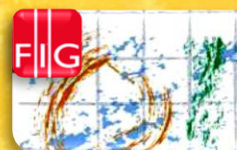


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Geospatial Concentration Patterns – Holdings

States	1970-71	1980-81	1990-91	2000-01	2010-11
Andhra Pradesh	0.582	0.573	0.529	0.543	0.567
Assam	0.388	0.465	0.412	0.366	0.413
Bihar & Jharkhand	0.511	0.534	0.525	0.421	0.456
Gujarat	0.518	0.544	0.573	0.605	0.621
Haryana	0.436	0.571	0.645	0.675	0.698
Karnataka	0.509	0.562	0.577	0.543	0.556
Kerala	0.483	0.449	0.392	0.348	0.392
Madhya Pradesh & Chhattisgarh	0.508	0.520	0.533	0.527	0.565
Maharashtra	0.514	0.570	0.570	0.526	0.587
Orissa	0.466	0.504	0.462	0.381	0.432
Punjab	0.398	0.685	0.694	0.706	0.784
Rajasthan	0.599	0.551	0.590	0.610	0.589
Tamil Nadu	0.480	0.555	0.527	0.508	0.539
Uttar Pradesh & Uttaranchal	0.471	0.520	0.498	0.450	0.478
West Bengal	0.433	0.494	0.430	0.313	0.392
India	0.567	0.596	0.591	0.557	0.587

- ❖ There is found an increasing trends of concentration at the states level in the country as is evidenced by the Gini's coefficient values which shows the degree of concentration in operational holdings which increased since 1960-61.
- ❖ Later on, such increasing trend has been slowed down since 1990-91 and further continued to decreasing over period's up to 2010-11 as evidenced by the Table 6.

Table 6: Gini's coefficient of concentration of the size distribution of operational holdings by States.

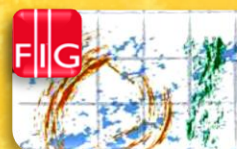


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Conclusions and Suggestions

- ❖ Geospatial land governance and management through digitalisation is a noteworthy matter of concern in the emerging economies and developing countries of the world, like India.
- ❖ In agrarian economies, the land is most important assets of the people. Besides this, 'to own the land is the highest mark of esteem; to perform manual labour, the lowest'. There is an ever-changing relationship between land, power and people.
- ❖ Ancient records show that, among the Indo-Aryans, arable land was held by family ownership. Later on, during the periods 1200 BC–1200 AD and AD 1540–1750, the principal unit of land settlement was the village.
- ❖ British governed the land from 1750 to 1947. During this period, the Permanent Settlement Regulation was introduced to record all rights in respect of land in order to maintain an up-to-date record of land rights, but this remained unsuccessful. So, such was the beginning of land record digitalisation at different levels in the country, India.

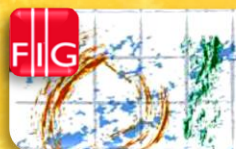


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Conclusions and Suggestions

- ❖ Since the country's independence, there has been an emphasis on the implementation of consecutive Five Year Plans addressing agriculture and related economic activities.
- ❖ In India, about 58.40 per cent of the labour force is employed in agriculture and allied activities for their livelihood in 2001. Land accounts for more than 50.12 per cent of the total assets of rural households. India is one of the world's rapidly developing and emerging economies.
- ❖ There has been a continuous decline in the share of agriculture and allied sectors in its gross domestic product (GDP), from 14.60 per cent in 2009–2010 to 13.90 per cent in 2013–2014 (at 2004–2005 prices), which is an expected outcome for a fast-growing and structurally changing economy.

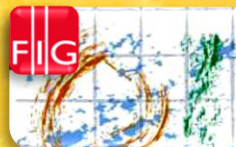


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Conclusions and Suggestions

- ❖ The main objective of land reform is to provide social justice for the people, particularly the cultivators, land owners, landless labourers, and rural populations.
- ❖ The main directives of land reforms are the abolition of intermediaries; land tenancy reforms; rent control reforms; ceilings on land holdings; consolidation of land holdings; security of land holdings tenure; reversal of forced evictions and relocations; women's land and property rights; and computerisation of land records.
- ❖ In addition to this, land digitalisation process is strengthened and speed-up with establishment of Village Resource Centre's (VRCs) for cadastral mapping and its connection with other services with the remote sensing satellite communication facilities provided by the National Remote Sensing Centre of the Department of Space of the Govt. of India.
- ❖ With the implementation of the land reform program, a certain specified limit of land belonging to landlords was set, and the rest would be taken over by the state..

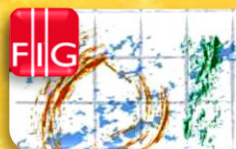


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Conclusions and Suggestions

- ❖ Kerala and West Bengal States, where rigorous implementation of tenancy legislation took place, have been successful role models of tenancy reforms for the country, India.
- ❖ Land reforms are connected with the right to life and livelihood of a huge rural population. The government is obliged to protect farmers' land rights.
- ❖ Chronological analysis of the past 11 Five Year Plans makes it clear that, since the inception of the Planning Commission, industrialisation has been equated with development.
- ❖ Agricultural sector has always been a secondary priority in different plans. It must be noted that a majority of people living in rural areas have remained untouched by the trickle-down effect of industrialisation.
- ❖ Consequently, the land reform has been focal point of the country's political and economic agenda. This also lays a sound foundation for growth, to enable India to compete in the global market.
- ❖ Thus, lessons learned from the experiences of India will also help other developing countries and in the global fight against hunger and poverty.

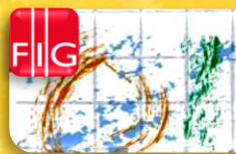


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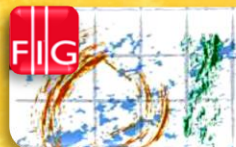


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Thank You

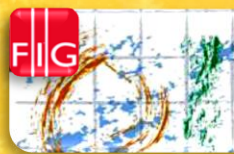


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