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**A SPATIO - TEMPORAL ANALYSIS OF
ORGANIZATIONAL SET-UP OF INDIAN
GEOGRAPHY – A STUDY OF VAST INDIAN
GEOGRAPHICAL STRUCTURE**

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A Spatio - Temporal Analysis of Organizational Set-Up of Indian Geography – A Study of Vast Indian Geographical Structure

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Abstract – Environmental issues now occupy a significant place in academic discourse and activism alike. Situation of India with regard to environmental crisis and resource depletion is deepening in the wake of rapid changes brought about by the new regime of economic liberalization and penetration of transnationals. However, few geographers have been able to take a holistic view of environment. Vulnerability is the key to our understanding that attempts to break from all-too technocratic agenda that have characterised relationship between human societies and their environments over previous centuries. There is a serious lack of integrated techniques and approaches to study vulnerable environment. There is a need to identify challenges and opportunities for improving human well-being through vulnerability analysis of different ecosystems and community groups. While application of GIS and remotely sensed data can make a world of difference, few seem to have undertaken meaningful research using this important tool. There is a dearth of empirical studies evaluating the impact of the current phase of liberalization and globalization on the environment and resources both at national and local levels.

Keywords: GIS, Significant, Situation, Relationship, Integrated Techniques, Environment, and Ecosystems.

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INTRODUCTION

State of the Art

Indian geography claims a substantial segment of the national academic space. If one goes by the numerical strength of the geographical community in terms of students admitted to various geography programmes in different universities and colleges and the strength of the faculty, Indian geography has certainly made impressive gains during the past eight decades. More geographers now attend summits, workshops seminars symposia and conferences in geography both at national and international level. Yet, Indian Geography does not feature prominently in the international arena. This is despite attempts to include every possible change in the development of the subject into the geography curriculum. Geographers in India have been alive to every new tool and technique that has appeared on its door step. Yet, the geographical enterprise has failed to reap dividends nationally or internationally.

Teaching and research in Geography is channelized through a large number of geography departments spread all over the country. The period under review

has witnessed establishment of many new departments of geography particularly in the North-Eastern region of India. But the inherent dichotomy in nature of geography continues to affect its position in the highly structured university system that treats the subject either as a natural science or as a social science. The placement of geography in the university system continues to baffle generations of students. Geography continues to be placed under the faculty of sciences in many universities enabling them to procure funds and projects from funding agencies as well as to establish laboratories. On the other hand departments which are placed under arts/social sciences continue to be eternally starved of funds for their minimal needs. This has created not only inequality between departments of geography, but also affects the quality of teaching and research. Private universities which have come up in large numbers in recent years have largely ignored geography as a serious area of teaching and research. Even some of the traditional departments of geography which have made significant contribution in geography teaching and research have (or are in the process of) begun to cultivate new techniques such as geo-informatics on the wake of advances made in GIS and Remote Sensing technology. A

number of geography departments now proudly display on their websites courses on GIS, Remote Sensing and Geo-informatics. There is nothing wrong in this trend except that an impression has gathered about a new image of geography as cultivation of these techniques. Many researchers now find it prestigious to add suffix-using GIS techniques- to the title of their research papers. Geography teaching and research is transforming in many departments to aggressively accommodate itself to this new trend. Yet there are many geography departments in universities and colleges which lack even computers to do word processing. Such is the state of affairs in geography that occupies a substantial segment of the national academic space.

Table 1-3 give an idea of the organizational set-up of Indian geography. There are many associations of geographers in the country-some very old and some relatively new-but there is no national council of geographers to coordinate their affairs. There are equally large numbers of journals published in geography, but few publish refereed research. This has seriously hampered maintenance of quality. The University Grants Commission made some effort in developing a Geography curriculum but it has not met with much success. There is an urgent need to reorient the curricular programme in geography keeping in view the spirit of the changing times.

IGU ACTIVITIES IN INDIA

The following major events concerning IGU in India took place during 2004-2008:

1. IGU Commission Session on LUCC and Biogeography and Biodiversity during Indian Geography Congress at Bangalore University. Bangalore November 2005.
2. 1st International Indian Geography Congress and IGLJ Initiatives on Culture. Civilization and Human Development, Osmania University, Hyderabad October 5-7, 2006.
3. IGU Seminar on Biogeography and Biodiversity at H. N. B. Garhwal University, Srinagar May 3-4, 2007.
4. IGU Seminar on Land Use and Land Cover Change and Agro-biodiversity, Lucknow University, March 7-8, 2008
5. Future Meeting: IGU Conference on Land Use Change, Biodiversity, and Climate Change at Marthandam. Kanya Kumari District, Tamil Nadu during October 6-7, 2008.

Indian Geographers working on IGU Commissions/Commonwealth Bureau

The following members are currently working as members of the IGU Commissions/commonwealth bureau.

1. Dr. R.B.Singh, University of Delhi, Member-IGU Commission on Land Use and Cover Change (LUCC) and South Asian Focal Point-IGU Initiative-Culture and Civilisations for Human Development.
2. Dr. T.V asanthakumaran, University of Madras, Member-IGU Commission on Geographical Information Systems.
3. Dr. S.K. Agarwal, University of Delhi, Member IGU Commission on Health and Environment.
4. Dr. M.M.D as, Member (South Asia), Managing Committee of the Commonwealth Geographical Bureau.

COLLABORATIVE PROGRAMMES

The period under review is marked by an accelerated pace of collaboration between different departments of Geography located in India and in other countries. A brief account is presented below though the list could be bigger:

University of Delhi

Members of the faculty, Department of Geography. University of Delhi have collaborated with different international institutions, notably (a) on Shastri Applied Research Project (SHARP) on Role of Public, Private and Civil Sectors in Sustainable Environment Management in collaboration with University of Manitoba and the University of Winnipeg, Winnipeg, Canada (b) ICSSR –Indo-Dutch Programme on Alternative in Development (TDPAD) on Environmental Implications and its Socio-Economic Implications in Rural-Urban Fringe with University of Groningen, The Netherlands (c) CIDA-SICI Partnership Project-II on Urban Development and Environmental Impacts in Mountain Context, with University of Manitoba, Canada (d) DFID Research Project on Enhancing Food Chain Integrity... Pollution Impact on Vegetable System in Pen-Urban Areas. Collaboration with Imperial College. London. UK. And (e) A Research Project on Water in Delhi with the University of Koln. Germany.

Gauhati University

International Collaboration with (i) Centre for South East Asia Studies, Kyoto University. Japan and (ii) Graduate School of Asian and African Studies, Kyoto University. Japan in the field of 'Agro-Ecosystem and Sustainable Development in the Brahmaputra Valley, Assam'.

Jawaharlal Nehru University

The Centre for the Study of Regional Development has developed collaboration with (a) York University Toronto, Canada, on a CIDA-SICI Project on Development Induced Displacement (b) Institute of Social Sciences, Paris, France on Urbanisation and (c) Austria on Spatial Information Technology

University of Madras

An Adaptive Ecosystem Approach to Managing Urban Environments for Human Health (a Study of Toronto and Hamilton in Canada and Chennai in India), funded by the Social Sciences and Humanities Research Council of Canada.

North-Eastern Hill University

Indo-Polish Collaborative Research Program under DST (New Delhi)-and KBN (Warsaw, Poland) to investigate Run off, Rainfall and Soil Loss in Cherrapunji Area, Meghalaya Plateau (III Phase)

Panjab University

The Department has an academic exchange with University of Pecs, Hungary spanning over two decades. The Department is also starting two new courses namely One-Year Diploma in Geoinformatics and a Two-year Masters degree course in Geographic Information Systems and Science in collaboration with Centre for Geoinformatics. University of Salzburg, Austria.

University of Pune

MOU signed between Department of Geography. University of Pune and Center for spatial Information science, University of Tokyo, Japan in 2005.

Tripura University

Innovative research methods and technologies for the multispatial/multitemporal analysis of landslides in mountain regions, the prevention and awareness of related natural hazards and risks's with Prof. Marco Giardino of The University of Torino. Italy.

Table I. Major Departments of Geography

Aligarh Muslim University, Aligarh Banaras Hindu University, Varanasi Bangalore University University of Bombay University of Delhi University of Gorakhpur Magadha University Karnataka University Govt. M.L.B. (PG) College. Jiwaji University, Gwalior University of Sagar, Sagar Rajasthan University, Jaipur Patna University, Patna Gujarat University, Ahmedabad Punjab University, Patiala Madurai-Kamaraj University, Madurai Himachal University, Shimla JNV University, Jodhpur Dharwad University North Eastern Hill University, Shillong University of Jammu Tripura University, Agartala Mizoram University, Aizawl	University of Allahabad University of Calcutta University of Madras University of Burdwan Sri Krishna Devaraya University Utkal University, Bhubaneswar Panjab University, Chandigarh Gauhati University, Guwahati Kurukshetra University Jamia Millia Islamia, New Delhi Ranchi University Sri Venkateswara University, Tirupathi Kashmir University, Srinagar Shivaji University, Kolhapur M.D. University, Rohtak M.L. Sukhadia University, Udaipur North-Bengal University Nagaland University, Kohima Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi Rajiv Gandhi University, Itanagar Manipur University, Imphal
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Table 2. Major Geographical Societies

The Indian Geographical Society, Madras (F-1926)
Geographical Society of India, Calcutta (F-1936)
The Aligarh Muslim University Geographical Society, (F-1948)
The National Geographical Society of India, Varanasi (F-1955)
Allahabad Geographical Society (F-1958)
The Deccan Geographical Society, Secunderabad (F-1962)
National Association of Geographers, India, Delhi (F-1978)
Rajasthan Geographers' Association
The Association of North Bengal Geographers
The Association of Panjab Geographers, Chandigarh
Geographical Society of the North-Eastern Hill Region, India; Shillong
North-East India Geographical Society, Guwahati

Table 3. Major Geographical Journals Published from India

The Geographer Department of Geography, Aligarh Muslim University Aligarh-202002
 Geographical Review of India University of Calcutta Ballygunge Circular Road Calcutta-700019

Annals of the National Association of Geographers, India (NAGI), Department of Geography, Delhi School of Economics, University of Delhi Delhi-110007

Indian Geographical Journal Department of Geography University of Madras Chepauk Madras-600005

Transactions of the Institute of Indian Geographers Department of Geography University of Poona Pune-411007

The Deccan Geographer Subhadra Bgavan 120/A Nehru Nagar East Secunderabad-500026

National Geographical Journal of India Department of Geography Banaras Hindu University Varanasi-221005

The Hill Geographer Department of Geography North Eastern Hill University, Shillong-793022

The North-Eastern Geographer Department of Geography Guwahati University Guwahati-781014

The Panjab Geographer, Department of Geography, Panjab University, Sector 14, Chandigarh- 160 014

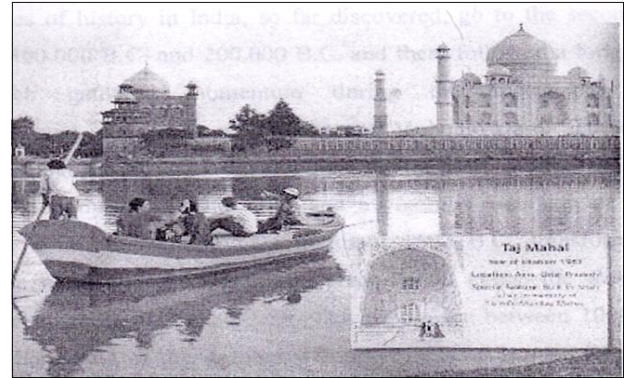
A GEOGRAPHICAL INCREDIBLE INDIA

Introducing Natural and Cultural Heritage

India is a country with amazing geographical diversity together with plurality in language, religion, culture and ethnicity. It is a country of second largest human resources of the world with a population of more than 1027 million people supporting nearly 16.8 per cent of world's population. From the mountains of the Himalaya in Kashmir to the sea coasts of Kanyakumari and from the Thar deserts of Rajasthan to the humid forests of the north-east, India displays her wealth of diversity in cultures, religions, fairs and festivals. Indeed, India is a unity in diversity. The country extends up to 3200 km from south to north and 3000km from east to west covering 32, 87,263 sq.km. Geographical mosaics of India include:



- i. Northern Himalayan Mountain incorporates typical land use Jhum and unique trans-humance practice together with varied cultural groups including a variety of tribes.
- ii. Two coasts of the Peninsula with rich biodiversity, estuaries and backwater ecosystem and dependent social groups like fishing communities.
- iii. Diverse humid to arid climates, varied rainfall and related production system, crop calendar and life cycles.
- iv. Extensive Indus-Ganga-Brahmaputra alluvial plains in the north exhibiting continuation of traditional unique socio-economic interaction such as Jajmani system.
- v. Rising million-cities like Delhi, Agra, Kolkata, Mumbai and Bangalore containing within them most modern to cultural heritage and most traditional land uses together with worst form of visible poverty in the form of slums.



- vi. Plateau characterized by steppe to savanna and humid meso-thermic forests and dependent indigenous people on minor forest products
- vii. Delta in the coastal regions of the eastern sea with typical mangroves and wetlands.

HISTORICAL DEVELOPMENT AND CIVILIZATION

The Name India is derived from Sindhu (Indus), the great river in the north-west. In traditional and legendary Hindu literature, India is called Bharatkhanda; and sometimes called Jambudvipa—one of the seven concentric legendary islands comprising.

The earliest traces of history in India, so far discovered, go to the second Inter- Glacial period between 400000 B.C. and 200,000 B.C. and there followed a long period of slow evolution. which gathered momentum during the spectacular Indus Valley Civilization excavated in the sites of Harappa and Mohenjo-Daro. These two sites bear testimony to the magnificent urban development dating back to 3000 B.C. The Harappan culture had declined by about 1700 B.C. and a vigorous incursion of the Indo-Aryan speaking people from the Middle East in about 1500 B.C. transformed the cultural landscape of the north-western India. The great Hindu epics, the Ramayana and the Mahabharata depict these historical events that took place between 1000-700 B.C. The Aryavarta —the homeland of the Aryans— was ruled by the Mauryan Kings and others in the Ancient period (321-185 B.C.) and the Mughals in the medieval period (1526-1712 A.D.) followed by the British rule until 15th August 1947. Urbanisation received a major spurt during the medieval and the modern period which witnessed the emergence of a large number of towns and cities as eminent centres of economic, cultural, social and religious diffusion.

PHYSICAL LANDSCAPE

The geological history of India started with geological evolution nearly 4.57 billion years ago. Indian geological formations consist of the Deccan trap, the Gondwana and the Vindhyan and those that originated

in Pleistocene, Tertiary and Pre-Cambrian periods. Conventionally the country is divided into three physiographic regions viz., the Himalaya and associated mountain chain, the Indus-Ganga-Brahmaputra plains and the Peninsular plateau including the coasts and the islands. The Himalayan Mountain covers about 5, 00,000 sq kms of land and extends over 2500 kms from the Karakoram in the west to the Myanmar in the east. Its width is about 240 kms. World's 14 highest peaks and few large rivers are located in the Himalaya. Indus-Ganga-Brahmaputra plains located in the northern part of the country, extends for 3200 kms from the River Indus in the west to Brahmaputra in the east. Its width varies between 150-300 kms. The senile peninsular plateau in the south is triangular in shape and has some of the oldest mountains of world with elevation varying between 600 and 800 mts. The Islands include Lakshwadeep (36 coral Islands) and the Andaman (200 Islands) and Nikobar (19 Islands). The soils in India fall into seven categories, namely the alluvial soils, Black soils, Red soils, Laterite soils, Forests soils, Mountain soils and Desert soils.

CLIMATE AND WATER RESOURCES

India is situated in the Northern hemisphere and the tropic of cancer divides the country into roughly two equal parts. The southern part enjoys a low temperature range while the North is cold in winters and warm for greater part of the year exhibiting much greater range in its temperature. Though generally described as a tropical country, India experiences varied climatic conditions in different regions. The north is more affected by a continental climate while the south has more maritime influence (Arabian Sea, Bay of Bengal and Indian Ocean). Much of the rain is a gift of the monsoon and is primarily orographic. The annual rainfall of 116 cms is only marginally higher than the global mean of 99 cms. Spatial distribution of rainfall in India is characterized by great unevenness. While Mawsynram, located in the southern face of Meghalaya plateau receives the highest annual rainfall in world, India also has one of the driest regions of world i.e. Jaisalmer located in the western part of the country. Generally rainfall decreases from east to west.

India has 4 percent of the freshwater reserve of the world. The annually 'replenishable' groundwater has been estimated at 432 billion cubic meters (BCM). The Ganga basin has the highest potential followed by the Godavari and the Brahmaputra. The Indo-Gangetic alluvial plain with an area of around 25,000 km² is one of the largest groundwater reservoirs in the world. Of the total groundwater of India, only 30 per cent has been harnessed. Overuse of groundwater in almost all the states of India has led to ground water depletion in large parts of the country. In certain areas, like Punjab, the level of groundwater exploitation is over 98 per cent.

India is rich in terms of surface water wealth. It has some of the largest rivers of world e.g. the Brahmaputra (2900 Kms), the Indus (2800 kms) and the Ganga (2525 Kms). Besides, there are many other large river basins, with basin area of more than 20,000 km². Some of its lakes are internationally known e.g. Chilka, Wular, Sambhar etc. Rainfall is the main source of surface water in India. It receives about 4000 BCM of water from precipitation. Of this, monsoon rainfall accounts for about 3000 BCM. The total utilizable water is about 690 BCM in the country.

India is one of the most disaster prone areas of world. Nearly 57 per cent of the country's land is prone to earthquakes included in the seismic zones III-IV. About 8 per cent of the land is vulnerable to cyclones of varying intensity. About 68 per cent of the net sown area and 5 per cent of the total land are vulnerable to droughts and floods (40 million ha). India alone accounts for 20 per cent of the deaths caused by floods in the world.

FORESTS, BIODIVERSITY AND LAND USE

Great variation in climatic conditions has given appearance to variety of forest types including tropical and sub-tropical forests in the Western Ghats and eastern Himalaya, temperate and alpine forests in central and western Himalaya and desert forests in the arid and semi-arid regions of the country. According to Forests Survey of India (2003), about 6, 78,333 km², constituting 20.64 per cent of its geographical area is under forest cover in the country. Very dense forest (VDF) however accounts for only 1.56 per cent while the moderately dense forest (MDF) and open forest account for 10.32 per cent and 8.76 per cent respectively. The total forest and tree cover of the country is estimated to account for 23.68 per cent of the country's land.

India contains a great wealth of biodiversity in its forests, wetlands and marine areas. The country has 7 per cent of the mammals, 12.6 per cent birds, 6.2 per cent reptiles, 4.4 per cent amphibians, 11.7 per cent fishes and 6 per cent flowering plants of the world. Among plants, endemism is estimated as 33 per cent. India contains 172 species (2.9 per cent of world's total) of animals considered globally threatened species. The Western Ghats and eastern Himalaya are biodiversity hotspots. The faunal species of India is estimated to be about 81,000, representing about 6.4 per cent world's fauna. Besides other invertebrates, there are about 2546 fish species, 204 amphibians, 428 reptiles, 1228 birds and 372 mammals. About 4,900 species of flowering plants are endemic to the Indian subcontinent. Among the endemic species, 2532 species are found in the Himalaya and adjoining areas, followed by 782 species in Peninsular India. About 1500 endemic flowering species are facing varying degree of threats of extinction. The number of plant species in India is estimated to be over 45,000 representing about 7 per

cent of world's flora. India is home to 14 biosphere reserves, of which 3 are in the world network of biosphere reserve viz. Sundarban, Gulf of Mannar. and Nilgiri.

Agriculture is the backbone of Indian economy. Agriculture and allied sectors like forestry, logging and fishing accounted for about 16 per cent of GDP and employed about 60 per cent of India's population. About 43 per cent of total geographical area of the country is used for the agricultural practices. Despite a steady decline of its share in the GDP, agriculture remains largest economic sector and plays a significant role in the overall socio-economic development of India. Indian agriculture is dependent on monsoon and is called "Gamble of Monsoon". Among the non-food crops, oilseeds, fiber crops, several plantation crops and forage crops are important. Rice and wheat are the principal food crops grown over the large tract (about 70 per cent of agricultural land) of ne country.

ECONOMY AND DEVELOPMENT

According to 2001 Census, a little over 27 per cent of India's population lives in 5161 urban centres. Going by the world average of 47 per cent living in urban areas, the share of urban dwellers is rather small, but in terms of total size, the urban population is huge by any measure. At least three cities namely Mumbai (16.37 million), Kolkata 13.22 million) and Delhi (12.79 million) contain a population size of over ten million persons. More than a million people reside in as many as 35 cities of India. The cities of India are a paradox in themselves displaying urban features comparable to any developed country and simultaneously retaining poverty and squalor as evident in the presence of slums supporting over 40 million people.

The country however has made streruous strides in achieving rapid development of its industrial base from traditional iron & steel, cotton, jute and sugar to engineering. computer, information technology, communication and biotech industries. However, poverty continues to be a major hurdle in faster socio-economic transformation. The National Sample Survey for 2004-05 estimates rural poor at 28.3 per cent and urban poor at 25.7 per cent of the respective population. The Five Year Plans and several other developmental schemes are geared to the upliftment of the poor and weaker sections of the society. Since 1991, the liberalization of the economy and the increasing integration of India with the global economy have helped GDP to grow at 9 per cent or more at the present. India in 2000 announced the introduction of Special Economic Zones (SEZs) for enhancing foreign investments and to promote exports. More than 500 SEZs have been proposed, 220 of which have been created until

Human development has become an important agenda in the development paradigm in India. Growth and development in literacy have been accorded

primacy for such an agenda. According to Census of India (2001), 64.8 per cent of Indian population is literate. There exists however a huge disparity in literacy attainment between the sexes as also among other social groups particularly the scheduled castes and the scheduled tribes. Various programmes such as National Literacy Mission, Sarva Shiksha Abhiyan and non-formal education etc. have been launched with a view to achieving total literacy in the years to come. Improvement in health has been an important agenda in overall strategy through the planning period. Sustained effort at improving the health of the people has borne some results in bringing down the crude death rate to 8 per thousand and life expectancy has substantially moved up to 64 years.

Improvement in transport and communication in a vast country like India has been recognized as an important sector of development. Total length of roads in India is over 3.0 million krns including both metalled and unmetalled roads. In terms of road length, India has one of the largest road networks in the world. The National Highways account for less than 2 per cent of the total road network hut carry 40 per cent of the movement of goods and passengers. The total rail route lengthis about 0.063 million kms and of this 0.013 million kms is electrified. The railways carry over 11 million passengers and 1.1 million tons of goods every day. There are 14,500 krns of waterways and 346 airports in India. Communication facilities show a phenomenal growth during the recent years. Public phone booths, mobile phones, internet facility have grown rapidly in India. The landline telephones have expanded from about 0.084 million connections at the time of independence to about 40 million by the year 2007. In addition, there are about 217 million mobile phones in India in 2007.

CULTURE, ETHICS AND UNITY IN DIVERSITY

A grand synthesis of cultures, religions and languages of the people belonging to different castes and communities has upheld its unity and cohesiveness. It is this synthesis which made India a unique mosaic of cultures. People belonging to several faiths-Hinduism. Jainism, Buddhism. Islam, Sikhism and Christianity have coexisted for centuries in a shared space. Diversity in India is not merely confined to racial, religious and linguistic distinctions but also permeates deep into patterns of living, life styles, land tenure systems, occupational pursuits, inheritance and succession law, together with local practices, rites and rituals related to social norms and values. The Indian cultural tradition is unique. The notions of dharma (normative order), karma (personal moral commitment) jati (caste) as the hierarchical principle of social stratification are basic to Indian society. Twenty three Indian languages are listed in our constitution and more than 544 dialects are spoken in the country. Pali language was prominent in ancient India. Sanskrit enjoyed the status of carrying Hindu Sanskritic culture throughout the country. These were followed by the modern Indo-Aryan languages. The institutional basis

of social order and socio-economic interaction among communities like Jajmani system remained unchanged to a large extent. A plural and multi-ethnic society like India would have an overlapping of ethnic, caste and class groupings. There are more than 285 ethnic tribal communities in India accounting for over 8 per cent of her population. The tribes themselves are not a homogenous group, but display remarkable heterogeneity in their racial, linguistic, religious composition as also in their modes of living and levels of development as well as in the level of socio-cultural integration. In spite of this great diversity, India continues to swear by its commitment to secularism and practices democratic form of governance. The federal principle of governance has provided a sense of identity to most people.

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