A historical map of India with various bioregional boundaries overlaid in green and red. The map shows major cities, rivers, and administrative divisions. The title is written in a stylized green font with a black outline.

Uncovering Pre-District Bioregions of

INDIA

August, 2022

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South Asia Bioregionalism Working Group

2022 South Asia Bioregionalism Working Group

RESEARCH, MAPPING AND WRITING

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Citation : Bhatnagar, M., Poulouse, N. M., 2022. Uncovering Pre-district Bioregions of India. South Asia Bioregionalism Working Group

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UNCOVERING PRE-DISTRICT BIOREGIONS OF INDIA

FOREWORD

Environment, climate change, sustainable development, river basins and watersheds, the green economy and nature based economy, have become bywords in the development lexicon today. Policies, programs and projects are framed keeping this lexicon in mind or are, at least, being influenced by it in some measure.

Tactical actions are far more successful if they are taken in the context of a supportive strategic framework. Thus, if development and governance initiatives are framed in the context of supportive spatial boundaries encompassing naturally homogenous regions, then a multiplier effect could be achieved.

So far national boundaries have been majorly based upon political demography, past military dominance, geopolitics, big power calculations, civilizational and cultural homogeneity and natural barriers. Sub-national or provincial boundaries within countries also have their origins in similar drivers.

Within provinces smaller administrative unit boundaries may have historical origins, based upon revenue generating capacity, availability of a sizeable headquarter settlement and then the convenient logistical distance from this settlement. In recent times political populism or the need to give greater attention to a neglected or underdeveloped area has also driven the formation of new administrative units.

In almost none of these cases of boundary determination have the ecosystem spatial boundaries been a consideration other than, in rare cases, accidentally. As such it can be imagined that all manners of human interventions – infrastructural, urban, developmental, administrative – are taking place in the absence of the symbiotic effect of a supportive ecosystem geography and thus achieving sub-optimal or even negative impacts by working at cross purposes with the underlying ecology.

The time has come to work in partnership with nature so as derive optimal results in a sustainable manner and for this the congruence of administrative boundaries and ecosystem boundaries is a pre-requisite.

The concept of bioregions has been around for some time in intellectual circles. This monograph takes as its hypothesis that, in India, the basis and extent of spatial regions, prevailing before the colonial district system, was rooted in observations and experiences of communities, garnered over centuries, of the homogeneity of natural

features over space and the edges at which a different ecology emerged.

This monograph has, within the constraints of time and resources, identified several such regions and has also outlined the possibility of these ecoregions becoming the underpinning of developmental decisions for the group of present day districts which overlie such regions.

This work may only be the start of an exploratory journey leading us into underexplored territories and concepts.

Manu Bhatnagar

ACKNOWLEDGMENTS

The authors acknowledge the financial support Kalpavriksh Environmental Action Group, India, and their funders, the Heinrich Boll Stiftung, whose grant has enabled the research.

The authors gratefully acknowledge the support and guidance received from Kalpavriksha Environmental Action Group who have encouraged and promoted this research whose outcome was fraught with uncertainty.

In particular we would like to thank Ashish Kothari, whose incisive observations and suggestions for research material added depth to the paper. Namrata Kabra helped to keep the work going with her administrative skills and encouragement. Lastly, we thank Pranvendra Champawat for his help in this exercise.

Manu Bhatnagar
Nisha Mary Poulouse

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I. The Concept of Bioregions

The concepts and definitions of bioregionalism have emerged from western literature and research work, actuated by human dominated spaces that have overwhelmed natural spatial processes even as the link between spatial identity, culture, diversity and development has become more obvious.

A bioregion is an ecologically and geographically defined area which has homogenous natural characteristics, such as a major community of plants and animals with similar life forms and environmental conditions, watersheds, soil and terrain characteristics, as well as human and cultural characteristics. They span areas larger than single eco-systems but are smaller than biomes which can be global in scale.

The bioregion is the basis of bioregionalism, an approach which suggests that “political, cultural and economic systems are more sustainable and just if they are organized around naturally defined areas called bioregions. Bioregionalism stresses that the determination of a bioregion is also a cultural phenomenon, and emphasizes local populations, knowledge, and solutions” (Alexander, 1996). Compared to ecoregions , “Bioregions, by contrast, are human regions, informed by nature but with a social and political element. In this way bioregionalism is simply political localism with an ecological foundation.”

Bioregionalism asserts that “A bioregion’s environmental components

(geography, climate, plant life, animal life, etc.) directly influence ways for human communities to act and interact with each other which are, in turn, optimal for those communities to thrive in their environment. As such, those ways to thrive in their totality—be they economic, cultural, spiritual, or political—will be distinctive in some capacity as being a product of their bioregional environment.”(Ryan, 2015).

The term ‘bioregionalism’ was coined by Allen Van Newkirk, founder of the Institute for Bioregional Research, in 1975, given currency by Peter Berg and Raymond Dasmann in the early 1970s (‘Reinhabiting California’, 1977) and has been advocated by writers such as David Haenke and Kirkpatrick Sale. The bioregionalist perspective opposes a homogeneous economy and consumer culture with its lack of stewardship for the environment. This perspective seeks to:

- Ensure that political boundaries match ecological boundaries
- Highlight the unique ecology of the bioregion
- Encourage consumption of local foods where possible
- Encourage the use of local materials where possible
- Encourage the cultivation of native plants of the region
- Encourage sustainability in harmony with the bioregion

“Bioregional mapping is a powerful tool to increase understanding, change the story and influence policy. A good bioregional map shows layers of geology, flora, fauna, and inhabitation over time. All the interdisciplinary content that is integrated in this kind of map makes it a great communication tool to illustrate an ecological approach.”

“Bioregionalism, while akin to environmentalism in certain aspects, such as a desire to live in harmony with nature, differs in certain ways from classical, 20th century environmentalism. According to Peter Berg, bioregionalism is proactive, and is based on forming a harmony between human culture and the natural environment, rather than being protest-based like the original environmental movement. Also, while classical environmentalists saw human industry as the enemy of nature and nature as a victim needing to be saved; bioregionalists see humanity and its culture as a part of nature, focusing on building a positive, sustainable relationship with both the sociological and ecological environments, rather than a focus on preserving and segregating the wilderness from the world of humanity.”

However, in history, world over, communities have known the natural limits of the regions with which they identified, which limits acquired a spatial nomenclature which has faded under the overlays of new spatial boundaries

based mostly on political requirements. Thus, it would not be out of place to say that communities throughout history, when nature was dominant and compelled humans to work in tandem with it, lived 'bioregionally' and identified bioregions from ancient times. It would not be out of place to say that wherever communities are associated with a distinct natural region a base of traditional indigenous knowledge also develops within the community. Hence, this paper attempts to peel the layers of recent spatial boundaries so as to identify the 'bioregions' of old while keeping in mind the western definition.

II. The Current Politico-Administrative Map Layer in India

The Indian sub-continent has a great diversity of landscapes. Ancient literature identified regions with nomenclature whose basis is unclear as yet. The rise of large empires such as the Mughals saw the landmass divided into '*subahs*' which were basically revenue gathering regions. Again, the basis of division remains a matter of research, but clearly, was not on the basis of bioregions as defined earlier in this paper.

Subsequently, the colonial period saw the division of the landmass into formalized provinces and districts on the basis of conquests, the old Mughal '*subahs/prants*' and administrative convenience. The first such district was Salem, formed in 1792, in what was then the Madras Presidency. In the areas directly administered by the British [British India] many districts were delineated in the 19th century and whose division and sub-division has continued as per administrative convenience or populist politics. In the Indian States, particularly the large ones and those which did not have British Residents, the district delineation has evolved mainly after Indian Independence in 1947. In many cases small princely states became districts.

The process of forming districts was also aided by the Great Trigonometric Survey launched in 1802. Here, the focus was on physiographic features, topography, accurate distance measurements, settlements, and not on ecological regions. The delineation of pre-British spatial nomenclature was consigned to oblivion as the name of the district was mostly the same as that of the district headquarters.

Basis of Districts Delineation : In colonial times the extent of land revenue and its collection was the basis of the areal spread of the district. The revenue yield was based upon the productivity and market value of the crops. This in turn determined the areal spread of the district as a particular amount of revenue was required to support the district administrative paraphernalia and also yield surplus for transfer to the provincial government. Another major consideration was the distance from district headquarters.

Currently, the Census of India is used as the reference source for number of districts and district composition, as the Census collects detailed demographic data at sub-district, village, and ward level. Generally, new districts are created for ease of administration so that the distance between the district headquarters and remote areas is shortened. This, in turn, helps with better monitoring of government schemes and maintaining law and order in remote areas. In addition, districts can be split based on their population size or various socio-cultural factors. A recent example is that of Malerkotla in Punjab, carved out of Sangrur District, as a Muslim majority area, possibly on political considerations. [It is within the State Government's powers to notify districts]. Yet another example is that of Delhi whose area, carved out of Punjab province in 1911, was divided into two districts – Delhi and Mehrauli – and in 2008 was further divided into 10 districts.

While the rationale behind creating new districts is average population, population density, urbanization, distance to district headquarters, the diversification of revenue sources and urbanization has led to a certain reduction in the importance of the land revenue criteria.

With a lineage of more than 200 years the district system, reinforced further by the Survey of India maps, has become engraved in the Indian mind space as a given. This etching has been reinforced by the fact that presently, India is divided into 741 administrative districts, which are the spatial units for which thematic statistics are gathered and which database then constitutes the basis for further developmental activity and governance. Some districts, such as Kutch or Ladakh, may well have bioregional congruence. But clearly, in most cases, the districts do not coincide with the definition of bioregions, given earlier, and have no relation with the underlying ecology.

Moreover, the British grouped the districts under provinces many of which persist to date and which are quite large spatially. These provinces and the areas of the Indian States were reorganized in independent India in 1956 by the States Reorganization Act, mainly rearranging regions along dominant linguistic communities' boundaries. Large states have been further broken down to give political control to linguistically or culturally homogenous

populations who have felt neglected in the development process by the dominant but culturally distinct groups.

While the formation of smaller states has unintentionally brought them closer to the concept of bioregions still the mismatch between political regions and bioregions continues to be large. For eg., in 1967, as a result of political agitation for a Sikh majority area within the Indian Union, the states of Himachal Pradesh and Haryana were carved out of the larger Punjab state. Thus, while Himachal is a mountainous area with a different ecology, Punjab is a highly fertile alluvial plain with several perennial rivers and Haryana is a water scarce semi-arid to arid zone dependent solely on the Yamuna river as its lifeline. Each of the three regions are culturally and ecologically distinct with some overlaps near the shared borders. However, even within these new states there are different ecologies peopled with different sub-cultures and occasionally very distinct cultures. Thus, Himachal has Buddhist tribal zones in its cold desert areas of Lahaul, Spiti and Kaza. Punjab has a mix of Shivalik foothills, fertile alluvial plains and semi-arid western area and celebrates different festivals. Haryana has a semi-arid zone in its eastern side and a highly arid zone on its western side which has congruities with both south west Punjab and north-west districts of Rajasthan.

Thus, there are several ecological geographies which are intersected by political boundaries rather than being congruent with them. A very clear example of mismatch is that of the Aravalli mountain ranges which form part of Delhi, Haryana [Gurgaon District], move in south-west direction into Alwar and several districts of Rajasthan and terminate in north Gujarat. This continuous mountain range provides several ecosystem services yet falls under several jurisdictions and is thus seen as isolated stretches prone to be exploited for mining or crushed as gravel.

The Deccan plateau, for example, spreads across 3 states and over 30 districts. The vast bioregion has strong geological and topographical features which then determine the agricultural practises and water systems and thus the carrying capacity of the land. District boundaries have parcelled the plateau and have created serious disruptions in ecosystem processes and functions.

III. Peering Beneath the Formalized Districts Layer of the Map

The constant mainstream usage of the district spatial system over the course of the last two centuries has resulted in the regional definition being entrenched in both culture and geography, erasing the historically established regional-spatial nomenclature from our mental space.

But prior to any politico-administrative spatial division, many regions acquired names based on their distinguishing natural characteristics. The historical nomenclature of regions was derived from a centuries long experience, observation and intuitive realisation of the resident community realising the spread of homogenous or contiguous natural characteristics over a particular space, the spatial limits of such characteristics and the differentiation beyond the perceived limits. These historical names are still in circulation amongst veteran citizens and those less schooled in vestiges of Anglicized culture and less affected by it. Even amongst the present generation such historical names occasionally surface at the periphery of conversations without acknowledging the rationale behind place names.

Since nature is the foundation of culture and gives rise to cultural expressions, including language, the differentiation in natural spatial characteristics births distinct cultural forms and expressions. The historical names derived from such spatial characteristics would often allude to regions which qualify to be bioregions as defined earlier.

An example is the native name for Mt. Everest, '*Sagarmatha*' or face to the ocean. It is well known that the north Indian plains, way back in geological time, were occupied by the Tethys Sea and as the Indian Plate crashed into the Asian Plate and subducted below it, the Himalayas rose up in elevation. Similar is the origin of the peak named '*Thaleysagar*'. The etymology of place names is, thus, often associated with natural characteristics and events waiting to be disinterred from the caverns of memory. Another example can be Himalaya or the abode of snow. In this way, some new states may also have similar origins, e.g. Jharkhand which means land of forests.

Agriculture, the primary driver for human settlements, became another strong determinant in understanding bioregional boundaries. Agrarian traditions are a direct outcome of climate, soil and topographical factors and these traditions, which reflect in festivals, cuisine, and lifestyle, are the bedrock of cultural identity as we know it today.

Kuttanad, a region now deemed a "globally important agricultural system" by the FAO, is a case in point. The land, which is in partly below sea level and characterised by rolling hills and valleys, is known for its bio-saline farming traditions. Everything from clothing to food habits, which is unique in this region is an outcome of its cultivational identity which in turn is a result of the very unique climatic and topographical nature of the region.

The concept of 'country', before it became synonymous with 'nation', could also be akin to bioregions. For eg. in the novel 'Kidnapped' by RL Stevenson the main character's flight through Scotland takes them through Macgreggor country to Campell country. In India the same is '*desh*' – '*aap kaun se desh se hain*' – or – 'to which country do you belong'. The word '*Nadu*' is an oft-used word referring to one's homeland in general and is part of ancient nomenclature for regions. The original meaning behind country, '*desh*' and '*Nadu*' have, by now, faded away. The overlayer of western geography in recent times, based on physiography, topography and climate, or of post-independence [1947] organisation of states based on language and other human-centred phenomenon, has also cloaked the indigenous sense of regional spatial delineation. [In Australia, 'country' is the term used by Indigenous/aboriginal people to define their territory. Similarly, native Indian tribes of North America were spatially divided into nations].

The objective, thus, is to identify and locate the pre- districts regions of India and build a map in two layers :

1. Layer showing the identified pre-districts regions
2. Layer showing the modern-day districts as an overlay. This is done

with the optimistic objective to examine whether the ecological regeneration and sustainable development of bioregions could be mainstreamed through the instrument of their constituent modern districts i.e. the new bioregion could be formed by grouping together existing districts where possible.

IV. The Approach to Identifying Historical Bioregions

The approach to identifying historical bioregions needed to be structured in order to proceed beyond the basic idea. The experience has made it clear that a vast literature and several historical maps needs to be examined to cull out small elusive clues.

The extensive ground required to be covered was, in this research, constrained by both time and resources limitations.

- Initially, it was considered that the original District Gazetteer series would offer ready references to the older regions as they were fairly close in time to the transition to districts. This necessitated the study of around 600 Gazetteers along with the Imperial Gazetteer, which time and resources did not permit. A cursory examination of this source, however, enabled the team to derive some clues for further research.
- Focus was then shifted to mythological sources and ancient literature such as Ramayana, Mahabharat, Rigveda, Meghdoot [by Kalidas]. Again, some clues could be gleaned but given the vastness of the material much was left unexplored.
- Accounts of the Sangham era and other ancient kingdoms, as researched and published by early 19th century historians like Sastri and Subbarayalu, were also resources that held strategic clues as to agro-cultural and ecological boundaries.

- Old travelogues were glanced through such as of Megasthenes, 'Periplus of the Erythrean Sea'- geographical texts by Strabo, Ptolemy and others were examined.
- Memoirs of the mediaeval period such as Babur Namah, Akbar Namah and Ain-i-Akbari, Tabaqqat-e-Jehangiri, travelogues of Manucci, Bernier, Tavernier constitute further sources which could only be skimmed through.
- Research into various accounts and documentation from the early 1800's reveal much about the cultural, linguistic, societal practices, climatic, geographical and agricultural context that existed in the country prior to the establishment of the British administrative boundaries. Documents and literature from the various pre-British kingdoms too hold immense information on agro-climatic, linguistic and cultural boundaries and the relationships shared between them. Colonial period literature by administrators, historians, domain writings such as Survey of India narratives, travelogues, hunting game books [eg. 'The Game Birds of India, Burmah, And Ceylon by Hume And Marshall or 'Flora of the Upper Gangetic Plains' by JF Duthie], can also be gleaned for clues.
- Geography books such as those authored by Alexander Cunningham [The Ancient Geography of India'] need a thorough examination as they describe the travels of the Chinese travellers Fa Hien and Hiuen Tsang. Francis D. Buchanan's early observations and accounts also hold much information of vernacular understandings of 'Place'.
- Much can be gleaned from various colonial times descriptive writings and the works of officers involved with the 4 great surveys – the Archaeological Survey of India, the Geological Survey of India, the Botanical Survey of India and the Survey of India
- Vernacular literature and local histories could also throw up relevant information but due to paucity of resources and time constraints could not be fully tapped. Informal sources such as blogs and opinion threads were explored for possible clues which were then researched amidst scholarly publications for verification.
- Another source of clues were the official websites of various district administrations which delves into the history of the region and the cultural pride that brims over political boundaries. Comparison with historical maps through the years and then further research for extracting hints, led to the understanding of bioregional boundaries in certain parts of the country.

Without exhausting the above the research moved on to

- Interlocution with veteran resource persons
- Linguistic maps[Ref- Fig. 1.]
- Provincial maps
- Tribal geography [Ref- Fig. 2.]
- Pre-colonial district limits as seen under the rule of regional empires, indigenous tribes, local chieftains and rulers, references in ancient texts and folklore were heavy clues that led to further research as to the bioregional nature of these districts. The colloquial references in the native tongues, collated with the agrarian, cultural and climactic distinctiveness proved to reveal many of the bioregions as mapped thus far.
- The district maps recorded by Pharoah and Company were an excellent source to identify and compare maps of the British era with political and administrative delineations in prior times.

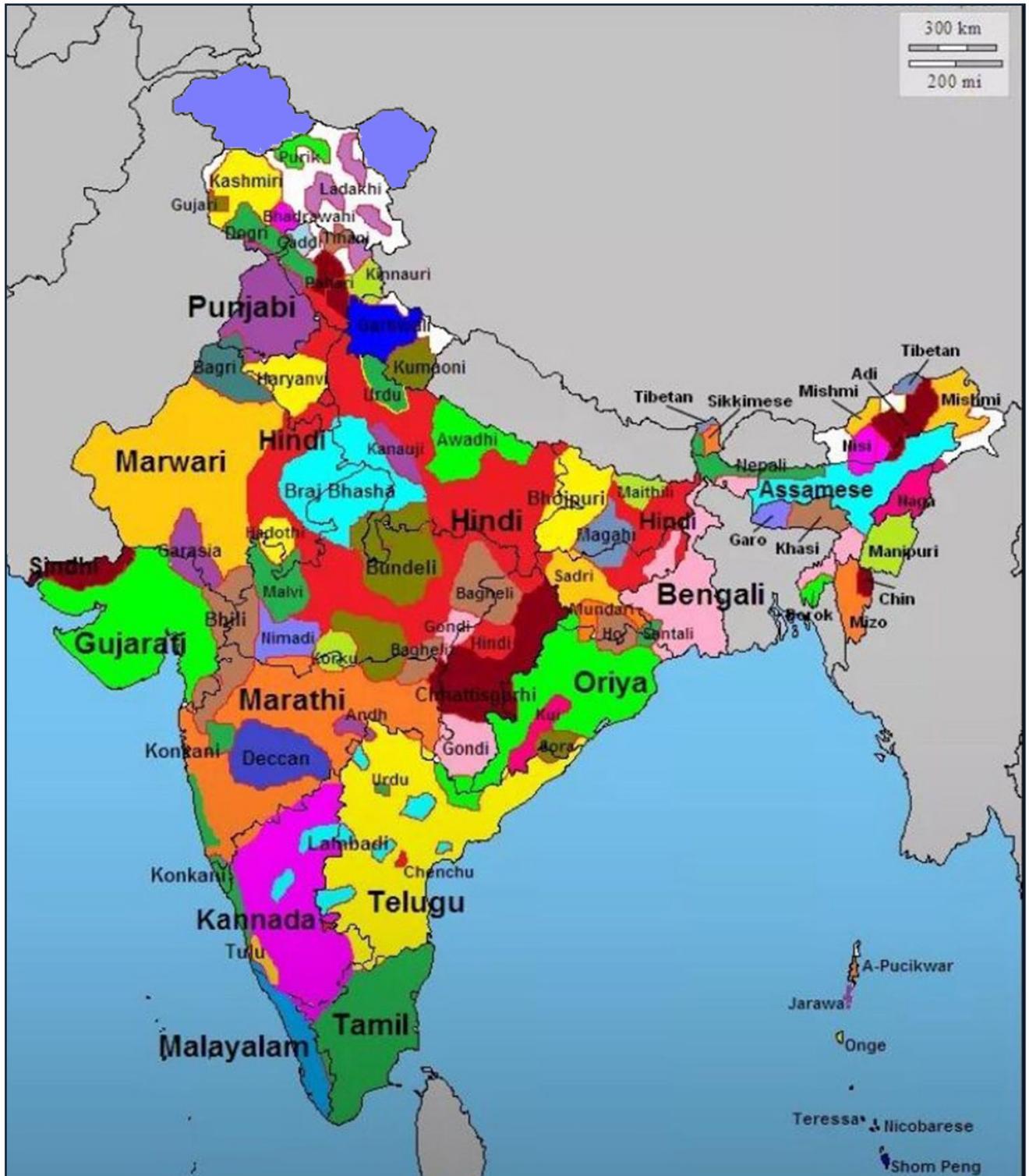


Fig.1 : Linguistic Map of India

(Source : <https://preview.redd.it/1wlzz9991ev11.jpg?auto=webp&s=6631f355a277cc55fd8b-1d7a62c6c29f5870eeae>)

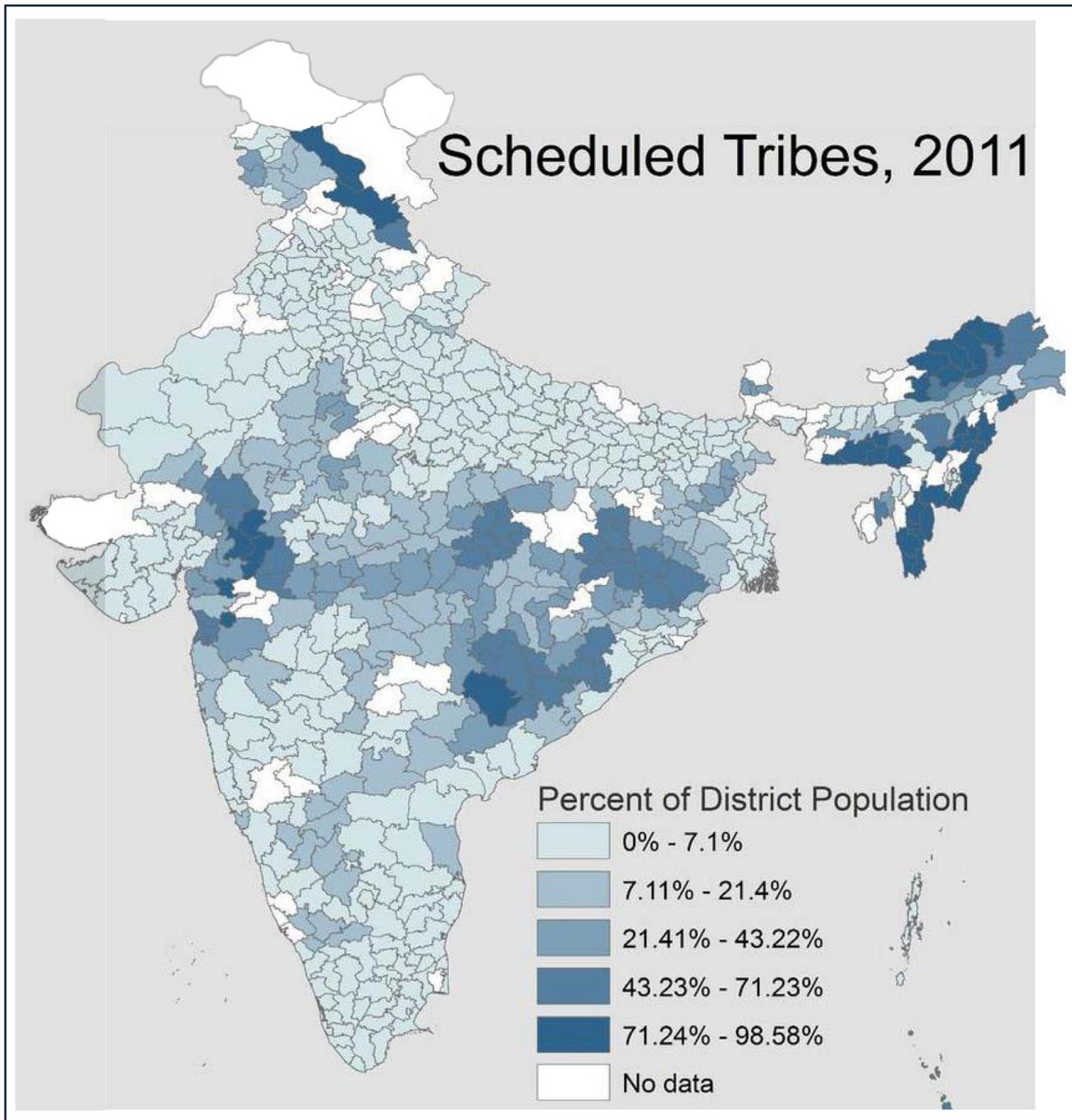


Fig. 2 : Tribal Map of India
(Source : Indian Census 2011)

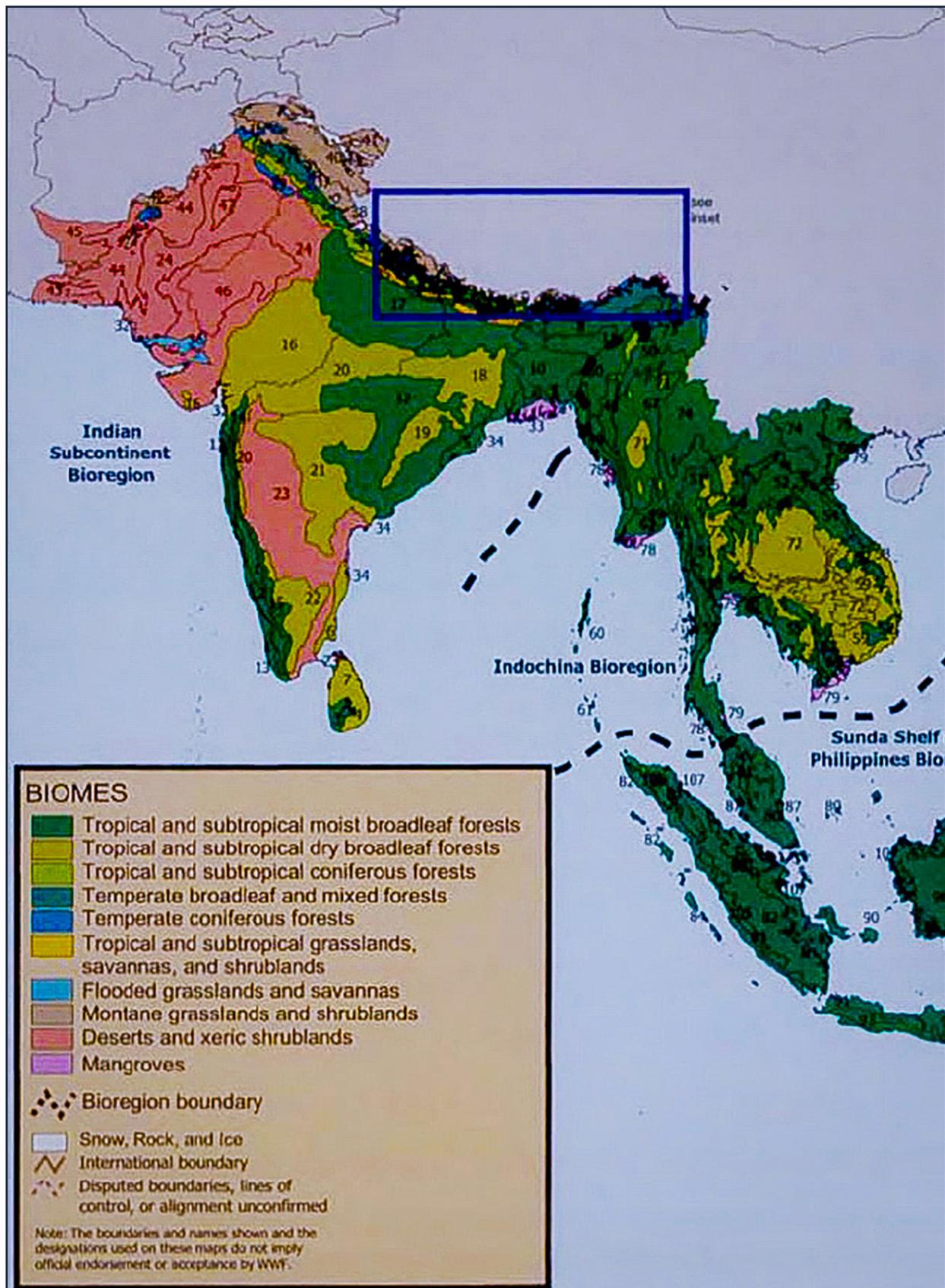


Fig. 3 : Ecoregions of the Indian Subcontinent

Source: Terrestrial ecoregions of the Indo-Pacific region p22 https://www.google.co.in/books/edition/Terrestrial_Ecoregions_of_the_Indo_Pacif/_VGRBWqIG2gC?hl=en&gbpv=1&print-sec=frontcover)

Note on the maps shows from Fig.1- Fig.3

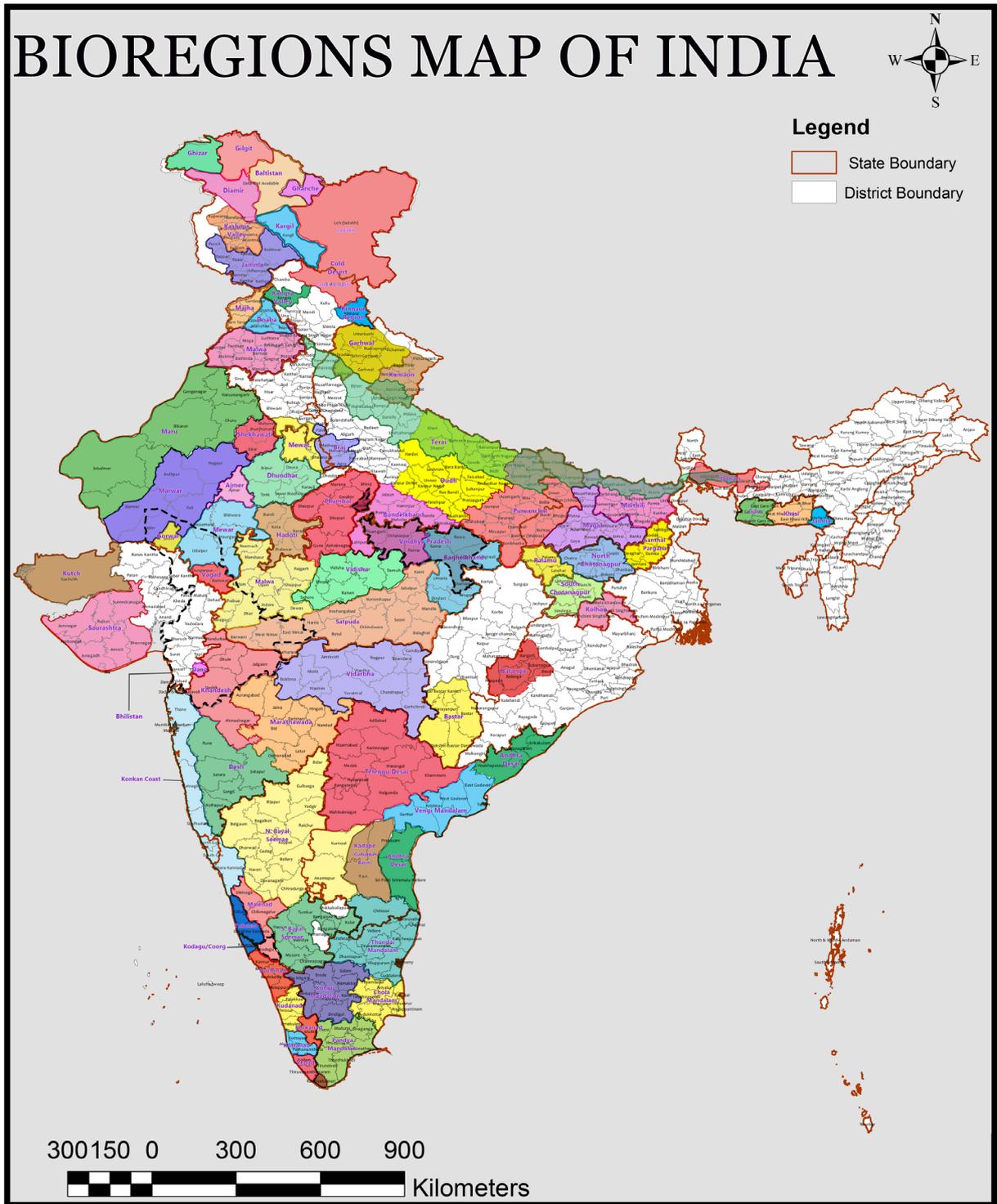
These maps served as initial reference sources that enabled the team to have an overarching picture of the vastness of the territory under survey, the complexity of its components and existing works that could be starting points for the research. It has been included herein to give the reader the perspective with which the team started the process.

The maps were essentially the first clues to unraveling the bioregions within the subcontinent. These maps were not used as basemaps and neither did they limit the process in any way.

The Mapping Process

1. A map of India showing district and state boundaries was obtained from Census of India 2011.
2. Regions were identified while carefully screening them for their basis as not being a political or administrative unit but rather based on
 - Linguistic geography and thus cultural basis
 - Clearly based on distinctive natural character
3. In this short time span and with limited resources the team could come up with historical natural regions for approximately 65% of the Indian land mass.
4. The regions could easily extend across international boundaries. Examples are the 'Terai' region along the Himalayan foothills which extends into Nepal or the Thar desert which extends into Cholistan or the Sundarbans Delta extending into Bangladesh or the Ladakh region being contiguous with Tibet. Similarly, some overlaps can be seen in the southern boundary of the sub-continent between Kerala, South-Western Tamil Nadu and Sri Lanka.
5. The pre-district regions and names identified thus far are given below. The regions have distinct land characteristics although sometimes the distinctions can be somewhat faint. The distinctions are in the nature of soil, climate, topography, culture, language/dialect (Refer Annexure 1 for further details)

1. Ghizar
2. Gilgit
3. Diامر
4. Baltistan
5. Ghanche
6. Ladakh
7. Kargil
8. Kashmir Valley
9. Jammu
10. Kangra Valley
11. Kinnaur
12. Malwa[Punjab]
13. Doaba
14. Mazha
15. Garhwal
16. Kumaon
17. Terai
18. Poorvanchal
19. Maithila
20. Maghai
21. Dooars
22. Garo Hills Kasi Hills
23. Jaintia Hills
24. Braj
25. Mewat
26. Chambal
27. Vidisha
28. Shekhawati
29. Dhundhar
30. Ajmer
31. Mewar
32. Hadoti
33. Marwar
34. Gorwar
35. Vagad
36. Bundelkhand
37. Baghelkhand
38. Palamau
39. Chhota Nagpur
40. Santhal Parganahs
41. Kolhan
42. Kutch
43. Saurashtra
44. Khandesh
45. Satpuda
46. Dangs
47. Vidarbha
48. Marathwada
49. Rayalseema
50. Konkan
51. Nolambavadi
52. Sindavadi
53. Kadapah
54. Coorg
55. Malenadu
56. Mysore
57. Tulunad
58. Thondaimandalam
59. Kongunadu
60. Thanjavur
61. Kuttanad
62. Madurai
63. Coramandel Coast



Map 1 : Bioregional Map Developed by the Research Team.

Please refer Annexure (P 49-50) for the larger format of the same. An interactive version of the map may be seen at <https://bit.ly/3sqz3c8>
(Source : Census of India 2011)

Note : The pre-district nomenclature of the regions in white has still to be discovered.

V. A Brief Examination of Natural Characteristics of Some Identified Regions

This study had been inspired by the historically named regions of Rajasthan and Uttarakhand State as shown in the following map.

i. Distinctions between Kumaon and Garhwal [modern Uttarakhand]

The Garhwal Region has massive glaciers, narrow valleys separated by rugged mountains, powerful rivers. In earlier times this was a forbidding terrain and is associated with the legends of the Hindu religion. The fact that the twin Bhagirathi peaks overlook Gaumukh and dominate the glacier lends credence to the legends of yore. The decline in elevation is quite rapid. In all characteristics Garhwal is distinct from Kumaon and the physiographical variations in the former are more extreme compared to the latter. For eg. Garhwal has a higher drainage density, more powerful rivers, greater elevations and larger glaciers as compared to Kumaon.

References for the Terai, Kumaon and Garhwal Sections above
E. T. Atkinson [1886] The Himalayan Gazetteer [Volumes I, II, III]

The Kumaon region is, comparatively, more accessible, with lower altitudes, smaller glaciers, gentler gradients, less powerful rivers, wider valleys and a larger sub-montane tract [Bhabar]. And whereas the vegetation has certain commonalities, the Garhwal region has more Alpine and coniferous content

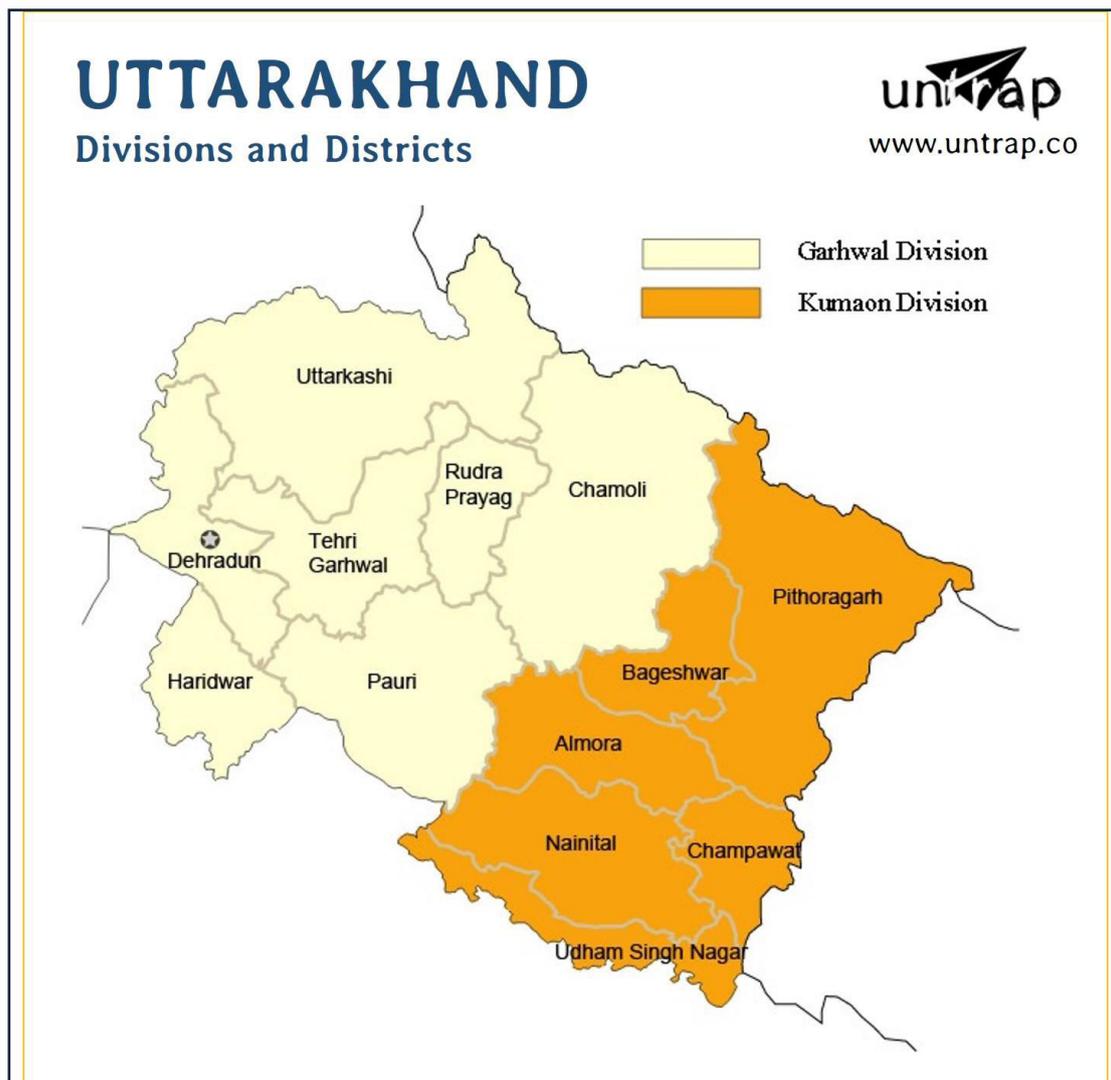


Fig. 4 : Garhwal and Kumaon Regions
(Source : www.untrap.co)

whereas the Kumaon vegetation has a significant content of tropical and sub-tropical broad-leafed vegetation.

The abiotic physiological differences have given rise to other biotic differences which appears to have resulted in cultural differences of which an obvious manifestation is in language with Garhwali and Kumaoni being the dominant tongues in the respective regions .

ii. Terai Region

The Terai or Tarai is a lowland region in northern India and southern Nepal that lies south of the outer foothills of the Himalayas, the Sivalik Hills, and north of the Indo-Gangetic Plain. The 49,500 km² Terai Arc is a part of Terai which stretches for over 700 km along the southern boundary of Nepal and the sub-Himalayan region of North India. This lowland belt is

characterised by tall grasslands, scrub savannah, sal forests and clay rich swamps. Terai region has dense forests due to the availability of rich fertile soils and huge rivers. ... rivers of the Himalayas that have created alluvial fans covering thousands of square kilometers below their hill exits.

The Urdu word *تاری* *tarāī* means “lands lying at the foot of a watershed” or “on the banks of a river; low ground flooded with water, valley, basin, marshy ground, marsh, swamp; meadow”. In Hindi, the region is called ‘*tarāī*’ meaning “foot-hill”. In Nepali, the region is called ‘*tarāī*’ meaning “the low-lying land, plain” and especially “the low-lying land at the foot of the Himālayas”. It has been described as “low, marshy ground”.

‘The Terai is crossed by the large perennial Himalayan rivers Yamuna, Ganges, Sarada, Karnali, Narayani and Kosi that have each built alluvial fans covering thousands of square kilometres below their exits from the hills. Medium rivers such as the Rapti rise in the Mahabharat Range. The geological structure of the region consists of old and new alluvium, both of which constitute alluvial deposits of mainly sand, clay, silt, gravels and coarse fragments. The new alluvium is renewed every year by fresh deposits brought down by active streams, which engage themselves in fluvial action. Old alluvium is found rather away from river courses, especially on uplands of the plain where silting is a rare phenomenon.

A large number of small and usually seasonal rivers flow through the Terai, most of which originate in the Sivalik Hills. The soil in the Terai is alluvial and fine to medium textured. Forest cover in the Terai and hill areas has decreased at an annual rate of 1.3% between 1978 and 1979, and 2.3% between 1990 and 1991. With deforestation and cultivation increasing, a permeable mixture of gravel, boulders and sand evolves, which leads to a sinking water table. But where layers consist of clay and fine sediments, the groundwater rises to the surface and heavy sediment is washed out, thus enabling frequent and massive floods during monsoon, such as the 2008 Bihar flood.’

iii. Regions of Rajasthan

This study had been inspired by the historically named regions of Rajasthan as shown in the following map. These regions are differentiated by language and cultural differences which reflect the distinctions in natural characteristics of the terrain. The map is followed by a modern agro-climatic regions map of the State. The agro-climatic regions are differentiated on the basis of climate characteristics, soil and moisture differences. The approximate coincidence of boundaries in both maps is unmistakable. Each map has 10 regions – Shekhawati [Sikar, Jhunjhunu Districts], Mewat [Alwar, Bharatpur Districts], Dhundhar [Jaipur, Dausa, Karuli, Tonk, Sawai Madhopur Districts], Ajmer, Hadoti [Bundi, Baran, Kota, Jhalawar Districts], Mewar [Bhilwara, Chittorgarh,



Fig 5a : Historically Named Regions of Rajasthan
(Source : Udaipurbeats.com)

Regions are – **Shekhawati** [Sikar, Jhunjhunu Districts], **Mewat** [Alwar, Bharatpur Districts], **Dhundhar** [Jaipur, Dausa, Karauli, Tonk, Sawai Madhopur Districts], **Ajmer**, **Hadoti** [Bundi, Baran, Kota, Jhalawar Districts], **Mewar** [Bhilwara, Chittorgarh, Udaipur, Rajsamand [Districts], **Vagad** [Banswara District], **Gorwar** [Sirohi District], **Marwar** Nagaur, Jodhpur, Barmer, Jalore, Pali Districts], **Thar** and desertic tracts [Jaisalmer, Bikaner, Ganganagar, Hanumangarh, Churu]

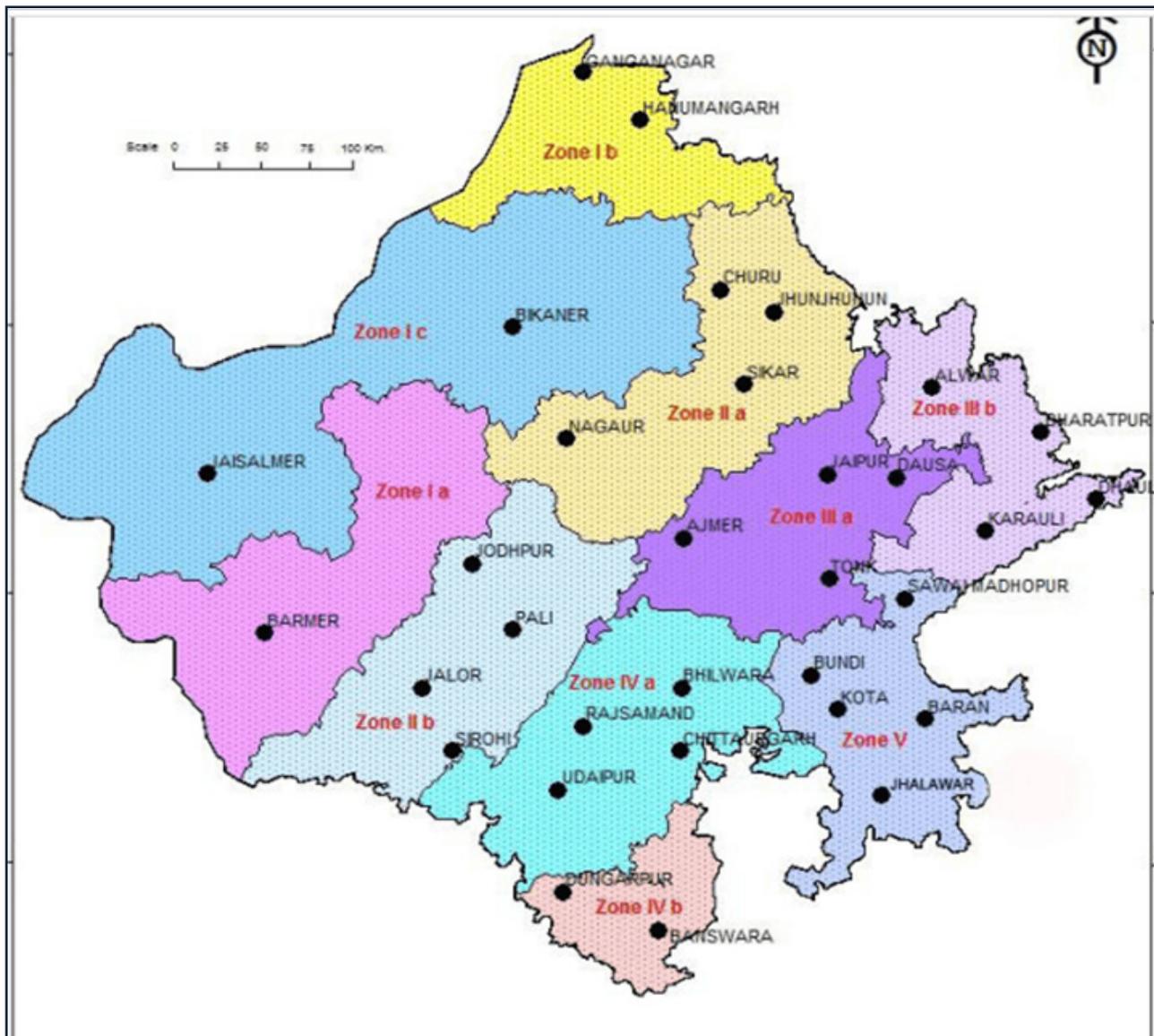


Fig 5b : Modern Agro-Climatic Regions of Rajasthan
(Source : ICAR)

Udaipur, Rajsamand [Districts], Vagad [Banswara District], Gorwar [Sirohi District], Marwar Nagaur, Jodhpur, Barmer, Jalore, Pali Districts], Thar and desertic tracts [Jaisalmer, Bikaner, Ganganagar, Hanumangarh, Churu]ii.

iv. The Western Ghats and the Coast

Malenad, which translates to ‘Land of Rain’, is the linear strip along the Western coast of Karnataka encompassing the Eastern and Western slopes of the Western Ghats. Characterised by forested mountain terrain, and heavy rainfall for half the year, this region is rich in biodiversity and indigenous knowledge.

The forests are thick and impenetrable in many areas and are home to wildlife and as a result these areas were historically inhabited by tribal communities who were hunter gatherers or foragers. Much of the landscape were converted to estates during colonial rule, and many of the forest dependent livelihoods gave way to spice and coffee farming. However, historically, these lands were so impregnable that only nomadic tribes could sustainably live here and thus it is also home to arts and crafts dependent on forest produce originated from this region. The Gazetteers allude to innovative native water conservation methods and traditional farming strategies indicating the nature dependent culture of the population. Towards the south, *Tulunad*, which is current day Mangalore and Udupi, can be characterised as another unique bioregion owing to the more settled culture and practices of the people. Overlays with topographical features demonstrated a region carved out between the coast

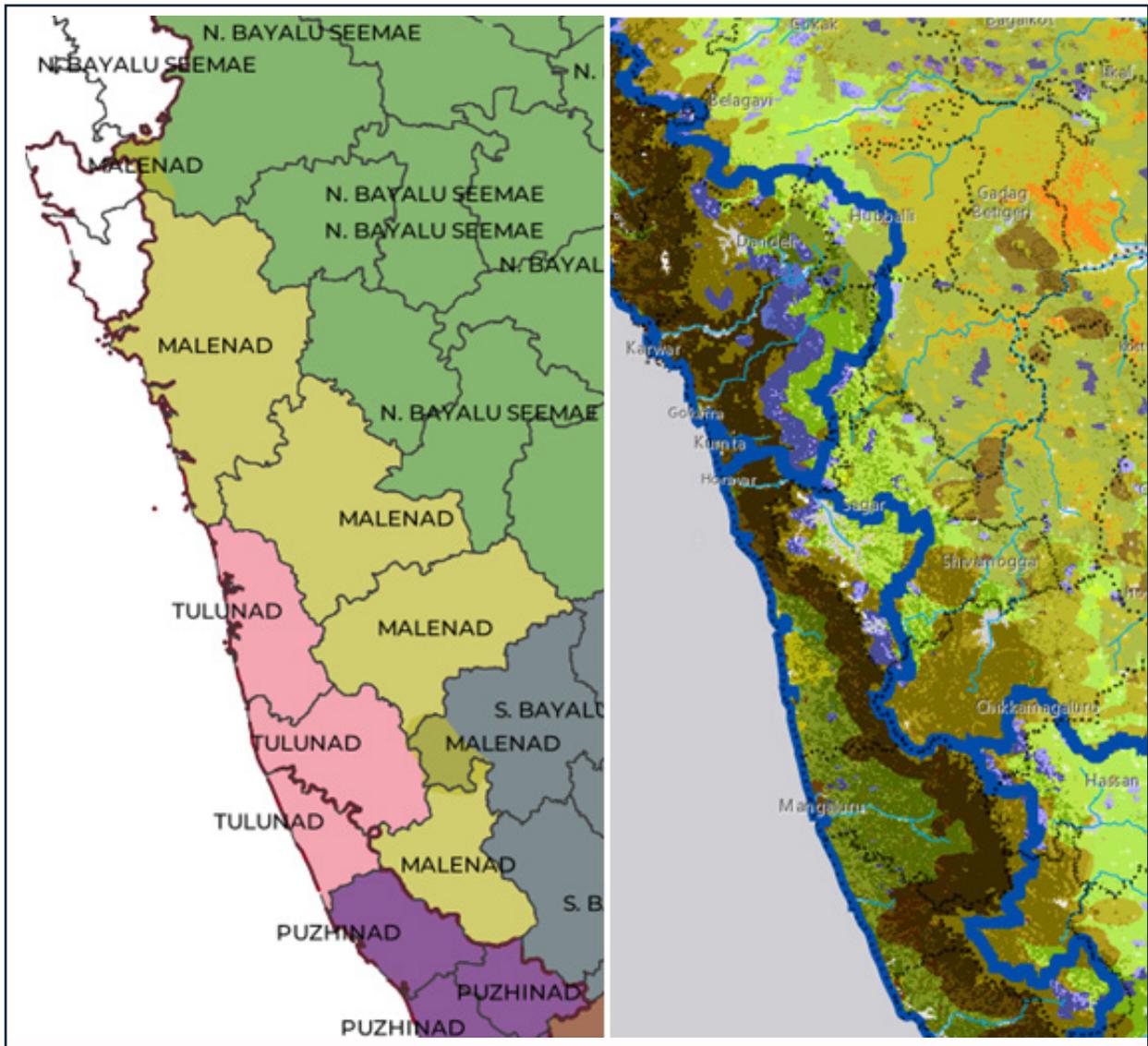


Fig. 6 : The Bioregional Map of Tulunad and Malenad delineated based on the sources described. (Map on the right shows the topographical characteristics that clearly show distinct physiography)

and the mountains and bordered by the River Chandragiri on the south. The same been referred to by Buchanan in “A journey from Madras through the countries of Mysore, Canara, and Malabar.” The Malabar region of the Western Ghats and the Karnataka region can be differentiated on the basis of traditional languages, cultivation and ancient trade driven settlement and hence are delineated as different bioregions.

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Buchanan, F., 1807. A journey from Madras through the countries of Mysore, Canara, and Malabar. BoD–Books on Demand

v. Bayalu Seemae

This region which covers a large majority of the Deccan Plateau is unique in terrain, climate and human geography. The name which literally mean open land or *maidan* (*Bayalu* - Open + *Seemae* - Land), is colloquially recognised and is used locally to refer to the region. In fact, the name Karnataka (*Kar* - Black + *Nat* - Land) alludes to the abundant black cotton soil found here. The *Bayalu Seemae* region is characterised by rocky terrain, scrub vegetation and periods of heavy drought.

Bayalu Seemae can be delineated as two bioregions. The Northern *Bayalu Seemae* region, which is at an elevation of 1200 -1500m, and is drained by the Krishna River and its tributaries. The rocks are heavily eroded and have a wealth of Black Cotton soil deposits which is favourable for cultivation of millets. These millets, traditionally cultivated here, are staple as indicated by the millet rich cuisines of Uttar Karnataka. While thorny scrubs are what is widely seen in the area today, it was historically home to large canopy trees.

The Southern *Bayalu Seemae* region, which was once dominated by the Mysore Kingdom, and the Gangas of Talekad prior to that is at a slightly higher altitude (1200 -1600m) and is the land south of the Tungabhadra and predominantly slopes towards the east. The land has crystalline rocks which resist erosion and received rain from the retreating Monsoon. This region is known for its irrigation tanks and the various kingdoms that existed here through the ages. Agriculture was difficult in this region and crops like sugarcane and *Raagi* were

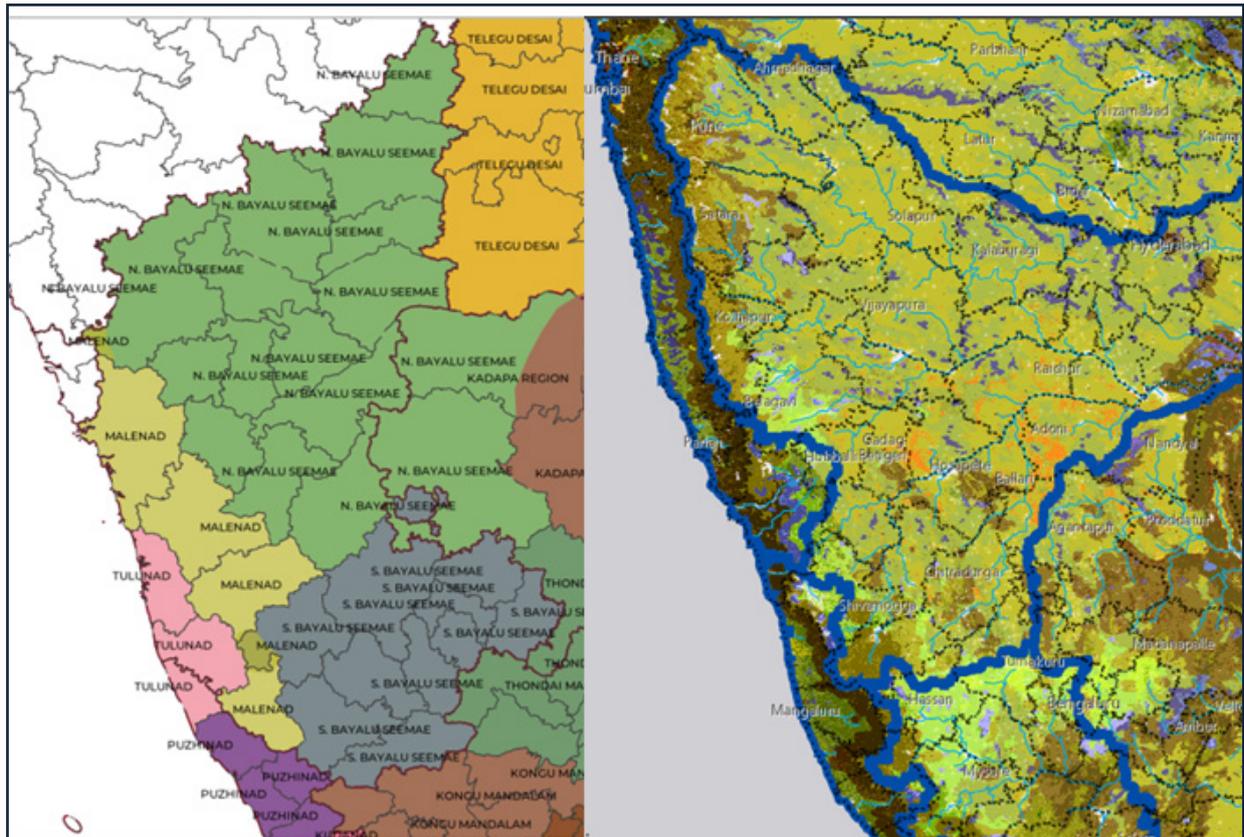


Fig. 7 : The Bioregional Map of North and South Bayalu Seemae which was delineated based on the sources described. (Map on the right shows the natural and topographical characteristics of the area)

traditionally cultivated and sericulture was a prominent livelihood. The region is heavily influenced by Tamil culture. It is part of the Cauvery watershed and denotes much religious and cultural association with the river.

References for the Bayalu Seemae Section

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VI. Limitations and Challenges

The approach to identifying historical bioregions needed to be structured in order to proceed beyond the basic idea. The experience has made it clear that a vast literature and several historical maps need to be examined to cull out small elusive clues.

- 1. Language Barriers :** The work thus far has revealed that local literature in regional and native languages, as well as folklore and colloquial names still refer to the bioregions without being conscious of the ecological significance. These indigenous names distinguish areas based on cultural and linguistic history, as well as agrarian traditions, soil and climate, and terrain. It is therefore, a great limitation to not know the regional languages while ascertaining the bioregional boundaries and characteristics. It was noted that the bioregions within the states/regions that had linguistic heritages matching the native tongues of the team members were easier to trace out, due to the local and familiar allusions to the bioregional and biocultural nomenclature.
- 2.** Access to local literature and local libraries in all parts of the country was severely limited.
- 3. Financial Resources :** The work of this magnitude requires humongous dedicated hours to be spent on research, extensive travel to obtain access to local resources, translations when necessary and the ability to purchase library memberships, old maps and books when required.

- 4. Time Limitations :** As this has been a six-month project with man hours being limited by financial resources, the bio-regional mapping has been done at a low resolution level. Bioregional boundaries are a multi-disciplinary exercise that requires much research into various subjects from ecology to ethnography to cartography. Sifting through archives, finding old maps and reading through the vast amounts of old and new literature in order to ascertain exact boundaries can be extremely time consuming. The cartography component (GIS) in thematic layers can be a useful exercise but, again, requires financial and temporal resources.
5. It would also not be out of place to state that the development juggernaut is overwhelming natural features and characteristics of the landscape through engineering interventions that establish a human dominated and engineered landscape eroding significantly the intrinsic characteristics of the bioregions.
- 6. Methodology :** As there was a constraint of resources, the mapping and the documentation process was done by a small team. Grassroot community participation, which is key to the development of an inclusive bioregional map, has not been a part of this stage. If a larger exercise is undertaken in future this inclusion of local participation is intended to be included.

VII. Conclusion and Way Forward

The delineation of bioregional boundaries in the Indian subcontinent is a vast exercise, which must look carefully at a myriad of socio-ecological factors and deconstruct the political, colonial and imperial boundaries that have been superimposed over the centuries. However, what is certain is that it is indeed possible to unpackage natural and human settlement histories, and to discern and extract meaningful bioregional boundaries.

This exercise in research centric mapping has created a prima facie case that forms the foundation for further research. The methodology has proven to be potent and fruitful. Frameworks need to be established to strengthen the process and increase the objectivity and precision of the results. A participatory format ought to be integrated in the next step so as to ensure micro-ecological, linguistic, social and vernacular inclusivity.

The bioregional map is the path to linking the vernacular with the global, exploring indigeneity and alternate administrative boundaries. It holds incredible potential in understanding land management and the forces, both tangible and intangible, that have modulated its shape over thousands of years.

The time has come to flesh out the identified bioregions and their constituent districts so to align development policies with spatial ecology. The 'fleshing out' will require scientific inputs to verify the distinct characteristics based on modern soil maps, geological maps, agro-climatic region maps, agro-ecological maps, aquifers and water quality, native vegetation. A larger exercise can be the way forward.

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The District Gazetteers

MAPS AND FIGURES

Fig.1 : Linguistic Map of India (Source : <https://preview.redd.it/1wlzz9991ev11.jpg?auto=webp&s=6631f355a277cc55fd8b1d7a62c6c29f5870eeae>)

Fig. 2 : Tribal Map of India (Source : Indian Census 2011)

Fig. 3 : Ecoregions of the Indian Subcontinent Source: Terrestrial ecoregions of the Indo-Pacific region p22

Fig. 4 : Garhwal and Kumaon Regions (Source : www.untrap.co)

Fig 5a : Historically Named Regions of Rajasthan (Source : Udaipurbeats.com)

Fig 5b : Modern Agro-Climatic Regions of Rajasthan (Source : ICAR)

Fig. 6 : The Bioregional Map of Tulunad and Malenad delineated based on the sources described. (Map on the right shows the topographical characteristics that clearly show distinct physiography)

Fig. 7 : The Bioregional Map of North and South Bayalu Seemae which was delineated based on the sources described. (Map on the right shows the natural and topographical characteristics of the area)

Map 1 : Bioregional Map Developed by the Research Team.

OTHER INFORMAL SOURCES

Blog : Bharatkalyan97 A homage to Hindu civilization. <http://bharatkalyan97.blogspot.com/?view=mosaic>

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Map sangham period map https://upload.wikimedia.org/wikipedia/commons/4/46/South_India_in_Sangam_Period.jpg

SUPPLEMENTAL REGIONAL MAPS

These maps cannot be referenced as they are not from academic sources. However, they provide clues that enabled the team to conduct research that led to the identification of some of the boundaries that have been depicted on the final map. (The nature of the project required the team to look into unconventional resources such as blogs and social media boards, for hints into local nomenclature that was used in vernacular folklore and remain in the memories of elderly. This served as the first layer of hints, which was then substantiated with academic and verified sources as detailed in the bibliography.) The maps below are some of those that are part of this collection.

THE PENINSULAR SOUTH



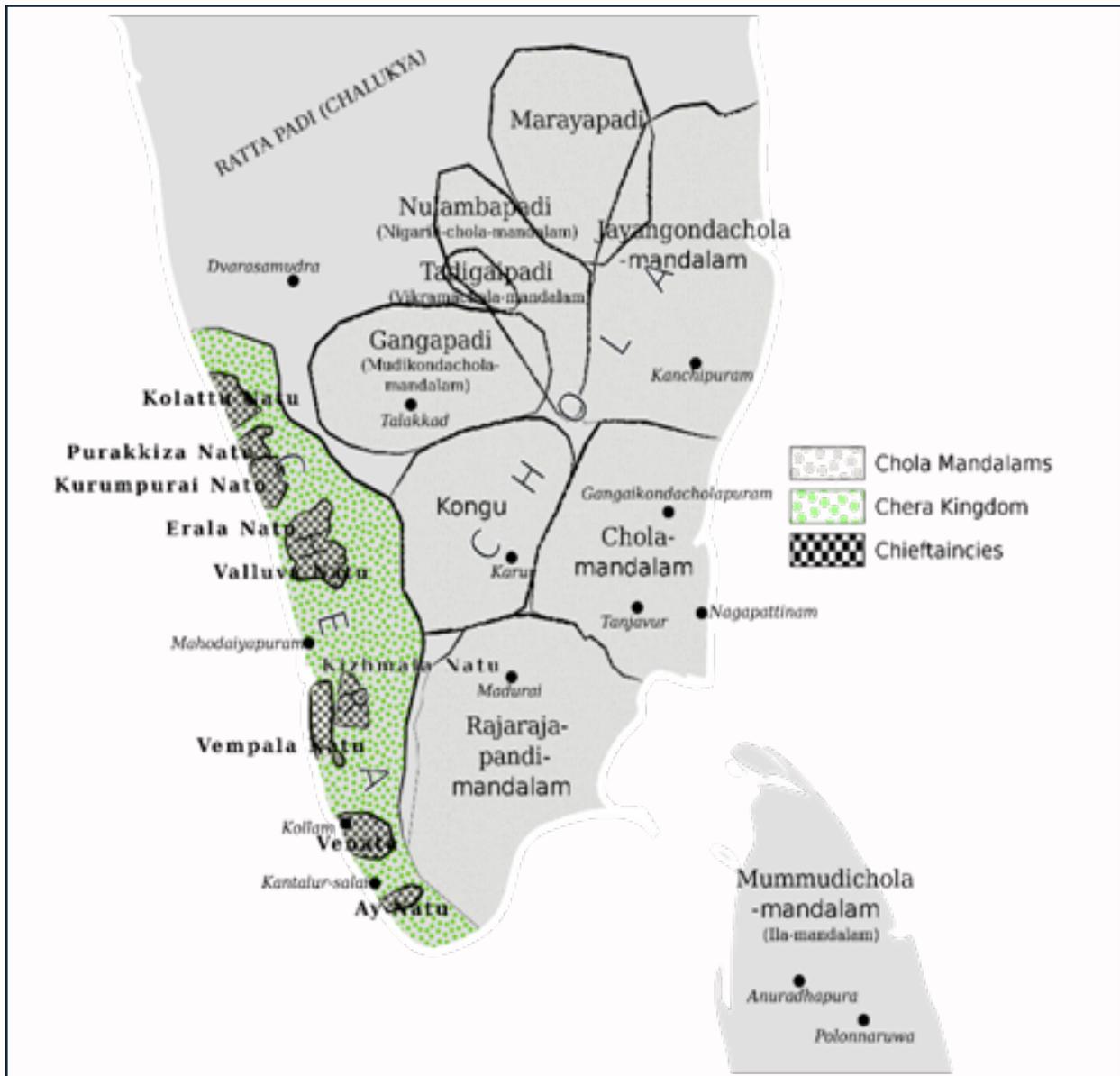
A map in Tamil denoting some important region. The names in the regional language were considered as clues. Further research into the names gave way to identification of the bioregional districts which have been.

(Map found on pinterest. Source : unknown)



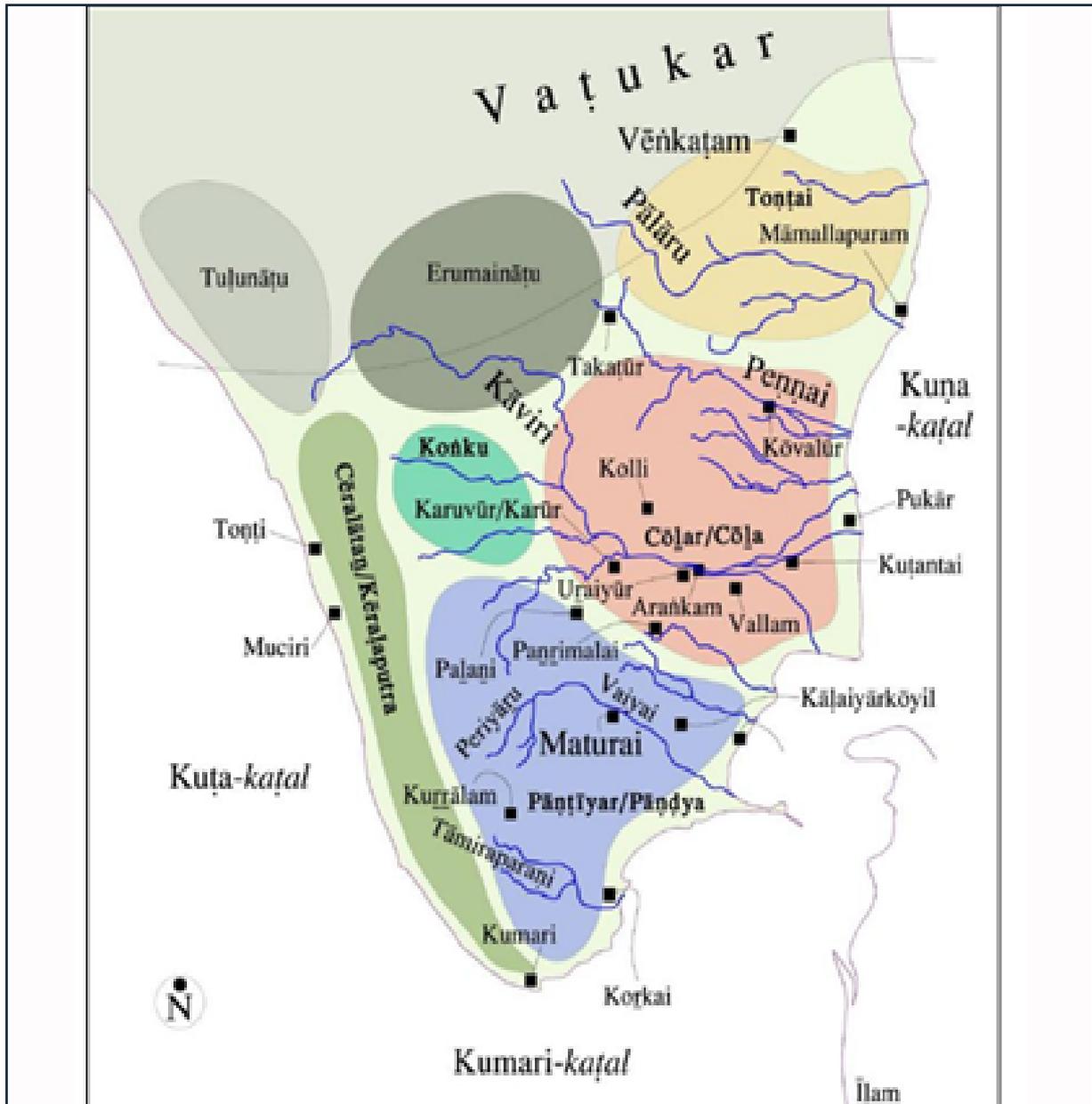
This regional map hints at regions and cities from the Sangham Period. The map led way to research into sangham literature which held a wealth of information pertaining to bioregions of the south, boundaryrationales and flows between regions.

(Map found on pinterest. Source : unknown)



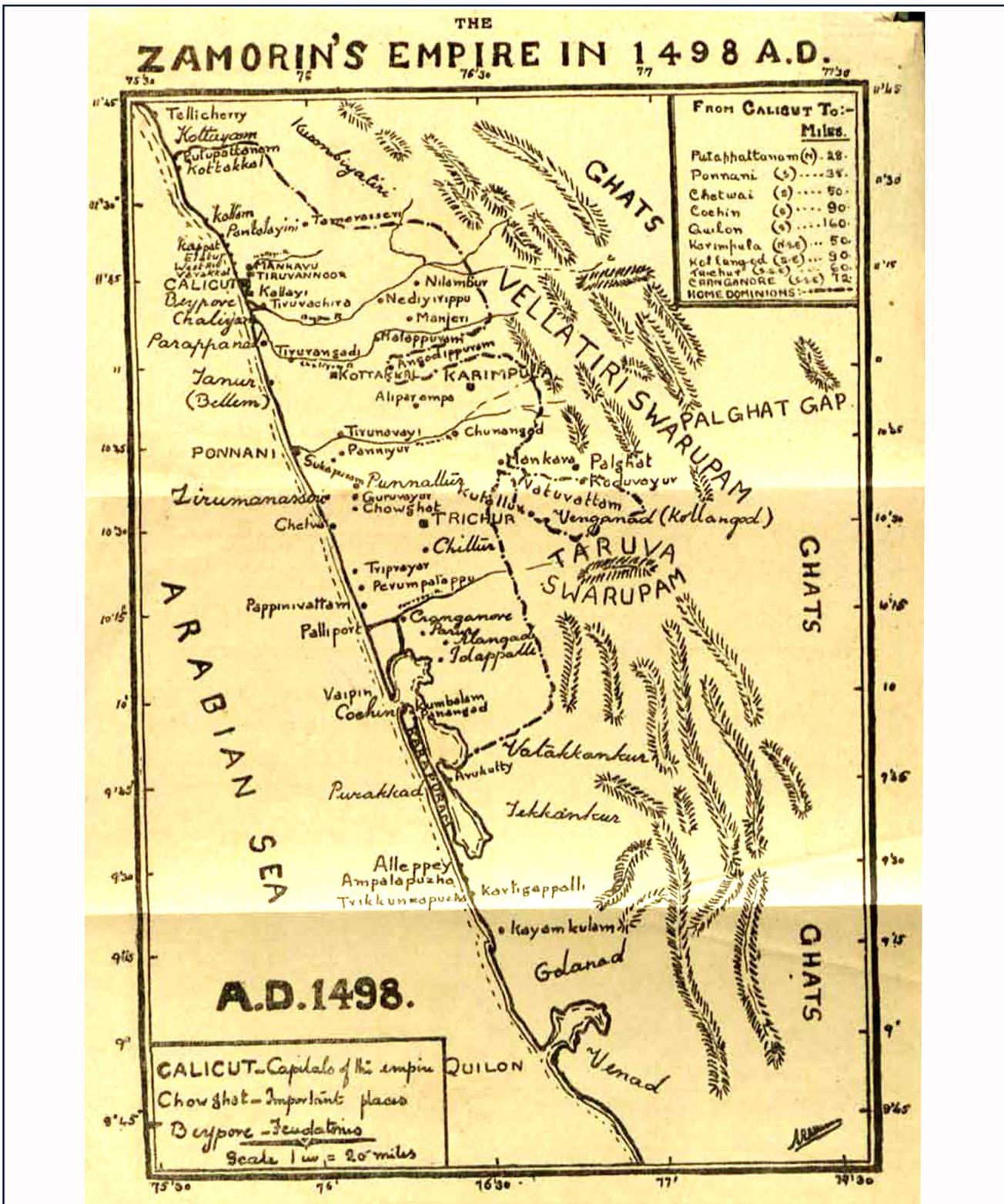
A map similar to the one on the facing page.

(Map found on pinterest. Source : unknown)



Another map of the same era with geographical information and additional information on cities of the time.

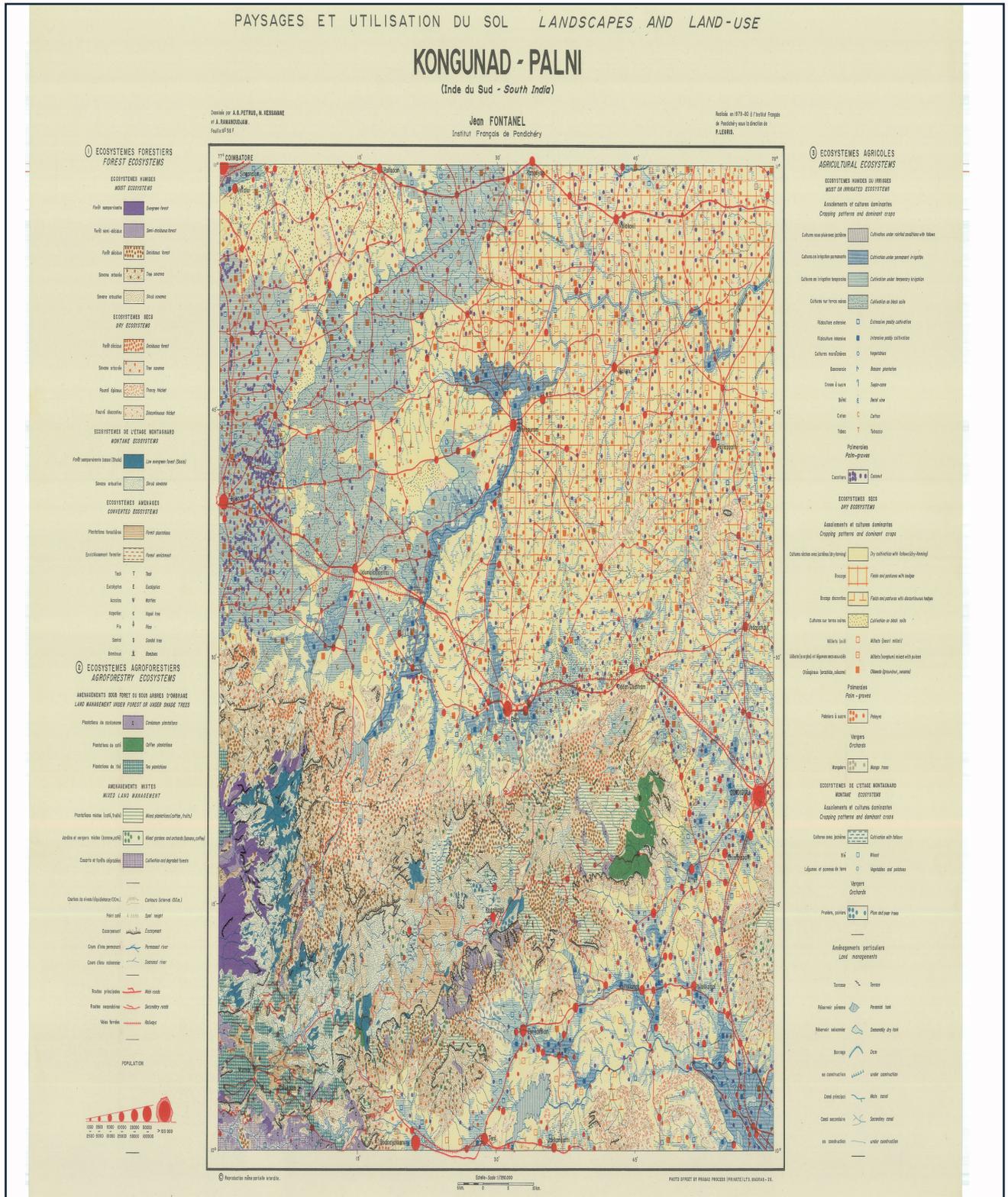
(Map by Pathiban Rajukulidoss. Source : unknown)



Zamorin's Empire in 1498 A.D

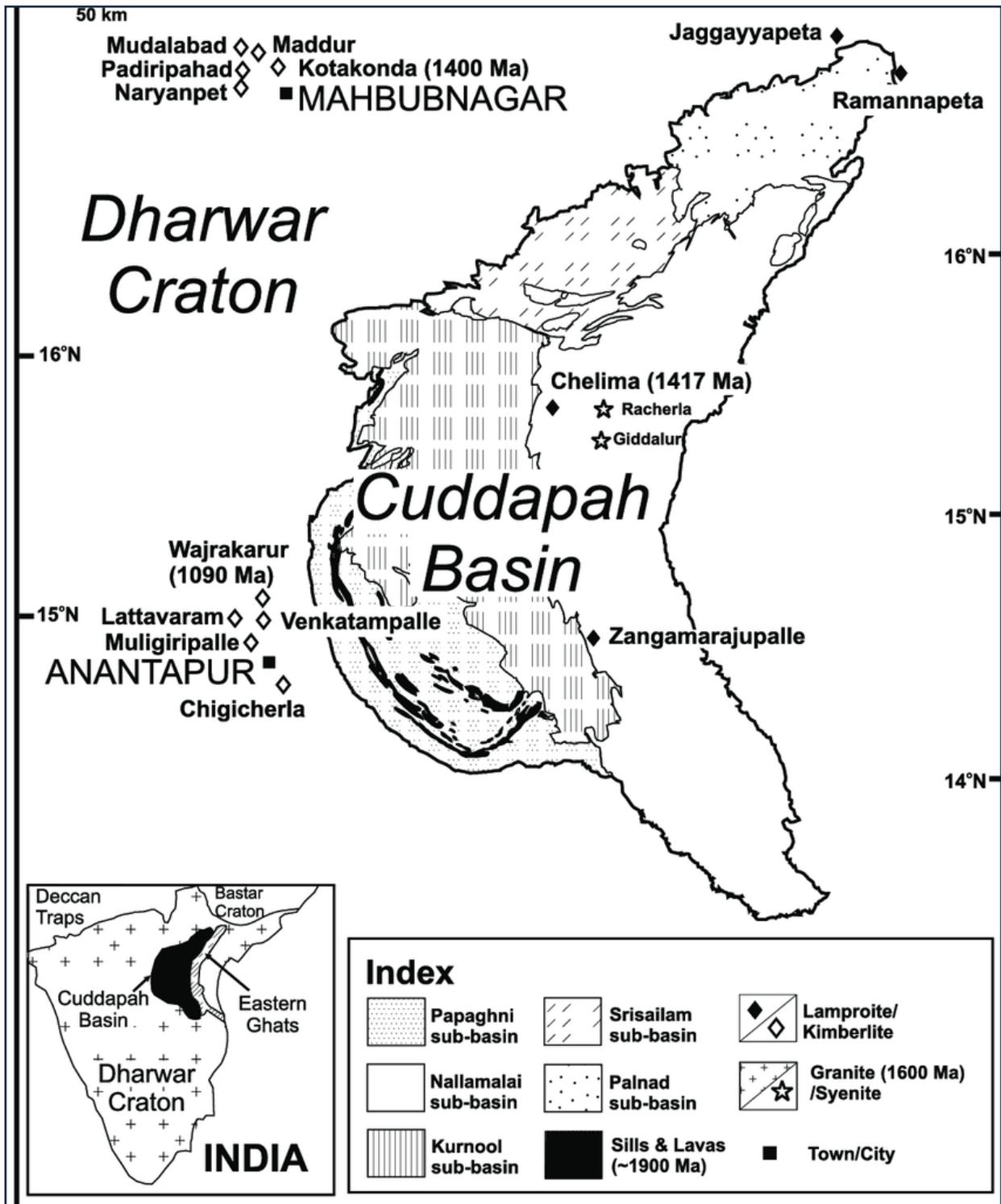
(Source : https://upload.wikimedia.org/wikipedia/commons/3/3e/Map_of_Samoothiris_kingdom.jpg)

KONGUNAD



French Cartographer Jean Foutanel's Map of Kongunad Palni- Landscape and Land Uses. (Source : French Institute of Pondicherry, 1979-80)

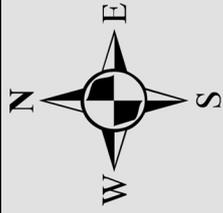
KADAPA REGION



A Geological Map of the Kadapa Region (Nagaraja Rao et al., 1987; Murthy et al., 1987- retrieved from Chalapathi Rao, N.V. & Gibson, Sally & Pyle, David & Dickinson, A.. (2004). Petrogenesis of Proterozoic Lamproites and Kimberlites from the Cuddapah Basin and Dharwar Craton, Southern India. *Journal of Petrology*. 45. 907-948. 10.1093/petrology/egg116.).

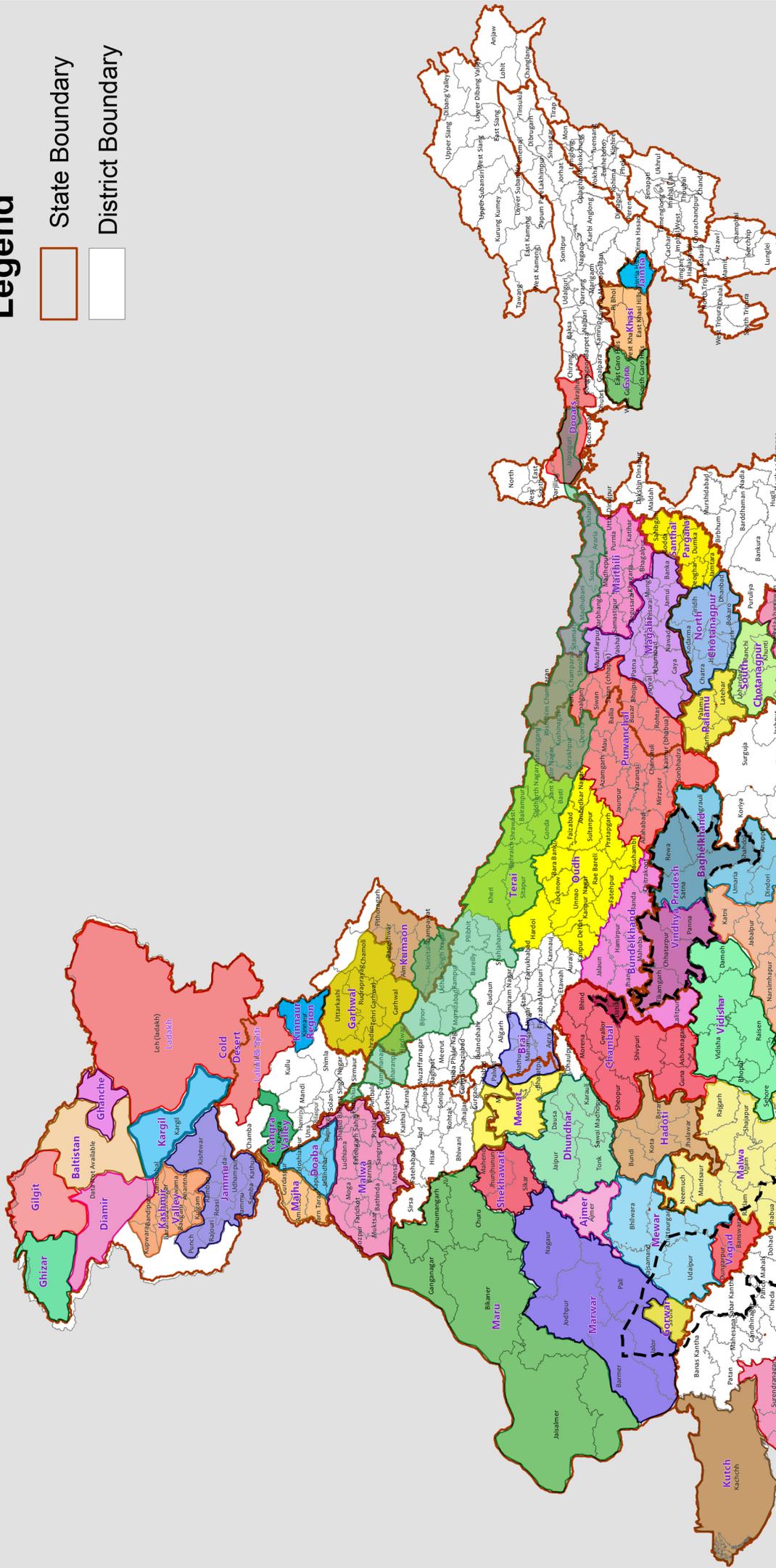
This map was a key clue that allowed researchers to unravel topographical and geological factors that determined the boundaries of a bioregion. Kadapa was identified as a bioregion.

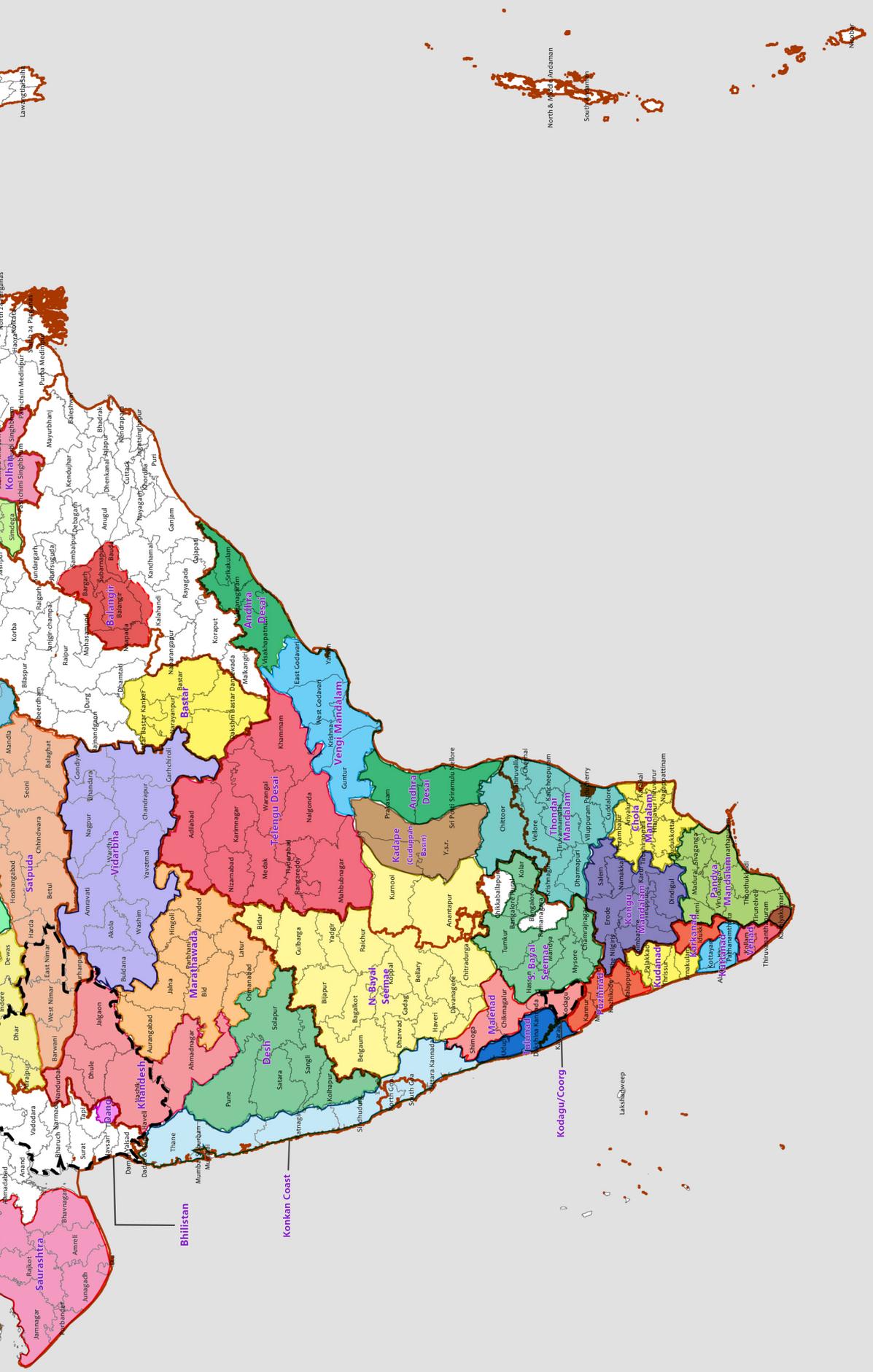
BIOREGIONS MAP OF INDIA



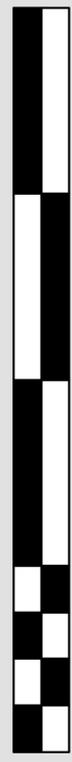
Legend

-  State Boundary
-  District Boundary





300 150 0 300 600 900



Kilometers



Manu Bhatnagar is an urban, regional and environmental planner heading the Natural Heritage Division of INTACH as Principal Director. He is an alumni of Cornell University with qualifications in Regional Planning and has further qualifications and trainings in Strategic Management, Strategic Environmental Assessment, Ecology and Habitat Management, Environmental Law, Conservation of Rivers and Lakes, Ecosystem Services and Sustainable Development, Public Policy and Circular Economy from prestigious institutes. He has

worked in India and in SE Asia on diverse projects ranging from urban-regional-environmental planning, regional landscapes, river conservation, lake management, water policy, sustainable agriculture, urban biodiversity, geoheritage, cultural documentation.



Nisha Mary Poulse is an award-winning architect and regional planner, whose interest lie at the confluence of human habitat, planning. Her ecological focus has been the guiding force behind her work, as is her relationship with nature. She is an Erasmus Mundus Scholar and is the founder of Woven Design Collaborative- an inter-disciplinary design and planning firm grounded in regeneration. She sees herself as a deep generalist and an integrator.

About South Asia Bioregionalism Working Group

The South Asia Bioregionalism Working Group, is a voluntary network of members re-imagining an ecoregional and bioregional governance for South Asia. It was initiated at a Democracy Vikalp Sangam (Alternatives Confluence) in October 2019. Our ecologies in the region are contiguous and so is the culture, which the group aims to highlight through documentation, dialogues, and action.

South Asia Bioregionalism Working Group



Facilitated by

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