

Evolution of Mapping Tribal Population in India

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ABSTRACT: Mapping of any tribal population group or a particular tribal community, in terms of depicting their distribution, economic or socio-cultural aspects, etc always throws up a different set of challenges to the cartographers. This is primarily due to the unique characteristics of such population in contrast to the non-tribal or general populations. The tribal communities in India, most commonly has their own dialect, other than several socio-cultural traits including integrated social network over a traditional eco-cultural zone. The presented essay is intended to share the author's experience of mapping the complex and intricate world of tribal communities of India with examples of evolution of tribal mapping. It is suggested that distributional maps of tribal communities using census data needs to be verified by certain ground realities and that quantitative thematic mapping of cultural dimensions of tribal population needs to be taken up seriously integrating field-based knowledge. Moreover, community participated GIS mapping has a wider applicability and acceptability for portraying the cognitive aspects of the people and thus to ease out various intercommunity contentions. Therefore, such maps expose the true inherent interrelation between tribe and their eco-cultural world which are of great importance for effective planning of tribal development with a pragmatic and people oriented approach.

INTRODUCTION

In present day usage maps have become much more popular tool and guide in defining and depicting public space with all its natural, socio-economic and cultural layers. In fact, cartography, as the science and art of map making, has extended its field far and wide particularly after entering in the digital platform and becoming the integral part of the information technology. Still for academic and planning purposes the classical theme based atlases, employing various regular and customised thematic mapping techniques, remain popular. For that matter depiction of demographic, socio-economic indices of tribal population at national, regional and State levels also

mostly remained within the ambit of such thematic maps and atlases. But while undertaking mapping of the cultural dimensions of any tribal community linked to their traditional territorial limit or their habitat, cartographers really face a different set of challenges. Let's examine now why it is so felt.

Fundamentally, people and space are the two major components in mapping tribal community or tribal population as in case of most other such mapping. But the inherent special demographic and cultural characteristics of any tribal community or even sub-groups along with their unique spatial spread and linkages demand a special attention of cartographers.

Instead of wide variations in defining 'tribe' by the sociologists, anthropologists or demographers
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there is no lack of consensus about their territoriality i.e. spatially definitive social organisation and specific habitat sharing. Dictionary of Anthropology defines a tribe as a social group usually with a social area, dialect, cultural homogeneity and unifying social organization. According to L. M. Lewis tribal societies are small in scale, are restricted in the spatial and temporal range of their social, legal and political relations and possess a morality, a religion and worldview of corresponding dimensions. Characteristically too tribal languages are unwritten and hence the extent of communication both in time and space is inevitably narrow. At the same time tribal societies exhibit a remarkable economy of design and have a compactness and self-sufficiency lacking in modern society. Prof. W. J. Perry defines tribes as a group speaking a common dialect and inhabiting a common territory.

Likewise, the tribal communities in India, most commonly has their own dialect, other than several socio-cultural traits including integrated social network over a traditional eco-cultural zone. This has been better postulated by D. N. Majumder, a famous Indian anthropologist, that a tribe is a social group with territorial affiliation, endogamous with no specialisation of functions ruled by tribal officers hereditary or otherwise, united in language or dialect, recognising social distance with other tribe or caste.

Tribal societies develop a unique spatially defined social network having strong integration with clan or communitarian basis of land holding. Their belief system encompasses God, spirit, nature which act as a driving force for traditional management of natural and cultural resources of their own. Mapping tribal habitat is the most important, sensitive and thus contentious aspect of delimitation and depiction of the territory of any tribe. The task is much complex due to presence of different historical, political and geographical contexts and dynamics of change thereof. On the other hand, the resource extraction zone or the actual sphere of their traditional habitat is mostly ill-defined or hazy and also varies seasonally. It may also overlap or mingle with the adjacent community or even is shared with other tribes of the same eco-cultural zone. Moreover, special constitutional provisions like the Sixth Schedule States, Tribal Reserves and Tribal Districts or the local

tribal councils etc have different territorial connotations. Parallel to the constitutional or legal delimitation of tribal habitat it is also important to attempt social and cognitive mapping techniques like 'mental map' or 'dream map' or even 'participatory mapping'. These aspects will be detailed at a later stage of this essay.

MATERIALS & METHODS

With a view to sharing the experiences of mapping the complex and intricate world of tribal communities of India several contextual examples are presented both from traditional forms of mapping and digital form of participatory GIS mapping. Contextual discussions are presented from 1) 'INDIA: SCHEDULED TRIBE', first cartographic representation of tribes was published in a single sheet India map by the Anthropological Survey of India in 1970 and the updated new version of the map was jointly published by National Atlas and Thematic Mapping Organisation (NATMO) and Anthropological Survey of India 2000. 2) 'An Atlas of Tribal India', the first atlas on Indian tribes published by Concept Publishing Company, 1990. 3) 'An Illustrated Atlas of the Tribal World', published by Anthropological Survey of India, 2002, and 4) Participatory GIS mapping of the forest villages in the unmapped tribal forest villages of Achanakmar Amarkantak Biosphere Reserve, Chhattisgarh, in 2007. Evolution of mapping techniques have been analysed and discussed to understand and assess the applicability of those. General spatial distribution of Scheduled Tribe (ST) population and their demographic characteristics on single piece of paper and series of thematic maps in an atlas remained in tradition for earlier such cartographic works.

Later on, attempts were made to add further dimensions at meso level scales to depict relational diagrams of tribal habitats with state and UT maps showing ranked distribution of individual ST community population. Mapping of unmapped tribal villages at micro level were experimented using Global Positioning System (GPS), Remote Sensing data (RS) e.g., satellite imageries and Geographic Information System (GIS) in digital platforms to include several spatially related layers of demographic, socio-economic and cultural dimensions at village and

household levels. Instead of depending mostly on secondary macro data e.g., census tables, the micro level GIS mapping generates much accurate primary data by involving the community being mapped using participatory real-time survey methods.

Thus, this particular domain of mapping has been evolved and still evolving to deal with the following major spatial dimensions of the tribal population at different scales of extent:

- 1) *Macro Scale:* The global or regional level categorisation of major human population groups in terms of their racial or genetic or linguistic characteristics and their historic migration etc are the most popular themes mapped. Such maps may spread over the whole or part of the hemispheres, one or more continents, country or regions and States.
- 2) *Meso Scale:* At this medium scale mapping demographic, socio-economic, linguistic etc characteristics of the tribal population as a whole are presented to show the spatial variations and patterns of distribution. Major tribe or community can also be depicted on national, regional or State level for visualising their concentration, major social elements or even certain physical or cultural traits.

Options are further open for mapping the landscape and land use types towards defining major tribal habitat and changes at meso level. Lower resolution satellite imageries and other easily available resource maps could be of much use for developing the base map layer for habitat extraction and delimitation.

- 3) *Micro and Local Level:* This is the most useful scale where we can present almost all information about any individual community or its sub-tribes. We consider district, block, tehsil, village level maps are suitable for portraying detailed features and traits related to the immediate environ and culture with interrelations at the micro niche.

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RESULTS & DISCUSSION

It is observed that the early form of mapping the tribal distribution was mostly pictorial depiction of communities over a base map marked with respective territorial boundaries. Those old maps visually presented each American Indian groups in their iconic attires. In many other instances ethno-linguistic zones were mapped at macro level indexed with names and population of tribes with a grid reference. The whole of Africa and North America have been mapped in similar ways to show the huge number of tribes living there. In fact development in thematic cartography paved the way to produce maps on specific and specialised themes. Different types of thematic maps, useful for showing different types of thematic variables, used to show natural resources, vegetation areas, population, types of soil, climate, temperature, etc.

In India, perhaps the first cartographic representation of tribes was published in a single sheet India map by the Anthropological Survey of India in 1970. The updated new version of the map was jointly published by National Atlas and Thematic Mapping Organisation (NATMO) and Anthropological Survey of India at the turn of the new millennium in the year 2000. The map of India at 1:4,000,000 scales is first given five different base colours for respective language families spoken by the tribes. This map 'INDIA: SCHEDULED TRIBE' shows individual tribes employing Doi's method to find the statistical combination of major tribe by population at district level using Census of India 1981 data. The name of a tribe is given an abbreviated form e.g., Jarawa denoted as 'Jrw'. These abbreviated names are printed inside the district boundary (or close by) along with that of second, third, fourth, etc tribes in combination. The dimension of the range of population of each tribe has also been presented through proportionate size of the letters of the abbreviations. Thus, for district Bastar of Chhattisgarh the combination is GnBhtHb denoting Gond, Bhatra and Halba in the order of population sizes. There are six sets of indexes for guiding the reader with the abbreviations of tribes along with the State or UT they are shown in the map. The physical map of India is given in an inset. The population ranges are seven starting with 5,000 and less to more than 5,00,000. Though only the statistically major tribes, out of total

418, have been chosen to map still several small districts of Manipur or Nagaland had accommodated 13-15 letter abbreviation which has become a bit congested for the readers' eyes. Uniquely, tabulated population data of

tribes in each State and Union Territories were printed on the reverse side of the map. Moreover, the map was folded and packed in a handy and attractive envelop for easy portability (Fig. 1).

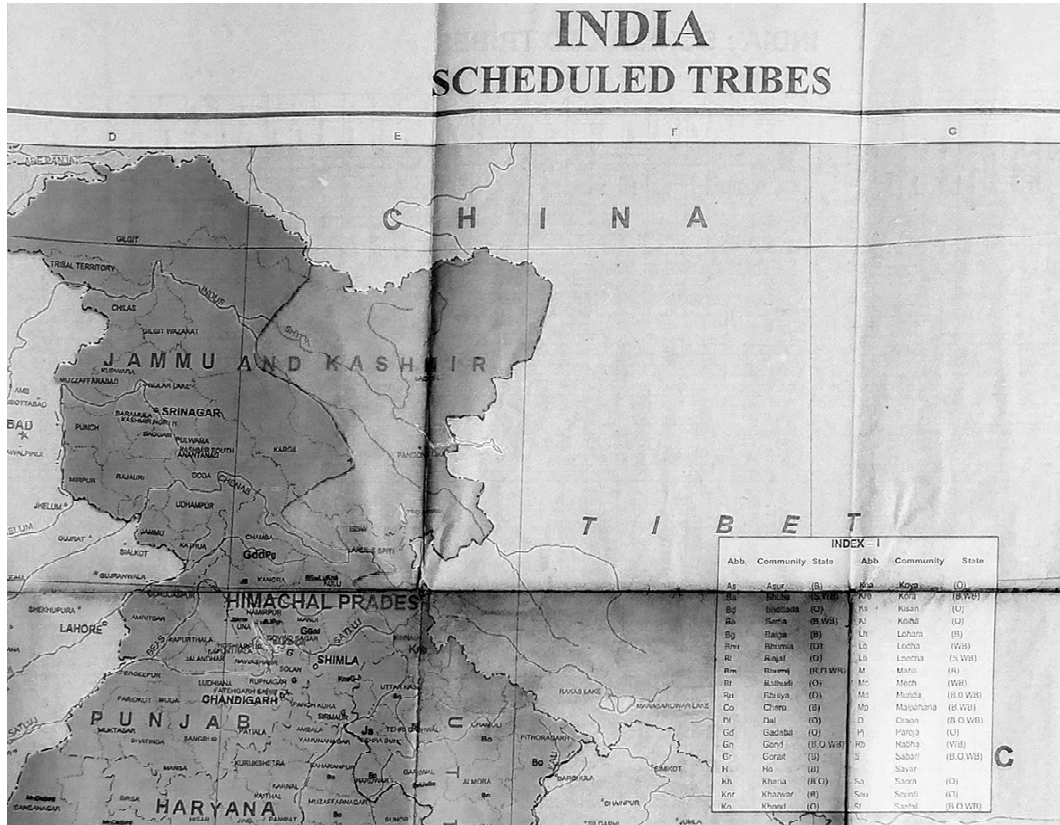


Figure 1: Part of India: Scheduled Tribe map sheet.

Source: 'India: Scheduled Tribe' by Anthropological Survey of India and NATMO, 2000

In between in 1990 the first tribal atlas in India was published using the 1981 Census figures of Scheduled Tribe population. The volume titled '*An Atlas of Tribal India*' was conceived and authored by two eminent Indian geographers from Jawaharlal Nehru University, New Delhi, Professor M. Raja and Professor A. Ahmed. The Atlas contains 188 Plates of all-India maps including a series of regional insets. It actually presented the salient demographic and socio-economic features of the tribal population of India with the help of a series of maps, diagrams and photographs. But it didn't deal with the individual tribe or community as such.

Then in 2002 came the second tribal atlas of India,

showing for the first time, the distribution of all 418 Scheduled Tribe communities of India in the maps of States and UTs. This volume, published by Anthropological Survey of India, too had to depend on the then available Census data of 1981 for individual tribal group. '*An Illustrated Atlas of the Tribal World*' remains unique for its simpler method of showing distribution of major tribes along with one habitat profile, brief ethnographic account and photographs for each State or Union Territory. Introductory map plates are at national level on the themes of i) growth and variation of Scheduled Tribe Population 1961-1991, ii) Concentration of Scheduled Tribe Population 1981, iii) Physiography, iv) Forest,

and v) Distribution of Major Scheduled Tribes 1991 with an inset map on Distribution of Language Families. The present author was entrusted with the cartographic works in the team of Sri H. K. Mandal, Project Co-ordinator and Smt. Archana Dutta, all three geographers attached to the Human Ecology section of the Survey (Fig. 2).

Main challenge faced was to find a simpler method to map the 418 (after merging certain sub-groups treated independently in the list of 427 tribes in Census of India 1981) tribes at district level. Finally, we found a relevant

solution in employing double ranking method and putting the rank number of each tribe instead of name or abbreviation thus accommodating all 418 tribal groups in showing distribution. Thus as many as 60 or more tribes could be shown within the small space of a district in the map of Arunachal Pradesh. Thus one State or Union Territory is presented in a plate to show district wise distribution of tribes listed in a box ranked on their population strength. The same rank number is plotted in each district in a sequence of the position by population strength of those communities in that district.

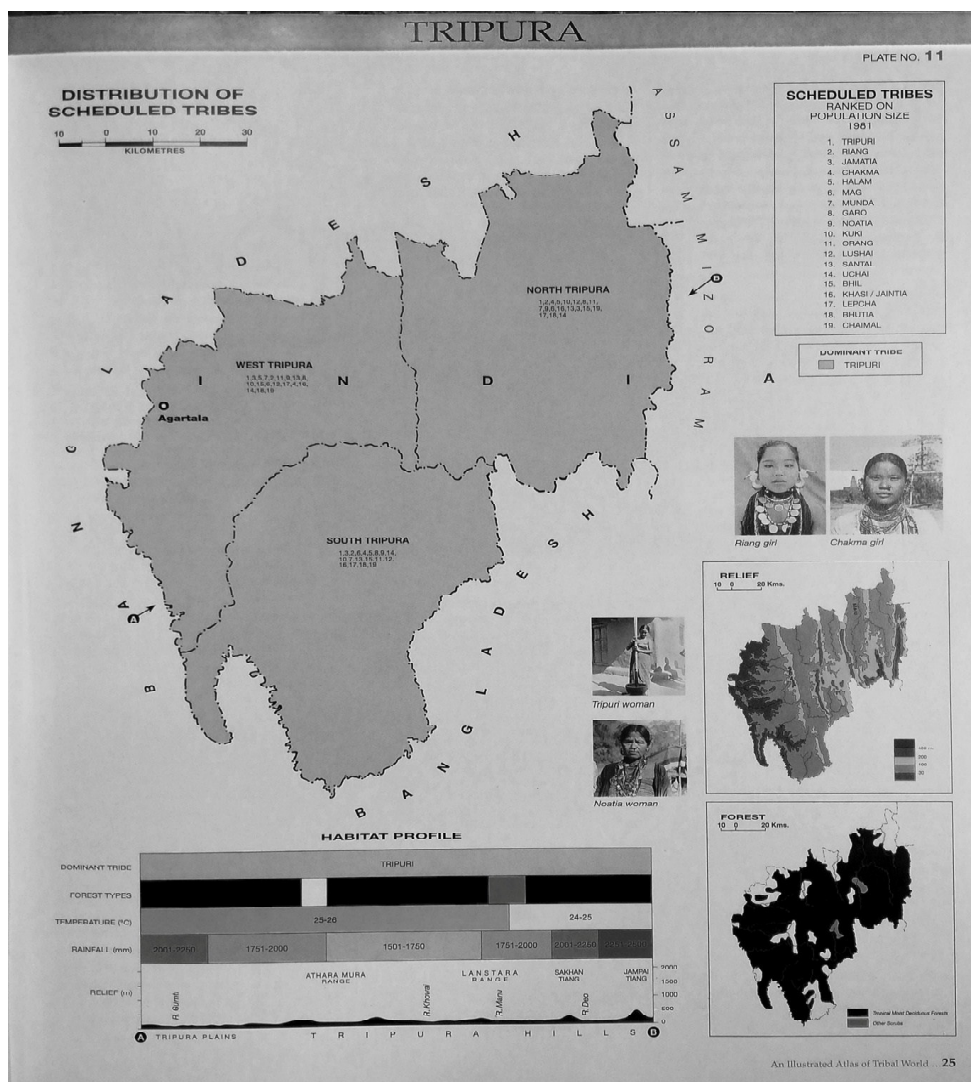


Figure 2: Map plate of Tripura state in the 'India: An Illustrated Atlas of the Tribal World'.
Source: Author

Relief and forest maps of the State or UT are also placed in the plate as insets. A habitat profile is prepared using a transect chart to project the geographical conditions of tribal habitat of that area. The diagram displays the physical parameters such as relief, drainage, rainfall, temperature, forest types in a stacked manner placing the distribution of tribal groups on the top layer. Thus, the habitat profile serves as a simple cartographic presentation of ecological conditions to understand the approximate ecological condition in which a tribal group is living. This inter-relationship actually hints towards the resource base and probable major economic pursuits, house types, nature of dress etc and thus enticing reader's rational interpretation. Few photographs of the major communities are also added in the map plate itself other than those given with the text.

Each plate is elaborated and supported in the corresponding write up a brief overview of the State is given along with the environment and resources of the concerned habitat. The socio-cultural and ethnographic characteristics of the few major tribes are concisely narrated as well. The volume concludes with select bibliographic account, glossary of terms and a series of detailed data tables are appended to include languages or dialects of scheduled tribe, primitive tribal groups (presently PVTGs), growth and variation of Scheduled Tribe, development variables of Scheduled Tribe, followed by the tables on State/ District level percentage of scheduled tribe 1981 and 1991, State/ District level ranking of scheduled tribe population 1981.

New Dimensions and Present Trends

With the great leap of traditional cartography into the arena of computer aided or digital cartography since late 1980's the scope and technique of mapping expanded many folds. Satellite based navigation and remotely acquired geographic information have boosted up customised thematic mapping on virtual earth in real-time. In brief Geographic Information System and Remote Sensing data has potentially systematised the mapping process. GIS is widely applied across disciplines as potential information processing and spatial imaging technology in the field of information and social accounting. GIS is many times more than mapping. It creates, updates, maps,

overlays, disseminates and analyses multispectral and multi-layered geo-database on virtual globe. The key issue between cartography and GIS is that cartography is concerned with representation while GIS is concerned with analysis of spatial relationships.

This system is being rapidly adopted worldwide to increase community participation in planning and development. Through its characteristic participatory surveying and mapping techniques, transparency, visual sharing and interactive nature GIS helps a lot particularly in building trust with the indigenous communities in amicable ways. On the other hand, due to its time constraint in developing and processing large samples GIS is found very appropriate in planning the process. The potentiality of this technology has been recognized as beneficial to the indigenous and rural community in generation and dissemination of essential database used in tribal mapping. Moreover, by facilitating access to the database in GIS format, viz. community GIS, community participation in planning can democratize the use of GIS and make it more relevant to the issued in mapping and planning. The cumulative impact on indigenous people, and the resources they need for their livelihoods, can be shown by overlaying maps depicting resources at different points in time. For this purpose, map showing population, land ownership, land use, carrying capacity and vegetation cover can be generated by participatory methods such as resource mapping, transect walks and calendars of seasonal activity patterns and by collecting local histories (Weiner, Harris and Craig, 1998). GIS mapping has been successfully used in regional scoping of each island to develop a human ecology model to illustrate potential impacts on Native Hawaiian communities, ancestral lands, cultural and natural resources and traditional and customary practices (Minerbi, 1996) and among several other indigenous communities (Rundstrom, 1995).

The system is thus hugely beneficial to the indigenous and rural communities:

- 1) Delimitation of unmapped traditional community land and areas of foraging and other economic activities,
- 2) Determination and temporal / seasonal changes in natural resource utilization,
- 3) Showing land tenure, land use, carrying

- capacity, settlement characteristics,
- 4) Community interrelations and linkages, and
 - 5) The habitat profile in virtual perspective.

It is suggested that distributional maps of tribal communities using census data needs to be verified by certain ground realities and that quantitative thematic mapping of cultural dimensions of tribal population needs to be taken up seriously integrating field based knowledge. Moreover, community participated GIS mapping has a wider applicability and acceptability for portraying the cognitive aspects of the people and thus to ease out various inter-community contentions.

In present day digital cartography system using RS and GIS one can smoothly roam along from a million scale map to a cadastral one with the roll of the scroll mouse. In fact, it is possible to have household level information overlaying a country level map composed of several layers and feature classes dedicated for a single tribal community.

Important Spatial Dimensions

In case of mapping settlement area with the dwelling huts of the tribal villages located in mountains or forests areas the main hurdle is total absence of any base map e.g., mouza, cadastral or village map. These unmapped village settlements are of much importance in terms of enhancing our knowledge required for planning and development. In the spatial layout of such traditional villages there are hidden treasures written about several intricate aspects of the land and people e.g., social linkages, cultural practices, sacred sites, etc. Interestingly, even spatial dimensions of marital relations, marriage distance and kinship can be shown in innovative ways using digital technology.

Further, community GIS or participatory GIS mapping with GPS enable:

- 1) Involvement of tribal people in mapping at field survey level (cognitive mapping),
- 2) Real world Resource mapping and Transect walk with GPS and palm top GIS,
- 3) Delimitation of Eco-cultural zones for a tribal group, even including sub-groups,
- 4) Incorporation of local / traditional knowledge

in mapping through peoples' participation for public policy,

- 5) Consideration and extraction of various cultural resource zones and cultural traits,
- 6) Mapping the indigenous rights and traditional practices, and
- 7) Locating sacred areas and common natural property etc.

In the international workshop titled 'Participatory GIS: Opportunity or Oxynorm?' held at University of Durham in January 1998 it was primarily agreed that "Participation in a GIS can operate not only at the level of producing information but also in terms of the active use of that information. By exposing alternative representations in one system, participatory GIS should generate dialogues and stimulate reflection and debate, e.g., in relation to conflicts over the use of resources. The most appropriate participatory GIS is perhaps one which is issue and context driven" (Abbot *et al.*, 1998). At the end of the day, it was accepted the participatory GIS is a means of integrating previously isolated qualitative and quantitative information sources which is a potential aid to conflict resolution. It is also a means of consolidating and sharing ideas.

Experiences in AABR

A series of GIS based village level maps (geo database) were prepared on remote Chhattisgarh forest villages by the present author at the Anthropological Survey of India laboratory during 2008-09. The first-hand experience of mapping anthropogeographic dimensions of those unmapped unsurveyed villages, inside the core of the Achnakmar Amarkantak Biosphere Reserves (AABR) forests, though meant for using in a mitigation action plan for resettlement, can be suitably cited here in this context. This is more so because those forest villages were the century old homeland of tribal communities like the Baiga, Gond, Oraon, Kavar, Kol and Dhanwar along with several caste groups having direct dependency on the forest ecosystem.

Each village level survey was started with a FGD involving the key persons. Then after gaining their confidence and support the whole village area was ground surveyed and mapped in realtime walking

across whole length and breadth using a hand-held GPS and guided by village representatives. In this way the present-day maps were created showing the actual extent, communication lines, water bodies, cultivable land parcels, common properties, sacred places and objects, other public utility areas, etc. Further, in the next lap of household survey, structured questionnaires and schedules were executed with corresponding mapping of the location and identification of each house using GPS. Selected key villagers were guided to draw the mental map of their

village to extract their cognition and world view about the geographic surroundings, resource zones etc. In most cases it was attempted to make them handle the GPS after a brief training about the basic system and universal symbols used.

Those maps and database primarily helped the SIA team to understand the community and clan level neighbourhood characteristics. Extracted actual land area and land use along with comparative land holding sizes and land tenure among different groups.



Fig. 3a



Fig.3b

Figure 3a: Old patta map overlaid on Google map
 Figure 3b: Patta map overlaid on current GPS map data
 Source: Author

Overlaying three different maps layer wise in one geo-referenced frame produced the new dimension to visualise and quantify the area of land actually acquired by the village Jalda in excess of the original patta allotted to them more than a hundred year ago (Fig.3a and Fig.3b). This finding was very useful in justifying the increased requirement of land by the villagers with the increased population size.

Towards a better understanding of the ethnic dimension of the present village settlement, e.g., their community and clan level neighbourhood preference along with the hierarchical location of their houses were plotted clan wise (Fig.4a). On the same base of present land-parcel map size of land holding has been plotted clan wise to show the spatial dimension of the relative holding size (Fig.4b).

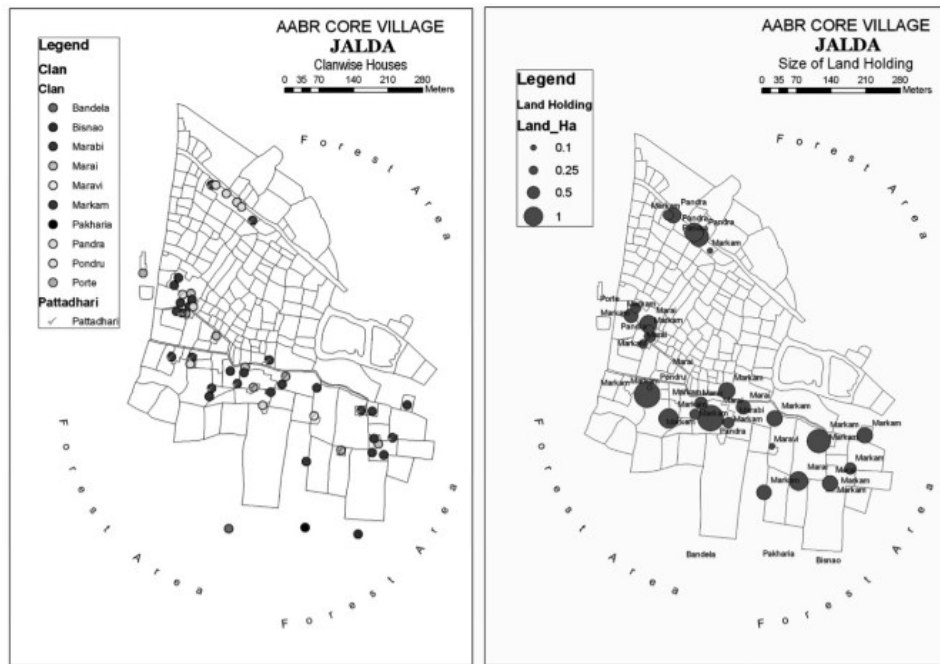


Fig. 4a

Fig. 4b

Fig.4a: Houses are depicted clan wise to depict spatial pattern.
 Fig. 4b: Size of land holding is shown clan wise at household level.

Source: Author

The longstanding gap between the planning and implementation of development of tribal groups in the State was gingerly raised by the students from such communities. They agreed that there still lies an unfortunate gap in understanding their problems and issues in proper context. After a thorough and rational discussion the student audience accepted that creation of detailed geo-database and mapping could be a better way to pave the path of development in a more meaningful and contextual manner.

CONCLUSION

In today's perspective mapping of tribal aspects is as essential as contentious. Therefore, remote data and empirical experiences are to be fused with Census data on tribal communities. Participatory community mapping is promising to build trust and reality. In practice RS and GIS offer unlimited opportunity 'beyond tribal map' creating and validating and updating multiple database on tribes.

Showing spatial distribution of a particular tribal

group also involves carefully delimiting their traditional or historical habitat zone. The traditional 'tribal territory' of autochthons may sometimes be extended or coterminous with their social network involving several other sub-groups and/or bands linked through the kinship or marital relations.

One has to keep in mind that a crucial issue often create difficulties in integrating remote sensing and social science field research methods is the constrains in interactions among processes acting at different scales. Spatial resolution of RS data affects which land cover change is recorded and analyzed. Within small holder systems that characterize much of rural India, changes in land use and land cover with major impacts on social system may be difficult to detect with RS system most commonly available/used for LULCC.

While the implications of environmental changes are often discussed in terms of global and regional consequences, there is growing recognition that many of the critical causes arise from societal and biophysical processes at the local level. In short,

driving forces of land use and land cover change are many faceted. They may change in relative influence over time, and their impact will vary as a local context changes. Analysis of LULCC at multiple scales demands conceptual frameworks and analytical methods that are both comprehensive enough to capture the dynamics of society-environment interactions at different scales, and flexible enough to accommodate the temporal dynamics of these processes (Mukherjee, 2012).

It is encouraging for the geographic fraternity and the tribal communities of India that the Central Government is planning to prepare a Tribal Map of India to facilitate smooth implementation of different programmes meant for the welfare of 'adivasis' in the country, an official release issued by the Union ministry of tribal affairs (MTA) on 3rd June 2018 in New Delhi. Latest GIS technology will be utilized to prepare the Tribal Map of India which will be immensely helpful in tracking the progress of different programmes, new schemes and projects for tribal people.

Meanwhile on July 23, 2018 the Chief Minister of Odisha has released first-ever tribal atlas of Odisha. The atlas has been prepared by the SC & ST Research and Training Institute in collaboration with Academy of Tribal Language and Culture. The atlas contains 60 plates of maps along with corresponding graphs and diagrams which portray the distributional aspects of the Odisha's tribal population, ecological setting of the tribal habitats, and their socio-cultural attributes such as linguistic or dialectical affinity, sex composition and literary levels.

Planning for tribal development with a pragmatic and people-oriented approach requires multifaceted information and knowledge about them. And, any attempt of mapping of any such community involves visual representation of empirical and statistical data

and information on a projected or virtual earth true to scale and perspective. Hence, map exposes the true inherent inter-relation between tribe and their physico-cultural world. The faith and acceptability of such spatial database using RS and GIS in mapping through community participation offers the most important dimension of developing trust and mitigation of contentious issues in tribal development, most importantly between planner and executors with the people in question. More we map ourselves more we know each other, through mapping we can disseminate culture and knowledge of any community worldwide.

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