Development of Spatial and Attribute Database for Planning and Managing Rural Service Centers, in Kendrapara District, Orissa, India: A GIS Based Information

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Key words: Spatial and Attribute Database, GIS and Rural Planning.

SUMMARY

At present, the decentralized planning process is a conspicuous feature in India having planning machinery operating at the state and district level. Block is the micro level unit, used for implementing different kinds of rural-regional development programs. There is certainly a strong need for data and information base for the successful planning and development operations at different levels. The decision making at appropriate places and time as a part of planning exercise. It is very much dependent on what kinds of data and information available. The rapid growth and quick development of information technology in developed nations have created awareness in developing world to have such a data base system at the district level on various planning issues and problems needed for the multi-faceted development programs. An attempt is made in this paper to illustrate the resource, types and quality of data and information available at the district level for development planning purposes. Kendrapara district of Orissa state in India is illustrated as an example.

- [1] *This paper is based on part on part of an M.Sc thesis by MrRanjan Kumar Mallick(1998) carried out at AIT, Bangkok, Thailand.*

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1. INTRODUCTION

Planning in India started in 1951 in the form of centralized and macro-level economic planning. A multilevel decentralized planning developed in later stage. A number of planning functions, such as the provision of services and other infrastructure, are being transferred to these bodies. Planners in the country now widely recognize that the location of services and infrastructure facilities play an extremely important role in promoting development in rural areas of the country.

The decentralization thinking has further gone down to the level of Gram Panchayat (GP) below the block in India and emphasis has been made by the government to further strengthen and energize the decentralized planning process in the eighth five year plan period (1990-1995). Efforts to be reconsolidate to revitalize the Panchayati Raj institutions to fulfill the promises and expectations of the people, at the lowest level with multifold objectives of reduction in economic and social disparity and participation.

It depends very much on the quality as well as quantity of database available. The objective of the paper is to make a review of different sources of data and information system with types and level of availability in order to create an attribute and also spatial database to identify rural service centers with the aid of GIS tools.

2. DATA COLLECTION

Essentially two types of investigations were made to study the existing situation of service facilities and planning prospective of rural development in the district level. The first type was of an exploratory nature and consisted of the collection and review of relevant published and unpublished literature on the development of service center in India (Table-1). It provides orientation on and familiarity with the existing situation and problems and was helpful in preparing for the actual survey. There are various types of digital data prepared by using GIS software. The digital data are in points, lines and aerial units in Kendrapara district, India (Table-2). The data sources are quite large and deal with varieties of phenomena and problems of different spatial and attribute data levels in the district (Table 3).

Table 1 Source and Types of Data (Government and other Agencies)

Source	Type
District Agricultural Office	Agricultural extension center service facilities
District Veterinary office	Livestock census, health services, etc
District Chief medical office	Location of health center and services
Circle Inspector of Schools/ District Inspector of the Schools	Primary and secondary educational facility
District Statistical Officer	All types of statistic relating to different sectors
District rural Development Agency	Types of development program
Superintended of Post and Telegraph	Post, telegraph facilities and service center
District road and buildings department	Types of road and their maintenance
District collector office	Information about administration
District Panchayatraj Office	Administrative system of the village
District Public Relation office	Cultural and recreation data
Manager, Lead bank Regional (rural credit)	Credit Loan

Source: Collector Office

Table 2 Digital Database of Kendrapara District

Sl.No	Description	Feature type	Map scale
1	Road network	line	1: 50,000
2	Drainage	line	1: 50,000
3	Block boundaries	polygon	1: 50,000
4	Settlements	point	1: 50,000
5	Police Station	line	1: 50,000
6	Flood	polygon	1: 50,000
7	Canal	line	1: 125,000
8	Services and amenities	point	1: 50,000
9	Land use map	Polygon	1:250,000

Table 3: Spatial data

Sl. No.	Maps	Source	Year	Scale
1	Toposheet	Survey of India	1976	1:50,000
2	Administrative map	Map production and distribution office govt. of Govt. of Orissa, Cuttack.	1997	1:50,000
3	Road map	Roads and Building Department, Kendrapara.	1995	1:50,000
4	Village map	Census Office,Bhubaneawar	1998	1:50,000
5	Land use map	ORSAC,Bbubaneswar, Orissa	1992	1:250,000

3. STUDY AREA

Kendrapara district, one of the coastal districts of Orissa state in india, was chosen for this study. The district has a geographical area of 2180km^2 and a population (in 1991) of 1,104,501 which constitutes 3.63 percentage of state population. The population density is 460 persons per square kilometer as against 203 for the state as a whole. The economy of the district is primarily rural and based on agriculture and allied activities. More than 75 percent of the total population earns a livelihood from the primary sector.

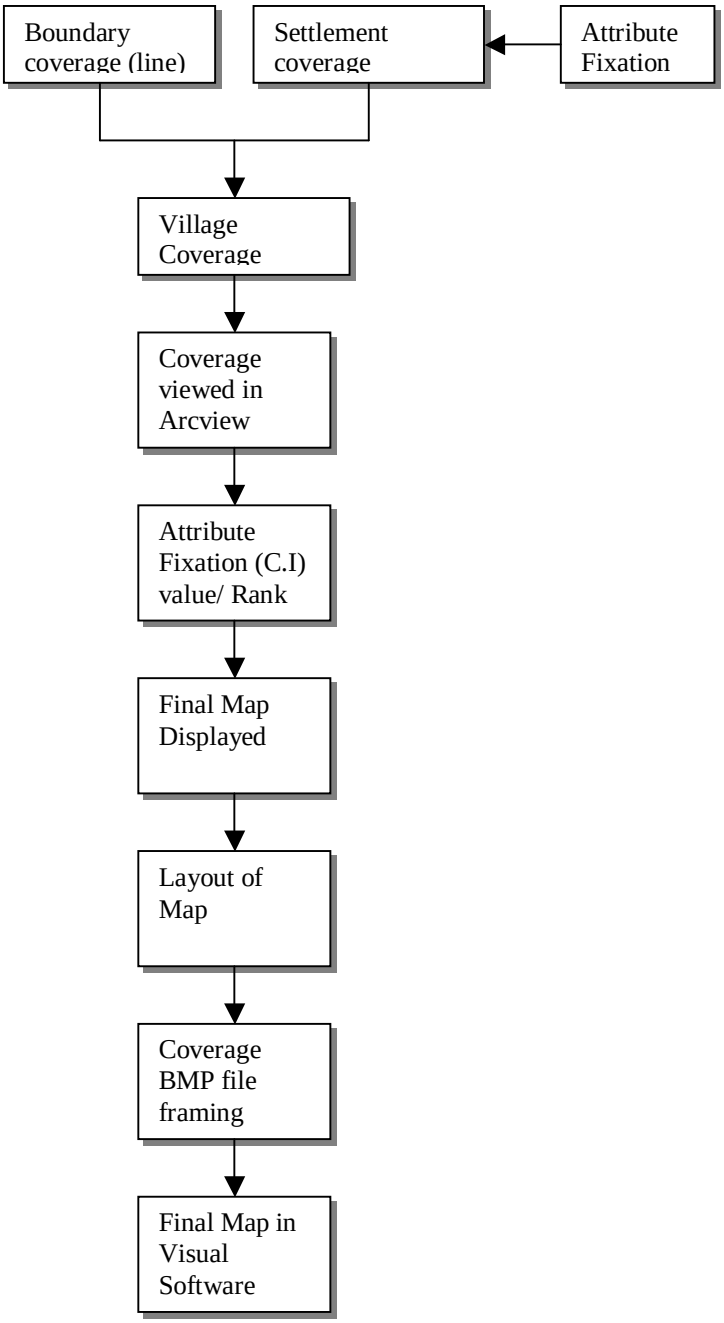
4. METHODOLOGY

The study methodology is based on the field visit, primary and secondary data collection, analyze and display the results. GIS is used in different ways, preparation of coverage and interpretation, also for planning and decision-making. All the relevant maps were obtained from the Topographical Survey Division. The GIS software Arc/ Info was used to establish the database and Arc View was used for map preparation. The data of the study area have been stored in the form of thematic layers and related attributed tables,using Arc/ Info software. This allows one to retrieve, overlay, and present them in map or tabular form. The data can also be retrieved in spatial format with windows-driven Arc/ View software. The figure 1 (APPENDIX 1) shows the process of creation of digital database for district level planning process.

5. MODEL DEVELOPMENT FOR THE CREATION OF DATABASE:

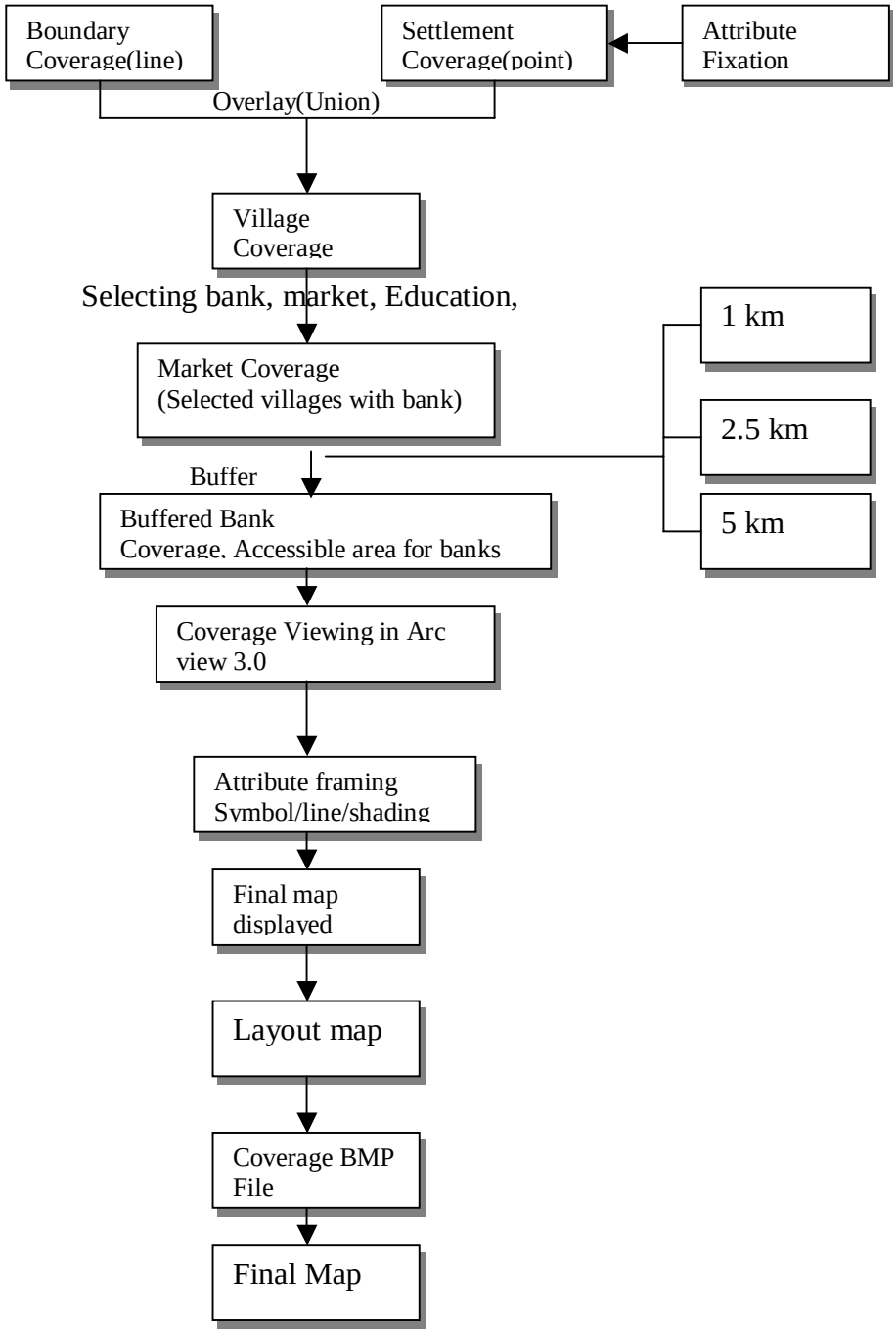
The appropriate Software's were used for the creation of GIS database. The model 1, 2, & 3 shows the clear picture for the creation of spatial and attribute database. According to the model we created map 1, 2, & 3, 1 (APPENDIXES 2,3 and 4). In the map it depicts linkage of spatial and attribute database and analysis.

Model 1: Functional and Population Hierarchy of Settlements

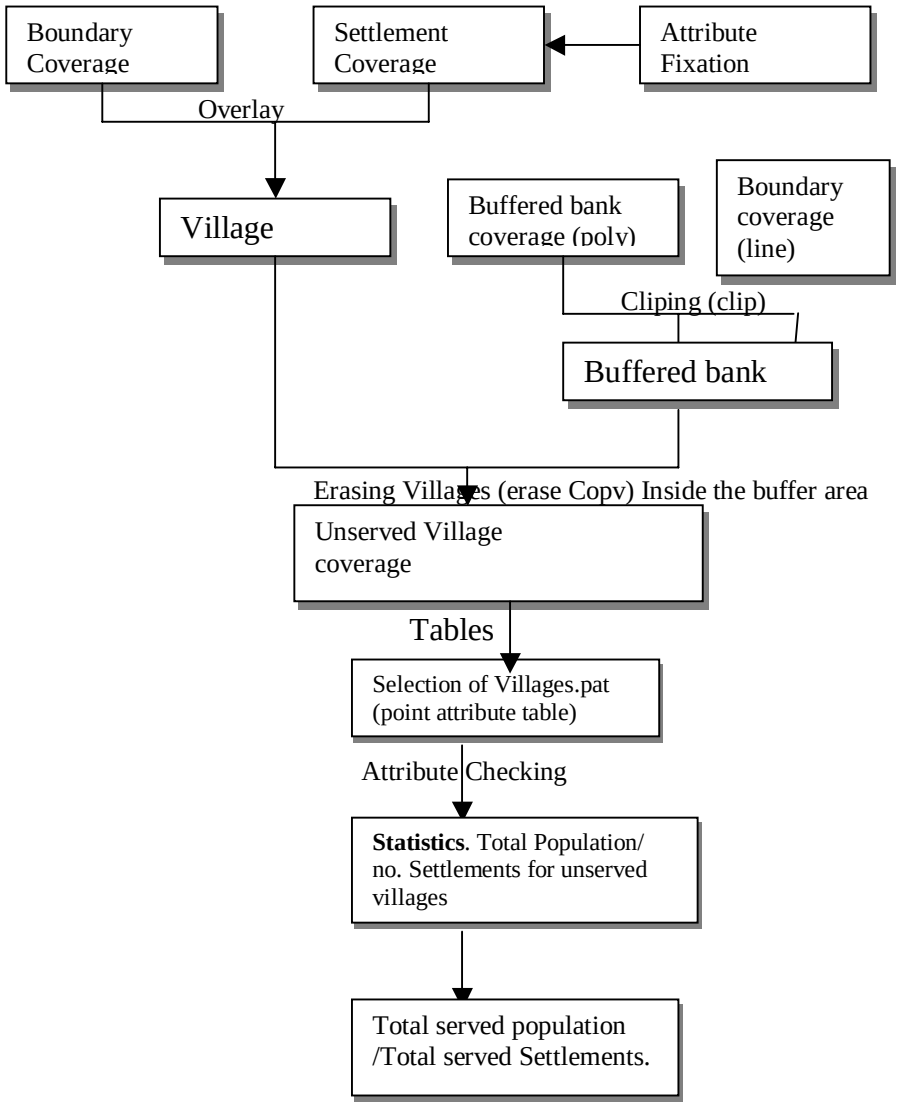


N.B- C.I= Composite index Value

Model 2: Accessibility Analysis of service Analysis



Model 3: Process to find out within and Outside Area of Buffer Zone of Service Centers.



6. CONCLUSION

Planning and Development at local level is very much concerned directly with people area and economic activities. It is further complicated when integrated with the higher order areal units in the hierarchical planning system. The planning issues are very much related to the right kind of data information at appropriate place and time. Secondly, the planning and development process is very much influenced (accelerated/retarded) due to the complexity of social and population characteristics in Indian situation. Non-availability of relevant data and information stimulated the politicians, administrators (implementers) to manipulate development in their interested areas and directions. Hence, there is a strong need to create appropriate database at all district levels. The data needs could be fulfilled with proper integration among the various data producers, data managers and data users. The issues discussed in relation to various data producers and managers if taken into proper care would

certainly help in building a strong database, which is an aid for further GIS information in process of planning and development. This database is helpful for planners, academicians, geographers and government officers.

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BIOGRAPHICAL NOTES

I was an M.Sc Student (1998) of Regional and Rural Development Planning, School of Environment, Resources and Development, Asian Institute of Technology (AIT) Bangkok, P.O. Box 4, Klong Luang, Pathumthani-12120, Thailand (Phone +6625245604). After that, I joined as Project Officer (2001) in the Department of Geology and Geophysics, in Indian Institute of Technology, Kharagpur, India. In the year 2003 I joined as Project Consultant and Guest Faculty in Xavier Institute of Management, Bhubaneswar, Orissa, India (Phone+91674-2300688 (Ext-135) Mobile-9861042269).

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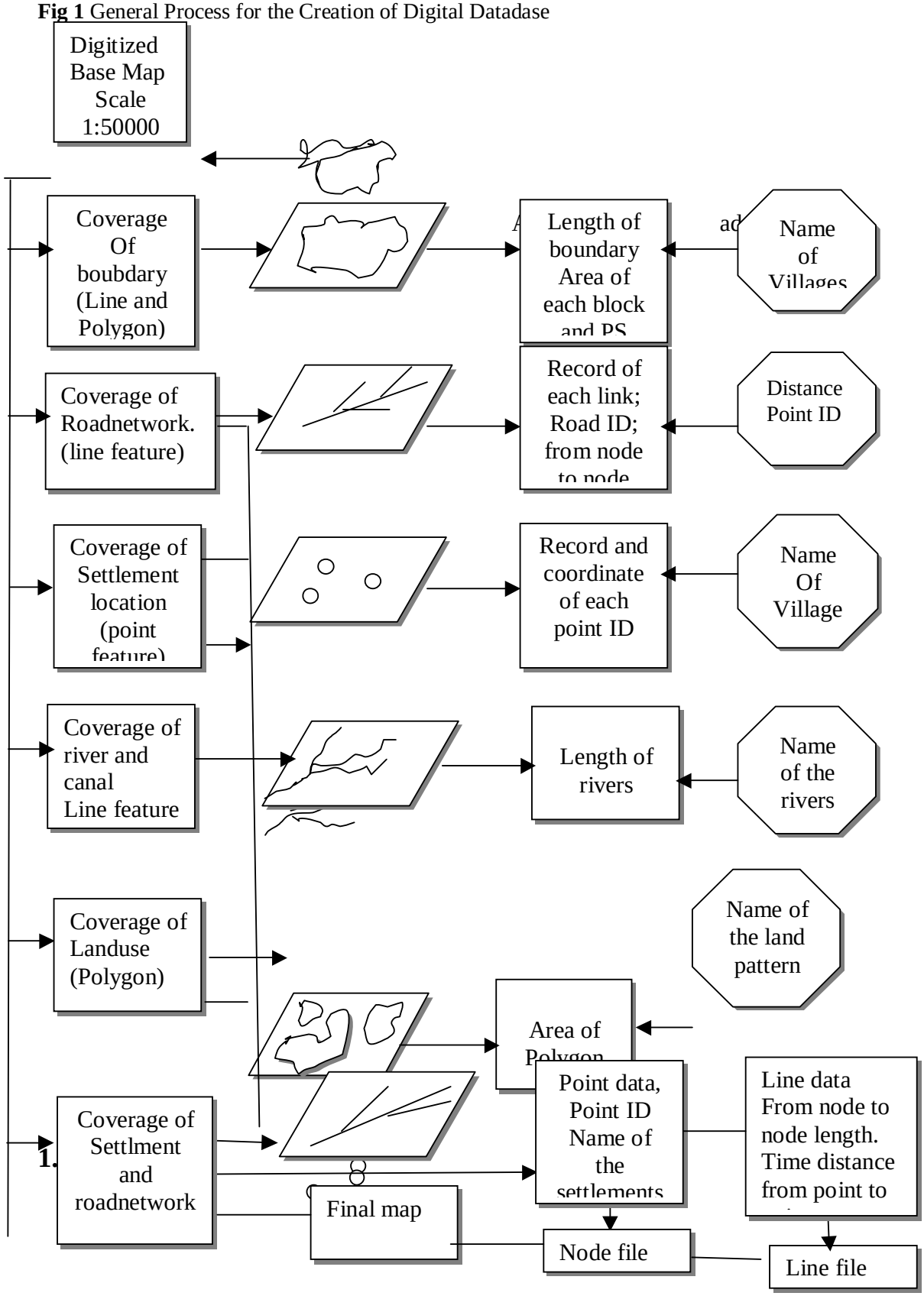
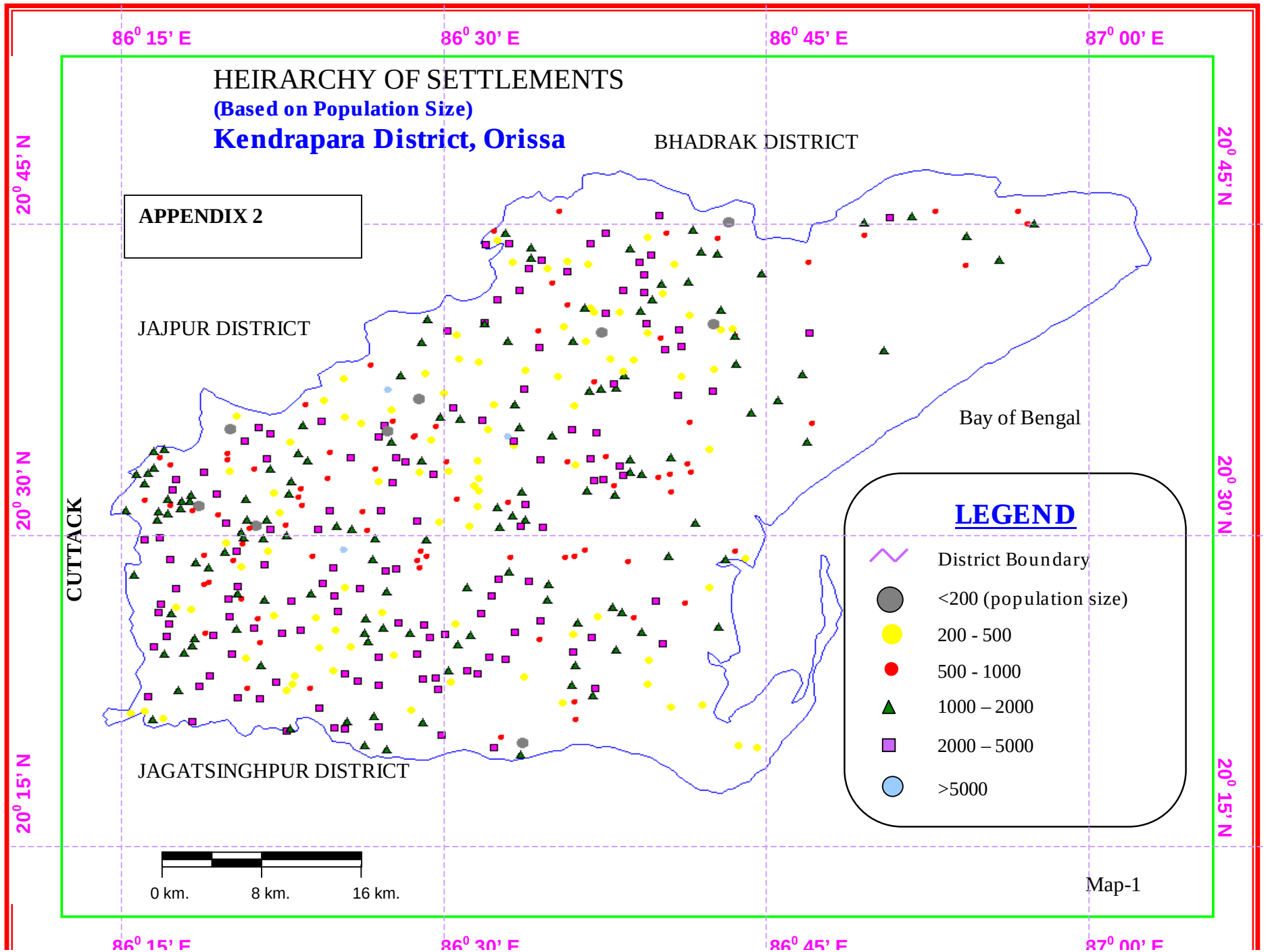
Fig 1 General Process for the Creation of Digital Datadase

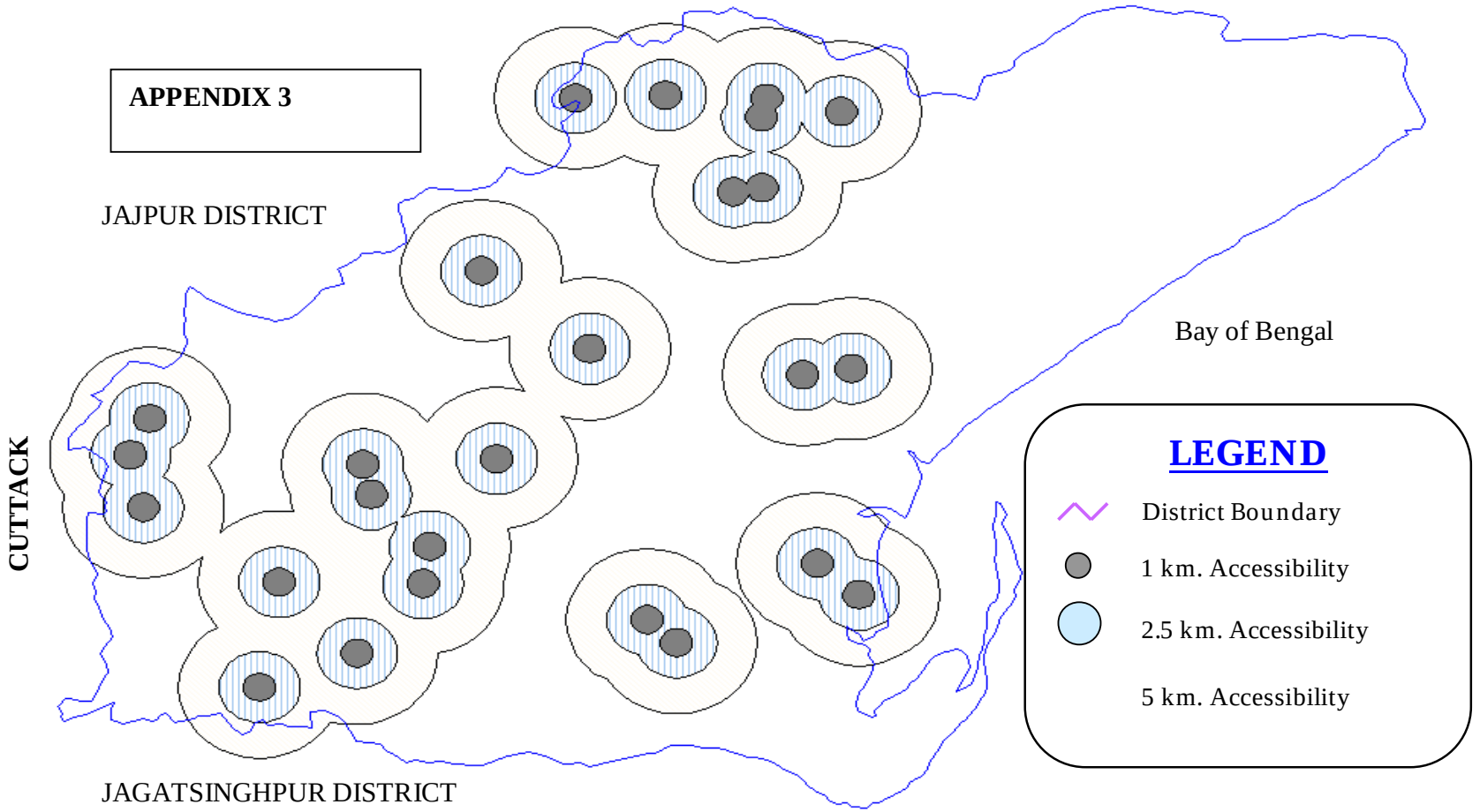



HEIRARCHY OF SETTLEMENTS
(Based on Population Size)
Kendrapara District, Orissa
APPENDIX 2
BHADRAK DISTRICT
JAJPUR DISTRICT
CUTTACK
JAGATSINGHPUR DISTRICT
Bay of Bengal
LEGEND
District Boundary
<200 (population size)
200 - 500
500 - 1000
1000 – 2000
2000 – 5000
>5000
0 km.
8 km.
16 km.
Map-1
86⁰ 15' E
86⁰ 30' E
86⁰ 45' E
87⁰ 00' E
20⁰ 45' N
20⁰ 30' N
20⁰ 15' N

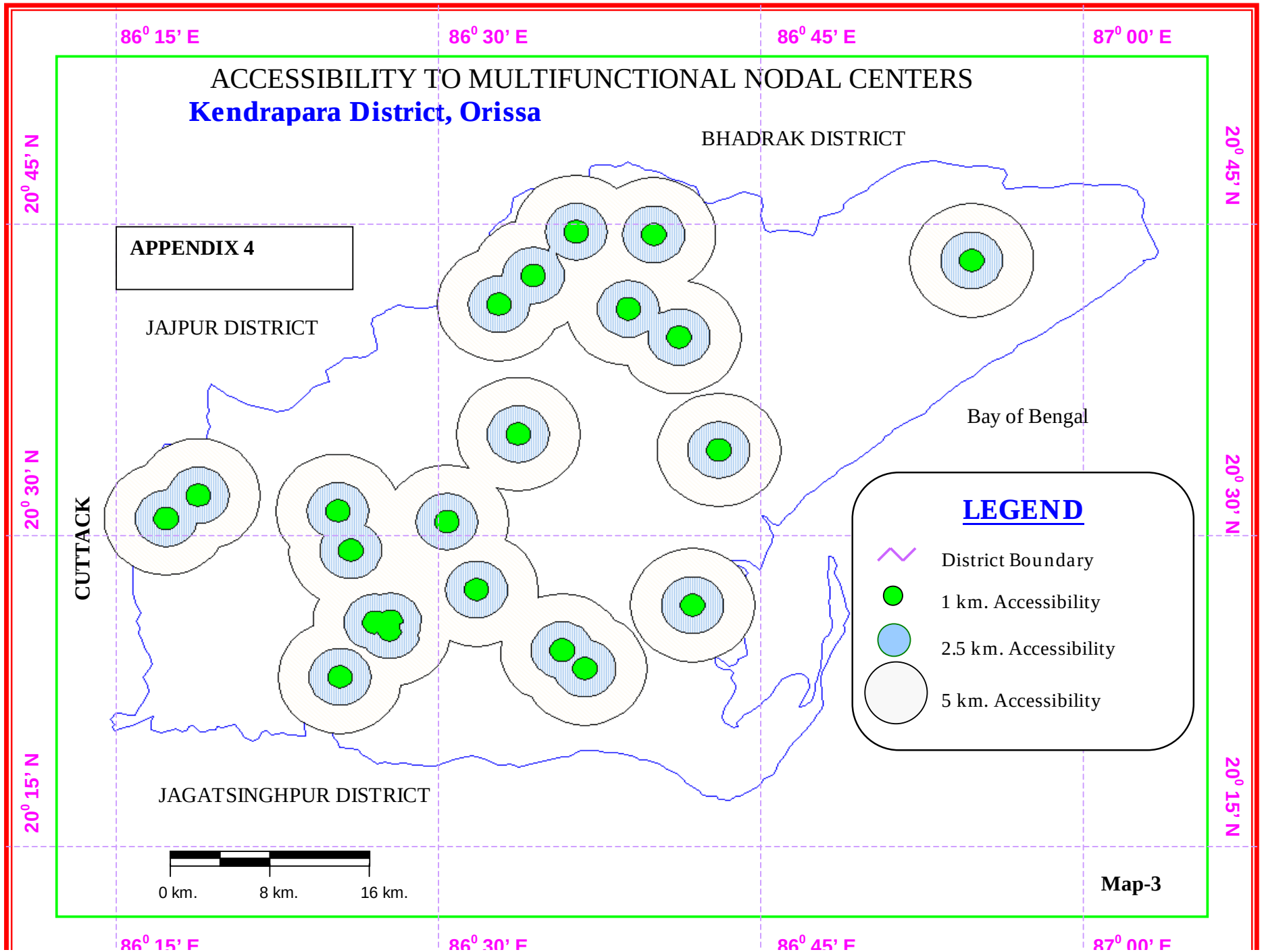
ACCESSIBILITY TO MARKETS
(PERIODIC AND DAILYMARKET)

Kendrapara District, Orissa

APPENDIX 3



Map- 2


86⁰ 15' E
86⁰ 30' E
86⁰ 45' E
87⁰ 00' E
20⁰ 45' N
20⁰ 30' N
20⁰ 15' N
ACCESSIBILITY TO MULTIFUNCTIONAL NODAL CENTERS
Kendrapara District, Orissa
BHADRAK DISTRICT
APPENDIX 4
JAJPUR DISTRICT
Bay of Bengal
CUTTACK
LEGEND
District Boundary
1 km. Accessibility
2.5 km. Accessibility
5 km. Accessibility
JAGATSINGHPUR DISTRICT
0 km.
8 km.
16 km.
Map-3