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FINAL DRAFT

Rural Area Development Plan Formulation and Implementation (RADPFI) Guidelines, 2016

सत्यमेव जयते

Ministry of Panchayati Raj
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PREFACE

Spatial planning is an important aspect of any planned development. It is vital for provision of serviced land and laying down of infrastructure further to which 'development' takes place. Spatial planning is undertaken in urban areas with different levels of success. It is however limited only to large urban settlements in most of the States as we have observed in practice. These spatial plan are prepared in the form of Master plans, Development plans and Comprehensive Development Plans. It is appreciated by all the planning practitioners that urban areas and the rural settlements should be considered in totality for planning at the district and regional level. Several States also have their Town and Country Planning bodies for undertaking Spatial planning, such exercises for rural settlements has altogether been absent.

Out of about 7933 urban settlements in India only 3892 qualify to be classified as Census Towns by the Census of India. From 2001 to 2011 the urban population of India has increased major contribution of which was by inclusion of large rural settlements as urban settlements in 2011. Such Census Town attracting migration from surrounding villages, serving as nodal centers or market places and as centers of socio-economic activities. The gram panchayat areas surrounding the settlements are used for agriculture, grazing, mining, resource collection and a variety of other uses. Environmental concerns are also rapidly gaining importance on account of increasing pressure on land and other resources. Planned development is intricately linked with socio-economic development including poverty alleviation. The need for Spatial Planning in Gram Panchayat areas can therefore hardly be over emphasised.

While the Ministry of Urban Development has released the Urban and Regional Development Plan Formulation and Implementation Guidelines, similar guidelines for Spatial planning in Gram Panchayat areas is lacking. The present document is prepared to serve as the guidelines for planned Spatial development in Gram Panchayat Areas.

This document has been prepared by a Policy Planners, Experts, Institutions namely Town and Country Planning Organizations, NIRD&PR, SPA, NRSC and CGG.

The Final Draft RADPFI Version 2.0 .is prepared under the leadership of Shri.K K Joadder, Chief Planner, Town & Country Planning Organisation, with valuable contributions from TCPO, NIRD&PR, SPA, NRSC and CGG.

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The development of the RADPFI Guidelines was headed by Shri.K K Joadder Chief Planner and Shri R,Srinivas, Town and Country Planner, TCPO, with back up support from all Resource Organisations like NRSC, SPA, NIRD&PR and CGG.

The Guidelines Committee place on records the rich contributions of Dr S S Meenakshisundaram, former Secretary(RD) and Advisor, NIAS, IISc, Bangalore, Dr P K Mohanty, Advisor, CGG, Shri S M Vijayanand, CS, Govt of Kerala; Dr M N Roy, Former Addl CS(RD&PR), Govt of West Bengal & Chainman, Ridhi Foundation and Dr W R Reddy, DG, NIRD&PR, who have hand hold the preparation Team to address the vital issues to make the spatial planning in GPs a reality.

The RADPFI Guidelines preparation Team thank the MoPR to provide an opportunity to participate in the grassroot development and bringing a change in the development scenarios in the rural India.

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Abbreviations

CAA	Constitutional Amendment Act
CFC	Central Finance Commission
CGG	Centre for Good Governance
DPC	District Planning Committee
FAR	Floor Area Ratio
FF-XIV	Fourteenth Finance Commision
GPDP	Gram Panchayat Development Plan
GPSDP	Gram Panchayat Spatial Development Plan
MoPR	Ministry of Panchayati Raj
MoRD	Ministry of Rural Development
MoUD	Ministry of Urban Development
NGO	Non- Governmental organization
NIRD	National Institute of Rural Development
SFC	State Finance Commission
TCPD	Town and Country Planning Department
TCPO	Town and Country Planning Organisation
URDPFI	Urban and Regional Development Plan Formulation and Implementation Guidelines
RADPFI	Rural Area Development Plan Formulation and Implementation Guidelines
NRSC	National Remote Sensing Centre
SPA	School of Planning and Architecture

1. INTRODUCTION

The Constitution (73rd Amendment) Act, 1992 relating to Panchayats containing articles 243 to 243-O and the Constitution (74th Amendment) Act, 1992 relating to Municipalities (articles 243P to 243ZG) imparted some basic features of democratic decentralization of the governance especially the Panchayati Raj Institutions all over the country. The 73rd CAA mentions about the responsibility of Gram Panchayats, to prepare the social, economic and resource plans for rural areas, but not the spatial plans. The 11th schedule of 73rd CAA lists the functions of Gram Panchayat, which does not include preparation of spatial plans for Gram Panchayats as one of the functions of Panchayats. Therefore, the rural areas are devoid of planned spatial development. The absence of planned spatial development in rural areas has major impact on regional development, especially in case of villages in the planning area boundary of the metropolitan areas and cities. The Rural Area Development Plan Formulation and Implementation Guidelines (RADPFI) guidelines emphasizes the need for the preparation of rural spatial plans, integrated with the overall development. The RADPFI guidelines aims to provide direction for the preparation of spatial plans for Gram Panchayat and also mentions the required alterations and additions in the existing statutory provisions of planning.

The main features of the 73rd Amendment are - (i) a three-tier system of Panchayati Raj (ii) Panchayat elections to be held regularly every five years; (iii) reservation of seats for the Scheduled Castes and Scheduled Tribes and for women (not less than one-third of seats), (iv) constitution of State Finance Commissions; (v) Constitution of District Planning Committee to prepare development plans for the district as a whole**;** (vi) establishment of State Election Commissions; and (vii) establishment of Gram Sabhas. The RADPFI guidelines highlights the importance of ***preparation of spatial plans for rural area*** and suggests the addition of clause for spatial planning for rural areas in statutory provisions.

Further, the State Legislatures have power, to confer on the Panchayats such powers and authority as may be necessary to enable them to function as institutions of self-government (Article 243G). They may be entrusted with the responsibility of *(a) preparing plans for economic development and social justice,* (b) implementation of schemes for economic development and social justice, and (c) in regard to matters listed in the Eleventh Schedule (inserted by the 73rd Amendment). The list contains 29 items, including, land improvement, minor irrigation, animal husbandry, fisheries, education, women and child development etc. The 11th Schedule thus distributes powers between the State Legislature and the Panchayat just as the 7th Schedule distribute powers between the Union and the State Legislature. Therefore, spatial planning in rural areas needs to be entrusted to the Gram Panchayats. Preparation of spatial plans for rural areas holds immense significance and hence the document makes an attempt to provide the direction for the same along with the legislative framework, institutional framework and transfer of funds to rural local bodies as per 14th Finance Commission recommendations.

73rd CAA, envisaged a three tier government, devolution of funds, along with functions delegated to both urban and rural local bodies. These were implemented by the state

governments with required modifications through the Municipal and Panchayat Acts. The provisions for setting up a *District Planning Committee (Article 243ZD)* and consolidation of village and City plans in District Plan, has been mentioned in the *Manual for Integrated District Planning,* prepared by Ministry of Panchayati Raj in 2008, elucidates "*District Planning as participative and multidimensional process and hence gives guidelines for preparation of any District Plan which is inclusive of both urban and rural requirements, and perceives the District as a Region.*"

Therefore, realizing the significance of the planned development in villages, Ministry of Panchayati Raj vide OM No.N-11019/16/2016-Planning dated 29th February ,2016 constituted an *Inter-Ministerial Working Group* for formulation of *Rural Area Development and Plan Formulation and Implementation (RADPFI) Guidelines* under the chairmanship of Secretary, Ministry of Panchayati Raj with representatives of Ministries of Urban Development, Rural Development, Environment, Forests & Climate Change, Industrial Policy and Promotion and Departments of Agriculture, Cooperation & Farmer Welfare, Land Resources and other organizations like Town and Country Planning Organization, School of Planning and Architecture, New Delhi, CEPT University, , Centre for Good Governance, Administrative Staff College of India, National Remote Sensing Centre and National Informatics Centre. Further, vide Ministry of Panchayati Raj OM No.11019/16/2016-Planning dated 21st April,2016 a separate Guidelines Development Committee was constituted to draft the RADPFI Guidelines under the chairmanship of Director General, National Institute of Rural Development and Panchayati Raj.

1.1 Need for RADPFI Guidelines

Spatial plans are prepared for cities and towns popularly known as Master Plans and Development Plans and notified under the respective State Town and Country Planning Acts and Urban Development Acts. These Acts in their title include ***Country Planning,*** but in actual terms, there is neither provision of preparing Master/Development Plans for village nor much attention has been given by the State Governments to prepare the same.

The need for the RADPFI guidelines arises from the fact, that the there are 6.4 lakh villages in the country and 68.84 percent of the total population lives in the rural areas. These villages have varied characteristics and shows different degrees of transformation from rural to urban. The villages which show high degree of transformation due to their spatial location may attain urban characteristics in the future and therefore it becomes indispensible to plan these settlements.

The areal extent of rural areas as stated in the Table1.1, State-wise as well as for the entire nation indicates the vast stretch of the land are in rural areas. Almost 94% of the total area of India, comprises rural areas. In India, rural areas cover 94% of land and 69% of population while urban area holds 6% of land and 31% of population.

TAKING FORWARD URDPFI GUIDELINES, 2014

The URDPFI Guidelines, 2014 mentions:

"While the planning and developmental norms for the city are available, there are no such norms for peri-urban areas. As the regional and metropolitan area planning intends to bring such area in planning framework it is only logical that development norms for peri-urban area is also developed because of its heavy bias towards urban character. In the absence of this, such settlements will keep developing unscientifically. These areas develop faster than rural settlements and have considerable urban form, yet it cannot have zoning regulation of larger cities."(*URDPFI Guidelines, 2014, pg.138)*

Therefore, it is imperative to formulate the RADPFI Guidelines for the guidance of State Government.

There has been no serious attempt to prepare Spatial Plans for rural areas and taking into account the vast rural population of the country who have been deprived of the access to basic facilities, the guidelines assumes much significance with overall objective of inclusive development of rural areas. The guideline encourages the planned development in the neglected part of the country which as shows in Table 1.1, accounts for 3,101,505 Sq.Km. approximately. The idea of Planning in rural areas often receives cynical perspectives because of the socio economic constraints that exist in villages, lack of technical knowledge, lower levels of educational attainment. However, with the new Digital Literacy vision of the government and the anticipated socioeconomic development, the rural planning may be contemplated as the next possibility. Moreover, the provision of basic infrastructural facilities requires norms and standards to make available the required services. Such norms and standards are prescribed by the RADPFI guidelines to facilitate the development in rural areas.

Table 1.1:Distribution of Area (Sq.km.) by Residence

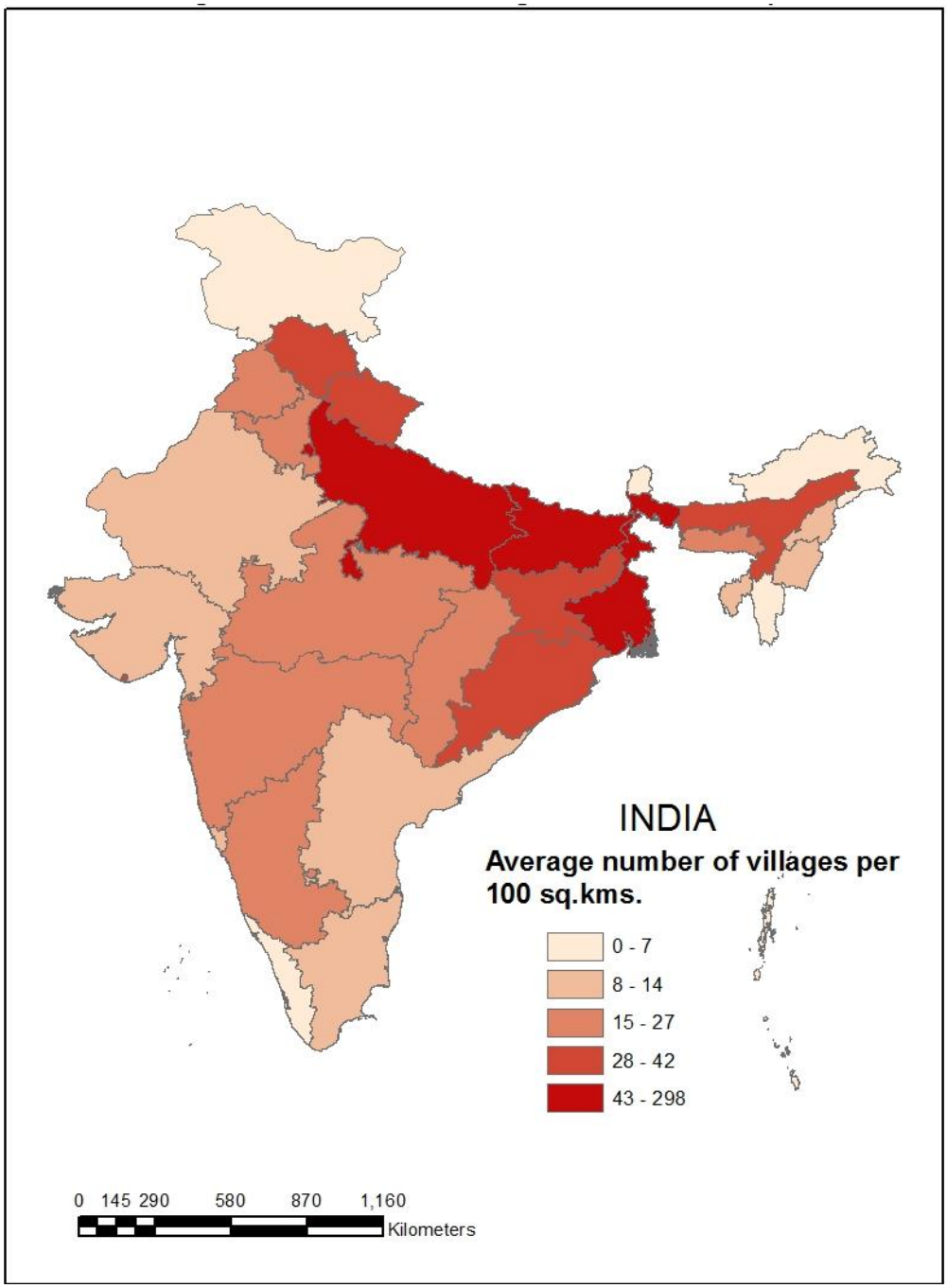
SL.NO	States/UTs	No.of villages	Total	Rural	Urban	Area/Village
1	Jammu & Kashmir	6,652	222236	220990.1	1245.9	33.22
2	Himachal Pradesh	19,831	55673	55402.18	270.82	2.79
3	Punjab	12,729	50362	47847.4	2514.6	3.76
4	Chandigarh	24	114	4.47	109.53	0.19
5	Uttarakhand	16,805	53483	52581.08	901.92	3.13
6	Haryana	6,955	44212	42235.92	1976.08	6.07
7	NCT of Delhi	165	1483	326.44	1156.56	1.98
8	Rajasthan	41,353	342239	335606.04	6632.96	8.12
9	Uttar Pradesh	107,440	240928	233365.71	7562.29	2.17
10	Bihar	45,113	94163	91838.28	2324.72	2.04
11	Sikkim	452	7096	7057.75	38.25	15.61
12	Arunachal Pradesh	4,065	83743	NA	NA	NA
13	Nagaland	1,315	16579	16335.52	243.48	12.42
14	Manipur	2,391	22327	22147.5	179.5	9.26
15	Mizoram	817	21081	20494	587	25.08
16	Tripura	870	10486	10094.12	391.88	11.60
17	Meghalaya	6,023	22429	22146.11	282.89	3.68
18	Assam	26,247	78438	77178.12	1259.88	2.94
19	West Bengal	40,783	88752	83632.59	5119.41	2.05
20	Jharkhand	32,615	79716	77467.12	2248.88	2.38
21	Odisha	51,352	155707	152355.34	3351.66	2.97
22	Chhattisgarh	20,308	135192	131810.3	3381.7	6.49
23	Madhya Pradesh	55,392	308252	300505.59	7746.41	5.43
24	Gujarat	18,544	196244	188840.46	7403.54	10.18
25	Daman & Diu	23	111	56.38	54.62	2.45
26	Dadra & Nagar	70	491	445.3	45.7	6.36
27	Maharashtra	43,722	307713	298628.75	9084.25	6.83
28	Andhra Pradesh	28,123	160205	156085.73	4119.27	9.50
29	Karnataka	29,483	191791	185783.46	6007.54	6.30
30	Goa	359	3702	2903.14	798.86	8.09
31	Lakshadweep	24	30	8.05	21.95	0.34
32	Kerala	1,364	38852	31253.2	7598.8	22.91
33	Tamil Nadu	16,317	130060	116427.97	13632.03	7.14
34	Puducherry	92	490	335.44	154.56	3.65
35	Andaman & N.Is	547	8249	8211.08	37.92	15.01
36	Telangana	640867	114840	111104.77	3735.23	4.84
	India	6,652	**3287469**	**3101505.41**	**102220.59**	33.22

Source: Census of India, 2011

Note: The sum of rural and urban area does not tally with the total area, as the bifurcation of rural and urban area is not given for the state of Arunachal Pradesh.

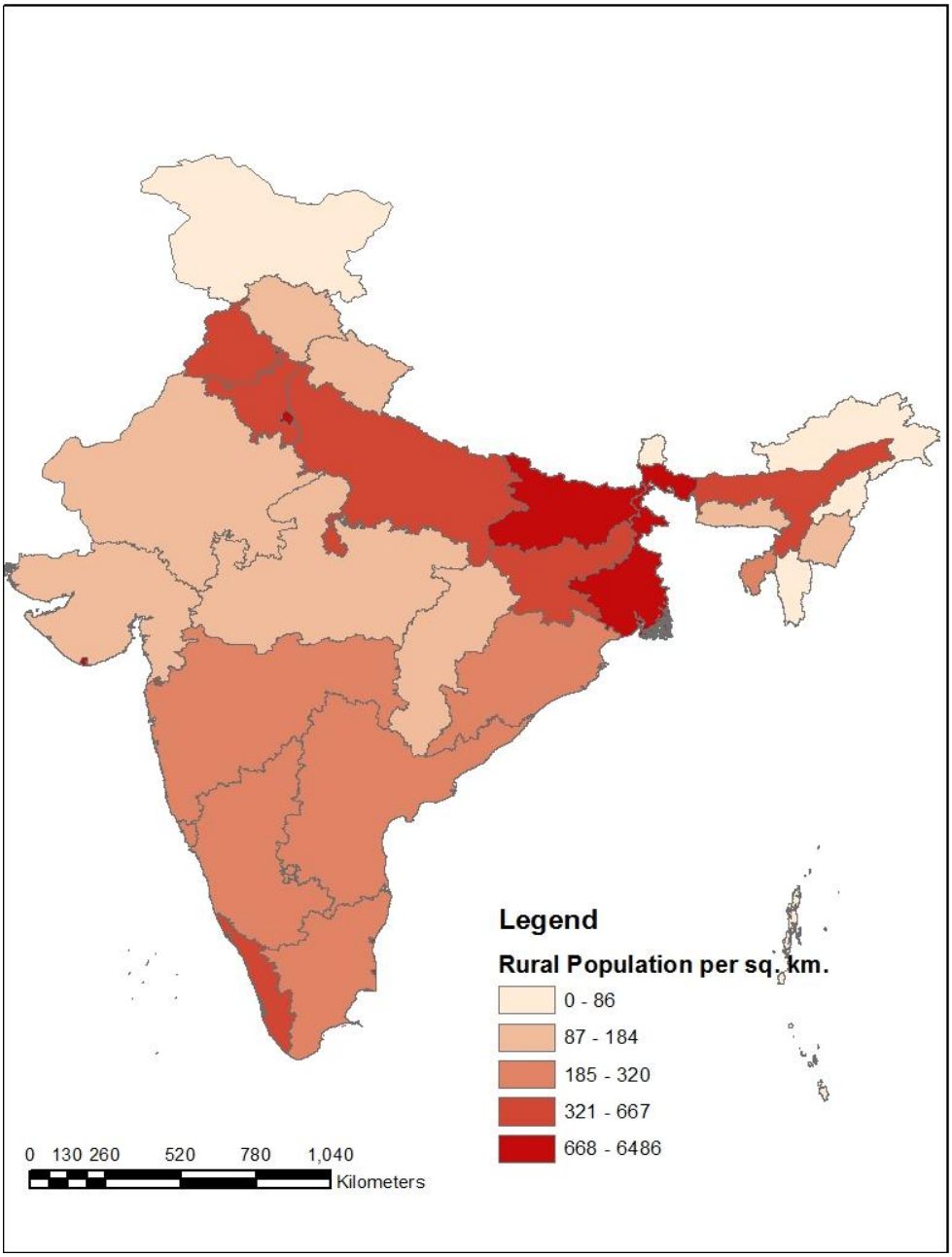
Figure 1.1 shows the concentration of villages per 100 sq.km or rural settlements density, which shows that Indo Gangetic plain has higher number of villages per 100 sqkm. This data can be related to the average rural population per sq.km of rural area, and importance of rural areas can thus be realised.

Figure 1.1: Density of Rural settlements, 2011



Source: Census of India, 2011

Figure 1.2:Rural Population Density, 2011



Source: Census of India, 2011

Figure 1.1 and Figure 1.2 gives a fair idea of density of rural settlements and rural population. The Indo Gangetic plains holds higher density of rural settlements as well as rural population. Kerala holds an exception in case of density of rural settlements because of its large size of the villages. The country's average works out to 1300 rural population per village, where Kerala has 12,808 rural population per village. (Table 1.2)

Table 1.2:Average Rural Population per village

State	Rural Pop.	No. of Villages	Average Rural Population per Village
JAMMU & KASHMIR	9108060	6,652	1,369
HIMACHAL PRADESH	6176050	19,831	311
PUNJAB	17344192	12,729	1,363
CHANDIGARH	28991	24	1,208
UTTARAKHAND	7036954	16,805	419
HARYANA	16509359	6,955	2,374
NCT OF DELHI	419042	165	2,540
RAJASTHAN	51500352	41,353	1,245
UTTAR PRADESH	155317278	107,440	1,446
BIHAR	92341436	45,113	2,047
SIKKIM	456999	452	1,011
ARUNACHAL PRADESH	1066358	4,065	262
NAGALAND	1407536	1,315	1,070
MANIPUR	2021640	2,391	846
MIZORAM	525435	817	643
TRIPURA	2712464	870	3,118
MEGHALAYA	2371439	6,023	394
ASSAM	26807034	26,247	1,021
WEST BENGAL	62183113	40,783	1,525
JHARKHAND	25055073	32,615	768
ODISHA	34970562	51,352	681
CHHATTISGARH	19607961	20,308	966
MADHYA PRADESH	52557404	55,392	949
GUJARAT	34694609	18,544	1,871
DAMAN & DIU	60396	23	2,626
DADRA & NAGAR HAVELI	183114	70	2,616
MAHARASHTRA	61556074	43,722	1,408
ANDHRA PRADESH	56361702	28,123	2,004
KARNATAKA	37469335	29,483	1,271
GOA	551731	359	1,537
LAKSHADWEEP	14141	24	589
KERALA	17471135	1,364	12,809
TAMIL NADU	37229590	16,317	2,282
PUDUCHERRY	395200	92	4,296
ANDAMAN & NICOBAR ISLANDS	237093	547	433
INDIA	**833748852**	**640867**	**1,301**

Source: Census of India, 2011

Recently, Ministry of Urban Development has brought out *Urban and Regional Development Plan Formulation and Implementation Guidelines in 2014*. The Guidelines basically have been prepared for the guidance of the Urban Local Bodies and Urban Development Authorities to prepare Master Plans/Development Plans for cities and towns. The URDPFI Guidelines 2014, have incorporated the regional connotation in terms of prescribing norms and standards for spatial planning in urban areas; however, it becomes imperative to consider village level planning duly considering the spatial approach. Though, the rural areas have very different characteristics based on their nature and degree of transforming into urban areas, there is a need for separate guidelines for the planning in rural areas.

One of the responsibilities of Gram Panchayats in the 73rd CAA is **prepare plans for economic development and social justice for Gram Panchayat.** *However, no such plans are being prepared at the village level with spatial connotation and incorporation, and without which it is very well known fact that majority of villages in the country are bereft of access to basic facilities. This also justifies the need to prepare Guidelines for Rural Area Development Plan Formulation and Implementation (RADPFI).*

Rural areas are highly flexible, and cater for a wide range of activities relating to agriculture, as well as rural industries, tourism, basic raw material extraction and mining. At the same time, rural land may also contain land with significant environmental values, provides habitat to various species. They are also centre for primary activities like dairying, farming, poultry, pisciculture and mining.

1.2 Aim and Objectives

The *aim* of this guidelines is: "***to have planned spatial development for overall integrated development of villages"***

Objectives

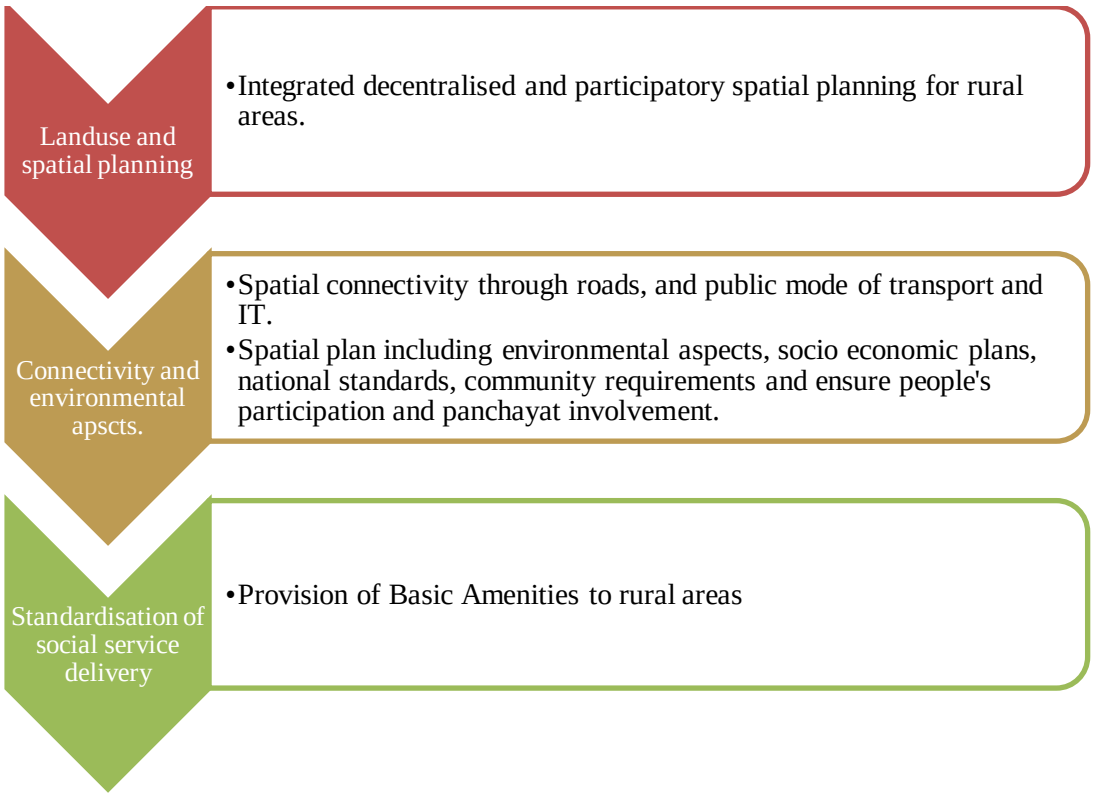
- To **suggest** methodological framework for preparing Gram Panchayat level Development Plan.
- To arrive at a spatial standards for Gram Panchayat development, especially for abadi areas
- To **prescribe** norms and standards for providing infrastructure facilities and amenities at the village level and its integration with spatial district plan.
- To **examine** the provision of existing statutory framework and suggest suitable amendments so as to ensure preparation of Rural/Village level Development Plan.
- To **recommend** institutional framework for operationalising the guidelines and provide a road map for planned development of Gram Panchayat.

1.3 Scope and Application

This document provides the guidelines for the spatial planning and development of rural areas. It will give direction to the process of development in various sectors such as physical and social infrastructure, economic activities, road and transport connectivity, land values and anticipated economic activities and aids towards a workable solution for conversion of

agricultural to non agricultural purpose for unplanned/unauthorised development. The preparation of spatial plans for rural areas also needs to follow the process as per statutory provisions. The illustration below lists the important areas where RADPFI guidelines are to be referred to, for making spatial development plans for Gram Panchayat.

Figure 1.3:Scope of RADPFI Guidelines



Application

- Dealing with different development standards, for different rural areas, with varied characteristics.
- To facilitate the planned spatial development of rural areas.
- Planning for environmental benefit and disaster preparedness.
- To link spatial plans with 14th FC and SFC.
- To improve the digital literacy and village e-governance.
- Integration/Cconsolidation of village development with Block/ District plan.

It is hoped that the Guidelines would be referred by the State Town and Country Planning Departments, State Rural Development and Panchyati Raj Departments and host of other offices located at the district/block level which are responsible for allocation of funds for the infrastructure development both physical and social in the villages. All departments in district will allocate budget according to Gram Panchayat Spatial Development Plan's proposals

The application of RADPFI guidelines extend to the arena of not just plan preparation, but also in the field of academics. The documents can be referred by the Planning schools, as a part of course curriculum, where preparations of village plans are laid emphasis on. The

guidelines will facilitate planned development in rural areas, if followed with effective governance structure. The past developments in the area of statutory framework for rural development and linkages between urban and rural planning are further discussed in forthcoming chapters.

2. PLAN FORMULATION

2.1 Developing and implementing RADPFI Guidelines

As mentioned in the preceding chapter, there is no exclusive exercise for spatial planning of panchayats/villages, and spatial planning is undertaken only if they are part of a planning area/region notified by the state government. In most of the cases, panchayats/villages-level planning is undertaken through District Planning Committees (DPCs). For the purpose of integrated planning some states like Karnataka, Tripura, Sikkim, Rajasthan, Haryana, etc. have made provisions in their modified Panchayat Act to establish DPCs. Other States like Gujarat, Orissa, Madhya Pradesh, Maharashtra, etc., have enacted separate enabling legislation for the constitution of DPCs, instead of incorporating such provisions in the Panchayat Acts. In addition, some states have made provisions for panchayats/village planning in their Town & Country Planning Act. Though the 74th CAA envisages spatial and environmental planning for integration of the municipal and panchayat plans with district plans wide Article 243-ZD(3-a), how effectively it has been implemented is an area of further research. A list some select states indicating relevant Acts to deal with panchayats/village planning is presented below

Table 2.1: Selected States and Relevant Acts for Planning Purpose

S.No.	State	Acts
1.	Karnataka	Karnataka Town and Country Planning Act 1961 amended in 2015
2.	Andhra Pradesh	• AP Metropolitan Region & Urban Development Authorities Act, 2016 • Panchayat Raj Act, 1994
3.	Kerala	• Kerala Town and Country Planning 2016 • Kerala Panchayat Raj Act 1994
4.	Jharkhand	• Jharkhand Regional Development Authority Act-2001 • Town Planning and Improvement Trust Act, 1954
5.	Bihar	Bihar Town and Country Planning Act-2012, amended in 2014
6.	Chhattisgarh	Chhattisgarh Nagar tatha Gram Nivesh Adhiniyam-1973
7.	West Bengal	West Bengal Town and Country (Planning and Development) Act, 1979 , Amended in 1994
8.	Odisha	Orissa Town Planning & Improvement Trust Act, 1956
9.	Haryana	Haryana Panchayatiraj Act 2007
10.	Punjab	Punjab Regional and Town Planning and Development Act, 1995
11.	Uttar Pradesh	• Regulation of Building Operation Act, 1958 – Regulated Area • UP Urban Planning and Development Act, 1973 – Development Area • UP Industrial Development Act, 1976 – Special Region • Special Area Development Authority, 1985 – Special Development Area
12.	Uttarkhand	• Uttar Pradesh Special Area Development Authority Act, 1986 • Housing and Urban Development Authority Act, 2013

13.	Himachal Pradesh	Himachal Pradesh Town and Country Planning Act, 1975
14.	Goa	Goa, Daman and Diu Town and Country Planning Act, 1974
15.	Gujarat	Gujarat Town Planning & Urban Development Act, 1976
16.	Madhya Pradesh	Madhya Pradesh Town and Country Planning Act, 1973
17.	Maharashtra	

Source: Acts of Various State Governments and National Rurban Mission (NRuM)

2.2 Modification in framework to implement the guidelines

The States which does not have provision of spatial planning in any of their Acts may adopt the following provisions depending on their respective situation.

- The provision for the declaration of development zone and preparation of development plan/Local Plans (spatial plans) for every Gram Panchayat and erection of buildings, as envisaged under Section 230 and 241 of the Haryana Panchayat Raj (Amendment) Act,2007.
- The provision for preparation of Local Area Plan, as envisaged in the Chapter 5, Section 30 (a) of the Kerala Town and Country Planning Act, 2016.

2.3 Plan formulation for Gram Panchayats

The community Development Plans in 1951 adopted a mechanism or framework for the first time, to bring rural development in India. Balwant Rai Mehta Committee came with a suggestion to include three tier planning in Indian Planning Framework and further with 1992 CAA, the provisions were made for three tier institutional mechanism for planning and Constitution of District planning Committee for consolidation or rural and urban plans and preparation of District Plans. However, mandate for spatial plans for rural areas was not made in 73rd CAA.

There are 2,38,617 Gram Panchayats in India and RADPFI suggests the Gram Panchayat Boundary as a planning boundary for Gram Panchayat Spatial planning.

Gram Panchayat level planning process comprises the following steps (Handbook for preparation of Gram Panchayat Level Plan, State institute of Rural Development, Assam, 2011):

a) Identification of issues by Gram Sabhas / Ward Sabhas, based on vision document of the panchayat which has already been prepared.
b) Determination of solution by Standing Committees of Gram Panchayat.
c) Prioritisation of solution and fund allocation by Village Panchayats.
d) Resulting in the preparation of first draft village panchayat plan.
e) Reconsideration of draft plan in second Gram Sabha meeting.
f) Finalisation of village panchayat plan by the full meeting of the village panchayat.

2.4 Statutory obligations

2.4.1 Planning Machinery/Staffing for Villages/Panchayat to plan or execute plans

The preparation of Gram Panchayat Spatial Development Plan, is the sole responsibility of Gram Panchayat, and hence constitution of a **Village Planning Committee** would bring ease in realization of functions of Panchayat. The Village Planning Committee can comprise Sarpanch, Sachiv, persons having special knowledge of economics, planning, finance, engineering or administration, as determined by the state of DPCs. Apart from this, the School Principal and Teachers, Doctors, ANMs, ASHA workers, NGO workers and youth and women of the villages with adequate qualifications can be engaged in the committee for preparation of Village Plans.

The DPC constituted in states as per 74th CAA, can further scrutinize each village development spatial plans as the consolidation lies in their function.

2.4.2 Legislative processes

Similar to Master Planning done in ULBs, Rural Area planning should also be based on similar legal process for its sustainability and continuity. The planning processes, such as community participation, followed in urban planning shall be made mandatory. The Flow of process regarding decentralisation of Plan approval process of Gram Panchayat Spatial Development Plan is illustrated at Figure 2.1

The 73rd CAA enables decentralisation while 243ZD in 74th CAA facilitates integrated district planning through consolidation of rural and urban plans.

State Policy lays down that the State shall take steps to organise village panchayats and endow them with such powers and authority as may be necessary to enable them to function as units of self-government. [1]

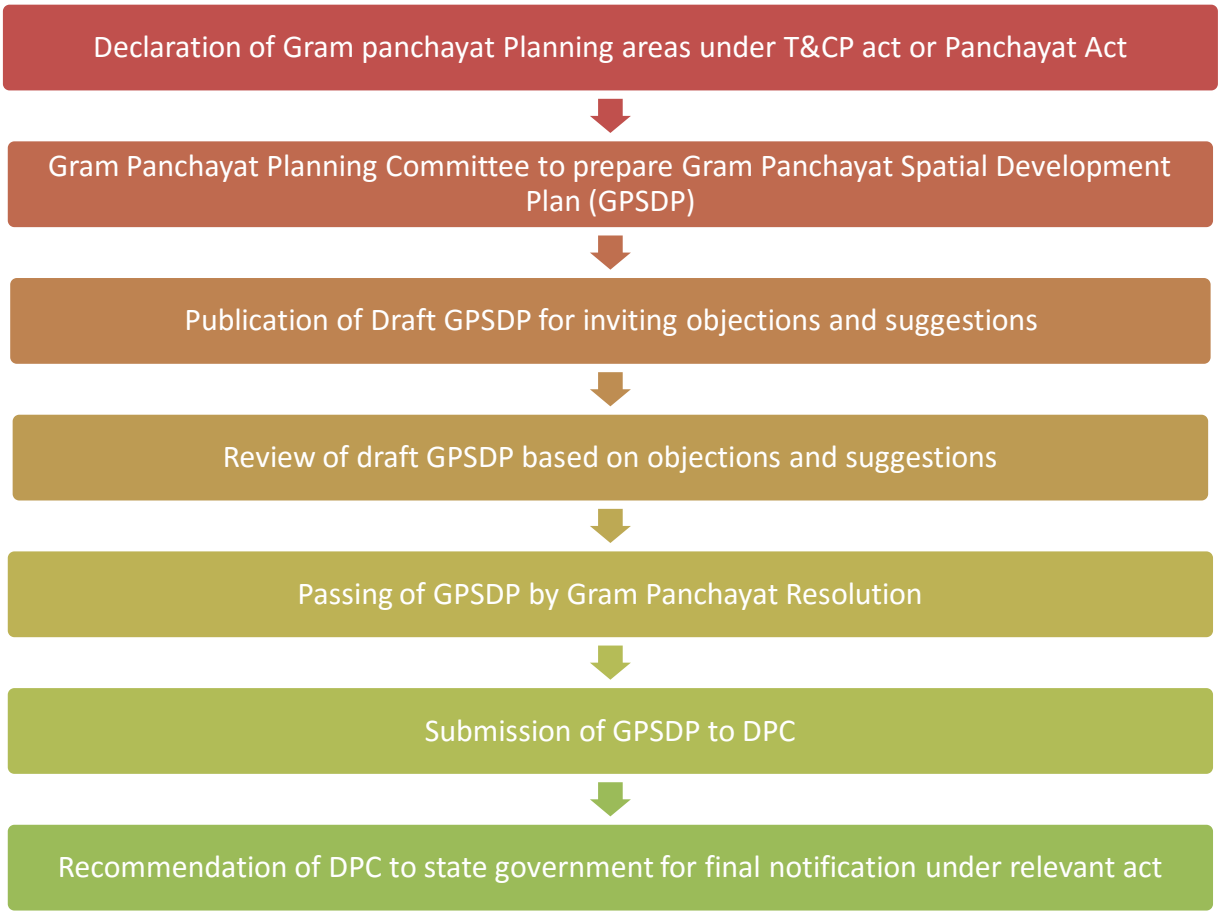
243ZD- Committee for district planning- There shall be constituted, in every State at the district level a District Planning Committee to consolidate the plans prepared by the Panchayats and the Municipalitiies in the district and to prepare a Draft Development Plan for the district as a whole.

However, there is no mandate or constitutional provision for preparation of Gram Panchayat Spatial Development Plans. Neither the existing planning framework has spatial planning approach nor there is, statutory provision exclusively for spatial plans for Gram Panchayat. It would be imperative to ensure enabling mechanisms for preparation of these plans which may necessitates amendments to existing Town and Country Planning Acts and Gram Panchayat Acts. The sectoral planning in villages is carried out in form of infrastructure planning through grants provided by State and Central government. The RADPFI guidelines shall facilitate the norms and standards for rural infrastructure planning as well as suggest statutory requirements and amendments in the existing T&CP acts for inclusion of rural planning.

[1] 73rd CAA, 1992

Figure 2.1 shows the Decentralised Plan Approval process, where panchayat plays a major role in preparation of the Gram Panchayat Spatial Development Plan. RADPFI guidelines suggest the plan approval process in synchronisation with the District or Block Vision of Development and hence the role of DPCs becomes mandatory. If in case, DPCs have not been constituted the Block Development Office shall take the lead and guide the preparation of GPSDP

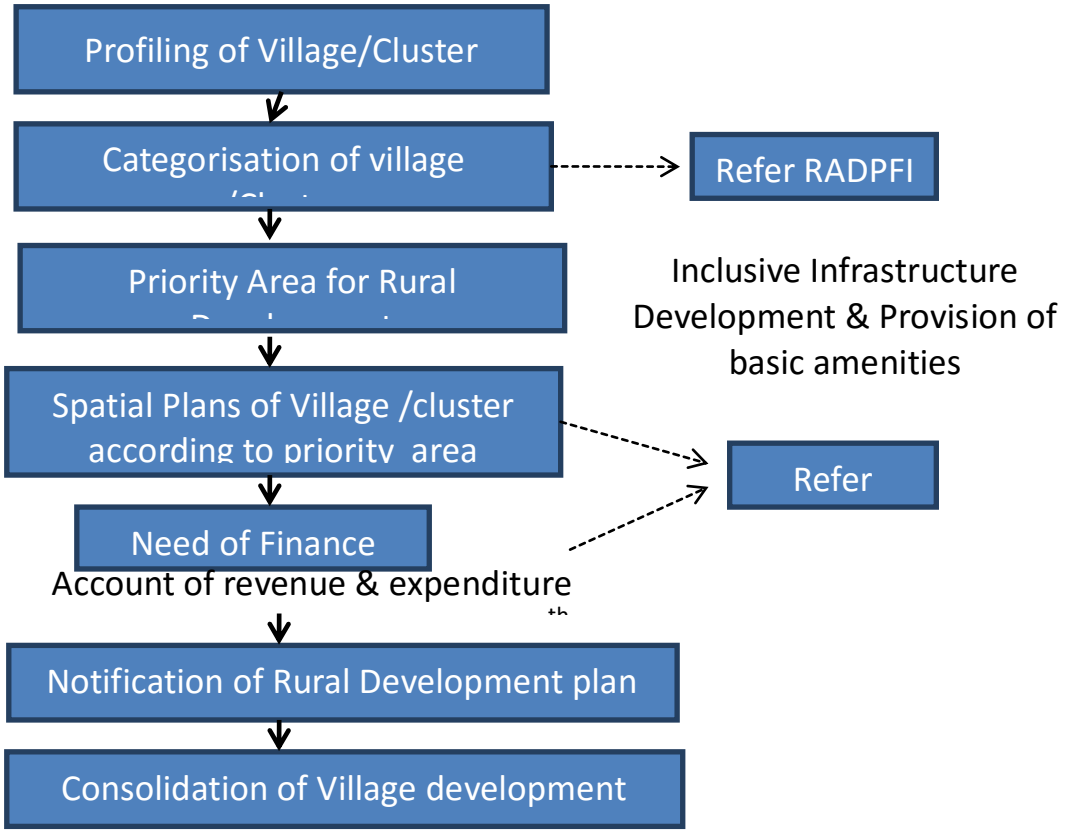
Figure 2.1: Statutory obligation for preparation of GPSDP



The Article 40 of the Constitution which enshrines one of the Directive Principles of Role of RADPFI in Spatial Rural Development Plans

The RADPFI guidelines aim to provide norms and spatial standards for making rural development plans, in synergy with the ICAP and RURBAN Mission. The preparation of rural development plans by local government with the participation and consultation of stakeholders involve, should refer the RADPFI guidelines for various stages of process. The RADPFI is a comprehensive document prepared in such a way that it can be understood by a layman.

Figure 2.2: Framework for use of RADPFI in rural development plans



The RADPFI Guideline aims to direct the procedure of preparation of spatial plans for rural areas. Figure illustrates the use of RADPFI guidelines in the process of spatial plans for rural areas and further in their implementation.

2.5 People's participation

The 73rd CAA envisaged Panchayati Raj System as a means of promoting greater community participation and involvement in development efforts in accordance with the needs for ensuring basic facilities to the villages. The Eleventh Five Year Plan (2007-2012) reiterates the objective of removal of regional imbalances through participatory planning processes at the grassroots level. The three tier local government, viz, Gram Panchayat, Panchayat Samiti and Zilla Parishad together needs to involve citizens for the preparation of the Gram Panchayat Spatial Development Plan through active participation. They are needed to be sensitized through the elected representatives who in turn through mass contact with the citizens cam highlight the existing deficiencies in the rural infrastructure facilities and assist the Gram Panchayat to prepare spatial plans. Citizens Paticipation strengthen the democratic contents of governance and provides opportunities to citizens to take interest in their own interest.

The participatory process can take many forms. Most commonly it takes forms of participatory focus groups, facilitated by outside facilitators: NGO staff, Consultants, researchers.[2]

2.6 Integrating and Implementation of Rural Planning

State Planning Commission provides support and direction for the preparation of District Plans. And therefore, it is proposed that the District Planning Commission shall support and direct the preparation of Gram Panchayat Spatial Development Plans, in accordance with the overall vision development of Block and District. However, the state and central involvement shall be limited and Gram Panchayats shall be given required autonomy to plan according to the indigenous needs and requirements. Key elements of the operational systems shall be as follows and is further discussed in Chapter 8:

- Gram Panchayat shall be in consultation with subject matter specialists, Government officials, NGOs and other stakeholder(s) determines plan ceiling between various rural segments or villages within the Gram Panchayats and formulates strategy to prepare and integrate their plan proposals.
- Rural Plans: Each Gram Sabha follows a participatory process with the help of Technical Support Group (TSG) and government functionaries to come up with a "vision of development" based on local needs. The Gram Sabha prepares its plan proposal after consultation with all the stakeholders especially with poor, SC, ST and women. The recommendations and needs of each group are integrated to prepare the plan proposal of Gram Panchayat. Similarly, Janpad Panchayat integrates the plan proposals of all Gram Panchayats including the interventions of Janpad. These are finally consolidated and integrated at the Block and District level.

- The rural and urban plans are submitted to the DPC for consolidation and approval. The DPC consolidates the plans at the district level with the help of district level TSG. The consolidated and integrated plan is finalized by DPC after due deliberations. The DPC is expected to ensure that the integrated District Plan provides clarity on the roles of various government departments and arrangements for monitoring and evaluation of the projects. The District Plan is then submitted to the State Planning Commission

- All the line departments are grouped into major key sectors. Further, working groups are constituted for each sector for preparing proposals keeping in view the needs and possible inter- and intra-sector convergence.The major sectors are as follows:
  - Education: School Education, Technical Education, Skill Education
  - Health and Nutrition: Public Health and Family Welfare, Public Health Education, Women and Child Development, Food and Civil Supplies;

[2] Chambers and Mayoux, 2003, Reversing the Paradigm: Quantification and Participatory methods, EDIAIS Conference, University of Manchester, U.K

  - Livelihoods: Agriculture, Forest, Panchayat and Rural Development, Animal Husbandry, Industry, Social Welfare, Water, Fisheries, Handicraft, Cooperatives, Planning, Backward Classes, Scheduled Castes/Scheduled Tribes;
  - Infrastructure: Public Works, Rural Development, Water, Power, Planning;
  - Energy: Energy, Rural Development, Forest;
  - Social Security: Social Justice, Women and Child Development, Revenue, etc.
- All government resources are included and district wise and department wise resource envelopes are calculated to facilitate the process. Budget is also earmarked separately for SCs, STs and women.
- Plan components are prepared focusing on specific social groups like SCs, STs, women and children at the level of habitation and then integrated. Gram Panchayat is the basic unit of planning in rural areas.

2.7 Contents of existing Gram Panchayat Development Plan(GPDP)

The guidelines issued by Ministry of Finance, for the release and utilisation of the local bodies grant stipulate that proper plans are to be prepared by the gram panchayats for the basic services within the functions devolved to them as per State laws before incurring expenditure under the FFC award.

In the context of the Constitutional mandate, these plans have to be participatory plans involving the community, particularly the gram sabha, in the formulation of priorities and projects and will also have to ensure the mandates of social justice and economic development mentioned in Article 243G. The Gram Panchayat Development Plan (GPDP) will have to have a clear component addressing vulnerabilities of poor and marginalised people and their livelihood opportunities through an integrated poverty reduction plan that converges with the labour budgeting and projectisation exercises under MGNREGS as well.

Various states have prepared Gram Panchayat Development Plan Guidelines for which would facilitate the coordination of various activities to be undertaken and arrangements that need to be made for the execution of a time bound action plan for preparation of Gram Panchayat Development plans.

The contents of GPDP has not been mentioned in the guidelines issued by MoPR and is left upto the states to give the prescribed format or the contents of GPDP, different states have given different formats for preparation of Plans, however, broadly they are as follows:

i. Introduction
ii. Resource Envelop

iii. Situation Analysis
iv. Environment Generation
v. Visioning
vi. Prioritization
vii. Technical and Administrative approval
viii. Post Plan arrangements
ix. System support for participatory planning in Gram Panchayat and Capacity Building

The above contents mentioned only refer to the sectoral development of the villages/Gram Panchayats but no Spatial reference is made, therefore RADPFI proposes the preparation of Gram Panchayat Spatial Development Plans. The spatial approach is discussed in next chapter and the contents are suggested in Chapter 4.

3. SPATIAL APPROACH TO RURAL PLANNING

3.1 Categorisation of villages

In India, the rural areas have no clear definition. Census has given definition of the urban areas, and all those areas which do not satisfy the parameters of urban are classified as rural areas. The rural areas or the villages, also have different characteristics according to their population size, proximity to and dependence on urban centre respectively, topography, economic activities, social customs and traditional values. There has been attempt by the Census of India to classify the urban and rural areas according to population size which in turn also effects in terms of characteristics of the city/town. But no such classification has been given for the rural areas where the characteristics of rural areas can be categorised and used for future planning. Hence, this document makes the first attempt to categorise the rural areas/villages on the basis of following criteria.

3.1.1 Villages with in Planning Area of the delineated Metropolitan area/city/town

The village in the vicinity to the urban centre will be having interdependence with the city, for the village's economic activities and growth. The village will not be a typical rural area with only agricultural activities but may have diversified economic activities (non-farm) existing. The transitioning in the character of the village is often witnessed and therefore, the area is termed to be a part of ***Rural Urban Fringe.***

This categorization signifies the villages which exist in the rural urban fringe areas and are present adjacent to the metropolitan city within the planning area boundary. These villages may or may not be connected to the city/town, by either a National Highway/State Highway/Major District Road or Other District road. The categorization can be done on the basis of such connectivity through the above mentioned transport networks.

- Along the national/state highway and within the urbanisable limit of Municipal Corporation
- Not along a national or State highway, but within the urbanisable limit of the Municipal Corporation.

Character of villages in fringe area

The Urban-Rural Fringe (URF) is the zone of transition in land use, social and demographic characteristics, lying between (a) the continuously built- up urban and suburban areas of the central city, and (b) the rural hinterland, characterized by the almost complete absence of non-farm dwellings, occupations and land use, and of urban and rural social orientation; an incomplete range and penetration of urban utility services; uncoordinated zoning or planning regulations; areal extension beyond although contiguous with the political boundary of the central city; and an actual and potential increase in population density, with the current density above that of surrounding rural districts but lower than the central city. These

characteristics may differ both in zonal and sectoral way, and can be modified through time (Pryor, 1968). [3]

74th CAA defines "a transitional area", "a smaller urban area" or "a larger urban area": meaning such area as the governor may, having regard to the population of the area, the density of the population therein, the revenue generated for local administration, the percentage of employment in non-agricultural activities, the economic importance or such other factors as he may deem fit, specify by public notification for the purposes of this part. The 74th CAA, mentions about the *Transition areas* where Nagar Panchayat would be the ULB to provide for the development for areas in transition from a rural area to urban area.

URDPFI Guidelines, 2014, gives definition of peri urban area as zone which is within the planning limits but outside the urbanisation limit of the municipal corporation/authority or metropolitan planning committee or authority. URDPFI suggests planning for integration of plans of such settlements through two approaches:

- The plans can be prepared by the developmental body in consultation with the village authority and implemented jointly by the village authority or developmental body,
- Village bodies may prepare the plan and such plans will be compiled and made part of overall developmental plan of the region by developmental body.

3.1.2 Villages adjacent to corridor development

"Economic Corridors" connect economic region along a defined geography. They do not stand alone, as their role in regional economic development can be comprehended only in terms of the network effects that they induce (Asian Development Bank, 2013). The impact on the cities and the villages lying adjacent to the economic corridors, have tremendous influence on the cities/towns as well as villages, in terms of land prices foremost. Surge in Land prices is the indirect impact arising from the anticipated landuse arising in the future. The economic activity in the villages adjoining an economic corridor is diversified as well. The anticipated industrial and economic growth along the corridor gives opportunities to the adjacent urban and rural areas to participate in the economic development. The transformation of villages is initiated with the future anticipated economic growth. The case study of Delhi Mumbai Industrial Corridor (DMIC) and the villages falling adjacent to this corridor can be taken as interesting exemplar to establish the changes which have been taken in the villages. DMIC will cover the development of 1540 km long Western Dedicated Freight Corridor with 24 nodes or investment regions/industrial areas, across seven states.

The villages near to industrial areas have their interdependency with the industry in terms of provision of employment and provision of raw materials. The industrial development, in turns leads to income generation for the labour. Therefore, the villages near industrial cities have peculiar characteristics regarding work culture and economic activities in the villages. The industrial city will act as a pull factor for labour to migrate from rural areas of backward districts which will further lead to urbanization and economic development of the city. If planned well, the villages near these urban centers may experience huge amount of trickle-

[3] Pryor, R.J, 1968, Defining the Rural-Urban Fringe, *Social Forces*, Vol.47, No.2, pp-202-215

down effect rather than only experiencing backwash effect and acting as a provider for the cities.

Villages near industrial city should have following criteria:

- Direct connectivity to the industrial region
- People commuting from the village to the city for daily work in industry.
- Atleast more than 50% of village population depended on industry in the city, either through employment or by provision of raw material.

Villages near investment regions tend to fall in the category of fast transforming villages, which is because of new land use activities coming in near future. Specialised investment in the region leads to differential characterisation and degree of development in the villages, which requires spatial plans for planned development in the region.

Apart from the corridor development, a city with active tourism opportunities provides employment opportunities to local population and people residing in nearby villages. The employment generation in the villages due to tourism activities in the city has to be highly recognized. Moreover, the villages can also serve as a centre for village tourism and can generate its own income. The provision for services/ infrastructure has to be given accordingly. A village development plan has to address the spatial development in accordance with the economic activities present.

- Any village depended on tourist city centre shall have following basis:
- Atleast more than 50% of population engaged in tertiary activities based on tourism in the city.
- People commuting from village to city for daily work.
- Villages being on the way of the existing tourism circuit, if any.

3.1.3 Villages in the interior

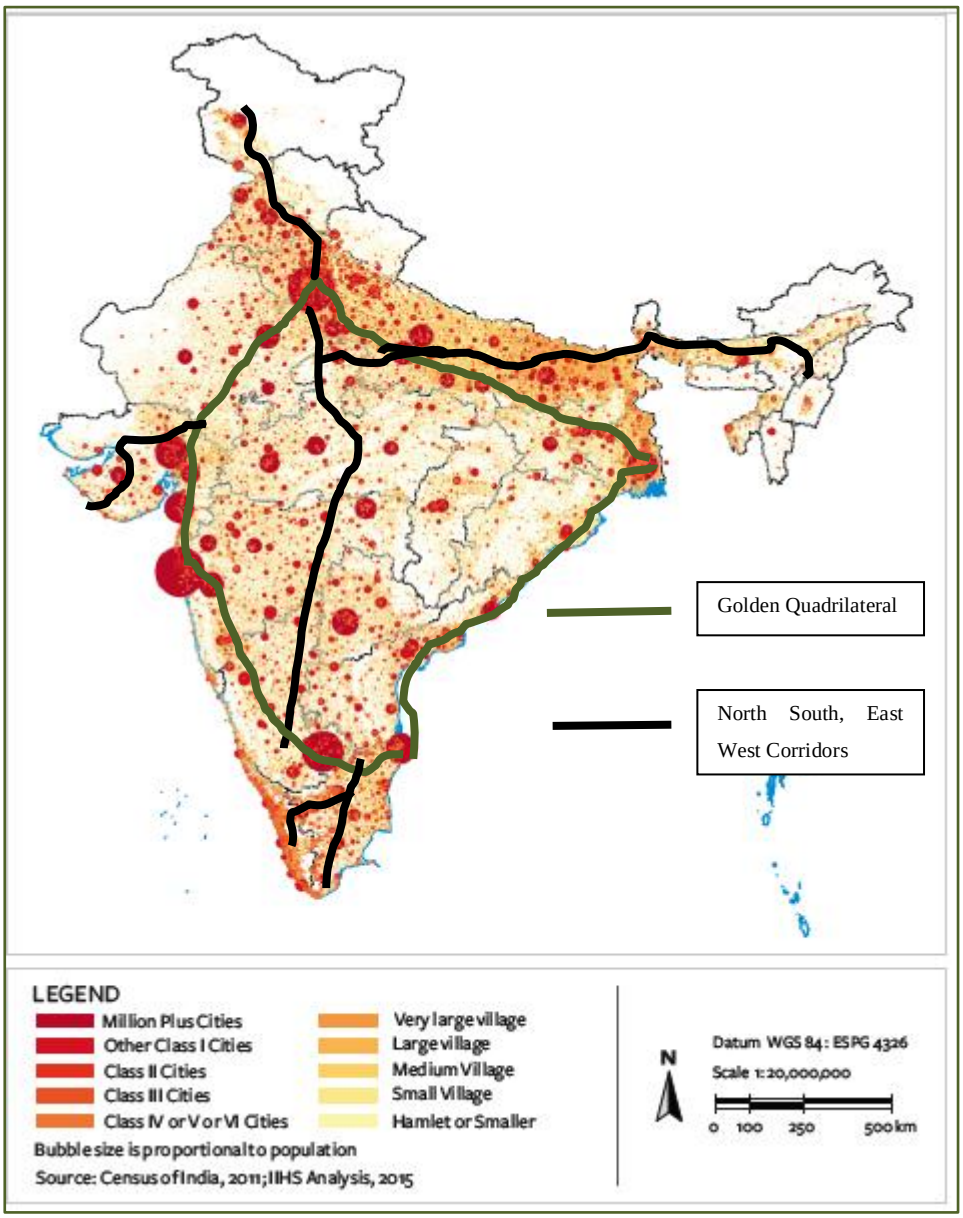
The rural areas which are purely depended on agriculture and allied activities or fishing and mining & quarrying activities should have spatial plans which are having potential to develop such activities and mentions the basic requirements for betterment of quality of life of individual, to mitigate the outward migration to urban areas. The villages with such socio economic characteristics are defined as pure rural areas isolated from the urban centers with specialized activities as per the geographic suitability of the area/region. The basis of qualifying to such categorization for village shall be:

- More than 75% of population depended on primary activity
- Isolation from urban areas in terms of distance and accessibility.

Since the physiographical conditions of the region holds significance in such classifications, the villages with small population size, with geographical contiguity can also be considered as a Cluster of villages, which would address integrated economic and spatial development in the villages.

The Figure 3.1 shows the villages along the metropolitan areas, corridor and those which are in interior. These villages will have different characteristics and would require different level and types of spatial plans to address their development.

Figure 3.1:Settlement Pattern and Corridors



Source: Urban India 2015: Evidence, Indian Institute of Human Settlement

3.2 Villages categorized by their population size

The census has given classification for the villages according to their population size. The villages having population less than 200 persons, are mostly located on hilly terrain, dessert or tribal areas, with low density areas, such as Himalayan belt of India, North East India, tribal belt of Chattisgarh, Jharkhand, Eastern and Western Ghats of South India. A separate spatial plans for each hamlet would be rather difficult process and would result in a piece-meal development, rather than integrated development. Alternatively, a group of these

hamlets with proper connectivity, can be treated as an integrated cluster. Also, the socio economic characteristics of the villages will have to be determined, while making spatial plans for cluster of such villages. The most critical aspect would be the connectivity and the sharing of resources amongst the villages for formation of such cluster. In case of villages with small population size and with spatial contiguity clusters could be formed by identifying contiguous villages/gram panchayats within a radius of 5–10 km (or radius appropriate to the population density and geography of the region) around the identified growth center. The criteria for selection of cluster can be same as given by RURBAN guidelines for selection procedure.

Selection criteria gives due weightage to rural demography, growth in non farm work force, presence of clusters, tourism and pilgrimage significance, proximity to transport corridors. The Integrated Cluster Action Plan methodology takes due cognizance of Tribal districts and follows distinct approaches for Tribal and Non Tribal districts. The ICAP addresses the rural development in the clusters comprising small villages. The ICAP mentions the desired level of benchmark for :

- Basic amenities
- Social amenities
- Economic amenities, and
- Digital amenities

The categorisation of villages as per Census 2011, explains the fact that 58.33% of the villages have population between 1000-5000 and are ideal for preparation of Gram Panchayat Spatial Development Plan. (Table 3.1) However, the villages having more than 5,000 population, the Spatial Development Plan can be prepared on the basis of URDPFI guidelines,2014. The villages which are less than 1000 population would also be considered for planned development which shall depend on their location, physiographic conditions and connectivity.

Table 3.1: Categorisation of villages according to population size

Class Size	Population Size	Total Villages	Total Population	% of rural population	Average population	Remarks
Class I	10000+	4,682	7,23,66,805	8.68	15456	1. Large villages which are likely to be urban in future, if near metropolitan areas. 2. Large villages which may be purely depended on flourishihng agricultural or other primary activities.
Class II	5000-9999	18,641	12,38,08,537	14.85	6642	1. Villages which are having population next to Class I village, and would also be urban, if near metropolitan areas.
Class III	2000-4999	96,388	28,86,37,987	34.63	2995	1. Medium sized villages which can be grouped together to form a cluster, if have geographical contiguity.
Class IV	1000-1999	1,39,136	19,74,96,806	23.70	1419	
Class V	500-999	1,41,761	1,032,91,220	12.39	729	1. Small sized villages where cluster plans would be feasible.
Class VI	200-499	1,14,726	39,68,3027	4.76	346	
Class VII	Less than 200	82,149	81,79,066	0.98	100	Isolated hamlet, where villages are located on hilly terrain, dessert or tribal areas, and spatial plans shall be based on connectivity and sharing of resources.
	Uninhabited	43,384	-	-		
	Total	6,40,867	83,34,63,448	100.00		

Source: Census of India,2011

3.3 Classification of Gram Panchayat

DATA FROM NIRD&&PR

3.4 Need for categorising the villages

- The unplanned development spurting up near the urban centers in the extended *abadi* area of the village, giving rise to unauthorized development, which has to be later regularized and retrofitted into planned development.
- The interdependency existing between the villages and the metro cities, makes it important to plan the villages for the provision of services and infrastructure.

- The plan for the rural land in vicinity to urban centre holds importance because of the anticipated spatial expansion of the urban area.
- The connectivity of the villages to the nearby metro city, leads to rising real estate prices leading to new non-farm activities coming in the villages, for which infrastructural services are required.
- The planning of the activities to be permitted in the fast transforming villages needs to be decided, for making a sustainable environment in the village.

4. CONTENTS OF GRAM PANCHAYAT SPATIAL DEVELOPMENT PLAN

4.1 Introduction

Planning exercise at Gram Panchayat level is complex because of the socio economic hindrances which exists at the rural level. The GPSDP should follow an overall common vision for the district. Because, plans prepared at these levels must be compiled at higher administrative units. Use of cadastral maps at village area planning level is important and the revenue department which is custodian of cadastral maps has to play the critical role in providing, reliable and authentic land data base.

With the enforcement of respective amended town and country planning acts, the state governments would thereby be empowered to prepare GPSDP.

Lower literacy levels in rural areas can be a hindrance to the planning process or can result in faulty planning or social-economic bias. The State governments can provide technical assistance/knowhow to village Panchayats. States can have a better Planning functioning reciprocated by healthy indicators on basic parameters at grass root level, such as :

- Literacy,
- Women's participation in decision making, women empowerment,
- Handling of development funds as in past records,
- Transparency in funds handling,
- Inclusion of vulnerable groups and youth in decision making

Therefore, the contents of the plan shall be accordingly included in the GPSDP to address the overall development of the villages. A sample plan of Chandrapur District and an international case study is given in the annexure for reference. (Annexure 2)

4.2 Contents of the Plan

The Gram Panchayat Spatial Development Plan (GPSDP) shall be prepared in accordance with the RADPFI guidelines. Therefore, the contents of the GPSDP are discussed in the chapter to guide the Panchayats in the direction of rural spatial planning.

4.2.1 Analysis of Existing Scenario

I. Regional setting

The following locational attributes shall be considered in planning exercise:

a) Location of the panchayat in absolute terms of latitude and longitude; also distance and direction from other established points;

b) Nodal significance of the village/panchayat in the national or regional infrastructure of transport and communication, power, and in an agricultural area, irrigation network, agricultural extension services, agricultural produce collection and distribution centre, agro-industries linked to local markets;

c) Status that the panchayat/village occupied in the rural hierarchy involved;

d) Role and status of the village/panchayat in the rural delivery systems of social services;

e) Relative significance of locations of village/panachayat in proximity to a metropolis/megapolis:
   i. Nodal significance
   ii. Presence of high productive economic activities
   iii. Presence of large scale market

The following site attributes shall be studied for taking up a planning exercise:

a) Conditions of site: low-lying, swamp, or dry land, ridge; on a river bank or canal side. Within the Block/district- flat, sloping (in which direction), undulating-gentle slope, moderate slope, steep slope.
b) Value and importance of the site; and its historical past, that is, when the nucleus was established.
c) Analyse the factors responsible for determining the site:
   i. In alluvial plains
   ii. In hilly and mountainous regions
   iii. In arid regions
   iv. In the areas of territorial ruler ship
   v. In the areas around some localised physical resources, mining settlements, manufacturing
   vi. towns, resort towns
   vii. Around large metropolises
d) Climate and its influence on daily life, on building the homes, the range of crops a panchayat can produce; and how the panchayat/rural activities have modified the natural climate, particularly in the built-up area.
e) Nearness/proximity to the core or urban centre.

II. Human Resource

a) Shall include the analysis of population characteristics.
b) The chapter should include the size, territorial distribution, and composition of population, changes therein, and the components of such changes.
c) The important data such as migration, population growth, population distribution, age sex population distribution, sex ratio, households characteristics shall be included in the chapter.
d) Skill assessment data under skill development programme.
e) Ward level data (Now few villages also have wards)
f) SECC (Socio economic Caste census) data, provides village wise caste and socio economic data.

III. Land Use and Land Management (Village level)

Land use planning of rural areas shall be in accordance with the categorisation mentioned in the chapter 5th. The chapter shall give information regarding the activities carried out in the abadi and agricultural area of the villages. It will also give information regarding existing services, living conditions and available land resource for further development of various activities. The rural area often has mixed land use

in abadi area, and the clear cut demarcation is not possible, therefore principle of zonation may not be applied in various villages, especially small villages in the interior. The Gram Panchayat is liable to modify the land use zones given in table 5.1 accordingly and formulate the land use plan. It is the onus of Gram Panchayat to restrict and prohibit activities which pollute the land, water and air resources in the local area, in the proposal.

The land management in the rural areas shall discuss the availability of land as a resource for raising revenue or for infrastructural development. It shall restrict the unplanned development near the metropolitan areas which often arises in the extended abadi areas of the villages.

IV. Economic Base: Primary, Secondary, Tertiary (if any)

The economic base of the village is largely primary. However, a village may depend on other activities as well depending on its connectivity, infrastructure, socio-economic status and regional setting. This chapter shall include the details of each economic activities in the villages, especially the one on which the village depends.

In case of primary activities the details such as workforce, employment, productivity, cost incurred, market activities, government assistance, landholding size, landholding ownership, techniques used in production, Net sown area, Gross sown area, irrigation details, storage information shall be given. The details can be referred in Chapter 5th.

V. Infrastructure: Social, Physical and Economic.

The plan shall analyse the available infrastructure in the villages and the population and area served by the existing services. The analysis carried in the chapter aims to bring out the requirements of infrastructural services and basic amenities in rural areas.

a) Physical- Deals with housing (Census data), Roads, Drainage,
b) Social – Deals with Health, Education and Community Centres
c) Economic- Deals with Milk collection centre, Godowns, Market Yards, Wholesale (Location and site)

VI. Disaster and Climate Resilience

The rural areas are the ecological backbone of a region and hence shall be given special attention to conserve the environmental resources. This chapter shall discuss the vulnerability of rural areas to various disasters. Hazards in the rural areas turns into a disaster easily, since these areas are given no attention and hence GPSDP shall dedicate a chapter to the issue stating the possible solution to the proneness of the villages to any hazard such as floods, fire, drought, earthquake etc. and suggest both pre and post disaster mitigation measures. The traditional methods and techniques to conserve the resources which are environment friendly shall also be included in the chapter. The building typology and the agricultural activities affecting environment

can be discussed along with the waste disposal and solid waste management issues and solution to build a climate resilient village.

The above mentioned aspects are area specific, however, synchronisation with the District Disaster Plan should be carried out in the Proposals and copy shall be forwarded to District office. The integration of Disaster Plan with the District Disaster Plan should be followed in the GPSDP and government agencies shall ensure the same.

VII. Resources and Potential

The villages or panchayats have Common Property Resources which belongs to the Panchayat, the GPSDP should mention the location and extent of all such resources along with their usage and potential that they carry for the development of rural areas. The forest area, River body, Land as a resource should be mentioned as per their extent on map and in table (area, usage, population depended)

VIII. Local level Governance: Common Issues and Potentials

This chapter on governance may include the present institutional framework of the panchayat, its functions performed as per 73rd CAA, its existing members, their term, various departments involved in planning of the panchayat, allocation of funds and budget preparation of panchayat.

The exercise of people's participation and decentralisation of powers and funds can be discussed in this section along with community participation in plan preparation stating the issues and potential in the existing form of governance of Panchayat.

Existing convergence and future convergence shall be discussed.

IX. Resource Mobilisation Options

This chapter will include the options offered by the panchayat for raising its revenue from the resources owned by Panchayat.

X. Convergence of Central/State funded Schemes and Projects

The existing central and state rural schemes for housing, infrastructure, employment, social assistance, and rural development allocates certain budget for various sectors in rural areas, such schemes shall be acknowledged and realised while planning the rural areas, especially during the requirement of financial assistance. This chapter should mention the budget received from the existing schemes of government; and study implementation, reviewing, monitoring and effectiveness of such schemes. The transfer of funds is guided by the recommendations of the 14th Finance Commission.

XI. Special Needs of Gram Panchayat

This chapter shall solely include the needs of the Gram Panchayat in present and in future (for 10 years), depending on the calculated population projections, using current trends of population growth and economic activities to be induced (if any).

XII. Conservation Areas

Tousrism, activities, handicrafts and culturally important areas shall be given special emphasis on and shall be planned accordingly.

XIII. Vision of the Gram Panchayat

For instance the following are some of the vision, mentioned in the GPDPs, however, they can be varied depending on the collective aspirations of the villages.

- Open defecation-free Panchayat
- Safe drinking water available to all households of GP
- Destitute free GP
- GP where all habitations are connected through all-weather road
- Child labour-free GP
- Forced migration-free GP
- Trafficking free-GP
- 100% Anganwadi enrolment GP
- 100% school enrolment GP
- 100% child and mothers are covered through immunization GP
- Malnutrition-free GP
- Infant death-free GP
- Maternal death-free GP
- Complete NSAP coverage GP
- Home for all-GP
- Clean and green GP

4.2.2 Projections

I. Population

Projected population should be guided by trends in rural population growth of panchayat, migration, economic activities induced or dispersal of economic activities.

II. Economic Base and Employment

Hierarchy of commercial centres, dispersal of commercial activities, any specialised economic activities of the villages, workforce, dependency on primary activities, production, potential of any other activity.

III. Shelter

Housing needs and requirements according to population projected.

IV. Transportation

Travel demand, forecast, road length, hierarchy of roads, transport terminals.

V. Infrastructure

Need of infrastructural services according to the projected population.

VI. Land use requirement for various activities proposed or needed

4.2.3 Strategies and Proposal

This chapter will include the strategies and vision of Panchayat in accordance with the district vision. The proposal shall be described spatially along with the budget required and source of funding.

5. RURAL INFRASTRUCTURE PLANNING: LANDUSE, NORMS AND STANDARDS

5.1 Introduction

The vision of RADPFI guidelines is to bring parity in terms of planned development amongst all settlements, whether rural or urban. Therefore, the need for planned development holds importance for rural settlements as well. The preparation of spatial plans shall depend on the prescription on norms and standards for the provisioning of infrastructure facilities. The chapter has attempted to prescribe norms and standards based on which proposals can be drawn. However, no guidelines have been prepared yet for dealing with spatial provision of services or management of land for rural areas.

Rurban Mission, launched by the Ministry of Rural Development addresses the need and urgency for provision of urban services to rural areas. However, if mission accomplishes, there are high chances and possibilities for land speculation leading to growing unauthorised activities in the periphery of the settlements. Thus, there is need for regulating such activities in rural areas, and hence norms and standards are required for activities permitted in under various uses in rural areas.

.However, the existing conditions do not seem to be much favourable, considering the diversity of Indian villages. The RURBAN mission and the Integrated Cluster Action Programme (ICAP) aims to bring service parity in rural areas and thereby foresee planned development of cluster of villages. Therefore, it becomes imperative to have development guidelines with a pragmatic vision for rural areas where people actively participate in the process of community development. The RADPFI guidelines answers the questions:

- What are the principles while planning and designing future settlements in rural areas and upgrading existing ones?
- What are key elements of sustainability?
- What futuristic changes do we have to prepare for?
- What lessons can be learnt from past?

5.2 Landuse for Rural Areas

Land and land use are essentially State subjects. The increasing urbanisation has put tremendous pressure on the land to be put for urban uses. As per Census 2011, the total area under the cities has increased from 77,370 sq. kms. to 1,02,220.59 sq.km. in 2011 thereby signifying increase of areas under cities and towns by 32.1 percent during 2001-11. In order to prevent unwarranted conversion of rich agricultural land to urban uses, it becomes essential to prescribe landuse norms and activities permissible for the rural areas.

Proper planning of land and its resources allows for rational and sustainable use of land catering to various needs, including social, economic, developmental and environmental needs. Proper land use planning based on sound scientific, and technical procedures, and land utilisation strategies, supported by participatory approaches empowers people to make

decisions on how to appropriately allocate and utilize land and its resources comprehensively and consistently catering to the present and future demands. There is a need for scientific, aesthetic and orderly disposition of land resources, facilities and services with a view to securing the physical, economic and social efficiency, health and well-being of communities.

The land use prescription shall form the internal component of the Spatial Development Plan. Further, how the landuses are to be regulated within the Gram Panchayat and at the fringe of villages become crucial aspect. This is backed by the fact that rural areas also needs to ensure adequate food security and hence rich fertile land need not be converted into non agricultural uses.

The table 5.1 provides break up of landuse categories for both built up and non built up areas.

Table 5.1: Landuse for rural areas

Built up Area	**Use category**	**Activities Permitted**
	Residential	Residences*
	Commercial/Economic	Retail shopping
		Informal Shop
		Daily market, weekly, informal , regulated and specialised markets
		Godowns, Storage grounds
	Industry	Service and Light industry(MSMEs, Household industries, agrobased industries, khadi industries, cottage industry, industries depended on indigenous raw materials and art and craft.) Location of SEZ and Big Industries.
	Educational	School
		Anganwadis
		Training Centres
		Vocational Institute
		College
		Skill development institute/Organisation
	Health Services	Subcentre/PHC/CHC
		Dispensary
		Pvt. Clinic
		Vetrinary Hospital/Clinic
		Hospitals
	Utilities and Services	Bank
		ATM
		Credit Society
		Police thana
		Cremation ground/Burial ground/Crematorium
		Community Hall
		Dharamshala
		Public Toilet
		Social Welfare Centre
	Special Area	Temple
		Heritage area
		Scenic Value Area
		Government Restricted Areas
	Recreational	Playgrounds

		Garden
		Chaupal
		Public open space
	Transportation &Communication	NH/SH/MDR/ODR/VR
		Village access roads
		Railways
		Bypass
		Bus stand/ Railway station/Integrated Customs
Non-Built Up Area	Area under non-agricultural use	
	Barren and Un-Culturable use	
	Permanent Pasture and other Grazing land	
	Land under miscellaneous tree crops	Agricultural land/ cultivable land/ culturable land
	Culturable Waste Land	Agricultural land/ cultivable land/ culturable land
	Fallow land other than Current Fallows	
	Current Fallows	
	Net Sown Area	

**The villages often, do not have, clear cut demarcated zones, For instance, there may be a household serving as a residence and a shop and a micro scale household cottage industry, therefore, Gram Panchayat may modify the land use zones according to the local situation. However, each Gram Panchayat shall mention about the restricted/prohibited activities which pollute the air, water and land resources in the local area and should mention in the landuse plan. Also, the socio cultural environment of the community in the village should be considered while preparing the landuse plan. For instance, the villages where tribal communities are dependent on indigenous resources the plan shall consider landuse plan accordingly.*

5.3 Norms and Standards

Norms and Standards for Infrastructure provision and construction activities are essential to promote development of amenities as well as sustainable built up environment for human habitation.

The standards for building construction and infrastructural allocations have been prescribed by National Building Code of Bureau of Indian Standards, Indian Road Congress etc, in various sectors of infrastructure construction and development.

There have been standards and norms in existence and enforced to a certain extent by the relevant statutory authorities in urban areas but compliance to the same in rural areas is virtually non-existent. Hence the construction activities in rural areas are by and large unregulated resulting in organic growth which is characterised by haphazard development and access to basic facilities remains a big challenge in rural areas.

The formulation of norms and standards has to be in congruence to a sustainable land utilization plan.

In the upcoming scenarios of seeding and expansion of urban development or processes of urbanization in the urban regional hinterlands, a set of norms and guidelines to regulate and moderate development activity in rural areas become nevertheless important.

5.3.1 Habitat Planning in Rural Areas

While planning for housing in rural settlements the following factors shall be taken into consideration:

- Ecosystem and Biodiversity.
- Topography with its direct effect on climate, likelihood of natural disasters, natural drainage, etc.
- Identity of the place rooted in its culture and heritage.
- Nearness and connectivity with nearby urban centres.
- Occupation related requirements.
- Water and Waste management.
- Land records and Land tenure.
- Site selected shall be conveniently approachable and suitably developed and shall not be subjected to water logging/flooding.
- Facilities like branch of co-operative bank, a fertilizer depot, a veterinary hospital, market place and a branch of the co-operative consumer store besides facilities for educational and health care should be available within a maximum distance of 5 km from any settlement.
- Proposed Road Hierarchy

5.3.1.1 Norms for Low Income Housing development.

- Plot size : 80 m^2, Minimum
- Density (Gross) : 60 plots per hectare, Maximum
- Minimum frontage : 6 m
- Ground coverage : 33percent (subject top a maximum of 50 percent)
- Floor area ratio (FAR) : 2, Maximum
- Open spaces : 1.21 hectare open space for a village with 200 houses.

(Source: National Building Code, Doc: CED 46 (8064)WC, Nov 2015)

5.3.1.2 Norms for Residential development

Table 5.2: Parameters of residential building

Sl.No.	Plot Area in sq. metres	Maximum ground coverage (in percent)	FAR	No. of D/U	Max. height in metres	Setbacks (in metres)		
						Front	Side	Back
1.	Below 50	90	1.8	2	6	1.2	-	-
2	51 – 100	80	1.6	2	6	2.0	-	1.5
3.	101 – 150	75	1.5	3	9	2.0	-	2.0
4.	151 – 250	66	1.3	3	9	3.0	-	3.0
5.	251 – 500	60	1.2	3	9	4.5	1.5	3.0
6.	Above 501	50	1.0	3	9	4.5	3.0	3.0

(Source: Model guidelines for Development and construction including safety provision for Natural Hazards in Rural Areas, GOI-UNDP Disaster Risk Management Programme, Ministry of Home Affairs, GOI, 2008.)

5.1.2.3. Norms for Commercial development

Table 5.3: Parameters of commercial buildings

Sl.No.	Use	Ground Coverage (in percent)	FAR	Maximum Height (in metres)	Setbacks (in metres)	
					Front	Back
1.	Convenience Shops	75	1.0	6	2	-
2.	Local Shopping Centre	50	1.0	6	3	-
3.	Community (Gram Panchayat) Shopping Centre	40	1.2	9	4.5	-

*Minimum size of plot for above, 20 sq. metres.

(Source: pp-31, Model guidelines for Development and construction including safety provision for Natural Hazards in Rural Areas, GOI-UNDP Disaster Risk Management Programme, Ministry of Home Affairs, GOI, 2008.)

5.3.1.3 Norms for Industrial Use (Resource based cottage Industries, non polluting industries and Non hazardous industries except those permitted by the State/UTs)

Table 5.4: Parameters of industrial buildings

Sl. No.	Plot Size (in sq. metres)	Ground Coverage (in percent)	FAR	Height	Setbacks (in metres)		
					Front	Side	Back
1.	100-400	60	1.2	8	3	-	3
2.	400-1000	55	1.1	8	4.5	-	3
3.	100-4000	50	1.0	8	6	3	3
4.	Above 4000	45	0.9	8	9	3	4.5

(Source: pp-31,Model guidelines for Development and construction including safety provision for Natural Hazards in Rural Areas, GOI-UNDP Disaster Risk Management Programme, Ministry of Home Affairs, GOI, 2008.)

5.3.1.4 Institutional and Community Facilities

Table 5.5: Parameters of institutional and community buildings

Sl. No.	Plot Size (in sq. metres)	Ground Coverage (in percent)	FAR	Height	Setbacks (in metres)		
					Front	Side	Back
1.	500-1500	40	1.2	9	4.5	3	3
2.	1001-2000	33	1.0	9	4.5	3	4.5
3.	2001-4000	30	0.9	9	6	3	4.5
4.	Above 4001	25	0.9	12	9	3	6

(Source: Adapted from Model guidelines for Development and construction including safety provision for Natural Hazards in Rural Areas, GOI-UNDP Disaster Risk Management Programme, Ministry of Home Affairs, GOI, 2008.)

5.3.1.5 Parking Norms

The following Equivalent Car parking space (ECS) or Equivalent Vehicle parking space (EVS) should be provided:

Table 5.6: Parking Norms

Sl. No.	Use	No. of ECS/EVS
1.	Residential	1 EVS for 100-200 sq. metre plot 1 ECS and 1 EVS for plots more than 201 sq metres.
2.	Multi Family Residential	1 ECS for 75-100 sq metre built up area and 1.25 for more than 101 sq. metre built up area.
3.	Motel	1 ECS for every room
4.	Wholesale Mandi, Godown and Cold Storage	2 EVS for 550 cu. Metre storage, 2 ECS for 100 sq metres built up area.
5.	Offices, Conference Hall, Banquet Hall	2 ECS for 100 sq. metre built up area
6.	Educational	1 ECS for 100 sq m built up area.
7.	Industrial	1 EVS,0.5 ECS for 100 sq. metre built up area.

*ECS stands for Equivalent car space which is 23sq.metres, if provided in open.

** EVS stands for Equivalent Vehicle Space, which is a more neutral term for the type of vehicle it proposes for parking. It is an inclusive term for Light Commercial Vehicle and tractors with trailors and non-motorised vehicles like Bullock Carts. The recommended space requirement for EVS in open is, 35 sq.metres.

(Source: Adapted from Model guidelines for Development and construction including safety provision for Natural Hazards in Rural Areas, GOI-UNDP Disaster Risk Management Programme, Ministry of Home Affairs, GOI, 2008.)

5.3.2 Road Infrastructure

Rural Connectivity is a key component of Rural Development in India. Rural roads contribute significantly to generating increased agricultural incomes and productive employment opportunities, alongside promoting access to economic and social services. Rural Roads are the virtual lifelines for the vast multitude residing in rural areas. However, even today, only about 60% of villages/ Habitations in the country are connected by roads.[4]

A **Road Network** in a Block or District comprises of all categories of roads, such as National Highways, State Highways, Major District Roads, Other District Roads and Village roads, which facilitate the essential movement of persons and goods in an area.

The **Road system** in India has been classified by the Indian Roads Congress into three categories. These are as follows:

i. **Primary Road System**- Expressways and National Highways (NH)

[4] http://pmgsy.nic.in/pmg61.asp

ii. **Secondary Road System-** State Highways (SH) and Major District Roads (MDR)
iii. **Tertiary System** or Rural Roads- Other District Roads (ODR) and Village Roads (VR)[5] .

The rural roads in India are commonly referred to:

(i) Other District Roads (ODR)

(ii) Village Roads (VR)

Other district roads are the roads serving rural area of production and providing them with outlet to market centres, taluka/tehsil headquarters, block development headquarters or major district roads, and would serve to connect villages with population 1000 and above or cluster of villages. Village roads are roads connecting villages or cluster/group of villages with each other and to the nearest road of a higher category. These two categories of roads are proposed to be called together as 'rural roads' with uniform standards.

The following table gives the minimum road widths for Village Roads. For further information on the norms and design specifications Indian Road Congress' Rural Roads Manual,2002 can be referred.

Table 5.7: Norms for Village Roads

Village Road type	Road Description	Minimum Road Width (in metres)	Functions /remarks
R1	Link Roads	6 m	Inter village , ODR, highways connectors.
R2	Major Through Roads	7.5 m	Main village roads with drain on both sides to facilitate drainage system of the village
R3	Minor Through roads	4.5 m	Other village roads
R4	Minor Through Lanes	3.75 m	Village lanes

(Source: Draft National Building Code, Doc: CED 46 (8064) WC, Nov 2015; Rural Roads Manual, 2002, Indian Road Congress)

5.3.2.1 Control of building activities along Highways and roads

In order to regulate and control building activities along National Highways, State Highways, Major District roads and major urban roads as notified by – PWD, the persons responsible for carrying out excavation, earth work, construction, demolition or repairs to all sites within 100 m. from these roads shall apply to the Panchayat concerned for permission to carry out such work in accordance with the set back mentioned here below, subject to NOC from PWD/NHAI, where ever applicable.

Table 5.8: Setbacks for building types

[5] ibid

Type of Building Activity	National Highway or State Highway	Major District Roads	Village Roads (All sub categories)
Theatres, Industrial Units etc., Major Commercial Establishments	8 metre front setback	5 metre	3 metre
Residential	5 metre front setback	3 metre	3 metre
Institutional	8 metre front setback	5 metre	5 metre

(Source:pp-35,Model guidelines for Development and construction including safety provision for Natural Hazards in Rural Areas, GOI-UNDP Disaster Risk Management Programme, Ministry of Home Affairs, GOI, 2008.)

5.3.3 Social Facilities

The social infrastructure component includes health and education services for the population. The norms for setting up schools and health centre is given below. For the villages of categories III to VII the provision of infrastructure can follow a cluster approach wherein the settlements have a common centrally located facility. The norms for hilly tribal and difficult areas can be set for at a lower threshold as per the respective state government policy.

Table 5.9: Norms for Educational/health/public utility Facilities

Use	Standard/Population	Area (in hectares)	Distance from Habitation
a) Primary School	1 for 5000	0.4 to .6 ha	Within 500 metres
b)High School with Primary School	1 for 15000	1 ha	Within 1km
c)Dispensary/Health Centre	1 for 5000	.05 ha	Within 500 metres
d) Community Hall	1 for 5000	.05 ha	Within 1 km
e) Aanganwadi	1 for 5000	.05 ha	Within 500 metres

(UNDP Disaster Risk Management Programme Ministry of Home Affairs, Govt. of India , 2008) The distance norms as well as population norms can be relaxed in case of hill areas/desert areas with low population densities/concentration.

5.3.3.1 Site Specific Norms for Education and Health Facilities

Table 5.10: Plot Size, Ground Coverage, FAR, Height and Setbacks

Sl. No.	Use	Minimum Plot Size (in sq. metres)	Ground Coverage (in percent)	FAR	Height	Setbacks (in metres)		
						Front	Side	Back
1.	**Nursery School/Anganwadi**	5000-1500	33.3	1.0	10	4.5	3	3
2.	**Primary School**	1500-3000	30	0.9	10	6	3	6
3.	**Senior Secondary**	4000-10000	25	1.0	12.5	9	4.5	6
4.	**Nursing Home,**	250	35	0.7	6	3	-	3
5.	**Dispensary**	251-500	33.3	1.0	9	4.5	3	3
6.	**Diagnostic centre**	Above 501	30	1.0	12	6	3	4.5

(UNDP Disaster Risk Management Programme Ministry of Home Affairs, Govt. of India , 2008)

5.3.3.2 Socio Cultural Facilities

The provision of socio cultural facilities shall correspond to the changing settlement demography worklife and in line to the idea of providing urban level facilities to the rural populace.

Table 5.11: Norms for socio cultural facilities

Category	Population Served per unit	Land Area Requirement (minimum)
Crematorium	One per Block	0.5 ha
Cremation Ground	One per Gram Panchayat or 5000 Population	400 sq. metres
Burial Ground	5000 residents observing burial rituals in a Habitation or a Gram panchayat	500 sq. metres
Open Spaces/Parks	One housing area park per 5000 population and Neighbourhood Park for 15000.	0.50 ha and 1 ha respectively.
Playground /Ground for Fairs and Festivals	One per 5000 population	1.00 ha.
Religious Places	5000	400 sq metres
Fire station	2 lakh population or 10 km radius	0.6 ha

(Sources: Derived from URDPFI Guidelines 2014; Green Burial Ground Project, PARD)

5.3.4 Water supply and Sanitation

5.3.4.1 Potable Drinking Water in rural Areas

The National Rural Drinking Water Programme envisages to provide every rural person with adequate safe water for drinking, cooking and other domestic basic needs on a sustainable basis. This basic requirement should meet minimum water quality standards and be readily and conveniently accessible at all times and in all situations.

While Implementing the Rural Water Supply Schemes, the following norms can be adopted for providing potable drinking water for the population The minimum supply for areas with extreme conditions of access of water resource, 40 litres per capita per day can be set as the minimum. The division of purpose for the usage of water ois as follows for the same:

40 litres per capita per day(lpcd) for humans to meet the following requirements.

Table 5.12: Norms for provision of water

Purpose	Quantity (lpcd)
Drinking	3
Cooking	5
Bathing	15
Washing utensils & house	7
Ablution	10

(Source: Acclerated Rural Water Supply Programme)

In addition, provision should be allowed at 30 lpcd for animals in hot and cold desert/ecosystems .With normal output of 12 litres per minute, one handpump or standpost is estimated for every 250 persons. In case of an independent habitation/hamlet/Wadi/Tola/Majra/Mohra etc, if their population is less than 250 persons and there is no potable water source within its location, one source may be provided . A rural habitation not having any safe water source with a permanently settled population of 20 households or 100 persons, whichever is more, may be taken as the unit for coverage with funds under the Accelerated Rural Water Supply Programme. However, the State Government could cover any habitation regardless of its size/population/number of households.

The above is the minimum to be provided. The recommended provison is in the range of 70-100 lpcd within walking distance of 50 metres. Individual states can adopt higher norms , supplying above 100 lpcd.

5.3.4.2 Safe water standards

A source is said to be safe if it is free from physical, chemical , bacterial and any biological contamination. It also should conform to the drinking water quality standards prescribed. The recommended standards acceptable and cause for rejection for drinking water in India by WHO and BIS is as follows:

Table 5.13: Potable water quality standards

Sl.No.	Characteristics	Acceptable	Cause for Rejection
1.	Turbidity (NTU)	1	10
2.	Colour (Units on Platinum Cobalt Scale)	5	25
3.	Taste and Odour	Unobjectionable	Objectionable
4.	PH	7.0 to 8.5	<6.5 or >9.2
5.	*Total Dissolved Solids (mg/l)	500	2000
6.	Total hardness (as $CacCo_3$) (mg/l)	200	600
7.	Chlorides (Cl) (mg/l)	200	1000
8.	Sulphates (as So_4) (mg/l)	200	400
9.	Fluorides (as F) (mg/l)	1.0	1.5
10.	Nitrates (as No_3) (mg/l)	45	45
11.	Calcium (as Ca) (mg/l)	75	200
12.	Magnesium (as Mg) (mg/l)	30	150
13.	Iron (as Fe) (mg/l)	0.1	1.0
14.	Manganese (as Mn) (mg/l)	0.05	0.5
15.	Copper (as Cu) (mg/l)	0.05	1.5
16.	Arsenic (mg/l)	0.05	0.05

*For determination of habitation with salinity problem, TDS limit (cause for rejection for rural areas) is fixed at present at 1500 mg/l against the recommended limit of 200 mg/l. As per the convention salinity is measured based on TDS characteristics. TDS has close co relation with salinity.

5.3.4.3 Sanitation

Proper sanitation provisions is necessary for a healthy habitat. The Swacch Bharat Mission aims to establish sanitary facilities in all houses, schools, anganwadis, places of community congregation, and for Solid and Liquid Waste Management activities through awareness generation, triggering behavior change and demand segregation.

Dwelling with individual conveniences shall have at least the following fitments:

- One bathroom provided with a tap,
- One water closet
- One nahani or sink raised from the floor with a tap.

Similarly provison of public or community toilets is to be taken up in rural areas. Public toilets are meant for floating population, i.e, for people on the move and community toilets are meant for a community that resides in the area and has a common provision of convenience. The following norms for number of seats, urinals, bathrooms and area for washing may be adopted:

Table 5.14: Norms for number of seats, urinals, bathrooms and area for washing

Types of toilets	Toilet seats	Bath Units	Urinal units	Clothes washing area
Community toilets	One seat per 50 users	One unit per 50 users	One unit per 200-300 users	4 - 5 sq. metres per 10 toilet seats; min 1.5m x 1.2 m
Public toilets near railway stations (may be used at all hours)	One seat per 100 users	One unit per 70 users	One unit per 300-500 users	4 to 5 sq. metres per 30 toilet seats; minimum 1.5m x 1.2m.
Public toilets near market place/ offices (will mostly be used during working hours)	One seat per 100 users	One unit per 50 users	One unit per 200-300 users	4 to 5 sq. metres per 10 toilet seats; minimum 1.5m x 1.2m.

(Source: BIS, Code of Basic Requirements for water Supply, Drainage and Sanitation, 1993)

5.3.5 Solid and Liquid Waste Management

5.3.5.1 Introduction

Waste can be defined as: Any material/liquid that is left over after productive use or which is beyond any use in its current form and is generally discarded as unwanted; and Material linked to human activity in comparison to nature which has its own system of recycling waste such that it eventually becomes a resource: for example, organic matter such as leaves, branches, and so on, decompose to form manure.

Waste can be classified in different ways:

- Based on its physical properties, waste can be categorized into solid waste (for example, garbage) and liquid waste (for example, waste water) ;
- Based on pattern of use, it can be classified into human waste (faeces, urine), animal waste, farm waste and industrial as well as commercial waste; and • Based on source, waste can be categorized as municipal waste (for example, household waste, commercial waste, and demolition waste), hazardous or toxic waste (for example, radioactive waste, explosives waste and e-waste), and biomedical waste (for example, hospital waste)

Solid Waste: Any waste other than human excreta, urine and wastewater is called solid waste. Solid waste can be classified into two types: biodegradable and non-biodegradable.

Biodegradable waste is that which can be decomposed by biological processes, for example, vegetable peel, food, farm waste, and so on. Organic waste is biodegradable and can be recycled; and Non-biodegradable waste cannot be broken down by biological processes, for example, paper, glass, metal, and so on.

Non-biodegradable waste can be further classified into two types: recyclable and no recyclable

- Recyclable waste is that waste which has economic value that can be recovered, for example, metal, paper, glass, plastic bottle, and so on
- Non-recyclable waste is that waste which does not have economic value of recovery, for example, tetra packs, thermocol, and so on..

Solid and Liquid Waste Management : SLWM is one of the key components of any sanitation initiative. In India especially in rural areas, waste is a severe threat to the public health concern and cleanliness. Though, the form of waste (both solid and liquid) generated in rural areas is predominantly organic and biodegradable yet is becoming a major problem to the overall sustainability of the ecological balance.

For e.g. it is estimated that rural people in India are generating liquid waste (greywater) of the order of 15,000 to 18,000 million liters and solid waste (organic/recyclable) 0.3 to 0.4 million metric tons per day respectively (DDWS-UNICEF, 2008). Generation of solid waste in rural areas ranges between 50 gm/cap /day and 250 gm / cap / day as mentioned below:

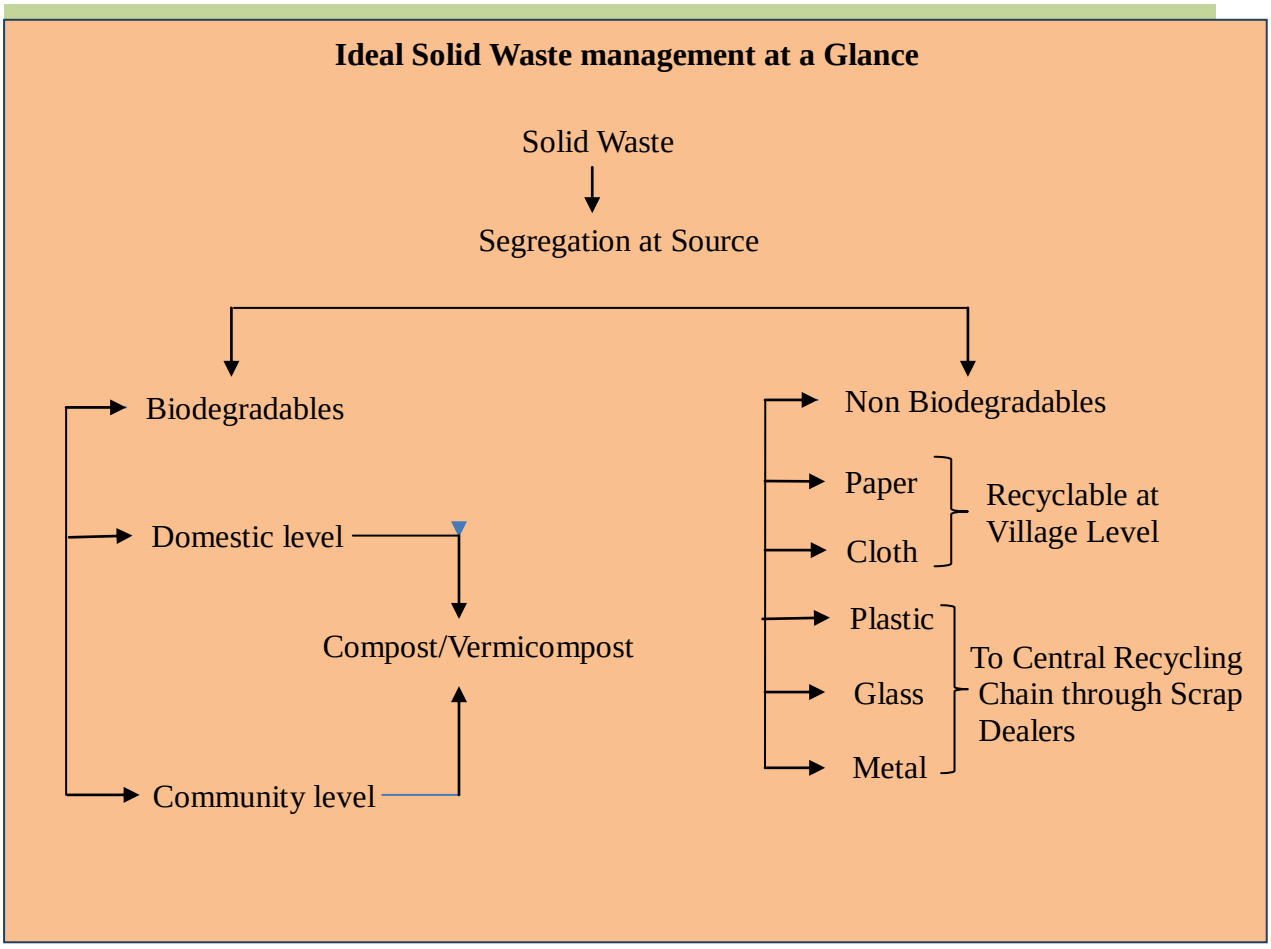
- Rural (Peri-urban or Urban outgrowth) 150 to 250 gm / cap / day.
- Rural (Remote /Tribal) 50 to 150 gm / cap / day.

Liquid Waste: Liquid waste is water which has been used once and is no longer fit for human consumption or other uses where clean water is required. Broadly, there are two types of liquid waste or wastewater (Figure 1):

- Black water is wastewater from toilets containing fecal matter; and
- Gray water or sullage is wastewater from bathrooms or kitchens. Gray water generally contains fewer pathogens than black water.

5.3.5.2 Solid Waste Management

Figure 5.1: Various levels of SWM



(Source: Solid and Liquid Waste Management in Rural Areas- A Technical Note, UNICEF/Ministry of Rural Development, Gov. of India)

Solid waste management in rural areas is often neglected although it is easier to handle and manage the process in rural settings. Several waste management techniques are available and all of them abide by the model of 4 Rs, i.e., Reduce, Reuse, recycle, recover.

The waste management in rural areas can be initiated through sensitization and cooperation of people. The process of waste segregation and collection is to be encouraged for a collective disposal and treatment. Inorganic wastes can be recycled locally or can be collected to be sold off for recycling. The various ways to manage solid waste, one of them is as follows:

Composting: Decomposition of organic waste is a natural process. Rural waste generation is largely organic in nature and can be put to an organized method of producing compost manure.

There are following options for composting of wastes:

- Pile method of Composting
- NADEP Method

- Bangalore Method
- Indore method
- Coimbatore Method
- Vermi Composting
- Thermophilic Composting
- Biogas Technology

One hectare of composting site can handle 83.33 tonnes per day. A composting site for biodegradable waste collected in the village can be accordingly built on a site away from the habitation as well as water body, close to the agricultural fields, where the manure generated can be put to use.

1. **Biomethanation**: is a process of anaerobic decomposition which results in the production of Methane. The site requirement is less as compared to the handling capacity, i.e., 1 hectare for 125 tonnes per day.
2. **Gasification/ Pyrolysis**: It is a thermochemical decomposition of organic material at high temperatures in the absence of oxygen. The land required for a 50 tonne per day plant is 1 hectare.
3. **Incineration**: It is a waste treatment process involving combustion of organic substances. The thermal treatment of waste converts it itno ash , gas and heat which in some cases can be used to generate electricity. The land required is I hectare for 125 tonne per day.
4. The **non biodegradable** waste generated of some value like , paper, plastic , metal can be sold off through the central recycling chain through scrap dealers. In spite of composting, re-use and recycling, some waste remains untreated/unmanaged which requires final disposal, either by incineration or by **land filling**.

Gram Panchayat can organize themselves to construct and maintain landfill. Gram Panchayat may make use of Youth Club members/Women Self Help Groups.

Selection of Landfill Site: Gram panchayat in consultation with Zilla Parishad/ Block Panchayat (as the case may be) should select the landfill site which should be:

- Located at the outskirts of the village
- Accesible
- On vacant/uncultivated land
- Located in the natural depressions with slight slopes
- Site should be such as to avoid surface water and ground water pollution.

5.3.5.3 Liquid Waste Management

Liquid Waste Management is important to complete the total sanitation system and for a better environment. The waste water can be recycled in other uses like irrigation or horticulture. The norms for the treated effluent to be released in the environment or water sources are:

Table 5.15: Sewage disposal standards

Parameters	Inland Surface water	Land for Irrigation
Suspended solids (mg/l). Max.	100	200
pH value	5.5 to 9.0	5.5 to 9.0
Oil and Grease (mg/l)., Max	10	10
Total residual Chlorine(mg/l)	1.0	-
Ammoniacal Nitrogen	50	50
Total Kjeldahl Nitrogen (mg/l)	100	-
Free Ammonia, (mg/l)	5	-
Nitrate Nitrogen (mg/l)	10	-
Biological Oxygen Demand, mg/l	10	-
Biological Oxygen Demand, Mg/l	30	100
Chemical Oxygen Demand, (mg/l)	250	-
Arsenic (As) (mg/l)	0.2	0.2
Lead (Pb), mg/l	0.1	-
Dissolved Phosphate (P) (mg/l)	5.0	-
Sulphide (S) (mg/l)	2.0	-
Phenolic Compound, (mg/l)	1.0	-

(Source: CPCB, 1986, Government of India)

Waste water collection system is necessary for any further discussion on the treatment techniques and facilities. On site decentralized treatment would need pipes conecting the source to the treatmnent or collecting facility. The centralized treatment system for settlements needs a layout of drains to carry grey and black water. The **shallow surface drain** is most suitable for carrying **grey water** along with **storm water**. For **black water** mixed with grey matter (sewage), **small bore/shallow sewer** is the cost effective sustainable option. They are designed alongside with interceptor tanks at the sources to receive liquid portion of household waste water for off site treatment and disposal.

Various technologies available for treatment of liquid waste generated in settlements is given in the table.

Table 5.16: Various technique of sewage treatment processes

Sl No.	Recycling/ Treatment Technique	Applicability	Land Requirement (per MLD in Hectares)	Capital Cost (per MLD in INR)	O&M cost Million/ year/MLD
1	Activated Sludge Process	The most widely used option for treatment of domestic wastewater for medium to large towns where land is scarce.	0.15-0.25	2-4	0.3-0.5
2	Stabilisation Pond Systems(SPS)	• In warm conditions • Easy land availability • Where power supply is expensive, low or unreliable. • Where social preference is for aquaculture	0.8-2.3	1.5-4.5	0.06-0.1
3.	Duckweed Pond System	• Low strength domestic wastewater after sedimentation of influent • Biological Oxygen Demand (BOD)<80mg/L	2-6	1.5-4.5	0.18
4.	Root Zone Treatment System	• Suitable for treatment of small quantities of waste water(250 gm BOD per day) • Maximum 50 kf BOD per day.			low
5.	Anaerobic Decentralised wastewater treatment system (DEWATS)	• Modified septic tank system • Takes total waste water , both grey and black. • Effluent has much less BOD ,suitable for reuse in agriculture and horticulture., • Can be designed tohandle waste water flow of 1- 1000 m^3 per day.			
6.	Soakage pit	• Simplest method of construction and use for grey water. • Household level, low volume handling • Suitable for sandy or sandy clay soil, for clay and black soil size of the pit would need to be larger.			
7.	Upflow anaerobic Sludge Blanket Process(UA SB)	The suitability of this technology may be doubtful as a standalone secondary treatment option may be needed.	0.2-0.3	2.5-3.6	0.08-0.17
8.	Facultative Aerate Lagoon (FAL)	• Standalone system • As a a pre treatment unit for WSP. • As an upgradation option for	0.27-0.4	2.2-2.9	0.15-0.2

		overloaded WSPs.			
9.	Biological Filtration and Oxygenated Reactor(BIOFOR) technology	• Adaptability to flow and load variations • Deep reactors enabling low land requirements • Very limited odour production • High energy/power requirement (220-335 kwh/ML treated.	0.04	6.5-8.1	0.86
10.	High Rate Activated Sludge Biofor-F Technology	• Compact layout • Higher aeration efficiency • Compliance wityh strict discharge standards • Absence of odour and aerosol in the working area.	0.08	5.2	0.18
11.	Trickling Filters	• Standalone system if operated at slow rates • As a high rate roughing filter For high BOD waste water • In combination with ASP.	0.25-0.65		
12.	Fluidized Aerated Bed (FAB)	• Small to medium flows in congested locations • Sensitive locations • Decentralized approach • Relieving existing overloaded STPs.	0.06	3-5	0.6-0.75
13.	Submerged Aeration Fixed film (SAFF) Technology	• Small to medium flows in congested locations • Sensitive locations • Decentralized approach • Relieving existing overloaded trickling filters	0.05	7	1.14
14.	Cyclic Activated Sludge Process (CASP)	• Small to medium flows in congested locations • Sensitive locations • Decentralized approach • Relieving existing overloaded trickling filters	0.1-0.15		

(Source: Compendium of Sewage Treatment Technologies, National River Conservation Directorate, MOEF, 2009 ; Technical options for Solid and Liquid Waste Management in Rural Areas, Ministry of Drinking water and Sanitation., 2013)

5.3.5.4 Criteria for selection of technology.

Implementation of solid and liquid waste management technologies faces a challenge of financial viability greater than the urban areas. The technique for selection should go by the:

- Cost effectiveness of the technology
- Area constraints if any in the area of implementation.
- Slope , drainage, water level and soil type

- The population it can serve,

It would be desirable, if several villages can pool together a facility with least distance to be covered. The Rurban settlements can follow URDPFI guidelines in implementing a centralized Solid and Liquid waste management system. Similarly the Villages adjacent to a municipality can become a part of the integrated urban waste management system.

6. ENVIRONMENTAL SUSTAINABILITY AND DISASTER MANAGEMENT

6.1 Natural Resources in Rural Areas

Rural areas are blessed with natural resources of land, water, vegetation and minerals. The rural habitations inhabit the bountiful natural landscape thus providing the rural population livelihood and sustenance extended to urban and regional economies.

6.2 Sustainability

One of the early definition of sustainable development was provided by Brundtland Commission (1987) as: 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs[6] . The Brundtland Commission's report also states that "in essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional changes are all in harmony and enhance both current and future potential to meet human needs and aspirations. Applied to the context of planning and development, the most fundamental element of **sustainability** is the utilization of natural resources in a region most efficiently, most equitably across sections of society and in such a manner that the resources are conserved and renewed for future generations to meet their needs and aspirations. Integrating sustainability principles in planning process and development in today's scenario has been explained in this chapter.

6.3 Sustainable Rural Planning

6.3.1 Sustainable parameters

Sustainable habitat development means achieving a balance between the economic and social development of human habitat together with the protection of environment, equity in employment, shelter, basic services, social infrastructure and transportation. Some of these parameters, which can be considered in Planning and Development, are:

1. **Integrated Rural-Regional Planning:** Regional planning and development to control, mushrooming unplanned and unorganized growth of rural settlements along with integration of land use and transport resulting in sustainable development. The article 243ZD of the constitution proposes the integration of rural and urban plans into a District Development Plan thus consolidating both the plans with the District and State vision for development.

2. **Sustainable Agriculture:** Sustaining agricultural productivity depends on quality and availability of natural resources like soil and water. Agricultural growth can be sustained by promoting conservation and sustainable use of these scarce natural resources through appropriate location specific measures. Indian agriculture remains predominantly rainfed

[6] 1 World Commission on Environment and Devlopment's (The Brundtland Commission) Report, Our Common Future (Oxford:Oxford University Press, 1987)

covering about 60% of the country's net sown area and accounts for 40% of the total food production. Thus, conservation of natural resources in conjunction with development of rainfed agriculture holds the key to meet burgeoning demands for foodgrain in the country. Towards this end, National Mission for Sustainable Agriculture (NMSA) has been formulated for enhancing agricultural productivity especially in rain-fed areas focusing on integrated farming, water use efficiency, soil health management and synergizing resource conservation.[7]

3. **Promotion of Renewable Energy:** India has embarked upon the targets envisaged for renewable energy generation through solar and wind, emboldened by the Jawaharlal Nehru National Solar Mission**.** The target to be achieved through the solar generation of electricity is 100 GW by 2022**.** The Rural areas can utilise the renewable sources of energy for in situ fulfilment of their requirements of energy. Similarly the use of agricultural, livestock/human waste can be used for biogas generation.

4. **Sustainable Rural Infrastructure**: Considerable amount of reuse and recycling has been an integral part of our traditional culture, especially due to austere lifestyles in rural areas. But with the changing times and the upgrading of services, the creation of new infrastructure should take the cognisance of principle of reuse and recycle, and recover to promote sustainable environment.

6.4 Climate Change Mitigation and Adaptation

Climate change and its recent trends have a direct impact on Human and Natural environment affecting lives and livelihoods. The changes in weather phenomena with increase in the occurrence of extreme events and long term climatic variability has impacted human habitations and regional economies to a great extent. These changes also impact agriculture and pathogens which pose a challenge to the rural economic base. Numerous agencies including National and International agencies are carrying out studies and are supporting settlements to develop, adopt and implement sustainable and climate safe practices as per the National Action Plan on Climate Change, Government of India. The International Panel on Climate Change (IPCC) Working Group-II's most recent report (2013) paints a grim picture for India. Focus of the report is on food and water supply and the urgent need for our regions to be resilient. Considering this, the Regional Plans and Development Plans must mainstream the impact of climate change and developing climate resilient rural areas.. The focus should be on water security, use of heat repealing materials in construction and minimising concrete surfaces. It may be desirable to develop appropriate policies and bring about effective legal and administrative control systems to deal with the problem.[8]

[7] National Mission on Sustainable Agriculture, Operational Guideline, Ministry of Agriculture, Government of India,2014

[8] Adapted from URDPFI Guidelines,2014.

6.5 Climate Proofing

The expression "climate proofing" is meant as a process that aims to **identify** risks that an investment project or development plan or simply people and their assets may face as a result of climate change, and to reduce those risks to levels considered to be acceptable. It does not imply a complete mitigation of the potential risks of climate change. ADB (2005) defines it as: "Climate proofing is a shorthand term for identifying risks to a development project, or any other specified natural or human asset, as a consequence of climate variability and change, and ensuring that those risks are reduced to acceptable levels through long-lasting and environmentally sound, economically viable, and socially acceptable changes implemented at one or more of the following stages in the project cycle: planning, design, construction, operation, and decommissioning."[9].

Table 6.1: Parameters and Strategy for Climate Proofing and Community Resilience

Parameters	Strategy
Housing	• Guidelines for construction of buildings on slopes • Structural Stability of buildings in hills for the entire Gram Panchayat. • Soil Erosion and sedimentation control in Non Hill areas.
Ecologically sensitive Rural Planning	• Demarcate eco sensitive areas • Bringing in principles of climate resilient rural development based on environmental parameters like conservation of natural ecosystems and watershed management.
Rural Infrastructure and Services	• Augment water supply and water treatment in rural areas • Water conservation and rain water harvesting.
Disaster Resilience	• Preventive health measures • Public health management and surveillance system • Emergency medical response

6.5.1 Vulnerability

Housing, Rural Infrastructure and Services, Poverty and Livelihood, Ecosystems and Land-Use as well as emergency response capacity are the key sectors which are considered to understand the present and future vulnerability of the rural settlements in the context of climate change impacts. [10] Kapur(2010) identifies the vulnerable population by three components-

- Disadvantaged people,
- Fragile living and
- Lack of services.

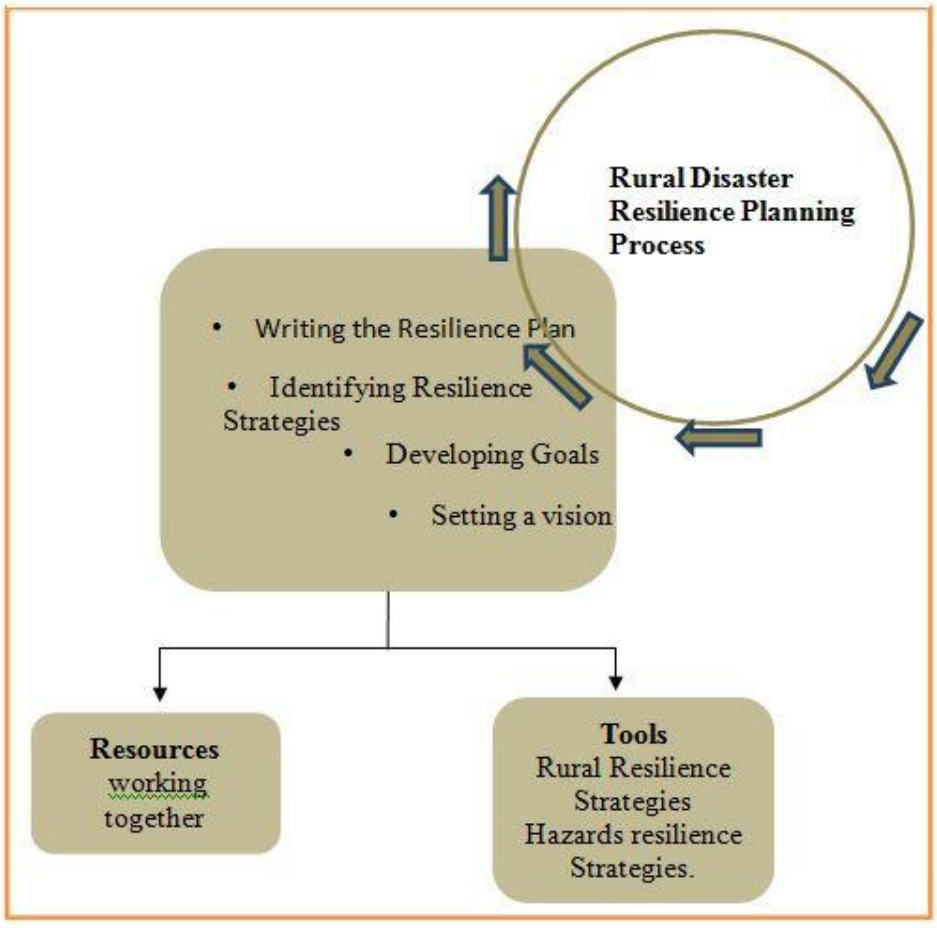
[9] pp-18, Guidelines for Climate Proofing Investment in Agriculture, Rural Development, and Food security, Asian Development Bank, 2012
[10] Pp-203, URDPFI Guidelines, 2014

6.5.2 Rural Disaster Resilience Strategy and Plan

The Rural Disaster Resilience Planning (RDRP) approach has been designed with rural communities in mind. The RDRP process includes a user-friendly guide to help you work through the various steps to increase resiliency in your community including:

Step 1: Getting Started – what steps to take in preparing for disaster resilience planning.
Step 2: Resilience Assessment – how to assess what disasters are likely to take place and community current state of resilience
Step 3: Building a Resilience Plan – identifying strategies and goals for building resilience in your community.
Step 4: Plan Implementation – how to develop an Action Plan to help your community increase its overall resiliency and adopt strategies to help the community survive a disaster.

Figure 6.1: Rural Disaster Resilience Strategy and Plan



(Source: Rural Disaster Resilience Planning ,Justice Institute of British Columbia last accessed from https://rdrp.jibc.ca/step-3-building-a-resilience-plan at 26.09.2016)

A resilient plan for settlements taking care of the environment can help us against the vagaries of climate change, i.e., weather extremities and aid resource optimization.

The above figure indicates steps undertaken to prepare a climate change induced vulnerability leading to hazard/disaster, resilient development plan.

6.6 Disaster Management

"Disaster means a catastrophe, mishap, calamity or grave occurrence affecting any area from natural and manmade causes, or by accident or negligence, which results in substantial loss of life or human suffering or damage to, and destruction of property, or damage to , or degradation of environment and is of such a nature and magnitude as to be beyond coping capacity of the community of the affected areas". It is clear from the definition, that disaster may impact human habitat in a severe manner. Hence it is evident to manage these disasters at appropriate level so that impact can be minimized.

As per section 2 (e) of Disaster Management Act, 2005, disaster management means a continuous and integrated process of planning, organizing, coordinating and implementing measures which are necessary or expedient for-

- Prevention of danger or threat of any disaster
- Mitigation or reduction of risk aof any disaster or its severity or consequences
- Capacity-building
- Preparedness to deal with any disaster
- Prompt response to any threatening disaster situation or disaster
- Assessing the severity or magnitude of effects of any disaster
- Evacuation, rescue and relief
- Rehabilitation and reconstruction .[11]

6.6.1 Institutional Set up

The Disaster management Act, 2005 (DM Act 53 of 2005) lays down institutional and coordination mechanisms for effective Disaster Management at the National, State, District and Local levels. As mandated by this Act, the Government of India created a multi-tiered institutional system consisting of:

- National Disaster Management Authority (NDMA), headed by the Prime Minister.,
- State Disaster Management Authorities (SDMAs) by the Chief Ministers and
- District Management Authorities by the District Collectors and co chaired by elected representatives of the local authorities of the respective districts.

The Act further provides for constitution of National Executive Committee (NEC), National Institute of Disaster Management (NIDM) and National Disaster Response Force (NDRF).[12] It also envisages the involvement of Community based and local level disaster management Initiatives in coordination and consonance with the District and state level disaster management authorities.

For the purpose of this Policy, local authorities would include Panchayati Raj Institutions (PRI), Municipalities, District and Cantonment Boards, and Town Planning Authorities which control and manage civic services. These bodies will ensure capacity building of their officers and employees for managing disasters, carry out relief, rehabilitation and

[11] pp-218, URDPFI Guidelines
[12] Pp 219-220, URDPFI Guidelines, 2014

reconstruction activities in the affected areas and will prepare DM Plans in consonance with the guidelines of the NDMA, SDMAs and DDMAs. Specific institutional framework for dealing with disaster management issues in mega cities will be put in place.

6.6.2 Community Based Disaster Management (CBDM)

CBDM initiates a process involving sequential stages that can be operationalized to reduce disaster risk. Processes of CBDM are guided by principle of :

- subsidiarity,
- economies of scale,
- equity,
- heterogeneity and
- public accountability.

The different stages in CBDM are:

- disaster/vulnerability
- risk assessment,
- risk reduction planning,
- early warning systems,
- post disaster relief and participatory monitoring and
- evaluation.

CBDM by its very nature demands a decentralized bottoms-up approach with intensive, micro interventions at the local Panchayats, ward or village level with the intention of generating confidence, awareness, knowledge, partnership and ownership for planning and rolling out local disaster management plans encompassing all levels of disaster management continuum. Equity and inclusion of marginalized segments of the society and bringing the vulnerable groups to the centre stage of planning and implementation of the CBDM has to be prioritized to make the programme participatory and inclusive.

Disasters affect the entire community, however, persons with disability, women and children, underprivileged, older persons and pregnant women need special attention at the programme implementation level. Such rights and human dignity based inclusive ethos created by such programmes will empower communities and display resilience in times of crisis. Capacity building and training of community volunteers is the mainstay of community based disaster management since they are the first responders. Considering the large number of stakeholders and community representatives that need to be sensitized and trained, it is important that capacity building and training interventions be meticulously planned for the purpose of CBDM. CBDM should converge with existing mainstream, institutional mechanisms and social welfare delivery programmes to make it holistic, cost effective, multi-dimensional and community centric.[13]

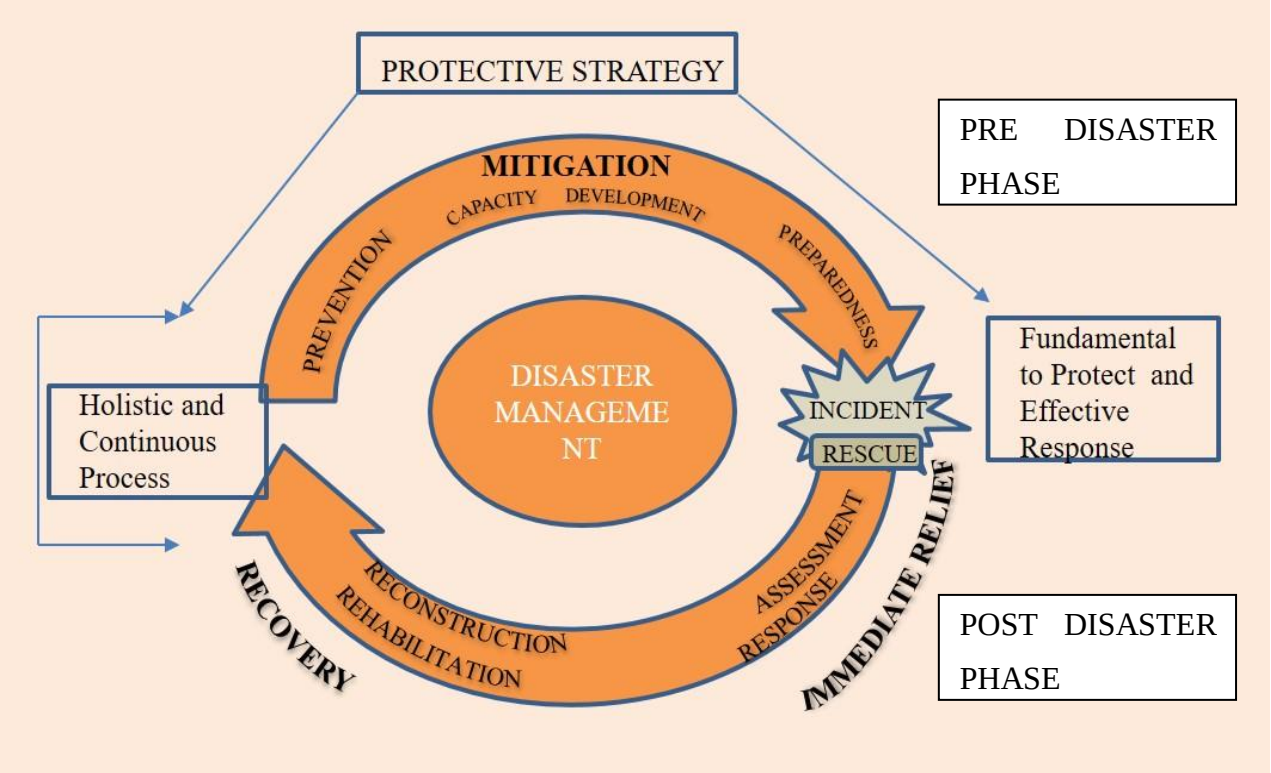
[13] Pp 6-7 NDMA Guidelines, Community Based Disaster Management,2014.

6.6.3 Gram Panchayat/Village Disaster Management Plan

The Village Disaster Management Plan (VDMP) emphasizes the local level as the first line of response, since communities are often the most familiar with local sources of risk and the first on the scene after disaster strikes. It can be used to tap human and material resources in the aftermath of a disaster and describe the roles and responsibilities of the concerned officials and teams related to that village.[14]

Development of Village Disaster Management Plan is the most important ingredient in implementing Community Based Disaster Risk Management in any area. It refers to a list of activities a village agrees to follow to prevent loss of life, livelihoods and property in case a disaster .It also identifies in advance, action to be taken by individuals in the community so that each one knows what to do when a disaster strikes or when a warning is received. The main objective is to empower the community to deal with disasters on their own as a way of life. The following figure shows the process of disaster management.

Figure 6.2: Disaster Management Cycle

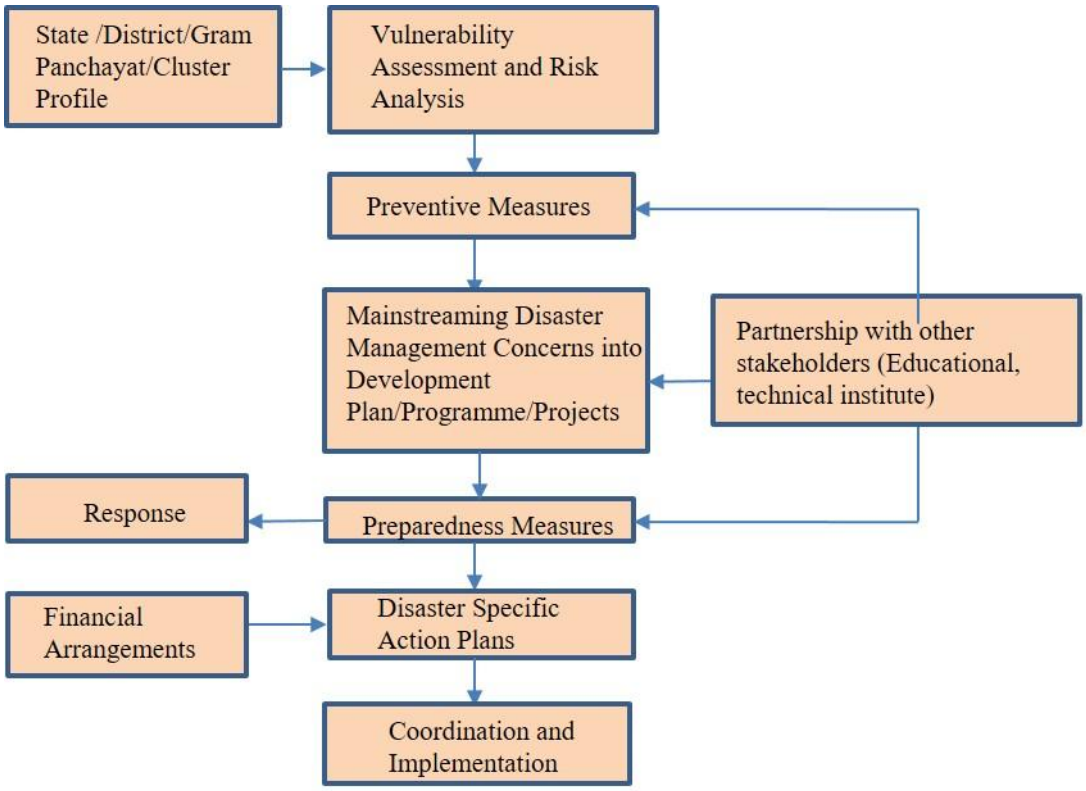


The Actions and initiatives can be grouped into Two Phases: Pre-Disaster Phase and Post-Disaster Phase.

The Pre-Disaster Phase involves all the Mitigation Measures through preparedness and capacity development to prevent untoward circumstances. The Post Disaster phase involves Immediate relief measures post eventuality and Recovery Measures by an Assessment and respective Reconstruction and Rehabilitiation.

[14] http://www.cdmhipa.in/vdmi.php

Figure 6.3: Suggested Framework for developing SDMP,DDMP,VDMP,CDMP



(Source: NDMA Guidelines, Preparation of State Disaster Management Plans)

6.6.3.1 Vulnerability Mapping

Hazard zonation mapping and vulnerability analysis in a multi-hazard framework will be carried out utilising Geographic Information System (GIS) based databases such as the National Database for Emergency Management (NDEM) and National Spatial Data Infrastructure (NSDI). As a first step towards addressing disaster vulnerabilities, Central Ministries and Departments, National agencies, knowledge-based institutions and DM authorities at the State and District levels need to carry out risk and vulnerability assessment of all disaster prone areas. Hazard zonation mapping and vulnerability analysis based on GIS and remote sensing data, needs to mandatorily include a ground check component. Hazard and Consequence Mapping on GIS platforms will be prepared for all chemical accident prone districts. 5.1.3 The increasing use of GIS, remote sensing and applications of Global Positioning Systems (GPS) in DM, has made it imperative to set up a mechanism for sharing thematic and spatial data through a designated electronic clearing house. The NSDI has been set up by the Survey of India, to collect, compile, analyse and prepare value-added maps for use by various agencies in the field of DM for management of natural resources, industrial applications etc. The NSDI need to work towards interoperability of data and information sharing protocols to facilitate effective policy analysis. A two-way interoperable link will be established between NSDI and the proposed National Disaster Emergency Communication Network for easy and quick sharing. The programme designed to have spatial and non-spatial

databases in a secure environment under the NDEM will derive the data sets through NSDI for addressing the information needs for disaster management.[15]

6.6.3.2 Prevention Preparedness and Mitigation Measures

Prevention consists of actions that reduce risk from natural or manmade disaster incidents. It is required to list and elaborate all types of measures (like - building codes, floodplain management, storm water management, coastal area zoning and management plan, etc.) – planned and implemented by the districts as a part of prevention measures. It is good to have long term mitigation goals in place and connect these goals with measures that district has planned and implemented.

These goals may include (but not limited to):

1. Provide better early warning methods for flood, storms, cyclone
2. Reduce the destruction and loss of life within buildings
3. Provide for safer environments for transportation systems
4. Eliminate flooding in populated areas
5. Ensure redundant water supply systems
6. Reduce environmental degradation and restoration of livelihood
7. Reduce effects of the natural environment on the infrastructure
8. Ensure redundant power systems on critical facilities
9. Ensure adequate materials available for road maintenance

Protection reduces or eliminates a threat to people, property and the environment. Primarily focused on adversarial incidents, the protection of Critical Infrastructure and Key Resources (CIKR) is vital to local habitations, national security, public health & safety and economic vitality. Protection includes actions or measures taken to cover or shield assets from exposure, injury or destruction. Protective actions may occur before, during or after an incident and prevent, minimize or contain the impact of an incident.

Mitigation, with its focus on the impact of a hazard, encompasses the structural and non-structural approaches taken to eliminate or limit a hazard‘s exposure; impact on people, property and the environment. Besides flood proofing, river desiltation, change in land use pattern and shelter belt plantation.

Examples of mitigation activities also include:

1. **Town Planning Act**: Planning, adopting and enforcing stringent building codes, flood-proofing requirements, seismic design standards and cyclone wind-bracing requirements for new construction or repairing existing buildings.

2. **Zoning Regulations**: Planning and adopting zoning ordinances that steer development away from areas subject to flooding, storm surge or coastal erosion.

[15] Pp-17, National Policy on Disaster Management,2009;NDMA, Ministry of Home Affairs

3. **Development Control Regulations**: Incorporate the disaster management concerns into development. This should include all Government Sponsored Developmental Programs and Schemes.

4. **Undertaking retrofitting** work on public buildings to withstand ground shaking or cyclone-strength winds.

5. Specificity of disaster:

6. **Land use regulation**: Planning and building community shelters and cyclone safe rooms to help protect people in their homes, public buildings and schools in hurricane and tornado-prone areas.

7. **Safety norms** for economic and social infrastructures including places of worships and crowd management: Steps taken for developing and implementing public safety norms for critical infrastructures and places of worships.

8. **Capacity Building for Mitigation**: Steps taken for human resource development and capacity building for effective disaster mitigation at District Level.

9. **Awareness generation** on disaster mitigation.

For further information National Disaster Management Guidelines and Handbook for Effective Disaster Management at Micro Level- NDMA&IGNOU, can be consulted.

6.6.3.3 Roles and Responsibilities at local level

Local Authorities have the following duties:

i. To provide assistance to the District Collector in disaster management activities.
ii. To ensure training of its officers and employees and maintenance of resources so as to be readily available for use, in the event of a disaster.
iii. To undertake capacity building measures and awareness and sensitization of the community
iv. To ensure that all construction projects under it conform to the standards and specifications laid down.
v. Each department of the Government in a district shall prepare a disaster management plan for the district. The local authorities need to ensure that relief, rehabilitation and reconstruction activities in the affected area, within the district, Block, Cluster and Gram panchayats are carried out.
vi. Trust / Organisations managing Places of Worships & Congregation
    a) Each establishment / organisation identified as ―critical infrastructure and key resource in a Gram Panchayat or cluster.
    b) Including places of congregation in a Gram Panchayat shall prepare ―on-site and ―off-site disaster management plan.
    c) Carry out mitigation, response, relief, rehabilitation and reconstruction activities.

Community Groups and Volunteer Agencies:

i. Local community groups and voluntary agencies including NGOs normally help in prevention and mitigation activities under the overall direction and supervision of the DDMA or the Collector.
ii. ii. They should be encouraged to participate in all training activities as may be organized and should familiarise themselves with their role in disaster management.

7. SIMPLIFIED PLANNING TECHNIQUES

One of the most commonly faced problems by Spatial Planners is lack of data availability and data records maintained by government offices. This poses a great deal of hindrance in plan preparation. The entire planning exercise requires collection and maintenance of datasets for analysis of present situation or existing scenario to predict the future requirements, issues and potential of a settlement. The data can be quantitative as well as qualitative to analyse the existing infrastructural services and make estimates based on population projections.

The Census of India, is the only organisation providing the information of villages regarding the demography and households assets and provision of services in Village directory. The CSO report on "Basic Statistics for Local Level Development"(BSSLD) is another initiative which addressed the needs of data requirement at local level for future planning.

The chapter briefly describes some of the useful and simplified techniques for data collection, survey, analysis, projections and mapping.

7.1 Data Identification and listing

The BSSLD report gives a clear idea about the datasets that needs to be maintained at local level and hence, a checklist can be prepared, referring BSSLD document, which would help in preparation of datasets for further analysis. Table below gives a suggestion of datasets required for Gram Panchayat Spatial Development Plan.

Table 7.1: Data Collection List for GPSDP

Aspect	Sub aspect	Indicators
Location	Regional Setting	• Latitude and Longitude/ Regional Setting • Administrative Boundaries of Gram Panchayat • Abadi area of Village/ spatial area of village. • Increase in horizontal space • Increase in vertical space
Physical	Topography	• Variation in degree of Slopes • Elevation above mean sea level.
	Surface Drainage	• Number of major rivers and streams. • Their nature.(perennial or seasonal) • Their direction of flow. • Use and potential of the water body
	Climate	• Temperature (Annual Mean Temperature and Mean Monthly Temperature in Degree Celsius) • Rainfall (Average monthly rainfall in mm)
	Land Utilisation	Percentage of land under: • Net area sown. • Current fallow • Fallow land other than current fallow. • Permanent pastures and other grazing land. • Land under miscellaneous tree crops

		• Culturable wasteland • Non-cultivable land. • Barren and unculturable land. • Area under non-agriculture use. • Forest.
	Land use	As given in Chapter 4
Demography (Schedule 1, 2, 3, 4, 5)	Population Size	Number of persons- TOTAL
	Population In different age groups and sex	Age group: • 0-6 years • 7 to 14 years • 15 to 19 years • 20 to 39 years • 40 to 59 years • 60 and above
	Population Distribution by religion and caste	Varying percentage of population in different sectors of religion and caste. Map of residential segregation, if any.
	Population density	Expressed As Persons per square km.
	Migration	Total No. of inmigrants from rural areas: • Distance from last residence • Reason for migration • Single migrant or with family. Total no. of out migrants from village: • Distance from destination • Reason for migration • Migrated with family or single
	Population growth in last few Decades	Increase in percentage of population from the base year.
	Occupation Structure	• Agricultural & allied workers. • Mining &quarrying • Manufacturing • Electricity, gas and water supply. • Construction. • Wholesale, retail trade& repair work, hotel & restaurant • Transport, storage and communications • Financial intermediation, real estate, business activities • Other services.
	Sex ratio	Females per 1000 males
	Household information (schedule 4 and 5)	• Head of the household • income of household/ households living below poverty line • Household size • Information about member of HH- age, sex, education
Infrastructure	Water supply	Water sources: • Groundwater

(Schedule 6 and 7) **Physical infrastructure**		• Well • Tube well • Handpumps Surface water • Lakes • Reserviors • Streams Storage and treatment of water Type of water supply • Piped or other • Per capita supply Duration of water supply Quality of water supply Consumption of water. (in lpcd) • Industrial Use • Agricultural Use • Domestic Use. Charges of water supply or tariff.
	Power supply	Duration of power supply Source of power supply Power tariff or charges paid Consumption of electricity. Consumption in KW Consumption by different sectors: • Agricultural • Industrial • Domestic
	Waste disposal and sanitation	Type of waste • Industrial waste • Biomedical waste • Agricultural waste • Domestic waste Quantity of waste generated (in tonnes) Storage of waste. • Communal bins • Door to Door collection Methods of disposal • Landfill/disposal site Authority/community responsible for SWM (if any)
	Road	Road network and hierarchy • National highway • State highway • MDR • ODR • Village road. Length for each level of hierarchy in km. ROW for each level of hierarchy in metres. Quality of materials used Length of Road constructed under which scheme and by whom.

		Money spent in construction or roads
Social Infrastructure	Education	Existence of institutions, number and their location: • Primary, Middle, Secondary and Senior Secondary • College for general education, engineering university and deemed university. • Vocational training centres, their activities. Distance travelled by students to reach. Provision of facilities Pupil Teacher ration Classroom Pupil Ratio Non teaching staff available Mid day meal provision Available infrastructure Educational indicators • Literacy rate • Enrolment rate • Drop out rate • Levels of educational attainment.
	Health	Existence of health institutes , their numbers and their location • Sub centre • Primary health centre • District hospital • Community health centre • Nursing homes • Speciality and super speciality hospitals • Veterinary hospital for pets and animals Facilities provided • Number of beds available • Staff available, ASHA workers, ANM • Types of treatment. Health indicators • Infant Mortality rate • Maternal mortality rate • Prevalent diseases • Vaccination to children
Existing resources Agriculture	Area	• Gross sown area and net sown area (hectares) • Size of landholdings
	Productivity / yield.	Type of crops produced per unit area
	Input used	Type and amount of fertiliser used • Amount of seeds used • Source of irrigation • Manure used
	Storage	Location of godown or domestic storage (spatial location)
	Marketing	Self use or sold in market, if sold: Location of market Amount earned from selling.

		Weekly markets (Including their spatial location)
	Cropping pattern	Single cropping or multiple cropping system What type of crops are grown
	Credit facilities	Amount of loan distributed yearly or decadal to the farmers.
	Irrigation	Canal irrigation or Lift irrigation • Number of acres irrigated • Numbers of acres irrigated
Horticulture	Area under horticulture	Hectares of area under horticulture Type of cultivation- flower cultivation or cash crop cultivation, orchards.
	Consumption or market	Self use or sold, if sold: amount of money earned
	Transportation	Mode, distance in km.
Forest	Area under forest	Area under reserved, protected, community forest or village forest or private forest.
	Present utilisation	
Industry	Number and type of industry	Small scale, medium scale and large scale industries. Location Inputs • Availability of raw materials • Power • Water supply Outputs • Productivity • Market • Transportation
Housing	Housing	Type of house: • Kutcha ,semi-pucca or pucca houses Type of material used for construction • Number of rooms. • toilet facilities available to the household • assets owned by houses • type of fuel used for cooking and place where it is availed from
Transport	Rail Hierarchy of rail network	Broad gauge, metered gauge, narrow gauge. Location of railway station Location of Bus stop Location of Railway station
Digital Connectivity		No.of schools having smart classes Citizens service centre Village level record maintenance Cable operators or Cable connections No. Of people having internet connection.
Public Asset Mapping		Mapping the resources of the community (As done by NRSC)

7.2 Data Collection Techniques

Information or data can be divided into two types, i.e. Primary data and Secondary data. Primary data is collected first hand by investigator, thus through Primary survey. Secondary data is second hand data, initially collected by some other investigator for other purpose but later on used by an investigator for his/her own purpose.

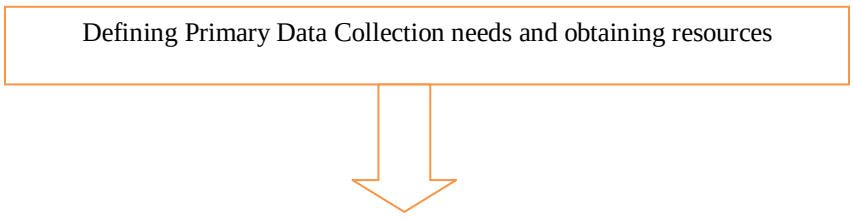
7.2.1 Primary data collection techniques

Primary data are data that were previously unknown and which have been collected directly by the researcher for a particular research project. Primary information is primary data to which meaning has been added; in other words, the data have been analysed, inferences have been drawn from them and, thereby, meaning has been added.

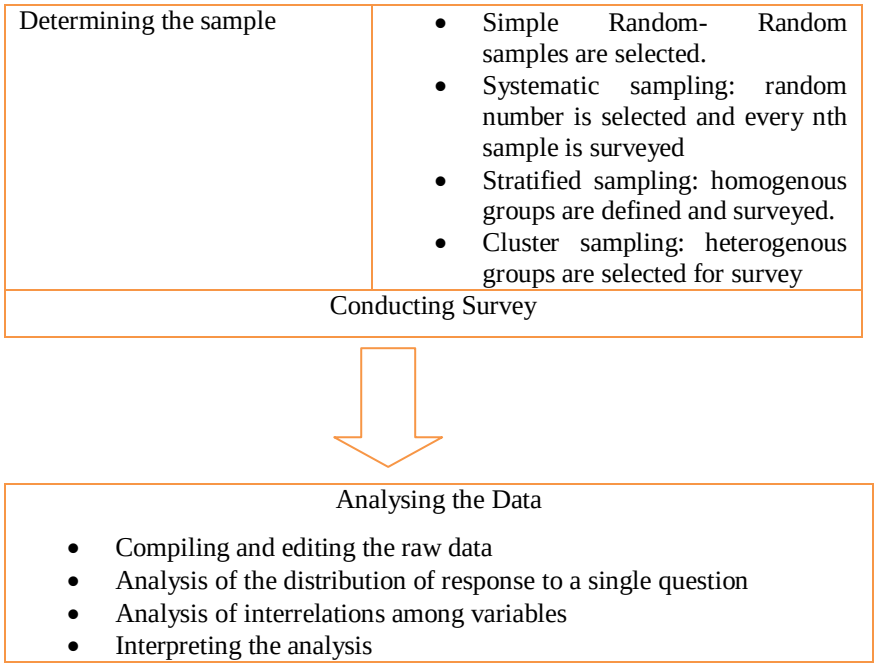
This section discusses four types of primary surveys which are listed in the order of passive to active respondents. Following are the broad categories of primary surveys:

- Visual survey / Reconnaissance survey: This survey does not require direct contact with population of the study area. It is quick overview of the area.
- Inspection: It involves direct inspection of area by surveyor for extracting information.
- Personal Interview / Dialogue: This survey is more personal and could be either face to face or telephonic. In such type of surveys some initial topics are investigated to gain insight in the area of interest.
- Self-survey: In this type of survey indirect contact is made with the respondent by sending questionnaire through mail or handed out but the response is not collected on the spot.

Figure 7.1: Stages of conducting Primary Survey



Primary Research (Data Collection)	
Choosing the Technique	• Self Surveys • Interviews • Direct Inspection
Defining the questions	• Nominal Scales : Answers in "yes" or "no" • Ordinal Scales: Prioritises the choices given • Interval Scales: Provides yardstick for measuring-age



Source: Reading Material on Planning Techniques by JH Ansari and Shri Mahavir & MM analysis

7.2.1.1 Visual surveys / Reconnaissance survey

Visual surveys are direct inspection surveys which are performed by survey teams moving in automobile or walking. This type of survey can be used in the initial stages of the investigation, often after preparing initial checklist. It performs variety of functions, such as:

- Familiarise with study area.
- Give initial impressions of the physical and human state of an area.
- Identify selected areas for further investigation.
- Generate ideas for development of checklist.

7.2.1.2 Inspection

Direct Inspection: The direct inspection of conditions or activities is employed in many kinds of surveys where human communication is not required to elicit the information [16] It can be used for observing traffic counts, recreation area use surveys, housing quality studies and proxy observations where required.

`Indirect Inspection: The findings of the initial survey can be substantiated with the help of Key Indicator Survey which are specific to the objectives of the analysis. Often, instead of

[16] Reading Material on Planning Techniques by JH Ansari and Shri Mahavir

getting direct information on the variable, surveyors rely on observing approximations known as proxies. A proxy is used to inform about a variable without direct investigation, instead investigating its key indicators. Such as: instead of enquiring about the income range, the surveyor can observe the housing condition, number of vehicles and other consumer goods.

7.2.1.3 Personal Interview/Dialogue

A number of types of surveys are undertaken face to face or by telephonic conversation. The questionnaire format in these surveys is either objective or subjective and based on qualitative or quantitative information gain.

In case of quantitative survey, the structured dialogue is one-way where precise questioning takes place. Semi-structured dialogue is a flexible two-way process where only some initial topics are investigated. These topics can be revised as the practitioner gains insight in the area as information flows-in from the respondents. The semi-structured dialogue is thus an informal process but it needs to be managed expertly, particularly in the aspects listed below:

- Behavioural factors of the surveyors and respondents
- Questions not to be ambiguous or long
- Careful probing to seek answers
- Judging responses without biases
- Cross-checking with other respondents
- Managing the conversation
- Recording the interview (audio/video)
- Avoiding errors and biases

7.2.1.4 Focussed Group Discussion (FGD)

Focussed group discussion is a qualitative data collection and research technique. Questions about opinions, perceptions, beliefs, attitude of people towards planning aims, services are probed in these discussions. FGD can be used for learning about stakeholders, their interrelationship and to know about a range of issues on the topic. This method costs fairly low compared to surveys, as one can get results relatively quickly and increase the sample size by talking with several people at the same time. FGDs can either be used to explore meaning of survey findings that cannot be explained statically as well as before designing questionnaires. Homogenous group of people are selected for FGD so that they are comfortable and have free flow of discussion. Main objective and key questions of the meeting should be pre-decided. Group of 10 to 12 people and questions should be selected for a single FGD110. More than one, mostly three to four FGDs to be done before legitimate results can be reached on an issue. FGD in rural settings can make use of interactive diagrammatic data collection techniques such as mapping, Venn diagram etc.

7.2.1.5 Self-Survey

These are often in the questionnaires sent to respondents through mail or survey forms handed out or inserted in the newspapers and the filled questionnaires are mailed back to the surveyor. It has various limitations, like; responses can be low and unsatisfactory.

Primary data collection techniques can be costly and very time consuming thus methods of rapid information collection, which rely mostly on direct observation, is an alternative. This method seeks several views of any one “fact” (cross checking), makes use of checklists and

semi structured dialogue. However, rapid methods must not be considered as substitutes to specialist investigations and should be used for quick access to information for rapid decision making only.

7.2.2 Secondary Data Collection techniques

Secondary data is the data that have been already collected and recorded by someone else and readily available from other sources. Secondary data collection is faster, less expensive and includes lesser activities. However, the secondary data may not always meet the needs of the planners/researchers or investigator.

Published sources:

Mostly secondary data is collected from published sources, which makes it reliable. Some important Sources of published sources and statistical data are as follow:

- Published reports of Central and State Governments and local bodies.
- Statistical abstracts, census reports and other reports published by different Ministries of the Government.
- Official publications of the foreign Governments.
- Reports and Publications of trade associations, chambers of commerce, financial institutions etc.
- Journals, Magazines and periodicals.
- Periodic Publications of Government organizations like Central Statistical Organization (CSO), National Sample Survey Organization (NSSO), Census Decadal data.
- Reports submitted by Economists, Research Scholars, Bureaus,
- Published works of research institutions and Universities

Unpublished sources:

Statistical and non-statistical data can also be collected from various unpublished sources. Some of the important unpublished sources from which secondary data can be collected are:

- The research works carried out by scholars, research associates and professionals.
- The records maintained by private firms and business enterprises, which may not have been published due to business discretion.
- Records and statistics maintained by various departments and offices of the Central and State
- Governments, Corporations, Undertakings among others.

7.3 Mapping

7.3.1 Scale of Map

The scale of map will differ according to type of map and the information required from the map. Following are the list of the maps to be prepared for the Gram Panchayat Spatial Development Plan:

Table 7.2: Scale of Map of GPSDP

Map	Information	Scale
Regional Map	Location of Village in District/Block	1:50,000-1:1,00,000
Gram Panchayat Map	No. of Villages in a panchayat and adjoining areas showing rivers, roads, railways, administrative boundary of panchayat, abadi area of villages and location of various facilities	1:20,000-1:50,000
Abadi area map	Inhabited area of the villages	1:5000-1:10000
Layout map of village	Layout of residential area of the village and location of various facilities.	1:5000 minimum
Landuse map of village	Landuse	1:5000 or more

7.3.2 Map Information checklists

Table 7.3 shows the maps required for GPSDP , the information it intends to provide, and its sources from where to avail it.

Table 7.3: Map information checklist

Features	Sub Categories		Sources
Physical	Physiography	Terrain(Hills, Plains and valleys)	SoI Toposheets Satellite Image Photo Mosiac from NRSC & Bhuvan (Resolution 30m, Height Accuracy 8m), Aerial Photographs
	Water bodies/drainage	Rivers, Canals, Lakes, Ponds, Reservoirs, Tanks, Abandoned quarries with water, wells, Hot Springs	SoI Toposheets, Satellite Image Photo mosaic from NRSC & Bhuvan (1:50,000; for 2005, 2012), Aerial Photographs
	Ground water	Aquifers, Water Table, Fluctuation in Water Table	SoI Toposheets, Bhuvan Ground water prospects maps (1:50,000), Centre Ground Water Commission
	Geological Structure	Lineament, Fracture/ Fault line valley,	SoI Toposheets, Satellite Image Photo

		Folds	mosaic from NRSC & Bhuvan (1:50,000), Geological Survey of India
	Soils	Types of Soils and depth of soil	Satellite Image Photo mosaic from NRSC & Bhuvan, Aerial Photographs, Geological SoI, District census handbook
Planning and Administrative	Administrative Boundaries	State, District, Block, Gram Panchayat, Village, Abadi Area/ Lal Dora Boundary, Planning area Boundary of nearest city	SoI Toposheets, Census Atlas Maps, Maps / Drawings from ULB, Revenue records, Municipal maps, State Remote Sensing Application Centre (SRSAC), Satellite Image Photo mosaic from NRSC & Bhuvan* (1:50,000),
	Location and Regional Setting	Location of Gram Panchayat/Villages in Regional Map	SoI Toposheets, Satellite Image Photo mosaic from NRSC & Bhuvan (Cities and Towns locations), Census Atlas maps, National Atlas and Thematic Mapping Organisation (NATMO), State Remote Sensing Application Centre (SRSAC)
History of Development	Settlement Morphology		Panchayat maps, Departmental Maps, Patwari Maps
Landuse Map	Abadi area		Landuse survey
	Agricultural land		SoI Toposheets Departmental maps Revenue records Satellite Imageries Aerial Photographs, Satellite Image Photo mosaic from NRSC & Bhuvan(1;50,000; 2005-06, 2011-12),
Environmental and Ecosensitive Areas	Forest Boundary, Water Bodies, Hazard Prone		Departmental Maps Maps and Drawings from ULBs Aerial Photographs

			CPCB (Zoning Atlas of Industries)
Socio economic aspects	Residential Segregation, BPL households		Primary Survey
Housing	Type of Houses, Houses with IAY aid, Buidling age, Building Height, Buidling material		Primary Survey
Infrastructure	Water supply network		Primary Surveys, various concerned departments
	Sewerage and SWM		
	Waste treatment and waste dumping site		
	Telecommunication network		
	Educational / health institutes		
	Post office		
	Police station		
	Fire station		
	Socio cultural and religious centres		
Proposed plan of various sectors			

Source: Adopted from URDPFI Guidelines, 2014

7.3.3 Procedure of Collecting Data

Procedure to retrieve data by permissions, which is not available in the public forum are given below:

7.3.3.1 Toposheets

Unrestricted topographical/ city guide maps published by Survey of India are available for sale. The standard topographical maps on scale 1:25000 and more published for selected villages are useful for rural development plan purpose. All the topographical maps along the external boundary/coastline of India, as indicated in the Topo Index map of Survey of India are categorised as restricted maps. The restricted category maps can be procured by State and Central Governments / Private Individuals / organisations/commercial firms by following a prescribed procedure. Private individuals and organizations / commercial firms can also obtain restricted maps with prior approval from Ministry of Defence through the State Government to whom they should apply.

7.3.3.2 Aerial photography

The available information regarding area of interest, its scale and cost rates can be obtained from Surveyor General's Office, Dehradun or the Directorate of Survey (Air), New Delhi. Survey of India (SoI) has a dedicated web portal for presenting the meta data information available with SoI from various aerial photography tasks commenced. Web Aerial

Photography Transaction Registry (APTR) provides transparent indenting process based on instructions issued by Ministry of Defence. Indentor can obtain the existing photography by marking the area of interest on 1:250,000 scale topographical map, indicating purpose, identifying the type (B&W, colour, colour infrared), scale and the photographic product required (contact prints, enlargements, mosaic, etc.). If the existing photography does not cater to the requirements of indentor, process for fresh aerial photography can be initiated. The National Government agencies, which provide fresh aerial photography, are:

- Indian Air Force (through Survey of India)
- National Remote Sensing Centre, Hyderabad
- Air Survey Company, Calcutta.

For indenting fresh aerial photography the indentor may approach any of the flying agencies with specific information. The indentor may mark the limit of the area to be photographed on 1:250,000 scale toposheet if photography is required on scale smaller than 1:20,000 and 1:50,000 scale toposheet if photography is required on scale 1:20,000 and larger and apply with the specific requirements mentioned for the procurement of the existing aerial photography.

7.3.3.3 Satellite Imagery

National Remote Sensing Centre, Hyderabad is the nodal agency for supply of current and archived satellite data products from all contemporary satellites namely Ocenasat-1, Ocenasat-2, Resourcesat1, Cartosat-1, Cartosat-2, Resourcesat-1 and from older satellites like, IRS-IA, IRS-IB, IRS-IC, IRS-ID, IRSP3. These can be processed to various levels and supplied on photographic media or on digital computer compatible media. Satellite data (processed and raw), aerial products, visualisation services can be assessed from the NRSC Data Centre, Hyderabad. Standard Satellite Data provided by NRSC (as on 2014) is presented in the Table

Table 7.4: Satellite Imagery

Sensor	Product	Scale (Accuracy)
HIGH RESOLUTION		
PAN(1m)	System corrected Geo-referenced Mono (9.6Km X 9.6Km)	10. (100m)
	Ortho Kit with RPC AOI	11. (100m)
PAN-A/F(2.5 m)	Geo-reference Mono (27.5Km X 27.5 Km)	12. (250 m)
	Stereo Ortho Kit (27.5Km X 27.5 Km)	13. (250 m)
	Ortho Corrected (7.5'X7.5')	25,000 (25m)
LISS-4MX (5m)	Standard (23.5 KmX 23.5 Km)	14. (500 m)
	Standard Full Scene (70 Km X 70 Km)	15. (100 m)
	Full Scene Ortho Reflected (70 Km X 70 Km)	16. (10m)
MICRO WAVE (RISAT)(1m-50m)	Standard RISAT SAR	17.

MEDIUM RESOLUTION		
LISS-III (24m)	Standard Full Scene 141 Km X 141 Km	250,000 (500 m)
	Full Scene Ortho Rectified 141Km X 141 Km	18. (24m)
AWiFS (56m)	Standard Full scene 740 KmX740 Km	19. (500 m)
	Full Scene Ortho Rectified 740Km X 740 Km	20. (56m)
	Standard Quadrant 370KmX 370 Km	500,000 (500 m)
	Quadrant Ortho Rectified 370Km X 370 Km	21. (56m)
LOW RESOLUTION		
OCM (360m)	Full scene (1420Km X 1420Km)	22. (1.5 Km)

Source: National Remote sensing centre quoted in URDPFI Guidelines,2014

7.3.3.4 Geological Survey of India

To assess the meta-database of Geo-environmental studies for various villages in India, with interpretation of geomorphology, hydrology, geological structures and tectonic data from Geological Survey of India, Rural Local Bodies and its representatives can approach Ministry of Mines and GSI with their specific requirements.

7.4 GIS Based Gram Panchayat Spatial Development Plan (Refer Annexure 5)

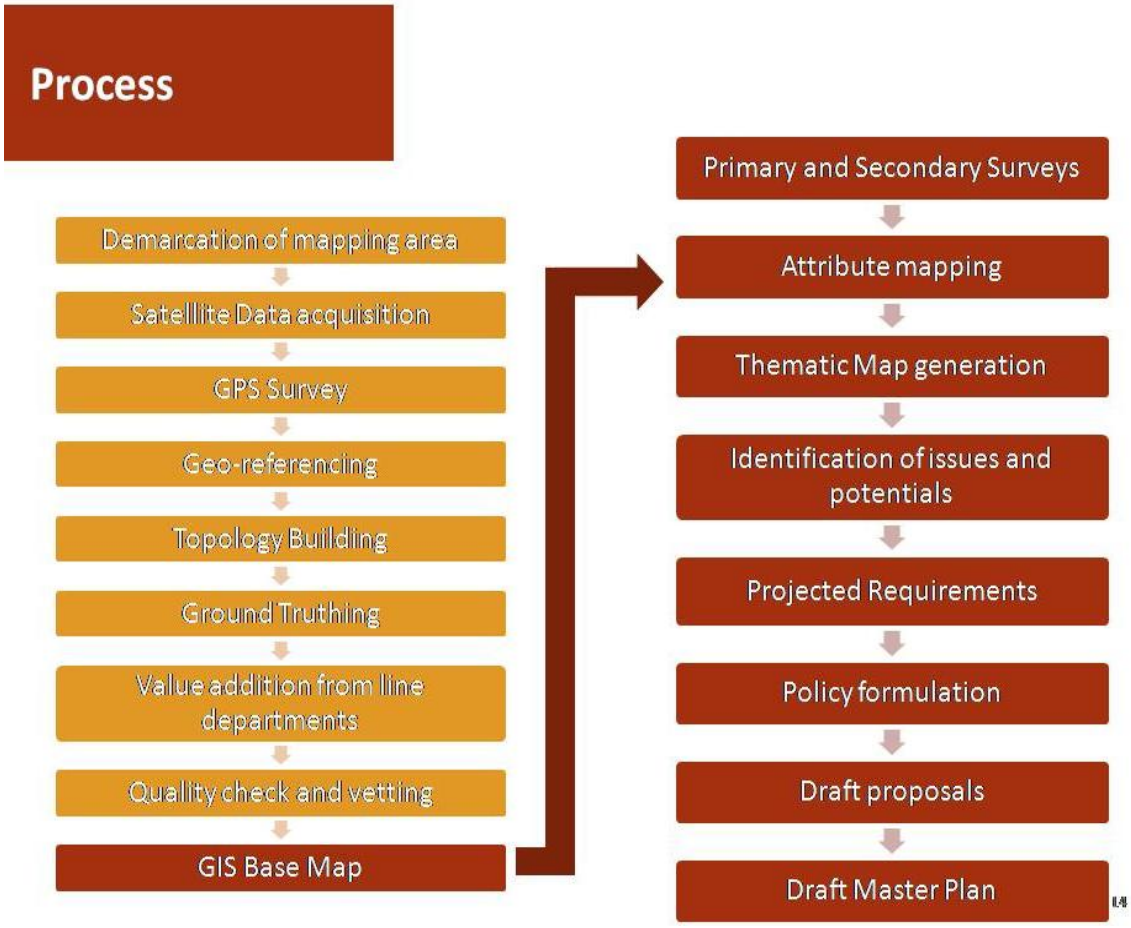
Rural areas development plan formulation and implementation requires a methodological framework for spatial planning. For the resource-based development of rural areas, a Panchayat-level integrated spatial participatory planning is the need of the hour. Spatial planning involves making decisions based on the spatial patterns and processes such as distance, location, neighborhood and proximity of various natural resources, infrastructural facilities, human activities and welfare activities in a set of terrain conditions. It is essential for a planner to understand the patterns of land use and land cover with social structure and to identify local resources and amenities.

In the entire process of village development plan formulation--starting from preparation, approval and finally its implementation on ground--an enabling environment is required, where one can geo-visualize, analyze and monitor the implementation status in a transparent way. Such an enabling environment will act as a tool in crafting the strategic guidelines at the Panchayat-level for a holistic development of the region.

GIS shall be used for the preparation of spatial plans for panchayats. GIS along with the interface of Remote sensing will add to availability of various information at village level which will facilitate spatial planning in rural areas. Annexure 5 mentions the case study conducted by NIRD, which can be referred for the preparation of GIS based Gram Panchahyat Plans

Remote sensing and GIS technologies play a key role here, right from generating and integrating geospatial information, to presenting on a user-friendly and interactive map. A map depicts the terrain, natural resources and human activities along with infrastructure facilities as an integrated view, which is the base for spatial thinking and further decides on intervention required and forming planning strategy. It helps to make informed decisions and subsequently the informed investments at the Panchayat-level for effective and transparent planning, implementation & monitoring of centre- or state-sponsored schemes.

Figure 7.2: Process of using GIS in GPSDP



Source: Formulation of GIS based Master Plan for AMRUT Cities, Town and Country Planning Organisation, Ministry of Urban Development, GoI, November 2015

7.5 Bhuvan platform for Spatial Planning

An enabling environment named Bhuvan Panchayat Portal is developed and hosted by NRSC (ISRO) under the project named 'Space-based Information Support for Decentralized Planning (SIS-DP)'. The web-portal integrates geospatial layers derived from space-based inputs in a web-GIS framework with interactive modules like Area Profile Report Generation, Asset Mapping, Activity Planning and Implementation-Monitoring for facilitating effective developmental planning in the light of Village Developmental Plan.

7.5.1 Database Available

The following are the database available on Bhuvan Panchayat Portal:

- **Satellite imagery:** An ortho-corrected high-resolution satellite imagery database (fused product of Cartosat-1 and LISS-IV imagery) is generated for the entire country to act as a base layer for further mapping.
- **Thematic data:** Overlaid on the base layer, various thematic layers (such as land cover, drainage, transportation and slope layers) are prepared at 1:10,000 scale for the entire country.
- **Legacy data:** Soil information layer, groundwater potential, forest boundary, watershed boundary, wasteland information and slope class layer
- **Cadastral data:** Prepared at 1:4000 scale for five priority States
- **Administrative boundaries:** Village, Panchayat, Intermediate Panchayat, District, State, Parliamentary and Assembly Constituency
- **Asset Data:** A continuously growing national inventory of geo-tagged community assets along with their photographs and related attributes is available on the Portal for its utilization in developmental planning. The inventory is crowd-sourced for citizens/PRIs/facilitators to map assets through *Bhuvan Panchayat Asset Mapping Mobile App.*
- **Non-spatial data:** In addition to the geospatial layers, the project database comprises village amenities, demographic and climatic data integrated with spatial database.

Following are the points worth mentioning in terms of database:

- **Periodicity of the satellite data:** There is a provision to update the satellite data every 2 years in order to facilitate regular monitoring of progress as per village.
- **Accessibility of the datasets:** All the datasets are available in public domain and viewing them on Portal does not require any registration.

7.5.2 Geo-visualization facility

Geo-visualization in its entirety encompasses search, access, visualize, analyze, understand and use the spatial and associated non-spatial data. The default window of the Portal contains a map-viewer that enables the geo-visualization of satellite imagery (along with other geo-spatial layers) that may be zoomed up to Panchayat / Village level. The left pane in the default view of the Portal gives options to visualize or hide various geospatial information layers. Several navigation tools, measurement tools and personalization tools are also provided to facilitate geo-visualization.

7.5.3 Interactive modules for planning needs

Towards the aim of facilitating the preparation of resources-based village developmental plans using space-based inputs, several specialized sets of functions are created, which may be used as tools for information extraction, analysis and updation along with its utilization as per the planning requirements. Following is a detailed description of each of such modules, as to what their capabilities are and how they can be used.

7.5.3.1 Automated area profile report generation module

This module integrates the spatial and non-spatial data for the selected area and delivers a ready-to-use profile report in a professional format with various maps, statistics and graphs. The selected area, part of an administrative unit, is spatially identified by a unique code. The demography and climate datasets are linked with the spatial datasets through this unique code. The data is retrieved and presented using spatial queries exploiting join and aggregation operations. In a nutshell, for the desired area, this module presents a resource inventory on natural resources and available manmade community assets along with information on disaster-prone locations and other major issues/constraints with its priorities.

The following points are worth mentioning regarding this module:

The module is interactive: Information can be updated from the user side as well. It facilitates assimilation of crowd-sourced information which may be considered more near to ground reality.

Freely downloadable pdf: The snapshot of satellite imagery and thematic maps along with various statistics of an area up to the Panchayat / Village level can be viewed and downloaded as a report in 'pdf' format. Considering the interest of the specific users, chapter-wise selection and downloading is also enabled. Figure 7.3 shows cover page of one such automatically generated pdf format report.

No registration required: This module does not require any registration in general, although updation of information can only be done by registered users of the Portal.

The following are the components of this module:

Identification details: This component provides administrative details of the selected area. Contact details of the key persons at various administrative levels are also provided so as to facilitate communication with the governing bodies. A table has also been given to highlight the on-going schemes along with its potential beneficiaries and money allocation details for a quick overview of development activities under progress in the selected area. This data is useful to locate any area and to decide the ongoing as well as future development activities.

Climate data: It provides information about statistical average of rainfall, temperature, and humidity over the desired area and timeframe. This data is averaged in two ways: grid-wise and district-wise.

Major issues and constraints of the area: It describes the problems and limitations in the area that require immediate attention. The development of an area depends on many factors such as its geographical location, governing authority, public participation, funding though various development schemes and their monitoring etc. Requirements for development would be different for each administrative unit (district/block/village). To begin and assess any development activity in any area, it is necessary to have an inventory of both existing and required facilities/amenities. This will help to decide the type of development activities which can be undertaken, and the same can be proposed and subsequently communicated to the higher authorities to get required sanction. Many of the issues listed here may find its origination at the Panchayat level discussions by the villagers during Gram Sabha meetings.

Priorities of the area: This component provides a list of significant activities that needs to be taken up on priority in the area. This list may point out all the gaps in developmental activities; however, the governing body needs to identify crucial and important activities which should be taken up immediately. Usually many applications for different schemes and activities proposed by local bodies are submitted to PRI heads, but a priority list of activities will enhance the focus of governing bodies to felicitate the important process.

Ongoing activities: This component highlights the ongoing activities under various schemes in an area. An inventory of existing activities under different schemes, its functioning authority/department, allocated budget, its period, and status are very important data for planning and decision making. PRI has to assess the development status of selected area using this data, and thus can further refine the ongoing development activities.

Village and Town Directory - 2011: This component provides primary census abstract with village & town directory of the area as per Census-2011. It gives insight into socio-economic information in the form of tables and charts. Many development schemes are based on socio-economic profile of an area. These schemes are introduced to bring gender and economic equality and also to improve literacy, health as well as overall behavioral and social development. To introduce such schemes and assess such activities, primary demographic data of an area is the foremost requirement. This component also facilitates governing body to modify the dynamic demographic details of selected area. These changes can be seen on portal in yellow column as well as in print format area profile report in tabular representation with starred mark.

Village Amenities Directory - 2011: This component provides the information of Village Amenities at the village level; the data has been compiled from Census of India 2011. It provides the detailed information for Educational, Medical, Drinking Water and Other facilities. For grassroot level planning, this data will be reliable and basic source for developmental activities.

House Listing & Housing Census Schedule - 2011: This component provides House Listing & Housing Census Schedules according to Census of India 2011. It gives the details of households by condition, predominant material, ownership status, and other facilities in the form of tables and charts. Broad idea can be obtained about the status of the basic facilities available such as source of drinking water, lighting, house condition, transportation, possession of assets etc. This information is needed to plan and manage

these amenities effectively in an area. Presently, these data are available at the district level only.

Mapping of vulnerable areas: Vulnerable areas are defined as areas which are susceptible to the disaster and damage. Vulnerability mapping will help people to depict the threats in that place and manage their infrastructure and asset according to the same. Any area may be subjected to many natural calamities due to its varying terrain and climatic conditions. This increases the disaster risk and exposing the assets of the administrative unit to become vulnerable to these risks. Lack of information in this regard may lead to failure of the development plans and activities. This component provides the details of vulnerable areas, type of disasters occurring in that area, the status of risk prone infrastructure, coping mechanisms and available disaster risk reduction measures in the area.

7.5.3.2 Asset mapping module

Asset mapping is an activity to spatially identify the village amenities which are valuable to the community. Towards an effective planning and development at grassroots level, awareness of the assets available in the region is a pressing need; hence creation of a spatial digital inventory of assets is initiated and facilitated through Bhuvan Panchayat. Assets inventory is the compilation of different types of assets which are created / being created under various schemes of Government of India, States and Communities by themselves to facilitate the local population. Bhuvan Panchayat identifies 271 different types of assets which are grouped into 3 major categories as follows (complete list is given in Annexure 1):

Civic Amenities/Infrastructure: 226 Asset types
Governance Assets: 35 Asset types
Productive Assets: 10 Asset types

The asset mapping module facilitates:

Geo-visualization of assets: Assets that are already mapped can be viewed interactively overlaid on satellite imagery.

Mapping assets: It allows users to spatially mark assets directly in the map-viewer window along with entering its associated attribute information in attached form field (Figure 7.3, 7.4,7.5). Although, a dedicated asset mapping mobile app is developed for GPS-based mapping of assets from the field.

Query assets: Planning in an area of interest essentially requires knowledge of information at hand. Questions may be posed as to "what all assets are in the area", "where are secondary schools located", etc. This module facilitates such queries to be answered. This allows information from the assets data to be converted into valuable knowledge of desired area.

The following are the points worth mentioning regarding asset mapping module:

Participatory approach for mapping assets: Considering the requirement of enormous efforts toward creation of a national inventory of assets at Panchayat/village level, a participatory approach through crowd sourcing is followed. Through the asset mapping mobile app linked with the Portal, any registered citizen can easily map assets from the field using his/her smartphone. To start through, under another project

of ISRO, named 'Empowering Panchayati Raj Institutions Spatially (EPRIS), efforts are being made to map assets of around 10% of the Gram Panchayats in the country, on a pilot basis, using Bhuvan Panchayat platform.

Bhuvan Panchayat asset mapping mobile app: It is an android-based mobile application for facilitating asset mapping directly from the field with geo-location, asset photograph and associated attributes. The app is freely downloadable from the Portal. It requires a simple first time registration after which user can start mapping assets. The mapped assets are uploaded to the Bhuvan servers and are also linked to the Portal.

Moderation of uploaded asset data: In order to avoid junk information (which is often possible when the system is crowd-sourced), validation/moderation steps are adopted by facilitating intervention by the concerned PRIs. For this, provisions are made for creation of separate PRI logins. Assets are considered validated after a simple approval of mapped assets from PRI logins. Further, to distinguish the assets mapped by the citizens and PRIs two different presentation schemes (icons) are designed.

Assets identified from satellite imagery: A few clearly distinguishable assets can be directly fetched from the associated thematic maps which are prepared overlaid on satellite imagery. Such assets directly get appended to the spatial inventory.

Figure 7.3: Snapshot of a marked asset (point) with attribute form

Figure 7.4: Snapshot of a marked assets (line) with attribute form

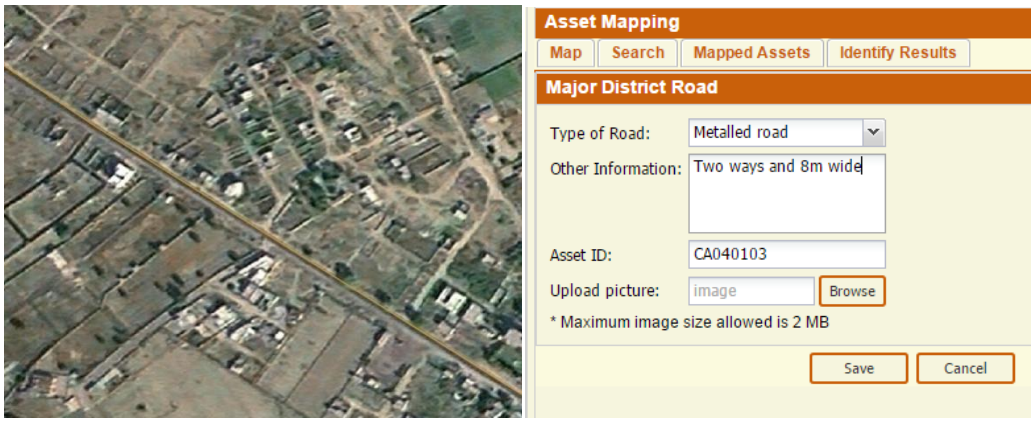
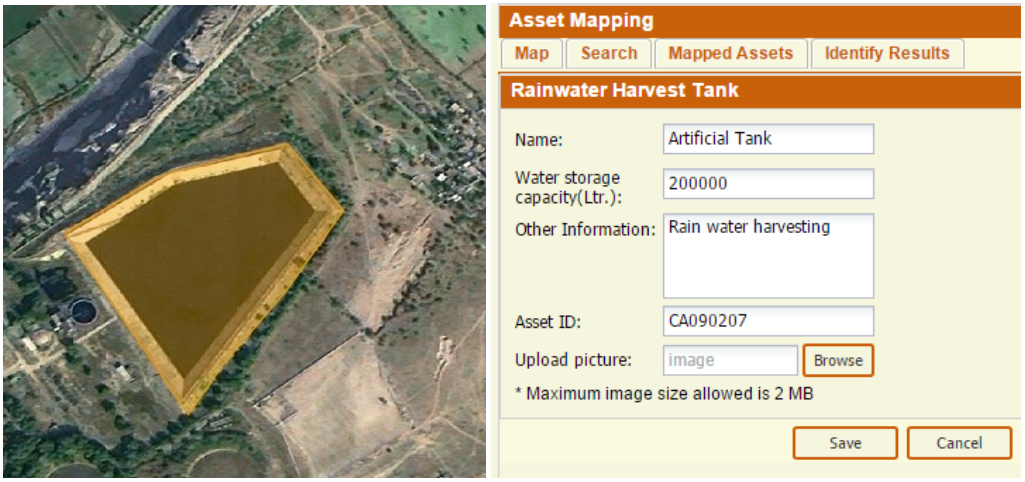


Figure 7.5: Snapshot of the marked assets (polygon) with attribute form



7.5.3.3 Activity planning module

This module is designed to provide an enabling framework for planning developmental activities under various Centre and State Governmental Schemes at the Gram Panchayat level. All 29 functions entrusted to the PRIs under the XI schedule are categorized and compiled into five major sectors comprising land and water development activities, productive activities, civic amenities and infrastructural development activities, social welfare activities and governance activities. This module facilitates the involvement of the common man in the local developmental planning. Any registered citizen can propose activities under the schemes in the Gram Panchayat of his/her area and this can be viewed, modified and consolidated successively at all three tiers of PRIs.

The following points are worth mentioning regarding activity planning module:

Spatially enabled process of activity planning: The user is given an option to geo-locate the plan as point, line or polygon. Once the Polygon is drawn, a form appears for the user to fill necessary information like activity title, cost, duration, and details of the activity. A user may attach any supporting documents to justify his/her plan. Once all the compulsory fields are filled, user can save the activity (Figure 7.8, 7.9).

Support of geo-spatial layers while planning: Spatial and non-spatial information assistance can be availed while planning by overlaying the required thematic layers and existing assets layer available on the left pane as base on his/her area of interest.

Participatory approach while planning: The Portal provides an effective approach in local planning as citizens can participate in planning activities. 'Draft plans' from the citizens would be available for consolidation to Sarpanch. This will facilitate PRI heads in submitting the 'Panchayat plan' without biasing and conflicts. However, the role of Panchayats at all three levels (Gram, Intermediate and District Panchayats) will remain significant towards the consolidation of activities planned by the citizens. Although, citizens can track the activity planned by him/her to know its current status as approved or pending for approval.

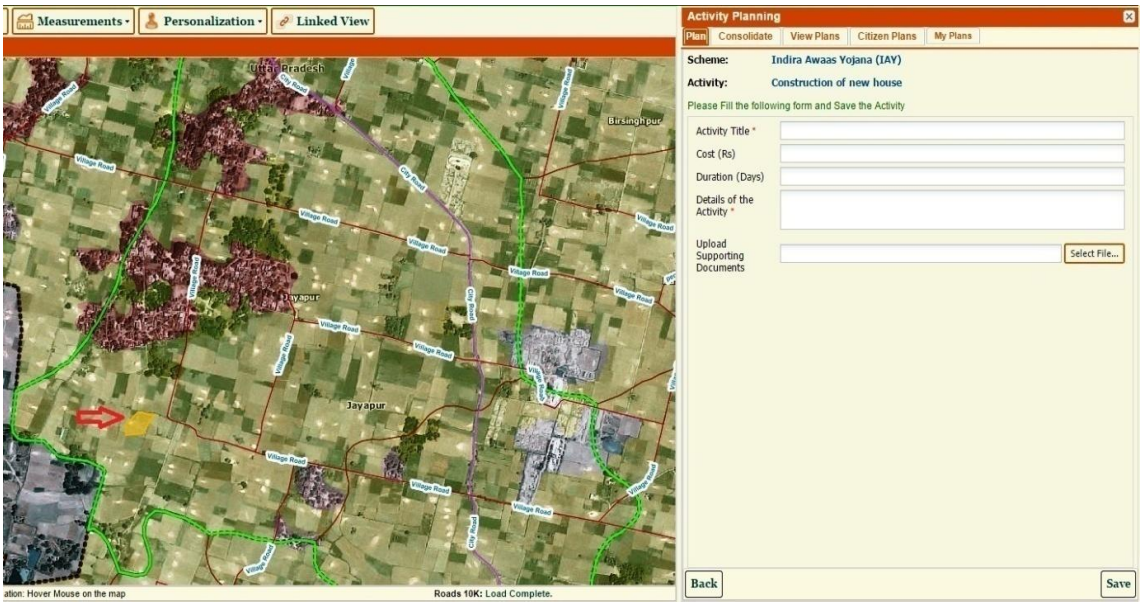
Separate logins for citizens and PRIs: The Portal have provisions for separate user accounts which helps in distinguishing citizen inputs from plans formulated by PRIs.

Facilitating consolidation at three levels by PRIs: The citizen plans in draft mode are automatically forwarded to concerned PRI accounts for consolidation and approval. The versatility of this module can be understood as the plan is passed through various levels of Panchayat system. Under PRI accounts, provisions are made for consolidation of plans with accepting, rejecting or editing facilities. The geometry and associated information of plans can be modified as desired by PRIs.

Incorporation of various Central and State Government Schemes: The Portal serves for planning of developmental activities through various flagship schemes of Govt. of India and other State-specific schemes which can be continuously updated. Activities from each scheme are enlisted to facilitate sectoral plans.

Figure 7.6: Activity planned as line feature

Figure 7.7: Activity planned spatially as Polygon feature



7.5.3.4 Implementation and monitoring module

Once the plan is finally approved by District Planning Committee and ready for implementation, an interface is required which may help in monitoring of approved and ongoing activities. To address this requirement, Bhuvan-panchayat portal is facilitated with 'Implementation and Monitoring' module. This module helps PRIs in tracking the progress of work undertaken against activities and sub-activities planned by citizens under various schemes. PRI heads at all the three levels can update the status of percentage completion of any ongoing activities. Once this status achieves 100 %, the activity is listed as completed activity.

Online monitoring facility: The synoptic view provided by satellite imagery offers technologically the most appropriate method for quick and reliable mapping and monitoring of various natural resources both in space and time domain. In order to facilitate monitoring the progress of ground works physically, there is a provision to periodically update the satellite imagery dataset every two years. With the launch of Cartosat-2 C & D and Cartosat-3, the spatial resolution of the satellite images will be getting to a finer level of upto 0.25 m. The ongoing works can also be photographically mapped using GIS in conjunction with mobile based technologies.

8. CONSOLIDATION OF GRAM PANCHAYAT SPATIAL DEVELOPMENT PLANS

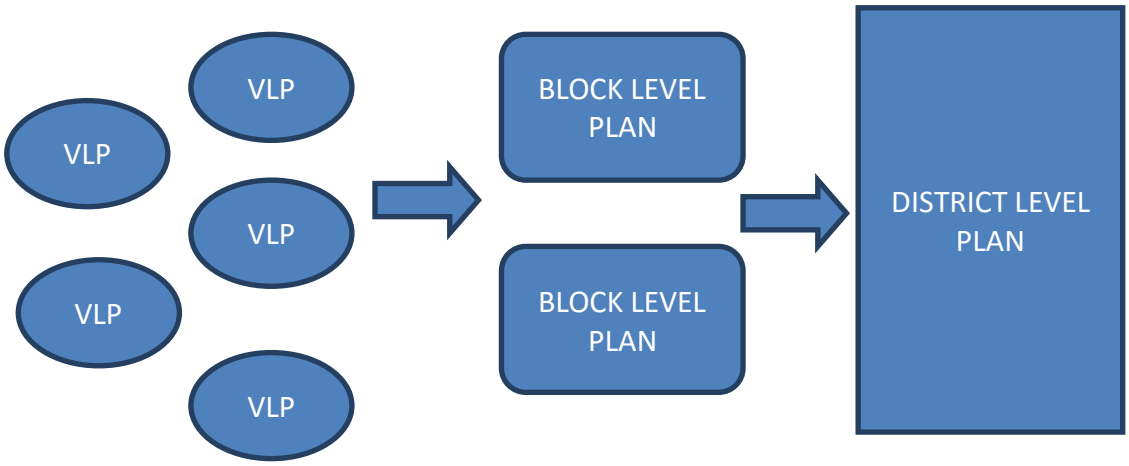
The rural planning exercise shall be carried out at Gram Panchayat Level, where each Gram Panchayat may have group of villages. The spatial development plans should consider the needs and requirements of each village. This approach can be adopted through assigning locational significance to each facility, which can be achieved through mapping exercises. The locational attribute to a facility would help to comprehend the usage and area served by the same facility rather than concern for just a mere presence of the service. District Planning Manual, 2008 has elaborately mentioned about the consolidation of Rural and Urban Plans into District Plans based on sharing of common resources. The District Planning Manual acknowledges the missing spatial planning approach in rural areas and has also suggested the way in which consolidation of plans could be carried out.

8.1 Spatial planning

Spatial planning involves management of space. It is not just 'land use management', but a planning with a vision for holistic development that takes into account the combined effect of spatial patterns and processes. It is a kind of territorial management with focus on the spatial relations within and around territories. Bhuvan Panchayat platform brings spatial planning deeply embedded in governance systems at all the three tiers of Panchayati Raj. It helps in guiding for land use decisions considering the pattern of resource mobilization and resource allocation. It is a single window interface providing an information system and decision support system along with facilitating spatial developmental planning. **Error! Reference ource not found.** shows categorization of spatial activity plans in a Gram Panchayat based on their distribution with respect to major settlement concentration – Core zone, buffer zone and outer zone.

RADPFI guidelines suggests consolidation of various village level plans to Gram Panchayat Spatial development plans which should be further consolidated into Block level plans for integrated development of the region.

Figure 8.1: Consolidation of Gram Panchayat Village Plan



VLP- Village level spatial

8.2 Spatial Consolidation of Plans

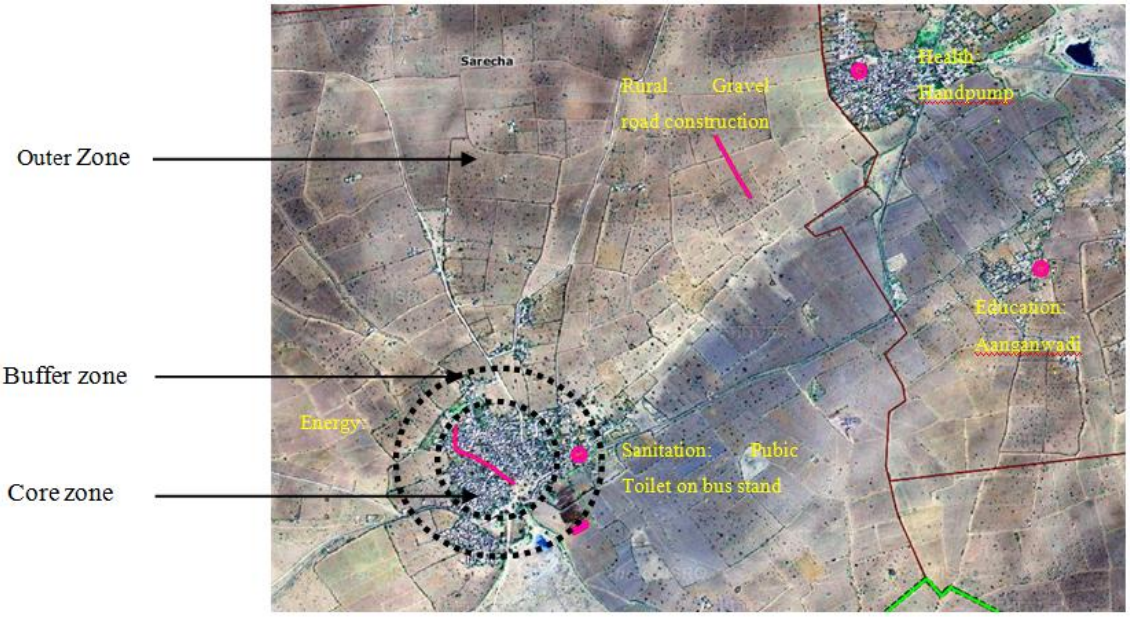
In a decentralization setup, plans evolve from the grassroot levels. They are the draft development plans which successively ascend to the sub-district and district levels. Ideally, the ascending plan should finally speak about local necessities and simultaneously be in communion with the vision strategic plan of the region or State. Spatial depiction of such plans helps in reducing spatial disparities. Framework of spatial strategic planning should be interlinked at all the three tiers of Panchayati Raj. Bhuvan Panchayat provides a platform for such spatial consolidation and interlinking.

The national spatial strategy should incorporate policies for industrial location and development, employment generation, human settlement pattern, and structure and infrastructure development, for both rural and urban areas. The State spatial plans should be prepared by taking into account demographic and economic potentials, broad land use configurations, infrastructure requirements, and project implementation schedules. Each district should prepare a District Development Plan that integrates the plans for its constituent urban and rural areas as well as the sectoral allocations for various schemes under the purview of existing district agencies (Source: Chapter 11, Eleventh Five Year Plan Document).

8.3 Integration of Spatial plans with Sectoral Plans

The sectoral plans prepared by various line departments for infrastructure planning and social development of the village which needs to be considered and integrated during the preparation of Gram Panchayat Spatial Development Plan. Usually the plan prepared by the departments such as PWD, electricity, irrigation department.

Figure 8.2: Categorization of spatial activity plans



(Source: Bhuvan Panchayat Portal)

Spatial planning when integrated with the sectoral planning is called as 'spatial strategy'. Spatial planning has the power of integration with individual sectoral plans. For example, the infrastructural development plans when integrated with the land use maps, gives a spatial way forward for urban extensions considering the fact that as far as possible, primary agricultural land should not be utilized, instead, endeavors should be towards using the degraded land. Another example can be of keeping provisions for green belt near the settlement clusters, in order to dilute the indiscriminate urban sprawl. At the sub-district scale, the provisions of rural hinterland around cities and towns can be planned so that ecology of the sub-district is preserved. A check can also be made to growing sizes of settlement areas by having a proper spatial planning for areas near rivers, their flood plains and other natural drainage systems. Proper maintenance of the land title records is also a major thrust area where spatial planning plays an important role. The pattern of population concentration in large cities reflects spatial polarization of the employment opportunities. The Portal helps future investment in a more spatially informed way. Its aim is to bring a clearer spatial dimension by integrating various policy sectors like infrastructure, industries, economy, energy, health, education, transport, tourism, etc.

9. RESOURCE MOBILISATION FOR PLAN IMPLEMENTATION

The 73rd CAA carried out in 1992 by the Union Government envisaged vastly enhanced expenditure responsibilities for the village panchayats in the country. However, it had not made any specific assignments of taxes to these bodies to meet their enhanced expenditure. It had been left to the state legislature to authorise village panchayats to collect taxes, duties, tolls, and fees or to assign such taxes to them and also to provide grant-in-aid to them. Though the state legislature was competent to do this even before the constitutional amendment virtually none of the States took initiative in this matter.

The enlarged responsibilities of village panchayats fell into two main categories namely (1) the traditional responsibilities which these bodies had been performing before the constitutional amendment and (2) responsibility conferred on them by the 73rd amendment covering both Plan and non-Plan activities. The traditional functions were funded by revenues raised by the panchayats supplemented by grants from the State government while the new additional responsibilities were to be financed by resources available to the State government.

Gram Panchayat for the development of villages depends entirely upon the grants and funds from the state government and through the centrally sponsored schemes. However, there may be certain sources through which a Gram Panchayat can raise its revenue to facilitate the development of the villages. It is seen that panchayats located close to urban areas enjoy better amenities in terms of health, education, and communication compared to other panchayats selected for the study. This has an impact on the working of these panchayats and also on their capability for mobilising resources internally.

- The main sources of income of the panchayat may broadly be classified under four heads: Tax revenue, Non-Tax revenue, Grants and Loans.[17]

Under tax revenue**,** main sources are: Own taxes, Assigned taxes, and Shared taxes.
Own taxes are those assigned to the panchayats and collected by them. The entire proceeds of own taxes are appropriated by the panchayat. Assigned taxes are those assigned to the panchayats, but collected by the State and given to the local bodies after deducting the cost of collection. Shared taxes are levied and collected by the State, but a portion is shared with the local bodies.
Non-tax revenue consists of licence fees, market fees, contributions, and deposits.
Grant component is a transfer from the State government, which may be either tied or untied.
Loans are conspicuously absent in most cases and constitute a negligible portion of the total receipts.

[17] Nair, R.P, 2004, Mobilisation of Resources by Panchayats: Potentials and Feasibilities (A Case Study of Six Selected Panchayats in Kerala), Kerala Research Programme on Local Level Development, Centre for Development Studies, Thiruvananthpuram.

9.1 Fourteenth Finance Commission

The main objective of fiscal transfer is to bring about progressivity; or, in other words, equality in the fiscal strength of the panchayats earning different levels of income. To achieve this objective, the mechanism of transfer should be used in such a way that panchayats with lower income should get higher transfers from the State. In other words, to achieve fiscal equalisation across the panchayats there should be an inverse relationship between per capita own revenue and per capita grants.

The XIV finance Commission mandated to recommend measures needed to augment the resources of Panchayats and Municipalities with the help of State's supplements, based on the recommendation of State Finance Commission (SFC)

The XIV Finance Commission has recommended assured transfers to local bodies for planning and delivering of basic services smoothly within the functions assigned to them under relevant legislatures.

Vertical Devolution to Panchayat

Table 9.1: Flow of funds from Central divisible pool to Panchayats

Finance Commission	Assigned to Panchayats Rupees in Crores
FC X	4,380
FC XI	8,000
FC XII	20,000
FC XIII	63,015

Source: Report XIV Finance Commission

9.1.1 Basis of Horizontal Distribution

The FC-X distributed its award exclusively on the basis of population (based on the 1971 Census). The FC-XI assigned a weight of 40 per cent to population (1991 Census), 10 per cent to area and 20 per cent to distance from highest per capita income. The FC-XII retained the weights used by FC-XI for each of these three criteria, but used the 2001 population data for distribution. The FC-XIII increased the weight attached to population to 50 per cent and retained the weight assigned to area at 10 per cent. While they retained the weight assigned to distance from the highest per capita income at 20 per cent for urban local bodies, for rural local bodies this was reduced to 10 per cent and a new criteria- proportion of scheduled caste and scheduled tribe population - with a weight 10 percent was introduced. Apart from these three common criteria, others like index of decentralisation, revenue effort, index of deprivation, index of devolution and Finance Commission grant utilisation index have been used by different Finance Commissions. In the distribution of grants, factors such as population, area and deprivation related indices take into account the resource needs of the States. Other criteria such as index of decentralisation, index of devolution, revenue mobilisation linked the quantum of grants to the efforts of States to decentralise or to empower the local bodies.

9.1.2 Recommendations of XIV Finance Commission

The XIV Finance Commission has recommended :

- Grant-in-aid to duly constituted Panchayats (Rural Local Bodies) in two parts, namely: Basic Grant and Performance Grant, In case of Gram Panchayat, 90% of Grant will be Basic Grant and 10% will be Performance Grant.
- Basic Grant to Panchayats for delivering Basic services especially water supply, sanitation including septic management, sewage and solid waste management, maintenance of community asset, roads, footpaths, street lightening, burial and cementation grounds and other basic services as per 11th schedule.
- The FFC has not distinguished between O&M and capital expenditure within the components of basic services. However, it is advised that the cost of technical and administrative support towards O&M and capital expenditure should not exceed 10% of the allocation of to a Gram Panchayat.
- Basic grant of Rs.1,80,262.96 crore for the GPs for the period 2015-20. Whereas amount of Rs.20,029.22 crore of performance grants for GPs has been recommended for a period of 2015-20. The details of State wise allocation of basic grants and performance grants to Gram Panchayats for period 2015-20 can be referred from *Guidelines for Release and Utilisation of Grant recommended by the Fourteenth Finance Commission (FFC) for Rural and Urban Local Bodies (Local Bodies Grant), No.13(32)FFC/FCD/2015-16, 8th October, 2015*

Eligibility for Performance Grants for Gram Panchayat:

1. Gram Panchayat will have to submit audited accounts that relate to year not earlier than two years preceding the year in which Gram Panchayat seeks to claim the performance grant
2. The Gram Panchayats will have to show an increase in their own revenues over the preceding year as reflected in the audited accounts.

FFC has further recommended that book of accounts prepared by the local body should distinctly account own taxes, assigned taxes, devolutions and grants and grants for any functions assigned by state or centre. This may be added to the Budget of the Gram Panchayat as suggested to be prepared in Chapter 2.

It is desirable that 2% of the total funds transferred to Gram Panchayats to be used for preparation of Gram Panchayat Spatial Development Plan.

9.2 Financial Plans for Rural Areas

Every Gram panchayat shall have and maintain its own fund to which shall be credited :

a. All moneys received by the panchayat from the Government by way of grants, loans, advances, or otherwise;

b. All development charge or other charges or fees received by the Panchayat

c. All moneys received by the gram panchayat from any other source.

9.2.1 Budget of the Gram Panchayt

Every Gram Panchayat shall prepare a budget document in such form and at such time every year as may be prescribed by the rules, a budget in respect of the financial year next ensuring, showing the estimated receipts and expenditure of the panchayat and shall forward to the DPC such number of copies thereof as may be prescribed by rules.

(1)Every panchayat shall maintain proper accounts and other relevant records and prepare an annual statement of accounts including the balance sheet in such form as the Government may by rules prescribe.

(2) The accounts of every Gram Panchayat shall be subject to audit annually by the District Planning Committee of the State and any expenditure incurred by DPCs in connection with such audit shall be payable by the state.

(3) The accounts of every Gram Panchayat as certified by the DPCs or any other person appointed by DPCs in this behalf together with the audit report thereon shall be forwarded annually to the Government and the Board.

9.2.2 Annual Report

(1) The DPC shall prepare for every year a report of its activities during that year and submit the report to the Government in such form and on or before such date as may be prescribed by rules, and the Government shall cause a copy of the Report to be laid before the State Legislature.

(2) Every Gram Panchayat shall prepare for every year a report of its activities during that year and submit the report to the Government and the Board in such form on or before such date as may be prescribed by rules Table 4. 1:

Table 9.2: Format of Balance sheet/Budget for rural areas

Particulars	Actual for the year 2014-2015	Budget estimates for the year 2015-2016	Actual for the year or revised estimates 2015-2016	Budget estimates for the year 2016-2017
OPENING BALANCE	-	-	-	-
Revenue Receipts				
Capital receipts				
Total				
GRANT TOTAL				
Revenue Expenditure				
Capital expenditure				
Total				
CLOSING BALANCE				

REVENUE RECEIPTS				
Grants and Funds				
Tax Revenue Property/Chulha tax/other taxes				
User Charges(if any)				
Sale and hire Charges				
Rental Income				
Other Income				
REVENUE EXPENDITURE				
Establishment				
O&M				
Administrative				
CAPITAL RECEIPTS				
Grants Contribution and specific Purpose				
Deposits Received				
Deposits Work				
Other Liabilities				
CAPITAL EXPENDITURES				
Fixed Assets				
Loans Advances and Deposits				

*The additions and substractions may be carried out as per the Panchayats' revenue and expenditure heads.

9.3 Spatial Budgeting INPUTS REQUIRED

9.4 Convergence with central rural schemes

The main source of revenue of Panchayat is grants from centre or state and hence the Gram Panchayat Spatial development Plan shall be in line with the existing schemes and allocation of funds to rural areas. Following are few centrally sponsored schemes for rural area through which funds can be drawn for various development in rural areas, according to projected requirements.

- Mahatma Gandhi National Employment Guarantee Act -Rural employment
- Sarva Shiksha Abhiyan -Education
- Pradhan Mantri Gram Sadak Yojana- Rural roads
- National Health Mission- Healthcare
- Integrated Child Development Scheme- Child development
- Indira Awas Yojana -Rural housing
- Mid-Day meal Scheme- Nutrition
- National Rural Drinking Water Programme- Water

10. INSTITUTIONAL SUPPORT MECHANISMS AND CAPACITY BUILDING

10.1 Institutional Set up

Planning function is a continuous process and the planning department's work continues from plan preparation to plan processing, enforcement implementation, plan detailing, review and then plan formulation and so on. The plan formulation, implementation, monitoring and review exercises must be statutorily prescribed in the State acts and completed within the specified time frame as schedule. In the context of these requirements institutional set up has a vital role.[18]

10.2 System Support for Planning and Implementation

To operationalise the entire planning and implementation process at the Gram Panchayat level, a strong administrative arrangement with regard to System Support is needed to be put in place. Besides human resource, technological and knowledge support, this arrangement shall include specific executive orders on technical, administrative and financial sanctions, procurement system by the Gram Panchayat. Since the Gram Panchayats are adequately empowered vide Article 243G of the Constitution with regard to preparation of an inclusive development Plan for Social Justice and Economic Growth. Fourteenth Finance Commission recommendations also maintains that the Gram Panchayats assume its legitimate role of approving Gram Panchayats Plans & mobilize the resources at its disposal for effective implementation of the respective Gram Panchayats Plans. Acknowledging the need to translate the ideas and aspirations of the stakeholders as reflected in the Plan document into tangible outcomes, it is imperative that both the planning & implementation stage of the project receives undivided support of all manners of resources like Human Resource, Technological Resource, infrastructural resource, Data resource, etc. Towards this end, therefore the Gram Panchayats will optimally utilize the services of the manpower deployed both from State level rural Development department and all the Line Departments.[19]

The work profiles of some of the functionaries or Technical Support Group (TSG) are detailed below.

10.2.1 District Town and Country Planning Departments(TCPDs)

- Gram panchayat planning would be moderated and assisted by the town and country planners at the district level.
- Subsequently rural Development assistants are needed to assist spatial planners with the ground level work.
- District level vision exercise as well as consolidation of the urban and rural plans in relevance to the state and district vision.

[18]Adapted from URDPFI Guidelines 2014
[19]Adapted from Gram Panchayat Development Plan Guidelines, 2015, Government of Sikkim.

10.2.2 Rural Development Assistants (RDA)

- Development Administration: RDAs are responsible for assisting in the planning, implementation and monitoring of all developmental schemes of the State Government, Government of India and the Panchayat level.
- Assist the Town and Country Planner at the District and Block level.
- Assistance for village library: Government can establish village libraries in the Panchayat Ghars of all Gram Panchayat Units which they are to maintain.
- Election related work: Election related work like delimitation of GPUs, preparation of electoral rolls, verification of polling stations, duties of polling officers and other related duties like counting, etc. which requires a very high sense of responsibility and accountability.
- Monitor e-Panchayat activities.[20]

10.2.3 Gram Panchayat Planning Committee

- It would constitute of competent Urban/Rural/Regional Planner, Rural development Assistants, Gram Sachiv, Patwari, Gram panchayat members, resource persons from the rural schools and health centres and official associated at rural level from the line departments.
- The Gram Panchayat planning committee would together aid, assist and contribute through participatory planning tools a comprehensive Panchayat development plan formulation in consultation with the Gram Sabha.
- The spatial plan would follow the spatial budgeting at the district and block level for various sectoral schemes of development.

10.3 Capacity Building

In order to implement the Participatory Planning for development of Gram Panchayats, capacity building is one of the important tools at all levels. The training strategy includes building capacities of all the stakeholders including Empowered Committee at State Level, Resource Groups at Panchayat level, other institutions etc. Training Strategy would be to provide training in cascading mode i.e. building capacities at SIRD level, then at District and block level, so as parallel trainings could be done in shortest possible time. 3 percent of the Basic Grant to Gram Panchayats to be earmarked for Capacity Building

10.3.1 Capacity Building Framework

10.3.1.1 Key Stakeholders

At State Level

- State PR & RD Officers at State Level
- Administrative Secretary + Senior Level Officer of Line departments
- State Resource Group including Universities representatives, Academician, NGOs, Subject Experts, UNDP Consultants, etc.

[20] ibid

- Faculty of State institutes of Public Administration, Scientists from KrishiVigyan Kendra, Public Relation Officers etc.
- Accredited or Private Training agencies to be identified.
- Mobile resource teams to be identified At Training Institute
- Faculty of SIRD.
- Resource Persons of SIRD at District Level
- Deputy Commissioners + Additional DCs + Senior Level Officer of Line departments
- District PR & RD Officers at District Level
- District Resource Group including Universities representatives, Academician, NGOs, Subject Experts, UNDP Consultants, etc.

At Block Level

- State PR& RD Officers at Block Level
- Block Level Officers of Line departments
- Block Resource Group including Local institutions, Eminent Retd. Personnel, NGOs, Subject Experts etc.
- At Gram Panchayat (Sensitization)
- Elected Representatives and Panchayat Functionaries
- Special Gram Sabhas, Camps, Seminars etc. for mass awareness of citizens.

10.3.1.2 Resource Persons or Master Trainers

- Faculty of State Institute for Rural Development (SIRD) and Extension Training Centres.
- Resource Person or Master Trainers of SIRD
- Resource Persons of SBM-G
- Resource Persons of SRLM
- Resource Persons of MGNREGA
- Resource Persons of Housing For All Scheme.
- Resource Managers of Rurban Mission.
- District Project Managers (Digital India)

10.3.1.3 Selection and Capacity Building of Resource Persons

- Proposed resource persons in place with orientation towards imparting training.
- Capacities of the proposed resource persons can be honed through 2-3 day State Level Workshop to be held at SIRD. MoPR to provide training support.
- Information Education and Communication activities fund of RGPSA can be used.

10.3.1.4 Developing Training Modules and Materials

- Model Training Modules to be provided by MoPR.
- Customization of Training Modules in local language by SIRD
- Training Management Portal would be used for design of modules etc.

- Handbooks, CDs, CBTs, PPTs would be prepared by SIRD

10.3.1.5 Infrastructure and logistics

- SIRD training facilities would be used for orientation programmes of Master Trainers.
- Training programs of District, Block and Gram Panchayats would be held at district and block.

10.3.1.6 Monitoring and Ensuring Quality

- Empowered Committee at State Level would do overall monitoring. Monitoring Module (IT based) would be developed.
- SIRD would monitor the training programs and report to Empowered Committee.
- Training Management Portal of Panchayat Enterprise Suite (PES) for monitoring.
- State Resource Group would do the Training Need Assessment at regular intervals to review and revise training modules, processes etc.

11. OPERATIONALIZATION OF RADPFI GUIDELINES

11.1 Adoption of RADPFI Guidelines

Rural Area Development Plan has no significance if it does not get implemented on ground. In the Planning Process in our country, excellent ideal plans were construed but these could not see the implementation stage due to numerous factors both local, socio economic, demographic, area and topography related, fund related issues, lapse in programmes and policies and a host of other related issues over period of time.

Spatial planning for development is an envisioning process which requires a sound assessment of the ground realities and provides options for sustainable development within demographic, physical, socio economic, jurisdictional and financial aspects. The focus is on spatial dimension as all development efforts have direct impact on the use of the land and different development projects need to be coordinated and integrated within a desirable spatial frame. The process of spatial planning is dynamic and needs to address the emerging problems of the human settlements. The formulation of the RADPFI Guidelines 2016 addresses the present challenges of rural spatial growth and development, plan preparation process and implementation and attempts to standardise and also simplify the guidelines required for planning in the country.

The norms and standards prescribed by RADPFI Guidelines 2016 are in the form of a suggested model, which may be adopted by the State Governments in accordance to their local conditions. State Town and Country Planning Departments have been preparing Development plans for urban areas based on from UDPFI Guidelines, 1996 and subsequently URDPFI Guidelines, 2016. The 'Country planning' which has always remained absent in practice from the various Town and Country Planning Acts as well as by state level agencies is now being given impetus through the 'RURBAN mission' and adoption of new and updated State Town and Country Planning Acts and also by the upholding of spatial norms by the RADPFI Guidelines.

The norms and standards are in slight variance to the urban norms and standards; but as stated in the URDPFI guidelines, 2016; the norms of both can be adopted by the respective state governments as well as can evolve its own but on a precondition of not violating the minimum standards given in the guidelines.[21]

11.2 Implementation of Projects/ Schemes

It is essential that the Gram Panchayat Spatial Development Plan (GPSDP) should be time bound, has clear cut outcomes, address the needs and priorities of the communities and area, enhance resource conservation, bring in sustainable development of the area.

The pre-implementation stages of GPSDP consist of the following major components:

[21] Adapted from URDPFI Guidelines, 2014

(a) The date on which the GPSDP will be firmed up taking into account various parameters specified in the Plan.

(b) The dates on which the sanctioning authority, whether it is the State Government or the Central Government (as the case may be) will be ready with the formal sanction separately in respect of each of the schemes/ projects , whether it is in the agriculture, irrigation, electrification, education, road connectivity, health infrastructure and delivery, social and economic sector schemes, need based and region specific schemes, communication, agro processing, rural industries etc.

(c) The dates on which GPSDP is launched for the schemes/projects by the Gram Panchayat.

After these critical landmarks are determined, under the pre-implementation stages of each of the projects/schemes, the Panchayat will start implementing GPSDP with an obligation and adhere to the time line as broadly suggested in the GPSDP.

(iii) In order to ensure that the time line is strictly adhered to, the delegation of authority and responsibility of the Gram Panchayat be considerably enhanced, and entrusted to Gram Panchayat Members for implementing the schemes/ projects etc. included in the GPSDP.

(iv) After determining the exact date of physical start-up of the projects, a simple graphical PERT network with clearly mentioning in local language preferably on a wall of the Panchayat Building or a separate cement board for transparency and ensuring participation of the local people.

(v) Before a project is included in the GPSDP and later on taken up for implementation, a very detailed examination of the scheme/project be undertaken. Detailed site investigations, geological investigations, resource endowment, technology assessment, SWOT analysis etc. should be undertaken in all cases. Expenditures on these investigations are very necessary and should be sanctioned liberally.

(vi) With regard to critical projects in the field of rural industry, electrification, irrigation, communication, road connectivity, drinking water and sanitation, rural housing, education and health, etc. a good deal of study like exact location, accessibility, serviceability, adequacy, judicious use, conservation of NRM, choice of technology, social cost benefit etc should be analysed and implemented in a simplified and expeditious manner.

(vii) As unutilised funds have to lapse towards the end of the financial year, the possibility of funding on a long term basis, for at least in critical sectors, will have to be examined as against the present system of annual funding. This will avoid delay in the implementation of projects.

(viii) Gram Panchayat responsibility for the implementation of the Plan should result in a sense of involvement in fulfilling of the Plan targets. The existing procedure would need a very careful examination so that proper formulations are drawn up quickly, and implemented.

(ix) When the project is undertaken, and even before the first phase of the project has been completed, expansion schemes have been introduced with the result that neither the objectives of the first phase were achieved, nor the various expansion projects which are loaded on to the original projects are productive, resulting in time and cost overruns. It would, therefore, be imperative that no expansion projects should be taken up unless the original project is completed, and is fully stabilised, and has given the desired results both in regard to the physical and fiscal performance.

(x) The Planning process at District and Block Level is fairly stabilized and there is a need to improve the plan process and project implementation at GP level. Though recently GPDP and SAGY are aiming towards improving the planning scenarios considerable strengthening is required at the GP level and RADPFI is expected to address these issues.

11.2.1 Monitoring of Implementation

1. The GPSDP implementation by the Gram Panchayat would also need to effectively monitor with a view to ensuring that for each scheme various targets relating to time and cost, generation of services, social and economic benefits relating to the individual projects through the rural industries, agricultural, primary education, irrigation, drinking water and sanitation, rural roads connectivity, primary health or any other sector of the rural economy are achieved.

2. Implementation of the GPSDP has to be very effective, and for this task, various line Departments concerned at the Block and District level of the concerned states have to be strongly geared up and quarterly or six monthly reviews with regard to the implementation of the GPSD Plans.

11.2.2 Machinery For Planning

1. There is technical manpower shortage at GP level or even Block level, particularly in core sectors like agriculture, drinking water and sanitation, irrigation, agro processing, rural roads, education and health and social services sectors. A GPSD project need techno-economic feasibility and social costs benefits.

2. The Block Planning machinery would need to be strengthened in the areas where deficiencies exist with regard to their role in supervising project implementation of the GPSD Plan projects. It would be desirable that the Block Planning agencies co-ordinate effectively with the Gram Panchayat in respect of formulation and implementation of the Plans.

3. Planning at the local level has an important role to play in investment decisions in agriculture, minor irrigation, animal husbandry, fisheries, marketing and processing, cottage and small scale industries, local infrastructure and social sector services including water supply, housing, health, education, sanitation, roads and local transport, which should be made area specific at the grass root level based on local environments, physiography,

demographic profile, socio economic aspects and potential for growth and fuller employment. It is envisaged that if the Block Level Planning is strengthened, the technical manpower could help in not only scientific plan formulation but also in the effective plan implementation of the programmes for the faster development of the rural area optimizing the use of local endowments, integrating the GPSD plan objectives and local needs.

4. The GP level plans would need to be in harmony with the Block and District level Plans. The investment decisions at the local level would need to take into account the effects of Central/State Plans in that area and of neighbouring localities. The cluster of GPs as rural areas and propensity to develop faster, is intended to be the primary area for GPSD local planning. Area specific development programmes will help deal with the problems of regional imbalances and intra-regional variations. The GPSD planning projects would require specific technical skills and manpower resources within a framework of guidelines formulated at the local level. Thus strengthening the planning machinery is imperative for promoting location-specific area plans for rapid development.

11.2.3 People's Involvement In Planning And Implementation

1. Apart from decentralisation of the administrative machinery and provision of adequate coordinating mechanisms at the local level, it will be necessary to ensure that at every stage of planning and implementation there is full participation and involvement of the people. Allocations or public funds for schemes in these sectors, whether by the Central or the State Governments are on the basis of certain patterns of funding designed to achieve the targets of the Plan. The selection of the specific tasks, however, is governed by local conditions and in assigning priorities it might be necessary to involve both the Gram Panchayat and Block Panchayat at the local level as well as the representatives of people particularly of the beneficiary groups, women's groups, youth, socially disadvantaged groups, NGOs and community based organisations for implementation of the RADP in consonant of its objectives and spirits at local level.

2. The institutional mechanism for this purpose will need to be adapted to changing requirements. The Panchayati Raj institutions should be strengthened in order to become institutions of democratic management of rural development both at the block and GP levels. Some State Governments have already established systems where at the Block level the development work is entrusted to Block Level Technical and administrative Officials for effective implementation. The block and GP level representative institutions will, however, have to give adequate voice in their affairs to the weaker sections of the society who are the major beneficiaries of the programmes ol development. The welfare of women and their economic emancipation should receive special attention.

3. Special emphasis would need to be placed on involving the youth at GP level. More imaginative ways through skill development, employment, upgradation of their technical skills, exposure for new innovations and rural technologies, opportunities in service sector, IT based tools and new way of eLearning and distance learning methods to be evolved, for

tapping the potential and idealism of the youth for constructive action in rural areas. Through participation of the youth, women, farmers, artisans, handloom and khadi workers, disadvantages groups etc, several development activities could be initiated towards addressing the needs for energy, housing, basic needs, drinking water and sanitation, farming technologies, employment, social security, education and health, income generating activities etc, under the purview of the RAD Plan implementation.

11.2.4 Manpower Requirement

1. Manpower requirement require careful review at GP level so as to bring about a hybrid approach with tapping technical manpower from PMKSY, Agriculture , MGNREGA, PMGSY, PMIAY etc and tapping the guidance of Block level technical functionaries, to keep a judicious mix for a sustainable approach. Staff posted in tribal, hill and backward regions require attention so that competent technical staff can be given skill upgradation and behaviourial modification for improved performance in the GPSD Plan implementation in such regions. Project based and part-time employment of locally skilled people, retired block level functionaries, NGO technical staff, CBOs, or through training, capacity building and hand holding of the Panchayat functionaries, involving local educational and social organisations, women's groups, farmers organisations etc can render maximise benefits from existing institutions for accelerating the development of rural areas, under RADPFI. Volunteerism, entrepreneurship, CSR, PP activities to be developed to be of backbone support agencies in rural areas.

2. Inadequacy of adequate administrative framework at Block and GP level is a major challenge in the promotion of basic amenities like housing, education, health and communication, accessibility, drinking water and sanitation, employment, economic activities etc for rural area development in terms of growth and economic development. Though the GP is the nodal agency to implement the GPSD Plans, Block level technical personnel should give their technical advise and support in the implementation of the Plans, for which the job profile of the Block functionaries may be redefined and made broad based.

11.3 New Roles and Functions of State Town and Country Planning Departments

The new role of Town and Country Planning Departments that emerges out of the provisions of the 73rd&74th CAA shall, among others, include :

a) Advice and technical assistance to the State Government on matters pertaining to spatial planning and development as well as implementation of state programmes;

b) Initiation of action pertaining to provision of legal support in relevant Acts for socio-economic, spatial planning and development processes; and on the suggested Regional, Rural and Urban Development Planning system;

c) Assistance to the State Urban and Regional Planning Board in formulation of the State Perspective Plan and strategy of spatio-economic development of the State, having regard to proposals contained in district and metropolitan area development plans;

d) Division of the State into various planning regions taking into account the physical, socio cultural, economic and climatic considerations and formulation of plans of their spatio-economic development to serve as a guide for resolving inter-district developmental issues and provide basis for inter-district cooperation and co-ordination with a view to prepare district development plans more harmonious;

e) Scrutiny of the district and metropolitan area development plans for approval of State Government, taking into account the State perspective plan, spatio-economic development strategy and proposals of relevant planning region covering the district or the metropolitan area;

f) Ensuring that respective settlement Development Plans (Regional/Urban/Cluster/Gram Panchayat) prepared by local authorities are within the framework of the approved perspective plan of the State/settlement;

g) Technical assistance to local authorities if so requested at the cost of the concerned body;

h) Preparation of the development plan in case of default by the local authority, district planning committee or the metropolitan planning committee, if so directed by the State Government, at the cost of the concerned planning body;

i) Provision of necessary research input directly or through the help of consultants in formulation of policies, strategies, norms, standards, laws, regulations and rules pertaining to urban and regional planning and development matters;

j) Provision of manpower training facilities;

k) Establishment of an Urban and Regional Information System and dissemination of information[22].

11.4 Information System, Database for Implementation

1. A detail computer based information systems for data storage, retrieval and processing of all Government Departments and sectors, both State and Central are being available and are in use in the country up to GP level. For most of the Central Schemes, the data is being updated on daily basis. A dedicated data capturing framework in the NIC to be developed for computerized desktop based, tablet based and mobile based updation on the progress of implementation of works under GPSD Plans.

[22] URDPFI Guidelines, 2014

2. Dash Boards in the NIC RADP MIS to be evolved to show the progress of work and also help monitoring and timely completion of the works, as per the GPSD Plans.

3. GIS based asset monitoring and updation through photographs, positional coordinates with details of the asset created, beneficiaries etc to be uploaded on daily basis by the various technical personal available in GP level under Central and State level and through that of Block level.

4. Crowd sourcing of information on GPSD Plan implementation would give a fillip to the faster progress of works under GPSDP in rural areas.

5. Social media networks to be extensively used for knowing the views of the stake holders in the progress monitoring and implementation issues for timely resolving the same for effective implementations.

TRAINING

1. Training, capacity building and hand holding is an essential component of the GPSD Plan implementation for all GP functionaries, Block functionaries, youth, women's groups and other stake holders in rural area. Training need to be organized at local level in simple manner in local language with instruction manuals to be available pictorially for easy understanding.
2. Training to be implemented on Mission Mode to make the GPSD Plans effectively implementable for bringing faster development and addressing the priorities and needs of the targeted rural areas and hence the training need to be area specific with special skills like hills, disaster prone, tribal areas, coastal, drought prone etc.
3. The existing Block and GP technical Staff under various State and Central development schemes to train, sensitise and familiarise the stake holders for operating in a mission mode approach.

SOCIAL AUDIT

1. The Social Audit dimension should be an integral part of the GPSD Plan implementation in rural areas. All the processes and methodologies followed under MGNREGA may be followed for GPSD Plans also for standard practice and for taking advantage of the local people's familiarizes and that of the Gram Panchayats.
2. The observations and feedback from the Social Audit should be rolled back to GPSD Plans for scientific, need and priority based, implementable, plan implementation to derive optimum benefits to the rural areas and people.

11.5 Recommendations to State Governments/ Town and Country Planning Departments/ Local Bodies/Development Authorities

State Governments should review and where necessary amend the **respective State Town and Country Planning Acts and related laws of the State Government** to minimize inconsistencies and contradictions and inadequacy in to propel integrated spatial and sectoral planning in rural areas. The state T&CP Acts could direct the public participation at pre-planning and post draft plan formulation stage and the time period for approval of development plans. The amendments are suggested to be referred from the Model Town and Country Planning Law and Model Municipal Law by the Central Government revision.

The relevant state level acts to be considered for revision can be looked up in table number 10.2 of the URDPFI Guidelines 2014.

- States need to proactively amend their T&CP Acts to incorporate the provisions of 74th CAA on the lines of Bihar and Kerala.
- States also need to amend Building Regulation as per the directions of Ministry of Urban Development
- Efforts to be made to operationalize the MPC and DPC with appropriate role of T&CP Departments.
- Integration of Sectoral Plans with Master Plans and GPDPs with provision of notification of the same.
- Any future amendments to be need based with wider stakeholder consultations
- Regulatory framework to be reengineered which ought to be people's friendly and with an enabling environment in a time bound and transparent manner.
- Revision of Model Town and Country Planning Law to be undertaken keeping in view the emerging issues and dynamism of spatial planning.
- TCPO and SPA together may attempt for this exercise as a follow up of the URDPFI and RADPFI Guidelines.

11.6 Modified State Town and Country Planning Acts

The Bihar and Kerala State Town and Country Planning Acts of 2012 and 2016 have tried to incorporate the components suggested by the 73rd and 74th CAAs as well as tried to widen the ambit of spatial planning to the Town as well as Country, i.e. Rural areas or Gram Panchayats. The implementation of the same would however prove the efficacy of the same.

The following sub sections just highlight the sections of the respective Acts which relates to spatial planning in rural areas.

11.6.1 Bihar Urban Planning and Development Act, 2012

Section 22: Contents of Development Plan-

The Planning Authority shall consider and incorporate, while preparing the Development Plan, such information and details including land use, Zoning Regulation, development

control regulations, whether the Planning Area is a Natural Hazard Prone Area, within a time frame of twenty years or such extended period as may be specified by the Government:

a) prepare a topographical map for the Planning Area and also earmark lands fit for agriculture (wet and dry), and allied sectors like animal husbandry, dairy, poultry, horticulture, floriculture, forestry (including social forestry), urban agriculture and wasteland fit for various kinds of development;
b) Identify and map the facilities *at the level of village, block, city and district.*
c) Identification and demarcation of zones and sub zones, within the holistic framework of the Development Plan.
d) Collect, compile and update the information on natural and human resources and the demographic profile, for preparing the database at block, city and district level for decentralized planning.
e) modify, amend and consolidate the *objectives and strategies made for five years or annual draft Development Plans of rural and urban areas, considering the overall objectives of development* .

11.6.2 Kerala Town and Country Planning Act

The Kerala Town and Country Planning Ordinance 2013, got passed as an Act in 2016. The act states to -

To provide for the promotion of planned development and regulation of growth of urban and rural areas in the State with focus on scientific spatial planning and to secure to their present and future inhabitants, sanitary conditions, amenity and convenience and for other matters connected therewith or incidental thereto.

Preamble.—WHEREAS, it is expedient to provide for the promotion of planned development and regulation of growth of urban and rural areas in the State with focus on scientific spatial planning and to secure to their present and future inhabitants, sanitary conditions, amenity and convenience and for other matters connected therewith or incidental thereto.

Local Planning Area.—From the date of commencement of this Act, the area under the jurisdiction of a Municipal Corporation, Municipal Council, Town Panchayat or **Village Panchayat** shall be deemed to be a Local Planning Area, for the purposes of this Act.

Powers and functions of the Municipal Corporations, Municipal Councils etc. in relation to spatial planning.—Notwithstanding anything contained in the Kerala Municipality Act, 1994 or the Kerala Panchayat Raj Act, 1994, Municipal Corporation, Municipal Council, Town Panchayat or **Village Panchayat** shall have the following additional functions for the purpose of this Act, namely:—

(a) prepare or get prepared for the Local Planning Area or part thereof,—
(i) a master plan, taking into account the Plans, if any, prepared under this Act which have relevance to the Local Planning Area;

(ii) execution plans, taking into account the master plan and other Plans, if any, prepared under this Act which have relevance to the Local Planning Area;

(b) implement all or any of the provisions contained in the Plans under this Act by formulating and executing projects, Land Pooling Schemes, Detailed Town Planning Schemes or otherwise;

(c) formulate, promote, regulate and control land use and developmental activities in the Local Planning Area as per the Plans under this Act;

(d) set up special function agencies, if necessary, for specific functions such as plan preparation, implementation of projects and guide, direct and assist such agencies on matters pertaining to their respective functions; and

(e) perform such other functions as are supplemental, incidental or consequential to any of its functions and or as may be directed by the Government from time to time.

The Kerala Town and Country Planning Act is the most recent and updated with the spatial Planning component for both Urban and Rural Areas. The act is exemplary in relation to the strengthening and emphasis it provides to spatial planning.

(Kerala Town and Country (Planning and Development) Act 2016; accessed, 19/07/2016; http://www.townplanning.kerala.gov.in/ACTS_RULES/ACTS_RULES_01.htm)

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INPUTS RECEIVED FROM

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2. National Remote Sensing Centre
3. Centre For Good Governance

ANNEXURE 1:

Decentralised Planning in India

Decentralised planning is a system through which planning process is brought close to the ultimate target of development, i.e, the people. It is a multilevel planning system in which planning is attempted at different political, administrative and executive levels. So that there is greater integration between the development needs and priorities of smaller areas and different socio-economic classes within the hierarchies of the local, district, regional, state and national levels.

Decentralisation involves planning for all sectors or types of activity within a geographical area. It lays emphasis not only on decentralisation of the decision making process but also on increasing participation by the people at all stages of planning. These would enable full utilisation of resources according to the needs of the local people by making them actively involved in the formulation as well as execution of plans at the grass root level. Decentralisation implies a movement away from the centre. It implies an even distribution of power among all agents in the social, political and economic spheres. It facilitates the articulation of people's needs and demand.

Decentralised governance, from capital cities to towns and villages, is the best way to involve people in development activities and for increasing efficiency. Local officials and politics will be better scrutinised and their activities better monitored. They will be more accountable to the communities which they are supposed to serve. Decentralisation by empowering people from the grass root level helps to generate a sense of belongingness among them and they get more deeply involved in development works

The Indian constitution has the concept of decentralisation in the Directive Principles of State Policy. Article 40 of the Directive Principles of State Policy states that the state shall take steps to organise villages and panchayats and endow them with such powers and authority as may be necessary to enable them to function as units of self government. The division of power and functions enshrined in Article 246, read with the seventh schedule of the constitution, made multilevel planning almost a necessity.

Subject to the provisions of the Constitution, the Legislature of a State may, by law, endow the Panchayats with such powers and authority as may be necessary to enable them to function as institutions of self government and such law may contain provisions for the devolution of powers and responsibilities upon Panchayats at the appropriate level, subject to such conditions as may be specified therein, with respect to-

(a)The preparation of plans for economic development and social justice,

(b)The implementation of schemes for economic development and social justice as may be entrusted

(c)To them including those in relation to the matters listed in the Eleventh Schedule.

Evolution of Decentralized Planning

India adopted economic planning with the launch of the First Five Year Plan in 1951. Five Year Plans have been mainly centralized plans. But even then, from the very first plan onwards attempts have been made by the government to introduce some degree of decentralization into the planning process by strengthening local level planning. Sometimes such attempts have been strong and visible. At other times, they have been weak and dormant. Thus decentralized planning has evolved in India in fits and starts over the years. Its evolution can be divided into five phases for a brief examination.

Phase – I: The Community Development Phase

The period includes the First Five Year Plan (1951-56) and the Second Five Year Plan (1956-61). During the First Plan the Community Development (CD) programme was started with great enthusiasm to give concrete shape to Gandhi's ideal of a self-reliant village. Significantly, the programme was started on October 2, 1952 in 55 selected blocks of the country to coincide with the birthday of the Mahatma. It was designed as a people's movement. According to the then ministry of Community Development, Government of India, "The initiative for Community Development programme comes from the people themselves. Village Communities not only choose the priorities according to which the problems are to be tackled, but they also undertake the major responsibility for implementing them. The role of the Government is to assist all these activities at every stage. Officials guide and help the villagers, provide technical advice and organise supplies, services and finance". The programme was implemented through the National Extension Service. In practice, however, the method adopted for the purpose was "top-down" in which all the directions came from the centre. But such directions neither reflected local needs, nor came with the necessary financial and technical resources. Therefore, the members of the community did not take much interest in the programme as was hoped for.

Phase - II : The Panchayati Raj Phase

This (1960-70) phase marks the creation of the Panchayati Raj institutions following the recommendations of the Balwantrai Mehta Committee set up to study the working of the Community Development projects. The Committee made an historic observation relating to decentralization: "So long as we do not discover or create a representative and democratic institution which will supply the local interest, supervision and care necessary to ensure that expenditure of money upon local projects conforms with needs and wishes of the locality, invest it with adequate power and assign to it appropriate finances we will never be able to evoke local initiative in the field of development."

According to the Balwantrai Mehta Committee's recommendations the Panchayati Raj system was to have three tiers at the village, block and district levels. At the village and block levels there were to be elected democratic bodies. At the district level there was to be an

advisory body under the Chairmanship of the District Collector. MPs, MLAs and other important persons were to be its members. The elected bodies were to be entrusted with planning and development activities. Panchayati Raj institutions were set up in many states following this report. But at the district level this institution was not regarded as a separate level of government. No Panchayat Samiti or Zilla Parishd at the block and district levels developed a proper development profile of the area. Political leaders dominated the meetings at the Panchayat Samiti and Zilla Parishad. All the development decisions were taken by the State and Central authorities. Lower level units were given guidelines for target and programme implementation from above. These institutions suffered a great decline by the end of 1970s.The Ashok Mehta Committee appointed in 1977 to review the existing situation of Panchayati Raj in the country recommended a two-tier system.

Phase – III : The Special Programmes Phase

During the 4th Five Year Plan some important changes were introduced to economic planning and development in the country. Up to this time States were getting plan funds from the Centre in the form of assistance for specific projects proposed by the State and approved by the Centre. But this system of disbursement of Central assistance for the States was changed during the 4th Plan. Now the so called Gadgil Formula came into play whereby block allocation were given by the Centre to the States on the basis of 30% grant and 70% loan irrespective of schemes and priorities adopted by the States. This can be described as a step towards decentralization of the planning process from the Centre to the States. The States now had to build up and strengthen their planning machinery to utilize the funds. Around this time it was also realized that the economic growth achieved in the country so far through the 5-Year Plans had not benefited all groups of society and all regions uniformly.

A need for the launch of special schemes to specifically benefit these areas and groups were felt. This led to the introduction of some special programmes in the plan like the following: • The Pilot Intensive Rural Employment Project (PIREP) • The Small Farmers Development Agency Programme (SFDAP) • The Marginal Farmers and Agricultural Labourers Agencies Programme (MFALAP) • The Drought Prone Area Programme (DPAP) • The Tribal Areas Development Programme (TADP) • The Hill Areas Development Programme (HADP) • The Minimum Needs Programme (MNP) A look at the titles of these programmes makes it clear that now the emphasis in rural development was given on “target groups” and “target areas”. The Development Block was viewed as the most suitable unit for this kind of area planning. Activities suitable for the area were to be planned and implemented with close involvement of the local people. A Working Group on Block- Level Planning appointed by the Government under the chairmanship of Prof. Dantwala prepared guidelines for blocklevel planning. But later on, with the change of government and adoption of a new 6th Plan (1980-89) the emphasis of local planning changed from the Block-level to the District-level.

Phase – IV : The District Planning Phase

The Sixth and Seventh Five Year Plans during this period (1980-90) continued with the special programmes in old and new forms. Decentralized Planning at the district and local

levels were intensely discussed during this period. The government set up a Working Group on District Planning under the Chairmanship of C.H.Hanumanth Rao in 1982. The Working Group recommended a unified planning process at the district level covering all sectoral programmes. It gave a detailed prescription for organizing planning at the district level relating to methodology, institutions and other prerequisites.

The G.V.K.Rao Committee appointed in 1985 to recommend administrative arrangements for rural development also pointed out that the district plan should not be viewed simply as a segment of the State Plan. It should be conceived and executed at the district level and integrated into the State Plan. Both the committees provided detailed guidelines to the states to reorganize planning below the State level. Many state governments went for decentralized planning in their own ways while following these guidelines generally.

Phase – V :

The Panchayati Raj Revival Phase Decentralized Planning depends to a great deal on the devolution of functions and powers from government at the top to the local levels. The Panchayati Raj institutions (PRIs) form the lower level authorities in our country. It has been seen, however, that even when powers and functions are given up to these institutions, something is held back for exercise by competing agencies. Very often the weak constitutional position of the Panchayati Raj institutions was the reason for this neglect. The Government has tried to strengthen the PR institutions by turning them into constitutional units of self-government through the 73rd Amendment to the Constitution in 1993. As many as 29 subjects have been identified for the PRinstitutions. Many States have already devolved considerable number of functions and powers to these institutions with the power to mobilize resources. At present the trend all over the country is to move fast towards decentralized planning through PRinstitutions.

(Adapted From- Decentralized Planning: A Training Module, Gopabandhu Academy of Administration, Orissa, Bhubaneswar)

Implications of &73rd and 74th Constitutional Amendment Act

The 73rd Constitutional Amendment Act came in effect from 24th April, 1993 and 74th Constitution Amendment Act (74th CAA), in effect from 1st June 1993, ushered a new era in the history of rural and urban local government in the country.

The key mandatory provisions are:

The establishment in every state (except those with populations below 2 million) of rural local bodies (panchayats) at the village, intermediate and district levels (Article 243B)

I. Direct elections to all seats in the panchayats at all levels (Article 243C)

II. Compulsory elections to panchayats every five years with the elections being held before the end of the term of the incumbent panchayat in the event that a panchayat is dissolved prematurely, elections must be held within six months,

with the newly elected members serving out the remainder of the five year term (Article 243E)

III. Mandatory reservation of seats in all panchayats at all levels for Dalits and Advivasis in proportion to their share of the panchayat population (Article 243D)

IV. Mandatory reservation of one-third of all seats in all panchayats at all levels for women, with the reservation for women applying to the seats reserved for Davits and Advises as well (Article 243D)

V. Indirect elections to the position of panchayat chairperson at the intermediate and district levels (Article 243C)

VI. Mandatory reservation of the position of panchayat chairperson at all levels for Davits and Advises in proportion to their share in the state population (Article 243D)

VII. Mandatory reservation of one-third of the positions of panchayat chairperson at all three levels for women (Article 243D)

VIII. In addition, the act mandates the constitution of two state-level commissions: an independent election commission to supervise and manage elections to local bodies, much as the Election Commission of India manages state assembly and parliamentary elections (Article 243K); and a state finance commission, established every five years, to review the financial position of local bodies and recommend the principles that should govern the allocation of funds and taxation authority to local bodies (Article 243 I).

XI. As per Article 243 H of 73rd CAA the Finances has been left to the legislature of the state to specify the imposition of taxes, duties, fees etc.

X. Article 243 ZD provides for constitution of District Planning Committee at district level in every state, to consolidate the plans prepared by the panchayats and the municipalities in the district and to prepare a draft development plan for the district as a whole. The DPC would provide interaction with the municipal bodies and panchayati Raj institutions, in addition to planning and conflict resolutions.

In terms of Article 243M of 73rd CAA the above provisions may not apply to Scheduled Areas and Tribal Areas as referred to in Article 244 of the constitution (i.e., Scheduled Areas and Scheduled Tribes in the states of Assam, Meghalaya, Tripura and Mizoram.). However, Parliament may by law, extend the provisons of Part IX A to these areas subject to such exceptions and modifications as may be specified in that law.

(http://www.preservearticles.com/2011092814252/what-are-the-importance-points-of-73rd-and-74th-constitutional-amendments-india.html; accessed 19th July, 2016)

Following is a successive list of items mentioned in 11th schedule of the Constitution meant under the responsibilities of Panchayats. We can very well see the missing spatial planning and regulation component from the Rural governance.

Table01 : List of items- Eleventh Schedule

LIST OF FUNCTIONS	
1. Agriculture, including Agricultural Extension	16.Poverty Alleviation programme
2. Land improvement, implementation of land reforms, land consolidation and soil conservation	17.Education, including primary and secondary schools
3. Minor Irrigation, water Management and watershed development	18.Technical training and vocational education
4.Animal husbandry, dairying and poultry	19.Adult and non-formal education
5. Fisheries	20.Libraries
6. Social Forestry and Farm forestry	21.Cultural Activities
7.Minor Forest Produce	22.Markets and Fairs
8.Small scale Industries, including food processing industries	23.Health and santitation , including hospitals, primary health centres and dispensaries
9.Khadi, village and cottage industries	23.Family welfare
10.Rural Housing	24.Women and child development
11.Drinking water	25.Social Welfare, including welfare of the Physically and mentally challenged.
12.Fuel and fodder	26.Welfare of the weaker sections, and in particular , of the Scheduled Castes and the Scheduled Tribes
13.Roads, Culverts, Bridges, Ferries, waterways and other means of communication	27.Public Distribution System
14.Rural electrification, including distribution of electricity	28.Maintenance of community assets
15.Non conventional energy sources	

Town and Country Planning Legal Framework

Town and country Planning Organisation (TCPO) formulated the Model Town and Country Planning Law in the year 1960-. This model Act was revised by TCPO in year 1985 “Model Regional and Town Planning and Development Law” to enact a comprehensive urban and regional planning legislation in all the States and UT’s. It is in the form of guidelines which ensures better overseeing and coordination of planning with implementation, so that a single agency can perform both these functions. The law provides for the constitution of State Regional and Town Planning Board by the State Governmnets for the purpose of advising on the delineation of the region for the planned development.

Since the preparation of the Model Law , almost 3 decades back, many legislative and ideological changes have taken place in the developmental approach of Government of India. Also to incorporate the provisions of 73rd CAA, the Model law requires a revision in the spirit to uphold Spatial Planning and Rural Development together with the empowerment of the Panchayati Raj system.

Rural Areas have always been out of any spatial planning guidelines or bye laws and development has largely been unregulated and haphazard. The need to regulate human habitations at the initial stage for a sustainable and better evolution of human habitat has been recently felt very strongly and it gets even more necessary to inculcate the provisions for Rural Development planning in the Town and Country Planning Laws of the state and the model law of the centre.

State Level Legal Framework and Rural planning- Overview.

Urban, Regional and Rural planning legislations controls the planning and development activity in a state. Some states have comprehensive Town and Country Planning legislation which provides for spatial and land utilization planning in Rural Areas.

The West Bengal Town and Country (Planning and Development) Act, 1979

The West Bengal Town and Country (Planning and Development) Act in Section 31 - Land Use and Development Control Plan The [Land Use and Development Control Plan] may also

- Allocate areas or zones of land for use—
  The existing and proposed lines of communications, including railways, transports, airports, canals and *linkage between towns and villages*
- Indicate, define or provide for—
  The existing and proposed lines of communications, including railways, transports, airports, canals and *linkage between towns and villages*
- *Locate cluster of villages and huts and designate* land for hats, markets, ottage industry, livestock, pasture festivals, fairs, meals and like community facilities and conservation of trees and forests;

The Karnataka Town and Country Planning Act, 1961

Statement of Objects and Reasons

Act 11 of 1963: Physical Planning has to precede economic planning as otherwise *cities, towns and villages of our country will grow to unmanageable sizes without proper planning resulting in unhealthy surroundings.*

Section 4A. Declaration of Local Planning Areas, their amalgamation, Sub-Division, inclusion of any area in a Local Planning Area.

(1) The State Government may by notification declare any area in the State to be a Local Planning Area for the purposes of this Act, [or include within such

local planning area, any area adjacent thereto, and on such declaration or inclusion] this Act shall apply to such area:

To create conditions favorable for planning and re-planning of *the urban and rural areas* in the [State of Karnataka], with a view to providing full civic and social amenities for the people in the State.

The Goa, Daman and Diu Town and Country Planning Act, 1974

(Act No. 21 of 1975) [4th November, 1975] AN ACT

To provide for planning the development and use of rural and urban land in the Union territory of Goa, Daman and Diu and for purposes connected therewith.

Section 8. Functions and powers of Board.

(1) Subject to the provisions of this Act and the rules made thereunder, the functions of the Board shall be to guide, direct and assist the Planning and Development Authorities, *to advise the Government in matters relating to the planning, development and use of rural and urban land in the State*, and to perform such other functions as the Government may, from time to time, assign to the Board.

Bihar Urban Planning and Development Act, 2012

Section 22: Contents of Development Plan.-

The Planning Authority shall consider and incorporate, while preparing the Development Plan, such information and details including land use, Zoning Regulation, development control regulations, whether the Planning Area is a Natural Hazard Prone Area, within a time frame of twenty years or such extended period as may be specified by the Government:

- prepare a topographical map for the Planning Area and also earmark lands fit for agriculture (wet and dry), and allied sectors like animal husbandry, dairy, poultry, horticulture, floriculture, forestry (including social forestry), urban agriculture and wasteland fit for various kinds of development;
- Identify and map the facilities *at the level of village, block, city and district.*
- Identification and demarcation of zones and sub zones, within the holistic framework of the Development Plan.
- Collect, compile and update the information on natural and human resources and the demographic profile, for preparing the database at block, city and district level for decentralized planning.
- modify, amend and consolidate the *objectives and strategies made for five years or annual draft Development Plans of rural and urban areas, considering the overall objectives of development* .

Kerala Town and Country Planning Act, 2016

The Kerala Town and Country Planning Ordinance 2013, got passed as an Act in 2016. The act states to -

to provide for the promotion of planned development and regulation of growth of urban and rural areas in the State with focus on scientific spatial planning and to secure to their present and future inhabitants, sanitary conditions, amenity and convenience and for other matters connected therewith or incidental thereto.

Preamble.—WHEREAS, it is expedient to provide for the promotion of planned development and regulation of growth of urban and rural areas in the State with focus on scientific spatial planning and to secure to their present and future inhabitants, sanitary conditions, amenity and convenience and for other matters connected therewith or incidental thereto.

Local Planning Area.—From the date of commencement of this Act, the area under the jurisdiction of a Municipal Corporation, Municipal Council, Town Panchayat or **Village Panchayat** shall be deemed to be a Local Planning Area, for the purposes of this Act.

Powers and functions of the Municipal Corporations, Municipal Councils etc. in relation to spatial planning.—Notwithstanding anything contained in the Kerala Municipality Act, 1994 or the Kerala Panchayat Raj Act, 1994, Municipal Corporation, Municipal Council, Town Panchayat or **Village Panchayat** shall have the following additional functions for the purpose of this Act, namely:—

(a) prepare or get prepared for the Local Planning Area or part thereof,— (i) a master plan, taking into account the Plans, if any, prepared under this Act which have relevance to the Local Planning Area; (ii) execution plans, taking into account the master plan and other Plans, if any, prepared under this Act which have relevance to the Local Planning Area;

(b) implement all or any of the provisions contained in the Plans under this Act by formulating and executing projects, Land Pooling Schemes, Detailed Town Planning Schemes or otherwise;

(c) formulate, promote, regulate and control land use and developmental activities in the Local Planning Area as per the Plans under this Act;

(d) set up special function agencies, if necessary, for specific functions such as plan preparation, implementation of projects and guide, direct and assist such agencies on matters pertaining to their respective functions; and

(e) perform such other functions as are supplemental, incidental or consequential to any of its functions and or as may be directed by the Government from time to time.

The Kerala Town and Country Planning Act is the most recent and updated with the spatial Planning component for both Urban and Rural Areas. The act is exemplary in relation to the strengthening and emphasis it provides to spatial planning.

(Kerala Town and Country (Planning and Development) Act 2016; accessed, 19/07/2016; http://www.townplanning.kerala.gov.in/ACTS_RULES/ACTS_RULES_01.htm)

ANNEXURE 2:

Perspective Plans for National and International case studies

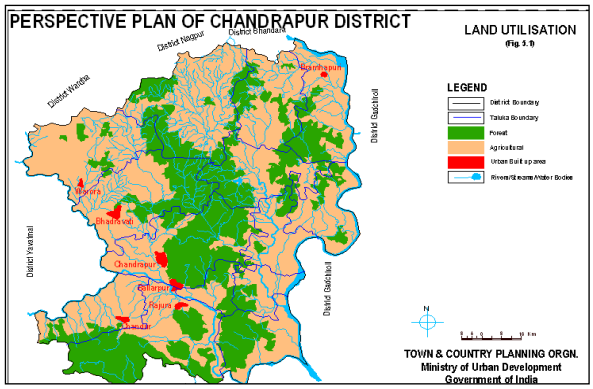
National Case:Chandrapur

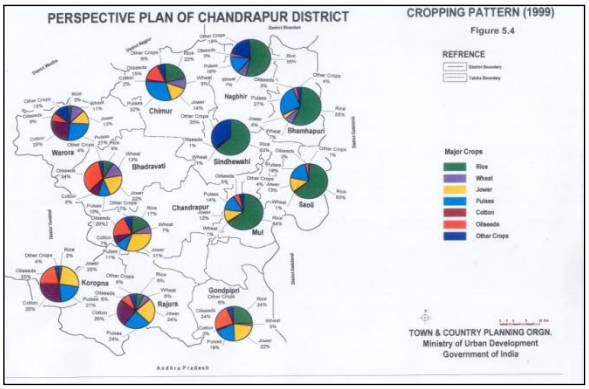
The Chandrapur district perspective plan draw a long-term development plan by integrating the various sectors of development with the sectoral plans as well as regional and state development plans. This plan integrates all the settlements in the district both rural and urban in an appropriate hierarchical pattern and plan for their all round development on long term basis by proposing for up-gradation of various infrastructural facilities. It take into account regional socio-economic and cultural practices while proposing for new schemes of development. Key features of the perspective plan of Chandrapur District are:

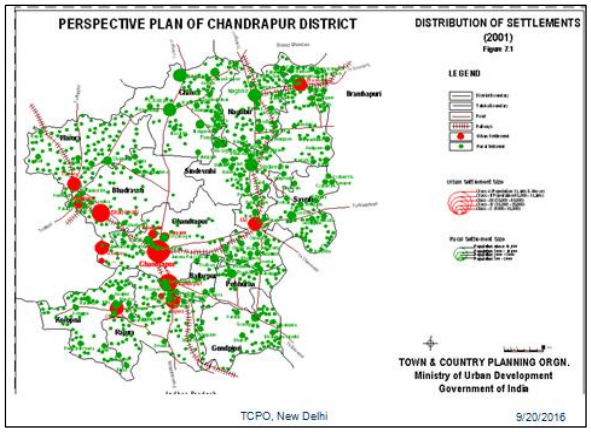
- Long term spatial development plan,
- Development Plans and Annual Plans will flow from the perspective plan
- To provide sectorwise broad directions of development
- spatial integration of the urban and rural settlements
- indicate future functional hierarchy of the settlements in the district.
- plan for their all round development proposing for up-gradation of various infrastructural facilities

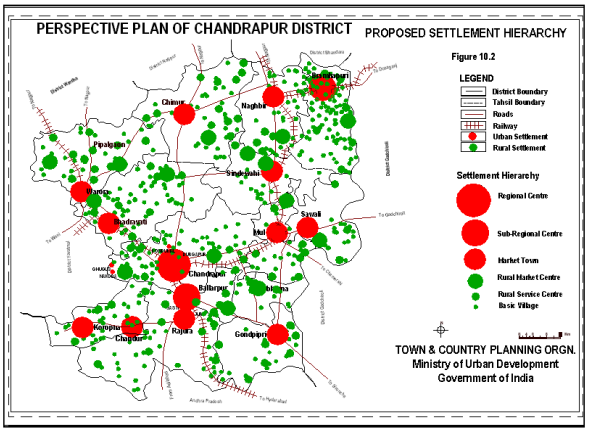
Methodology followed in preparation of the plan are as follows:

- Assess availability and distribution of economic and physical resources in relation to demographic profile of the district.
- Make and inventory of resources such as land, forest cover, minerals, agriculture, water resources, industries etc. will be prepared.
- Examine availability of socio-economic infrastructure e.g. educational & health facilities, traffic and transportation, marketing, and communication facilities.
- Analyse and assess development potentials and constraints. Projections of population both urban and rural have been attempted.
- Development strategy for spatial planning is formulated for the district.
- Proposed settlement system for the district is being formulated both for the urban and rural settlements.
- Development programmes are integrated at the settlement level by filling up the gaps in the settlement system and also by integrating the schemes of the urban and rural settlements.









International Case: West Hills Rural Area Plan in the U.S. state of Oregon

The Rural Area Plan for the West Hills Rural Area is part of the overall Multnomah County Comprehensive Framework Plan. The plan is a guide to decision making with regard to land use, capital improvements, and physical development (or lack thereof) of the community.

The elements of this plan reflect future trends and policies for the West Hills Rural Area during the next 15 to 20 years. The Rural Area Planning Program was initiated in 1993 by Multnomah County. With the annexation of urban unincorporated communities and the increasing land use issues faced in the rural areas of Multnomah County, the Board of Commissioners directed the creation of five rural area plans in order to address land use issues faced by these areas.

Work began on the Plan in January, 1993, with the initiation of an issues identification process. This process included interviews with key stakeholders, interviews with other governmental agencies, solicitation of written comment, and two public forums held within the West Hills Rural Area in order to gain input on major issues facing the community. A Scoping Report summarizing this material was presented to the Multnomah County Planning Commission and Board of Commissioners in September, 1993. After adoption of the Scoping Report, which identified major issues to be addressed in the plan, the Multnomah County Chair appointed the West Hills Citizen's Advisory Committee, consisting of twelve members, plus one Planning Commission ex-officio member, to work with Planning Division staff on

preparation of this document. The Committee held monthly meetings between November 1993 and June 1994 to review all elements included within this document. The Committee's role was not to make official recommendations to the Planning Commission and Board of Commissioners, but rather to review and comment upon materials prepared by Planning Division staff, and provide a forum for additional public involvement in the preparation of the West Hills Rural Area Plan. In July, 1994 Multnomah County hosted two public forums in order to present material which came from the Citizen's Advisory Committee meetings. Next, Planning Division staff prepared this document for review and comment by the Planning Commission and Board of Commissioners at noticed public hearings.

GOAL: The goal of the west hills rural area plan is to preserve the rural character of the area.

POLICY 1: Where possible, use incentives, rather than restrictions or disincentives, to accomplish land use and other policies contained in the West Hills Rural Area Plan.

POLICY 2. Preserve resource-based land uses related to forest practices as the primary land use in the West Hills.

STRATEGY: Divide Commercial Forest Use lands within the West Hills into three categories. The first, designated CFU-1 Forest Lands, consists of areas with large land-holdings generally in excess of 40 acres and areas with few or no existing residences. The second, designated CFU-2 Forest Lands, consists of areas with smaller land holdings generally less than 40 acres, and areas with scattered existing residences. The third, designated CFU-5 Forest Lands, consists of properties within that area identified as a Study Area on the map titled West Hills (Northern Portion). *[Amended 1999, Ord. 924 § II]*

STRATEGY: Preserve CFU-1 Forest Lands for continued commercial timber production by limiting residential uses to tracts of 160 acres or greater, or non-contiguous tracts of 200 acres or greater.

STRATEGY: Allow non-forestry related uses,such as residences,on CFU-2 Forest Lands as follows:

a. dwellings on 160 acre tracts or 200 acre non-contiguous tracts.

b. dwellings on existing lots of record owned continously by the current owner or antecedents of the current owner since 1985 which are capable of producing less than 5,000 cubic feet per year of commercial timber.

c. dwellings on existing lots of record which contain at least eleven existing lots and five existing dwellings within a 160 acre square template centered on the lot of record containing the proposed dwelling.

STRATEGY: Allow non-forestry related uses, such as residences, on CFU-5 Forest lands on all tracts as defined by OAR 660-- 06-027(5)(a). *[Added 1999, Ord. 924 § II]*

STRATEGY: If current statewide planning regulations of Commercial Forest Use lands are changed, Multnomah County should not allow new subdivision lots of less than 40 acres in the CFU-2 district or less than 80 acres in the

CFU-1 district in order to preserve forest practices and natural resources such as wildlife habitat, streams, and scenic views.

POLICY 3. Preserve farm lands in the West Hills for agriculture as the primary use.

STRATEGY: Allow non-agricultural uses, such as residences, on Exclusive Farm Use Lands as permitted by Oregon Administrative Rules, with additional development standards and lot aggregation requirements to ensure public safety, public health and welfare, and protection of natural and environmental resources.

POLICY 4 Do not designate additional "Exception" lands in the rural West Hills. *[Amended 1999, Ord. 924 § II]*

STRATEGY: Consider redesignation of approximately 80 acres at the intersection of U.S. Highway 30 and Watson Road, adjacent to the Columbia County line, from Commercial Forest Use CFU-2 to CFU-5. *[Amended 1999, Ord.924 § II]*

POLICY 5 Promote a community core in the rural West Hills through establishment of a rural center which serves the local needs of West Hills residents.

STRATEGY: Consider a limited area near the intersection of Cornelius Pass Road and Skyline Blvd. for designation as a Rural Center if justified by a county-initiated assessment of the need for additional commercial or other uses to support public needs in the rural West Hills.

STRATEGY: Do not consider expansion of the existing Burlington Rural Center unless 1) existing facilities of the Burlington Water District are upgraded, 2) evidence of increased demand for housing and commercial or institutional services in Burlington exists in the form of construction on vacant lots within the existing rural center boundaries, and 3) a market analysis indicates that the expansion of the Burlington Rural Center is necessary to serve West Hills Rural Area needs.

POLICY 6: Do not adjust the Urban Growth Boundary in the West Hills.

STRATEGY: Study 90 acres of relatively undeveloped land in the Balch Creek basin (SUBAREA ONE) for proper zoning which will recognize this area's severe development limitations.

STRATEGY: Rezone approximately 50 acres located along Walmer, Ramsey, and Ramsey Crest Drives (SUBAREA THREE) from Rural Residential to appropriate urban residential zoning districts.

POLICY 7: Urge METRO to designate most of the West Hills Rural Area as a Rural Reserve within the Regional

Framework Plan -- consider Urban Reserve designations only for fringe areas adjacent to Portland and Washington County urban areas.

STRATEGY: Forward to Metro a resolution directing that only the southern and central portions of the Bonny Slope subarea of the West Hills Rural Area be considered as an urban reserve area as part of the Region 2040 project.

POLICY 8: Oppose placement of regional roadways in the West Hills Rural Area, should such roadways be under consideration by any regional transportation authority in the future.

POLICY 9: Improve West Hills Rural Area roadways to attain appropriate safety levels for local motorized and nonmotorized traffic.

STRATEGY: Accelerate re-paving and shoulder-paving on Skyline Blvd. to make the route safer for use of automobiles, bicycles, pedestrians, and equestrians.

STRATEGY: Include in the capital improvement program a project to upgrade Cornelius Pass Road, with first priority the road between its intersection with Skyline Blvd. and the switchback to the north, and second priority being the road between the switchback and Highway 30.

STRATEGY: Include in feasibility studies of a "rails-to-trails" conversion of the Burlington Northern Cornelius Pass line consideration of making the trail a bicycle route as well in order to remove the bicycle route from Cornelius Pass Rd. and eliminate modal conflicts.

POLICY 10: Discourage through traffic on local roads not shown on the Circulation Plan.

STRATEGY: On local roads with heavy through traffic consider additional control measures such as traffic signals and speed bumps to reduce such traffic.

POLICY 11. Coordinate planning and development review activities with the affected school districts to ensure that adequate school facilities exist to serve local needs.

STRATEGY: Monitor student population at Skyline Elementary School, and work with the Portland School District on solutions if the school becomes overcrowded.

POLICY 12: Require proposed development in the West Hills to meet fire safety standards.

STRATEGY: Ensure that agencies responsible for fire protection in the West Hills Rural Area are provided an opportunity to comment on development applications prior to approval of the application.

POLICY 13 Require proposed development to be supplied by a public water system with adequate capacity or a private water system with adequate capacity.

STRATEGY: Require a finding of adequate quantity of water available to a development project prior to final approval of the project, and clearly spell out a procedure which allows adequate public review of the proposed water source without requiring the project applicant to undergo excessive and possibly unnecessary expense.

STRATEGY: Work cooperatively with the Burlington Water District in ensuring adequate water supply to its customers.

POLICY 14: Discourage public sewer service to areas outside of the Urban Growth Boundary and areas where public sewer service would accommodate inappropriate levels of development.

STRATEGY: Consider lowering the allowed density of urban residential land for areas within the Balch Creek basin which have no public sewer service.

POLICY 15: Maintain and enhance the recreational values of Forest Park and adjacent areas in concert with the City of Portland, METRO, and other agencies.

STRATEGY: Review lands which become available through tax foreclosure in the the vicinity of Forest Park and within the Balch Creek Basin for potential recreational use.

STRATEGY: Target key parcels needed for enhancement of Forest Park recreational values for acquisition through revenue from the Natural Area Fund.

STRATEGY: Coordinate management of acquired properties in the vicinity of Forest Park to preserve natural resource values consistent with the Natural Resource Management Plan to be approved by the City of Portland.

STRATEGY: Promote and provide incentives for voluntary use of conservation easements by property owners in lieu of purchase.

POLICY 16: Support and promote the placement of links within a regional trail system for use by pedestrians, equestrians, and bicyclists.

STRATEGY: Support and participate in the feasibility studies for the conversion of the Burlington Northern Cornelius Pass line into a recreational trail, which will provide a regional trail for the Portland Metropolitan area; consider its impacts on adjacent properties and include affected property owners in discussions on all phases of the project.

STRATEGY: If the Greenway to the Pacific project locates a trail alignment in the West Hills, do not obstruct METRO's acquisition of the right-of-way for such a facility and review development proposals along the trail alignment for compatibility with the proposed trail.

POLICY 17: Consider and mitigate the impact on adjacent private properties of all proposed recreational facilities.

POLICY 18: Use voluntary measures to decrease the negative impacts of some agricultural practices upon water quality in area streams.

STRATEGY: Do not institute zoning regulation of agricultural practices to protect streams at this time – instead pursue a voluntary educational program jointly with the U.S. Natural Resources Conservation Service and the West Multnomah Soil and Water Conservation District.

POLICY 19: Protect water quality in areas adjacent to Multnomah Channel through control of runoff from West Hills Rural Area streams.

STRATEGY: Revise the ESEE analysis and protection program for Burlington Bottoms to include discussion of water quality impacts from West Hills drainages into this wetland, and adopt appropriate zoning ordinance amendments to protect water quality in Burlington Bottoms.

STRATEGY: During the Sauvie Island/Multnomah Channel Rural Area Plan preparation, review ESEE analysis and protection program for Multnomah Channel to include discussion of water quality impacts from West Hills drainages into the channel, and adopt appropriate zoning ordinance amendments to protect water quality in

POLICY 20: Develop and maintain consistent regulations for significant streams under the jurisdiction of both the City of Portland and Multnomah County.

POLICY 21: Use hillside development and erosion control standards to control the effects of nonpoint runoff into streams from sources such as roadways, parking areas, and farms.

POLICY 22: Protect against seismic hazards to structures and ground areas susceptible to upset.

STRATEGY: Work with the City of Portland to implement appropriate building code revisions for areas of greatest seismic hazard, when information on the location of such areas becomes available.

POLICY 23: Protect lands having slopes greater than 25% from inappropriate development.

STRATEGY: Revise the Multnomah County Comprehensive Framework Plan to designate lands with average slope greater than 25% as having development limitations. This action will resolve an inconsistency between the Comprehensive Framework Plan and the Hillside Development Overlay provisions of the Multnomah County Zoning

POLICY 24: Balance protection of scenic views with flexibility of use by property owners.

STRATEGY: Do not preclude or prevent building on any lot because of scenic considerations.

STRATEGY: Allow placement of residences so that a view from the property is possible as long as the proposed development is visually subordinate.

STRATEGY: Regulate the use of reflective glass in scenic areas.

STRATEGY: Require industrial uses to meet the same siting standards as residential development in order to protect scenic views.

STRATEGY: Work with the Oregon Department of Forestry to better protect scenic views from the negative impacts associated with timber harvesting.

STRATEGY: Provide incentives for development compatible with significant scenic views.

POLICY 25: Balance protection of significant streams with flexibility of use by property owners.

STRATEGY: Minimize runoff from roads, particularly from County road clearing processes.

STRATEGY: Encourage "friends of" individual streams to educate people about best management practices necessary to protect streams.

STRATEGY: Work with the Oregon Department of Forestry to better protect significant streams from the negative impacts associated with timber harvesting.

STRATEGY: Work with the local Soil and Conservation Districts to educate farmers about sound farming practices which also protect significant streams.

STRATEGY: Provide incentives for development compatible with significant streams.

STRATEGY: Consider additional streams for significance and protection if requested by a property owner or other interested party.

POLICY 26: Balance protection of wildlife habitat with flexibility of use by property owners.

STRATEGY: Enforce existing animal control restrictions on free-ranging domestic pets which can have a negative impact on wildlife.

STRATEGY: Encourage fencing which allows wildlife to pass through.

STRATEGY: Encourage clustering of development to minimize conflicts with wildlife.

STRATEGY: Develop programs to educate people about how wildlife habitat can co-exist with other uses on private property.

STRATEGY: . Continue to collect data and information on the status of wildlife and wildlife habitat in the West Hills.

STRATEGY: Work with the Oregon Department of Forestry to better protect wildlife habitat from the negative impacts associated with timber harvesting.

STRATEGY: Work with the local Soil and Conservation Districts to educate farmers about sound farming practices which also protect wildlife habitat.

STRATEGY Provide incentives for development compatible with wildlife habitat .

POLICY 27: Allow expansion of the Angell Brothers quarry to provide needed aggregate materials for the Portland metropolitan area.

POLICY 28: Balance the need for aggregate material with the protection of scenic views, streams, and wildlife habitat in the vicinity of the Angell Brothers quarry by implementing the measures contained within the West Hills

ANNEXURE 3:

Interview Schedules

Introduction of the village:

Name of the State	
Name of the District	
Name of the Block	
Name of the Gram Panchayat	
Name of the village	

Demography: schedule 1

	0-7				8-14				15-19		20-39		40-59		60 and above		TOTAL				
Male	SC	ST	OBC	GEN.																	
Female																					
TOTAL																					

Population Growth: schedule 2

Years	Population							
	SC		ST		OBC		GEN	
	Male	Female	Male	Female	male	Female	male	Female
N								
N+1								
N+2								
N+3								
N+4								
N+5								

Migration schedule: 3

Name	Sex	Age group	Occupation	Place of origin	Distance from village	Reason for migration	Migrated single or with Family

Household Information: schedule 4

Name	Relation ship to the head of HH	Age	Married /unmarried/ Divorced/ separated	Sex	Educati on level	Occupation	Income/ month	Source of Lightening	Type of fuel used for cooking

Assets: schedule 5

Tv	Radio	Fridge	Computer / Laptop	Computer With Internet Connection	Washing Machine	Bicycle	Two Wheeler	Car/ Jeep	Truck	Tractor

Facilities: schedule 6

Distance from educational facility	**Primary**	
	Middle	
	Secondary	
	Degree college	
	Technical education	
	Vocational training centre	
Distance from health facility	Subcentre	
	PHC	
	CHC	
	District hospital	
	Vetrinary hospital	
	Anganwadi	
Distance from major roads	Weather Road	
	Metalled Road	
	NH/SH	
Distance from cooperative society		
Distance from state capital		
Distance from block headquarter		
Distance from metropolitan city		
Distance from district headquarter		
Distance from Railway station		

Distance from bus stop		
Distance from post office		
Distance from bank		
Distance from weekly market		
Distance from ATM facility		
Distance form Internet Facility shop		

Infrastructure :schedule 7

Water supply

Source of water	**Ground water**	
	Surface water	
Duration of water supply		
Average consumption of water supply	Domestic use	
	Industrial use	
	Agricultural use	
	For cattle	
Quality of water supply		
Treatment of water? If any?		
Charges for water supply?		
Individual connection		

Power supply

Source of power supply	
Individual connection	
Duration of power supply	
Metered connection	
Duration of power supply for irrigation and agricultural purposes	

Waste disposal and sanitation

Amount of waste generated	Domestic	
	Industrial	

	Agricultural	
	Cattle	
Storage of waste		
Treatment of waste		
Landfill site		
Recycling of waste, if any		

Health

Level of health facility available	**Dispensary**	**Subcentre**	**PHC**	**CHC**
No. of trained doctors				
No. of trained asha workers				
Equipments available				
No. of beds available				
No. of non medical staff				
Medicines available				

Mortality indicators:

	Girls	**Boys**	
No. of live births			
No. of still births			
Death below 1 year			

	1-6 yr		**7-14 yr**		**15-20 yr**		**20-39 yr**		**40-59 yr**		**Above 60yr**	
Other deaths	M	F	M	F	M	F	M	F	M	F	M	F

No. of deaths of women at time of child birth	
No. of Institutional delivery	
What are the common diseases in villages? According to age group? Chronic and acute	

Disabled persons:

No. of disable persons by type of disability	Male	Female	Total	

Education

Level of school	Primary				Middle				Secondary			
No. of students enrolled	sc	st	obc	gen	sc	st	obc	gen	sc	st	obc	gen
Male												
Female												
No. of teachers												
No. of classrooms												
No. of students attending												
No. of students discontinuing												
Reasons for discontinuation												

ANNEXURE 4: Classification of Assets in Bhuvan Panchayat

Major Category	Subclass	Asset Group	Asset Type	Count
Civic Amenities / Infrastructure Assets	**Education Facilities**	Schools	Primary School / Middle School / Secondary School / Senior Secondary School / Training School / School for disabled / Other School	7
		Colleges / Universities	University / Science College / Commerce College / Arts College / Medical Sciences / Engineering College / Management College / ITI / Polytechnic / Other College or University	10
		Training Institutions / Centres	Adult Literacy / Distant Learning / Computer Centre / Vocational Training / Physical Training Institute / Other Training Institute or Centre	6
		Public Libraries	Public Library	1
		Other Educational Assets	Other Educational Asset	1
	Medical and Health Facilities	Aanganwadi	Aanganwadi	1
		Women & Child Health Centres	Women & Child Health Centre	1
		Health Centres / Hospitals	Sub Centre / Primary Health Centre / Community Health Centre / Dispensary / Hospital / Super Speciality Hospital / Other Health Centre or Hospital	7
		Other Medical Facilities	Drug Rehabilitation Centre / Blood Bank / Immunization Centre / T. B. Clinic / AIDS Centre / Polyclinic / Leprosy Centre / Mental Hospital / Tobacco Control Centre / Physiotherapy Centre / Occupational Therapy Centre / Emergency Trauma Centre / Eye Hospital / Diagnostic Lab / Medical Shop / Other Medical Facility	16
	Veterinary	Veterinary Dispensaries /	Veterinary Dispensary or Hospital	1

	& Fisheries Facilities	Hospitals		
		Other Veterinary Facilities	Other Veterinary Facilities	1
	Transport Systems & Connectivity	Road Types and Structures	National Highway / State Highway / Major District Road / Footpath / Cart Track / Bridge / Culvert / Flyover / Causeway / Underpass / Tracks / Other Structure	12
		Road Transport Facilities	Subway / Bus Stand / Parking Area / Bus Shelter / Bus Stop / Bus Depot / Taxi or Auto Stand / Check Post / Other Road Transport Facility	9
		Railway Types and Structures	Indian Railways / Metro / Tram / Monorail / Other Rails / Railway Bridge / Manned Crossing / Unmanned Crossing / Other Railway Structure	9
		Railway Transport Facilities	Railway Station / Railway Reservation Centre / Metro Station / Loco Shed / Railway Yard / Other Railway Transport Facility	6
		Air Transport Facilities	Airport / Helipad / Airstrip / Other Air Transport Facility	4
		Water Transport Facilities	Harbour / Sea Port / Light House / Waterway / Jetty / Boat or Ferry Station / Other Water Transport Facility	7
	Power and Energy	Electricity and Usage	Electricity and Usage	1
		Electric Assets	Power Pole / Street Light / Transformer / Power Sub-station / Other Electric Asset	5
		Power Generation Plants	Nuclear Power Plant / Solar Plant / Thermal Plant / Hydel Plant / Tydal Plant / Wind Mills / Bio-energy Plant / Biogas Plant / Other Power Generation Plant	9
	Sanitation & Sewerage Facilities	Public Toilets	Public Toilet	1
		Garbage Disposal Sites	Garbage Disposal Site	1
		Garbage Treatment Units	Garbage Treatment Unit	1
		Drains / Naalas	Drain or Naala	1
		Sewage Treatment Plants	Sewage Treatment Plant	1
	Postal & Telecom Services	Postal Facilities	Post Box / Post Office / Courier Service / Other Postal Facility	4
		Telecom Facilities	Telephone Booth / Telephone Exchange / Telecom Poles / Distribution Point Station / Mobile Tower / Cyber Café / Other Telecom Facility	7
	Banks, Insurance & Credit Societies	Banks	Bank	1
		ATMs	ATM	1
		Insurance	Insurance Company	1
		Credit Societies	Credit Society	1
		Other Financial Institutions	Other Financial Institutions	1

Major Category	Subclass	Asset Group	Asset Type	Count
Civic Amenities / Infrastructure Assets	Water Sources & Structures	**Water Sources**	Tap / Hand Pump / Well / Dug Well cum Bore Well / Tubewell / Tank or Pond / Canal / River / Lake / Spring / Tanker Supply / Other Water Source	12
		Water Structures	Dam / Check Dam / Earthen Dam / Barrage / Weir / Anicut / Rainwater Harvest Tank / Storage Tank / Overhead Tank / Pump House / Water Treatment Plant / Water Desalination Plant / Other Water Structure	13
	General Assets / Facilities	**Commercial**	Milk Depot / Milk Collection Centre / Tea Stall / Restaurant / Godown or Warehouse / Cold Storage / Repairing and Workshop / Slaughter House / Mandi / Commodity-wise Market / Haat / Shopping Mall / Other Market / Other Commercial Unit	14
		Fuel Depots	Fuel Depot	1
		Public Distribution Shops	Ration or Fair Price Shop / Cooking Gas Distribution / Kerosene Depot / Other Public Distribution Shop	4
		Public / Social Services	Child Adoption Centre / Day Care Centre / Night Shelter House / Orphanages / Old Age Home / Disaster Shelter / Fire Station / Dhobhighat / Cremation Ground / Graveyard / Other Public or Social Service Unit	11
		Lodging Facilities	Hotel / Guest House / Lodge / Inn / Dharamshala / Other Lodging Facility	6
		Tourist Places	Zoo / Museum / Park or Garden / Historic Place / Other Tourism Site	5
		Religious Places	Temple / Church / Mosque / Shrines / Dargah / Gurudwara / Monastery /	9

			Agiary / Other Religious Place	
		Recreational Places	Cinema or Video Hall / Kisan Club / Youth Club / Sports Club / Playground / Stadium / Akhada / Choupal / Auditorium / Marriage or Community Hall / Other Recreational Facilities	11
		Feed Fodder Facilities	Feed or Fodder Manufacturing Unit / Fodder Storage House	2
		Livestock Water Troughs	Livestock Water Troughs	1
		Other General Assets	Other General Asset	1
	Others (Specify)	**Other Civic Amenities / Infrastructure Assets**	Other Civic Amenities or Infrastructure Asset	1
Governance Assets	Administrative	**Offices**	Collector Office / Zila Parishad / Panchayat Samiti / Tehsil or Taluka Office / Gram Panchayat Bhavan / Gram Sewak Office / Patwari Office / Police Station or Chowki / Line Department Office / Other Office	10
		Government Lodging Facilities	Circuit House / Youth Hostel / Dak Bunglow / Forest Guest House	4
		Other Administrative Assets	Other Administrative Asset	1
	Extension, Training & Data Collection Centres	**Information Centres**	Krishi Vigyan or Gyan Kendra / Kisan Call Centre / Agricultural Kiosk / Agro Service Centre / Pest Control Centre or Unit / Certified Seed Centre / Fertilizer or Manure Depot / Charitable Trust / Non Governmental Organization / Voluntary Organization / Other Information Centre	11
		Training and Research Centres	Farmers Training Centre / Agricultural Research Station / Village Cooperative / Soil Testing Laboratory / Other Training and Research Centre	5
		Data Collection Centre	Hydro-meteorological Observation Station / Rain Gauge or Meteorological Instrument / Other Collection Centre or Observatory	3
	Other (Specify)	**Other Governance Assets**	Other Governance Asset	1
Productive Assets	Agriculture System and Allied Activities	**Agriculture Practice**	Agriculture Practice	1
		Dairy Unit	Dairy Unit	1
		Fishery / Aquaculture	Fishery or Aquaculture	1
		Poultry Farm	Poultry Farm	1
		Other Farming Assets	Other Farming Asset	1
	Forest Produce	**Forest**	Forest	1
	Mining & Quarrying	**Mines**	Mine	1
		Quarries	Quarry	1
	Industries & Types	**Industries**	Industry	1
	Others (Specify)	**Other Productive Assets**	Other Productive Asset	1

ANNEXURE 5:

GIS based GP Planning Case Studies By NIRD&PR

(Villivalam, Kanchipuam, Tamilnadu)

Introduction

Spatial technologies play a key role in generating timely and reliable information for planning and decision-making at all levels. The use of GIS for a micro administrative unit for planning and implementation was tested in an Action Research Project in one of the panchayats in India, where the knowledge base is developed up to cadastral level (land parcel level) and the house hold socio economic data is embedded on this layer on a GIS platform, with all graphic features of house type and house hold linked, to enable stakeholders take decisions in a dynamic mode.

Even though it is widely recognized that the Geographic Information System (GIS) has the capacity to analyze both spatial and temporal data on a cost effective manner for effective planning and management, its application at the micro level for participatory planning and management is limited. In this context an Action Research Project was taken up at the Panchayat level by the National Institute of Rural Development where efforts were made to develop an interactive package for participatory management at the panchayat level.

An attempt has been made to actually apply the GIS Package, simple, user friendly, customized, local need based, interactive and can be handled by the local youth and Gram Panchayat functionaries. It could be called Panchayat GIS, which has all inbuilt features of various decisions at he Gram Panchayat level integrating various layers of information both spatial and attribute pertaining to the Villivalam Gram Panchayat.

Identification of Problems and Objectives

1. To devise a GIS Based Action Plan for the Gram Panchayat Level Planning on an Interactive Mode.
2. To test the Interactive GIS Based Gram Panchayat Plan on Pilot Basis with the help of Local Self Government, Government Functionaries, NGO, and the Local People.

Study Area

The study area consists of entire Villivalam Gram Panchayat. It is created using the geographical extents of the Gram Panchayat and true origin (74^{o} N 21^{o} E) of the Walijabad Block of Kanchipuram District of the State of Tamilnadu.

The Gram Panchayat as three (3) villages namely Villivalam, Koyambakam and Pandyan. The study area chosen was the Villivalam Gram Panchayat of Wallijabad Block of Kanchipuram District, Tamil Nadu State, a Southern State in India.

The purpose was to give appropriate development initiatives in planning, monitoring and projectisation by the local people of Villivalam Gram Panchayat and the local bodies, for developing a reliable database and take decisions based on the same.

Development of an Interactive GIS Package for these people is a modest attempt to take Spatial Technologies and ICT to the door steps of the local people to reap benefits of advanced technologies at the lowest level, making GIS application as a mass movement.

Study Methodology and Analytical Framework

The base data forms the attribute database and the maps, satellite imagery, Ariel photographs etc spatial database. These databases are integrated in a GIS platform and an information system is developed.

The developed information system is embedded with query facilities so as to make it interactive. The presentation is developed in GIS Map Objects 2.30 Version Software and customisation is being made through capabilities of Map Object GIS Software and Visual Basic 6.0.

Flexibility is built in the Interactive GIS Village Plan to adapt to new situations and environments. The pilot software is being provided to the Villivalam Gram Panchayat and the GP functionary and the village youth are trained to use the same.

A group of youth is specially trained at SIRD, Tamil Nadu in computer skills and they are very enthusiastic in operating and maintaining the same. Four(4) Desktop Computer Systems were provided by NIRD&PR to this erstwhile Action Research Village of NIRD, where lot of development activities has been brought by participatory mode by SIRD, Tamilnadu and the NIRD&PR.Tamil Language interface is being attempted and the Gram Panchayat GIS Package showcases the Government, NGO and Local Bodies for their daily activities, monitoring, reporting, decision making, data needs and other allied activities.

Method and Type of Data Collected

1. Integrated resource surveys (Natural resources and Human resources) and mapping at the panchayat level involving local volunteers, panchayat officials etc.
2. Surveys relating to basic infrastructure of the Panchayat roads, drinking water resources, schools etc.
3. Household information, housing structure, type of material used in house construction, basic amenities like electricity, water, telephone etc.
4. Photograph of the house and its members.
5. Household wise collection of data relating to house tax, water tax etc.
6. The resource surveys using cadastral map in the scale of 1: 5000. Plot wise information was collected.
7. Develop a Cadastral based Information System (CIS) at panchayat level with Geo-reference to higher level administrative system.

Process Methodology

A Participatory Rural Appraisal (PRA) exercise was carried on to understand the priorities and needs of the people of Villivalam Gram Panchayat. The PRA Resource Map showed good understanding of people about their Gram Panchayat spatial spread, resources, infrastructure, Governmental programmes and projects and their neighbourhood.

The entry level activity taken up was information on education, tutorials, admission, coaching, Question Banks, Career prospects, skill development and related aspects. The database on the same was built up from existing database of the Gram Panchayat, Walijabad Block and Kanchipuram District information base. This was further consolidated with Tamilnadu Sate and other web based materials making it accessible for youth, students, Panchayat Factionaries and others.

Topo Sheet of the district and cadastre map of Villivalam including that of Koyanbakam and Pandyan was geo-coded. Satellite imagery of Resource Sat P6 both LISS III and PAN were obtained and merged and overlaid on the base vector layer with draping. Various relational database of the Gram Panchayat were integrated with the base vector layer and analysis based on the Gram Panchayat day to day decision requirements were attempted for use by the Panchayat for local level application.

The GIS, Image Processing and other allied Software used are Arc Info 9.0, Arc View 3.2, Map Object 2.0 and Visual Basic 6.0, for developing the Interactive GIS for Gram Panchayat Planning.

The output on the Window Screen is placed for visualizing the Software capabilities and outcomes. The required data format for inputting and building up of database are placed in the window format by Visual Basic and Map Object capabilities. The Software has the capabilities to update database and the files are saved in new databases, which facilitates comparison of data over time period, for studying the impact of schemes or programmes or development initiatives and in detection of changes.

The land holding and survey numbers are integrated with the house door numbers for exact identification of each person and household for detail database pertaining to all aspect of demography viz. age, sex, education, occupation etc, asset structure, income particulars, land use and land cover particulars from satellite imageries and cadastre, and other useful information like social status, ration card, marital status and related data.

The photographs of each household family member are embedded with the house at the back drop. The profile of each household is available. The Villivalam Gram Panchayat profile with graphics is also available at Gram Panchayat layer. All formats are placed in window format for ease in use and understanding at the local level with Visual Basic 6.0 Software.

With a Training of one day, a person with high school qualification can operate the software and maintain the same. Any new parameters can be added and the software can be upgraded from time to time based on the need of the time, without losing any data.

Salient features

The Village GIS has been developed using ArcGIS 9.0, Map Objects 3.0 and VISUAL BASIC 6.0 working under WINDOWS. A standard Pentium IV system would suffice the hardware requirement for its implementation. The following are some of the salient features of Village GIS:

Thematic maps

Thematic maps are often required to provide decision support information for spatial planning in several key areas. Village GIS facilitates efficient generation and display of thematic maps directly by the end user to enable him perform situation analysis and gain an insight for proper decision-making. It also supports map tool bar (zoom, pan) on any thematic map.

Display of village profile

The Gam Panchayat profile is a template containing a set of predefined attributes of the village (village name, Panchayat name, population details, availability of facilities etc.) User can view the profile of any specific sector by clicking on the sector in the map or by choosing the desired item from the Gram Panchayat menu list displayed on the screen.

User-friendly interface

Village GIS provides an interactive and user-friendly interface and it does not require any GIS expertise for its operation. It requires about 4~5 hours of learning time and could be thus easily deployed in the rural areas where the operating personnel are usually novices.

Applications of Village GIS

Village GIS has been customized for facility planning and management for the Villivalam Gram Panchayat in Walijabad Block of Kancipuram District of Tamilnadu State. Although Village GIS can support a wide range of applications due to its open-ended design, it is presently being contemplated for use for the following applications.

1. Facility planning (Identification of suitable locations for creation of new facilities such as primary schools, middle schools etc.)
2. Monitoring the functional status of various village amenities such as transformers, hand pumps, schools, hospitals etc.
3. Monitoring and evaluation of the implementation of various rural development and poverty alleviation programmes/schemes (Mid-day meals scheme for school children, housing and employment guarantee schemes etc.)
4. Management of road network.
5. Village connectivity to Panchayat Hqrs.
6. Land Holding Analysis
7. House Type Analysis
8. Income Analysis
9. Occupation Analysis
10. Social Strata and eligibility analysis
11. Age Group Analysis for education infrastructure

Observations & Findings

The striking revelations in this study is the fact that local people are greatly enthusiastic in adapting to new technology and new way of working together and takes lot of interest in knowing new ways of doing things.

Secondly the people at the local level rise above political, economic and social affiliations, and express their solidarity in effecting the new tools and technology in their day-to-day work.

The women participation was quite encouraging and they come forward for propagating the use and adoptability to new way of doing things.

The younger mass feels social upheaval and increase in their social status in exposure and use of new IT Tools at the local level.

The people's representatives give all encouragement and support and stand by the people in introduction of new technology and in new ways of doing things, irrespective of their political affiliations.

The district and local administration takes great interest in introducing new IT Tools and request development of these tools with inbuilt functionality of day to day administrative use at all level, in improving their performance and effectiveness and express their support and cooperation in any attempt in this regards.

Replicability

The Interactive GIS developed at the Gram Panchayat can be replicated. There are also possibilities and potential available for adding additional features and in making it wide spectrum software.

The database required may vary depending on the type of problem faced in a particular area. The level of social mobilization needed to ensure participation in data collection and analysis can also vary from place to place, which can be handled by the software with necessary modifications.

Lessons Learned

Geographic information systems are being integrated in communities to serve many purposes, and with various degrees of effectiveness. The contribution in this pilot project was to provide a broad view of the current state of Village GIS practice in the country.

The critical lessons learnt from this pilot project can be summarized as under:

a. Any change process is dynamic and people at local level have resilience to cope with new technological changes and assimilate the new process and system and new way of doing things into their societal and institutional framework;
b. GIS as a fusion and sandwich approach have brought in integration among the fragmentation and dispersal data/ information and frame the same as an integrated package conveniently visualized by the community at their level;
c. The Graphic and map presentation along with relational data clicked the conscience of the local people to identify themselves with a system which spells out their unique recognition and give a psychological satisfaction of projecting who they are, their affiliations, neighborhood and societal binding;
d. Given a platform and facilitation, the local people, who are totally ignorant about the new technologies like GIS, came forward to use the same with ease and conviction;
e. The younger generation exert influence on their parents, neighbours and elders to ride on new technology and bring in collective optimism and desire for a hope for better future;
f. Data gaps and errors in the Village GIS were voluntarily identified by people and the same is corrected, which brought in greater conviction that the new technological change can prove beneficial;
g. When shown Gram Panchayat, Block and District scenarios by various GIS analysis, their participation and acceptance seems to be greatly strengthened;
h. A view of satellite imagery integrating their cadastre appalled their sense of understanding and knowledge base, giving relentless support for Village GIS;
i. Synoptic view, spatial spread, locational features and understanding terrain and topography of their area vis-à-vis conventional resource maps exhibiting congruence made them enthusiastic and satisfied;
j. Integrating all aspects of village in an GIS information system is more powerful and vibrant as it exhibits graphic display, locational features, entity and gross information, it's true value, display and nature, what it was and present status (temporal analysis), a system which can act an any level with time and space dimension identifying man, neighborhood, household, assets, occupation, economy and the like in particular and society and life in general.

Where do we go from here!

Time has changed. When we remember of the initial days when the country had gone for the bank, railway, airlines and a host of other computerization, there was stiff resistance and experts apprehended that such a measure would jeopardize the employment situation in the country and displace large number of people from securing employment.

Today, all know, how embedded the system of computerization everywhere in Government, Banking, Airlines, Railways and in all walks of life, economy and society are.

Similarly GIS would bring a sea change in the outlook and thinking of the people, policy makers, experts and elected representatives, when stabilized with the system. The transition would result beneficial outcome sooner or later.

Many countries namely Qatar, Singapore, Australia, USA, UK, Germany, Canada and a host of other countries have faced enormous amount of teething problems at the beginning but now, everything is so simple, reliable, robust and happening everywhere.

The Village GIS have inherent significance from the point of decentralized governance and Constitutional Mandate of empowering people at local level. There can't be a better tool than GIS for providing a powerful decision support system to the people to take their own decisions, analyze situations, assess potentials, plan for future, model and simulate and generate scenarios.

Technology is enshaping mankind and with rapid strides of development in GIS Software and in the Information and Communication Technologies, and with price slashing in cascades, not only GIS will be an affordable tool in the hands of local people but would usher an integrated end to end solution based system for local bodies, NGOs, Government Departments, and people at large.

GIS with GPS, Internet connectivity, high resolution satellite imageries and attribute data can revolutionize the entire thinking process of mankind in coming years. Rather than e-governance, it would be possible to implement G-Governance (GIS Governance) at all levels, anytime, any place, making information flow and decision making a real time dynamic process ensuring total participation and involvement of local people.

Conclusion

The user friendly interactive GIS for a micro administrative unit have helped in ensuring better participation of the stakeholders in decision making. The variation in the level of education of the community was bridged by pictorial representation of data. The project helped in empowerment of the community and generated land literacy.
User friendly interactive GIS data base generated at a micro administrative unit (panchayat) can improve the efficiency of administration, improve resource mobilization and help in informed decision making. The software being simple and customized and open for modifications holds lot of promise for local level applications. The strong aspect of this software is the capabilities of liking wide graphic aspects, like photographs, audios, videos, imageries and analyzed maps etc , which project field realities and help taking appropriate decision making, by people themselves.

Village GIS is a GIS based Gram Panchayat Planning system, which has all the data formats to build up data inventory, link graphics, identify locational features, generate various graphic analysis for decision making and shows information both horizontal and vertical. Village GIS is expected to usher in the desired transparency and easiness in the Gram Panchayat planning and enable a faster response to the changing ground realities in the development planning, owing to its in-built scientific approach. It demonstrates that the GIS approach can provide cost effective solutions for local level planning in rural areas, and help bring the benefits of Spatial Technologies to the rural masses.

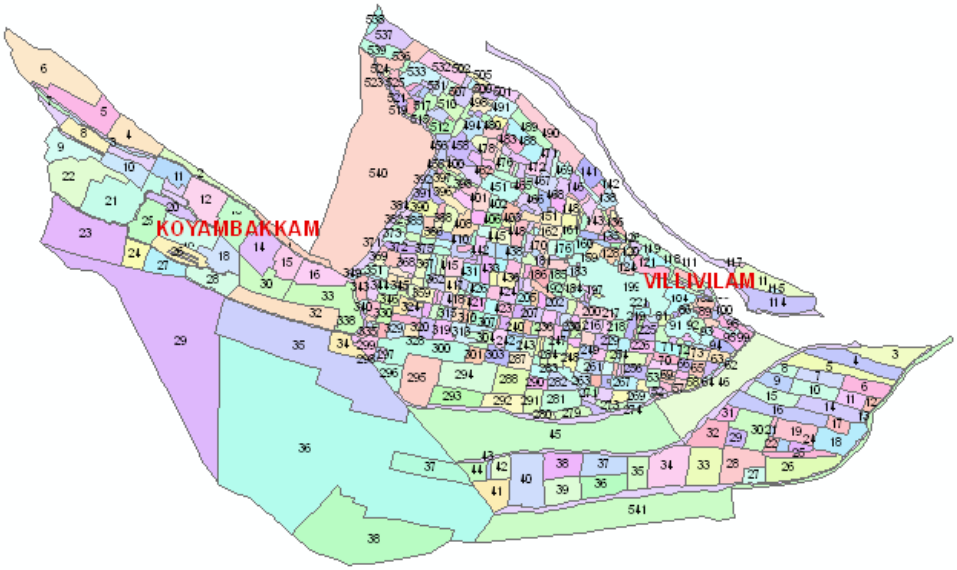
With local knowledge and local control, accountability set in where a GIS system could direct at real needs, and the design relevant to local conditions. Sensitising, Training and education village Youth, elders, Gram Panchayat functionaries and involvement of women, particularly from SHGs work towards sustainable GIS systems at local levels.

GIS is a tool of power. Like all geographical information, GIS has the potential to reduce social inequities or to exacerbate them, within regions. GIS can be subversive or it can empower techno-elite (Clark and Worobec 1996). But Yapa (1991, 52) argues that GIS may also be an instrument for 'discovering' local resources contextually and that the full implementation of appropriate technology is not possible without access to a GIS because it is the knowledge of the region (and the ability of the GIS to enhance this knowledge) that makes appropriate technology a viable alternative to the current modes of development.

GIS could become a tool for empowerment, decision alternatives, scenarios, modeling, what if analysis, locational and spatial spread analysis and an integrating tool for interfacing all information for synthesis, which can be a very potential tool for Gram Panchayat Planning and with the changing Map Policy of Government, GIS has come a long way and be an integral part of our life, administration, policies and programmes.

In a global thinking and technology subservient to mankind in a global thinking and technology subservient to mankind, GIS could become a tool in the service of the poor rather than a technological instrument for their control. To that end, GIS and ICT and other spatial technology tools need to converge and emerge as powerful application tools for wider use at all levels, particularly at local or cadastral level, to take the benefit of technology to the door step of the poorest of the poor, to empower the people for making their lives better, livable and for leading a life with quality inputs for sustenance.

Figure 0.1:Villivilam gram panchayat



Survey numbers of land parcel integrated with household and house numbers for a integrated information system at local level.

Figure 0.2:Satellite imagery of the study area showing land use and land cover and river basin

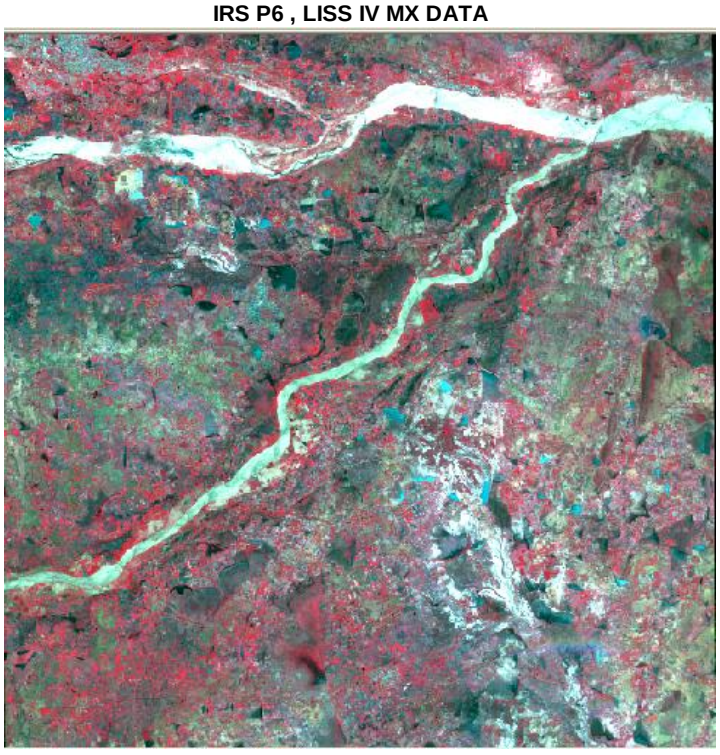


Figure 0.3:Land records map drapped over image

Figure 0.4:A Screen Shot in the Village GIS Software with detail Window Display format.

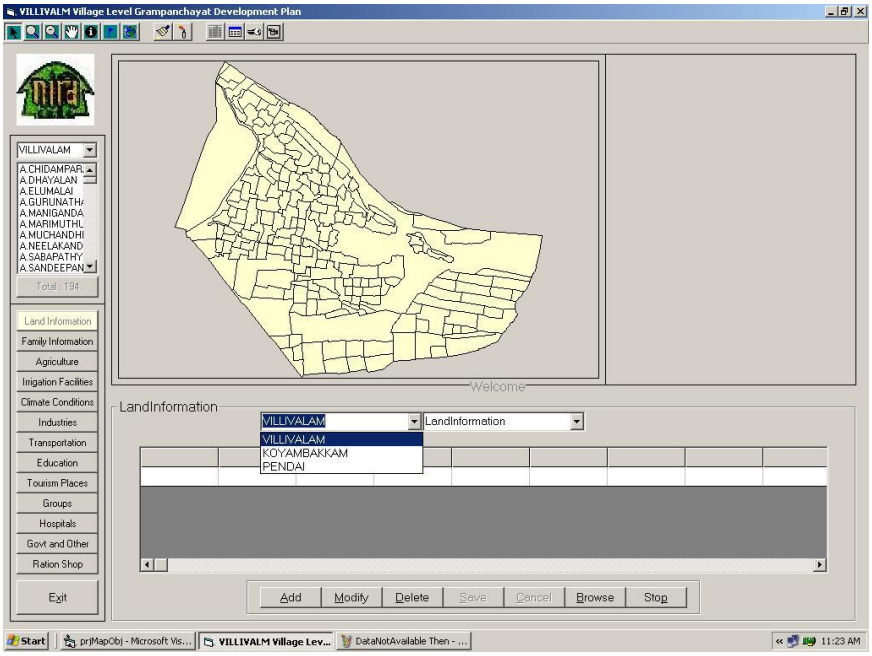
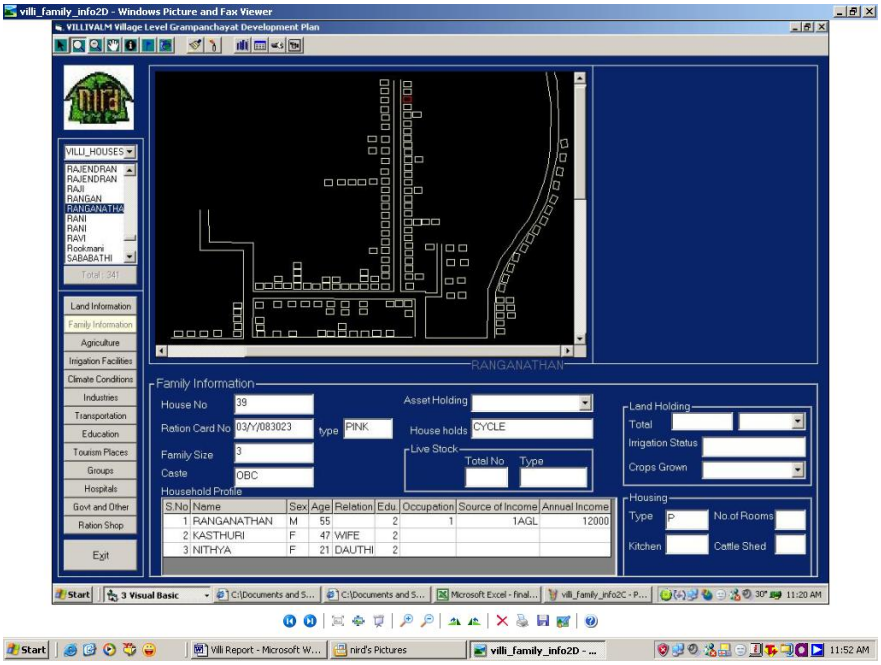


Figure 0.5:Villivalam Gram Panchayat Layout and Village GIS interface for interactivity.



RalegaonSiddhi, Ahmednagar District,

Maharashtra State

Study Area Profile:

Ralegaon Siddhi Gram Panchayat is situated in ParnerTaluka in Ahmednagar District, with geographical extents of the true origin (74 degree 22min 0sec E & 18 degree 54 min 0 sec N) in Maharashtra State. Distanced about 87 km from Pune city towards north-east and 5 km away from Pune -Ahmednagar State Highway and having total Geographical area measuring 9.67 Sq.km. Drought-prone and resource poor area with annual rainfall ranging between 50-700 mm and temperature varying between 12ºC to 44ºC, the GP is surrounded by small hillocks on the northeast and southern sides. The land is undulating and slopes vary from 3-15%, soils shallow with black soils mixed with pebbles seen in lower areas and soils are inferior and unsuitable for cultivation in higher areas, with about 70% of the area the soils , composition of which light to medium in structure. Due to inadequacy and uncertainty of rainfall leading to failure of the crop, and with soil depth up to 45cm and having low N.P.K. contents, the prospects of agriculture appears to be under great stress.

Objectives:

1. To prepare land base map for Ralegaon siddhi village to analyze demographical and cadastral information;
2. To prepare various types of thematic maps (land use and land cover,Drainage, ground water (well and bore wells), soil maps etc;
3. To identify rural resources for generating self employment and stronger village based economy;
4. To identify the constraints in agriculture /economic expansion;
5. To study basic services like education, health, drinking water, road connectivity, communication, sanitation, energy use, transport details etc , for identifying the standards of rural areas;
6. To suggest various action plans and decision rules for rural development.

Methodology and Analytical Framework :

The methodology used for a GIS based GP planning for Ralegaon Siddhi essentially consists of design and creation of appropriate spatial as well as attribute databases and integration of the same to facilitate the creation of various planning scenarios for facility planning and management.

Capturing all layers of data:

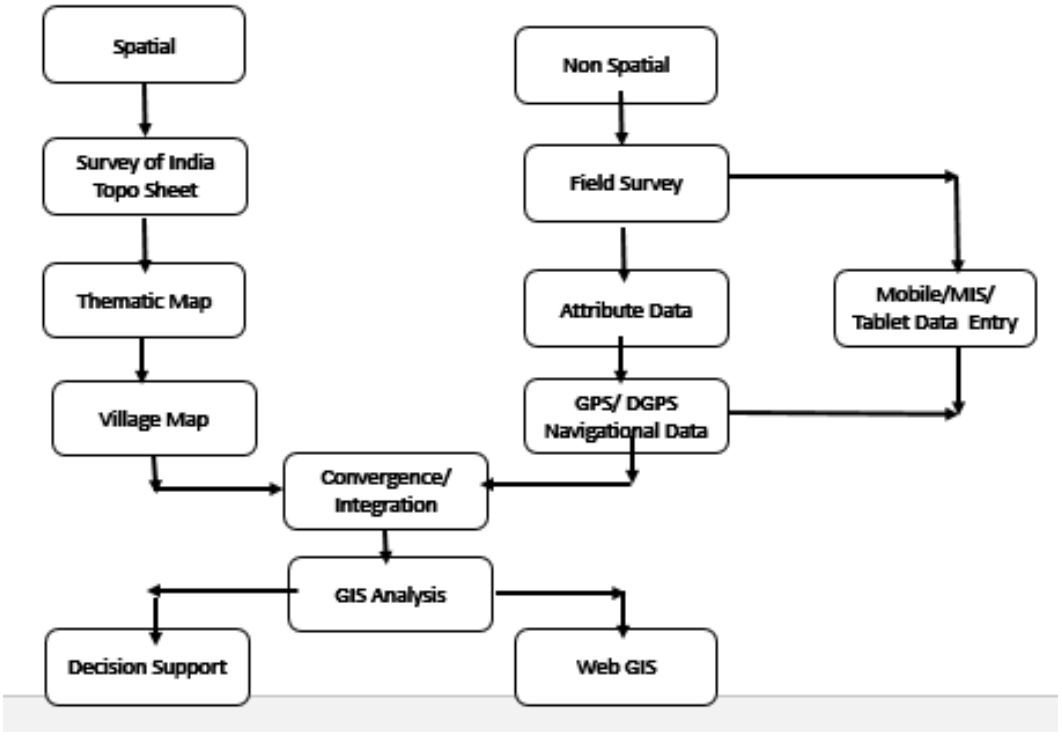
1. Integrated resource surveys (Natural resources and Human resources) and mapping at the GP level ;
2. Physical surveys relating to basic infrastructure of the GP;
3. Household information, housing structure, type of material used in house construction, basic amenities like electricity, water, telephone etc.
4. Socio economic survey including PRA, FGD etc;
5. Estimation of resource base, needs, gaps, alternative strategies to augment the requirements for over all growth and development of the GP.

Natural Resource Management:

The land base map was prepared for the study area using the high resolution satellite imagery globe world view one imagery of 50cm resolution at 1:1000 scale. The total image of the study area was divided in to grids of 500 m by 500m and the plots were taken at 1:1000 scale in such a manner that 1 mm on the map will be equal to 1 meter on the ground. The land base map is prepared by taking these plots to the field where all the houses, field bunds and pump sets locations will be marked on the field plot. These field plots were digitized and the land base map is prepared for the entire study area. The data models were prepared for collecting the land base details like the house address, the no of floors, family info details etc. These data collected will be linked to the land base map for generating the final land base map. For generation of natural resources, thematic maps land use land cover , Hydrogeomorphology, Soil, Slope etc the merged data of cartosat 1and IRS P6 LISS IV images was used . Taking the SOI Toposheets as source, the thematic layers like drainage and contours are prepared at

1:25,000 scales. The slope map is derived using Survey of India topographical sheets at 1:25000 scale with 5 meter contour interval. The rainfall and temperature data and other collateral data of the study area are collected and is integrated in the GIS Domain.

Figure 0.6:Flow Chart Depicting Broad Methodology



Spatial database creation:

Open Source Software, Map Objects and Dot Net Software were used for creation of the required spatial database in digital form. The digital map layer information weregenerated appropriately in the form of Thematiclayers, each layer representing a unique entity in the spatial data dictionary.

Non-spatial databases:

The Non Spatial database represent the characteristics of the spatial relational data reflecting the land use, land cover, infrastructure, basic facilities, demographic profile, land holding, asset structure, income and livelihoods etc.

The database on village level basic amenities includes schools, hospitals/dispensaries, Gram Panchayat Building, Anganwadi, rural housing under IAY, Post Office, Banks, MGNREGS and IWMP structures, etc., and accessibility to drinking water, sanitary latrines, telephones, and road, SHG Micro Finance, amongst others. The population census provided the demographic profile for the village, while the special requirements for Gram Panchayat were related to

village administration and management, besides data related to weekly market places, items in fair price shops, fertilizer, seeds, pesticides availability etc.

Integration of spatial and non-spatial databases:

For the purpose of integration of spatial and non-spatial databases, the attribute databases were conveniently organized to correspond to required distinct areas of planning, which include education, health, transport, communication etc. These data sets were linked and integrated with the spatial databases to facilitate the development of facility planning and management system.

Participatory Rural Appraisal (PRA) Methodology:

A Participatory Rural Appraisal (PRA) exercise was carried out to understand the priorities and needs of the people of Ralegoan siddhi Gram Panchayat. The PRA Resource Map showed good understanding of people about their village spatial spread, resources, infrastructure, Governmental programmes and projects and their neighbourhood. The entry level activity taken up was information on education, tutorials, admission, coaching, Question Banks, Career prospects, skill development and related aspects.

The database was validated with field data of the RalegaonSiddhi Gram Panchayatand was further consolidated with MaharashtraState making it accessible for youth, students, Panchayat Functionaries and others. Various relational database of the village were integrated with the land base vector layer and analysis based on the Gram Panchayat day to day decision requirements were attempted for use by the village for local level application.

Planning Process:

A flexible and user friendly customized GISbased GP Planning system was developed to assist planners for Gram Panchayat planning with reference to managing the resource of Ralegaon Siddhi village. An important task of GP GIS is to show visualization between non-spatial point information and the spatial information. The non-spatial information consists of census, Panchayat data, socioeconomics, asset holding, infrastructure, agriculture, house hold information and the spatial information consists of maps, referenced GPS geographic latitudes-longitudes, land use and land cover, topography and terrain, drainage, slope, aspect etc. The integration of multi-layered data from different sources and various scales, with visualization and query capability, which gives analytical ability to pose complex query and extract information spatially.

Natural Resources Planning:

Land use planning, water resources, soil resources, forest resources, mineral resources etc help Gram Panchayat Planning most optimally and indicate current patterns and future use and help in planning productive resources with changing demands of the society.

Land Use Land Cover:

The knowledge of spatial distribution of land cover/land use of large area is of great importance to regional planners and administrators. Satellite data can provide information on large areas and the temporal data can be utilized for change detection and updating old data. The land use / land cover categories can be obtained from the remotely sensed data include level III classes of land use classification system such as water bodies, forest, grass land, agricultural land, barren land, and scrub land. The Spatial Distribution of the various land use land cover classes found the study are listed in the Table-1.

Figure 0.7:Land Use Land Cover Map of Ralegan Siddhi

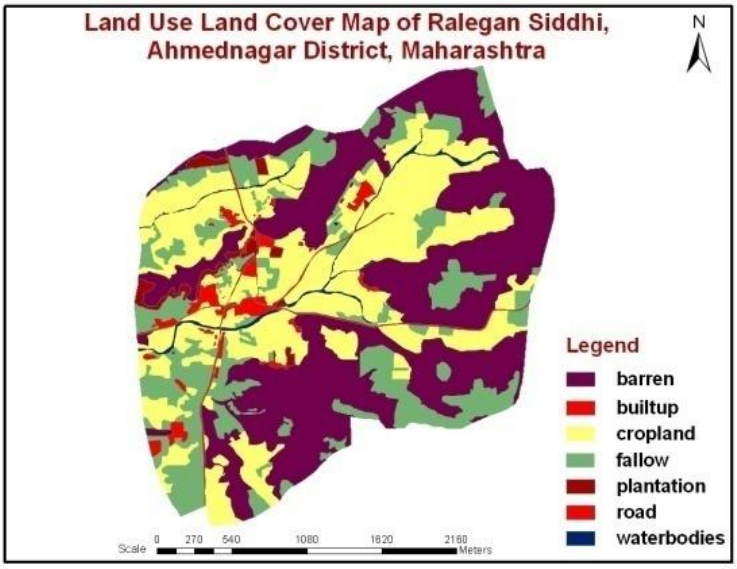


Table 0.1:Areal extent of Land Use Land Cover

Mapping Unit	Land use/Land cover category	Area in Sq.Km
1	Barren Land	1.32
2	Built up Land	0.23
3	Crop land	3.5
4	Fallow Lands	1.67
5	Plantations	0.07
6	Water bodies	0.12
7	Scrub land	2.76
	Total	**9.67**

Figure 0.8 :Land Base map of Ralegaon Siddhi village,Ahmedhnagar dist,maharastra

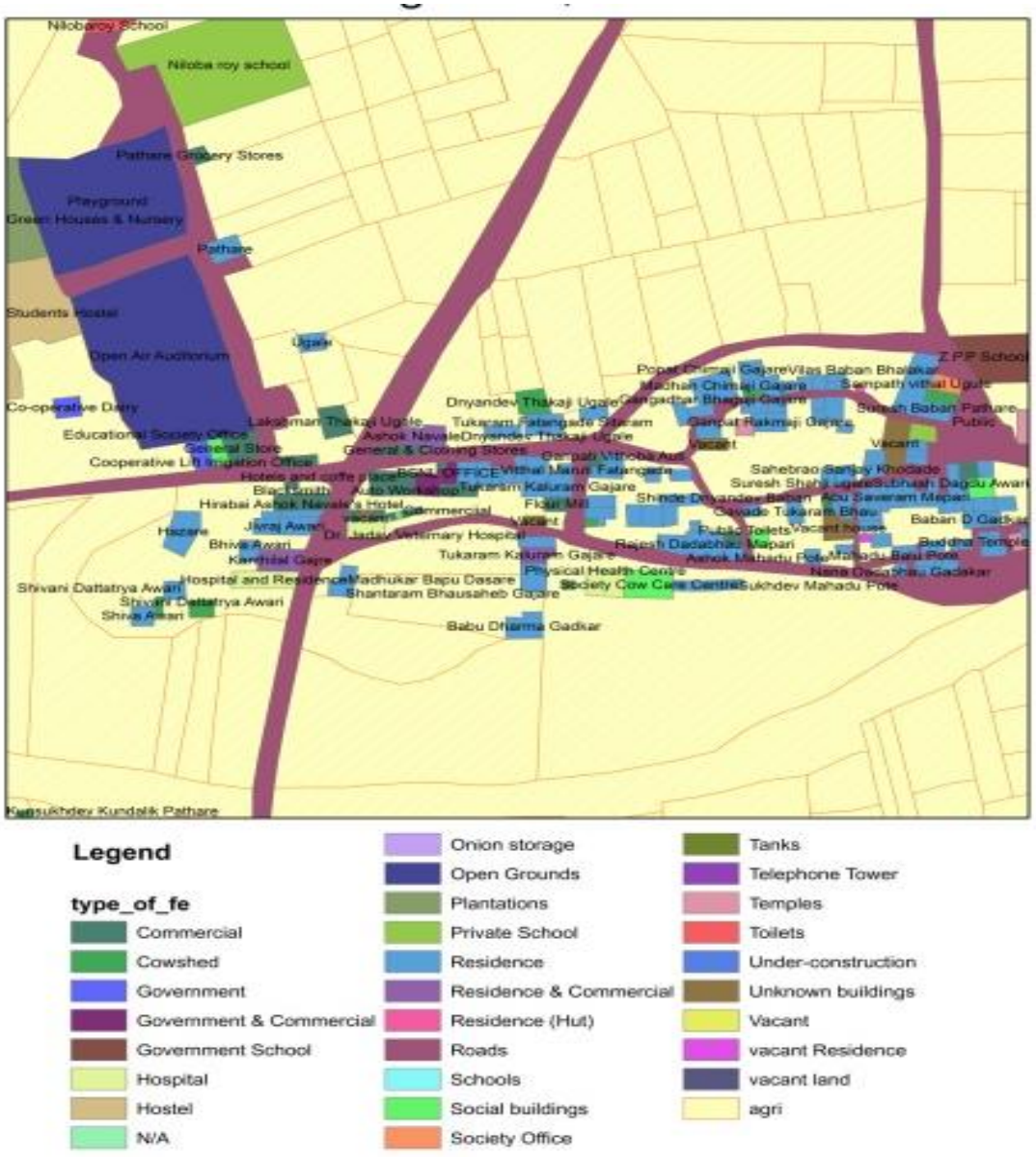
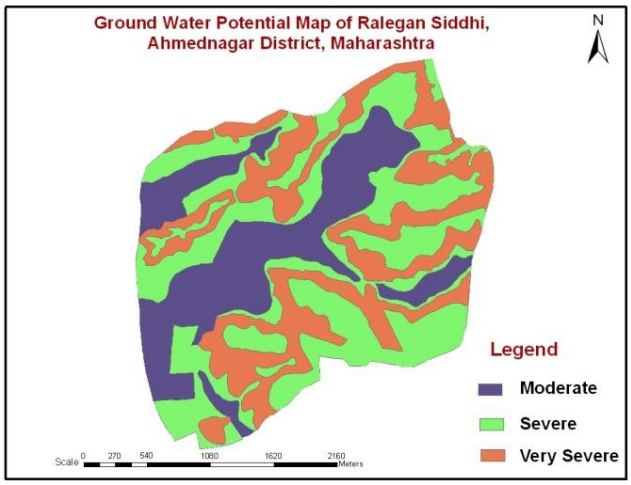


Figure 0.9 :Ground Water Potential



Hydrogeomorphology:

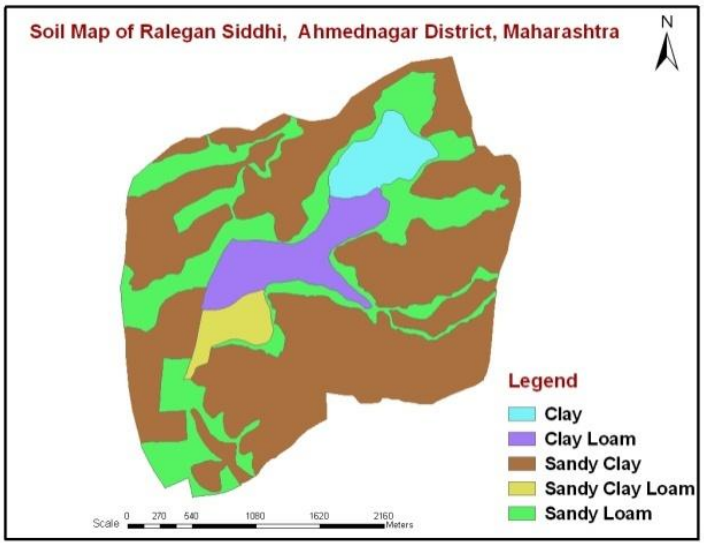
Hydrogeomorphology deals with the study of landform in relation to groundwater occurrence and availability. It is manifested at the surface, mainly by geology, geomorphology, structure and recharge conditions. All the four parameters were studied and integrated to arrive at the groundwater prospects under each geomorphic cum lithologic unit, designated as hydrogeomorphic unit. Ground water potential maps are prepared by integrating information on geomorphology, slope lithology, structural features and the precipitation. The Geology and Geomorphology of the study area have been studied and by combining the individual litholo-landform units the Geomorphology map is prepared. These Geomorphic units have been evaluated for their Ground Water Prospects based on the hydrogeological characteristics of the geological and geomorphological parameters. In the village around 3.65 sq.km of area under moderate ground water potential area ,2.54 sq.km of area in under poor or severe shortage of the ground water potential ,3.18 sq.km of area is under very poor or very severe shortage of ground water potential.

Soils :

On the basis of physiographic analysis of the satellite data. Clay, Clay Loam, Sandy Clay, Sandy Clay Loam, and Sandy Loam were delineated. These were further subdivided based on the tone, texture, pattern, slope and land use. The Sandy Loam and Clay are nearly level, intensively cultivated and mostly irrigated. Sandy Clay Loam is all most covered with built-up lands Clay Loam is mostly used for cultivation and certain areas are cover with built-up lands .Sandy Clay is barren rocky area. It is a little elevated area.The soil samples were collected and analysed for particle size distribution, pH, EC, CaCO3, organic carbon, ion exchange capacity and exchangeable ions. The soils are slightly alkaline (pH 8.5-8.9), having low electrical conductivity (0.05-0.8 dsm-1), low organic carbon (0.01-0.4%) and variable calcium carbonate content. The low organic carbon content (<0.4%) of these soils is due to limited biological activity and rapid decomposition of biomass under the prevalent torricconditions.

Based on the difference in soil texture, drainage and profile development, the soils were grouped into five soil series. The soil - physiographic relationship was established. The soils were classified as per Soil Taxonomy (Soil Survey Staff, 1996) as UsticTorripsamments (Soil Series 1 and 2), Coarse loamy UsticHaplocambids (Soil Series 3 and 5), Fine loamy UsticHaplocambids (Soil Series 4). The final soil map was prepared on 1:10,000 scale.

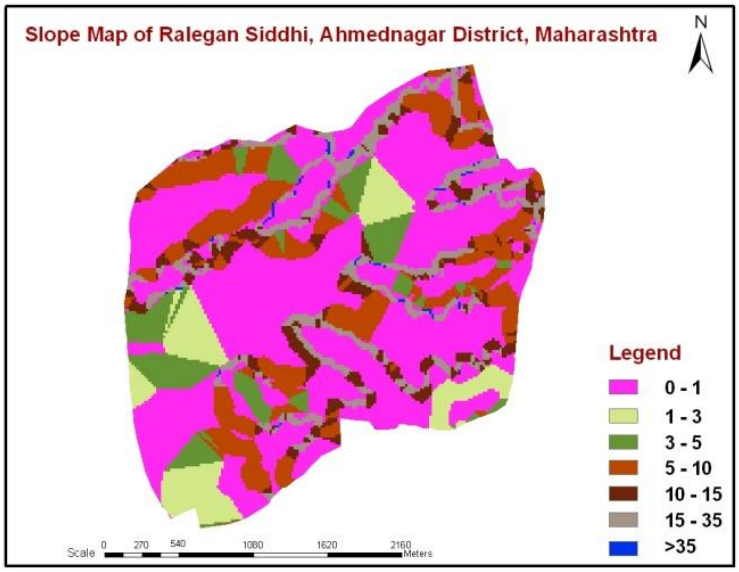
Figure 0.10:Soil Map



Slope:

Slope refers to the inclination of the surface of the land. It is defined by gradient, shape and length, and is an integral part of any soil as a natural body. The length and gradient of slope influences soil formation and soil depth, which in turn affects land development and land use. Around 5.65 sq.km of area under village is level to nearly level slope, 1.65 sq.km of area is under 3-5 % sloping lands and 2.37 sq.km is covered under 10-15 % and above slope.

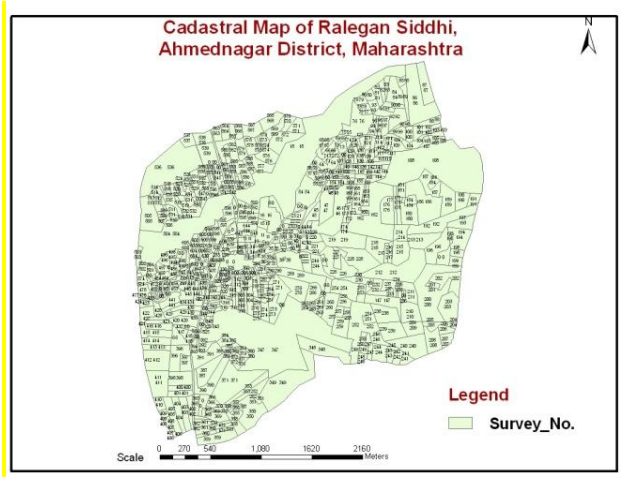
Figure 11:Slope Map



Cadastral Map:

The cadastral map was procured from the revenue department. The scanned cadastral map was converted in to GIS form and the survey numbers were attached for each land parcel. Using the DGPS the cadastral was georeferened.This geo-referenced cadastral was overlaid on the land use maps to identify the crop land details based on the survey number.

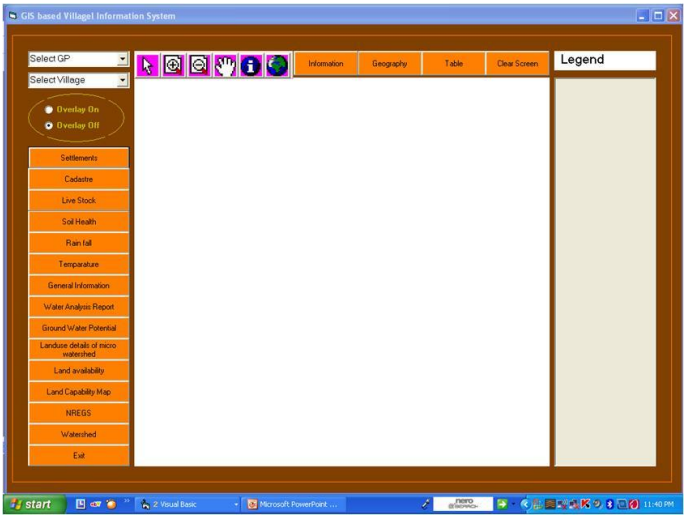
Figure 12:Cadastral Map



Gram Panchayat GIS System:

The Gram Panchayat GIS has been developed using Open Source Software and operates on standard hardware in windows . The main screen of the Gram Panchayat GIS is shown below:

Figure 13: Main Screen of Gram Panchayat GIS



Open-ended Design:

The Gram PanchayatGIS is a seamless integration of all facilities at micro level in a GP.

Thematic maps:

Thematic maps are often required to provide decision support information for spatial planning in several key areas. The GP GIS facilitates efficient generation and display of thematic maps directly by the end user to enable him perform situation analysis and gain an insight for proper decision-making. It also supports map tool bar (zoom, pan) on any thematic map.

Display of village profile:

This contains set of predefined attributes of the Gram Panchayat (village name, Panchayat name, population details, availability of facilities, infrastructure, etc.) User can view the profile of any specific sector by clicking on the sector in the map or by choosing the desired item from the GP menu list displayed on the screen.

Query shell:

An in-built query shell is also provided in Village GIS to enable the end users build both simple and complex queries using any of the parameters (alone or in combination) contained in the attribute databases. The corresponding output can be obtained in the form of a map. The query shell thus aids in meaningful presentation of the data to arrive at appropriate planning decisions.

User-friendly interface:

Village GIS provides an interactive and user-friendly interface and it does not require any GIS expertise for its operation. It requires about 4~5 hours of learning time and could be thus easily deployed in the rural areas where the operating personnel are usually novices.

Applications of Gram Panchayat GIS:

The Gram Panchayat GIS has been customized for facility planning and management for the Ralegaon siddhi village in Ahmednagar District of MaharashtraState. Although Village GIS can support a wide range of applications due to its open-ended design, it is presently being contemplated for use for the following applications.

1. Facility planning (Identification of suitable locations for creation of new facilities such as primary schools, middle schools etc.)
2. Monitoring the functional status of various village amenities such as transformers, hand pumps, schools, hospitals etc.
3. Monitoring and evaluation of the implementation of various rural development and poverty alleviation programmes/schemes (Mid-day meals scheme for school children, housing and employment guarantee schemes etc.)
4. Management of road network.
5. Village connectivity to Panchayat Headquarters.
6. Land Holding Analysis
7. House Type Analysis
8. Income Analysis
9. Occupation Analysis

10. Social Strata and eligibility analysis
11. Age Group Analysis for education infrastructure.

Need for Gram Panchayat GIS:

Data Set Issues:

Gram Panchayat GIS has a strong component of socio economic, demographic, ethnic, societal data. Satellite imageries provides information on environmental and land use and land cover mapping, change detection, spatial spread etc. The socioeconomic data coupled with Census data validated by ground-truthing from a satellite image and Topo Sheet data layer provides precise data. There may be some challenges of inconsistencies in referencing systems or geographical scales, and difficulties in the sharing of data and the coordination of information flows between users. However with OGC and ISRO Bhuvan Platform including SISDIP, the data accessing could be possible and there could be free flow of data to the users.

Data Analysis:

The inventory, analysis and mapping capabilities of GIS have wide applications in rural and regional planning, ranging from data retrieval and site selection to project monitoring and programming, information retrieval, development control, mapping, land suitability analysis and a host of related applications varying at different stages of the planning process.

GIS as an Integrating Tool:

GIS have evolved by linking a number of discrete technologies into a whole that is greater than the sum of its parts. GIS have emerged as very powerful technologies because they allow integrating the data and methods in ways that support traditional forms of geographical analysis, such as map overlay analysis. But they also make possible new types of analysis and modeling that are beyond the capability of manual methods, including visualizing alternative futures.With GIS it is possible to map, model, query and analyze large quantities of data all held together within a single database.

Conclusions:

The Geospatial Technology is a significant creation which has changed the dimensions of man's thinking and made him very powerful for the capabilities of spatial data visualization, analysis, storage, modelling, scenario generation and decision making anytime anywhere. The GIS provides spatial dimension to the database and make man's understanding of the earth features more meaningfully and address the why and how the situations and changes taking place over time and space and has demonstrated its potential for grass-root level development planning taking into consideration the local needs and constraints. It has also established its usefulness to the decision-makers at micro level to generate decision-making at local-level. Gram Panchayat GIS could have direct application in pan India, even though personnel, institutional and financial issues will continue to constrain adoption, with the following powerful features :

(1) Customization:

The Geospatial Technology have many tools and programming features which facilitates customization for faster analysis, mapping, modelling and processing. Customisation could be for a particular process or methodology to derive a particular outcome.

(2) Topology:

A GIS topology is a set of rules and behaviors that model how points, lines, and polygons share coincident geometry. Given that all Gram Panchayat informatics as spatial part of a common coordinated system, numerous combinations can be performed. Layers of interlinkages in terms of levels of functions, human use and management strategies.

(3) Decision Support System (DSS):

As far as rural development planning is concerned, Gram Panchayat GIS generates DSS for development activities to be implemented at micro level by integrating all aspects of physical, economic, social, human, resources, for optimal utility.

(4) Future Developments:

A few possible future development programs for better service to the users for decentralized planning are:

User friendly interactive web GIS for micro administrative unit (Gram Panchayat)can improve the efficiency of administration, improve resource mobilization and help in informed decision making.

Geospatial capabilities in terms of visualization, 3 D capabilitiesliking wide graphic aspects, like photographs, audios, videos, imageries and analyzed maps etc, which project field realities and help taking appropriate decision making, by people themselves.

GIS based Gram Panchayat Planning system, has all the data formats to build up data inventory, link graphics, identify locational features, generate various graphic analysis for decision making and shows information both horizontal and vertical. Village GIS is expected to usher in the desired transparency and easiness in the Gram Panchayat planning and enable a faster response to the changing ground realities in the development planning, owing to its in-built scientific approach. It demonstrates that the GIS approach can provide cost effective solutions for local level planning in rural areas, and help bring the benefits of Spatial Technologies to the rural masses.GIS technology is more useful to developing countries since many issues of development relate to large-scale problems requiring integration of large spatial dataset. The availability of remotely sensed data and other national and international databases can facilitate action and GIS have the potential to contribute positively.With local knowledge and local control, accountability set in where a GIS system could direct at real needs, and the design relevant to local conditions. Sensitising, Training and education village youth, elders, village functionaries and involvement of women, particularly from SHGs work towards sustainable GIS systems at local levels. GIS could become a tool for empowerment, decision alternatives, scenarios, modeling, what if analysis, locational and spatial spread analysis and an integrating tool for interfacing all information for synthesis, which can be a

very potential tool for Gram Panchayat Planning and with the changing Map Policy of Government, GIS has come a long way and be an integral part of our life, administration, policies and programmes.

BERA GRAM PANCHAYAT IN BHILWARA DISTRICT, RAJASTAN STATE

Introduction:

The Gram Panchayat is emerging as a hub of activities at micro level and proving as a community and people's decision making process for developing their livelihood and area, for their sustenance.

The Ministry of Rural Development has been developing the rural areas with numerous development programmes to assist the local people to develop themselves and providing a safety net, for their empowerment and economic development.

Technology such as GIS is proving as a decision supporting tool at local level for judicious and rational decisions, by integrating all knowledge base at village level and has the capabilities of modelling, scenario generation and strong visualisation for making the communities and people participate in the process of development.

A GIS based Gram Panchayat Plan was taken up in Bera Gram Panchayat in Bhilwara district, Rajasthan for overall development of the GP and to devise geospatial decision support at GP level and facilitate judicious support system for deriving the benefits of all RD Flagship programmes in the Panchayat.

Objectives:

The following are the broad objectives of the GIS based Bera Gram Panchayat Plan:

a) Design and development of a digital Village GIS for Bera Gram Panchayat integrating each household and cadastry, demography, resources, LULC, livestock, Soil, Rainfall, Water quality, high resolution satellite data , GPS/DGPS Coordinates, House hold photograph of the family members along with the house and authentic identification number etc with automatic Report Generation, capturing graphic viz. audio and videos, and language interface;

b) Integration of all development schemes like Watershed, MGNREGS etc;

c) GP development plan based on capability, resource base, optimum use, priorities and feasibility;

c) Training & Capacity Building for managing the Village GIS by Gram Panchayat locally.

Process methodology

The Process Methodology followed for the GIS based development plan for Bera Gram Panchayat in Bhilwara district was as under:

a) Collection of all information based on cadastral maps, Khasara Girdavari copies, house hold photographs, land marks, DGPS reference points of selected points, relational databases from all available sources, satellite imageries, NRM, infrastructure, topography etc;

b) Information on all ongoing State and Central Govt development schemes in the GP;

c) Mapping, analysis, overlays, scenario generations, to identify decision parameters for suitability, irritability, capabilities of soil; optimum and productive use of infrastructure, resources, etc to develop decision parameters for planning at GP level.

Figure 14: Displaying Settlement of Surajpura Village based on Family Code

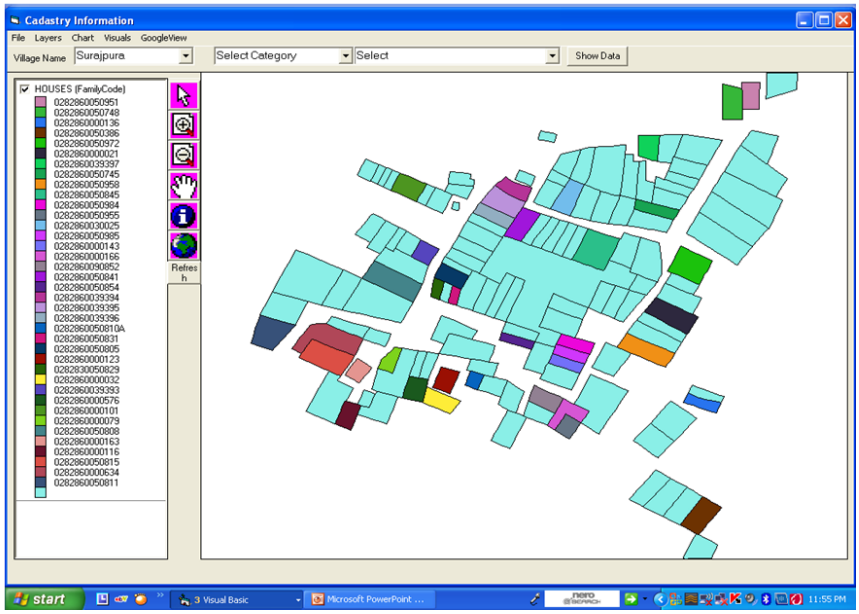


Figure 15: Identifying Family Information along with their photograph

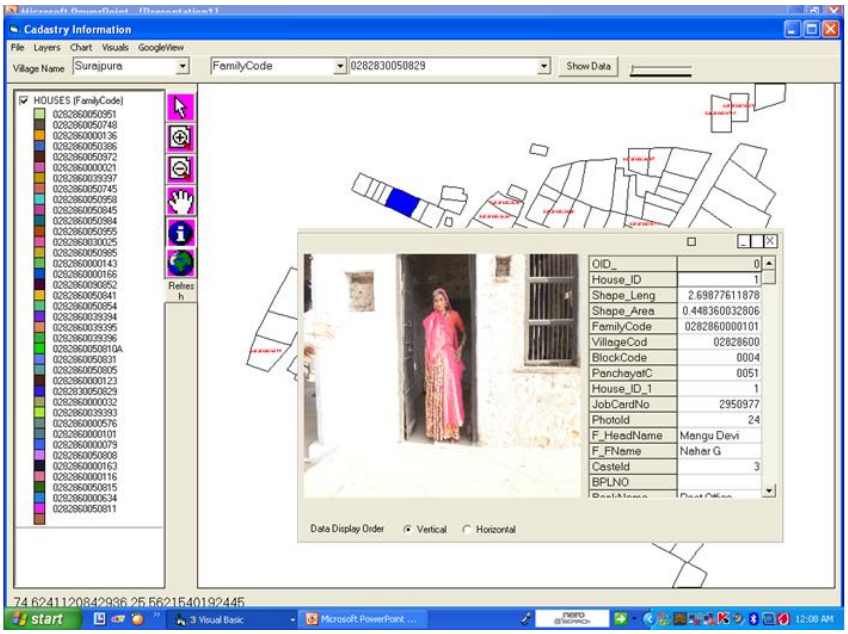


Figure 16: Displaying Cadastral Map based on Survey Number

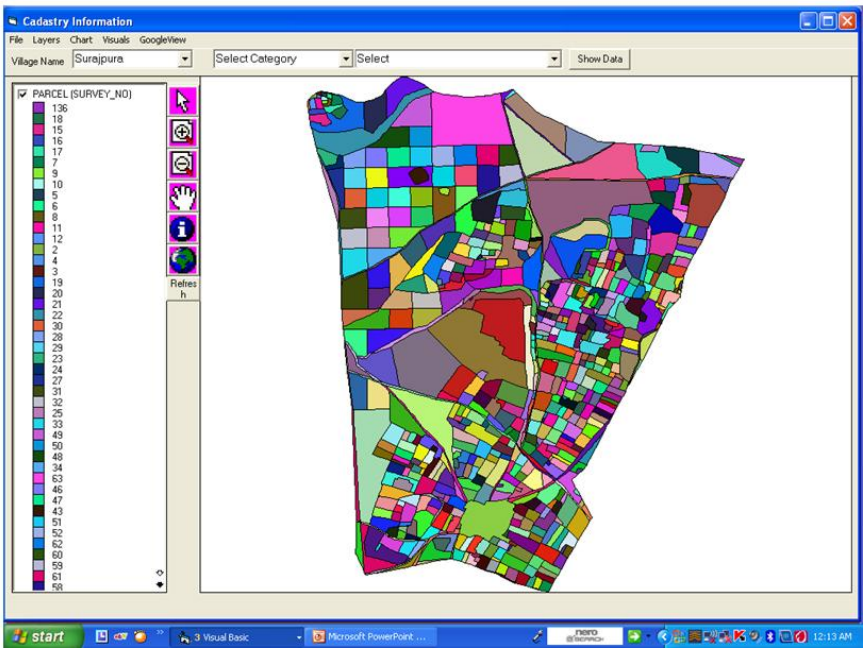


Figure 17: Displaying Cadastral Map based on Account Holder

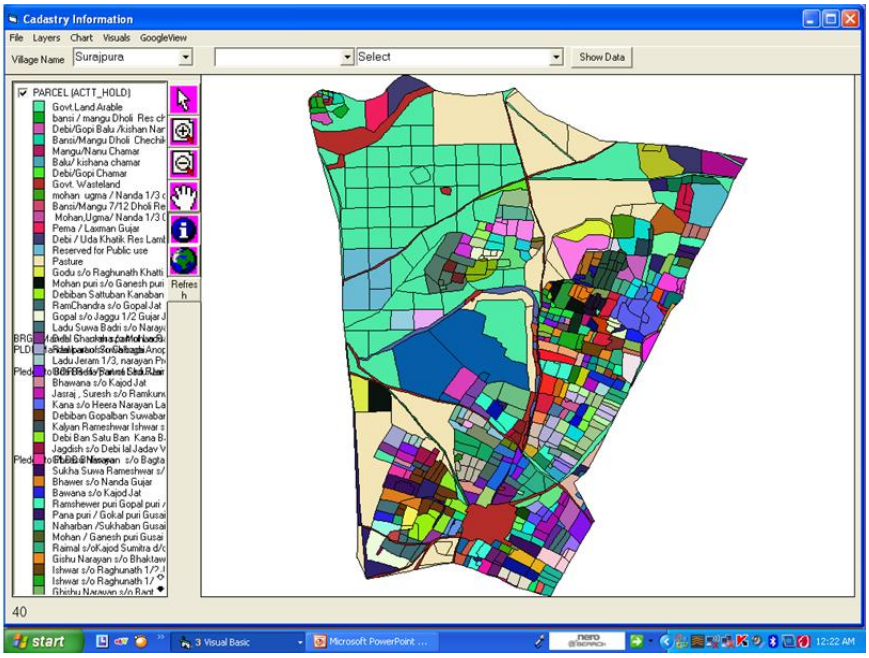


Figure 18: Identifying NREGS Structures in Satellite Imagery

Figure 19: Land Classification

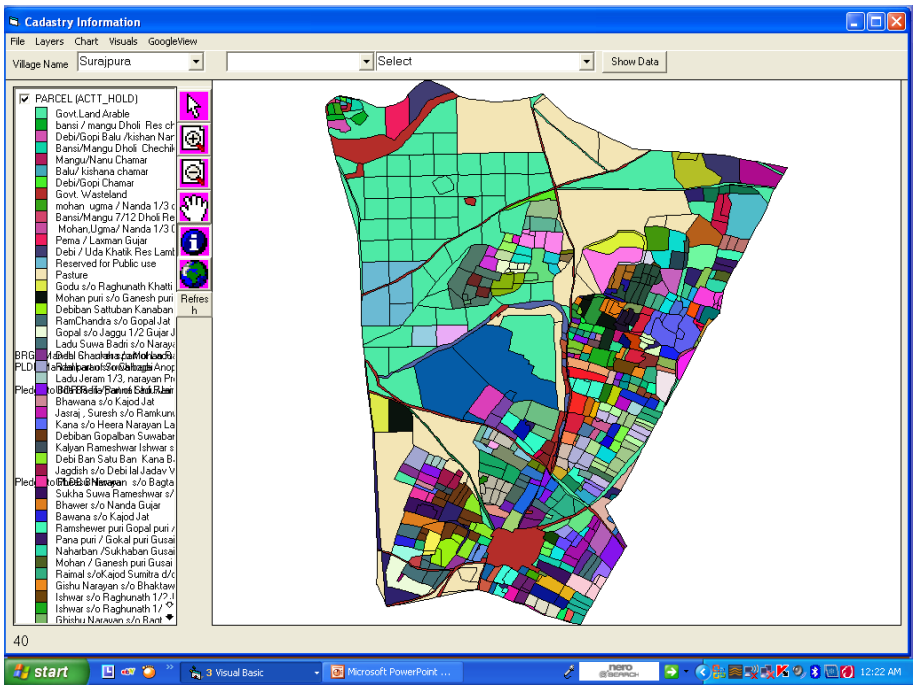


Figure 20: Area reserved for wells

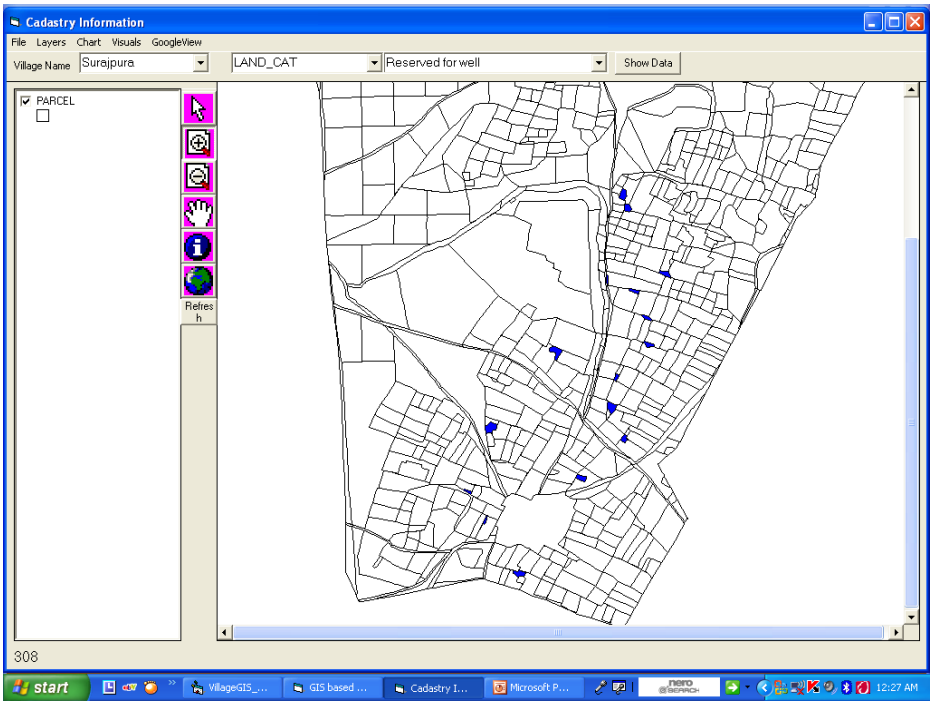
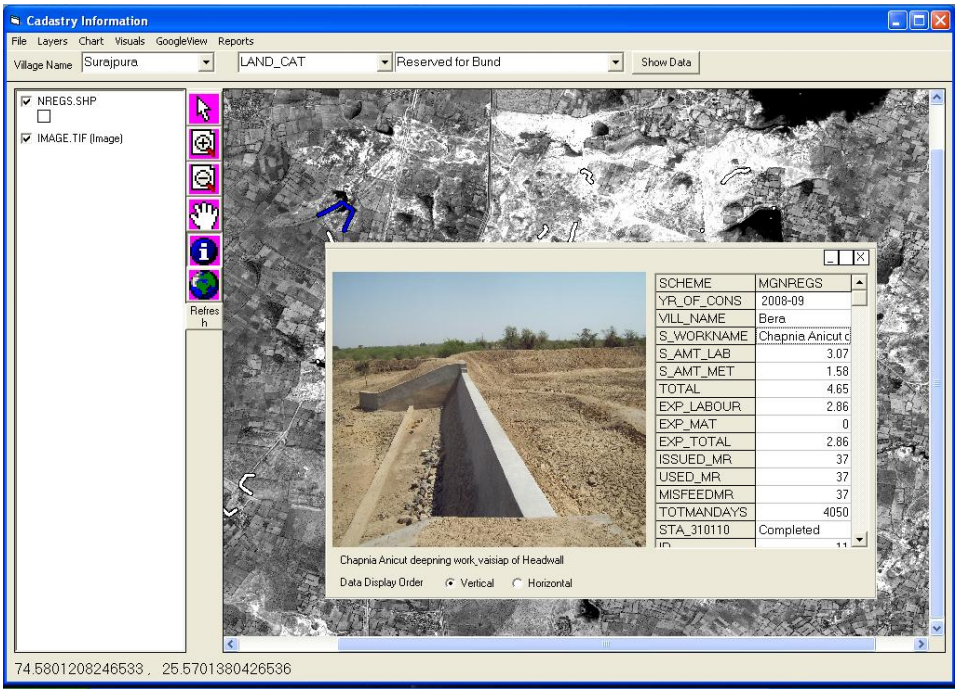


Figure 21: MGNREGS structure and its details with field photograph



Conclusion

GIS based GP Planning is a comprehensive document with all analysis for the Gram Panchayat planning for local people and for local decision support. The GIS based GP Planning facilitates integration and convergence of all village layers up to cadastral and house hold on real time mode. The GIS based GP Planning has inbuilt capabilities to capture All Village Thematic layers generate modern GPS, Space Technology, Communication Technology as an integral part of the GP development at grassroot level.

Kasare Gram Panchayat, Parner Taluka ,Ahmednagar District ,Maharashtra State.

Introduction

A well known fact is that India lives in her villages and would continue to do so. But rapid urbanization and consequent haphazard growth of cities has resulted in neglecting of villages. It lead to deterioration of infrastructure facilities, health hazards, loss of agricultural land and water bodies, besides many micro-climatic changes disturbing the ecological balance. Further, there is exodus of population, driven by lack of adequate facilities/opportunities in villages, from rural to urban areas. Though the urban regions have developed faster as compared to rural, the basic objective of a balanced development of different regions has still remained a distant dream. Instead, this has widened the gulf between the developed (urban) and the less developed regions (rural), thereby creating islands of prosperity. Hence there is an urgent need to reduce the cleavage between the rural and the urban areas through appropriate development planning for the villages.

The advent of space technology all pervading and the pace of ICT(Information Communication and Technology) facilitating the data acquisition on almost real-time mode gives opportunity for judicious decision making at all levels of governance for the developing world for reduction of redundancy and time and for optimum utilization of the scarce resources. The planning process has undergone a drastic change in recent years where decentralized participatory decision-making is resorted to ensure sustainability. However for this participatory decision-making, accessibility to a comprehensive data base which is easy to access and understanding of land records, topography, resources, settlement patterns and infrastructure new methodology and technology are needed. This is an area where spatial technologies play a key role in generating timely and reliable information for planning and decision-making at all levels. The use of GIS for a micro administrative unit for planning and implementation was tested in an Action Research Project in one of the Panchayats in India, where the knowledge base is developed up to cadastral level (land parcel level) and the house hold socio economic data is embedded on this layer on a GIS platform, with all graphic features of house type and house hold linked, to enable stakeholders take decisions in a dynamic mode.

Planning requires association and integration of various activities with spatial (geo-referenced) and non-spatial characteristics. Facility planning and management is one such an important area. Geomatics-based approaches to facility planning and management have, of late, gained prominence as they offer rational, efficient and effective solutions. Further, the rapid advances in the hardware and software technologies coupled with a growing competition among the related vendors have brought down the cost of Geomatics /GIS technology by manifold, making it affordable for deployment on a large scale for use in decentralized planning.

Even though it is widely recognized that the Geographic Information System (GIS) has the capacity to analyze both spatial and temporal data on a cost effective manner for effective planning and management, its application at the micro level for participatory planning and management is limited.

In view of this scenario, an attempt has been made to actually apply the GIS Package, simple, user friendly, customized, local need based, interactive and can be handled by the local youth and Village functionaries. It could be called Village GIS, which has all inbuilt features of various decisions at the village level integrating various layers of information both spatial and attribute pertaining to the Kasare village.

Planning:

Planning is a basic human activity that involves thinking ahead and organizing to achieve given objectives. The function of the planning system is to regulate the development and use of land in the public interest and to reconcile current requirements with the need to protect the natural and historic environment.

GIS in Planning:

The usefulness in planning and management of resources of GIS technology cannot be ignored. Country conditions in India provide plenty of opportunity to implement this technology. However, some barriers to effective utilization do also exist, such as non-availability of maps and cost of high resolution satellite data, and institutional and organizational weakness and the present-day requirement for skilled personnel to handle GIS software, but these barriers do not lessen the appropriateness of this technology.

The GIS technology is geared to prove most appropriate in every aspect of planning, decision-making, modeling, disaster management, alternative scenario generation and as a decentralized governance tool in India. Top administrators can be expected to employ a GIS to obtain views of the future spatial development of an area. With these tools, planning professionals will be able to provide high-quality services and information.

Objectives:

The objectives of the study are:

- To prepare land base map for study area to analyze demographical and cadastral information.
- To prepare various types of thematic maps (land use and land cover,Drainage, soil maps etc. on 1:10000 scale
- To prepare a GIS based GP Plan

Study Area

The Study Area is taken as the Kasare GP of Parner Taluka in Ahmednagar District of Maharashtra State.

District profile:

Ahmednagar is the largest district of Maharashtra State with geographical area of 17418 k.m., which is 5.66% of area of Maharashtra State. Out of total areas 391.5 sq. k. m. is urban area and remaining 16,656.5 sq. k. m. is rural area. Ahmednagar is centrally located in western Maharashtra. In Ahmednagar district there were 13 talukas and 1,581 villages and

1,308 gram sabhas. The Ahmednagar district is laid between 18.2* to 19.9* North latitudes and 73.9* to 57.5* East longitudes, and is bounded on the north by Nasik district, on the north east by Aurangabad district, in the east by Beed and Osmanabad, on the south by Solapur and in the south west by Thane and Pune district.

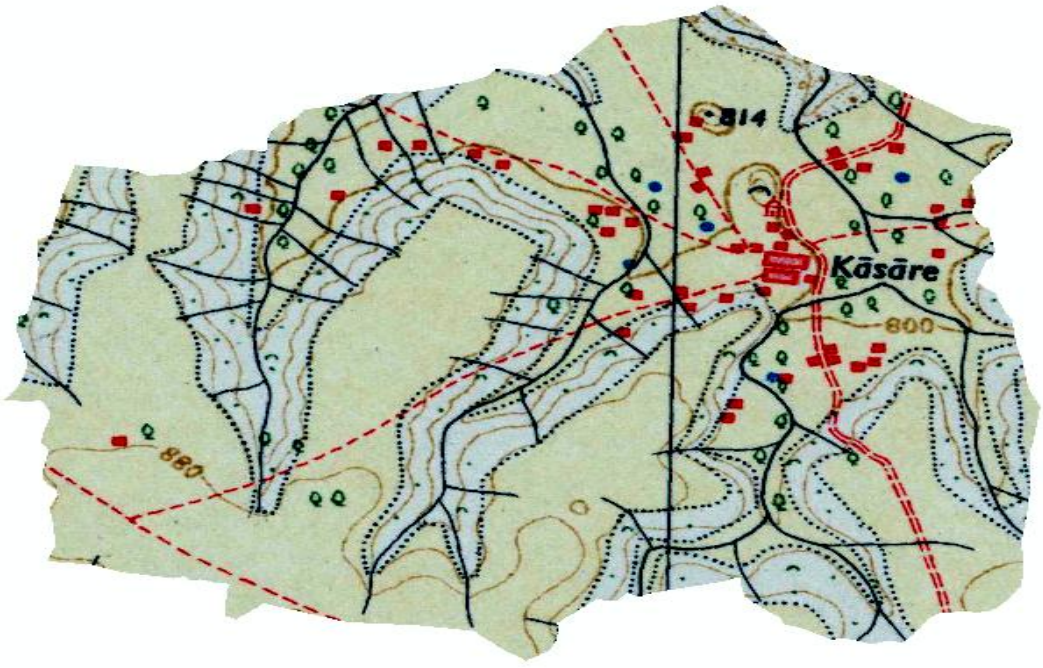
The climate of the district is characterized by a hot summer and general dryness during major part of the year except during south-west monsoon season, when the relative humidity is between 60% and 80% thereafter it decreases. Ahmednagar gets rain mainly from south-west monsoon but the distribution is mostly uneven. The average rainfall in the district is 579 mm.

The study area is Parner Taluka which comes under Ahmednagar district of Maharashtra state. Geographical location lies between 18.32 degree and 19.19 degree Northern Latitudes and 76.15 degree and 74.24 degree Eastern Longitudes. As per 2001 census the total population is 246535. It covers an area of 1,930 sq. km. The main study area is Kasare village in Parner taluka of Ahmednagar district. This village is located near Takli Dhokeshwar. Kasare is located at coordinates 19°8'21"N and 74°20'14"E. It covers an area of 8.2 sq.km approx

Data Inputs:

- Survey of India Toposheet 1:25,000 scale.

Figure 22: Toposheet



- Soil Survey, Analysis and Sampling.

Figure 23:Soil Map

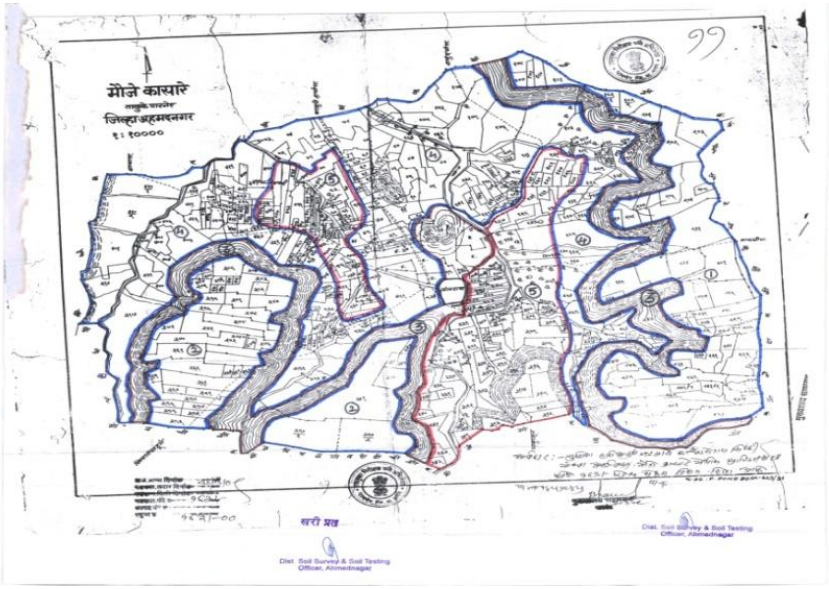
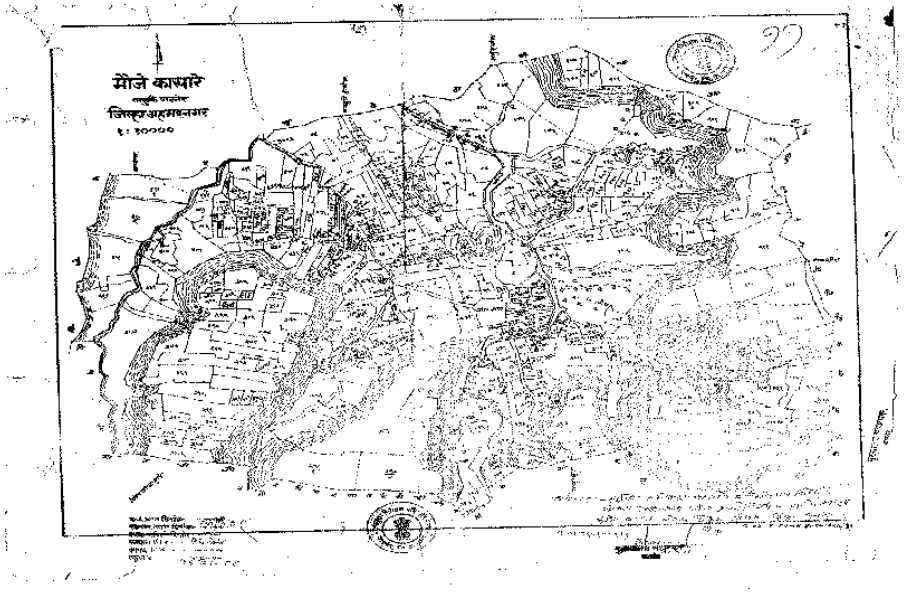


Figure 24:Cadastral map



- Field Survey data sets.

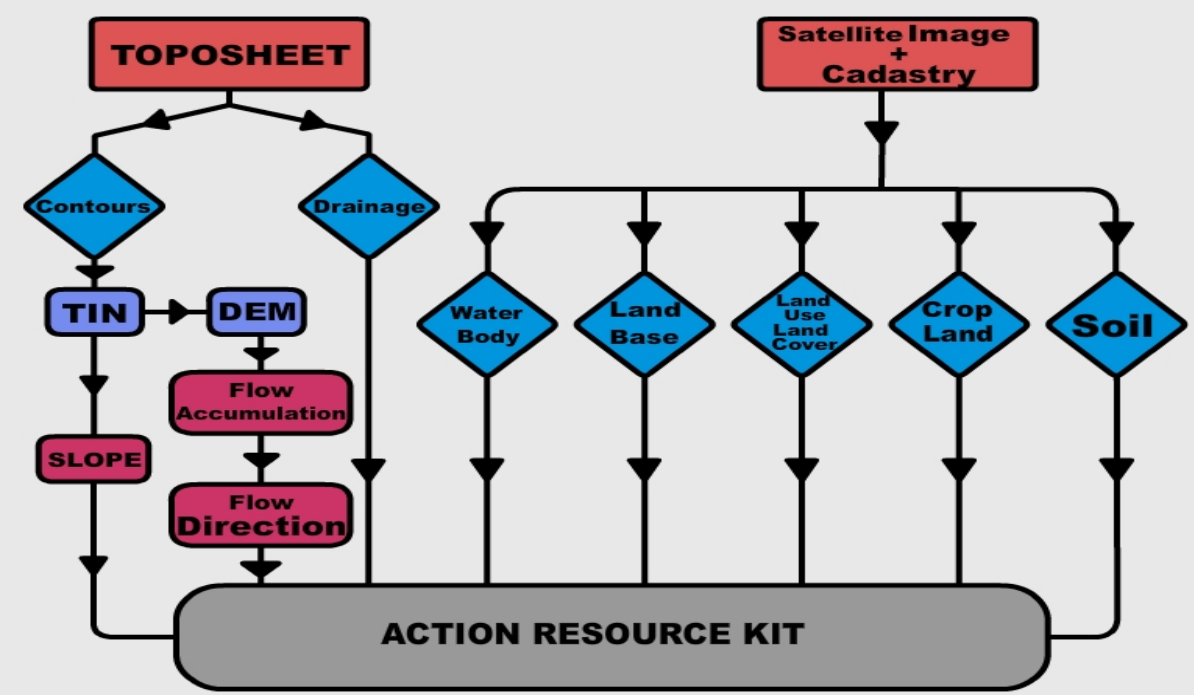
Methodology and Analytical Framework

The methodology used for GIS based GP Plan essentially consists of design and creation of appropriate spatial as well as attribute databases and integration of the same to facilitate the creation of various planning scenarios for facility planning and management, integrated with the priority and needs of the people, ensuring basic facilities, avenues for livelihood, and productive use of resources. Flowchart gives a schematic representation about the Geo-informatics approach/methodology used in the GIS based planning of the GP.

Methodology:

1. Land Base Map is prepared for the study area using the Geo-eye satellite imagery with scale of 1:1000.
2. The data models were prepared for collecting the land base details like house address, family information details etc.
3. For generation of thematic maps land use land cover, soil, slope etc. the merged data of cartosat-1 and IRS P6 LISS IV images is used.
4. Taking SOI Toposheet as source, thematic layers like drainage and contours are prepared at 1:25000 scale.
5. The Slope map is derived using SOI topographical sheets at 1:25000 scale with 20 meter Contour Interval;
6. Organising PRA through Resource Mapping, Need Analysis, priority analysis;
7. GP house hold data bases;
8. Study on Ongoing State and Central development schemes;
9. Study on finances and provisions, powers and functions of GP.

Figure 25:Methodology



Spatial database design:

GP Profile:

The study area consists of entire Kasare Gram Panchayat. It lies between 19°8'21"N and 74°20'14"E of the Parner Taluka of Ahmednagar District of Maharashtra State.

Coordinate system

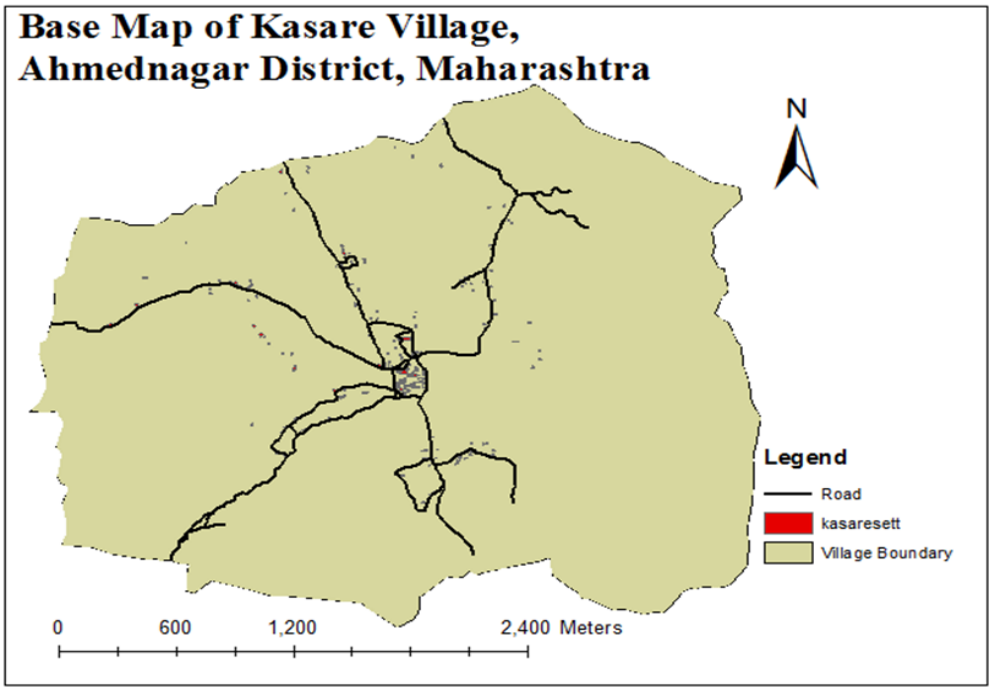
The coordinate system for the study area needs to represent the geographic features in true shape and size. Since the capture of the spatial features is based on Survey of

India (SOI) Toposheet (Scale-1: 50,000), UTM projection system has been followed for the coordinate system as adopted by SOI. For convenience, the same coordination system is used for Registration points also, thereby allowing proper integration of data sets. Cadastral maps were integrated with the spatial coordinates of the Village.

Base Map

Base map isprepared from Survey of India Toposheet on 1:50,000 scale comprising settlements, village administrative boundaries and road network.

Figure 26:Base Map of kasare Village



Drainage Map

The base map comprising of drainage network has been prepared using Survey of India topographical maps on 1:50,000 scale. The study area is having streams, which are sparsely located over the region. These streams are further classified based on stream ordering.

Figure 27:Flow analysis and Drainage pattern of kasare Village

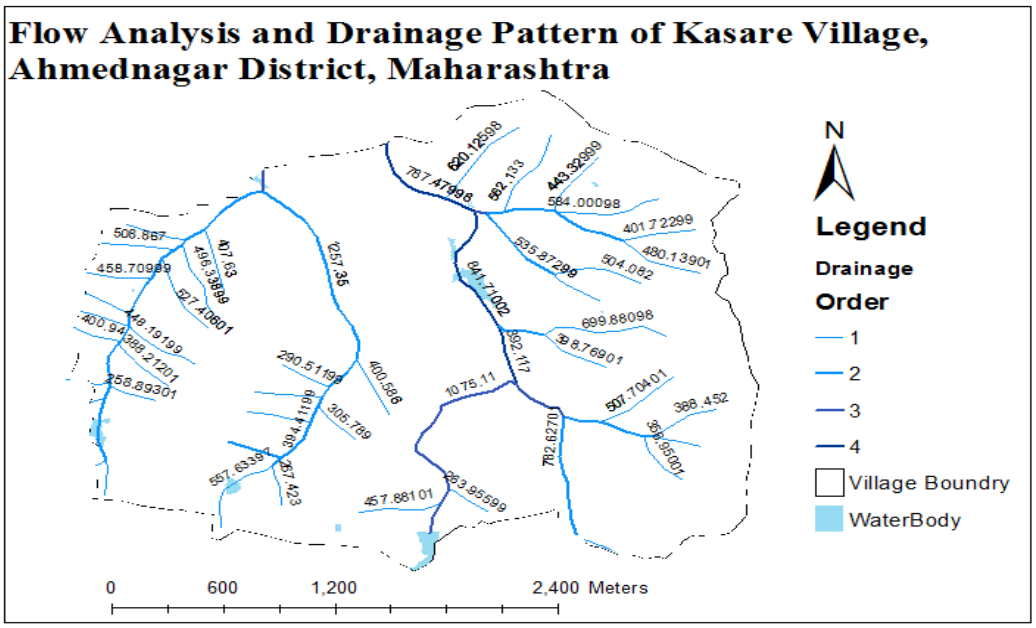
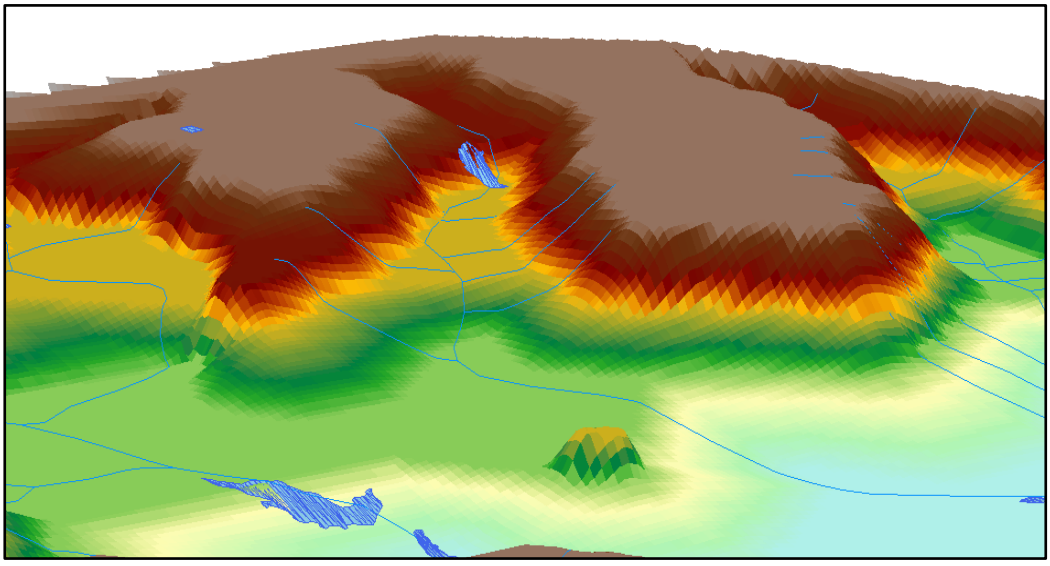


Figure 28:Flow analysis in 3D

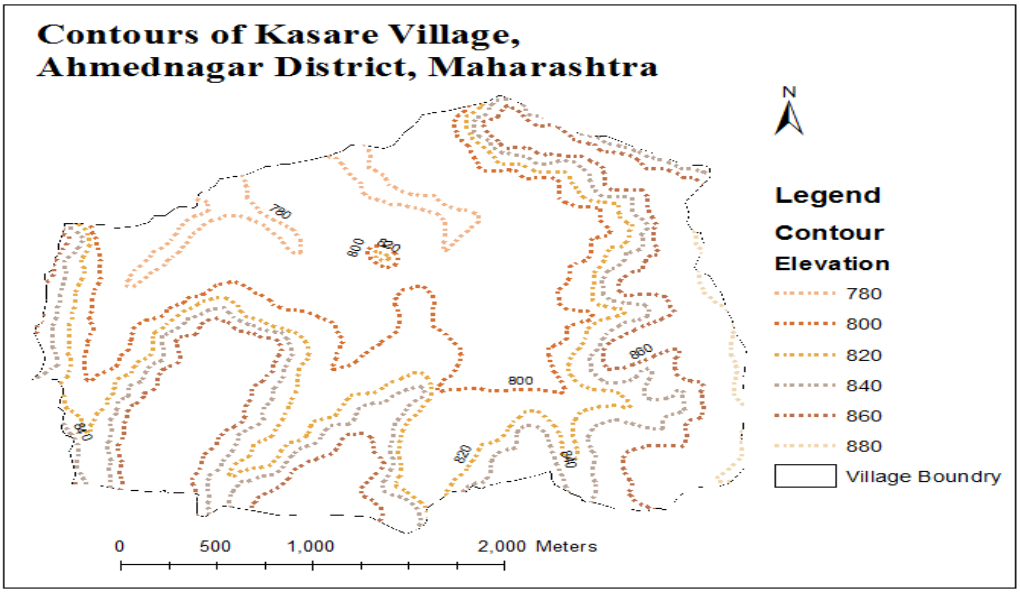


Contour Map

A contour line joins points of equal elevation above a given level, such as mean sea level. It is used to define the elevation of the region, through contour data the slope, elevation and terrain of the region is known.

Kasare Village is an hilly terrain and the region falls under the elevation with minimum height of 780 meters to 880 meters from MSL (Mean Sea Level). Contour map has been prepared by using Survey of India topographical sheets at 1:50000 scale.

Figure 29:Contours of Kasare Village



Generation of TIN (Triangulated Irregular Network) and DEM (Digital Elevation Model)

In order to establish flow accumulation raster and possible stream network an elevation raster has to be created. For this contour datathus generated in the vector format has to be used to generate TIN using Arc Map 3D analyst functions. Later this TIN has to be converted to DEM (Elevation raster) raster form by using spatial analyst functions. Slope map can be generated from the elevation raster by surface analysis tools under spatial analyst functions.

Figure 30:TIN of kasare Village

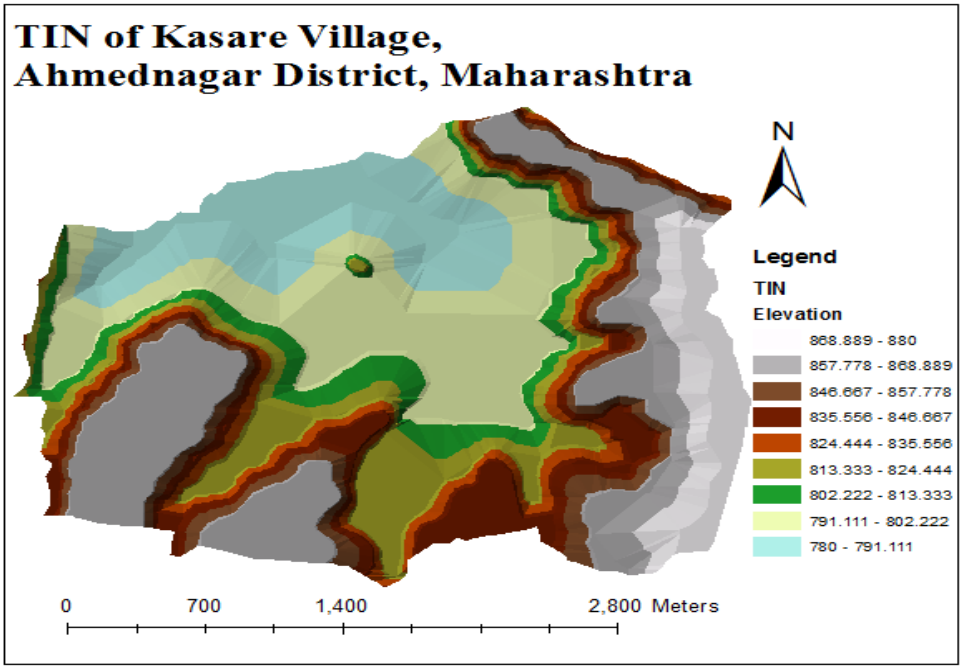
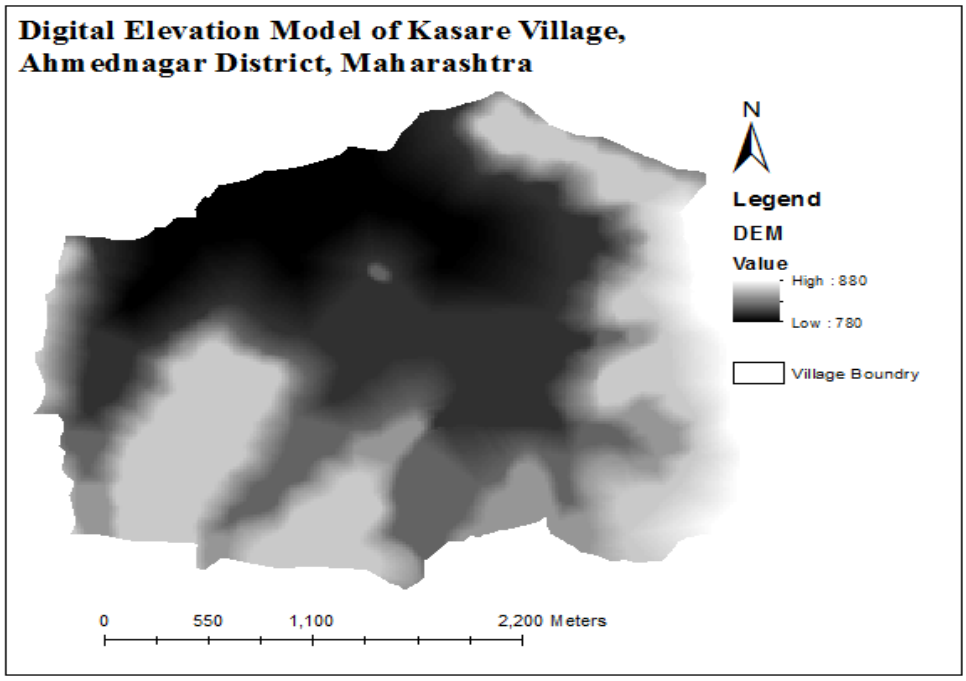


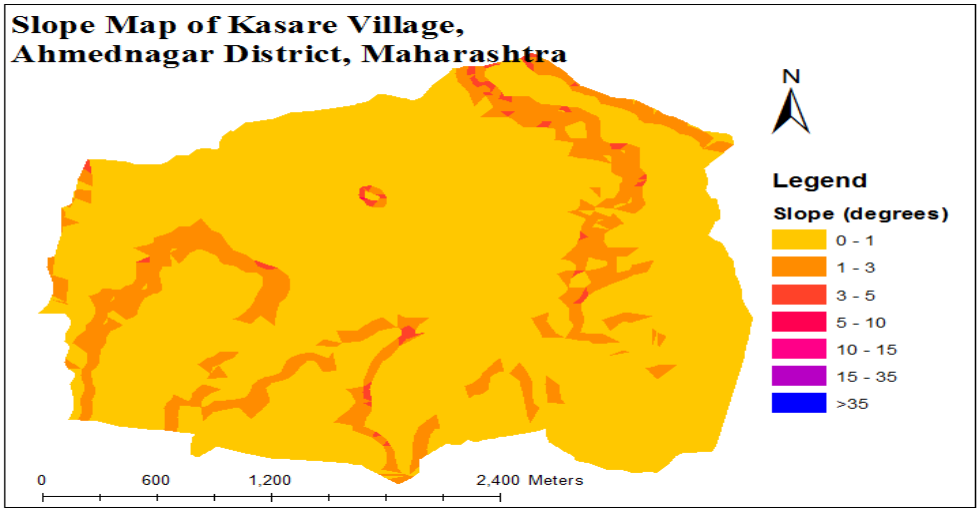
Figure 31:DEM of Kasare Village



Slope

Slope maps play a crucial role in addition to flow direction and flow accumulation in hydrological modeling. Slope is one of the important terrain parameters which can be explained by horizontal spacing of the contours. In general, in the vector form closely spaced contours represent steeper slopes and sparse contours exhibit gentle slope where as in the elevation output raster every cell has a slope value. Here, the lower slope values indicate the flatter terrain (gentle slope) and higher slope values correspond to steeper slope of the terrain.

Figure 32:Slope Map of Kasare village



GIS Analysis

The hydrological analysis process in GIS is one of the effective methods in terms of cost and time in proposing various water harvesting structures. This process deals with assessing

various hydrological characteristics of a surface. The basic parameter that controls the surface water flow (run-off) is the shape of the surface (terrain). Slope and aspect play a vital role in determining the shape of a surface. The basic inputs required to generate a hydrological model for a region are slope, aspect, sinks, flow direction, flow accumulation, and a possible stream network. The whole hydrological process can be broadly divided into 2 phases i.e. (1) Surface analysis and (2) Hydrological analysis.

Surface analysis

The topography of a land surface is represented by digital elevation data. This data set consists of the elevation in the form of grid points in a raster based GIS. In vector-based systems, the elevation is represented in the form of Triangulated Irregular Network (TIN). The most commonly used terrain functions are calculation of slope and aspect. The slope gives the rate of change of elevation and the aspect is the direction that a slope faces. The maximum slope is the gradient.

Surface analysis process involves creation of Triangulated Irregular Network (TIN) and Digital Elevation Model (DEM) from elevation data either in the form of spot heights or contours.

In the present study contour data is in the vector form derived from the Survey of India Toposheet on 1:50,000 scales have been used.

Hydrological Analysis

The process includes filling of sinks, identifying maximum flow directions, possible accumulation points, creating a stream network, based on flow direction, sinks and by identifying the contributing area above each point. An elevation raster is required to process hydrological modelling.

Flow Direction

Flow direction indicates the direction of surface flow which is an integer raster value ranges from 1 to 255. In an elevation raster if a cell is lower than its neighboring cells, the direction of the flow will be towards that cell. In some elevation rasters when multiple neighbors have the lowest values then the flow will be defined by filtering out one-cell sinks. In some cases if a cell has the same change in 'Z' value in multiple directions the resulting flow direction will be sum of those directions. The flow direction can be determined by finding steepest descent from each cell which can be calculated from the equation.

Change in Z value/Distance *100

The elevation raster thus generated without sinks is been used to generate the flow direction in the study area by using 'Flow direction' option in hydrology analysis function.

The output flow direction raster shows eight (8) possible directions.

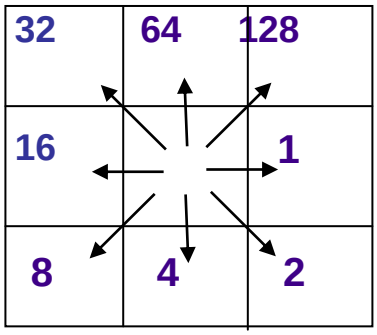
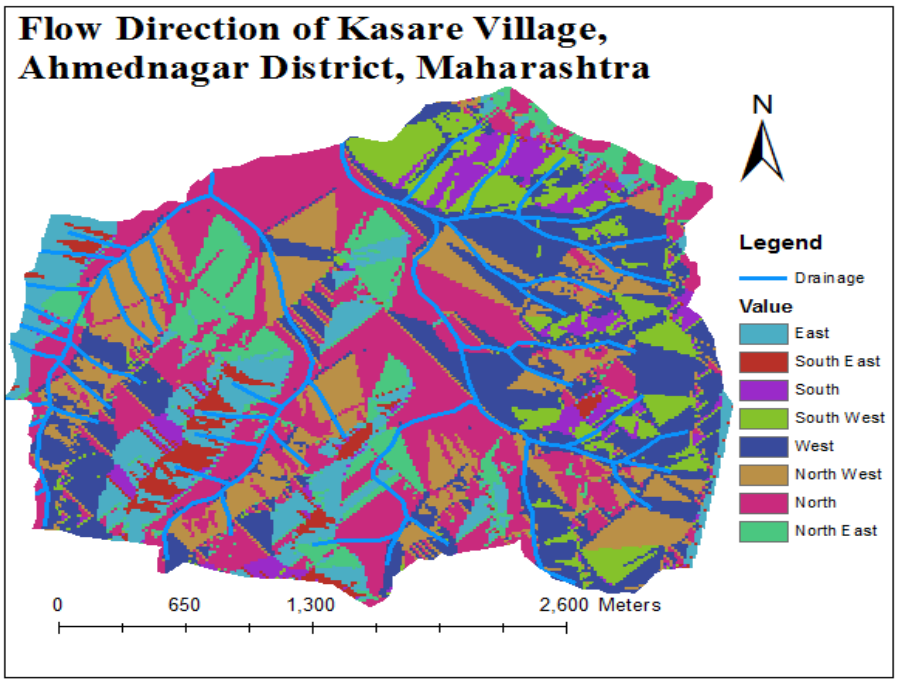


Figure 33:Flow Direction of Kasare village



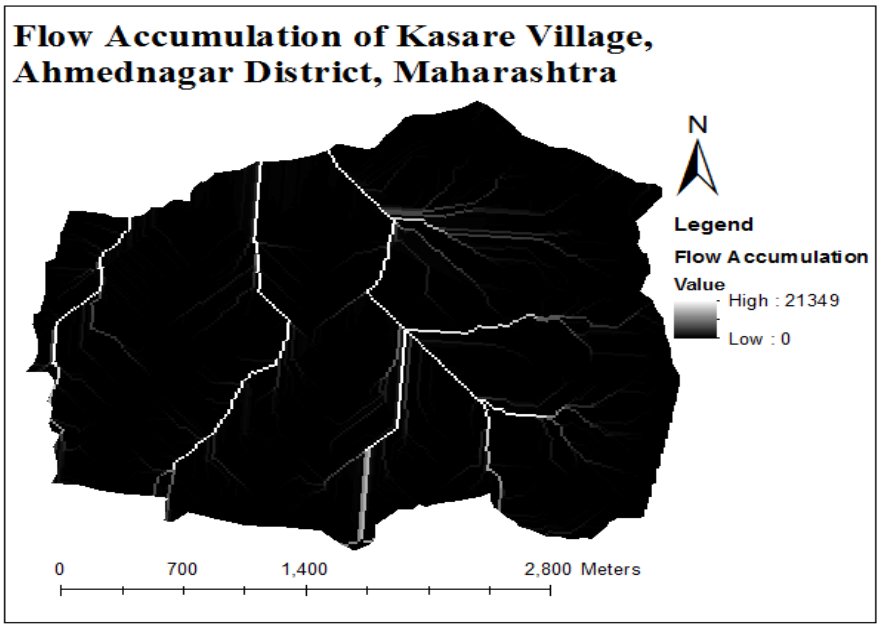
Flow Accumulation

Flow accumulation is generated from the error free elevation raster data. The cells of undefined flow directions other than (1 to 8) will only receive flow accumulation. The accumulated flow in the raster output is calculated based upon the number of cells flowing towards each cell. The high flow areas in the output raster are the areas of concentrated flow, which are important to identify possible stream channels. Similarly, those areas with flow accumulation value zero (low) are the areas, which are topographically high like ridges. A stream network is created by using the results of the high-accumulated flow. Similarly, this stream network is used as input to generate stream order, stream line and stream link.

Figure 33:Flow Accumulation Grid

0	0	0	0	0	0
0	1	1	2	2	0
0	3	7	5	4	0
0	0	0	20	0	1
0	0	0	1	2	0
0	2	4	7	3	1

Figure 34:Flow Accumulation of Kasare Village



Land use /land Cover

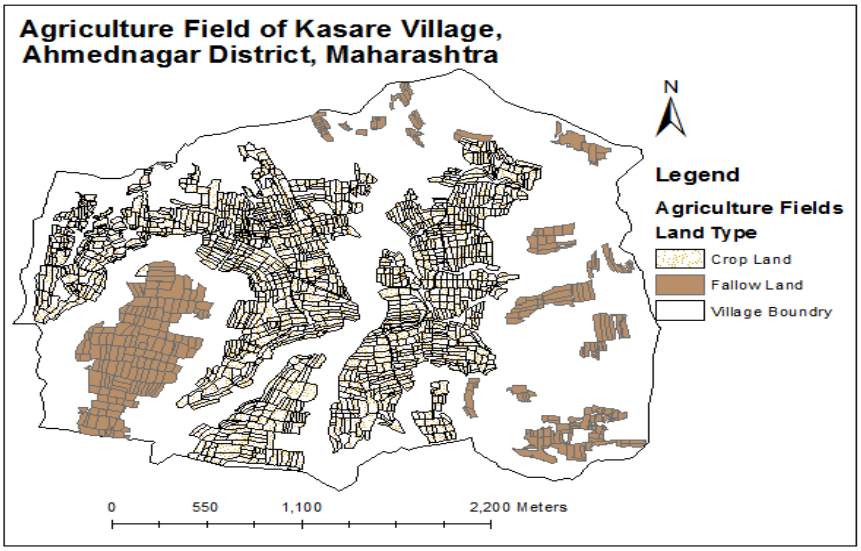
Comprehensive information on spatial distribution pattern of land use /land cover and their dynamics is a necessary pre requisite for planning and management of land resources of any region. The studies on land use /land cover are assuming importance in diverse resource sectors like agriculture planning, environmental studies, settlement and cadastral surveys etc. Further precise knowledge of land use /land cover pattern enable understanding the land utilization aspects with emphasis on cropping pattern in the agriculture lands, forest and grazing lands, and waste lands. A holistic picture of these aspects when viewed in combination with other land resources will enable us to suggest alternate /optimal land use for a given parcel of land.

Agricultural Land

Agricultural land use is dependent on land system and land units. It shows wide variations in the land units. It shows wide variations in the land use patterns in different part of the area.

The agricultural land classes are delineated in crop and fallow land which constitute an area of about 3.56sq km.

Figure 35:Agricultural field of Kasare Village



Fallow Land

Cropland left un-cropped during both the kharif and rabi season fall under this class. The total estimated fallow land area is 0.54sq.km

Barren Lands

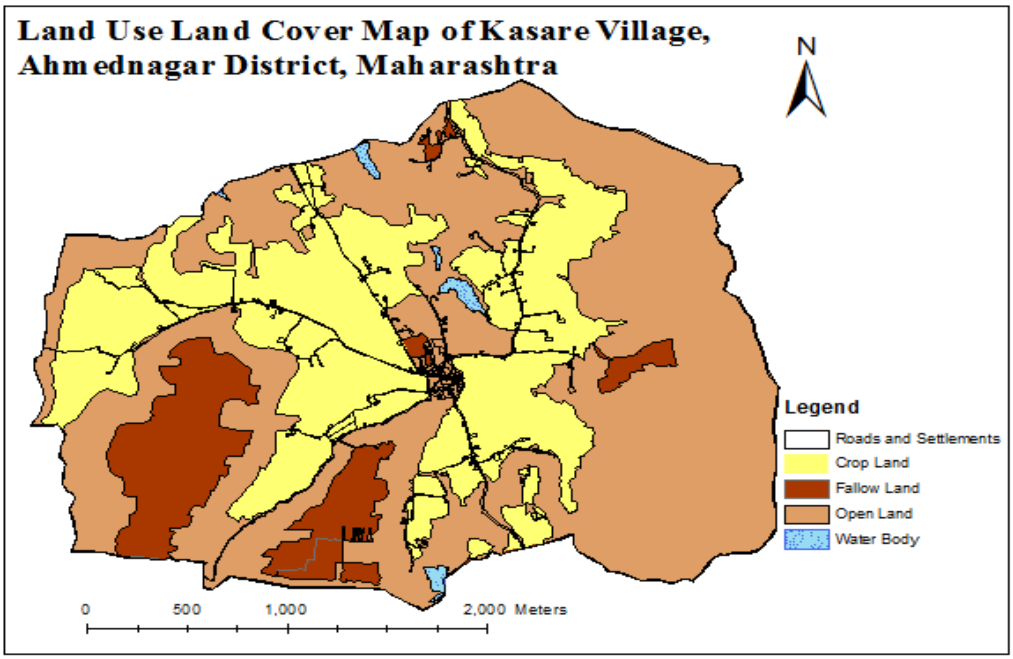
Barren Lands are described as, degraded lands which can be brought under vegetative cover with reasonable effort and which are currently under utilized and lands which are deteriorating due to lack of appropriate water and soil management or on account of natural causes. Wastelands can result from inherent/imposed disabilities, such as locations, environment, chemical and physical properties of the soil or financial or management constraints. The total estimated wasteland area is 4sq.km, which constitute nearly 50% of total study area.

Water Bodies

There are prominent surface water bodies in our study area. The area has high productivity potential, which can be achieved through optimum land use planning. The total estimated water body area is 0.06sq km.

Mapping Unit	**Land use/Land cover category**	**Area in Sq.Km**
1	Fallow Land	0.54
2	Open Land	4
3	Crop Land	3.56
4	Water bodies	0.06
	Total	**8.16**

Figure 36:Land Use Land Cover Map of Kasare Village



Soil

Soil is a natural body differentiated into horizons of mineral and organic constituents usually unconsolidated, of variable depth which differs from the parent material below, in morphology, physical properties and constitution, chemical properties and composition as well as biological characteristics.

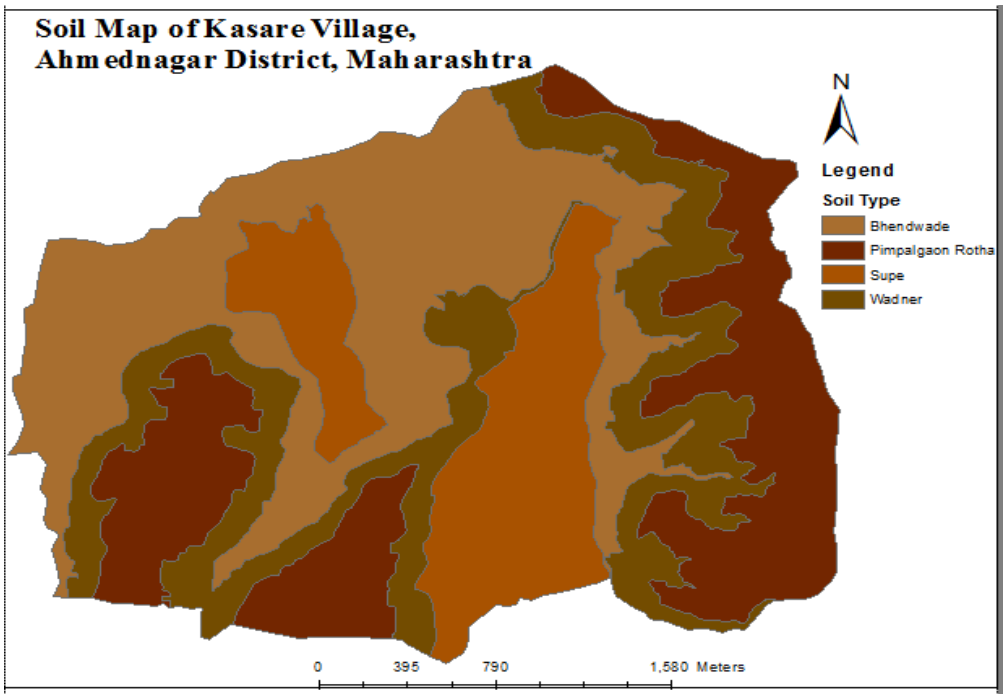
Utilizing the soil resources based on their productivity and capability lead to food economic and agricultural development of the region. The Soil, Land capability, Land Irrigability maps of the study area has been prepared on 1:50,000 scale using satellite images and other collateral data with limited field surveys.

Details of Soil Types

Sl. No.	Soil Series	Description	Area (sq.km)
1	Pimpalgaon Rotha	Pimpalgaon Rotha- shallow soil, sandy clay, very gently slope, moderate erosion, dark brown, messa, cultivated soil	1.27
2	Pimpalgaon Rotha	Pimpalgaon Rotha- shallow soil, gravelly clay, gently sloping, severe erosion, very dark grayish brown, messa, cultivated soil	0.94
3	Wadner	Wadner- shallow soil, gravelly sandy loam, moderate to steep, very severe erosion, dark brown, Escarpment, uncultivated soil	1.89

4	Bhendwade	Bhendwade- shallow soil, gravelly sandy clay loam, gently sloping, severe erosion, brown, Pediment, cultivated soil	3.26
5	Supe	Supe- medium soil, clay, very gently sloping, moderate erosion, brown, Pediment, cultivated soil	1.52
		Grand total	**8.08**

Figure 37:Soil Map of Kasare Village



Spatial database creation

As per the methodology and guidelines described above, state-of-the-art Arc GIS 9.3 and Quantum GIS 1.7.4 version were used for creation of the required spatial database in digital form. The digitized map information is stored in the GIS database appropriately in the form of layers, each layer representing a unique entity in the spatial data dictionary.

Non-spatial databases

Data sets related to the following were used to illustrate the nature of attribute data for consideration in the exercise for facility planning at village level.

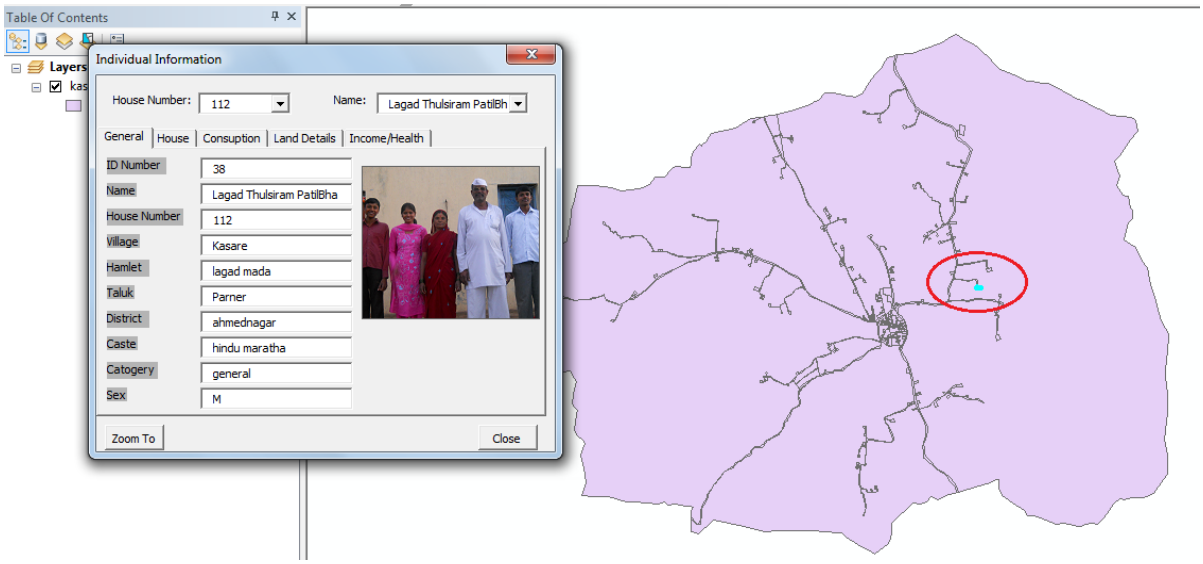
- Status on village-level basic amenities
- Population Census

The database on village level basic amenities under provided the status on the schools, Gram Panchayat Building, etc., and accessibility to roads. The population census provided the demographic profile for the village.

Integration of spatial and non-spatial databases

For the purpose of integration of spatial and non-spatial databases, the attribute databases were conveniently organized to correspond to required distinct areas of planning, which include education, health, etc. These data sets are linked and integrated with the spatial databases to facilitate the development of facility planning and management system.

Figure 38: Individual Information



Kasare GPMap

The figure shows the combined outcome of all layers such as Land Base Map, Soil Map, Agricultural Fields, Water Bodies, Drainage Map, Wells, Slope, DEM etc.,

Figure 39: Kasare Village Map