Chapter – VII

GEO-SPATIAL RESOURCES INFORMATION SYSTEM (SRIS) OF MIRAJ TAHSIL

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GeoInfoSys (GEO-SPATIAL INFORMATION SYSTEM) DEVELOPMENT WITH HELP OF GEOINFORMATICS

7.1 Introduction

Land as a resource is a finite and significant entity. The importance of land as a resource can not be overemphasized. It is an issue of local but very intact with national as well as global scale. Therefore, the geo-spatial information plays a key role on local to global scale. The change in landuse / landcover became one of the main concerns of land administrators, planners, geo-information managers, and researchers. The term landuse / landcover is much dynamic as well as complex, which deals with several aspects. GSIS (Geo-Spatial Information System) is a multipurpose tool, which deals with the spatial and non-spatial information of landuse/landcover and other related aspects. It is quite useful for local government and meets all preliminary expectations of different users. This information system helps to store, organize, manage the datasets along with its geospatial mapping module.

7.2 Motivation and Background

The information system plays a vital role by providing available information to different users at different levels. Generally less accurate and incomplete datasets are ineffective and inefficient in the planning and decision making process. The integrated form of database is more effective than the particular focus (Mwakapuja, 2003).

This present study aims to improve land use management processes in local government with the support of an information system. This objective to develop an application is arrived after deep thought. The experience of secondary data collection from government office during the research has leads to develop this information system development. Many times it is found that the simple data, which should be publicly displayed is kept like some important secrete. Generally there is big
question on the data updates and its storage. In short, the data unavailability, its access for common user, its platform, etc. have forced to develop GSIS. This application is comprised of database, feature layers, maps and reports. The use of geoinformatics applications along with programming is applied to develop this application.

7.3 Literature Review

The field of information system is quite new hence some of the important studies conducted in this field are studied are literature review is conducted.

Paul Helden, (1994) developed an integrated information system for urban landuse management. He emphasized that, the information system is popularly linked to concepts of Decision Support System. It serves as a tool to determine what information is required and for what purpose.

Yolanda and Garcia, (2001) worked on Development of Cadastral Infrastructure: Case Study ‘National Cadastre in Guatemala’ in Central America. Here an exchange of mechanism between the Cadastre and the National Property Registry is made through Open GIS approach.

The objective of information system is not so much to support decision making but more to meet the demands and satisfaction of users and clients. Hence, information system is brought form the boardroom to customer interface (Bacon and Fitzgerald, 2001).

Chanza, (2003) worked on title “A GIS Based Municipal Information System for Management of Urban Development Control Process, Case Study: Blantyre Malawi”. The study looks at how a GIS based municipal information system can increase the effectiveness and efficiency of urban development control (UDC) process in a case study situation of Blantyre city assembly, Blantyre, Malawi.

Santos, (2003) developed a Biodiversity Information System in an Open Data / Meta-database Architecture. This study represents an
overview of biological collections, their complexity and related bio-
information management activities in the main institutes in the Amazon
region.

Cruz, (2004) developed a Land Use Information System for Local
Government for the Naga City, Philippines. This study aims to improve
land use processes in local government with the support of an
information system. The analysis is done to understand the context of
land use processes and based on analysis a design solution for the
information system is proposed. Initially a set of guidelines for developing
the system is defined later it translated into system architecture to get a
global view.

Requirements and Use for Allocating Social Infrastructure”. This work
attempted to examine the planning process at district level through
which decision and allocations of social infrastructure are made. The
allocation of social investment in education, health and water sectors at
district (local government) level is important aspects.

Lee, (2005) designed the Survey Record Management System
(SRMS) to support Land Information System (LIS) in South Korea. The
objective of this study was to design survey record management system
to support LIS in South Korea and to link survey records with cadastral
features in the cadastral data model.

Yun (2007) focused on Web Services through his study
“Interoperability between Web Services for Geoinformation and Earth
Sciences”. The study focuses on two web services i.e. Web Coverage
Service (WCS) and Catalog Service for the Web (CSW) and the Geo-
interface for Atmosphere, Land, Earth and Ocean. The interoperability
experiment (GALEN IE) project is evaluated in the study.

Other than above some other important studies are Davassuren
(2001) worked on Information System Design for Land Degradation

7.4 Database and Methodology

The data collected for the research is utilized in this application. Same time the output derived during analysis is also used as an input for the information system.

The methodology of this application development is systematic and simple. The user is centrally placed and he is accessing the information through the developed tools. The handling of attribute data is done through computer tool kits, programming language and relational data
Geo-Spatial Information System (GSIS) of Miraj Tahsil

base management structure (RDBMS). The spatial data is managed by Geoinformatics software applications. The Geo-Editor is made available to linking of spatial and non-spatial data, analysis, updating of spatial data and mapping representations. This application is made for individual desktop user and structuring is made to access through the WebGIS application in future. These all components are integrated together and formed GSIS for Miraj tahsil.

The development of DeskGIS, WebGIS, Editing segment and programming development is made by applying specialized methodology, which is further in respective sections. In general the empirical approach is adopted to develop the GSIS application. The focus is made on basic features like database generation, data maintenance, display the spatial and non-spatial information, mapping of features and its representation, etc. The mapping segment is accomplished on two levels i.e. individual desktop and webGIS. The rural and urban areas are the two functioning areas, on which the focus is made. One detail sample model is developed for one village as Village Information System (VIS). The detail information of village Savali (from Miraj tahsil) is made available and for rest villages the format (structure) is created to add the data. For urban areas, Municipal Information System (MIS) is another application developed for a small area in a SMK Municipal Corporation.

7.5 Software and Hardware Considerations

The Software and Hardware are the heart and body of an information system. Without these two components the application development and its functioning is not possible. The technology is available in versatile nature hence the developer can choose the software and hardware as per the need and specifications. Before developing any software tool the limitations, flexibility and technology of hardware and software components needs to be considered. The Visual Basic (6.0) and .Net application (i.e. VB .Net) is used for non-spatial data management.
The Desktop application is developed by MapWindow software, which is .Net based handy explorer. Same task of desktop application can be performed by any browser or viewer like ESRI browser. The Quantum GIS open source software is used as a Geo-editor. WebGIS development is done though GeoServer open source, which is comprised of several open source add-ons. The installation of supporting software is must for the functioning of GSIS.

The hardware part is same as common computer with its devices. The basic hardware system configuration (P4 and ahead) is capable handle this system properly.

### 7.6 Geoinformatics Approach in System Development

Geoinformatics combines geospatial analysis, modeling, development of geospatial databases, information systems design, with application of computer and advance remote sensing technology. In other words, Geoinformatics technology is one broad term which includes three interdisciplinary areas i.e. Geographic Information Systems, Global Positioning Systems (GPS), and Remote Sensing; as per some scholars Photogrammetry is also one of the parts of Geoinformatics.

The development of GSIS is furnished successfully with the support of Geoinformatics i.e. GIS, GPS and Remote Sensing. The development, analysis and its presentations is the work area of Geoinformatics. Hence, Geoinformatics played a vital role in the application development of Geo-Spatial Information System.

### 7.7 Important Terminologies

There are several terms associated with the information system. Some of the important terminologies related to this application are explained below:

- **Information System**

  An information system is defined as a group of different data bases and other documentation put together in a systematic manner for
transfer of knowledge and communication of data on any subject. Such system is generally for identify and analyzes problems, set priorities, formulates policies & programmes along with its monitoring & evaluation (Narain 1997: 38).

Information system is defined as a collection of people, procedures, data, software and hardware that collects, processes, stores and communicates data and information to support operational task and decision-making (Paul Helden 1994: 489).

- **Land Information System**

  A land information system is a support to land management by providing information about the land, the resources upon it and the improvements made to it for the purpose of land administration while implementing land management.

  A Land Information Management System [LIMS] in the context of Land Administration Systems consists of a number of broad dimensions, firstly an institutional element, which includes a corporate structure in terms of policies, legal framework etc. Second a technological dimension that includes hardware and software. Thirdly, it includes a platform or a resource-base, on which data are stored and from which meaningful land information can be produced, analyzed and disseminated (Yolanda and Garcia, 2001).

- **Web GIS**

  WebGIS is a tool that represents the GIS data simply and understandable way with the help of Map Server where data is directly accessible for users through internet. WebGIS is having its own tools which are needed for map navigation and browsing. In other words, WebGIS is a way of publishing of GIS data on the Internet. There are several commercial as well as open source Web GIS packages are available in market like Minisota Mapserver, ArcIMS, Autodesk MapGuide, GeoServer, etc. The PHP, LISP (List InStruction Program),

- **Geo-Spatial Information System (GIS)** of Miraj Tahsil
JAVA, python, etc. are the Web Servers customized languages. The simple architecture of Web GIS is given below.

![WebGIS Architecture](image)

**Fig. 7.1 WebGIS Architecture**

- **Web Services**

Web Services provides a set of services including client/server software and data management toolkits. Web Coverage Service (WCS) and Catalog Service for the Web (CSW) are the main streams of OGC (Open Geospatial Consortium or OpenGIS) for Web Services (OWS). Some of the main features of open source technologies of web services are discussed below.

<table>
<thead>
<tr>
<th>Service Name</th>
<th>Service Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Map Service (WMS)</td>
<td>Dynamically produces spatially referenced map of client-specified ground rectangle from one or more clients-selected geographic datasets, returning pre-defined pictorial renderings of maps in an image or graphics format.</td>
</tr>
<tr>
<td>Web Feature Service (WFS)</td>
<td>Retrieves features and feature collections stored that meet client-specified selection criteria.</td>
</tr>
<tr>
<td>Web Coverage Service (WCS)</td>
<td>Retrieves client-specified subset of client-specified coverage (or image) dataset</td>
</tr>
<tr>
<td>Catalog Service for the Web (CSW)</td>
<td>Retrieves object metadata stored that meets client-specified query criteria.</td>
</tr>
</tbody>
</table>

**Table 7.1 Specific Information Management Services**

- **Table 7.2 Supported data type using different services**

<table>
<thead>
<tr>
<th>Service</th>
<th>Supported Return Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Map Service</td>
<td>Static Map: PNG, GIF, JPG, SVG, webCGM, etc.</td>
</tr>
<tr>
<td>Web Feature Service</td>
<td>Discrete geospatial features in GML format</td>
</tr>
<tr>
<td>Web Coverage Service</td>
<td>Space-varying phenomena: satellite imagery, DEM, TINs</td>
</tr>
</tbody>
</table>

**Source:** Chen Hsiang- Yun (2007): “Interoperability between Web Services for Geoinformation and Earth Sciences” pp.16
The Information Management Services which are designed to store datasets and providing access. A list of services included in the Information Management Services details is given in Table-7.1. A summary of supported data type using different web services in OWS Information Management Service is listed in Table-7.2. Three services provide server’s information based on client-requesting spatial constraints and other criteria in the similar manner. However, WFS and WCS provide available data with their detailed descriptions while WMS returns maps but not data

- **GeoInformation Science**
  
  A field of information science specializing on the fundamental issues arising from creation, handling, storage and use of geographic information (Chen Yun, 2007).

### 7.8 Guidelines for System Development

There are few general principles which are being followed during development of an information system. Some of them are listed below.

1. Information system should be multipurpose and useful
2. Make the system progressive and adaptable
3. The appearance of application should be simple and effective
4. The developed information system should be easy to understand and any user should handle it with minimum training.
5. The developed system must captures data and local knowledge
6. The system should be base on current needs and also useful in coming days
7. Make the system operational for updating records and deciding applications

The development of GSIS is made by considering the main guidelines and positively hopes for its utility. While developing this application main focus was a first step towards the data generation and its sharing.
7.9 System Structure / System Design

The GSIS is combination of different segments which are integrated together in one application. It is having own base, structure, functionality and applicability. The Fig.7.1 depicts the general structure / system design of the GSIS application.

Fig. 7.2 System Structure of SRIS
7.10 Components of GSIS

The GSIS is having two segments i.e. Village Information System (VIS) and Municipal Information System (MIS). Both are dealing with two different aspects but on same type of data and platform. The land parcel of a village is first prime aspect and household is another one.

7.10.1 Village Information System (VIS)

Village Information System (VIS) is a Geographical information system based application, which provides detailed information pertaining to demography, infrastructure and natural resources for particular village. It displays geo-referenced maps of various aspects of village. User can create query and print their maps through interactive maps. The system is currently designed for the village Savali same can developed for the rest villages in the tahsil and district.

Information which is presented systematically and related to various aspects of village is known as Village Information System. Natural Resources Data Management System (NRDMS) programme was initiated in 1982 by the Department of Science and Technology, Ministry of Science and Technology Govt. of India as a multi-disciplinary and multi-institutional Research and Development programme. NRDMS is working in the area of the spatial support for local level planning. During initial stage the developed databases were mostly non-spatial and not much spatial data were there. The aim of 10th plan was to establish centers to create spatial database for the country where they are started from the local level i.e. village. Although under this scheme there are more than 20 centers in India no single center is available for Maharashtra. Hence this work will help in some extent as initial task related to NRSMS project in Maharashtra.

In other words VIS is nothing but an information system for village, which will store the data regarding the various aspects of village. It will contain the data about agricultural aspects i.e. various crops, the
area under particular crop, ownership of land, land measurements, demographic details, economic conditions and other related data. The display or output of information will be available in terms of map, chart, and graph soft as well as hard copy can be generated as per the need. Various types of queries i.e. simple, compound and complex will be made on the generated database. Since it has up-to-date database thus one can easily get required information about that village. This system will maintain and controlled by the government officials for their own purpose but same time it helps society, individuals and researchers as a prime source of information about the village. As it contains enormous data of various aspects of village, also it has capacity to analyze and display the appropriate results hence it is considered as a decision support system.

7.10.2 Municipal Information System (MIS)

Municipal Information System is another application same as VIS but developed for urban areas. It is designed for a small area of a single ward in SMK Municipal Corporation. It also deals with same basic information like land parcel and household details. The area from Ward number-4 of Kupwad is selected for application development. This ward is possess mixed landuse pattern i.e. residential, commercial, agricultural, industrial, etc. hence it selected for development. The total population of this ward is about 9708 (as per 2001 census) in which 5040 males and 4668 females. This ward is having 2085 households as per 2001 census. Still there are other several aspects which are equally important but not included in MIS due to certain limitations.

There are many things about the VIS and MIS, which are important but due to limitation of space few are explained above. Also all the snaps of functioning of system cannot be shown hence few representative snaps are given in the text (thesis).
7.11 Functionalities of Application

The functionalities of each aspect are different from each other. This section deals with the overview of the major functions available in developed applications.

7.11.1 Computer Application

The application of computer will work based on the written programmes. The flowchart of programming development is given in fig.7.3. There are several forms are designed for data entry and these are component of this system.

![Diagram of Computer Application Development Process]

Fig.7.3 Computer Application Development Process

The computer application is developed using .Net programming, especially for non-spatial data management. The below given flow chart (Fig.7.2) depicts the system design of a computer application.

![Diagram of Functionality of Programming Segment]

Fig.7.4 Functionality of Programming Segment

The computer application is having basic functions like add, delete, modify and view of available attribute data. The user can feed the data through developed format and using Add option the data entry can...
be done. The Modify option is generated to change the available information.

Using Delete option the user can delete the unwanted or wrong record. The View option is used to display the information for user. The data is stored for versatile aspects like land parcel details and household details. The developed application is menu driven and users can handle it efficiently.

The demonstration of programming application is done and some of snaps are given below which will represent the aspects of developed application in brief.

Fig.7.5 Demonstration snaps of programming application
Fig. 7.5 Demonstration snaps of programming application
#### Chapter VII

**Agricultural Landuse Details**

<table>
<thead>
<tr>
<th>Name of Village</th>
<th>Cereals</th>
<th>Pulses</th>
<th>Vegetables</th>
<th>Fresh Fruits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barley (Sata)</td>
<td>Basmati</td>
<td>Black</td>
<td>Bittergourd (Kafir)</td>
<td>Achar (Spicy)</td>
</tr>
<tr>
<td>Finger Millet (Nachni)</td>
<td></td>
<td></td>
<td>Bollinger (Dusht Bhupola)</td>
<td></td>
</tr>
<tr>
<td>Food Mill (Rata)</td>
<td></td>
<td></td>
<td>Bittijal (Batt)</td>
<td></td>
</tr>
<tr>
<td>Kedia Mill (Kotra)</td>
<td></td>
<td></td>
<td>Capsicum (Simla Mich)</td>
<td></td>
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<tr>
<td>Masa (Makai)</td>
<td></td>
<td></td>
<td>Cauliflower (Flower)</td>
<td></td>
</tr>
<tr>
<td>Pearl Mill (Bajri)</td>
<td></td>
<td></td>
<td>Cluster Beans (Gawar)</td>
<td></td>
</tr>
<tr>
<td>Rice (Tanduli)</td>
<td></td>
<td></td>
<td>Cucumber (Kail)</td>
<td></td>
</tr>
<tr>
<td>Sorghum (Jowar)</td>
<td></td>
<td></td>
<td>Carumus Acutangulac (Dekda)</td>
<td></td>
</tr>
<tr>
<td>Wheat (Gatha)</td>
<td></td>
<td></td>
<td>Fenugreek Leafy (Melb)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>French Beans (Cheverda)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Olio (Bhard)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Onion (Kanda)</td>
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<td></td>
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<td></td>
<td>Potato (Tatots)</td>
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<td></td>
<td></td>
<td></td>
<td>Sweet Potatoes (Rats)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Other (Others)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Other Crop</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Other Non-Crop</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Non-Crop Other</td>
<td></td>
</tr>
</tbody>
</table>

**Spices and Condiments**

<table>
<thead>
<tr>
<th>Name of Village</th>
<th>Cereals</th>
<th>Pulses</th>
<th>Vegetables</th>
<th>Fresh Fruits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilli (Mith)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fenugreek Seed (Meth)</td>
<td></td>
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</tr>
<tr>
<td>Garlic (Lassen)</td>
<td></td>
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</tr>
<tr>
<td>Sugarcane (Usas)</td>
<td></td>
<td></td>
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<tr>
<td>Turmeric (Halad)</td>
<td></td>
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</tr>
</tbody>
</table>

**Oil Seeds**

- Sunflower (Sunflower)
- Groundnut (Brown)
- Soybean (Soybean)
- Cotton (Kapurs)
- Tobacco (Tambaku)

**Other**

- Fodder
- Other Cereals
- Other Pulses
- Other Vegetables
- Other Fresh Fruits

**Form1**

- **Village Name**: 
- **Circle Name**: 
- **Select Survey No:**
- **Select Sub-Survey No**: 
- **Main Survey No**: 
- **Area in Acre**: 
- **Area in (GUNTHA)**: 
- **Other Remark**: 

**Crop Details**

<table>
<thead>
<tr>
<th>Crop</th>
<th>Category</th>
<th>Type</th>
<th>Select Crop</th>
<th>Area in Guncha</th>
<th>Area in %</th>
<th>Area Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
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</tr>
</tbody>
</table>

**Other Food Crop**

<table>
<thead>
<tr>
<th>Other Food Crop</th>
<th>Area in Guncha</th>
<th>Area in %</th>
<th>Area Left</th>
</tr>
</thead>
</table>

**Other Non-Food Crop**

<table>
<thead>
<tr>
<th>Other Non-Food Crop</th>
<th>Area in Guncha</th>
<th>Area in %</th>
<th>Area Left</th>
</tr>
</thead>
</table>

**Non Crop Other (Total)**

- Other than crop area (if any)

**Total Area**

- **Total in %**: 

**Exit**
7.11.2 DeskGIS

The DeskGIS is geospatial information system functioning on individual computer. The vector datasets are arranged systematically in a GIS Viewer and user can browse the information as per the requirements. The user can run spatial queries to get the information. The shape features are containing attribute information in which is user is interested. If user clicks the feature with identifier then popup window will appear and show the related information. The DeskGIS application will perform only on the installed computer.

The MapWindow (6.0) is having several tools like vector overlay, interpolation, analysis (Buffer, Clip Raster, Merge Raster, Erase, etc.), spatial reference, terrain analysis, raster overlay, conversions, statistics, etc. It support raster and vector datasets along with pan, zoom, selection, identifier, options. The attribute table and query builder are another supporting features. It is having several extensions and print option. Overall this is good capable DeskGIS browser for GIS datasets.

As earlier stated any browser or viewer (commercial or open source) is having the capabilities to represent the data and work as DeskGIS. Many users are well set with ESRI i.e. ArcGIS Explorer / browser, so that also be a part of this application.

The raster and vector both datasets are handled with DeskGIS. The user can understand the feature by general view or generating query. This will helpful to local level administrators. Also one can use it at inputs as per specific needs.
The functioning of DeskGIS application is represented below with the help of screen shots.

Fig. 7.6 Demonstration snaps of DeskGIS application
7.11.3 WebGIS

The development WebGIS application is done by utilizing GeoServer Open source Suite. The GeoServer is having add-on connectivity like PostGIS, GeoServer, GeoWebCache, GeoEditor, Styler, GeoExplorer, etc. which are used in web application development. The shape files are uploaded on GeoServer then spatial reference system is assigned to the shape files. Using style option symbology is created and finally the map is published. The published maps can be explored with the explorer available in suite.

The developed WebGIS application is containing all common functionalities. The PostGIS is a very strong database and having capability to handle huge database effectively. The GeoServer is having services like GWC, WCS, WFS and WMS. It is also having stores from which data can be uploaded. The GeoEditor is having all basic editing tools. The styler contains symbology with different colour for shape features. The GeoExplorer was having functions like pan, zoom, measure, query, etc. The WebGIS development is complicated and quite big process. Therefore, few representative snaps are incorporated in below section.

Fig.7.7 Snaps of WebGIS Development
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Fig. 7.7 Snaps of WebGIS Development
7.11.4 Geo-Editor

The geo-editor is software, which can do the updating in spatial database, linkage for newly added attribute data to vector and analysis. Considering this point a browser-cum editor is incorporated in the system. Quantum GIS is an open source GIS editor having best performance hence, it is selected as a Geo-editor. Several shape layers are added in the editor and symbology is created for better visualization. As the new data entered, the user can modify the layers and save it. Then updated information can be forwarded further to DeskGIS and WebGIS applications.

Quantum GIS is common GIS Software having all functionality of Geo-editor. The software is having editing features like digitize, reshape, projection setting, various options of view, layer management, etc. Other than this the measurement, annotation tools, GUI options, Live GPS Tracking availability, GRASS integration, python support, etc. are also available. It is supporting several vector and raster datasets. Other than these more than twenty add-ons are available to easy access which makes this software further strong. The Google earth connectivity, simple look, easy to handle are the supporting points.
The QGIS software is used for editing and updation task. Some of its snaps are given below.
This tool will be able to do the things, if the needed software applications and data are available in the respective computer system. This rule is also applicable for all tools i.e. DeskGIS, Prog. Application, WebGIS, etc.
7.12 Limitations

While developing this application there were several ideas in mind but all of them could not be implemented. There are several limitations to develop such kind of applications and some of them are listed below.

7.12.1 Availability of data

The data mining is one of the major problems. During data collection it is found that many times data is not available on records. The authenticity of available data is always a big question. If data is available it is not supplied to user by giving several reasons. Therefore, in developed system the database is made available for only accessible data.

7.12.2 Web server and Internet

The developed system is having WebGIS functionality and system is developed accordingly. But for that capable web server is not available where this application can be installed permanently. Also the server must contain internet connectivity then only this system can function. Maintain all these kind of activities are costly and very difficult for the common person.

7.12.3 Technical knowledge of Programming

To develop a computer programming it requires strong computer programming language knowledge and experience. The researcher is having basic knowledge of programming hence for this task some help is taken from the expert.

7.12.4 Software selection for application development

Although there are several commercial and open source software available in market. Any software has its own functionality, pros and cons in real practice. Most of the time the limitation of software becomes the limitation of developed project. The open source softwares have developed by contributors as per their needs and specifications. Hence it may suit for other user and also possibility to partially or totally mismatch. The software may execute properly up to certain limit and
thereafter creates problems. Also there may be bugs in developed application hence it is always having a risk while doing software selection.

7.13 Future work

This application is focused on developing information system. Developing such system is a beginning and may be in coming days it will part of organizational processes. Changing the present system is not a part of the study but it is a step towards that direction. Full fledge system development and its implementation is not directly tackled in this study but could be a topic for further research.

The best attempt has been made to cover all important aspects so that it should be applicable to users at various levels. Still there might be few bugs or gaps in this application. It is a beginning not a destiny, so in future the other researchers may contribute more advance than this.

The model application is working and it is fully functional, but it needs some work to make it better. There are few things which need to improve.

References:


**Web References:**


http://www.odyssey.maine.edu/gisweb.spatdb/urisa/ur94043.html