# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure No.</th>
<th>Figure caption</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fig. 1.1</td>
<td>World Disaster Occurrences (1988-2007)</td>
<td>3</td>
</tr>
<tr>
<td>Fig. 1.2</td>
<td>World Disaster Victims (1988-2007)</td>
<td>3</td>
</tr>
<tr>
<td>Fig. 1.3</td>
<td>World Disaster Damages (1988-2007)</td>
<td>4</td>
</tr>
<tr>
<td>Fig. 1.4</td>
<td>Flood Zones in Gujarat</td>
<td>11</td>
</tr>
<tr>
<td>Fig. 1.5</td>
<td>Mobile GIS System and SDI Client-Server Architecture</td>
<td>19</td>
</tr>
<tr>
<td>Fig. 2.1</td>
<td>Electromagnetic Spectrum</td>
<td>25</td>
</tr>
<tr>
<td>Fig. 2.2</td>
<td>IRS Data of Spatial Resolution 1 km to 1 m</td>
<td>26</td>
</tr>
<tr>
<td>Fig. 2.3</td>
<td>IRS Data of Different Spectral Resolution</td>
<td>26</td>
</tr>
<tr>
<td>Fig. 2.4</td>
<td>IRS Data Capturing Effects of Temporal Resolution</td>
<td>27</td>
</tr>
<tr>
<td>Fig. 2.5</td>
<td>Reflectance Curves of Typical Surface Features</td>
<td>29</td>
</tr>
<tr>
<td>Fig. 2.6</td>
<td>Inundated area of Gujarat flood of 2005</td>
<td>36</td>
</tr>
<tr>
<td>Fig. 2.7</td>
<td>Red River (CANADA) Flood Inundation of 1990</td>
<td>37</td>
</tr>
<tr>
<td>Fig. 2.8</td>
<td>METEOSAT 5 (Geostationary) Images of 1998 Indian Cyclone</td>
<td>38</td>
</tr>
<tr>
<td>Fig. 2.9</td>
<td>Elements of GIS</td>
<td>41</td>
</tr>
<tr>
<td>Fig. 2.10</td>
<td>Major Interface of GIS system</td>
<td>41</td>
</tr>
<tr>
<td>Fig. 2.11</td>
<td>GIS Raster and Vector Data Model</td>
<td>42</td>
</tr>
<tr>
<td>Fig. 2.12</td>
<td>GIS Data Integration and Modeling</td>
<td>46</td>
</tr>
<tr>
<td>Fig. 2.13</td>
<td>GIS Map of Damaged Crop Area - Orissa</td>
<td>47</td>
</tr>
<tr>
<td>Fig. 2.14</td>
<td>GIS Map of Bihar Flood (2008) with severity of affected population</td>
<td>48</td>
</tr>
<tr>
<td>Fig. 2.15</td>
<td>GIS Map of Population Density within / outside 10 Meter Elevation Zone - Gujarat Coastal Area</td>
<td>48</td>
</tr>
<tr>
<td>Fig. 2.16</td>
<td>GPS Constellation</td>
<td>51</td>
</tr>
</tbody>
</table>
Fig 2.17  GPS Standard Positioning Technique  55
Fig.2.18 GPS Differential Positioning Technique  56

Fig 3.1 Client – Server Mobile GIS / GPS Based Disaster Management System  63
Fig 3.2 Off the shelf available Mobile Mapping Systems  65
Fig.3.3 DELL AXIM Pocket PC and CRUX II CF GPS  70
Fig.3.4 ArcPad User Interface Design  71
Fig.3.5 Screen Shots Showing Various Applications of Mobile GIS System  72
Fig.3.6 IRS Image with GPS Locations  74

Fig 4.1 DMS Query Shell-Main Menu,
  Toolbar Design, Display Functions  89
Fig.4.2 DMS Query Shell –
  Label Module and Query Builder  89
Fig.4.3 DMS Shell - Damage Assessment Module and Query Module  90
Fig.4.4 DMS Query Shell - Flood, Cyclone, River Query and Report Module  90
Fig 4.5 DMS Query Shell –
  Navigation and Label Property Module  91
Fig 4.6 DMS Query Shell –
  Feature Attributes and Layer Functions  91
Fig 4.7 Mobile GIS Query Shell –
  Direct Access to DBF Tables  93
Fig 4.8 Mobile GIS Query Shell – Grid and Scale Bar
  On /Off Status  94
Fig 4.9 Mobile GIS Query Shell –
  Attribute Based Symbolisation  94
Fig 4.10 Mobile GIS Query Shell –
Layer Properies and Color Scheme 95

Fig. 4.11 Mobile GIS Query Shell – Text / Annotation Options 95
Fig. 4.12 GPS Signal Processing Model 98
Fig. 4.13 Mobile GPS-GIS User Interface –
GPS settings and Data Collection 105
Fig. 4.14 Mobile GPS-GIS User Interface
Measurement, Drawing and Symbolization 106

Fig. 5.1 Location map of case study area 108
Fig. 5.2 Methodology of GIS Database Creation 113
Fig. 5.3 Spatial framework of the study area 115
Fig. 5.4 Administrative map of Surat district showing
thalukas boundaries 115
Fig. 5.5 FCC of Study Area 116
Fig. 5.6 Clipped LISS III FCC of Study Area
(IRS P6, 24 October 2006) 116
Fig. 5.7 Clipped LISS III FCC of Study Area
(IRS P6, 26 March 2006) 117
Fig. 5.8 Settlement Locations 118
Fig. 5.9 Transport Network 118
Fig. 5.10 Drainage Network 119
Fig. 5.11 Land use (Level – I) Map of Surat District 120
Fig. 5.12 Digital Elevation Model of Surat District 121
Fig. 5.13 Rainfall pattern of Surat district. 122
Fig. 5.14 Roads category under different risk zone 124
Fig. 5.15 Settlements under category of different risk zone. 128
Fig. 5.16 Tapi River buffer zone and covered Land use
categories 130

Fig. 6.1 Integrated Map of Sutat Taluka 136
Fig. 6.2 Enlarged Integrated Map of Part of the Surat taluka

xv
and the details of the GPS stations

Fig.6.3 Integrated Map of Chorasi Taluka
Fig.6.4 Integrated Map - Part of Chorasi Taluka
Fig.6.5 GIS-GPS Integrated Map of Olpad Taluka
Fig.6.6 Integrated Map of Part of Olpad Taluka
Fig 6 7 a Map showing affected villages in black color (0-7 kms)
Fig.6.7.b Detailed report of affected villages
Fig.6.8.a Map showing affected villages for 53.66 m water level
Fig.6.8.b Detailed report of affected villages
Fig.6 9.a Map showing likely marooned villages in light blue color
Fig.6.9.b Detailed report of villages affected
Fig.6.10.a Multiple Layer Integrated Map
Fig.6.10.b Villages labeled shown with village name
Fig.6.11 Cadastral parcel alignment before geo-referencing
Fig.6.12 Cadastral parcel alignment after geo-referencing

xvi