

Table of Figures

Figure 1.1 Study Area	9
Figure 2.1 Core drivers of Spatial Decision Support System (Sugumaran and DeGroote, 2011)	28
Figure 2.2 Evolution Components of SDSS (Sugumaran and DeGroote, 2011)	29
Figure 3.1 Administrative Subdivisions of Kachchh	37
Figure 3.2 Village boundaries of Lakhpat and Nakhatrana Taluk.....	39
Figure 3.3 Geomorphology of Kachchh district	41
Figure 3.4 Geomorphology of Lakhpat and Nakhatrana (Source: http://www.nnrms.gov.in/ , 2016)	42
Figure 3.5 Drainage Networks of Lakhpat and Nakhatrana	43
Figure 3.6 Map of Soil Erosion	45
Figure 3.7 Map of Soil Depth.....	46
Figure 3.8 Soil Productivity Map of Kutch District	47
Figure 3.9 Landuse of Lakhpat and Nakhatrana.....	48
Figure 3.10 Transportation network of Kachchh District	50
Figure 3.11 Rainfall Analysis of Kachchh District.....	52
Figure 4.1: Data Used in the Study	63
Figure 4.2: Flow Diagram of Indices Generation	67
Figure 4.3: Python program to calculate NDVI deviation from previous five years.....	70
Figure 4.4: Model for SPI calculation.....	73
Figure 4.5: Model for PCI calculation	74
Figure 4.6: Methodological flowchart of ISDI computation.....	76
Figure 4.7: Model for ISDI computation	77
Figure 5.1 SDSS database in PostgreSQL.....	84
Figure 5.2 Published Layers in Geoserver	85
Figure 5.3 Sample code of Styled Layer Descriptor (SLD).	85
Figure 5.4 Layered Architecture of SDSS Application	87
Figure 5.5 Database architecture of SDSS.	88
Figure 5.6 Design views of tables in the SDSS database.....	89

Figure 5.7 Home page of SDSS.....	90
Figure 5.8 Controls of SDSS (Map Panel, Layer Panel, Legend Panel, Menu bar and Toolbar).....	91
Figure 5.9 Display of Ground Water Prospect Map as Overlay layers.....	92
Figure 5.10 Display of Geomorphological Map as Overlay layers.	92
Figure 5.11 Display of Soil Texture Map as Overlay layers.	93
Figure 5.12 Display of Lithology Map as Overlay layers.....	93
Figure 5.13 NDWI Layers with dynamic date selection.	94
Figure 5.14 Dynamic selection of NDVI.	94
Figure 5.15 Display of NDVI deviation Layers.	95
Figure 5.16 Display of NDWI Anomaly Layers.....	95
Figure 5.17 Display of Seasonal SPI.....	96
Figure 5.18 Display of Seasonal PCI.....	96
Figure 5.19 Display of Monthly LST (May-2011)	97
Figure 5.20 Display of Seasonal ISDI (Year-2016, Kharif).....	97
Figure 6.1 Study area with Village and Taluk Boundary.....	100
Figure 6.2 VCI 2011-2012 (Kharif Season).....	101
Figure 6.3 VCI 2011-2012 (Rabi Season).....	101
Figure 6.4 VCI 2012-2013 (Kharif Season).....	102
Figure 6.5 VCI 2012-2013 (Kharif Season).....	103
Figure 6.6 VCI 2012-2013 (Kharif Season).....	104
Figure 6.7 VCI 2013-2014 (Rabi Season).....	104
Figure 6.8 VCI 2014-2015 (Kharif Season).....	105
Figure 6.9 VCI 2014-2015 (Rabi Season).....	106
Figure 6.10 VCI 2015-2016 (Kharif Season).....	107
Figure 6.11 VCI 2015-2016 (Rabi Season).....	107
Figure 6.12 NDWI Anomaly 2011-2012 Kharif Season.....	109
Figure 6.13 NDWI Anomaly 2011-2012 Rabi Season	109
Figure 6.14 NDWI Anomaly 2012-2013 Kharif Season.....	110
Figure 6.15 NDWI Anomaly 2012-2013 Rabi Season	111
Figure 6.16 NDWI Anomaly 2013-2014 Kharif Season.....	112
Figure 6.17 NDWI Anomaly 2013-2014 Rabi Season	112
Figure 6.18 NDWI Anomaly 2014-2015 Kharif Season.....	113

Figure 6.19 NDWI Anomaly 2014-2015 Rabi Season	114
Figure 6.20 NDWI Anomaly 2015-2016 Kharif Season.....	115
Figure 6.21 NDWI Anomaly 2015-2016 Rabi Season	115
Figure 6.22 NDVI Deviation (Kharif Season, 2011-2012)	117
Figure 6.23 NDVI Deviation (Rabi Season, 2011-2012).....	117
Figure 6.24 NDVI Deviation (Kharif Season, 2012-2013)	118
Figure 6.25 NDVI Deviation (Rabi Season, 2012-2013).....	118
Figure 6.26 NDVI Deviation (Kharif Season, 2013-2014)	119
Figure 6.27 NDVI Deviation (Rabi Season, 2013-2014).....	119
Figure 6.28 NDVI Deviation (Kharif Season, 2014-2015)	120
Figure 6.29 NDVI Deviation (Rabi Season, 2014-2015).....	120
Figure 6.30 NDVI Deviation (Kharif Season, 2015-2016)	121
Figure 6.31 NDVI Deviation (Rabi Season, 2015-2016).....	121
Figure 6.32 Seasonal Mean Rainfall (Climatology)	123
Figure 6.33 Monthly SPI (monsoon Season-2011).....	125
Figure 6.34 Seasonal SPI (monsoon Season-2011)	125
Figure 6.35 Monthly SPI (monsoon Season-2012).....	127
Figure 6.36 Seasonal SPI (monsoon Season-2012)	128
Figure 6.37 Monthly SPI (monsoon Season-2013).....	129
Figure 6.38 Seasonal SPI (monsoon Season-2013)	130
Figure 6.39 Monthly SPI (monsoon Season-2014).....	131
Figure 6.40 Seasonal SPI (monsoon Season-2014)	132
Figure 6.41 Monthly SPI (monsoon Season-2015).....	133
Figure 6.42 Seasonal SPI (monsoon Season-2015)	134
Figure 6.43 Monthly SPI (monsoon Season-2016).....	135
Figure 6.44 Monthly SPI (monsoon Season-2016).....	136
Figure 6.45 Monthly PCI (monsoon Season-2011)	138
Figure 6.46 Monthly PCI (monsoon Season-2012)	139
Figure 6.47 Monthly PCI (monsoon Season-2013)	139
Figure 6.48 Monthly PCI (monsoon Season-2014)	140
Figure 6.49 Monthly PCI (monsoon Season-2015)	140
Figure 6.50 Monthly PCI (monsoon Season-2016)	141
Figure 6.51 Seasonal PCI for the years 2011, 2012, 2013, 2014, 2015 and 2016.....	142

Figure 6.52 ISDI for the years 2011, 2012, 2013, 2014, 2015 and 2016 (Kharif Season). ..	143
Figure 6.53 Weekly Soil Moisture Content Year 2012(09 July to 30 September).....	144
Figure 6.54 Weekly Soil Moisture Content Year 2013 (09 July to 30 September).....	145
Figure 6.55 Weekly Soil Moisture Content Year 2014 (09 July to 30 September).....	145
Figure 6.56 Weekly Soil Moisture Content Year 2015 (09 July to 30 September).....	146
Figure 6.57 Weekly Soil Moisture Content Year 2016 (09 July to 30 September).....	147
Figure 6.58 Monthly Short Term Average (10-Years) of Land Surface Temperature (2002-2011)	148
Figure 6.59 Monthly Average of Land Surface Temperature (Year-2012)	149
Figure 6.60 Monthly Average of Land Surface Temperature (Year-2013)	149
Figure 6.61 Monthly Average of Land Surface Temperature (Year-2014)	150