| Figure No. | LIST OF FIGURES | Page No |
|---------------|--|------------|
| 1.1 | Overall flow chart of research methodology | 7 |
| 3.1 | Location map of the study area | 28 |
| 3.2 | Soil and Lithological maps of the study area | 29 |
| 3.3 | Geomorphology and LULC maps of the study area | 30 |
| 3.4 | Maximum temperature and annual rainfall maps of study area | 31 |
| 3.5 | Altitude and Slope maps of the study area | 32 |
| 3.6 | Forest density and tree species maps of the study area | 33 |
| 3.7 | River, drainage pattern and watershed maps of the study area | 34 |
| 3.8 | Transport and settlement maps of the study area | 35 |
| 4.1 | (a)Masking image used to eliminate forest pixels (left), (b) Ground truth map indicating of collected filed samples (Right) | 40 |
| 4.2 | Spectroradiometry field survey (a) and laboratory analysis of collected spectra (b) | 41 |
| 4.3 | Pre-processing of raw spectra to build spectral library | 42 |
| 4.4 | Raw field forest spectra obtained from field | 47 |
| 4.5 | Research methodology for forest health assessment | 50 |
| 4.6 | Mean, median, upper and lower quartile values of narrow banded VIs classes | 52 |
| 4.7 | VIs tool based forest health classes | 53 |
| 4.8 | Visual comparison of resampled field average reflectance spectra of different forest health class | 54 |
| 4.9 | Forest heath mapping (a) VIs tool based Hyperion (b) SAM based Hyperion (c) SVM based Hyperion (d) SVM based Landsat OLI | 55 |
| 4.10 | The relation amongst different forest health classes, distance from mines and foliar dust concentration (Kiruburu and Meghataburu) | 57 |
| 4.11 | Correlation between field reflected spectra and pixel reflected spectra of healthy, moderate healthy and unhealthy forest class. | 58 |
| 4.12 | 6×6 Scatter matrix plot (3 from satellite data and 3 obtained from field data) | 59 |
| 5.1 | (a)Masking image used to eliminate forest pixels (left), (b) Ground truth map indicating collected field tree species and biodiversity samples (Right) | 66 |
| 5.2 | Spectro-radiometery field survey and laboratory analysis | 68 |
| 5.3 | Research flowchart of tree species classification and its diversity estimation. | 74 |
| 5.4 | Visual comparison of resampled field average reflectance spectra for different tree species at the study area | 76 |
| 5.5 | Spatial distribution of tree species mapped by SVM algo. based on Hyperion data | 77 |
| 5.6 | Regression between Hyperspectral narrow banded VIs and field measured Shannon Index of 18 sampling plots | 79 |
| 5.7 | Species diversity mapped by Shannon Index based on narrow banded VIs | 80 |
| 5.8 | Regression between Hyperion imagery derived by Shannon index | 81 |
| | xxi | |

| | and field measured Shannon index | |
|-------|--|-----|
| 5.9 | The relation amongst species diversity indices (Shannon Index), distance from mines (Kiruburu and Meghataburu) and foliar dust | 83 |
| | concentration | |
| 6.1 | Vegetation affected by mining generated dust in the study area | 90 |
| 6.2 | (a) Masking map used to eliminate forest and dust pixels (left), | 91 |
| 0.2 | (b) Ground truth map indicating of collected filed dust samples | 71 |
| | and unchanged areas location (Right) | |
| 6.3 | Laboratory experiment for validation | 92 |
| 6.4 | Research flowchart of foliar dust estimation and mapping | 98 |
| 6.5 | Vegetation affected by dust in the study area | 99 |
| 6.6 | Classified healthy and dust contaminated pixels of study area | 102 |
| 6.7 | Spectral signature of dust-covered leaf with different dust | 102 |
| 0.7 | amounts (g/m2) | 102 |
| 6.8 | Relationship between VIs values and foliar dust amounts (g/m2) | 103 |
| 6.9 | (a & b) Dust mapped by Landsat (a) and Hyperion (b) data based | 105 |
| | on NDVI difference dust model | |
| 6.10 | Magnified view of mines and buffer areas showing dust mapped | 106 |
| | by Hyperion data | |
| 6.11 | (a &b) Landsat (a) and Hyperion (b) based estimated foliar dust | 107 |
| | values of the 20 sampling plots against their measured dust values | |
| 7.1 | Overall flowchart of FHR assessment and prediction | 122 |
| 7.2.a | Present causative parameters of forest health | 123 |
| 7.2.b | Predicted causative parameters of forest health (2030 (a) & 2050 | 124 |
| | (b)) | |
| 7.3 | Comparative results of forest health risk (Present and predicted | 125 |
| | years) | |
| 7.4 | Magnified view of the comparative FHR results (Present and | 126 |
| | predicted years) of areas surrounding the mines | |
| 7.5 | ROC Curve for FHR results comparison (Present and predicted | 128 |
| | years) | |
| 7.6 | Scatter matrix plot of FHR(Present and predicted years) | 129 |
| 7.7 | Relationship between forest health risk, distances from mines | 130 |
| | with foliar dust concentration | |