5.1 CONCLUSIONS

Based on the studies conducted in the present work on the CSF at the JCF through analysis of the 2,07,362 pixels, adopting the processing tools of the NDVI, ERDAS Imagine, Arc GIS, histogram equalization along with LULC mapping, following conclusions could be drawn:

1. The NDVI, ERDAS Imagine, Arc GIS, histogram equalization, with LULC mapping are effective tools for the assessment and the demarcations of the uncontrolled CSF as they proved effective in the Jharia coalfields.

2. The pixel segmented equalizations may be successfully used for the demarcating of the CSF advancements.

3. The imageries for the demarcated surface above the underground CSF were correlated with JCF coal mine fire maps through the field based GPS Geo tagging and DEM models. Good correlations were observed in this effort. It was observed that the vegetative index above these fires were low.

4. The temperature above the surface CSF had been monitored with the NDVI and Histogram equalization. The demarcated surface fire in imageries with radiant pixel values above surface CSF correlated well with the ground surface temperatures.

5. The LULC changes from 1972 to 2017 in temporal Multi Spectral data had been studied by correlating with the field data and vegetative indices of pixel radiance. LULC had been differentiated; the observed maximum and minimum numbers of

pixels are in the waste land and Industrial classes respectively. The LULC were classified in twenty five distinct classes.

6. The CSF in JCF was demarcated by incorporating the inputs from the analysis of the temporal satellite data of 1972 to 2013 in ERDAS imagine and Arc Map/ GIS software. The behaviour of the fire advancement had been studied. The quantification of surface and subsurface CSF depicted that they reduced in the last decade.

7. The NDVI, Histogram Equalization and field investigations in JCF were used for the simulation of pixel values to prepare the LULC map. The LULC changes corroborated with the field observations. The LULC classes were then established within Level – 1 which was further elaborated in Level – 2 categories.

8. The temporal data obtained through ERDAS and Arc Map/ GIS software was integrated with the field investigation for demarcating the CSF in JCF. The surface and subsurface coal seam fire in JCF were delineated from the satellite radiance and field observations.

9. The buffer map of CSF of JCF was prepared and the fire prone areas under the buffer zones were demarcated.

5.2 FUTURE SCOPE

,

1. The real time data for the CSF should be obtained deploying drone. The collected data should be analysed using CNN (Convolution Neural Network) or Artificial Intelligence (AI) techniques.

2. CSF alarming systems should be developed using the above data and its analysis.

3. Temporal data for each month should be used for the study of the advancement of the fires.

4. The changes in the surface topography be studied and incorporated through real time radar data.