The main objective of this thesis is to create an appropriate methodological procedure for classifying damaged forest in the selected area of Šumava National Park. For this purpose, multispectral imagery WorldView-2 and Landsat 8 are used. Work emphasis on distribution of each phase of forest development affected by bark beetle. According to selected legend, involving multiple stages of damaged but also recovering forest, the images are classified by Neural Network, Support Vector Machine and object classification methods. Application of these methods on selected images required a suitable choice of parameters and rules to achieve optimal results. The results of this thesis compare and evaluate the final classification. Another outcome of this work is to evaluate the influence of the processed images WorldView-2 and Landsat 8 on the final classification performance. All work results are assessed by overall precision, error matrix and kappa coefficient.