



Bojonegoro-Tuban-Lamongan area, especially of Bengawan Solo valley is a flood prone area. But, this area has also a relatively high agriculture production. Therefore, it is necessary to be mapped the flood susceptibility and risk condition.

Objectives of this research are: (1) to study some flood indicators which can be identified on aerial photograph and Landsat TM image to determine flood susceptibility level at research area. (2) to enhance of digital image using Tasseled-cap transformation to differentiate between flood prone areas and not flood areas. (3) to evaluate the amount of potential damage or losses caused by each flood risk level.

Method used for this research consisted of several steps. **First**, interpretation of landform units using digital Landsat TM data and black-white panchromatic aerial photographs. **Second**, the Landsat TM data was used to provide land cover and landuse maps. **Third**, a flood susceptibility map was then produced using digital Landsat TM data. For this purpose, digital data had been enhanced with Tasseled-cap Transformation, to obtain indices of brightness, greenness and wetness. Brightness and wetness indices were used to distinguish moist soils from the dry ones. Based on the soil moisture levels, flood susceptibility map could be made. **Fourth**, flood susceptibility map was then overlaid with the landuse map, in order to deliver flood hazard map. This map was overlaid with land productivity and population density maps to obtain flood risk map. Two-dimensional tables controlled by Boolean logic were also used in this overlay analyses.

Results of this research showed that: (1) there were 5 forms of origin units, namely Marine, Fluvial, Solutional, Denudational, and Structural-Denudational origins; these units were formed from 24 detailed landform units. (2) landforms that susceptible to flooding include the Fluvial Landform, especially Alluvial Plain (F1), Meander Cut-off (F3), Backswamp (F7) and Flood Basin (F8). (3) Based on the result of Tasseled-cap transformation (especially Wetness Indices), the flood prone areas clearly appear and easily identified. The spectral values of Tasseled-cap transformation image varies, i.e.  $>22$  (highly susceptible to flooding),  $17 - 22$  (susceptible to flooding),  $11 - 16$  (moderate),  $5-10$  (low), and  $< 5$  (not susceptible to flooding). Flood characteristics of five flood susceptibility levels are specific in nature. For example, area of highly susceptible to flooding encompasses three characters, these are, return period of 1 year, inundation depth of  $> 9.5$  meter, and inundation duration of 90-120 day. As the final result of this research, Flood Risk Map shows that high-risk category is associated with high chance of losses. Level of losses at high risk class for every 25 Ha at landuse type of irrigated paddy field, dryland, and fresh water fish pond are 150750 Kg, 138275 Kg, and 39150 Kg, respectively. Based on these losses, the class of flood risk may be used to determine priority scale in mitigating flood.