

CHAPTER IV

STUDY AREA

4.1 Mount Bromo Profile

Mount Bromo is located in East Java Province, Indonesia with the highest point is 2,329 m and the coordinates $7^{\circ}56'30''\text{S}$ $112^{\circ}57'00''\text{E}$. Mount Bromo is one of the mountains in Bromo Tengger Semeru National Park (TNBTS) complex. Mount Bromo is active volcano which is surrounded by sea sand and the crater can be climbed and visited and become a tourist attraction. There are four districts surrounding Bromo Mountain which are Probolinggo, Pasuruan, Malang, and Lumajang. These four regencies suffer the biggest impact when Bromo erupts and this research concentrated only in Pasuruan Regency area.



Figure 4.1 Districts Surrounding Bromo (Kementrian PU 2016)

Mount Bromo is one of the mountains at Tengger mountain complex in Indonesia which has an active crater that also functions as a tourist attraction. The mountain is located in East Java Province and administratively belongs to Bromo Tengger Semeru National Park (TN-BTS). Mount Bromo crater is measuring about 600 m x 800 m with several holes eruption in it and the crater is at an altitude of 2329 m above sea level and about 133 m above the base of the caldera (Abidin et al. 2004). In general, Bromo crater activity is in the form of thin white smoke up to thick white smoke with height about 50 meters to 100 meters from the lip of the crater and blowing direction generally goes to west and northwest (Pusat Vulkanologi dan Mitigasi Bencana Geologi 2011).



Figure 4.2 Mount Bromo (Survey Result)

Mount Bromo is categorized as an active volcano type A which the activities of the volcano can endanger visitor or people who live around it and the potential hazards can come from rock incandescent, poisonous gas, ash rain, and sulfur rain (Rachmawati, Faizah, and Muntasib 2007). Mount Bromo explosion characters are effusive and explosive from central crater which ejects ash, sand, lapilli and in

certain condition catapult lava and volcanic bomb (Pusat Vulkanologi dan Mitigasi Bencana Geologi 2011).

Historically, Bromo eruption or volcanic activity increased began recorded since 1804 and duration of Bromo eruption varies from the shortest which only happens just in few days (12 – 14 June 1860) and the longest one more than one month with the continuous eruption, meanwhile, the interval eruption period varies from less than a year until the longest interval period is 16 years (Pusat Vulkanologi dan Mitigasi Bencana Geologi 2011).

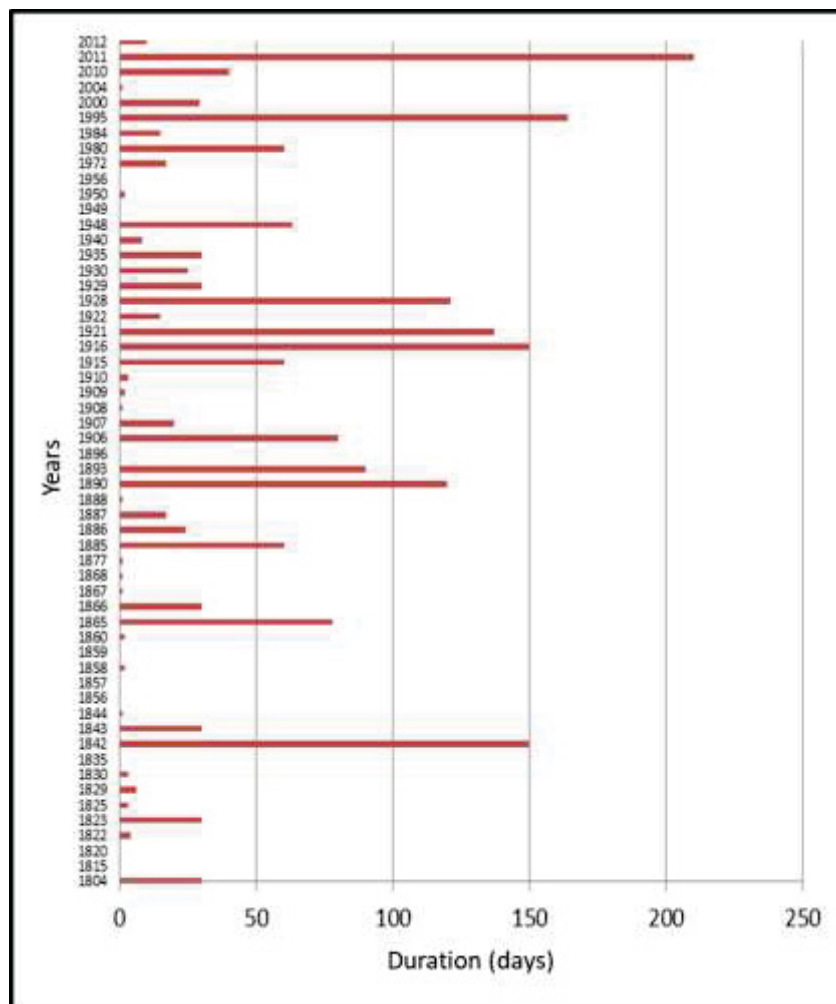


Figure 4.3 Bromo Eruption Duration (Bachri et al. 2015)

Eruption duration is less than 50 days in 2010 and eruption continued in 2011 and last for over 200 days and the frequency of Bromo eruption has become increasingly

frequent in the last 20 years. The latest eruption happened in December 2015 until February 2016 which was spewing volcanic ash with the distribution of ash in five surrounding districts which are Probolinggo, Malang, Pasuruan, Lumajang, and Jember (Hendra Gunawan 2016). Moreover, there are some hazards that threaten people who live around Bromo mountain which are volcanic ash, lava flow, sulfur gas and landslides (Bachri et al. 2015).

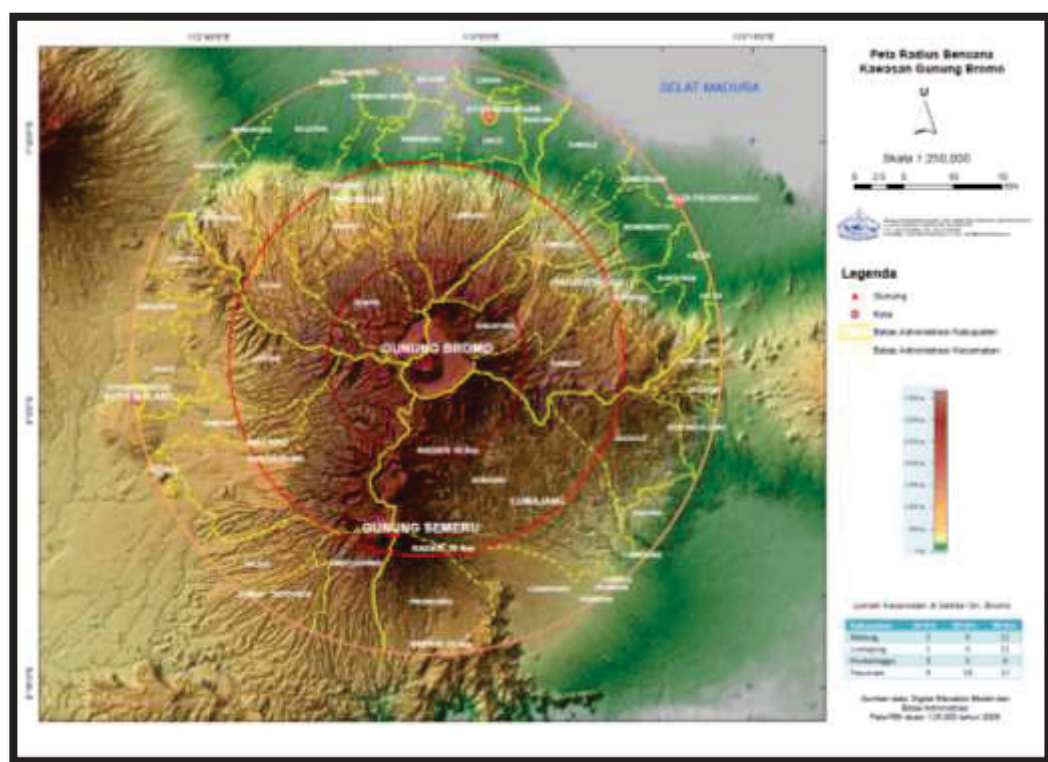


Figure 4.4 Bromo Disaster Radius Area (Bakorsurtanal 2006)

There are some sub districts in four districts which are getting impact from Bromo activity depending radius of the impact. Districts which are impacted by Bromo activity are Malang, Lumajang, Probolinggo, and Pasuruan, and the number of districts which are influenced for each regency is different depend on disaster radius. In general, Pasuruan is the regency that has most districts which are impacted by volcanic activities in each disaster radius.

4.2 Tosari District Profile

Tosari is a district in Pasuruan Regency which is located near Mount Bromo with total area 85.73 km² and Tosari district is a highland area with the average area high more than 1,000 meters above sea level and the land slope from east to the north is 0 0 – 3 percent (BPS-Statistics of Pasuruan Regency 2015). The border of the district in north side is Pasrepan District, the east side is Lumbang district, the west side is Puspo District and the south border is Malang Regency.

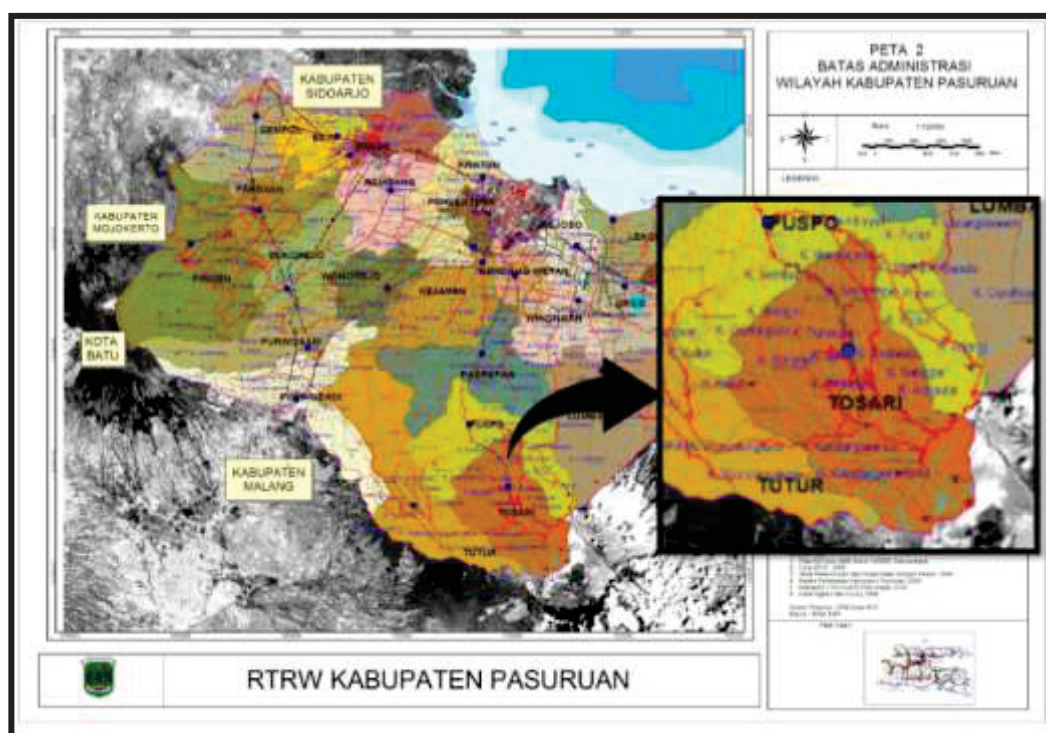


Figure 4.5 Tosari District (P. R. Law 2010)

Tosari district has eight villages which are Kandangan, Mojorejo, Ngadiwono, Podokoyo, Wonokitri, Tosari, Baledono, and Sedaeng. The villages are divided into 24 hamlets (Dusun), 33 citizen pillars (Rukun Warga/RW), and 133 neighbor pillar (Rukun Tetangga/RT) (BPS-Statistics of Pasuruan Regency 2015)

Table 4.1 Villages in Tosari District (BPS-Statistics of Pasuruan Regency 2015)

No	Villages	Areas (Km2)	Hamlets	Citizen pillars	Neighbor hood Pillar
1	Kandangan	3,66	2	3	8
2	Mojorejo	6,52	2	3	11
3	Ngadiwono	11,06	4	6	23
4	Podokoyo	11,97	3	3	9
5	Wonokitri	38,18	2	5	26
6	Tosari	5,51	5	5	26
7	Baledono	6,67	3	4	12
8	Sedaeng	9,52	3	4	18
	Total	93,09	24	33	133

Tosari district total population is 18,907 people in 2015 which consist of 9,331 male and 9,576 female with density population is 203.1 people/km². Average population in each village is 2,363 people and the highest population is Tosari Village with 3,206 people, meanwhile the lowest population in Kandangan village with only 1,381 people (BPS Kabupaten Pasuruan 2016).

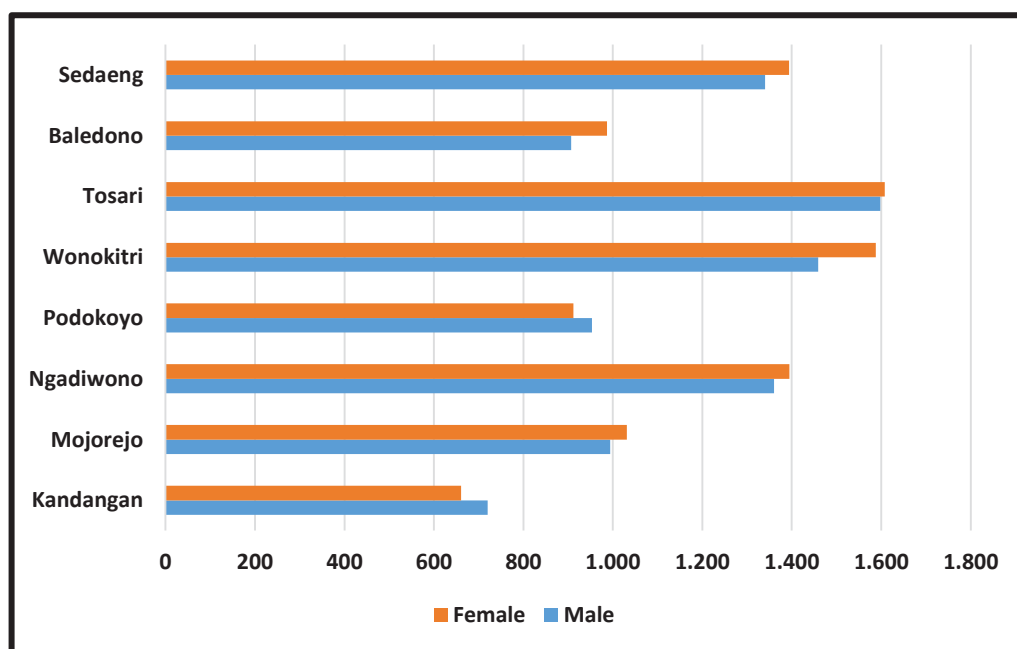


Figure 4.6 Tosari Population (BPS Kabupaten Pasuruan 2016)

Educational background of Tosari residents' mostly elementary school at every village with a total number is 8,013 people, and the number of people who do not finish elementary school is 3,345 people (BPS, Statistics of Pasuruan Regency 2015). Resident with educational background higher than senior high school at Tosari district is very low with only less than two percent of the population which consist of 0.5 % (80 people) associates degree, 0.6 % (122 people) bachelor degree and 0.02 % (4 people) master degree (BPS, Statistics of Pasuruan Regency 2015).

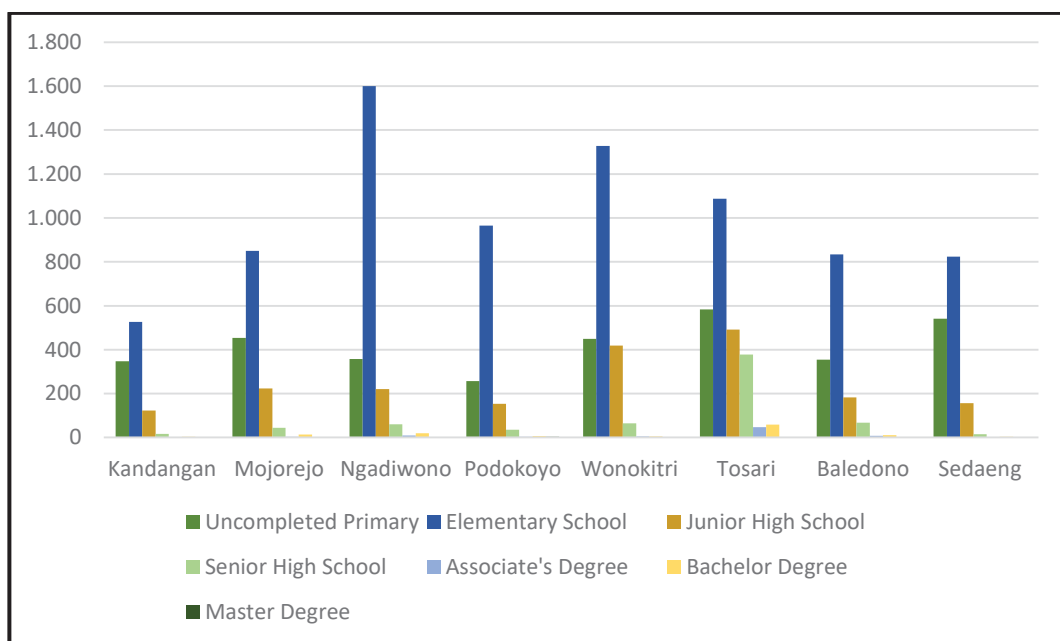


Figure 4.7 Tosari Population Educational Background
(BPS-Statistics of Pasuruan Regency 2015)

Farming is the main livelihood of Tosari residents and the plant for the farming is potato, cabbage, onion, broccoli, kailan, and radish. Potato is the favorite vegetable for Tosari residents with 3,308 households have it and potato farmland areas 27,248,811 m², and then cabbage with 1,700 households (6,776,338 m² areas), carrot with 909 households (3,033,896 m² areas), spring onion with 984 households (2,808,547 m² areas) (BPS Kabupaten Pasuruan 2016). Livestock ownership also an important matter for a household in Tosari district for supporting their economic and livestock that household have are a cow, goat, and pig.

Tosari district is categorized as a disaster-prone area because there are several disaster hazards in the district which are landslides, flood, volcano eruption, tornado, drought and forest fires. In the case of volcano eruption Tosari district is one of the districts which is categorized as a district with high volcano eruption hazard in Pasuruan Regency (BPBD Kabupaten Pasuruan 2013)

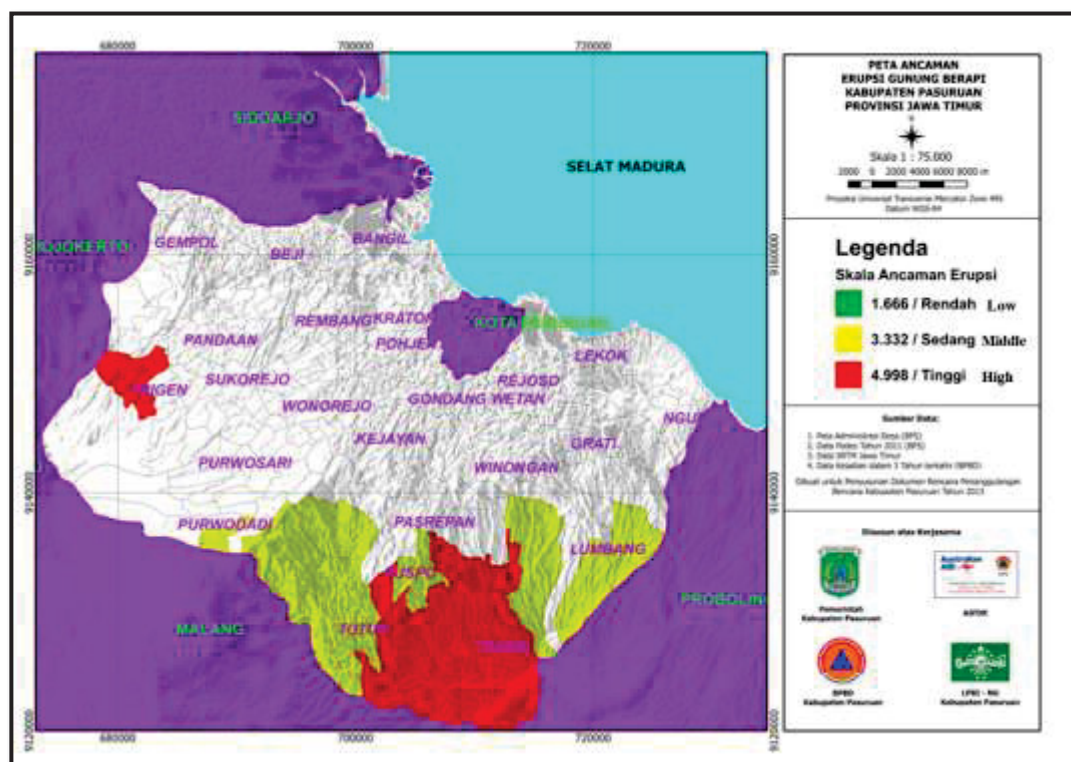


Figure 4.8 Pasuruan Regency Volcano Eruption Threat
(BPBD Kabupaten Pasuruan 2013)