Identification of Galunggung Volcano Potential Area for Geographic Education Field Laboratory Development

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Abstract. The actual geographic learning resources are found in the field, that the field takes an important role in Geography studies with its function as a laboratory. In the field, students can understand the true conditions about Geography studies directly. Galunggung volcano was located in Tasikmalaya, West Java, Indonesia. It has potential aspect to be developed into a laboratory for Geography studies. The purpose of this study is to identify the potential possessed by the Galunggung mountain area as a Geography education laboratory. The step carried out in the Galunggung area analysis are: Delineation of the Galunggung volcano area using Satellite Maps and Images, data obtained by field surveys which are identified descriptively. Utilization of the Mount Galunggung Area as a field laboratory can help students to gain deeper understanding about the study in a more realistic situation. Mount Galunggung has the potential to be developed into a Geography Education Laboratory based on studies; hydrosphere, lithosphere, biosphere, anthroposphere, and atmosphere. Evaluation of environment-based learning is carried out thoroughly during the learning process and after learning is completed.

1. Introduction
Geography education requires models, visuals, modules that are relevant to the geosphere learning (lithosphere, hydrosphere, atmosphere, biosphere and anthroposphere). The need for geography development research requires detailed, and in-depth analysis. Therefore, the minimum standard requirements for geography laboratories are needed. The need for applied research in geography must be able to provide solutions related to location suitability. People modify the spaces they live in, in turn are modified by them society creates space, space create society [1]. Geographic thinking requires intellectual knowledge about space. Knowledge about space consists of the recognition and elaboration of the relations among spatial concepts, the advanced associations derived from these concepts, and the formal linking of the associations into theories and generalizations [2]
A geographic study model for field laboratories is needed, because its presence is able to help problems with certain geographical symptoms that occur in the community. Field laboratories are needed to support learning in the classroom. Practicum in the laboratory, field observations and field trips are fundamental parts of many earth sciences and environmental science courses [3].

Experimental learning is one of the ways that is able to provide chance for learners to gain deep understanding in learning. Spatial thinking enhances perceptions, logic, and organized learning goals and therefore improves social work practices [4]. The involvement of students in practicums in the field can shape their conceptual knowledge, which then leads to an in-depth understanding of a theory [5].

Indonesia is one of the most active areas in the world with over 150 million population [6]. Galunggung is one of Indonesia's most active volcanoes and hence has serious attention. Mount Galunggung is one of the active volcanoes with a strato-shaped dome and has historically erupted four times, namely in 1822, 1894, 1918 and 1982 [7]. With this in mind, Mount Galunggung has the potential as a field laboratory for Geography Education. Identification of Galunggung volcano area can be done based on the level of need in teaching.

2. Method

2.1. Setting of the study
The location was carried out in the Galunggung Volcano area, Tasikmalaya, West Java, Indonesia. The altitude is 2,168 meters above sea level or 1,820 meters from the mainland of Tasikmalaya City with astronomical location at coordinates 7.25° -7° 15'0" N and 108° 058° -108° 3'30" E. The imagery map and Galunggung area presented in Figure 1.

Figure 1. Imagery Map and Galunggung Area
2.2. Data Analysis
Regional analysis is carried out in 3 step:
   a) Delineating the area by satellite imagery is done by overlaying the map with ArcGis software.
   b) Field surveys in the Mount Galunggung area with observation guidelines.
   c) This study only focused on three field which needs analyze for the study of Hydrosphere, Biosphere, and Lithosphere.

3. Result and Discussion

3.1. Geological and Geomorphological Studies of Galunggung Volcano Area
Galunggung was divided into four parts including crater morphology, slope morphology, leg morphology and hilly morphology. The land use map presented in Figure 2. For more details about the distribution are as follows:
   a) The morphology of a depression shaped crater on the top is a Guntur crater 100-150 meters deep, 500 meters center line. The southern part of Guntur crater has been cut off by the Galunggung crater where the horseshoe shaped crater opens to the southeast. The Dome of the Gunung Jadi where located in the west was 560x440 meters and 70 meters high. Before the 1982-1983 eruption in the Galunggung caldera there were three small craters called Karso Crater, Hejo Crater, and Crater Crater.
   b) The morphology of the volcanic slope is located in an altitude area starting 700 meters above sea level to the peak with a slope of 10°-40°. The level of erosion here is so strong that it produces narrow hill ranges and deep and steep "v" valleys, centering on the Thunder crater.
   c) The morphology of the mountain foot occupies an area below the height of 700 meters to the south to the plains of Singaparna with a slope of 0°-10° away from the center of the eruption. The level of erosion is already weaker with the constituent lithology of pyroclastic and lava deposits.
Based on geomorphological data, stratigraphy and geographic structure, the evolution of Galunggung Volcano can be explained as follows: Geological history begins with Guntur Mountain activity which produces lava and Galunggung lava breccia. The point of the eruption is in the Guntur Crater. This rock is concentrated in volcanic rocks as a result of activities before Guntur Mount, namely Karacak Mount, and Talaga Bodas Mount. This basic rock in the form of lava and pyroclastic falls. The slope map presented in Figure 3 and the disaster vulnerability map of Galunggung volcano presented in Figure 4.
3.2 Galunggung Area Study for Biosphere Study Field Laboratory

The Galunggung study for the Hydrological study can be carried out in all regions, based on the Tasikmalaya District Spatial Plan, the hydrology around the Gunung Galunggung area, namely the Ciwulan River Basin, has a river length of 119.30 km with a maximum width of 80 m and slope averaging 0.02080 m. This watershed area reaches 103,808.86 km² with an average flow thickness of 7.67 mm / day and a potential discharge of 3.144 million cubic/year. In addition there are also Citandui rivers, Cibanjaran and Cikunir rivers. These rivers have strategic functions and roles, namely for irrigation, households and industry and also function as the main drainage area. Hydrological studies are very important because the oceans have the largest water reserves on the surface of the Earth, representing 96.5% of the total reserves. The spatial distribution of water availability in various regions can be a disadvantage for regional and local development plans. The total world freshwater supply is estimated to be 41,022 billion m³ [8].

Based on the survey in the field Galunggung area has a diversity of living things that are diverse both flora and fauna. Based on the results of the research conducted there were found 20 types from 9 families. Cichlidae are the most dominant family with six types [9]. The regional zone map of galunggung volcano biosphere study figure presented in Figure 5 and the study area zone of galunggung volcano biosphere study in 3D presented in Figure 6.

In addition to the waters, the typical plant species, namely: Anapalis Javanica, Nephentes, and Orchid can be used as research. In addition to the typical plants, the Galunggung area also contributes to the high oxygen content of the debt area which still covers most of the region. Based on this, it can be seen that 4 (four) regions can be used as field laboratories for biosphere studies including:

a) Ari Wall Mount with an altitude of 1,677 meters above sea level.
b) Gunung Siang with an altitude of 2,168 meters above sea level.
c) Guntur Mountain with an altitude of 2,160 meters above sea level.
d) Beuti Canar Mountain with a height of 2,241 meters above sea level.
3.3 Gunung Galunggung Study for the Utilization of Field Laboratories

The stages for analyzing the needs of field laboratory studies in the Gunung Galunggung area are carried out with the Stages of Identification needs, with reference to the learning outcome program and the learning course. An integrated laboratory type that is located in a faculty or university study center, or a technical implementing unit that organizes education and / or training with supporting facilities for category I, II, and III equipment, and managed materials are general and special categories of material for serving research activities, and community service, students and lecturers.

The characteristics of the right learning model for the use of the Gunung Galunggung area as a Geography Education Field Laboratory can be done in several stages, namely:

a) Management of basic material based on the environment

Material is the basic material of learning activities, material is a material that must be conveyed and understood by students to improve competence. Material is included in learning planning preparation. Based on direct observations in the field teaching material has a very important function because the abilities that want to be formed in the learning process are closely related to the material that must be learned. Spatial practice includes not only the sustainable development of the built (physical) environment, but also how the marketing (themental), as well as other things in daily life (social life), all of which form an integrated type of practice [10]

b) Management of environment-based learning interactions

Educative interaction is reciprocal communication between one party with another party, it already contains certain intentions, namely to reach a shared understanding which is then to achieve the goal (in learning activities means to achieve learning goals). Based on observations in the field students feel more interested in following learning when dealing directly with real objects. This can be seen from the activity of students in making observations about an object. In the use of the
environment as a learning resource, there is a normative educative interaction through activity-based teaching, in addition the opportunity to explore and interact in groups will make students feel depressed. Providing opportunities for students to use more time to make observations, experiments and discussions are some of the things that can be done to create fun learning. The pleasant interaction pattern will make students feel comfortable and pleasant in learning activities. The ability of individuals to demonstrate map reading skills, knowledge of spatial location of places, and understanding of peoples and culture association various regions [11].

c) Management of environmental-based evaluation of Geography learning
Evaluations can be carried out there are several techniques, including written evaluation and oral evaluation. This is done according to the needs of the value to be taken. Evaluations can be carried out regularly to see the focus to be achieved in learning activities. In this study the focus observed was cognitive, affective and psychomotor research. Written tests can be categorized into two, namely objective tests and description tests that can function to measure the cognitive domain. Affective learning outcomes that are important to measure, namely the attitudes and interests of students towards these subjects and the willingness to practice and accept certain values. A form of caring and being open to experience influences interest in art learning. It can be interpreted that the personality of students also needs to be evaluated because it will greatly influence interest in understanding the lesson.

4. Conclusion
a) The function of the laboratory is to carry out careful and accurate testing and measurement of the phenomenon under study. The types and measurements of parameters vary from one study to another. Different types and/or measurements of research parameters require different tools.

b) The development of the Galunggung area as a geography education laboratory can be assessed according to learning needs, with indicators of study based on geographic phenomena, namely: study of hydrosphere, lithosphere, anthroposphere, biosphere, and atmosphere.

c) Development of studies can be done in depth based on an analysis of the level of learning needs.

d) Biosphere studies in the Galunggung area can be devoted to the study of endemic flora and fauna, the distribution of vegetation in tropical rainforest areas, and collaborations as an ecosystem study in an integrated manner with Ecology.

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