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Innovation in Interdisciplinary Subject for Preserving Mountainous Forest Ecosystems

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***Abstract*—Mountain forest is one of the remaining natural forest types in the tropics. Economic needs and the lack of forest villagers' knowledge around the mountain forests often lead to deforestation. Therefore, efforts to prevent and community empowerment are needed to conserve the remaining natural resources. Field study and community services are two experience-based lectures that can be used to improve students' knowledge and skills and empower communities. This research aims to formulate an interdisciplinary subject on the mountain forest. In 2015-2017, data of students' understanding were collected on field study of Forestry Faculty of UGM in National Park of Mount Merapi, Mount Lawu, and Nature Reserve of Mount Ijen. Samples were taken ±10% of the total field attendees/years. Variables observed in the form of description in student practice report and information from key persons. The data were then analyzed descriptively. The result shows that the implementation of interdisciplinary subject is needed for the enrichment of knowledge and student insight. This enrichment should address (1) forest ecosystems, biodiversity and, climate change, (2) Mountains: landscapes and formation processes, (3) springs and watersheds, (4) mountain flora: native and invasive species, (5) herb and shrubs potentially natural medicines and dyes, (6) mountainous fauna, (7) domesticated mountain species and ethnobotany, (8) natural disaster in the mountains, (9) problems of mountain forest villagers, (10) education and empowerment of forest villages, (11) mountain environmental services, (12) agriculture and silviculture of mountain forest, (13) social collaboration in the mountains, (14) mountain forests in several countries.**

Keywords—mountain forest, forest ecosystem, interdisciplinary subjects, field study, community services.

I. INTRODUCTION

Tropics have several forest types in the world, such as coastal forests by Syahbudin, *et al*. in [1], mangroves by Setyawan *et al*. in [2]; Whitten, *et al*. in [3]), lowland forests, monsoon forests, and mountain forests.

Rapid population growth has resulted in increased demand for land and food. Forests are often targeted by communities to meet these needs. In general, forests in relatively flat and accessible areas are more easily transformed into other uses. Several inter-sectoral conflicts of interest also occur, especially in urban areas [4].

Mountain forest is part of the natural forest that can still be found. Its location on the slopes of the mountain, cold air, and some other limitations are some of the reasons. On the other hand, mountain forests actually have a very important ecosystem function for life. These functions include: water conservation and springs, native species, both flora and fauna, abundant springs, typical mountain landscapes, and other uniqueness. If the natural resources are not maintained and conserved, then the loss will cause damage to the lives of surrounding communities. Therefore, the community must know and be empowered in maintaining the natural resources in the vicinity. Local governments also put it as a priority scale of development. Likewise, universities in carrying out their dedication through education, research and contribution to the forest ecosystem of the mountains.

Adjustment of the curriculum of higher education according to the needs of the community is a must. Similarly, the University of Gadjah Mada (UGM) through Rector Regulation No. 16 of 2016 on the Curriculum Framework has asked the faculty to adjust the curriculum of its study program in several aspects. One of them is the provision of interdisciplinary subjects (Article 11 Paragraph 3b). In line with the adjustment of the curriculum, the Forestry Study Program has been conducting field studies to identify forest types, including the types of mountain forests. In addition, several research lecturers and students and community services have been conducted in mountain forests.

Based on the evaluation and discussion of Faculty of Forestry curriculum team, students' ability in understanding forest as a whole of life ecosystem still needs to be improved. Innovation in interdisciplinary subjects is needed to improve graduate quality. Therefore, this study aims to formulate proposals for interdisciplinary subject, especially in the mountain forest.

The rest of this paper is organized as follow: Section II describes the proposed method. Section III presents the result and following by discussion in section IV. Finally, Section V concludes this work.

II. PROPOSED METHOD

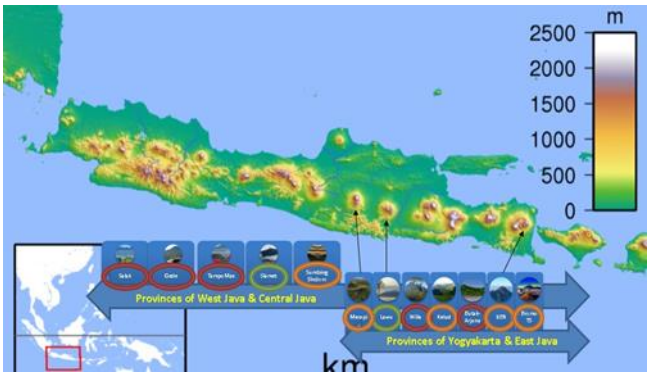

Fig. 1. Data was collected from three mountain forests in Java Island: National Park of Mount Merapi, Mount Lawu, and Nature Reserve of Mount Ijen

Data of students' understanding that forest is a complex ecosystem was obtained through observation and evaluation in the form of description in student practice report during field study in mountain forests, research activities and community services of Faculty of Forestry UGM in 2015-2017. Information from key persons were also recorded. The location of data collection is in three mountain forests in Java Island, namely: National Park of Mount Merapi, Mount Lawu, and Nature Reserve of Mount Ijen (see Fig. 1).

Samples were taken 20 students (±10%) of the total field attendees. The data obtained were analyzed descriptively.

III. RESULTS

The handbook of field study asks students in each forest type to observe, document and record several aspects of each forest type, i.e. forest description, edaphic factors, climatic factors such as temperature, humidity and rainfall, and their utilization. The result of the research related to the utilization in mountain forest shows that all students (100%) write the result of timber forest and non-timber forest products coming from tree, and not all students reckon that mountain forests are also important for ecosystems through the conservation of water resources, genetics, and others (see Table I). Students have not fully understood yet that forest is a complex ecosystem so that it requires understanding of diverse disciplines.

TABLE I. TYPES OF UTILIZATION IN MOUNTAIN FORESTS BASED ON STUDENTS FINAL REPORT OF FIELD STUDY OF FACULTY OF FORESTRY UGM

No.	Types of utilization	Total (%)
1.	Timber forest product	100
2.	Non-timber forest product	100
3.	Tourism	80
4.	Conservation place	75
5.	Education and research	30

IV. DISCUSSION

Mountain forest as a complex ecosystem requires a holistic understanding. Not only understood from the forestry sector, but also from the fields of biology, agriculture, pharmacy, and geography. The implementation of interdisciplinary subjects allows students to think new approach across boundaries. Unfortunately, today the students are still learning in the curriculum with the discipline of each faculty. They are expected to learn by respecting different perspectives and methods.

The implementation of interdisciplinary subjects is needed for the enrichment of knowledge and student insight. This enrichment will greatly assist the students while conducting field studies, community services, and thesis research. Innovation in interdisciplinary subjects should address (1) forest ecosystems, biodiversity and, climate change, (2) Mountains: landscapes and formation processes, (3) springs and watersheds, (4) mountain flora: native and invasive species, (5) herb and shrubs potentially natural medicines and dyes, (6) mountainous fauna, (7) domesticated mountain species and ethnobotany, (8) natural disaster in the mountains, (9) problems of mountain forest villagers, (10) education and empowerment of forest villages, (11) mountain environmental services, (12) agriculture and silviculture of mountain forest, (13) social collaboration in the mountains, (14) mountain forests in several countries.

V. CONCLUSION

This research has formulated interdisciplinary subject for preserving mountainous forest ecosystems. The result shows that the implementation of interdisciplinary subject is needed for the enrichment of knowledge and student insight. It is concluded that this enrichment should address fourteen (14) areas.

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