

# Conservation and Ecological Threats of Agarwood (*Aquilaria* sp.) on Leyte Island, Philippines

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## ABSTRACT

*Aquilaria* is a genus of about 20 species distributed mainly in the Indo-Malesian region. The genus *Aquilaria* belongs to the Thymelaceae family of Indo-Malayan trees known for producing the world's most expensive oils which are naturally occurring throughout the Philippines. *Aquilaria* is well known for the production of agarwood which is a highly wanted forest product of substantial economic value. In the Philippines, there is limited published information on the physical condition, habitat structure and ecological threats of *Aquilaria* which is a crucial factor to determine the optimum requirements to develop *Aquilaria* production system. Hence, this study was conceptualized to assess the habitat structure of *Aquilaria* as well as its conservation and ecological threats in the wild. Assessment, surveys and interview were conducted to gather on-site atmospheric data as well as ecological threats of *Aquilaria* in the wild. Soil collection was also gathered to analyzed soil properties.

The results revealed that there were two species of *Aquilaria* documented in the study site, namely: *A. malaccensis* and *A. cumingiana*. Moreover, the soil chemical properties are not significant between different topographic expositions but it is acidic and have generally low nutrient status. Furthermore, the conservation and ecological threats documented in the study site are unsustainable harvesting, massive collection of regenerant and inflicting damage of *Aquilaria* by punching nails or drilling holes in the trunk of standing mature tree.

Therefore, it is highly recommended that *Aquilaria* should be protected particularly *A. malaccensis* since it is rare and considered a new record of occurrence to Leyte Island as one of the major findings of the study. The establishment of *Aquilaria* production system is necessary as an option to reduce the rampant illegal poaching of agarwood in the wild but should be established in private land and registered with the Department of Environment and Natural Resources (DENR).

Keywords: *Aquilaria*, topographic expositions, ecological threats, habitat structure

## INTRODUCTION

- Agarwood is traded in several raw forms, ranging from large sections of trunk to finished products such as incense, medicine and perfumes (Barden et al., 2000). Furthermore, *Aquilaria* trees are often cut down indiscriminately in the search for those containing agarwood. It has been suggested to be extinct in the wild due to heavy exploitation of agarwood resources (Lim, 2012).
- Foreign nationals are now searching agarwood in the Philippines, specifically Leyte. There is documentation that *Aquilaria* trees are highly threatened (Chakrabarty et al., 1994) due to exploitation of the species for commercial purposes and high export prices (Soehartono, 1997). Barden et al (2000) reported that overexploitation remains significant concern.
- The result of the study is significantly important in the design and establishment of *Aquilaria*-based production system to minimize and reduce the overexploitation of the plants in the wild and eventually conserve the remaining population within the natural habitat.

## OBJECTIVES

- To characterize the habitat condition and structure of *Aquilaria* on Leyte Island; and
- To determine the ecological threats of *Aquilaria* in the natural habitat

## MATERIALS AND METHODS

- Site selection (Fig. 1)**
- Selection of the Study and Sampling Site**
  - Preliminary survey and assessment
    - Collecting information from reliable individuals to identify the exact location of *Aquilaria* trees in the wild
    - Incidence of rapid and over-harvesting of the *Aquilaria* matured trees and regenerant
- Habitat Structure Assessment**
  - Atmospheric Data Collection
  - Soil Collection and Analyses
- Determinants of Ecological Threats**
  - Interview to the reliable individuals (i.e., poachers, buyer of agarwood and seedling-growers)
  - Data recording and photo documentation
- Data encoding and statistical analysis**

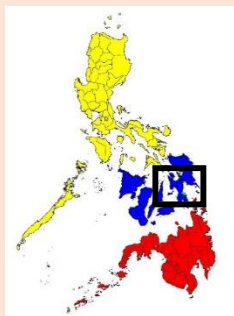


Fig. 1 Location of the study sites



Fig 2 (a) Atmospheric data collection, (b) soil collection, (c) interview with the local

## RESULTS

### A. Microclimatic Condition in the Study Site

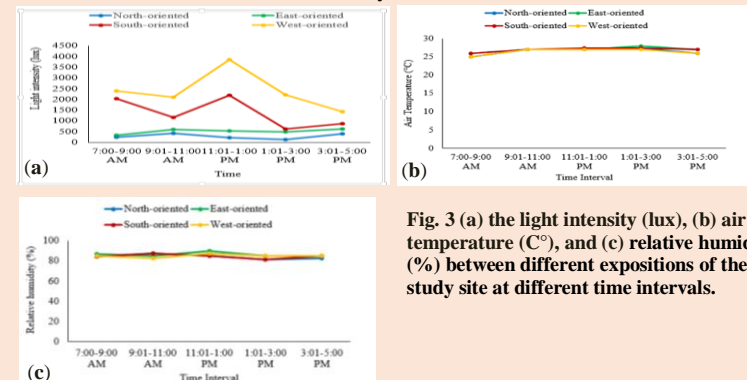


Fig. 3 (a) the light intensity (lux), (b) air temperature (C°), and (c) relative humidity (%) between different expositions of the study site at different time intervals.

### B. Soil Chemical Properties

Exposition	pH	Soil Organic Matter (%)	Total Nitrogen (g/kg)	Available Phosphorus (mg/kg)
North-oriented	4.90 ± 0.18	4.27 ± 0.63	0.21 ± .03	0.96 ± 0.16
East-oriented	4.85 ± 0.18	4.11 ± 0.63	0.21 ± .03	0.59 ± 0.16
South-oriented	4.90 ± 0.18	4.46 ± 0.63	0.22 ± .03	0.92 ± 0.16
West-oriented	4.74 ± 0.18	4.01 ± 0.63	0.20 ± .03	0.63 ± 0.16

Table 1 Soil chemical properties within study site between different topographic expositions.

### C. Conservation and Ecological Threats

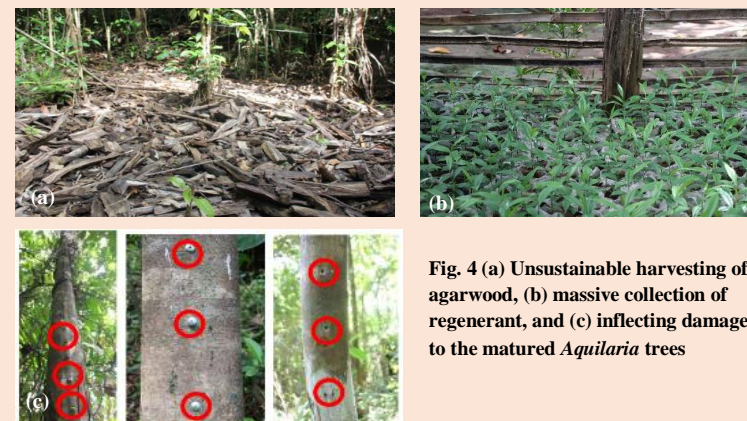


Fig. 4 (a) Unsustainable harvesting of agarwood, (b) massive collection of regenerant, and (c) inflicting damage to the matured *Aquilaria* trees

## DISCUSSIONS AND CONCLUSIONS

- Fig. 3a** shows the different levels of light intensity (lux) in between different topographic expositions. The average temperature at all periods of data collection had an increasing trend from seven o'clock in the morning until three o'clock in the afternoon but had a slight drop at five o'clock in the afternoon (**Fig.3b**). The east-oriented topographic location got the highest average, and north-oriented topographic location had lowest measurement. (**Fig. 3c**). The average rainfall during the conduct of the study between different expositions at different time intervals was 2.64 mm of rainfall for three days during the month of May.
- Table 1** statistical analysis showed no significant difference between soil chemical properties of the study site between different topographic expositions. Soil pH was very strongly acidic and soil organic matter content was moderate. The total nitrogen in the study site is medium.
- The ecological and conservation threats documented in the study site were unsustainable harvesting (**Fig. 4a**) of *Aquilaria* sp., massive collection of regenerant (**Fig. 4b**) and inflicting damage of *Aquilaria* by punching nails or drilling holes in the trunk of standing mature tree (**Fig. 4c**).
- Therefore, it is highly recommended that *Aquilaria* should be protected particularly *A. malaccensis* since it is rare and considered a new record of occurrence to Leyte Island as one of the major findings of the study.

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