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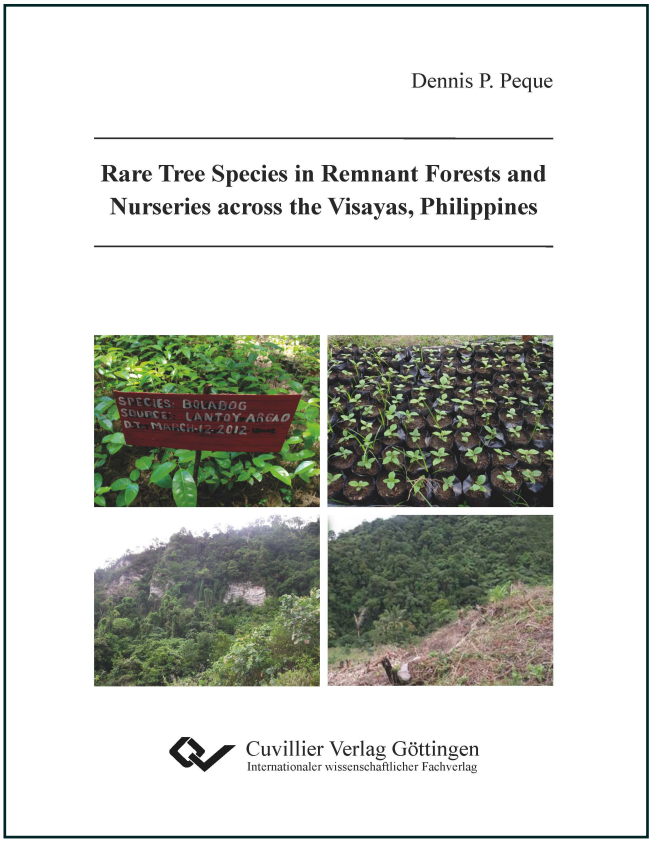
Rare Tree Species in Remnant Forests and Nurseries across the Visayas, Philippines



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CHAPTER 1

GENERAL INTRODUCTION

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1.1 Introduction

The Philippines is among the countries in Southeast Asia that are heavily deforested. Although its forest cover is improving (FAO 2010) much still has to be done to rehabilitate and/or restore formerly forested areas and protect remaining ones (Cardillo 2006). In the Visayas in particular, only few remnant forests are currently left but the integrity of these forests continues to be shaped and threatened largely by anthropogenic activities and as well by natural disturbances (Fig.1.1). However, remnant forests are still vital (Harrison 2011) as they may harbor important assemblage of tree species including rare and endangered ones which are potential seed sources for future reforestation using native species mixed plantations especially when the aim is for biodiversity conservation (Sayer et al. 2004). Rare species are important components of forests because they largely contribute to diversity (Hubbell 2013; ter Steege et al. 2013); at the same time they may also contribute to important ecosystem functions (Jain et al. 2014; Lyons et al. 2005; Mouillot, 2013). Patch size and the level of disturbance in forest remnants may also be contributory to the ecological status of the species. Loss of forests reduces habitat sizes and may result to a decline in species diversity especially those that are very sensitive to disturbance. It is a common assumption that rare species are often those most at risk of decline but common species are also susceptible to extinction (Lindenmayer et al. 2011) because extraction may be centered on them (Gaston 2010).

Several studies have shown that species diversity, abundance and distribution are shaped by soils (Goldberg 1985; John et al. 2007; Potts et al. 2002), topography (Poulos & Camp 2010), and climatic factors (Toledo et al. 2012) or their combinations (Condit

et al. 2013; Slik et al. 2009). Thus it becomes necessary to understand all these influencing factors in order to make an informed decision relative to the conservation of tree species. Knowledge on which species grow on a particular kind of soils or conditions may serve as guide for future tree planting. Proper site-species matching increase chances of a successful reforestation by assuring that native species used are suitable to the sites where they are planted (Manson et al. 2013).

The use of native species in reforestation in the tropics has gained wide importance in the past decades. Several studies have shown that some tree species may perform well especially in degraded lands (e.g. Milan & Margraf 1994; Schneider et al. 2014; Shono et al. 2011; van Breugel et al. 2011). However the range of species used seemed to be limited despite of the number of trees to choose from and many reasons were related to nursery operations such as lack of information in terms of growth rate, germination and seed sources (Condit et al. 1993). In the Visayas, Philippines a number of native species have already been tested for planting using the Rainforestation approach- an agroforestry scheme that aims to emulate the structure of natural forests (Milan and Margraf 1994) and performance of these species are documented in Nguyen et al. (2012) and Schneider et al. (2014). However, despite of its success uptake by tree farmers is still limited most likely due to some socio-economic, technical and political reasons. For reforestation that aims to conserve and/or restore forest biodiversity, it becomes imperative to know what species are there left in remnant forests and what species are grown in nurseries.

The general objective of this research was to generate information about the abundance and distribution of 20 selected rare and endangered tree species in 10 remnant forests across the Visayas, Philippines through ecological sampling, and to

gather additional information about the target species in nurseries located near in the studied forests.

Specifically, the study aims to determine:

1. The environmental factors that are related to the presence and abundance of target species in the remnant forests.
2. The associations of species, if any, and with sites.
3. The extent to which focal species that are found in forests are used in nurseries.
4. The factors that influence the production of rare tree species in nurseries.
5. Deduce considerations for the conservation of rare tree species.

A better understanding of the ecological status of selected 20 rare tree species, their densities and associations in different sites in the Visayas may be useful to their conservation and could be a basis in formulating policy and management actions for the protection of the remaining forest and as well in restoring biodiversity of formerly forested areas by planting of native species based on the observed association of species and sites.

Figure 1.1 Some forms of man-made and natural disturbance occurring within remnant forests in the Visayas: (A) newly cleared and burned forest, Santa Catalina Negros, photo source: K. Bornias; (B) leftovers (slabs) from newly cut dipterocarp species, *Shorea astylosa* in Silago; (c) landslides occurring in abandoned swidden farm, Lake Balinsasayao, Sibulan, Negros; (d) new established farm adjacent to a remnant forest, Palayan, Almeria, Biliran

1.2 References

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CHAPTER 2

GENERAL BACKGROUND

Chapter 2

2.1 Species rarity

Almost all ecological communities is comprised largely of rare species and by only few species that are exceptionally dominant (Flather and Sieg 2007; Magurran and Henderson 2003). For instance, studies in the tropical forests of Barro Colorado Island (BCI) in Panama (Hubbell 2013) and in Amazonia (ter Steege et al. 2013) showed that only relatively few (0.6% and 1.4% for BCI and Amazonia, respectively) species make up half of the individuals found and the rarest half of the species constitute only a very small proportion of all individuals present. Rare species may play important ecosystem functions and they receive a lot of attention by ecologists and conservationists. Species conservation requires understanding of the factors and mechanisms that cause their rarity (Kaye 1999). For effective and consistent communications, it is also important to clearly define what rarity is and the kind of rarity that is being referred to.

2.1.1 What does rarity mean?

Rarity has a lot of meanings and defining which species are rare is difficult. Its definition is not clear-cut as most people have their innate definition what constitute a rare species (Hartley and Kunin 2003). As a consequence, it might be a problem of comparing results from different studies despite investigating the same rarity types due to inconsistent use of the term ‘rare’ (Bevill and Louda 1999) and the variable or attributes measured in studying rarity. Thus, it could lead to misleading interpretation of results and misguided judgments about which species deserve protection (Pritt and Frimpong 2010).