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Threatened species of Genus *Podocarpus* in the Philippines

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ABSTRACT

Among Southeast Asian countries, Philippines is one of the biodiversity hotspots due to a number of endemic flora and fauna. Higher percentage of endemic flora is noted to be threatened. Among these are members of gymnosperms specifically *Podocarpus*. Threatened species of this genus in the Philippines include *P. ramosii* Mill, *P. lophatus* de Laub., *P. palawanensis* Silba & de Laub., *P. costalis* Presl, *P. rumphii* Bl., *P. macrocarpus*de Laub. and *P. polystachyus* R.Br. *ex* Endl. Various threats hampers the existence of these species of like deforestation, logging, human settlement, mining and overexploitation for several purposes. These are the reasons of placing these species in threatened category. Indeed, determination of these variables are essential in the establishment of conservation measures towards these species.

Key words: Horticulture, overexploitation, *Podocarpus*.

INTRODUCTION

It is noteworthy that the diversity of Family Podocarpacea is due to the large number of *Podocarpus* species (Li, 1953). Approximately, there are about 107 species represent this genus wherein it is more than half of the total number of species in the family (de Laubenfels, 1985). Inspite of this, genus *Podocarpus* is one of the less studied genera of Podocarpaceae. This is due to the location and less differentiation of each species. The species are widely distributed in tropical countries with greater concentration in South and Central America, and Malesian regions (de Laubenfels, 1988; Jaffre, 1995).

In the Philippines, there are 10 validly recognized species of this genus. These include *Podocarpus ramosii, P. pilgeri, P. glaucus, P. lophatus, P. palawanensis, P. rumphii, P. neriifolius, P. macrocarpus, P. costalis* and *P. polystachyus* (Salvaña and Gruezo, 2015). About 70% of these species are noted to be threatened based on the international and local assessments and based on these, categories seem to be inconsistent.

Various factors have been associated to the threatened category of one species. More often than not, this category is commonly associated to the reduction of population size brought about by massive deforestation, logging, expanding agricultural lands and human settlements (Wong, 2012). For the fact that plants have a lot of medicinal and industrial importance, it can be assumed that overexploitation for such purpose may also cause the reduced number of these species (Peters and Banco, 1996). Indeed, it is the very core of this study to determine threats that the population of *Podocarpus* species in the Philippines are facing. Furthermore, the categories on both international and local surveys are also presented.

MATERIALS AND METHODS

Specimens from local herbaria were examined and the collection sites were noted. Local herbaria include (1) Botanical Herbarium (CAHUP), Museum of Natural History, University of the Philippines Los Baños, College, Laguna; (2) Philippine National Herbarium (PNH), National Museum, Manila; (3) Jose Vera Santos Memorial Herbarium (PUH), Institute of Biology, University of the Philippines Diliman, Quezon City. Other international herbaria were also accessed through virtual herbarium.

Field sampling was also carried out for additional specimen. New distribution localities and conservation status of each species were included. Conservation status of each species was based on the classification of International Union for the Conservation of Nature (IUCN, 2014; Ver. 2.3) and local assessment of Fernando et al. (2008).

RESULTS AND DISCUSSION

Based on IUCN (2015; Ver. 2.3) and assessment of Fernando et al. (2008), a total of seven (7) species of *Podocarpus* are threatened (Table 1). These include *Podocarpus ramosii* Mill*, P. lophatus* de Laub*., P. palawanensis.* Silba & de Laub., *P. costalis* Presl, *P. rumphii* Bl., *P. macrocarpus* de Laub. and *P. polystachyus* R.Br. *ex*Endl.

Most of the common reasons on the decreasing wild population include deforestation and overexploitation for some purposes including timber production and horticulture. Most of the areas where species of *Podocarpus* are located faced the challenge of deforestation due to spreading agricultural landscapes and

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Table 1. Threatened species of *Podocarpus* in the Philippines.

SPECIES	CONSERVATION STATUS (IUCN, 2014 Ver. 3.1/ Fernando et al., 2008)
Podocarpus ramosii Mill	Data Deficient/ Endangered A1c, B1+2bc
Podocarpus lophatus de Laub.	Vulnerable D2/ Endangered Ac1, B1+2bc
Podocarpus palawanensis Silba& de Laub.	Critically Endangered B1 ab (ii)+2ab(iii)/ Critically Endangered A1c, B2bc
Podocarpus costalis Presl	Endangered B2ab(v)/ Endangered A1cd, B2bc
Podocarpus rumphii Bl.	Near Threatened/ Other Threatened Species (OTS)
Podocarpus macrocarpus de Laub.	Endangered B2ab (ii, iii, v)/ Other Threatened Species (OTS)
Podocarpus polystachyus R.Br. *ex* Endl.	Vulnerable A4ac/ Other Threatened Species (OTS)

Human settlement. Furthermore, there are also areas which are altered for commercial and tourism purposes. Particularly, this situation can be observed in the case of *P. macrocarpus* wherein most of the species are found in the northern part of Luzon like in Baguio and other areas of Benguet. There are also records wherein the wood of the species is used for making sounding boards of some musical instruments, tennis rackets and even pencils. Deforestation also posed a threat on the existence of *P. palawanensis,* as only known from the type locality. And the limited area where this species occur is not considered protected. Deforestation also occurs in coastal bluffs and limestone areas which posed a threat to the population of *P. polystachyus*. Adding to this, uncontrolled mining of limestone also contribute to the decreasing population of this species.

In the field of horticulture, the most common species of *Podocarpus* used for ornamental purposes is *P. costalis*. This species can now be seen in every house and building landscapes. This is quite problematic since planting materials of cultivated plants mostly came from the area of distribution which reduces wild population. Moreover, seed-bearing structures or so called "receptacle" are considered edible and commercially used for jam production.

Furthermore, *P. rumphii* is rapidly decreasing due to high quality timber characteristic of the species. Massive logging of *P. rumphii* in the Philippines is one of the reasons in considering the species as near threatened. There are additional records on the population of *P. rumphii* aside from the list provided by previous assessment. Thus, the near threatened category of the species must be updated in terms of its status in the Philippines.
Mining activities in Mt. Tapulao is one major threat in the population of *Podocarpus lophatus*. Although it is not only endemic in the area, it is where most of the population of the species can be found and, historically, the type specimen is collected.

These species need much attention in terms of conservation since declining population is observed. Population decrease, although indirect, can affect the taxonomy of these species (Winter et al., 2009). Adequate samples rely on the number of population which yield a better characterization of a species. Moreover, degree of variations among members of the same plant group can be supported if samples are taken from different populations and distribution areas. And more importantly, conservation of these species, the same with other plant groups, helps maintain biodiversity in the Philippines (Langenberger *et al*., 2006).

CONCLUSION

Species of *Podocarpus* in the Philippines are not well-assessed in terms of systematic studies. This can be attributed to species distribution and the population reduction of these species. The enumerated threats in this study are the reasons of the decreasing population. The number of these species will continue to reduce if activities associated to the reduction will also continue. Thus, the establishment of conservation measures and the proper management of the areas where these species occur are essential in eliminating the possibility of losing these species in the future.

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