

## **Status and Distribution of Philippine Teak (*Tectona philippinensis* Benth. & Hook.f. ) on Ilin and Ambulong Islands, San Jose, Occidental Mindoro**

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**Distribution mapping surveys of the endangered endemic Philippine teak (*Tectona philippinensis* Benth. & Hook.f.) was conducted on Ilin and Ambulong Islands, Occidental Mindoro, Philippines from 2017–2019. It aimed to provide critical and updated information for the management and conservation of the species. A total of 2,140 Philippine teak individuals were counted and mapped in the area, nearly a 50-fold increase of the known population from only 44 trees documented in 2003.**

Keywords: distribution, Ilin and Ambulong, Philippine Teak, *Tectona philippinensis*

The Philippine teak, a Philippine endemic species, is found only in five locations (EDC 2020), including Ilin and Ambulong Islands, Occidental Mindoro. It is highly valued as fuelwood and timber in the construction industry (Madulid *et al.* 2008). Medicinally, the species is tested for antimicrobial activity against bacteria and fungi (Ragasa *et al.* 2008). It is currently classified as endangered (B2ab) on the International Union for the Conservation of Nature (IUCN) Red List and the Wildlife Resources Conservation and Protection Act/ Department of Environment and Natural Resources Administrative Order 2017-11 national list due to its continuing decline in Batangas and Cavite (EDC 2020; DENR 2017).

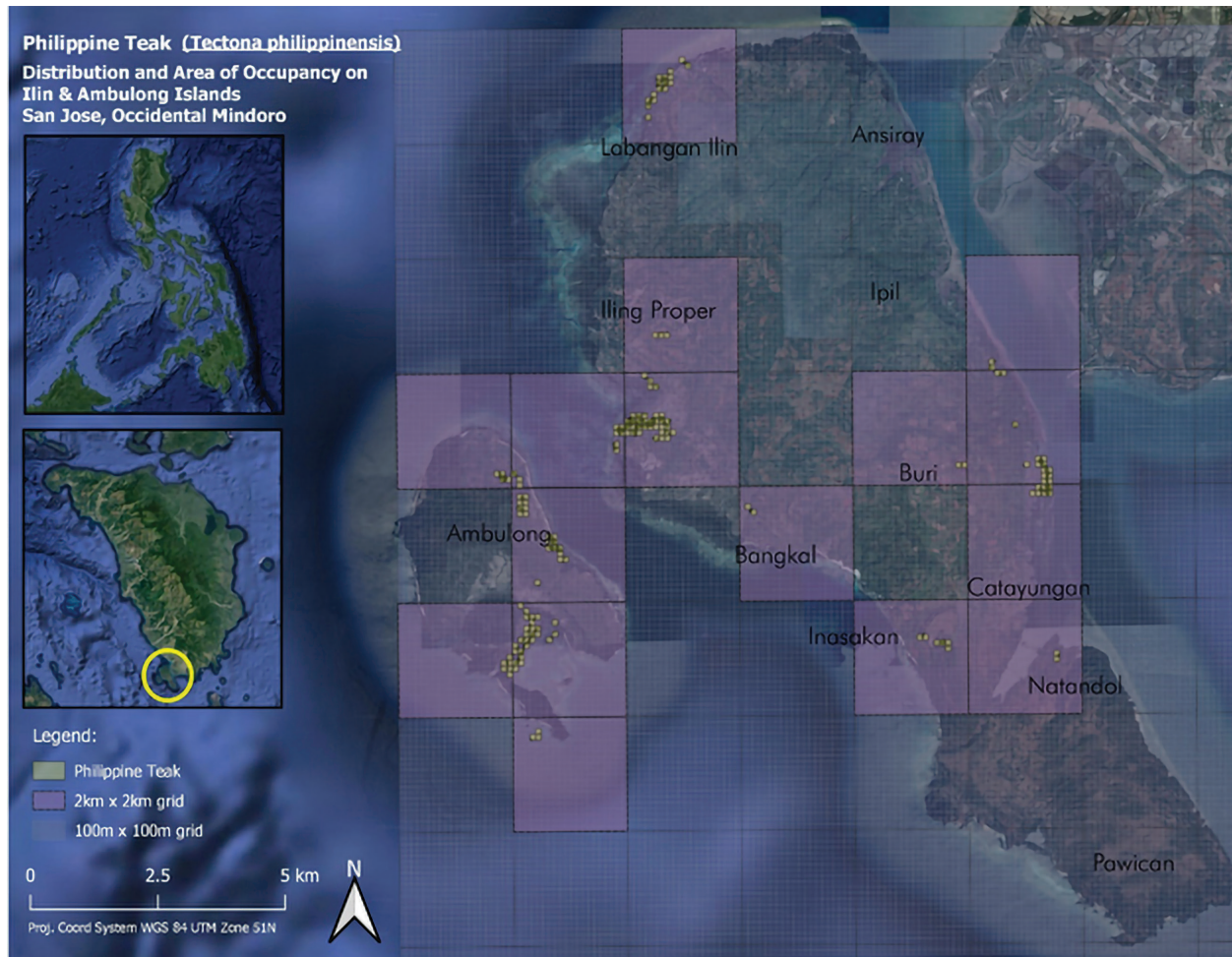
In Ilin and Ambulong Islands, 44 Philippine teak individuals with at least 10 cm diameter at breast height (DBH) were recorded from 2003–2004 (Mandia 2007, 2014). By 2013, 251 individuals were observed; 41 had DBH > 10 cm while the rest had < 10 cm DBH and were

considered seedlings and saplings. A reforestation project was then prompted, including species individual tagging and mapping to update information for its conservation management in the mentioned islands, located between 12°9'11.10"–12°17'51.45" N latitude and 121°0'3.84"-121°8'9.61" E longitude off the Occidental Mindoro southwestern tip. Tagging was conducted between April 2017–2018, with a follow-up survey in October 2019.

A total of 2,140 Philippine teaks were encountered with 2,028 (94.8%) coordinates sets retrieved. The highest concentration of the species was located at Barangay Iling Proper with 787 individuals (36.8%), followed by 444 (20.7%) and 364 individuals (17.0%), respectively, from Ambulong and Buri. The combined three areas accounted for the population majority (74.5%). Philippine teaks in each of the 11 barangays of Ilin and Ambulong Islands are summarized in Table 1.

Following the IUCN (2018) mapping guidelines, the 2,028 points occupied a total of 64-km<sup>2</sup> area of occupancy. In

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**Figure 1.** Population structure of Philippine teak (*Tectona philippinensis*) on Ilin and Ambulong Islands, San Jose, Oriental Mindoro, versus population structure in Lobo for comparison.

**Table 1.** Summary of Philippine teak distribution per barangay on Ilin and Ambulong Islands, San Jose, Occidental Mindoro.

Barangay	Island	No. of Philippine teak trees recorded	% of the total recorded
Ambulong	Ambulong	444	20.7
Ansiray	Ilin	0	0
Bangkal	Ilin	0	0
Buri	Ilin	364	17.0
Catayungan	Ilin	25	1.2
Iling Proper	Ilin	787	36.8
Inasakan	Ilin	208	9.7
Ipil	Ilin	0	0
Labangan	Ilin	185	8.6
Natandol	Ilin	15	0.7
Pawican	Ilin	0	0
<b>Total with coordinates</b>		<b>2028</b>	<b>94.8</b>
<b>Missing data</b>		<b>112</b>	<b>5.2</b>
<b>Total count</b>		<b>2140</b>	<b>100</b>

calculating the density, points were also plotted on a finer 100 m x 100 m (1-ha) grid, which occupied 148 1 ha-grid squares resulting in a density of 13.7 trees/ha.

Table 2 shows the Philippine teak population on Ilin and Ambulong Islands following five-size/DBH-classification (Caringal *et al.* 2015). It shows a relatively high number of seedlings and saplings (< 10 cm) with 232 individuals (39.8%) nearly as high as the number of poles (> 10–30 cm), which tallied 292 individuals accounting for more than half (50.2%) of the sample population. Few trees reach the larger size-classes (standard and veteran, > 30 cm) with only 58 individuals (10%). Dwarfing was observed possibly due to the overexposed karst limestone and dry coral hills (Ella *et al.* 2015; Hernandez *et al.* 2016). The species population distribution curve in the study areas (Figure 2) approximates the population in Lobo, Batangas, exhibiting a “good regeneration” with up to 3,000 individuals (Caringal *et al.* 2015; Hernandez *et al.*

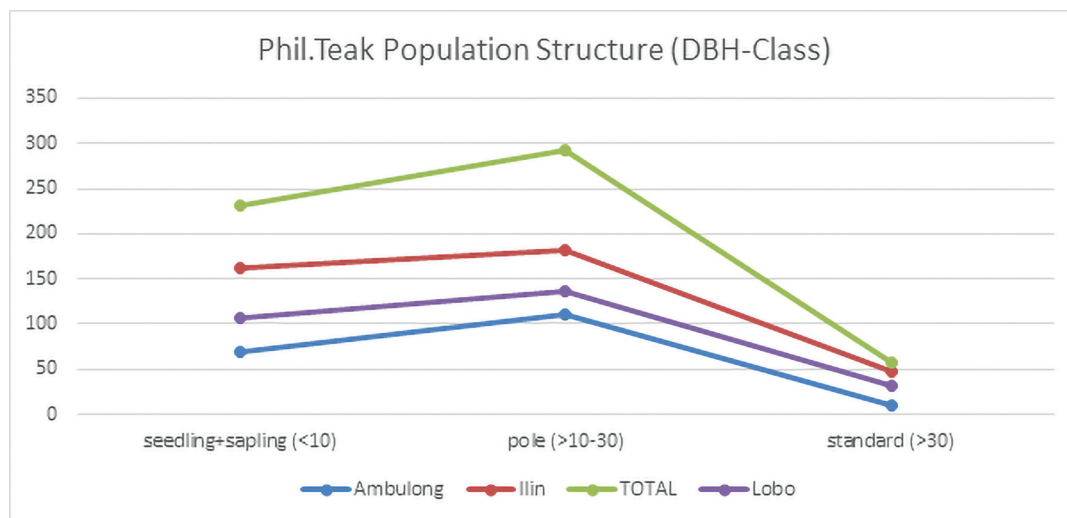
2016). A high proportion (60.2%) of trees belonging to the pole and standard size-class (> 10 cm) indicate a high potential to regenerate, considering that a high species percentage has been observed to mature and bear flowers at pole size-class (Caringal *et al.* 2015).

Extensive reproductive phenology studies on the Philippine teak are yet to be conducted for the Ilin and Ambulong population. However, late-flowering to early drupe formation on the fourth week of June were observed in the area. However, no simultaneous mass flowering events of the species have been documented. Sprouting or regrowth was observed on a few severed stumps, similar to the Batangas population (Caringal *et al.* 2015), indicating the regenerative ability to natural or anthropogenic disturbances with a high potential for producing regenerants through coppicing (Ella *et al.* 2015). Further studies and appropriate species management may produce numerous stems or trunks throughout its lifespan.

Over the past two decades, the Ilin and Ambulong Philippine teak population was monitored. To date, there are 2,140 species individuals, with a significant number (> 60%) reaching age/DBH-class greater than 10 cm, which is considered reproductively mature and possibly contributes additional batches of regenerants. Together with the 4,471 counted from four locations on Batangas, the new total (n = 7,611) goes beyond the 7,300 individuals estimated by Malabrigo *et al.* (2016) and, conversely, with increasing population trends in the study area (EDC 2020). Compared to the initial 44 trees counted, the current Ilin and Ambulong species population has increased by 48.64 times, highlighting the conservation efforts by the Mindoro Biodiversity Conservation Foundation, Inc. (MBCFI), DENR Community Environment and Natural

**Table 2.** Summary table of Philippine teak population structure in Ilin and Ambulong Islands, San Jose, Occidental Mindoro.

Size-DBH class (cm)	Ilin Island	Ambulong Island	Total count
Seedling (≤ 5)	52	4	56 (9.6 %)
Sapling (> 5–10)	111	65	176 (30.2 %)
Pole (> 10–30)	181	111	292 (50.2 %)
Standard (> 30–75)	47	11	58 (10.0 %)
Veteran (> 75)	0	0	0 (0 %)
<b>Total count</b>	<b>391</b>	<b>191</b>	<b>582 (100%)</b>



**Figure 2.** Population structure of Philippine teak (*Tectona philippinensis*) on Ilin and Ambulong Islands, San Jose, Oriental Mindoro, versus population structure in Lobo for comparison.

Resources Office (CENRO), and Ilin and Ambulong Bantay Gubat (IAMBAG) for threatened Philippine teak, which include reforestation and patrolling, among others.

The Philippine teak georeference will help prioritize Barangays Ambulong, Buri, Iling Proper, Inasakan, and Labangan for the declaration as critical habitats, including reforestation and protection efforts.

However, to further provide better management and conservation efforts for the species, it is recommended that a phenology and population study must be conducted for the Philippine teak in Ilin and Ambulong Islands, and the population of Philippine teak in the islands will be further protected if Ilin and Ambulong Islands will be declared critical habitat in the national level.

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## REFERENCES

CARINGAL AM, BUOT IE, ARAGONES EG. 2015. Population and Reproductive Phenology of the Philippine Teak (*Tectona philippinensis* Benth. & Hook.f.) in Lobo Coast of Verde Island Passage, Batangas, Philippines. *Philipp Agric Scientist* 98(3): 312–322.

[DENR] Department of Environment and Natural Resources. 2017. Updated National list of threatened Philippine plants and their categories. *Wildlife Resources Conservation and Protection Act/ DENR Administrative Order No. 2017-11*. 30p.

ELLA AB, DOMINGO EP, SAMIANO FB, BONDAD EO. 2015. Identification of naturally grown Philippine teak (*Tectona philippinensis* Benth. & Hook.f.) based on morphological and anatomical features. *Philippine Forest Products Journal* 6: 12–21.

[EDC] Energy Development Corporation. 2020. *Tectona philippinensis*. The IUCN Red List of Threatened Species 2020: e.T32123A126992854. Retrieved on 25 Aug 2020 from <https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T32123A126992854.en>

HERNANDEZ JO, MALABRIGO PL, QUIMADO MO, MALDIA LSJ, FERNANDO ES. 2016. Xerophytic Characteristics of *Tectona philippinensis* Benth. & Hook. f. *Philippine Journal of Science* 145(3): 259–269.

[IUCN] International Union for the Conservation of Nature. 2018. Mapping Standards and Data Quality for the IUCN Red List Categories and Criteria Version 1.16 (September 2018).

MADULID DA, AGOO EMG, CARINGAL AM. 2008. *Tectona philippinensis* (errata version published in 2016). The IUCN Red List of Threatened Species 2008: e.T32123A98839585. Retrieved on 14 Nov 2019 from <http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T32123A9681850.en>

MALABRIGO PL, DAVID M, DAVID-PILAR M. 2016. BINHI: Tree for the Future. Energy Development Corporation, Philippines.

MANDIA EH. 2007. Vegetation Inventory on Ilin Island, SW Mindoro, Philippines. The Proceedings of the De La Salle University – Osaka University Academic Research Workshops, Vol. 7, p. 8–11.

MANDIA EH. 2014. Vegetation Inventory Integrated with GIS for Ilin Island, Southwestern Mindoro: A Sabbatical Research Report [URCO (16 SU/C)]. De La Salle University-Manila. 87p.

RAGASA CY, LAPINA MC, LEE JJ, MANDIA EH, RIDEOUT JA. 2008. Secondary metabolites from *Tectona philippinensis*. *Natural Product Research* 22(9): 820–824. DOI: 10.1080/14786410701640551