TREE DIVERSITY AND CARBON IN AURORA: A COMPARISON BETWEEN PRESERVED AND DEVELOPED ECOSYSTEMS

Presented by: For. Ericson E. Coracero

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Ericson Esquibel Coracero[1,2*], Pastor L. Malabrigo, Jr.[3], Jayvee M. Bambalan[4], Ivhon Kyle S. Palapal[4], Reynan V. Guleng[4], RB J. Gallego[2,4], and Mark John A. Suniega[4]

1 College of Agriculture and Forestry, Batangas State University – The National Engineering University Lobo Campus, Batangas, Philippines
2 Department of Graduate Studies, Aurora State College of Technology, Baler, Aurora, Philippines
3 Department of Forest Biological Sciences, College of Forestry and Natural Resources, University of the Phil-ippines Los Baños, Laguna, Philippines
4 Department of Forestry and Environmental Sciences, Aurora State College of Technology, Baler, Aurora, Philippines

Trees

One of the most important components of the ecosystem

Provide countless benefits

- Oxygen production through photosynthesis
- Key elements of biodiversity (habitat and food for wildlife) (Bütler et al., 2013)
- Protection from calamities (typhoons, landslides, climate change) (Wahlström, 2015)
- Food and livelihood source (Reed et al., 2017)

Decreasing Forest Cover

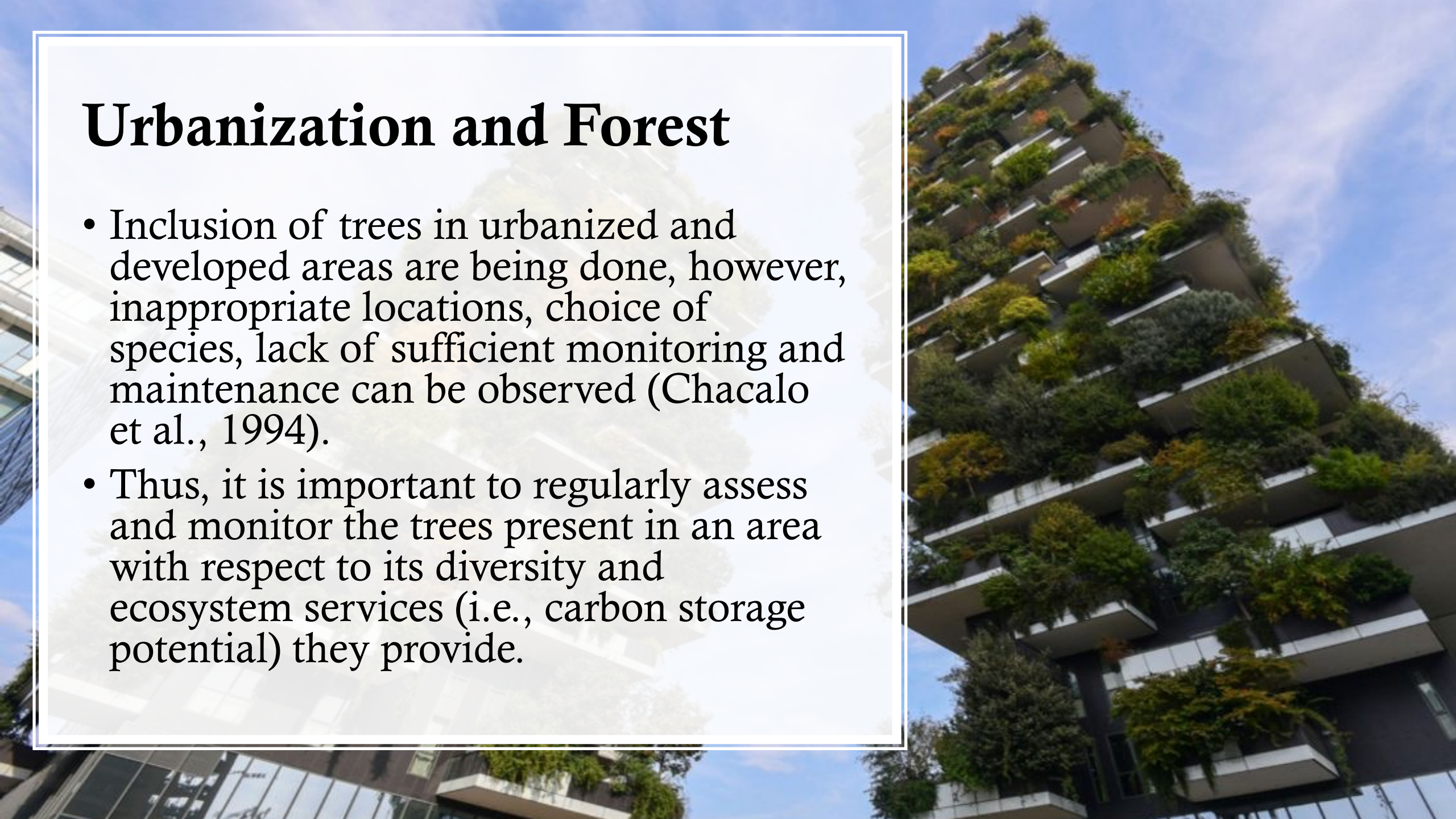
- Since 1990, estimated amount of 420 million hectares of forest have been lost, globally (Food and Agriculture Organization of the United Nations, 2020) due to:
  - agricultural expansion
  - forest degradation
  - and land conversion
- Philippines: 90% or 27 million ha original forest cover (Chokkalingam et al., 2006); 2015, 8.205 million ha (SEPO, 2015)

Urbanization and Forests

- Development of areas which eventually leads to its rapid urbanization greatly contributes to the loss of remaining trees (Lüttge & Buckeridge, 2020)
- Forested areas across the world are continuously converted into commercial areas being driven by urbanization (Smail, 2010).
- the supposedly numerous benefits that trees can provide also decrease with its number

Urbanization and Forest

- Inclusion of trees in urbanized and developed areas are being done, however, inappropriate locations, choice of species, lack of sufficient monitoring and maintenance can be observed (Chacalo et al., 1994).
- Thus, it is important to regularly assess and monitor the trees present in an area with respect to its diversity and ecosystem services (i.e., carbon storage potential) they provide.



Tree Diversity and Carbon Stock Assessments

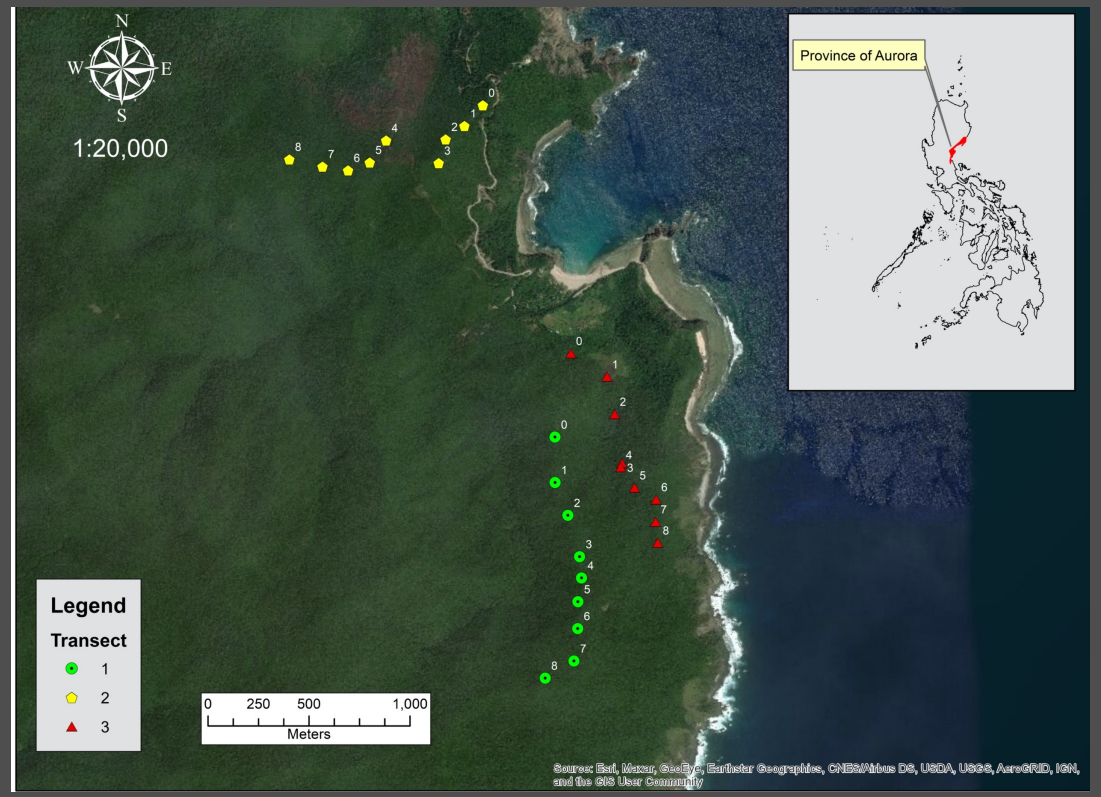
Effective tools in uncovering useful information relating to the underlying problems relating to their overall diversity, ecological status, and carbon storage potentials (Coracero & Malabrigo, 2020; Assefa et al., 2013).

Product of these assessments can also be used in devising strategies and plans to combat loss of trees especially in developed areas where land use planning is vital (Dida & Tiburan, 2020).


METHODOLOGY

Sitio Dicasalarin, Barangay Zabali, Baler, Aurora

Coracero and Malabrigo (2020)



North Poblacion and South Poblacion, Dipaculao, Aurora

Bambalan et al. (2022)

Study Sites

Data Collection

- Establishment of three 2-km transect with nine 20x20m plots each in Baler (total 1.08 ha)
- 100% survey of trees in Dipaculao
- Trees with diameter at breast height of at least 5cm
- Conservation Status Classification under IUCN Red list (IUCN, 2022) and DAO 2017-11 (DENR, 2017)
- Nativity and endemism of tree species (Pelser et al., 2011)

Tree Diversity & Carbon Stock

- **Diversity:** computed using PAST software v. 3.14
- **Tree Carbon Stock Formula**:
  - Aboveground biomass (Y) = exp (-2.134 + 2.530 · ln(D)) → Brown (1997)
  - Belowground biomass (BGB) = Y · 15% → Pragasan (2022)
  - Carbon Stock (CS) = (Y + BGB) · 50% --> Pragasan (2022)

Most Abundant Tree Species: Baler

Teijsmanniondendron ahernianum or Dangula with 168 individuals (7.5%%)

Xanthostemon philippinensis Merr. or Bibit with 129 individuals (5.76%)

Most Abundant Tree Species: Dipaculao

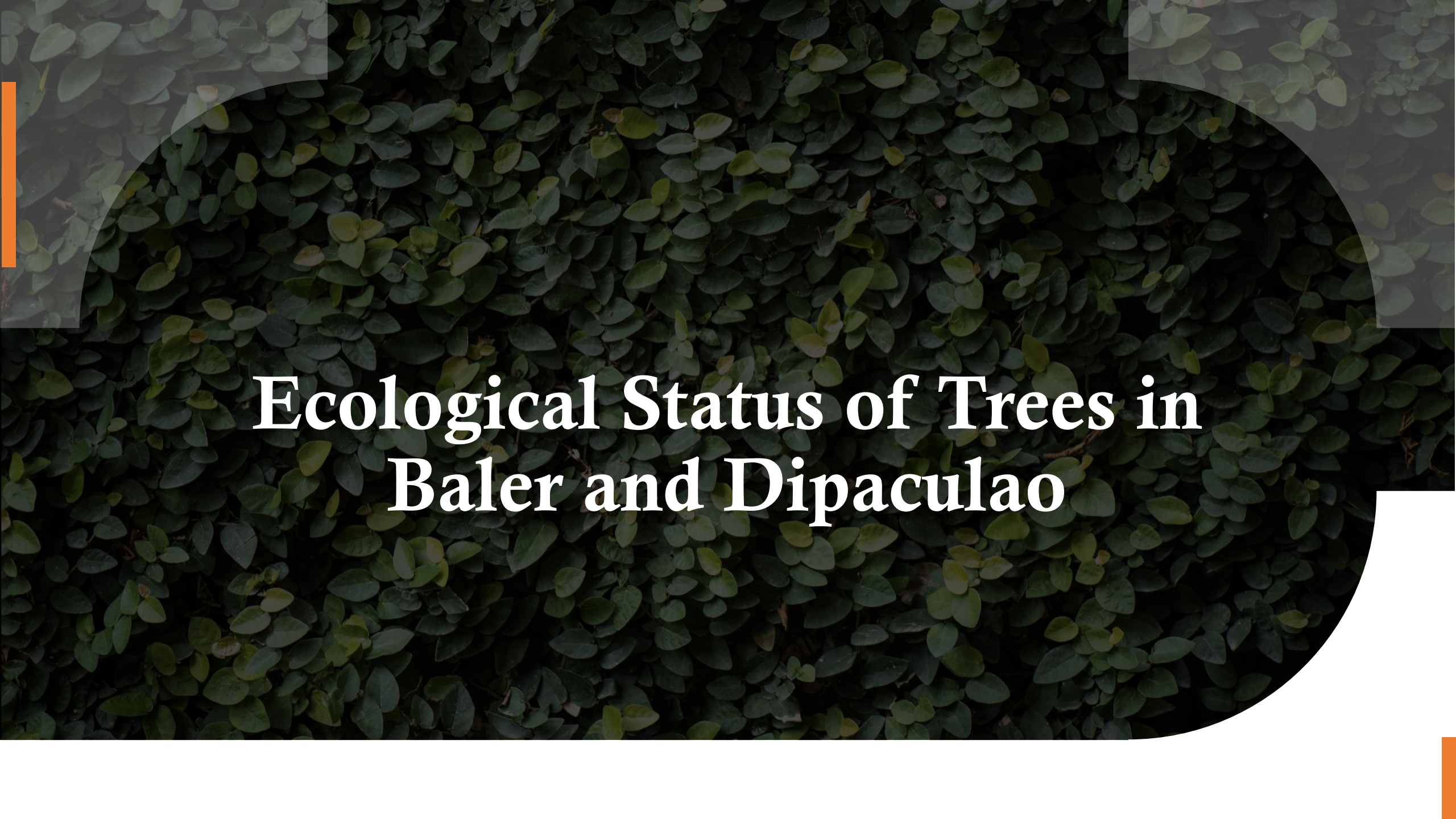
Swietenia macrophylla King or Big Leaf Mahogany with 191 individuals (14.8%)



Mangifera indica L. or Mango with 172 individuals (13.33%)



Gmelina arborea Roxb. ex Sm. or Yemane with 102 individuals (7.91%)



Ecological Status of Trees in Baler and Dipaculao

Philippine Native and Endemic Tree Species in Baler

Native species: 139 out of 139 tree species (100%)

Endemic species: 48 out of 139 species

Philippine endemics: *Xanthostemon philippinensis,* etc.

Philippine Native and Endemic Tree Species in Dipaculao

Native species: 37 out of 68 tree species (54.4%)

Endemic species: 3 out of 68 species

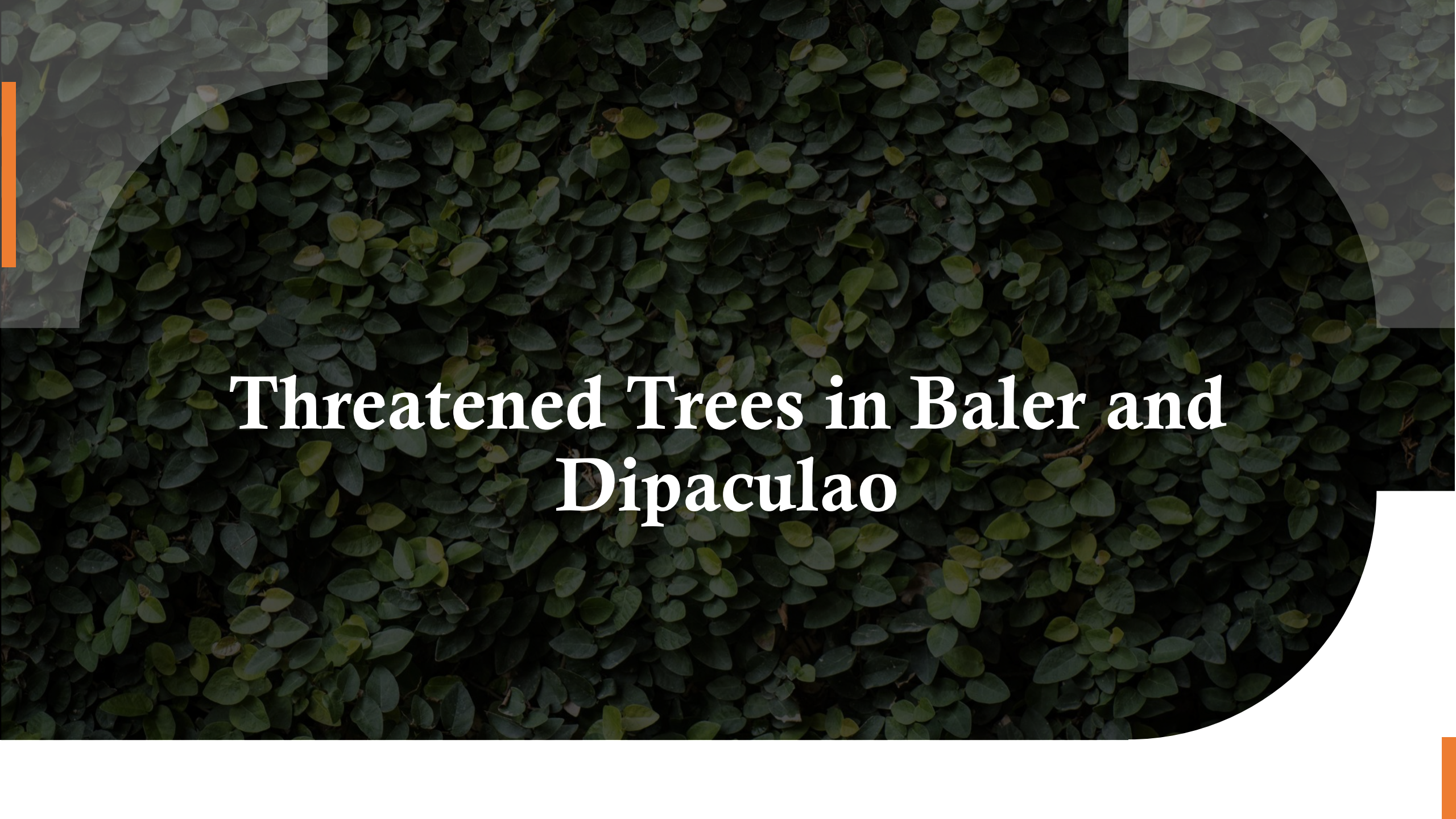
Philippine endemics: *Artocarpus blancoi* (Elmer) Merr., *Ficus pseudopalma* Blanco, and *Drypetes falcata* (Merr.) Pax & K.Hoffm.

Philippine Endemic Species

Artocarpus blancoi (Elmer) Merr.
Pakak/Antipolo

Ficus pseudopalma Blanco
Niyog-niyogan

Drypetes falcata (Merr.) Pax & K.Hoffm.
Gakakan



Threatened Trees in Baler and Dipaculao

Xanthostemon philippinensis or BIBIT

Critically endangered in IUCN and DAO 2017-11

Shorea malibato

Yakal malibato

- Endemic species
- Critically Endangered in IUCN Redlist and DAO 2017-11

Pterocarpus indicus **Willd. or Narra**

- Native species
- Endangered in IUCN Redlist
- Vulnerable in DAO 2017-11

Invasive Species in Dipaculao

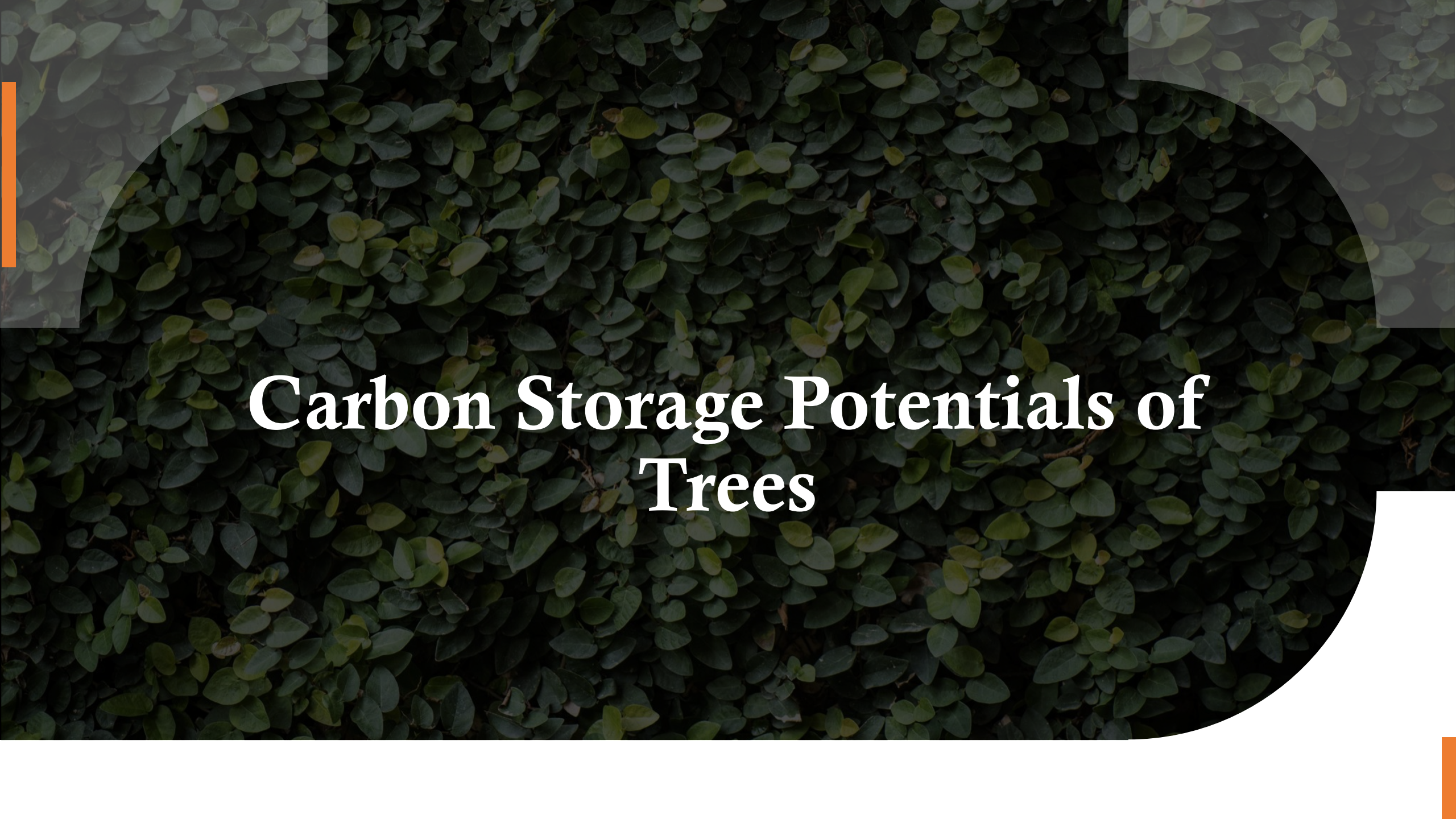
Gmelina arborea Roxb. ex Sm. or Yemane

Swietenia macrophylla King or Big Leaf Mahogany

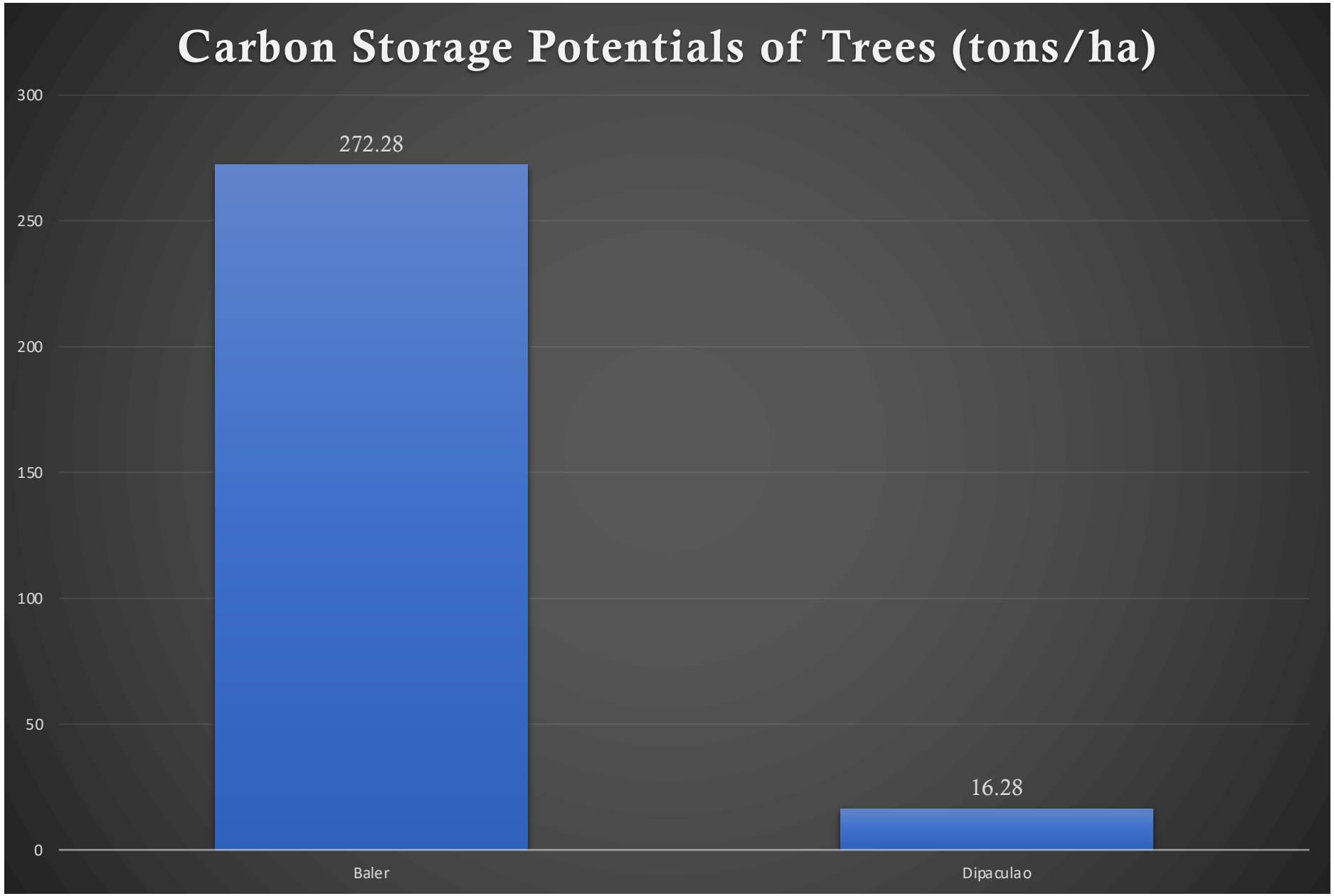
Leucaena leucocephala (Lam.) de Wit or Ipil-ipil

Tree Species Composition and Diversity

	Baler	Dipaculao
Number of Individuals	2239	1290
Number of Species	139	68
Number of Families	46	23
Native species	139	37
Endemic species	48	3
Threatened Species	16	7
Shannon Diversity	4.096	3.278



Carbon Storage Potentials of Trees


Carbon Storage Potentials of Trees (tons/ha)
300
250
200
150
100
50
0
272.28
16.28
Baler
Dipaculao

Xanthostemon philippinensis (Bibit)

68.60 tons

Samanea saman (Rain Tree)

407.4 tons

What have we learned?

- Natural (preserved) forests are more diverse than developed ecosystems
- There are more ecologically important species in natural forests than developed ecosystems
- Natural forests contain larger amounts of carbon in tons per hectare than developed ecosystems
- Results of the studies calls for immediate action from the government to prioritize proper land use planning and right choice of species to be integrated in developed area

What we should do:

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THANK YOU!