

Are native-species planting mandates good for biodiversity?

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Abstract:

Many municipalities now require a certain percentage of native trees and shrubs in new landscape installations. Introduced woody species are increasingly perceived as undesirable, primarily because they are lumped together with their invasive counterparts. This presentation will summarize the current science regarding the effects of native and nonnative tree species on urban landscape stability. A more practical approach than simply mandating more native species will be suggested.

Research question:

Do native and nonnative trees differ in how they affect community diversity?

Parameters:

- A. Information drawn from a global survey of relevant, peer-reviewed, scientific articles.
- B. All urban settings are considered, including private residences, botanical gardens, remnant natural areas, golf courses, and public parks.
- C. Biodiversity analysis must include organisms other than tree species themselves.

Additional considerations:

- A. Noninvasive tree species as acceptable introductions.
- B. Ecological benefits conferred by some invasive species.
- C. Influence of ecosystem edges on biodiversity (the “edge effect”).
- D. Biodiverse communities less susceptible to invasive species.

Rationale for native species mandates:

- A. Long-term studies document the loss of native species in urbanized landscapes.
- B. Perception that urbanization accelerates loss of biodiversity by displacing native species.
- C. Perception that only native species can fill ecological roles in urban greenspaces and thereby increase biodiversity.
- D. Perception that native plants are superior to introduced species because of their adaptation to local environment, reduced maintenance requirements, integration with other ecological community members as well as their contribution to sense of place.

Published evidence on biodiversity effects:

- A. Plants
 - a. Older trees important for epiphytic species.
 - b. Majority of introduced species are non-invasive and do not appear to threaten local biodiversity.

- c. Home gardens and other cultivated areas serve as conservation refuges for endangered and vulnerable plant species.

B. Birds

- a. Urbanization favors omnivorous, carnivorous, granivorous, and cavity nesting species, but threatens those that nest or forage in grasses or on the ground.
- b. Introduced tree species, including invasives, can meet and diversify habitat needs.
- c. Species richness and diversity are positively influenced by:
 - i. Abundance and diversity of trees and shrubs
 - ii. Older, larger trees
 - iii. Native vegetation
 - iv. Moderately disturbed sites (suburbs, public greenspaces)

C. Insects

- a. Introduced tree species, including invasives, can meet and diversify habitat needs.
- b. Many native pollinators have become dependent on introduced plants as their native hosts disappeared.
- c. Community, botanical, and residential gardens support a wide diversity of insects (especially pollinators).
- d. Species richness and diversity are positively influenced by:
 - i. Abundance and diversity of trees and shrubs
 - ii. Profusely flowering species with seasonal diversity
 - iii. Large trees
 - iv. Hollow trees
 - v. Native vegetation
 - vi. Connectivity

D. Mammals

- a. Introduced tree species, including invasives, can meet and diversify habitat needs.
- b. Species richness and diversity are positively influenced by:
 - i. Habitat structure
 - ii. Tree density
 - iii. Large trees
 - iv. Hollow trees
 - v. Native vegetation
 - vi. Grass cover

E. Reptiles

- a. Species richness and diversity are positively influenced by:
 - i. Habitat structure
 - ii. Tree density
 - iii. Large trees
 - iv. Hollow trees and woody debris
 - v. Native vegetation
 - vi. Herbaceous cover

The rationale, revisited:

- A. Definitions of native and alien species are value judgments, not science-based concepts.
- B. Urban areas are developed for human use and rarely resemble a natural habitat.
- C. Native species are often less well adapted than introduced species for urban conditions.
- D. Mandating native trees in urban areas is not a science-based policy.

Utilizing introduced species to enhance ecosystem biodiversity:

- A. Selection
 - a. Conducting tree surveys
 - i. age distribution
 - ii. percent canopy cover
 - iii. percent invasive cover
 - iv. percent native cover
 - v. species diversity
 - b. Evaluating urban site considerations
 - i. Air pollution
 - ii. Drought
 - iii. Heat
 - iv. Light
 - v. Salt
 - vi. Unnatural soils
 - c. Diversifying palette
 - i. Identifying needed roles in plant community
 - 1. food value
 - 2. large species
 - 3. nesting value
 - 4. percent canopy cover
 - 5. percent native cover
 - 6. species diversity
 - 7. structural diversity
 - ii. Determining potential invasiveness
 - iii. Championing “well-behaved” introductions
- A. Management
 - a. Replace invasive species with natives and/or noninvasive introductions
 - b. Plant alternative resources before removing invasive species utilized by native birds
 - c. Remove invasive species favored for nesting during the winter and removing food resource plants during periods when there are ample alternatives
 - d. Maintain a vertically diverse assemblage of trees, shrubs, and groundcovers to enhance vegetation structure.
 - e. Protect middle-aged trees to ensure they become old trees
 - f. Plant trees in groups rather than as isolates

- g. Enhance vegetation at ecosystem edges (“buffer strips”); reduce management as much as possible
- h. Maintain deadwood and other nesting structures in place when possible
- i. Reduce managed, open lawns when possible
- j. Reduce soil compaction with organic mulch
- k. Encourage private property owners to follow these guidelines as well
- l. Educate private property owners as to the value of well-managed gardens and landscape to contribute to urban biodiversity

Beyond arboriculture:

Science-informed decision-making must occur in planning and design of urban green spaces as well as in selection and management of urban trees.

- A. Urban areas are not natural ecosystems – a native only policy sharply reduces the planting palette and ultimately biodiversity.
- B. Non-native trees species have demonstrated value in carbon storage, supporting biodiversity at all levels, and aesthetically enhancing designed landscapes.
- C. Community, botanical, and residential gardens as well as public greenspaces that include noninvasive, introduced species support rich biological communities.

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