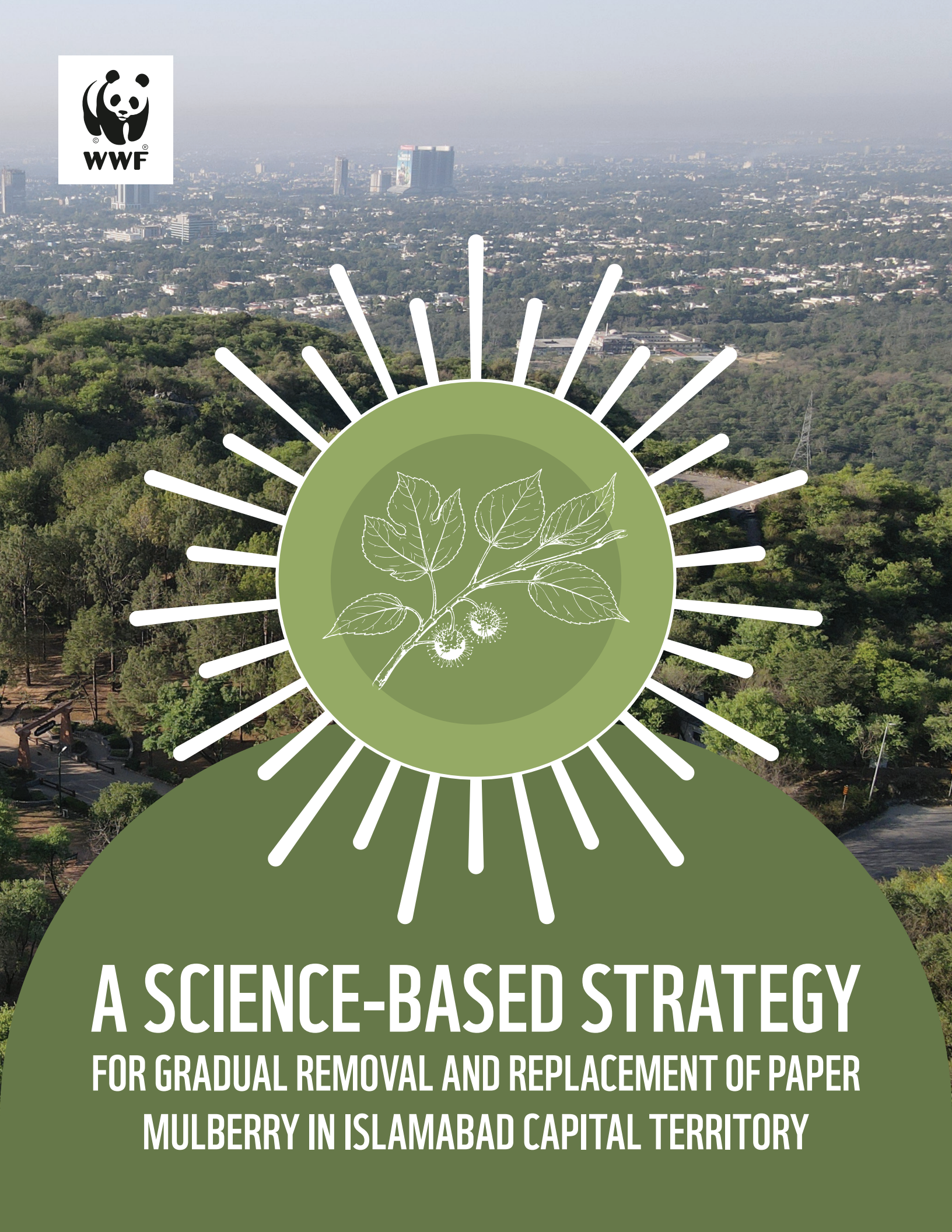

A SCIENCE-BASED STRATEGY

FOR GRADUAL REMOVAL AND REPLACEMENT OF PAPER MULBERRY IN ISLAMABAD CAPITAL TERRITORY

A Science-Based Strategy for Gradual Removal and Replacement of Paper Mulberry in Islamabad Capital Territory

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1. Background and Problem Statement

Paper mulberry (Broussonetia papyrifera) is a non-native, highly invasive species in Islamabad and Rawalpindi that has aggressively colonised natural vegetation pockets, from the Margalla foothills and associated nullahs to urban and peri-urban sectors (Malik et al., 2017; Shinwari & Gilani, 2003). Beyond its well-documented role in pollen allergies, primarily from male trees, paper mulberry suppresses native tree regeneration, ground flora, and associated wildlife habitats through rapid growth, dense canopy formation, and allelopathic effects (Khan et al., 2020; Qureshi et al., 2019).

The species regenerates both sexually (seed dispersal via birds, wind, and water) and vegetatively (root suckers and coppicing from cut stumps), making complete eradication ecologically impractical and technically unrealistic (Khatoon & Ali, 2014; FAO, 2011).

2. Key Ecological Considerations

Paper mulberry has distinct male (pollen-producing) and female (fruit-producing) trees; management approaches must therefore differentiate between the two where feasible (Shinwari & Gilani, 2003). Sudden, large-scale removal, especially uprooting, risks soil disturbance, erosion, loss of understorey vegetation, and displacement of urban wildlife (FAO, 2011; Chazdon, 2014). Indiscriminate felling may also unintentionally remove native species and mixed natural growth, further degrading ecological integrity and ecosystem services (Khan et al., 2020).

3. Proposed Strategic Approach: Gradual, Targeted, and Ecologically Sensitive Management

3.1 Priority-Based Zoning

A GIS-based zoning and mapping approach should be adopted as a foundational step for managing paper mulberry in Islamabad. Using high-resolution satellite imagery, field surveys, and existing land-use and vegetation data, CDA should systematically map the spatial extent, density, and dominance of paper mulberry across the city (FAO, 2018; MoCC&EC, 2021). Such spatial analysis enables evidence-based decision-making, avoids ad-hoc interventions,

and ensures management actions are aligned with ecological sensitivity and public-health risk rather than uniform, city-wide clearance.

Based on this mapping, CDA should delineate priority management zones, including: (i) high pollen-exposure areas such as schools, hospitals, and densely populated residential sectors; (ii) biodiversity-sensitive zones including the Margalla foothills, nullahs, green belts, and wildlife movement corridors; and (iii) areas where paper mulberry dominance has resulted in near-complete suppression of native vegetation and ground cover (Khan et al., 2020). This zoning framework should guide phased and site-specific interventions and avoid blanket removal that risks unnecessary ecological damage.

3.2 Targeted Removal Rather Than Eradication

In high-exposure urban zones, priority may be given to selective removal of pollen-producing (male) paper mulberry trees in residential areas, and around schools, hospitals, and heavily used public spaces to help reduce allergy-related public-health risks (Shinwari & Gilani, 2003). While this approach is conceptually aligned with public-health objectives, its application in Islamabad is constrained by practical challenges, including difficulty in reliably identifying tree sex at scale, extensive clonal regeneration, and continued seed dispersal from retained female trees (Khatoon & Ali, 2014). Accordingly, selective male-tree removal should be implemented only as a complementary, short-term measure within a broader, phased management strategy.

In biodiversity-sensitive areas such as the Margalla foothills, nullahs, riparian corridors, and interconnected green belts, tree management should be based on thinning and gradual canopy opening rather than wholesale felling (Chazdon, 2014; FAO, 2011). Wherever feasible, uprooting of paper mulberry trees should be avoided to minimise soil disturbance and secondary invasion, as mechanical soil disturbance accelerates erosion and facilitates reinvasion (FAO, 2011).

3.3 Ecological Stump and Root Management

To prevent aggressive resprouting, cut stumps and exposed roots should be treated using biological methods, such as the application of locally occurring fungal spores, to accelerate natural decay. Similar approaches have been successfully applied in Khyber Pakhtunkhwa for rapid decomposition of poplar stumps. This reduces the need for mechanical uprooting and preserves soil structure and microbial health (FAO, 2011).

3.4 Immediate Replacement with Native and Naturalised Species

Removal must be immediately followed by on-site replacement using species selected for fast crown closure, dense mid-storey and shrub layers, availability of bird food across seasons, and site matching. Replacement should emphasise structural diversity rather than one-to-one tree counts (Chazdon, 2014).

3.5 Intensive Post-Plantation Ecological Management

Paper mulberry management should follow an integrated restoration approach combining

native sapling plantation, direct seeding, and protection of existing native vegetation (Chazdon, 2014; FAO, 2011). All interventions should be supported by multi-year maintenance and survival monitoring, recognising that sapling survival, not planting numbers, determines ecological success (FAO, 2018).

4. Governance, Transparency, and Compliance

All activities should be guided by site-specific ecological assessments and legally compliant Environmental Impact Assessments where applicable (Pakistan EPA, 2012; MoCC&EC, 2021). Public disclosure of species removed, species planted, and survival outcomes is essential to maintain transparency and public trust (FAO, 2018).

References

- Chazdon, R. L. (2014). Second Growth: The Promise of Tropical Forest Regeneration. University of Chicago Press.
- FAO (2011). Guide to the Management of Invasive Forest Tree Species. FAO Forestry Paper.
- FAO (2018). National Forest Monitoring Systems: Monitoring and Measurement, Reporting and Verification (M&MRV). Rome.
- Khan, A., Ahmad, S., & Qureshi, R. (2020). Impact of invasive alien plant species on native biodiversity in northern Pakistan. Pakistan Journal of Botany, 52(2).
- Khatoon, S., & Ali, S. I. (2014). Invasive potential of Broussonetia papyrifera in Pakistan. Pakistan Journal of Botany, 46(1).
- Malik, R. N., et al. (2017). Vegetation change in urban ecosystems of Islamabad. Environmental Monitoring and Assessment.
- MoCC&EC (2021). National Forest Monitoring System of Pakistan.
- Pakistan EPA (2012). Guidelines for Environmental Impact Assessment.
- Qureshi, R., et al. (2019). Ecology and management of invasive alien plant species in Pakistan. Biological Invasions.
- Shinwari, Z. K., & Gilani, S. S. (2003). Medicinal plants of Margalla Hills. Journal of Ethnopharmacology.

Annexure I: Recommended Species for Paper Mulberry Management and Ecological Restoration in ICT

This annexure provides a consolidated list of native and suitable species recommended for different restoration objectives following the gradual removal of paper mulberry (Broussonetia papyrifera) in Islamabad Capital Territory. Species selection emphasises site suitability, ecological function, biodiversity value, and invasion control.

A. Upper-Storey / Canopy Species (Fast Crown Closure & Bird Habitat)

- *Dalbergia sissoo* (Shisham)
- *Albizia lebbeck* (Siris)
- *Bauhinia variegata* (Kachnar)
- *Ficus palmata* (Wild Himalayan Fig)
- *Ficus racemosa* (Gular)
- *Ziziphus mauritiana* (Ber)
- *Syzygium cumini* (Jamun)
- *Morus alba* (Common mulberry – long-naturalised)

B. Mid-Storey and Understorey Shrubs (Regeneration Control & Habitat Complexity)

- *Carissa spinarum* (Garanda)
- *Ziziphus nummularia* (Jhar Ber)
- *Dodonaea viscosa* (Sanatha)
- *Justicia adhatoda* (Vasaka)
- *Maytenus royleanus* (Gymnosporia)
- *Zanthoxylum armatum* (Toothache tree)

C. Ground Layer and Grasses (Soil Stabilisation & Invasion Prevention)

- *Cenchrus ciliaris* (Dhaman grass)
- *Cynodon dactylon* (Khabbal / Bermuda grass)
- *Desmostachya bipinnata* (Kush grass)
- *Saccharum spontaneum* (Kans grass)
- *Cymbopogon jwarancusa* (Khavi grass)

D. Pioneer / Temporary Stabilisation Species (Use Selectively)

- *Calotropis procera* (Aak)

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