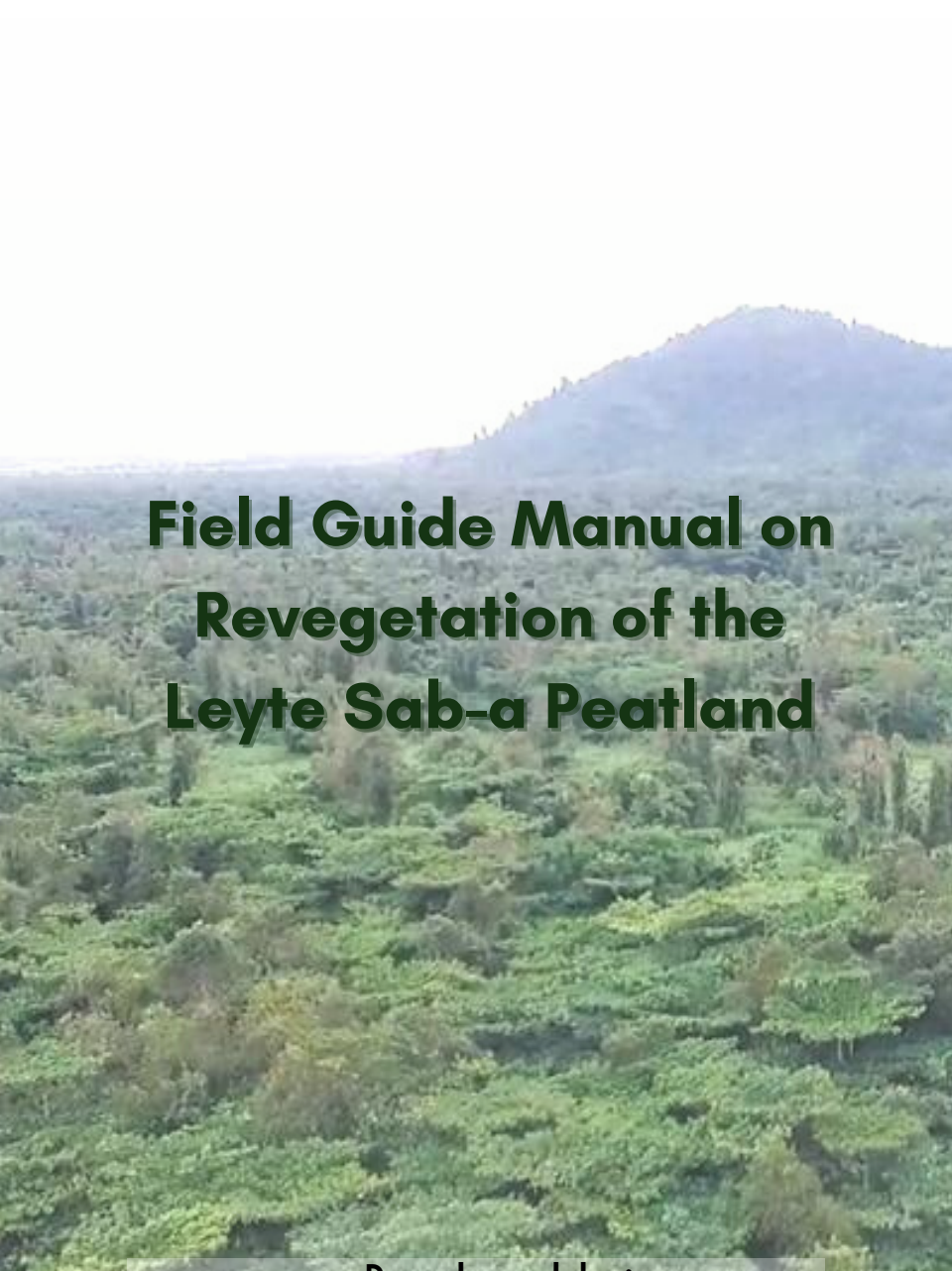
Field Guide Manual on Revegetation of the Leyte Sab-a Peatland



Developed by:

IIRR
INTERNATIONAL INSTITUTE OF RURAL RECONSTRUCTION

VISAYAS STATE UNIVERSITY

Weavers

ENVIRONMENTAL LEGAL ASSISTANCE CENTER

Forest Foundation Philippines
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International Institute of Rural Reconstruction
A non-profit organization, IIRR seeks to enable communities and seek their own potential with programs across health, education, environment, and livelihood, its goal is to have rural communities take charge of their own success. Managing the project, IIRR worked with local partners, community, local organizations, and institutions to achieve the project's goal of sustainable management of the Sab-a Peatland.

Visayas State University (VSU)
VSU, is a premier university of science and technology and environmental conservation. Research and development are part of the primary mission to generate knowledge. VSU led the technical research in Sab-a Peatland to establish the peatlands' profile.

Women's Enablers Advocate and Volunteers for Empowering and Responsive Solutions (WEAVERS)
A non-government organization led by women, the group led the social preparation and community organizing component of the project. The organization emphasized helping women in the communities.

Environmental Legal Assistance Center, Inc. (ELAC)
ELAC is an environmental non-government organization committed to helping communities uphold their constitutional right to a healthful and balanced ecology. ELAC led the legal research component of the project.

Forest Foundation Philippines
Established in 2002, under a bilateral agreement between the governments of the United States of America and the Philippines, the Forest Foundation Philippines is a nonprofit organization that provides grants to organizations that empower the people to protect and conserve the forests.

For Inquiries, please contact

Forest Foundation Philippines
E-mail: info@forestfoundation.ph
Telephone: (+63 2) 8891 0595; (+63 2) 8864 0287
Website: www.forestfoundation.ph

Visayas State University
E-mail: op@vsu.edu.ph (Office of the President) | registrar@vsu.edu.ph (Office of the Registrar) | mediateam@vsu.edu.ph (University Integrated Media Center)
Telephone: (+63 53) 565 0600
Website: vsu.edu.ph

Weavers
E-mail: bestweavers@gmail.com
Telephone: (+63 53) 832 1089; (+63) 967 411 9984
Facebook: https://www.facebook.com/WEAVERSPh/

International Institute of Rural Reconstruction
E-mail: hq@iirr.org
Telephone: +63 46 419 8600
Website: https://iirr.org/

Editors and Contributors

Ernesto Militante PhD, Juvilyn Salazar,
Maggie Rosimo, Marjorie Pamplona

Layout Artist

Kayla Nicole T. De Quiroz

Introduction

What is a Peatland?

A peatland is a terrestrial wetland ecosystem in which water-logged conditions prevent plant material from fully decomposing. Consequently, organic matter production exceeds its decomposition, which results in a net accumulation of peat, forming a peat dome. It has low nutrient content. The organic content is at least 35 % with a minimum 80 cm(0.80 m), peat depth. The water and soil is acidic (low pH) due to carbon storage. The water table is at least 10 cm below the peat surface.

Why is peatland important?

The peatlands act as a carbon sink a catchment of water during the rainy season that minimizes or reduces flooding to nearby areas. They play major roles in water and biogeochemical cycles.

They serve as habitats and sanctuaries of diverse flora and fauna. Peatlands also provide food for nearby communities.

Why restore peatlands?

There is a need to restore, protect and conserve the peatland in order to enhance the biodiversity, attracted by the improved biophysical conditions. With restoration through revegetation, the Leyte Sab a Basin Peatland, will serve as a genetic repository of endemic / native flora and fauna, and other plant and wildlife species acclimatized in the wetland ecosystem.

Restoration is a process of assisting the gradual recovery of the peatland ecosystem that has been destroyed or damaged by human activities and natural causes. The strategy is to bring back the biophysical components in harmony resulting in a productive and sustainable peatland through revegetation technically known as Assisted Natural Regeneration (ANR).

Trees and other equally important plants are the food producers and trapping of solar energy . They play an important role in nutrient , and carbon recycling. Trees and other vegetation in the peatland also serve as a source of food, sanctuary and nesting grounds for birds, animals and other wildlife.

SITUATION AND STATUS OF THE LEYTE SAB A BASIN PEATLAND

The Leyte Sab-a Basin Peatland is located in Northeastern Leyte, Philippines in the Municipalities of Alangalang (Barangays of Divisoria, Tabangohay, and Langit, Veteranos) and Sta. Fe (Barangays of San Isidro and Gapas) San Miguel (Barangays of Guinciaman and Capilihan. (Figure1. LSBP Boundary, 2021).

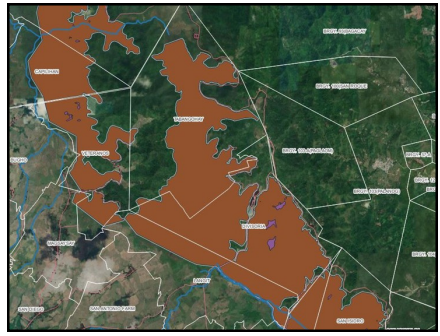


Figure 1: The Leyte Sab-a Basin Peatland Boundary

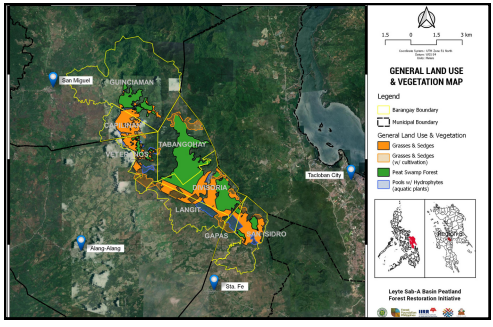


Figure 2. General Land Use and Vegetation of the LSBP (Source: Geoinformatics Study of Dr. Pastor Garcia)

The remaining vegetation in the Leyte Sab-a Basin Peatland which includes the peat swamp forest, grassland and sedges, grasslands and sedges with cultivation and pools with hydrophytes is shown in Figure 2.

Issues in the Peatland

Many peatlands are partially degraded, due to illegal cutting of trees , improper land use, and uncontrolled collection of other biological products.

Excessive draining of water through man made canals, causes drying, oxidation and releasing the carbon into the atmosphere through rapid decomposition.

Occurrence of peatland fires. During summer peatlands easily burn with the presence of heat, fuel and oxygen. The fire may be started by human activities or natural means. The direct effects of peatland fires are, loss of biodiversity , decline of physical quality of the environment, and hazardous to human health.

The occurrence of fire is a serious problem in the grassland ecosystem especially during dry months.

Figure 3: Forest fires in the Leyte Sab-a Basin Pestland

The Leyte Sab-a Basin Peatland has been reclaimed for agricultural purposes, planted with rice, gabi, and palawan. Portions of the areas were cleared and burned, resulting in the formation of grassland dominated by Sedges and Tikog.

Figure 4. Grassland ecosystem within the Leyte Sab-a Peatland

Some of the areas have been used for rice, fishponds and livestock production. However, the yield of rice is low due to the acidic condition oF the soil and water.

Figure 5. Portions of the Peatland, converted to rice fields, fishponds.

Despite the destructions in the Peatlands, many areas have still patches of trees dominated by Lanipau (Terminalia copelandii Elmer), Kabak or Bangkal (Nauclea orientalis Linn.), Dangkalan(Calophyllum obliquenervium Merr.), Putat (Barringtonia acutangula (L.) Gaertn, Tan-ag (Keinhovia hospita L.), Toog (Petersianthus quadrialatus (Merr.) , and Bugnay (Glochidion sp.) .

Figure 6. Patches of peat swamp forest with Lanipau, Kabak/Bangkal in the water- logged sites and other trees like Toog growing in the upper stretches of the peatland.

The Peat Swamp Forest

The peat swamp forest is distinctly unique from all the 12 forest formations.

Tadiosa, et. al, 2014 succinctly describes a peat swamp forest as a forest dominated area in the peatland, characterized by a peat dome typically surrounded by lowland rain forests on better drained soils and river systems. Such areas are subjected to flooding and the input of water is relatively high in nutrients close to the river and shallower portion. The nutrient levels is low in the deeper peat with stunted character of the forest. The peat swamp forest maybe classified into vegetational zones, according to the zonal edaphic characteristics or composition of the peat, height. diameter and growth form.

The diversity of trees in the peat swamp forest serves as nesting and sanctuary of birds and wildlife (Figure 7).

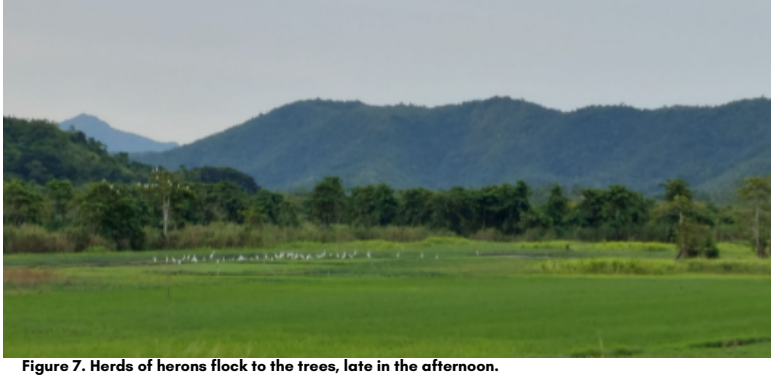


Figure 7. Herds of herons flock to the trees, late in the afternoon.

In 2000, the area of the Sab-a marshland was estimated at 3,088 hectares (ADB,2000). However, in the recent study conducted through the Leyte Sab-a Peatland Forest Restoration Initiative Project, remnants of the Leyte Sab-a Basin peatland is only 2,107.64 hectares (Garcia, et al, 2021) which is continuously threatened by illegal wood cutters, hunters , collectors, and fisher folks.

OBJECTIVES OF REVEGETATION

General

To develop an ecologically balanced peatland ecosystem with emphasis on mitigating climate change.

Specific

1. Increase the diversity of native tree species and other flora and adapted to the area,
2. Revitalization of the habitat conducive to the survival and reproduction of endemic flora,
3. Biomass production as source of peat soil accumulation,
4. Enhance physical and hydrological function of the peatland ecosystem,
5. Improve the productivity and sustainability of the area as a peatland.

GUIDING PRINCIPLES IN PEATLAND REVEGETATION

1. Trees are the most dominant biological component of the peatland forest ecosystem. The cutting or removal of such vegetation causes tremendous impact on the biodiversity and the physical attributes of the peatland. This leads to the degradation of the fragile ecosystem, rendering it unproductive and ecologically unstable.
2. Revegetation and or assisted natural regeneration as strategies to restore the peatland relies on the inherent characteristics of the mother trees to produce quality and adequate amount of seeds , efficient dispersal agents, such as the birds and animals. The restored peatland will gradually recover resulting in a balanced, ecologically efficient, and functional peatland ecosystems.

MAJOR ACTIVITIES IN PEATLAND REVEGETATION

1. Orientation of the community constituents on the goals and restoration strategies of the peatland.

Conduct a consultation meeting with the community to present and discuss the project objectives and their possible involvement.

2. Training on forest nursery establishment and operations.

Participants of the project are trained through lecture /demo, practicals on seedling production, care and maintenance. Their knowledge is enhanced through visits to forest nurseries and clonal production areas.

3. Establishment of a forest nursery.

A forest area nursery is an area where the planting stocks (Seedlings, Wildlings and Cuttings) are raised, nurtured, cared and maintained regularly.

CRITERIA FOR NURSERY ESTABLISHMENT

a. Location

Locate the nursery close to the planting site in order to minimize transportation cost.

b. Accessibility

The forest nursery must be located near the road for easier transport of supplies and materials and planting stocks.

c. Adequate Water Supply

A continuous and adequate water supply is needed for the regular watering of planting stocks.

d. Good Drainage

Canals or ditches in between seedbeds and around the forest nursery are constructed to avoid flooding. A sloping topography of 1 to 2 % is ideal to avoid soil runoff.

e. Sources of Materials

There should be easier access to building materials, soil and fertilizer supplies, manure and compost.

f. Microclimate Conditions

The nursery must not be exposed to drying winds, and should receive full sunlight during the most part of the day

4. Forest and Design Nursery Infrastructures

The design and size of the forest nursery depends on the volume / number of planting stocks to be raised. In general, the different structures and features of the nursery include:

a. Headhouse - serve as office ,for storage of supplies and materials, seed extraction and processing and drying.

b. Potting Shed - preparation of potting bags filled with soil. where seeds are directly sown, or seedlings and wildlings are potted.

c. Water Impoundment or Storage- adequate supply of water is insured by storing water in time for drier months.

d. Sowing Seed Beds- usually raised beds, rectangular in shape, with gravel at the bottom and with humus rich soil mixed with sand on top.

e. Hardening Beds – seedlings are gradually hardened by exposing them to sunlight few weeks before outplanting.

f. Elevated Beds - for cuttings and conditioning of planting stocks). Seedbeds are elevated with drainage on both sides.

e. Compost Pit – organic waste material such as leaves, small branches and other plant materials are decomposed by microorganisms, mixed with carbonized rice hull. and vermicast.

f. Walkways – constructed in between seedbeds to facilitate watering and other care and maintenance activities.

- Fencing – a fence around the forest nursery is constructed to prevent animal damage to seedlings and nursery structures.

5. Planting Stock Production

a. Identification of collection sites of superior mother trees

The mother trees are located and labeled. Each candidate tree is screened based on the selection criteria.

Hereunder is a list of trees and other equally important plants that can be propagated and mass produced in the Leyte Sab-a Basin Peatland. The inclusion of non- trees is for the sustainable use , for food and other products derived for livelihood for the communities.

1. Lanipau ----------Terminalia copelandii Elmer
2. Kabak/Bangkal-----Nauclea orientalis Linn.
3. Putat----------Barringtonia acutangula(L.) Gaertn
4. Dangkalan ---------Callophyllum obliquenervium Merr.
5. Tan ag Keinhovia hospita L.
6. Bugnak/Bugnay ----Glochidion woodii Merr.
7. Malubago----------Hibiscus tiliaceus L.
8. Bitanghol----------Callophylum blancoi Pl.& Tr.
9. Hamindang----------Macaranga bicolor Muell.-Arg.
10. Toog----------Petersianthus quadrialatus (Merr.) Merr.
11. Talisai Terminalia catappa L.
12. Banaba----------Lagerstroemia speciosa (L.) Pers.
13. Lungbiya----------Metroxylon sagu Rottb
14. Tikog Fimbristylis globusa (Retz.) Kunth
15. Gabi----------Colocasia esculenta (L.) Schott
16. Palawan ----------Cyrtosperma merkusii(Hassk.) Schott
17. Bigo----------Livistona decora (W. Bull.)Dowe
18. Buri----------Corypha utan Lamk

Selection criteria for mother or seed trees:

1. Good vigor
2. Straight bole
3. Good crown form
4. Free from diseases and pests
5. Dominant

b. Field Collection of Mature Fruits, Seeds, Wildlings and Cuttings.

Mature fruits and seeds are collected in the upper portion of the crown during dry months in baskets and paper bags to minimize molding and seed decay. These are promptly brought to the forest nursery for processing, extraction and drying.

c. Seed Extraction, Processing and Storage.
Dry fruits are air dried on an elevated wire screen, to extract the seeds, while fleshy fruits of Kabak with its fine seeds are soaked first in a pail of water until soft, then mixed well to separate the fleshy pulp, filtered ,washed and air dried. Seeds may be treated with fungicide if stored for longer periods, then kept in plastic or paper bags in cool, dry place.

6. Treatment of Potting Medium

1. Physical Method
a. Boiling water is poured into the soil evenly.
b. Baking the soil.
- The soil is baked in metal drums under fire for few hours.

c. Solarization

This is done by exposing the soil continuously to sunlight. The plastic trays are covered by black or transparent plastic sheets and exposed to sunlight continuously. The seeds are sown in the trays after solarization. This method is also used on seedbeds on a wider scale.

2. Biological Method

Antagonistic fungi can be isolated from the soil or purchased and can be applied to control the damping off and root rot diseases of seedlings.

The common antagonistic fungi in the soil are, Trichoderma harzianun and T. viride.

d. Sowing of Seeds

Seeds are sown in plastic trays containing sandy loam soil. The fine seeds of Kabak are mixed with sand and are thinly and evenly sown on the surface of germination trays and watered gently while the larger seeds of Putat, Lanipau, Bugnay and Dangkalan, are sown directly on the seedbed, with the seeds well distributed on the growing medium.

e. Care and Maintenance

The seedlings are regularly watered and monitored for signs and symptoms of possible pests and diseases. Seedlings with nutritional deficiencies are fertilized.

f. Conditioning/ Hardening of Seedlings

The seedlings are placed in partially shaded areas and gradually exposed to sunlight for a few days to prepare them for outplanting in the field. Hardened seedlings can withstand the harsh conditions in the planting site.

The plantable seedlings must be one foot tall or more. Overgrown seedlings are root and branch, foliage pruned. A one is to one ratio of roots and stem, (including leaves and branches) is maintained.

7. Location and preparation of planting area

The farmer owners are consulted regarding the use of their land for planting, afterwhich the area is geotagged in order to determine its exact location and overlaid in the control map. The planting site is prepared by layouting of the planting design using a premarked plastic string at 10 x 10m spacing or 83 trees are planted per hectare.

Each planting point is ring- brushed and marked with a bamboo stick with conspicuous green cloth tied to the upper end.

8. Transportation of planting stocks from the nursery to the planting site.

The hardened/conditioned seedlings and wildlings are properly and carefully loaded to the Pick up vehicle, then transported to the planting site.

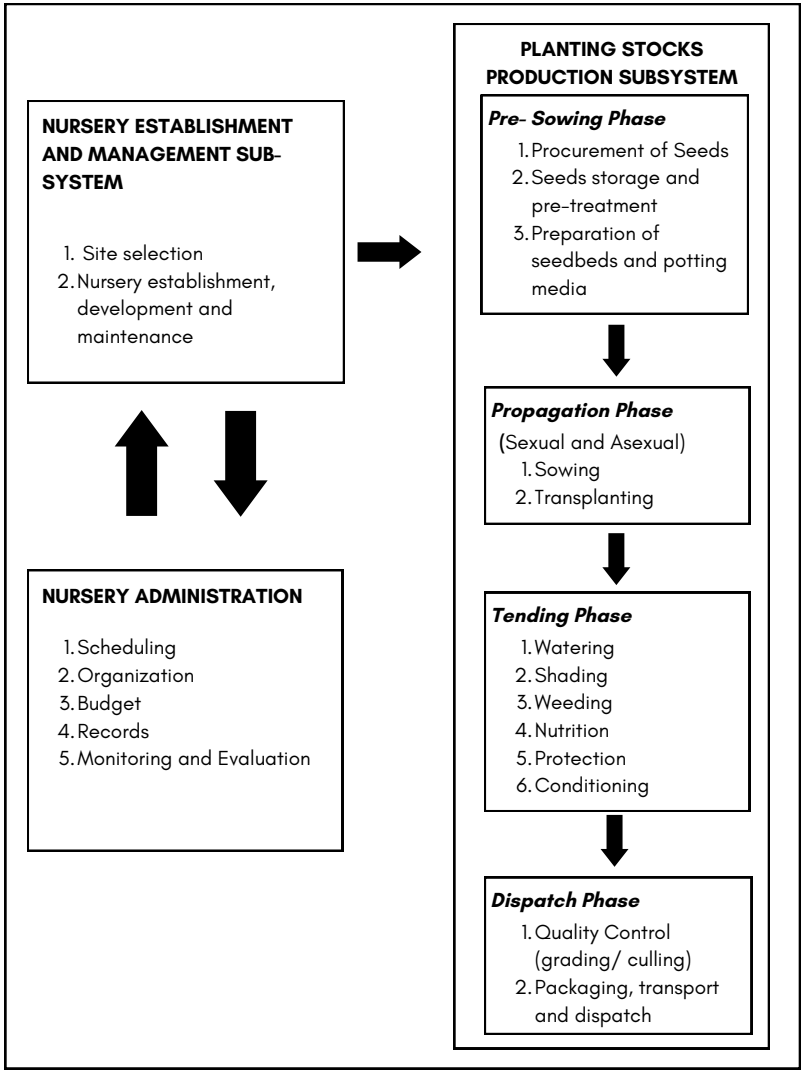
9. Planting of seedlings, wildlings and cuttings in the site.

The planting materials are carried with care, and distributed to the staked hole in the planting site. The bottom part of the plastic bag is removed, and the seedling or wildlings are planted erect, covered with top soil at the base in order to insure maximum root development. Cuttings of Kabak are directly planted in areas with high water levels.

10. Monitoring and Evaluation of planting stocks

Outplanted seedlings are assessed 3 months after planting to determine survival rate. The growth and development of plants are assessed by measuring the diameter and height every 6 months.

FOREST NURSERY MANAGEMENT SYSTEM



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