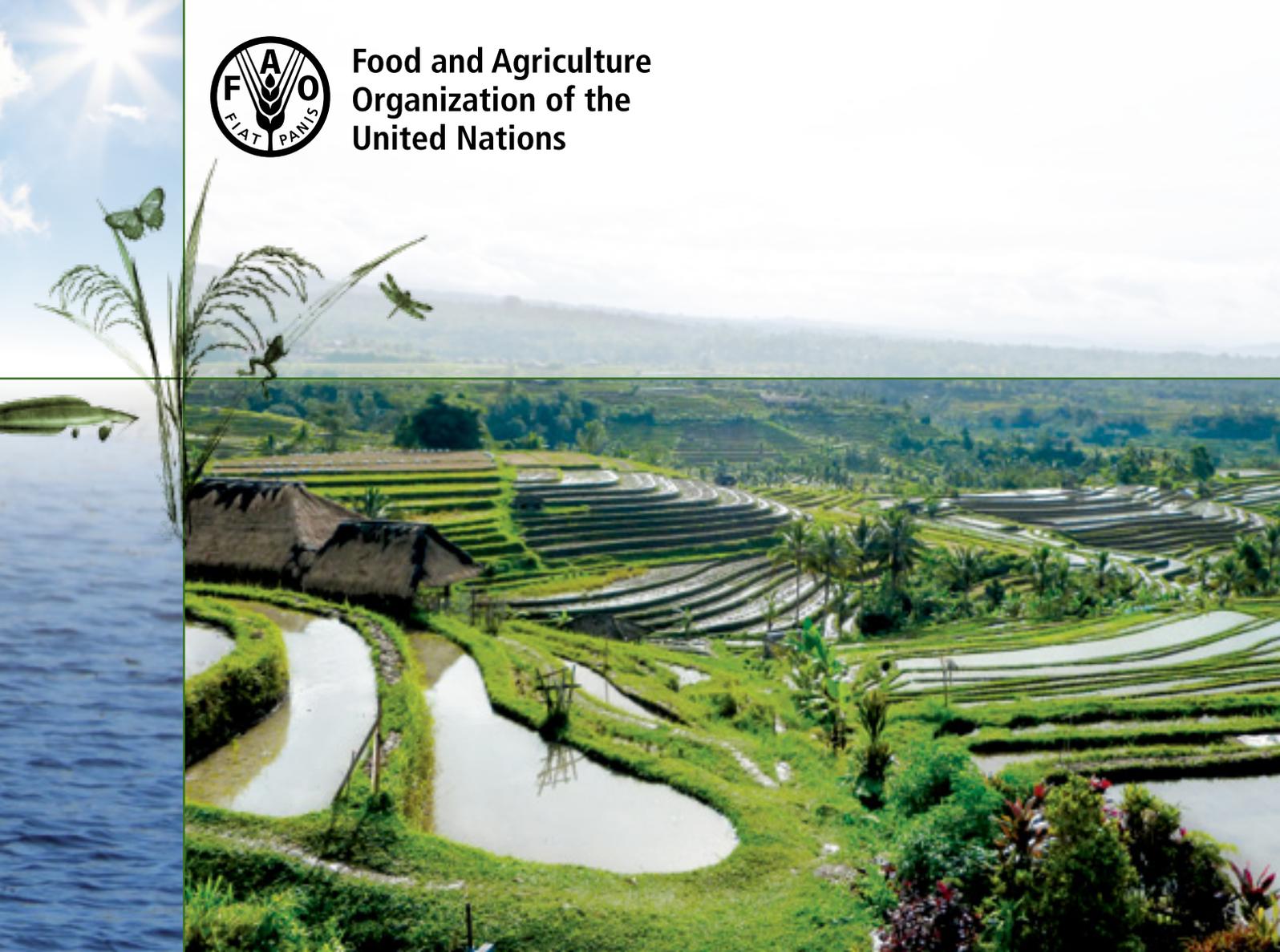**Food and Agriculture Organization of the United Nations**

ASSESSING AND PROMOTING TREES OUTSIDE FORESTS (TOF)
IN ASIAN RICE PRODUCTION LANDSCAPES

ASSESSING AND PROMOTING TREES OUTSIDE FORESTS (TOF)
IN ASIAN RICE PRODUCTION LANDSCAPES

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PREFACE

Over the last few years, it has become widely accepted that overall productivity of agricultural systems cannot be measured only on the basis of its yield, but should also take into account the products and services delivered by the agroecosystem as a whole. This holistic approach of basing production on ecological processes and ecosystem services is clearly reflected into Strategic Objective 2 (SO2) of FAO's new strategic framework: "Increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner". This strategic objective explicitly recognizes that to attain sustainability, it is essential to manage and collaborate across landscapes and sectors as ecosystem services and products generated by agriculture, forestry and fisheries contribute to an increased sustainability and resilience of landscapes, playing a crucial role in the livelihoods and well-being of rural communities.

To ensure sustainable development in rural areas it is essential to empower decision-makers to take informed decisions on land use planning and management. This is also the case for rice production landscapes in Southeast Asia, where climate change, land degradation and water scarcity – combined with poverty and over-exploitation of resources – are putting the region's food security at risk.

To pilot the innovative concepts underlying FAO's new Strategic Objective, and to support countries in improving policies and strategies to promote sustainable management of rice agro-ecosystems, FAO designed the Regional Rice Initiative (RRI) for Asia in 2013. The Initiative, comprising regional and national components, developed pilot projects in Indonesia, Lao PDR, and the Philippines. Activities conducted were linked to a number of existing national policy frameworks, and were organized under four components: Component 1 – Water and rice/fish systems; Component 2 – Biodiversity, landscape, and ecosystem services; Component 3 – Management practices; Component 4 – Social, economic and policy cross-cutting issues.

The "Assessment of Trees outside forests in Asian Rice production landscapes" was a pilot project developed under Component 2 of the RRI. It made use of FAO's recently developed methodology for the assessment of trees outside forests to evaluate the extent of this resource in selected sites in each of the three countries and to collect information on the uses and functions of the trees. The results may provide policy and decision makers with evidence of the contribution that trees in rice production landscapes can provide to socio-economic and environmental sustainability and resilience. Planted or naturally regenerated trees scattered throughout agricultural landscapes or in and around agricultural plots, in the pilot sites and elsewhere, have proven to be excellent sources of goods and services to increase the

socio-economic and environmental sustainability of agricultural landscapes. Trees in agricultural lands can provide food and non-food products, support adaptation to climate change, increase biological diversity, preserve natural forests, increase water and nutrients provision, protect the soil and generate income. As a result, they can play an important role in mitigating and adapting to the multiple stressors that agricultural systems are currently facing and, consequently, in increasing food and nutrition security of rice-based small-holder farmers.

We hope that the methodologies used in the project and the findings will prove useful to efforts designed to collect and feed information into national and regional dialogues that promote an integrated and sustainable approach to the management of rice production landscapes.
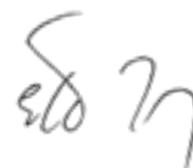
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TREES OUTSIDE FORESTS (TOF):
A SOURCE OF PRODUCTS AND SERVICES VITAL FOR THE LIVELIHOOD OF RURAL COMMUNITIES

Forests and wooded lands are known to play a central role in sustaining the livelihoods of rural communities worldwide. These tree systems contribute to the regulation and provision of water at landscape level, protect the soil avoiding erosion and landslides, and provide communities with food and products for home consumption and income generation. Such services are also very important in agricultural landscapes, where the maintenance of water availability, land fertility and soil stability are critical for ensuring productivity over time, and where products provided by trees are an important additional source of food and incomes for farmers. In most agricultural landscapes, however, the expansion of agricultural systems has led to the depletion of natural forest and wooded areas. In these contexts, the only trees that farmers can rely upon for the provision of the aforementioned environmental services and products are those distributed throughout or surrounding their agricultural land. Such trees, found on land not defined as *Forest* [1] or *Other wooded land*[2], are called trees outside forests (TOF). The practice of managing and integrating this tree resource with crops and livestock is known as *agroforestry*[3].

The presence of TOF in agricultural landscapes is either the result of the degradation of a previously forested area or of the purposeful planting of groups or individual trees on a given piece of land. Research and studies carried out over the last decades have clearly proven that maintaining an adequate tree cover in agricultural landscapes is a valuable strategy to increase the sustainability and resilience of crop production and the provision of services and products

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1   *Forest*: Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use (FAO definition).

2   *Other Wooded Land*: Land not classified as Forest, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use (FAO definition).

3   Agroforestry has been defined as a sustainable land management system which increases the overall yield of the land, combines the production of crops (including tree crops) and forest plants and/or animals simultaneously or sequentially, on the same unit of land, and applies management practices that are compatible with the cultural practices of the local population (King and Chandler, 1978). Especially in South East Asia, there are innumerable examples of traditional land-use practices by smallholder farmers involving the combined production of trees and agricultural crops on the same land.

to rural communities. When well-integrated and managed in these systems, TOF enhance the livelihood and resilience of smallholder farmers through crop and income diversification, soil and water conservation and efficient nutrient cycling and conservation. TOF systems in agricultural lands may range from open parkland assemblages, to complex agroforests and homegardens, to planted mixtures of only a few species, to intercropping in monoculture tree orchards, to trees planted in hedges or on boundaries of fields and farms, with differing levels of human management of the various components. The range of products and services that trees integrated in agricultural landscapes can provide is quite varied:

- Trees in agricultural landscapes increase and regulate the water level, protecting the soil from drought. By providing shadow and storing carbon, trees also provide a buffer against increasing temperatures and contribute to the adaptation of farming systems to the effects of climate change.

- Trees planted along the boundaries of the fields can contribute to an increase in soil productivity and resilience. In mountainous areas, trees are used to prevent soil erosion and landslides, especially during rainy seasons.

- Trees contribute directly and indirectly to food security of smallholder farmers. From trees, farmers get fruits, which enrich their diet with vitamins and minerals, increase food and nutrition security and can be sold on the market. Therefore, trees on farms make it possible to diversify the production and to generate additional income: basing the diet and the economy of a community on a single commodity is definitely riskier than diversifying the sources of nutrients and revenue.

- By providing shadow with their crowns, trees can diversify the microclimate and create niches suitable for the cultivation of different crops on the same plot of land. This practice allows for a more diversified production to better respond to climate variations and to reduce yield losses.

- The presence of trees can positively influence the abundance of natural enemies of insect pests threatening crops cultivations, such as birds.

- Trees are important for livestock, as they produce feed and fodder, and provide shadow for the animals.

- The presence of trees on farms makes the collection of timber and wood fuel easier for farmers and represents an important source of additional income, as well as contributing to the preservation of forests and wooded lands from depletion.

- Many traditional remedies are based on ingredients derived from trees. These are usually destined to home consumption, with the excess sold at the local market. Increasing their production can thus generate additional income.

- Trees mark the boundaries of fields and are often grown for their cultural and religious significance.

Trees in and around agricultural landscapes are thus an important environmental and socio-economic resource, especially for smallholder farmers, whose livelihoods and food security entirely depend on the products provided by their land. According to recent studies, more than 43 percent of all agricultural land area globally (over 1 billion hectares) have a tree cover greater than 10 percent, with Southeast Asia, Central America and South America, having over 50 percent of the agricultural areas under agroforestry. Having the contribution of trees in agricultural lands recognized by all involved in agricultural production, planning and policy is thus essential to address the challenges of food security, sustainability of agricultural systems, and adaptation to climate change effects.

ASSESSING THE CONTRIBUTION OF TREES OUTSIDE FORESTS IN RICE PRODUCTION LANDSCAPES:
A PILOT PROJECT IN SOUTHEAST ASIA

Rice production landscapes in Southeast Asia are highly diversified, with rice cultivated over a large range of different environmental conditions.

It is well known that rice cultivation in paddy fields is strongly influenced by climatic and environmental factors such as temperature, water availability and soil fertility. It is also widely acknowledged that agricultural lands at low latitudes (such as in Southeast Asia) are more susceptible to the impact of climate change. By meeting both these conditions, rice production landscapes in Southeast Asia are among the agroecosystems that are most vulnerable to climate change.

The combination of adverse environmental conditions and the high socio-economic vulnerability of smallholder farmers in rice-based farming systems is thus increasing the exposure of Southeast Asian countries (where smallholder farmers are responsible for over 80 percent of total rice production in the region) to the risk of food and nutrition insecurity. Implementing landscape management practices aimed to enhance the capacity of farmers to adapt to the effects of climate change and to enhance local environmental and socio-economic resilience is thus crucial to guarantee the subsistence and livelihood of rural communities over time.

As most smallholder farmers in Southeast Asia depend on the products and services provided by the land they manage, evidence of the contribution of trees to rice-based ecosystems could pave the way for more sustainable landscape management practices.

IMPLEMENTATION OF THE PROJECT

The aim of the "Assessment of trees outside forests in Asian rice production landscapes" pilot project was to provide the involved pilot countries with an evidence of the importance of enhancing integration and management of trees in rice production landscapes for the numerous environmental and socio-economic benefits they provide to rice-based communities.

The project's objectives were: (i) providing evidence of the role of TOF in increasing economic and environmental sustainability in rice production landscapes through pilot assessments in the countries involved in the RRI (namely Indonesia, Philippines and Lao PDR); (ii) adapting an innovative methodology recently developed by FAO ("Trees Outside Forests

Assessment Methodology"[4]) to quantify and qualify the tree cover in rice production landscapes; (iii) developing national capacity on applying adapted tools and methods for assessing tree resources, products, use, economic and environmental functions in rice production landscapes.

The project was implemented as follows:

1. A preliminary classification of the different rice production landscapes available in the region (Southeast Asia) was conducted and three pilot sites identified in the three countries;

2. The "Trees Outside Forests Assessment Methodology", developed by FAO and taken as a reference tool for conducting the study, was revised and adapted to the context;

3. National experts were trained on the methodology and conducted assessments in the three sites;

4. Three pilot sites were selected and assessed in Indonesia, Lao PDR and the Philippines.

Rice production landscapes: a preliminary classification

From the analysis of satellite images of Southeast Asian rice production landscapes, it was evident that the presence and distribution of tree cover is highly variable as a result of different environmental and social factors, with rice production landscapes with similar geographical and management features usually characterized by the presence of similar tree systems. These may range from orchards, homegardens and various other agroforestry systems, to trees in hedges or along roads and streams, to fallows and forests or wooded lands. Depending on irrigation system, topography and permanence of water in fields, four main rice production landscape types can be identified in Southeast Asia:

Rice production landscapes with irrigated rice

Rice fields are generally aggregated and occupy large (up to a few tens of ha in mountainous areas) to very large areas (up to a few hundreds of ha in large flat plains). The irrigation involves a strong cooperation between water users, as well as complex technical and equitability issues that are usually managed by strong institutions well acknowledged by the local society.

1. **Irrigated rice production landscapes in large flat plains**

   Rice fields and dense settlements dominate these landscapes, which are usually characterized by a high to very high population density (> 500 inhabitants/km[2)] and the absence of Forest. TOF are usually rare and are almost always found in homegardens.

2. **Irrigated rice production landscapes on terraces in mountainous areas**

   These landscapes have a large range of population densities (from ca. 50 to 500 inhabitants/km^2). Rice fields in terraces share the landscape with other land uses. Trees are usually abundant here, either in various kinds of TOF systems (homegardens and other agroforestry systems, along roads and streams, and small woodlands) and/or as Forest.

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4 The methodology proposed for the study is based on an adaptation of the methodology reported in the FAO publication "Towards the Assessment of trees outside forests" (de Foresta *et al.*, 2013).

Rice production landscapes with rainfed rice

Rice cultivation here depends entirely on rainfall, which requires a certain level of synchronization among farmers, but does not imply a strong institutional and collaborative setting.

1. **Rainfed rice production landscapes cultivated in permanent fields**

   These rice field systems are usually found in densely populated areas (> 100 inhabitants/km^2). Although Forest cover is generally absent, TOF are quite abundant and occur mainly in hedges, and (scattered) in fields.

2. **Rainfed rice production landscapes in shifting cultivation systems**

   These landscapes are characterized by a low population density (usually <30 inhabitants/km^2). Temporary rice fields are left fallow after 1 to 3 years of cultivation, and the land is cultivated again after 10-20 years. Rice fields mainly share the landscape with forests and fallows, where TOF are usually very abundant.

   This classification, although not official, provided a very useful background for conducting the preliminary assessment of tree cover in rice production landscapes.

Assessment methodology proposed

The *Trees Outside Forests Assessment Methodology* was developed by FAO in 2013 to respond to the request of countries for a simple tool to assess TOF in different landscapes. It is based on the analysis of remote sensing data (to quantify the TOF cover), followed by focus group interviews with farmer communities (to gather information on the contribution provided by TOF). The methodology consists of two phases:

1. **Mapping and quantifying TOF cover:** after a preliminary assessment of the site on a digital map using a Decision Tree algorithm[5] (BOX 1), points/areas of uncertainty are checked in the field to produce a detailed map of land-uses and FAO tree cover categories: *Forest*, *Other Wooded Land* (OWL), *Other Land with TOF*[6] (OLwTOF), *Other Land without TOF* (OLwNoTOF).

2. **Conducting Focus Group interviews:** structured interviews are conducted with 15-20 farmers living in villages of the pilot site to collect further information on the most common tree species present and on the economic, social, cultural and environmental importance of trees, as perceived by farmers.

The advantages of the methodology is that it can be conducted on easily accessible and free Google Earth images, requires minimal training and software and can be applied to any site for which satellite images are available. In addition to providing a biophysical assessment of tree resources, the methodology also allows the collection of detailed information on the farmers' perception of the contribution of trees to their livelihood.

It is important to specify that this methodology does not allow assessing all the TOF present. Tree systems and individual trees below the minimum biophysical thresholds to be classified as TOF might not be visible in the resulting analysis.

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5   Dichotomous key scheme proposed by the author of the methodology to classify the land-cover/land-use into one of the following categories: *Forest, Other Wooded Land, Other Land with TOF, Other Land without TOF*.

6   For assessment purposes, an operational definition of *Other Land with TOF* has been proposed (de Foresta *et al.* 2013): *Land classified as* Other Land *(i.e. not classified as* Forest *or* Other Wooded Land*), spanning more than 0.05 hectares with trees higher than 5 m and a canopy cover above 5 percent, or with trees able to reach these thresholds in situ; or with a combined cover of shrubs and trees above 10 percent.*

BOX 1. **DECISION TREE ALGORITHM**

For assessment purposes, an operational definition of "Other Land with TOF" has recently been proposed (de Foresta *et al.*, 2013) so that TOF can be integrated into the FAO land classificatory framework. The definition includes minimum biophysical thresholds already used in TOF assessments by some countries: Land classified as Other Land (i.e. not classified as Forest or Other Wooded Land), spanning more than 0.05 hectares with trees higher than 5 m and a canopy cover above 5 percent, or with trees able to reach these thresholds in situ; or with a combined cover of shrubs and trees above 10 percent. This definition includes:

- land that is predominantly under agricultural land use if it meets the area and tree/shrub canopy cover thresholds.
- land that is predominantly under urban land use if it meets the area and tree/shrub canopy cover thresholds.
- land that is not predominantly under agricultural or urban use, which comprise: (i) areas spanning less than 0.5 hectares and more than 0.05 hectares; (ii) windbreaks, shelterbelts and corridors of trees and shrubs, with an area spanning less than 0.5 hectares or a width of less than 20 m but more than 3 m.

It is important to note that by adopting minimum thresholds, the subcategory "Other Land with TOF" implicitly leaves out some TOF: it omits those that fall below the 0.05 ha threshold. The proposed decision tree algorithm can help clarify decisions in classifying any given piece of land into "Forest", "Other Wooded Land", "Other Land with No TOF", or "Other Land with TOF." This decision tree suits the particular land use categories, definitions, set of decision criteria, as well as the current thresholds used in the FAO-Forest Resource Assessment framework. Seven (minimal and sufficient) decision criteria were used to construct the decision tree algorithm for classifying land as Forest (FOREST), Other Wooded Land (OWL), Other Land with TOF (OLwTOF), Other Land with No TOF (OLwNoTOF). The seven decision criteria (in parentheses the levels for each criterion) were:

1. Presence of trees and/or shrubs on the land (yes/no)
2. Land use: Urban (U), Agriculture (A), Non Urban/Agriculture (NON A/U)
3. Spatial pattern of trees and/or shrubs
4. For linear tree formations: Length (L) and Width (W)
5. Trees and/or shrubs patch area (area)
6. Trees and/or shrubs height at maturity (h)
7. Trees and/or shrubs canopy cover (cc)

→

→

TREES OR SHRUBS —— no ——→ **OLwNoTOF**

yes ↓

no ↗ **OLwNoTOF**

AGRICULTURE OR URBAN — yes → area ≥ 0.05 ha / h ≥ 5 m, cc ≥ 5% / h < 5 m, cc ≥ 10% } ? — yes ——→ **OLwNoTOF** (Agri or Urb)

no ↓

↓

no ↗ **OLwNoTOF**

LINEAR TREE FORMATION —→ L ≥ 25 m? — no — ↗ **OLwNoTOF**

W ≥ 3 m — yes → **OLwNoTOF** (NON A/U-2)

yes ↘ W ≥ 20 m —— yes ——→ **FOREST** (Linear)

no ↓

↓

no ↗ **OLwNoTOF**

AREA < 0.5 ha? — yes → area ≥ 0.05 ha / h ≥ 5 m, cc ≥ 5% / h < 5 m, cc ≥ 10% } ? — yes ——→ **OLwNoTOF** (NON A/U-1)

no ↓

↓

HEIGHT < 0.5 m? — yes → cc < 10%? — yes → **OLwNoTOF**

no → **OWL** (Shrubs)

no ↓

↓

Cc < 5%? —— yes ————→ **OLwNoTOF**

no ↓

↓

Cc < 10%? — yes ——→ **OWL** (Trees)

no ——→ **FOREST** (Stand)

Training national experts

Three national GIS/forestry experts (from Indonesia, Philippines and Lao PDR) were trained on how to conduct comprehensive tree resources assessments in rice production landscapes through the application (and adaptation) of the *Trees Outside Forests Assessment Methodology* developed by FAO. The three experts were selected from national public institutions, the University of Los Baños in the Philippines, the Ministry of Forestry in Indonesia and the National Agriculture and Forestry Research Institute in Lao PDR. Once trained, the three experts were expected to replicate (under the supervision of an international expert) the methodology in the pilot site in their own country and later use it to collect tree cover data in rice production landscapes.

Pilot sites selection

Three pilot sites were identified in Indonesia, Lao PDR and Philippines. The sites had to meet at least one of the following criteria: (i) trees being visibly an integral part of the rice production landscape; (ii) food and nutrition security being a critical issue in the site; (iii) site being placed in a rice production landscape of special relevance, i.e. UNESCO World Heritage Site. Overlapping with study areas where other projects and activities under the same initiative were being conducted was also considered an asset. In Indonesia and the Philippines the pilot sites were placed in two UNESCO World Heritage Sites and were characterized by a relatively wide tree cover. In Lao PDR, the pilot site was selected in one of the provinces most affected by malnutrition and rural poverty.

OUTCOMES

Indonesia

Site: Jatiluwih (Penebel District, Tabanan Regency, on Bali Island)
Classification: irrigated rice fields on terraces in mountainous areas
Assessment Area: 2 122 ha
Villages: Jatiluwih (2 122 ha)
Inhabitants: 2 800 inhabitants, corresponding to 800 households
Land ownership: ca. 1 ha/household (land inherited from the parents)
Main economic activity: farming

The pilot site is characterized by the presence of rice field terraces surrounded by agroforestry systems, in turn surrounded by forest. Three distinct zones can be distinguished: a northern (upper) part covered by an (at least apparently) undisturbed forest; a southeastern part dominated by irrigated paddy fields, with small agroforestry areas; the rest covered by a mosaic of paddy fields, crop fields, chicken farms and settlements embedded in an agroforestry matrix.

(i) Mapping and quantifying TOF cover:

■	FOREST/WOODED LAND
■	OTHER LAND WITH TOF
■	RICE FIELDS (Other land without TOF)
■	AGRICULTURE (Other land without TOF)
■	BALINESE TEMPLES (Other land without TOF)
■	SETTLEMENTS (Other land without TOF)
■	CHICKEN FARM (Other land without TOF)
■	NO DATA (Cloud)
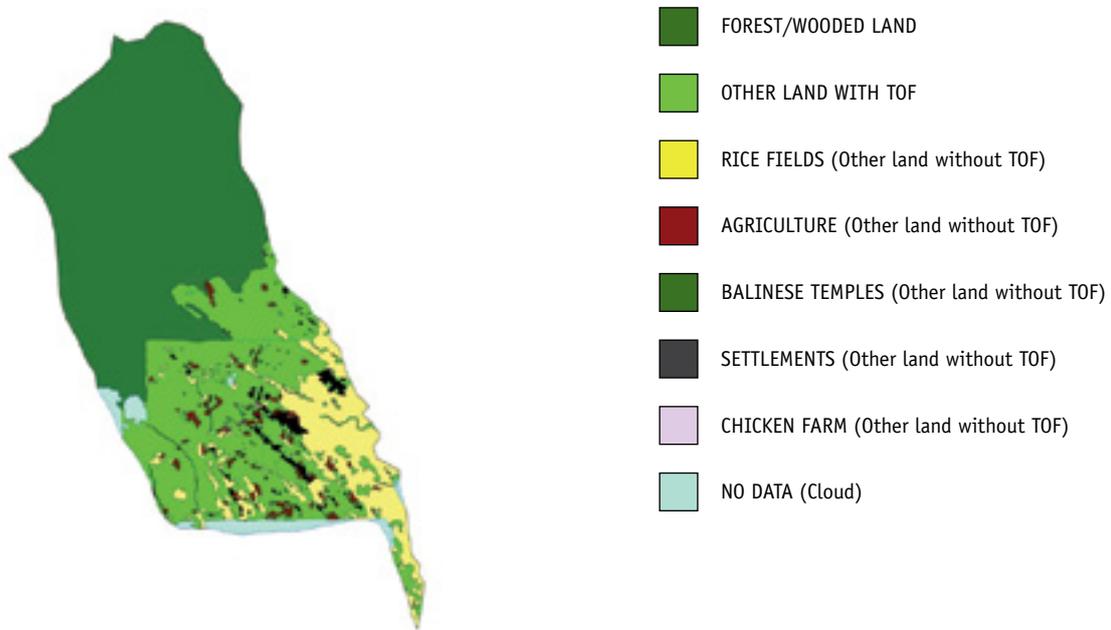
The mapping of the tree cover in the pilot site led to the production of the village land-use map and to the calculation of the following land-use/land-cover percentages:

FAO CATEGORY OF LAND-USE/LAND-COVER	AREA (HA)	%
FOREST	1 199	56.5
OTHER LAND WITH TOF	691	32.6
OTHER LAND WITHOUT TOF	170	8.0
NO DATA (CLOUD COVER)	62	2.9
TOTAL	2 122	100

The assessment highlighted how natural forest (*Forest*) and TOF (*Other Land with TOF* -including homegardens and agroforestry systems), make up almost 90 percent of the whole assessed area. Four main land-uses have been identified in the pilot site: (i) irrigated paddy fields in terrace (umah); ii) homegardens (pekarangan), mainly used here for religious purposes (temples), and planted with a few banana trees, vegetables and red pepper, or ornamental plants such as the frangipani tree; iii) natural forest (alas), owned by the government and playing an important ecological role in the conservation of forest biodiversity, in preventing erosion and landslides,

and in regulating stream water flow and; iv) non-irrigated land (tegalan), owned by individual farmers and planted with tree-crops, very generally in the form of "agroforest[7]". Although trees are almost absent in the two first land use systems, they are the dominant elements of the 'alas' and 'tegalan' systems. Also, while the forest constitutes an area to which villagers have no access, agroforestry systems (closer to the settlements and to the cropping areas) are individually owned and managed for the production of cash crops and other tree products. These agroforestry systems make up the bulk of the TOF cover.

(ii) Focus Group interviews: outcomes

Tree products: trees are held in great consideration and maintained in and around the paddy fields for their numerous benefits and for the products they provide both for home consumption and market sale. Coffee trees appear to be the most important commodity, followed by various timber tree species (jabon, mahoni, albasia, angih, cempaka), and coconut. Except for coffee and cocoa, most tree products are used for home consumption first, with the surplus being sold and generating supplementary income. Banana trees and various fruit trees (e.g. mangosteen and durian) are also commonly grown. In addition to food and products for human consumption, trees also supply farmers with other important products: fodder for livestock (coconut, banana, bamboo leaves), ingredients for medicines and natural remedies (coconut for virgin coconut oil; lateng and dadap for curing fever), and green manure for crops (gamal/anyih, dadap, lamtoro, pinang leaves). Also, the firewood collected from plantations is used by local people to cook, contributing to farmers' nutrition security. With regard to homegardens, they are mainly used for planting banana trees, vegetables, red pepper, or ornamental plants; however, the presence of trees and shrubs here is very limited and mainly aimed at cooling the houses.

Tree social and environmental services: trees are also maintained for their contribution in maintaining two important environmental functions for the sustainability and resilience of paddy fields in mountainous landscapes: protection against erosion and regulation of stream-water levels for rice field irrigation. These ecosystem services of TOF (more specifically by the agroforestry systems surrounding the paddy fields) are well known to the villagers and acknowledged as an important benefit for the sustainability of rice production. This is confirmed by the numerous examples of active tree planting along paddy field areas observed during the field visit. Bamboo is often found on the hedges surrounding the fields, where it plays an important role in water storage and soil maintenance. Other species (*Gliricidia sepium*, *Erythrina* spp., etc.) are also commonly

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7   Agroforests are here defined as « forest-like structures planted and managed by farmers for the production of various forest and agricultural products on the same piece of land." Agroforests have a "complex multistrata structure and a closed to almost closed canopy that is usually dominated by a few tree species." (de Foresta and Michon, 1996)

planted, both for shade and for soil fertility maintenance. Some of these trees are also cultivated for use in religious ceremonies (cempaka, coconut, bamboo and enau). By providing shade, TOF systems also contribute to provide areas suitable for raising livestock (cows and/or pigs).

Additional info: Focus groups interviews conducted in two neighboring villages, located respectively at mid-elevation (Tengkudak village) and low-elevation (Buruan village), highlighted how the contribution of TOF can change according to different environmental and socio-economic conditions. Where the forest is absent (as in Buruan and Tengkudak), TOF in agroforestry systems continue to provide a dense "forest-like" cover contributing to the conservation of the forest biodiversity, preventing erosion and landslides and regulating stream water flow. In Buruan the cultivation of vegetables and ornamental flowers in paddy fields is also very common, as well as the presence of widespread plantations of dwarf coconuts along the paddy fields; this is probably due to the proximity to the capital of the regency, Tabanan, where products can be easily sold. Finally, when non-irrigated lands owned by people are very small (as in Tengkudak), monoculture plantations are usually rare, as farmers prefer to plant different species of trees in order to better meet their needs.

| LOCAL NAME | SCIENTIFIC NAME | PRODUCTS AND SERVICES | | | | | | | | PRODUCTS AND SERVICES | | | | | | JATILUWIH | TENGKUDAK | BURUAN |
		EDIBLE FRUITS	VEGETABLES	FODDER	SUGAR	SPICE/ STIMULANT/ INCENSE	CASH CROP	FUELWOOD		LUMBER/ POLES/FIBER/ CARVING	MEDICINE	FERTILIZER	EROSION CONTROL	ORNAMENTAL	CEREMONIES	ABUNDANCE	ABUNDANCE	ABUNDANCE
Adpukat	Persea americana	X						X		X						3	1	1
African tulip tree	Bignoniaceae							X		X		X	X			1	1	1
Angging	Bignoniaceae							X					X			2	3	2
Aren/enau	Arenga pinnata	X	X		X	X				X	X					2	2	2
Bambu	Bamboos spp		X							X			X			4	4	3
Bayur	Pterospermum javanicum							X		X	X		X			?	3	1
Belimbing bintang	Averrhoa carambola	X														1	1	1
Belimbing wulu	Averrhoa bilimbi	X														1	1	1
Bengkal	Anthocephalus cadamba Miq.												X			?	?	1
Cempaka	Michelia champaka							X		X	X			X	X	3	3	3
Cengkeh	Eugenia aromatica					X		X			X			X		2	2	2
Coklat	Theobroma cacao						X	X								4	5	4
Dadap	Erythrina sp							X				X	X	X		4	4	5
Duku	Lansium domesticum	X						X			X					?	3	1
Durian	Durio zibethinus	X						X		X	X					3	3	4
Gaharu	Aquilaria sp					X		X		X						?	?	1
Gamal	Gliricidia sepium			X				X				X	X			5	5	5
Gempinis	n.a.															2	1	?
Hanjuang	Cordyline fruticosa													X	X	5	5	5
Jabon	Anthocephallus cadamba									X	X					4	2	3
Jambu air	Eugenia aquea	X														2	2	2
Jambu batu	Psidium guava	X				X		X		X	X					2	2	2
Jati	Tectona grandis							X		X	X					2	2i	2
Jeruk bali	Citrus grandis	X									X					1	1	1
Jeruk mipis	Citrus lemon	X				X					X					1	1	1
Kadjimas	Duabanga moluccana							X		X						3	2	2
Kaliandra	Calliandra calothyrsus							X				X	X			3	1	1
Kedongdong	Spondias dulcis	X						X		X						1	1	1
Kelapa	Cocos nucifera	X			X			X		X			X		X	3	4	4
Kelapa gading	Cocos nucifera (improved: dwarf coconut)	X			X			X							X	?	1	4
Kelor	Moringa oleifera	X	X								X			X		1	?	1
Kemiri	Aleurites moluccana	X						X		X					X	2	2	2

| LOCAL NAME | SCIENTIFIC NAME | PRODUCTS AND SERVICES | | | | | | | PRODUCTS AND SERVICES | | | | | | JATILUWIH | TENGKUDAK | BURUAN |
		EDIBLE FRUITS	VEGETABLES	FODDER	SUGAR	SPICE/ STIMULANT/ INCENSE	CASH CROP	FUELWOOD	LUMBER/ POLES/FIBER/ CARVING	MEDICINE	FERTILIZER	EROSION CONTROL	ORNAMENTAL	CEREMONIES	ABUNDANCE	ABUNDANCE	ABUNDANCE
Kenanga	Cananga odorata									X			X	X	1	1	1
Kepundung	Baccaurea	X							X						?	3	1
Kopi	Coffea canephora					X	X	X							5	4	2
Lamtoro	Leucaena leucocephala		X	X				X	X	X	X	X			4	3	3
Lenggung	Trema orientalis Blume							X							3	2	1
Mahoni	Swietenia mahoganny							X	X				X	X	4	3	4
Manga	Mangifera indica	X	X					X	X	X					1	2	2
Manggis	Garcinia mangostana	X							X	X					2	2	2
Melinjau	Gnetum gnemon	X	X												?	?	1
Mengkudu	Morinda lucida	X						X		X			X		1	1	2
n.a.	Ficus spp									X					3	2	3
n.a.	Lagerstroemia sp														1	1	1
n.a.	Melia azedarach														2	?	1
n.a.	Terminalia sp														?	1	1
Namnam	Cynometra cauliflora	X				X			X				X		?	?	?
Nangka	Artocarpus heterophyllus	X	X					X		X					4	4	4
Nyantuh	Chrysophyllum spp.								X						?	1	1
Pala	Myristica fragrans					X		X							?	2	1
Pepaya	Carica papaya	X	X			X				X					3	2	3
Petai	Parkia speciosa		X					X	X	X					1	1	1
Pinang	Areca catechu		X			X			X	X				X	2	3	2
Puding	Codiaeum variegatum		X							X			X	X	5	5	5
Rambutan	Nephelium lappaceum	X						X	X	X					2	2	2
Salak	Salacca edulis	X													2	2	1
Salam	Eugenia polyantha	X	X			X		X	X						2	2	2
Sawo	Achras sapota	X													1	1	1
Sengon	Paraserianthes falcataria							X	X		X				3	3	3
Sirsak	Annona muricata	X				X				X					1	2	1
Surian	Toona sinensis							X	X						2	2	1
Terap	Artocarpus elasticus							X	X	X					2	2	2
Timbul/sukun	Artocarpus communis	X	X						X	X					2	2	1
Wani	Mangifera caesia	X	X						X	X					2	3	2
Waru	Hibiscus tiliaceus							X	X	X		X			2	1	3

Philippines

Site: Hungduan (Ifugao province, on Luzon Island)
Classification: irrigated rice fields on terraces in mountainous areas
Assessment Area: 3 135 ha
Villages: Baang (2 122 ha) and Nungulunan (1 502 ha)
**Inhabitants:** 1 941 inhabitants, corresponding to 348 households
Land ownership: ca. 0.25-1.5 ha/household (farmers only have usufruct rights, not legal ownership, of the landholding)
Main economic activity: farming (men usually work as off-farm laborers during the fallow period)

Forest cover is by far the most important component of the pilot site and according to farmers, it is an integral component of the rice production landscape. Technically, almost all the area of the pilot site is classified 'forest land' and is formally owned by the state. However, the forest is managed communally and is locally called 'pinugo'. The 'pinugo' is normally planted by farmers with indigenous tree species and covers up to 50 percent of the area of each individual farm.

(i) Mapping and quantifying TOF cover:
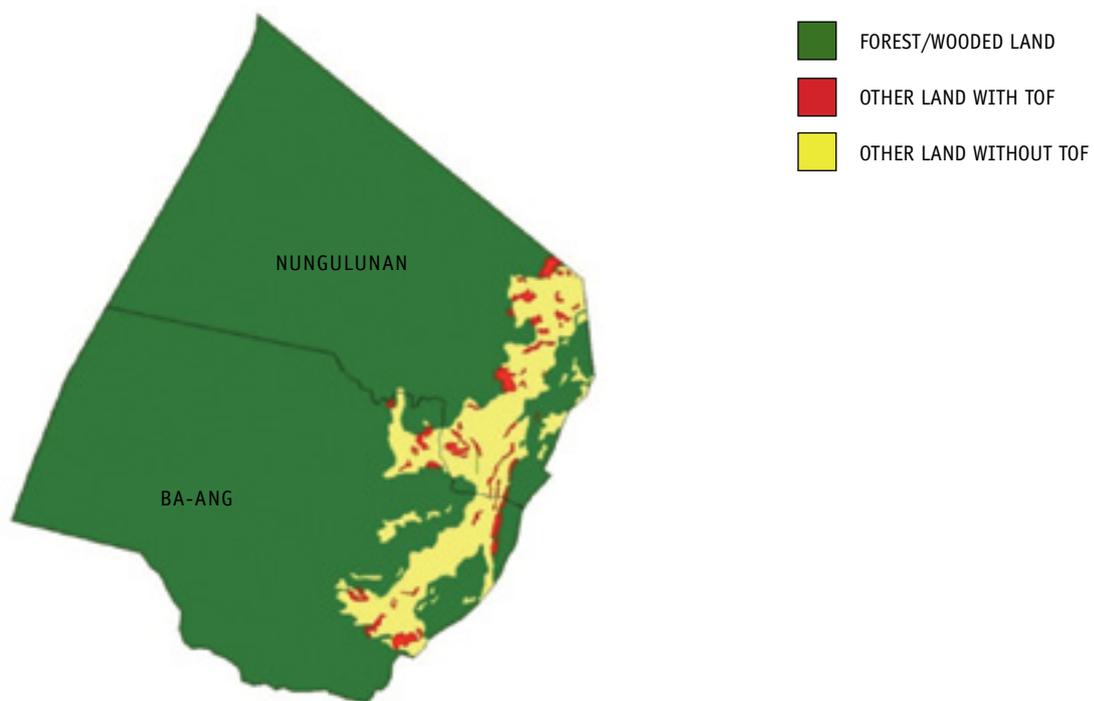
The mapping of the TOF cover in the pilot site led to the production of the following maps and to the calculation of the following land-use/land-cover percentages:

FAO CATEGORY OF LAND-USE/LAND-COVER	AREA (ha)	%
FOREST	2 823	90.0
OTHER LAND WITH TOF	48	1.6
OTHER LAND WITHOUT TOF	264	8.4
TOTAL	3 135	100

The pilot site in the Philippines is characterized by a vast area of *Forest*, covering 90 percent of the total area, and a very small area of *Other Land with TOF* (1.5 percent). Rice fields cover up to 40 percent of the site and are locally called 'payo'. The total area of the rice terraces is about 264 ha, but some conversions from paddies to vegetable farm, fish pond and livestock farming (e.g. pigs) was observed in the field. The remaining 10 percent of land is covered by dwellings. Farmers only have usufruct rights and not legal ownership of the land.

(ii) Focus Group interview: outcomes

Tree products: Villagers know and use many of the tree species that thrive in their forest. On average, half of the holdings consist of forests planted with indigenous species managed by households as primary source of firewood, as well as of carving material and lumber for building and repairing houses. Trees also play an important role as a source of food and of ingredients for home-made medicines. The farmers also mentioned species of vines, brush and bamboo. In particular, the stems of *Miscanthus sinensis* – a grass species, are used as vegetable plant support. A red ornamental plant locally known as dongla is maintained for ceremonies, festivals, as well as rituals to drive away rats and bad spirits, including rituals for land preparation and harvesting.

Tree social and environmental services: Farmers reported that preventing erosion and ensuring the sustainability of water are the main contributions provided by trees to the health and productivity of the paddy fields terraces. Furthermore, they maintain trees on their lands also for pest control and soil fertilization purposes.

LOCAL NAME	SCIENTIFIC NAME	EDIBLE FRUITS	FIREWOOD	LUMBER/ HOUSE MATERIAL	CARVING MATERIAL	HAND TOOLS	ROOF MATERIAL	MEDICINE	FERTILIZER	EROSION CONTROL	WATER SUSTAINABILITY (ACCORDING TO LOCAL BELIEF)	PEST CONTROL	RITUALS AND CEREMONIES
Adawe/bakani	*Elaeocarpus argenteus* Merr.				x								
Akapulko	*Cassia alata* Linn.							x					
Alagaw	*Premna odorata* Blanco							x					
Alimit/hagimit	*Ficus minahassae* (Teijsm. & De vr.) Miq.										x		
Anabon/balumti	*Macaranga dipterocarpifolia* Merr.		x										
Arnos/alnus	*Alnus japonica* (Thunb.) Steud.		x							x			
Avocado/abukado	*Persea americana* Mill.	x											
Babaybayon/babayong	*Garuga floribunda* Decne.				x								
Bahug/bfahog	*Cynometra* sp.				x								
Baloiboi/kwadadanum	*Baccaurea philippinensis* (Merr.) Merr.										x		
Baluha/faloy	*Phyllanthus curanii*										x		
Benguet pine	*Pinus kesiya*			x									
Bignay/bunne	*Antidesma bunius* (Linn.) Spreng	x						x					
Bikal	*Dinochloa acutiflora* (Munro) S. Dransf.			x	x								
Bimil	n.a.	x											
Bultik	*Syzygium santosii* Merr.			x									
Buñga/betel nut palm	*Areca catechu* L.	x											
Cogon	*Imperata cylindrica*						x						
Gmelina	*Gmelina arborea*			x									
Guava/bayabas	*Psidium guajava*	x						x					
Gutmu/malasulasi	*Leptospermum flarescens*	x	x	x						x			
Guyabano	*Annona muricata* Linn.	x											
Hawili/hungo	*Elaeocarpus pendulus* Merr.	x		x						x			
Hopal/hopang	*Archidendron clypearia*							x					

LOCAL NAME	SCIENTIFIC NAME	PRODUCTS AND SERVICES					PRODUCTS AND SERVICES							
		EDIBLE FRUITS	FIREWOOD	LUMBER/ HOUSE MATERIAL	CARVING MATERIAL		HAND TOOLS	ROOF MATERIAL	MEDICINE	FERTILIZER	EROSION CONTROL	WATER SUSTAINABILITY (ACCORDING TO LOCAL BELIEF)	PEST CONTROL	RITUALS AND CEREMONIES
Itangan	*Weinmannia luzoniensis* S. Vidal						x							
Kalantas	*Toona calantas* Merr. & Rolfe				x									
Lagundi	*Vitex negundo* Linn.								x					
Langka/jackfruit	*Artocarpus heterophyllus* Lam.	x												
Lipang-kalabau/tokbo	*Dendrocnide meyeniana* (Walp.) Chew												x	
Liwliw/hauili	*Ficus septica* Burm. F.									x		x		
Migtanung puso/bulu	*Acalypha caturus* Blume									x				
Ngange	n.a.								x					
Palayon/manggasiriki	*Lithocarpus ovalis*		x	x							x			
Payapa	*Ficus drupacea var. auranticarpa* (Elmer)	x	x											
Pigikon	n.a.			x										
Piwi/Siningsing	*Ficus annulata*		x		x									
Pomelo/Suha	*Citrus grandis*	x												
Tabangawon/Malugai	*Pometia pinnata*			x										
Tabgun/Lupping	*Ficus ruficaulis* Merr.											x		
Talibunog/Kulminga	*Ehretia resinosa* Hance		x											
Tibig/Lablabong	*Ficus nota* Merr.									x		x		
Tikom/Mabalod	*Timonius arboreus* Elm.			x										
Timbuwan/Timbawan	*Litsea* sp.			x										
Tuai/Tuwol	*Bischofia javanica* Blume	x		x										
Umug/Malaklak	*Clethra canescens var. novoguineensis* (Kaneh. & Hatus.) Sleum.		x								x			
Wild sunflower	*Tithonia diversifolia* (Hemsl.) A. Gray									x				
Dongla	*Cordyline terminalis*													x

Lao PDR

Site: PhouKhout (Xien Khouang province)
Classification: irrigated rice in flat plains
Assessment Area: 5 106 ha
Villages: Nasaythong, Phoungman, and Kheung
**Inhabitants:** 1 795 inhabitants, corresponding to 300 households
Land ownership: ca. 0.7-1.0 ha/household
Main economic activity: farming

The site is located in one of the poorest areas of the country. The main land use is grazing. The pilot site is characterized by a relatively flat plateau with small scattered hills, usually covered by trees. The landscape is dominated by paddy fields and very large areas of pasture.

(i) Mapping and quantifying TOF cover:
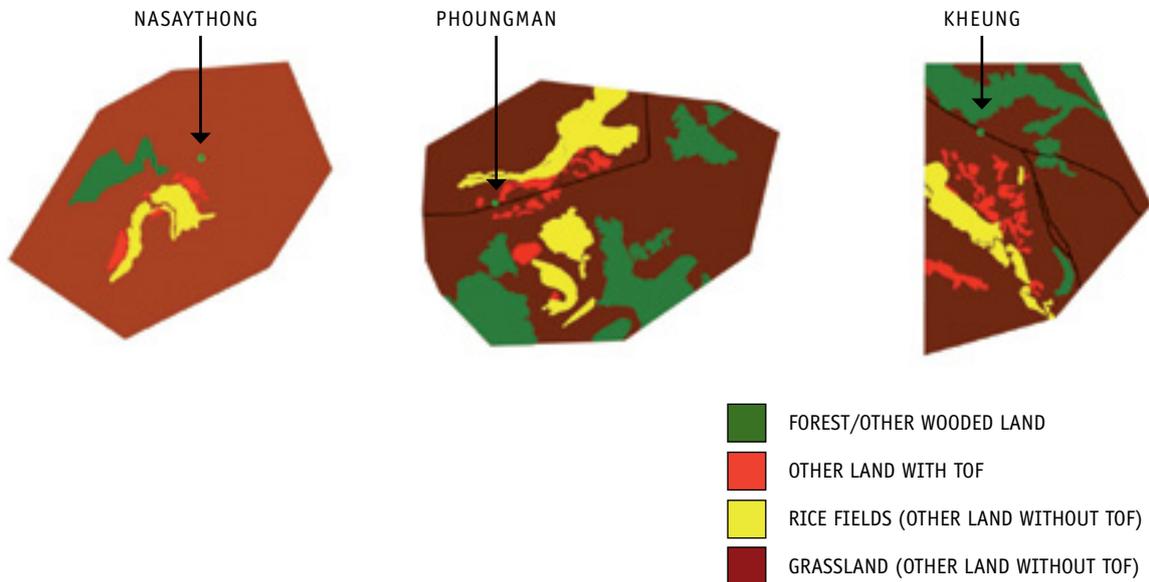
The mapping of the TOF cover in the pilot site led to the production of the following maps and to the calculation of the following land-use/land-cover percentages:

FAO CATEGORY OF LAND-USE/LAND-COVER	AREA (HA)	%
FOREST	300	5.9
OTHER LAND WITH TOF	30	0.6
OTHER LAND WITHOUT TOF	4 776	93.5
TOTAL	5 106	100

Total tree cover (*Forest* and *Other Land with TOF*) represents only around 7 percent of the area of the pilot site, with *Other Land with TOF* category accounting for less than 1 percent. As in the Philippines, TOF appear to have a minor role in the landscape, although several species are cultivated by the farmers for the provision of products and services. Forest is made up of natural forest and pine plantations.

(ii) Focus Group interview: outcomes

Tree products: Trees in the pilot site are maintained for the many products they provide. Among the trees producing edible fruits, jackfruit, mango, makmanh (*Blumea aurita DC*), makkhai (*Prunus persica*), makchong (*Pyrus pashia Bach*) are those mainly cultivated in the site. As for trees used for wood and woodfuel production, the paek tree (*Pinus kesiya royle ex Gordon*) was mentioned by the farmers as an important source of firewood (mainly for starting the fire) and timber for building native houses. The wood from this tree is also sold at markets. Bamboo is also widely cultivated and is used mainly for the construction of hand tools and for building fences around houses and rice fields.

Tree social and environmental services: The landscape is dominated by paddy fields and very large areas of pasture. The scattered hills are usually covered by forests, which ensure the same protective (soil) and regulatory (stream water level) functions as in the two other sites.

COMMON NAME	SCIENTIFIC NAME	PRODUCTS AND SERVICES				
		EDIBLE FRUITS	FIREWOOD	HOUSE MATERIAL	MARKING BOUNDERIES	HAND TOOLS
BAMBOO	*Bamboo* spp				X	X
JACKFRUIT	*Artocarpus heterophyllus*	X				
MAKCHONG	*Pyrus pashia Bach*	X				
MAKKHAI	*Prunus persica*	X				
MAKMANH	*Blumea aurita DC*	X				
MANGO	*Mangifera indica*	X				
PAEK TREE	*Pinus kesiya royle ex Gordon*		X	X		

DISCUSSION

The results of the project provide clear evidence of the different and multiple roles that trees can play in rice production landscapes depending on different economic, social and environmental factors.

During the interviews, all farmer groups recognized the important contribution of trees to their livelihoods, especially with regard to the provision of wood and food, as well as their role in preventing soils erosion and in increasing water availability.

TOF appear to have a particularly important role in the Indonesian pilot site, where farmers confirmed that the environmental services and products provided are crucial for their livelihoods. Here, in fact, farmers do not have access to the forest, and the only trees available for supporting their needs are those planted or grown on their lands.

TOF appear to have a lesser role in the Philippines and Lao pilot sites, with a very small area falling in the *Other Land with TOF* category. However, while in the Philippines site the forest covers most of the landscape, in the Laotian site trees are present only as forests located on the scattered hills and cover a minor percentage of the landscape. Such a difference between tree cover in Lao and in the other two sites is due to the fact that in Indonesia and the Philippines, where the pilot sites are located in mountainous irrigated rice production landscapes, erosion control and stream water regulation have a critical influence on the productivity and sustainability of paddy fields. In both cases, trees are maintained by farmers in dense tree cover (mainly as TOF in the Indonesian pilot site, and Forest in the Philippines pilot site) and are protected and managed accordingly.

The contribution of TOF in increasing the availability of food and non-food products also changes from one site to the other. The difference can be observed not only by assessing pilot sites located in different countries, but even when the assessments are carried out in two neighboring areas. The comparison on the role and presence of TOF conducted at the Indonesian pilot site between the two neighboring villages of Tengkudak and Buruan (see the Additional information under the Indonesian assessment results) confirms this evidence.

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TREES AND RICE:
CHANGING PARADIGMS AND PROMOTING INTEGRATION

The project provides strong evidence that in rice production landscapes TOF can offer numerous benefits in terms of environmental sustainability, rice field productivity and income generation.

In spite of this, trees are not duly taken into consideration in policy decisions related to food security and nutrition, land-use planning and rural development programmes in rice production landscapes.

Their role in supporting the livelihoods and well-being of rice-based smallholder farmer communities and in environmental sustainability is mostly overlooked and, consequently, their potential contribution is still far from being fully exploited.

The lack of awareness, knowledge and tools, at both farm and policy level, are among the main causes for this gap. A lack of awareness can lead to see trees and rice as incompatible, with trees considered as competing with crops for soil and water. In fact, while it is true that tree shadow can negatively affect the growth of rice plants and some biochemicals released by trees can be detrimental to crops, these negative interactions could be easily managed. For example, selecting tree species with less dense foliage or placing the trees a few meters away from the paddy field would reduce negative interactions while maintaining the numerous benefits of tree presence.

Also, knowledge of whether a tree species is detrimental or beneficial in a specific context would allow planting the right trees in the right place, avoiding negative effects on the crop.

Finally, planning investments and designing interventions to increase the contribution of trees to the sound management of the landscape requires detailed knowledge of the tree resources available. Unfortunately, in many countries this information is unavailable or incomplete, mostly due to the lack of user friendly tools and/or capacity to perform such assessments. In addition, distinguishing TOF cover from Forest is sometimes not easy: in the humid tropics, for instance, tree fallows associated to shifting cultivation are very often confused with Forest [8]. This is also the case for many agroforestry systems.

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8   In the FAO classification, a fallow with trees is classified as Forest only if it has been abandoned and is no longer integrated into the crop-fallow cycle. Otherwise, a fallow with trees is classified as *Other Land with TOF* if it meets the bio-physic criteria of this subcategory proposed in the "Trees outside forests Assessment Methodology" (de Foresta *et al.* 2013).

THE WAY FORWARD

The results of this project should encourage governments and local authorities to promote trees presence and agroforestry practices in rice production landscapes. To this aim, the following steps could be considered:

- **Raising awareness of the beneficial contribution of trees to rice production landscapes:** building knowledge on how to properly manage this resource is a first step towards the recognition of its potential in the implementation of national policy and rural development programmes. The fact that many farmers allocate part of their private or common land to the cultivation of trees clearly indicates that there are aware of the benefits gained from this resource. However, the full potential of trees is still far from being exploited. In many countries, Farmer Field Schools and education programmes addressed to youth and students can be valuable strategies to increase awareness and pave the way towards a more effective management of the landscape.

- **Implementing tree resources assessments:** sound management of tree resources requires a detailed knowledge of the landscape. To this aim, it is essential to implement comprehensive assessments of TOF, including information on their exact location and the characterization of the different tree systems, their economic and social role in supporting livelihoods, and how they integrate in the surrounding landscape. Such information is useful both for monitoring the changes of this resource over time and for developing strategies for promoting the use of trees. The methodology proposed for conducting this preliminary study provides a good and tested reference on which further assessments could be based.

- **Creating an enabling policy environment:** Among other things, agroforestry should be promoted as a sustainable practice of management of agricultural lands. In this regard, the Agroforestry Guidelines developed by FAO can be a useful guide to support adoption of enabling conditions for agroforestry's development.

- **Recognizing and valuing the contribution of trees to rural development:** trees should be considered in policy decisions related to food security and nutrition and rural development programmes in rice production landscapes, and their potential to increase farmers' and communities' livelihoods should be fully exploited.

- **Planning investments and designing interventions to increase the contribution of trees:** trees should also be duly considered and included in the development of land-use plans, duly recognizing the good and service that they provide to rural communities

REFERENCES

Bellefontaine, R., Petit, S. & Pain-Orcet, M., Deleporte, P. & Bertault, J.G. 2002. Trees outside forests. FAO Conservation Guide 35. Rome, FAO.

de Foresta, H., Somarriba, E., Temu, A., Boulanger, D., Feuilly, H. & Gauthier, M. 2013. Towards the Assessment of Trees Outside Forests. Forest Resources Assessment Working Paper 183. FAO Rome.

FAO. 2010. Global Forest Resources Assessment 2010: Main Report. FAO Forestry Paper 163. Rome.

FAO. 2013. Advancing Agroforestry on the Policy Agenda: A guide for decision-makers, by G. Buttoud, in collaboration with O. Ajayi, G. Detlefsen, F. Place & E. Torquebiau. Agroforestry Working Paper no. 1. Food and Agriculture Organization of the United Nations. FAO, Rome. 37 pp.

Garrity, D.P. 2004. Agroforestry and the achievement of the Millennium Development Goals. Agroforestry Systems, 61: 5–17

Kumar, B.M. 2006. Agroforestry: the new old paradigm for Asian food security. Journal of Tropical Agriculture 44 (1-2): 1-14, 2006.

Lasco, R.D., Habito, C.M.D., Delfino, R.J.P., Pulhin, F.B. & Concepcion, R.N. 2011. Climate Change Adaptation for Smallholder Farmers in Southeast Asia. World Agroforestry Centre, Philippines. 65p.

Zomer, R.J., Trabucco, A., Coe, R., Place, F., van Noordwijk, M. & Xu, J.C. 2014. Trees on farms: an update and reanalysis of agroforestry's global extent and socio-ecological characteristics. Working Paper 179. Bogor, Indonesia: World Agroforestry Centre (ICRAF) Southeast Asia Regional Program. DOI: 10.5716/WP14064.PDF

PREPARATION OF THIS DOCUMENT

This document reports the outcomes of the "Assessment of Trees outside forests in Asian rice production landscapes" pilot project developed in 2013 in Indonesia, Lao PDR, and the Philippines under Component 2 (*Biodiversity, landscape, and ecosystem services*) of the Regional Rice Initiative for Asia (RRI).

The project was conducted under the guidance of the FAO Forest Assessment, Management and Conservation Division and in close collaboration with counterparts in relevant ministries and partner organizations in the countries, as well as team members in the FAO Regional Office and Country Offices.

The present document is based on information contained in the final report prepared by Dr. Hubert de Foresta who, also thanks to the contribution of IRD (Institut de Recherche pour le Développement, France), collaborated with FAO on the design and implementation of the pilot project, as well as training and supervising the work of the following national experts for the pilot assessments:

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○ **Ms Retno Sari**, National expert for Indonesia (Department of Forestry and Plantations, Indonesian Ministry of Forestry, Indonesia)

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PHOTOCREDITS

ASSESSING AND PROMOTING TREES OUTSIDE FORESTS (TOF)
IN ASIAN RICE PRODUCTION LANDSCAPES

Mature planted or spontaneous tree systems scattered throughout or surrounding agricultural landscapes have been proven to be an excellent source of goods and services for increasing the socio-economic and environmental sustainability of agricultural landscapes. In spite of this, their role in supporting the livelihoods and the well-being of rice-based smallholder farmer communities and in environmental sustainability is mostly overlooked. Consequently, their potential contribution is still far from being fully exploited. The "Assessment of Trees outside forests in Asian rice production landscapes" pilot project was developed in 2013 in the framework (Biodiversity, landscape, and ecosystem services) of the FAO Regional Rice Initiative for Asia, with the final objective of providing policy and decision makers with evidence of the contribution that tree systems located in rice production landscapes can provide in terms of socio-economic and environmental sustainability, as well as in terms of resilience. This document reports on the outcomes of the project and could be used as a reference to feed higher-level national and regional dialogues, in order to promote an integrated and sustainable approach to the management of rice production landscapes.