

SOIL EROSION AND AGROFORESTRY

THE STATE OF AGRICULTURE IN THE PHILIPPINES

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SOIL EROSION

THE PROBLEM





Soil erosion is a major agricultural and environmental problem in the Philippines that is primarily caused by rainfall under upland, subsistence rain-fed farming.



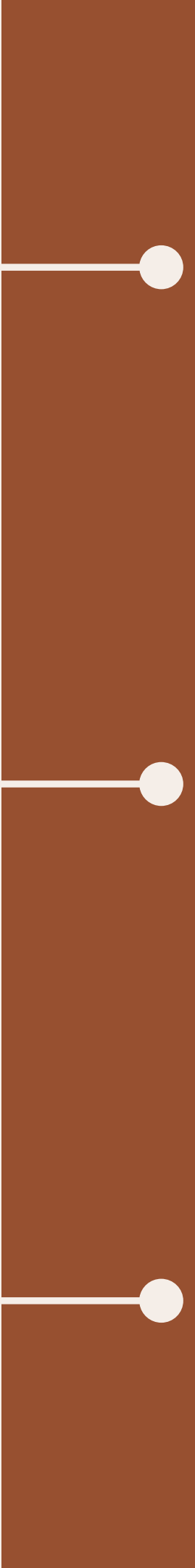
Soil erosion is the most prominent form of land degradation; it occurs in various forms and magnitude.



As early as 1989, World Bank has already identified soil erosion as the Philippines' worst environmental problem.

Soil Erosion

The Philippine Situationer



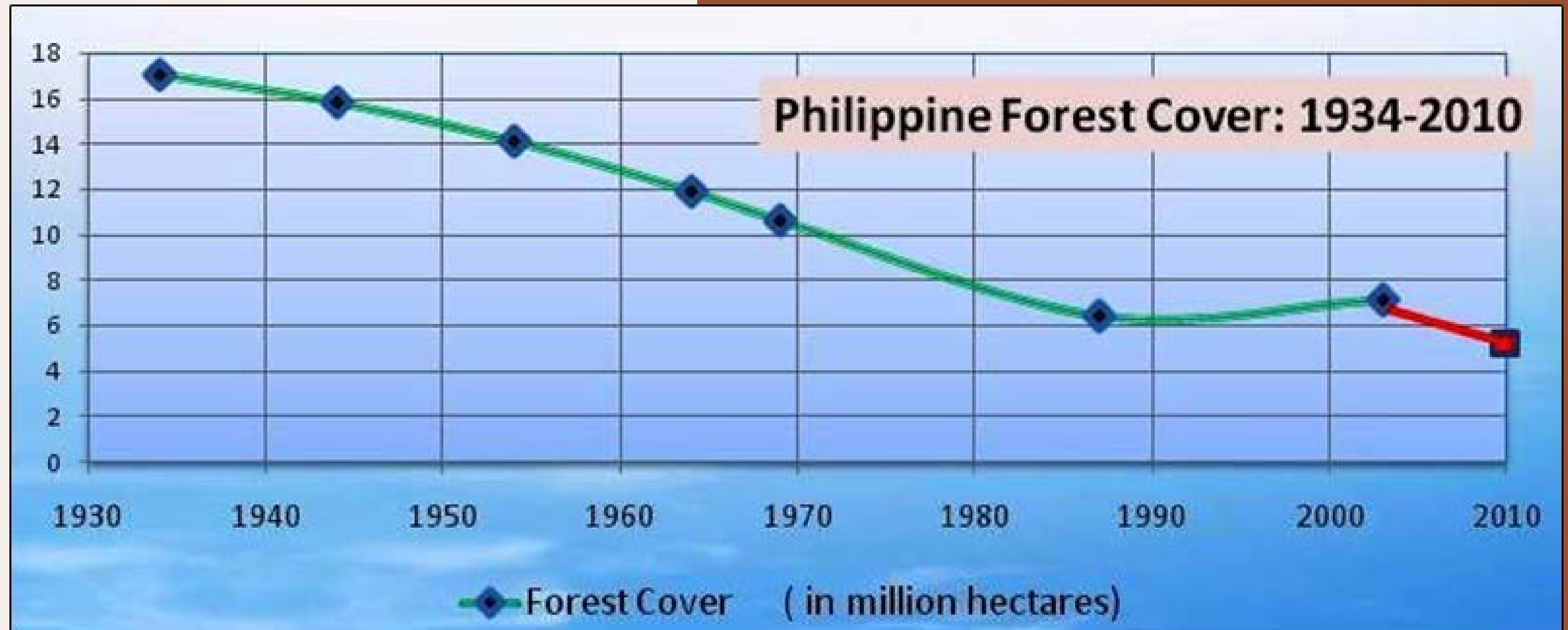
The Philippines has a total land area of 299,765 sq.kms or about 30 million hectares from a total of 7,107 islands.

59% or about 17.6 million hectares of the 30 million hectares are classified as public lands or forest lands with slopes of equal to or greater than 18%

All lands with a slope equal to or greater than 18% compose the Philippine uplands.

The Philippines is one of the most deforested countries worldwide.

Declining Forest Cover



Being an agricultural country, agriculture plays an important role in the Philippine economy.

The main agricultural enterprise is crop cultivation.

Mostly, subsistence farmers cultivate approximately 9.4 million hectares of the Philippine uplands (or about 31% of the country's total land area) classified as hilly or mountainous.



Philippine Situationer

VULNERABLE AREAS (11.45 M HA)

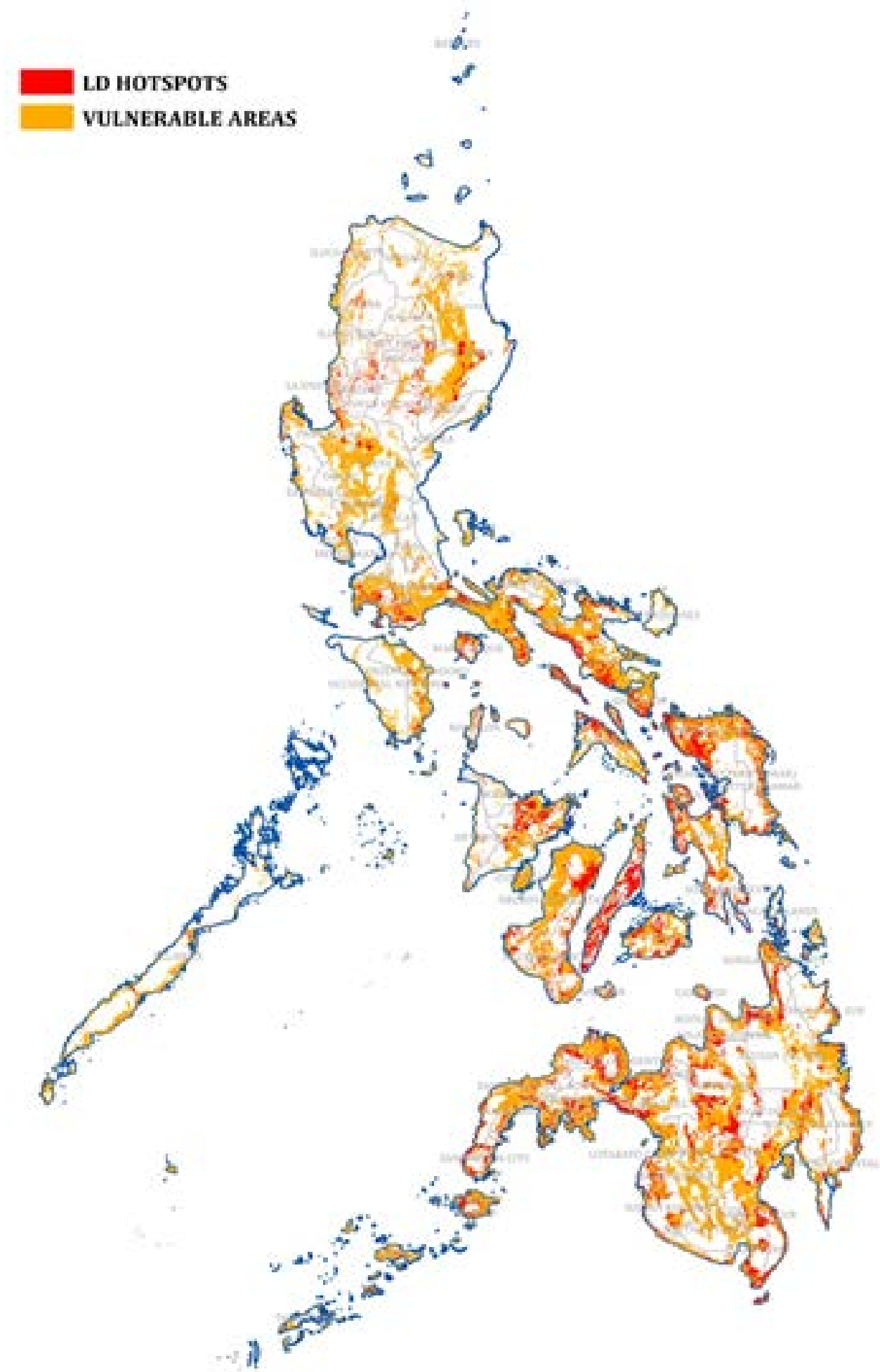
- ▣ Sloping agricultural areas, which are not practicing soil and water conservation measures.
- ▣ Sloping areas with minimal vegetative cover or those denuded forests, shrubs and grasslands.

HOTSPOTS (2.6 M HA)

- ▣ Areas requiring immediate interventions or priority areas for land conservation measures.
- ▣ Agricultural areas, greater than 18 % slope with severe erosion.
- ▣ Denuded forests, shrubs and grasslands with slopes of more than 18%

Status of Land Degradation (LD) in the Uplands

LD Hotspots and Vulnerable Areas



What areas in the Philippines are heavily eroded?

In terms of **size** of eroded land area, the top ranking provinces are:

- Cebu (386,717 ha) Central Visayas (Region VII)
- Bohol (271,739 ha) Central Visayas (Region VII)
- Masbate (269,147 ha) Bicol region (Region V)
- Batangas (262,762 ha) CALABARZON region (Region IV-A)
- Abra (258,410 ha) Cordillera Autonomous region (Region I)

Twenty two (22) provinces were reported to have alarming soil erosion rates.

What areas in the Philippines are heavily eroded?

At present, Cebu and Bohol provinces have 0% primary forest growth.

Assessment in 2016 showed that Bicol region is the most-affected region by soil erosion, since it is the area most visited by typhoons.

The Philippine data in the FAO database is that agriculture alone contributes about 457,000,000 metric tons per year soil loss.



Philippines

0 50 100 150 Kilometers
0 50 100 150 Miles



BICOL REGION

CEBU & BOHOL

Causes of Soil Erosion

IN PHILIPPINE UPLANDS



The Philippines is one of the most extensively deforested countries in the tropics.

Deforestation has always been referred to as the primary cause of soil erosion in the Philippines.

Commercial logging and “opportunistic” cultivation.

Deforestation



In the 90's, it was estimated that as high as about 2.5 million persons per year migrate from lowlands to the uplands.

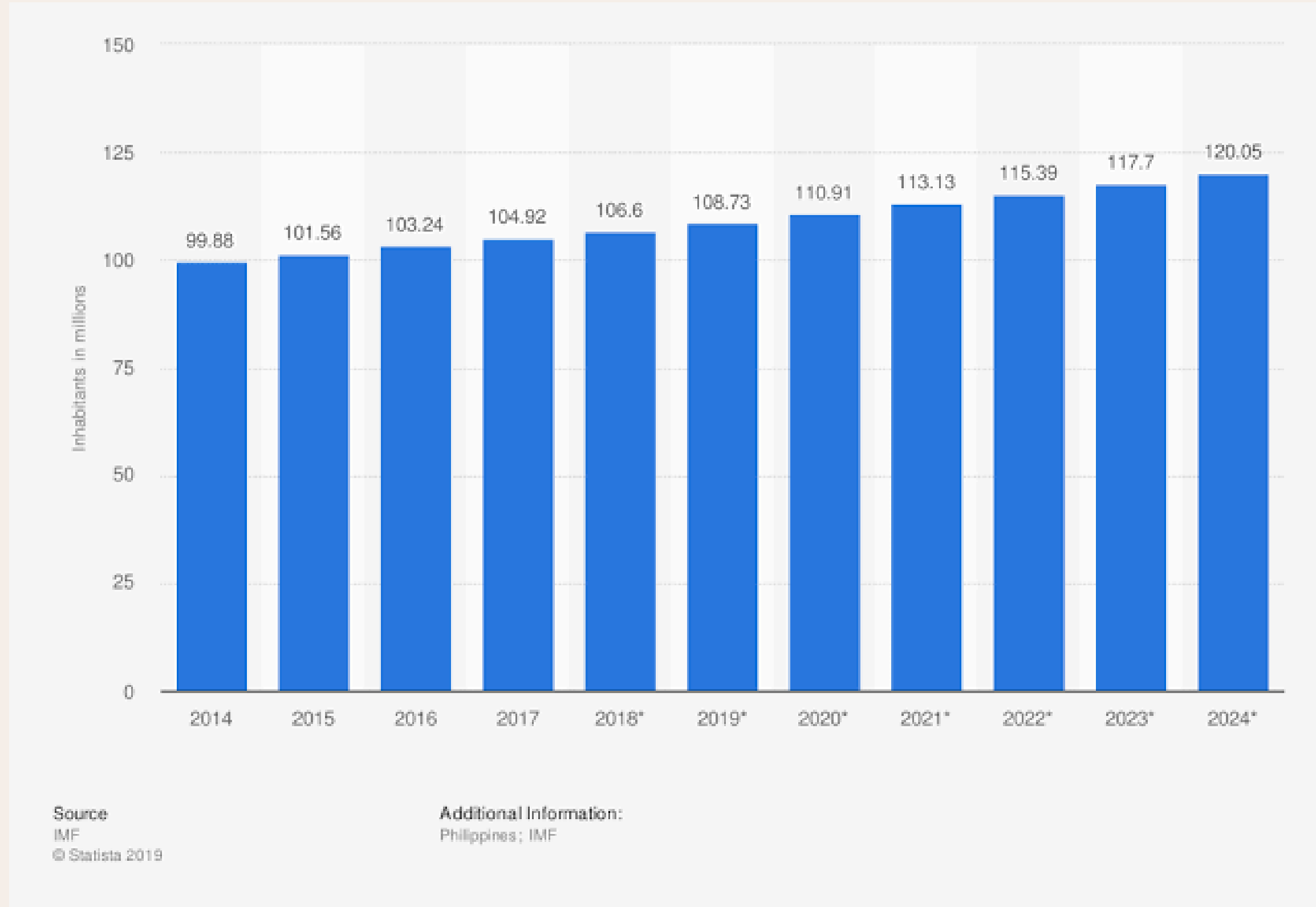
Expansion and intensification of farming in the uplands, more often with unsustainable practices, encourages soil erosion.

In the Philippines, prime agricultural lands are located around the main urban and high population density areas.

Population Pressure



Philippine population, 2014-2024 (in million inhabitants)



Land Tenure

Considered the most important indirect cause for accelerated erosion of agricultural lands in the Philippine uplands.

Since most farmers do not own the land, there is no motivating factor to implement any land improvements and soil conservation practices.



Poverty

Due to the absence of alternative sources of employment in the lowlands, landless agricultural people are compelled to cultivate the highly erodible uplands in order to survive.

Soil erosion is not only caused by poverty, it contributes to poverty.



Mismanagement of Upland Resources

Weak administrative capability, poor coordination among involved agencies, and lack of resources hamper interagency cooperation.

Because of the government's incapability in managing upland resources, stakeholders view upland resources as available on a first come, first served basis.



Impacts of Soil Erosion

SOIL FORMED ON GEOLOGICAL TIME SCALE
IS BEING LOST ON HUMAN TIME SCALE

DECLINE IN FARM PRODUCTIVITY

Erosion has caused declines in corn productivity in the Philippines as severe as 80% over the last 15 years.

EROSION REQUIRES INCREASING INPUTS
AND INVESTMENTS TO MAINTAIN THE
PRODUCTIVITY LEVELS

More upland agricultural technology development that both increase the productivity and conserve the soil resource have to be pursued.

Challenges to Soil Conservation

IN THE PHILIPPINES



Research

There is need to establish tolerable soil losses under Philippine condition or establish simple and suitable models for practical use in predicting soil loss (Basic)

Reviewers of research proposals always look for the economic benefits or the Return-on-Investment (ROI) of farmers as an important criterion (Applied)

This mindset is a major obstacle and challenge for Philippine agricultural research to move forward.



Farm Level

Many of the areas occupied by upland farmers are considered non-alienable and non-disposable and generally logged over areas with slopes greater than 18%

Absence of security of tenure is disincentive for farmers to invest in permanent crops and soil conservation measures.

Soil conservation and management is not considered a major concern by farmers and this translates to lack of will.



Local Government Level

The local government units have very few competent agricultural extension staff to handle farmer training on soil conservation and management.

Implementation of any program at the local level depends on the priority of the incumbent.

Soil conservation is not a vote-getting economic development program for the local government to give a priority.



National Level

The Philippines is a party signatory to the UN Convention to Combat Desertification, Land Degradation and Drought (UNCCD) and the National Action Plan (NAP) is the instrument to implement the agreements of the convention.

Funding remains a major constraint in the programs specified in the Philippine National Action Plan.

Incremental financing for land degradation programs and projects are miniscule compared to those for climate change and biodiversity.



As a nation with exponentially increasing population, maintaining agricultural productivity to feed its people remains a top priority.

There are challenges from farm level to local government level to national level in the implementation of sustainable agricultural land management programs.

Despite these challenges, we are optimistic to hurdle and address the causes and impacts of land degradation to reduce soil erosion rates to tolerable levels.

Conclusion

AGROFORESTRY

THE SOLUTION



Agroforestry

A collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence.



DEFINED

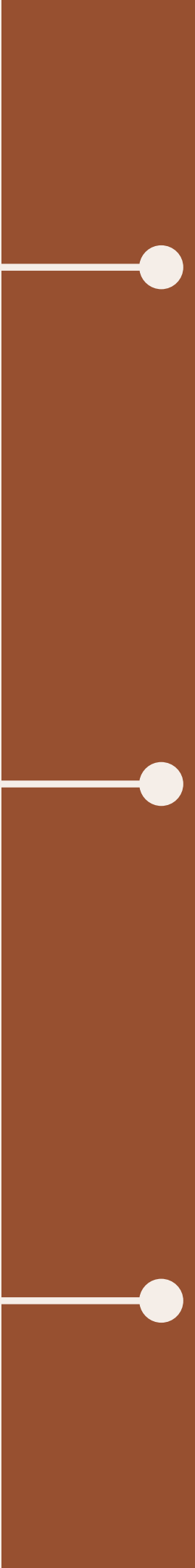
Agroforestry

“Agroforestry is a science, art, and practice that deals with the production, management, and utilization of woody perennials in combination with agricultural crops, animals, aquatic and/or other resources either zonally, mixed simultaneously, or sequentially for the twin purpose of conservation and socioeconomic productivity”



DEFINED

In a nutshell...



Since 1995, the Philippine government has been using agroforestry as the main technology for the community-based forest management (CBFM).

As a national strategy, agroforestry enhances the sustainable development of the country's forest resources at the same time promotes people empowerment and social justice.

Thus, it has been marked as an integral part in the development of the uplands up to the present.

Features of Agroforestry Systems in the Philippines

Classified according to their
dominant component, that
is: agricultural crops, forest
trees, and animals.



FEATURES



Agrisilvicultural System

- Combination of agricultural crops with woody perennials.

- Example:

ALLEYCROPPING- simplest and most widespread agroforestry practice in sloping lands

FEATURES



Silvopastoral System

- Combination of woody perennials with livestock production.
- Example: livestock under tree; live fence

FEATURES



Agrisilvopastoral System

- Combination of agricultural crops, woody perennials, and livestock.
- Example:
multistorey system+ animals

Evolution of Agroforestry

THROUGH ALLEY CROPPING



EVOLUTION

History

The Mindanao Baptist Rural Life Center (MBRLC), a nongovernmental organization (NGO) began working with *Leucaena leucocephala* in the mid-1970s as hedgerow plant in alley cropping system, originally designated as **SLOPING AGRICULTURAL LAND TECHNOLOGY(SALT)**

SALT recommended that every third alleyway between the double hedgerows of *Leucocephala* be planted with perennial woody crops, such as coffee trees, with the majority of the alleys maintained by continuous cropping with annual food crops.



This concept offered more diversified sources of farm income and improved soil erosion control.

EVOLUTION

History

By the early 1980s, hedgerow intercropping was advocated by the Philippine Department of Agriculture as a technology to sustain permanent cereal cropping and as a soil erosion control measure for sloping lands.

By the mid 1980s,
SALT was adopted
by the Philippine
Department of
Agriculture (DA) as
the basis for its
extension effort in
the sloping uplands.



The Department of
Environment and
Natural Resources
(DENR) also used it
as the technical
basis for its social
forestry pilot
projects.

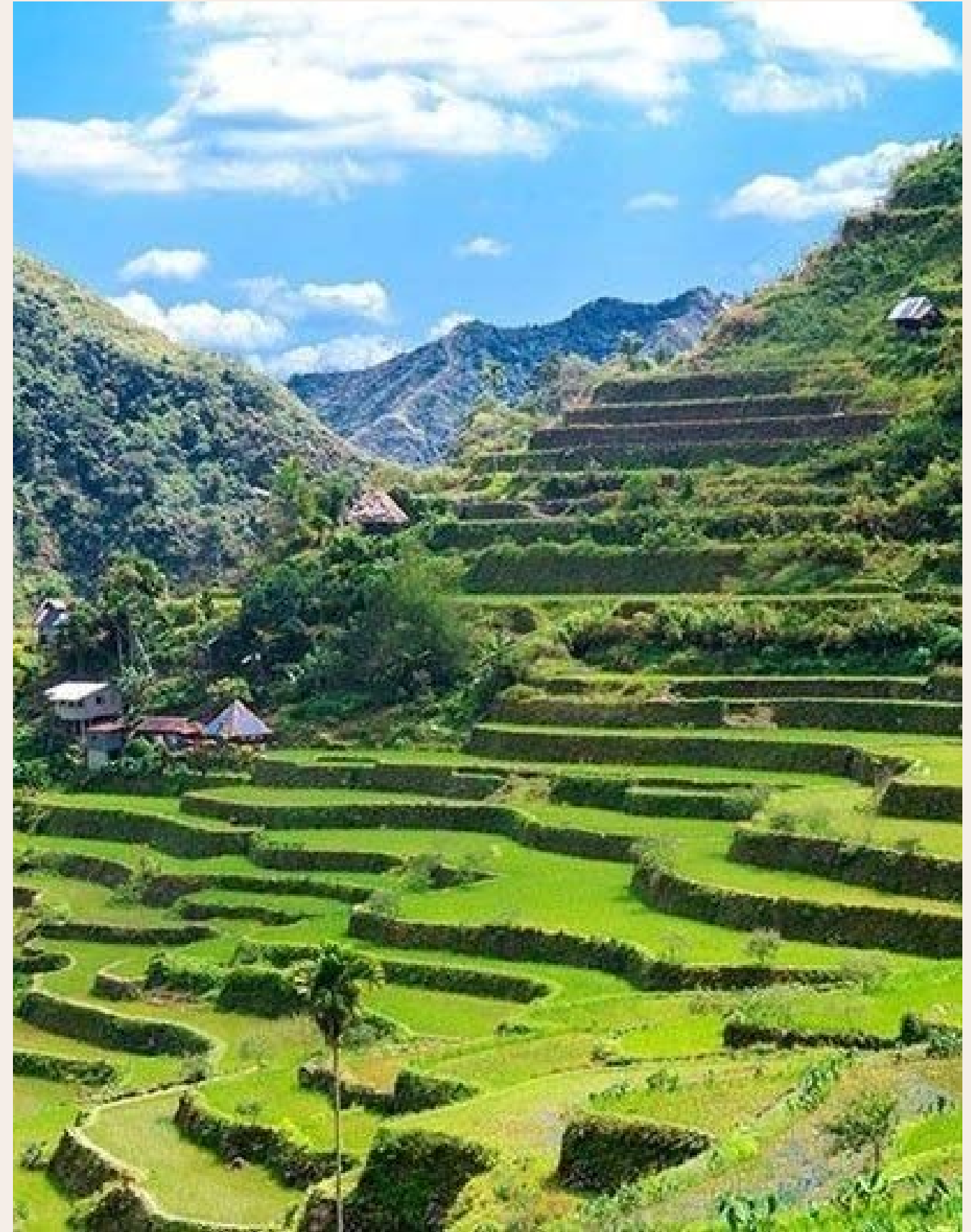
The effort
on *Leucaena* hedgerows
suffered a major setback
in 1985 when the exotic
psyllid leafhopper
(*Heteropsylla cubana*)
invaded the Philippines,
attacking hedgerows and
killing or stunting trees
throughout the country.



This forced a
search for
replacement
hedgerow tree
species. *Gliricidia*
sepium has been
the most common
replacement.

The Philippine Ifugao Rice Terraces

THE EIGHTH WONDER



The Philippine Ifugao Rice Terraces

Terraces that were carved into the mountains of Ifugao province in the Philippines by the ancestors of the indigenous people built with minimal equipment, largely by hand.

The terraces are reported to cover around 4,000 miles and its length is roughly half of the Earth's circumference.

Occasionally called the "Eighth Wonder of the World"

An agroforestry system that have existed more than 2,000 years, and counting.

THE PHILIPPINE IFUGAO RICE TERRACES

A “mini forest” is maintained at the top of the mountain which is the source of water that irrigates the rice paddies. Also prevents land slippage.





Current priorities in agroforestry development*

China

Agroforestry models for farm forestry in the plains; "Four-around" tree planting; "Economic and ecological" agroforestry development in hilly, coastal and arid areas

Thailand

Agroforestry research and development in the N and NE, particularly in critical watershed areas

Indonesia

Agroforestry for soil conservation, watershed and upland development; Rehabilitation of degraded forest areas

Vietnam

Agroforestry in land allocation program; Multistory cropping systems in hills; Silvofishery development in mangrove areas

Laos

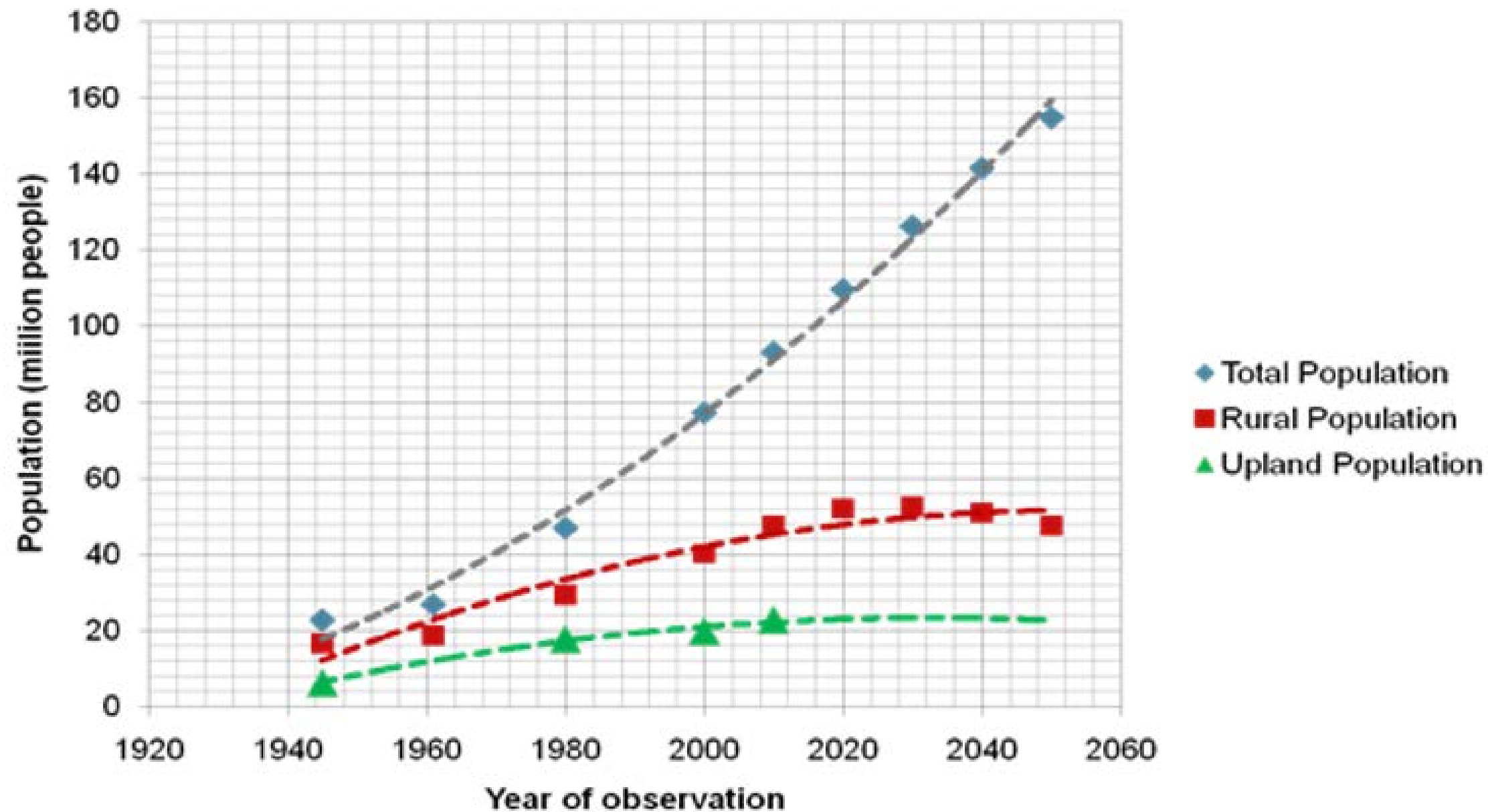
Agroforestry to improve shifting cultivation systems

Philippines

Agroforestry in integrated social forestry and upland development programs

Based on the work of the Asia-Pacific Agroforestry Network (APAN) and consultations with member countries in Southeast Asia.

Trends in rural and upland population in the Philippines (based on various data from different studies)



Upland population grew at a rate of 2.5 to 2.8 percent per year.

¹ Lynch, O.J. & Talbott, K. (1998). Legal Responses to the Philippine Deforestation Crisis. Journal of International Law and Politics, 20, 679-713.

Technological Milestones

FOR AGROFORESTRY





Promising agroforestry systems and technologies for the Philippine uplands were developed.

■ Example:

Sloping Agricultural Land Technology (**SALT**)

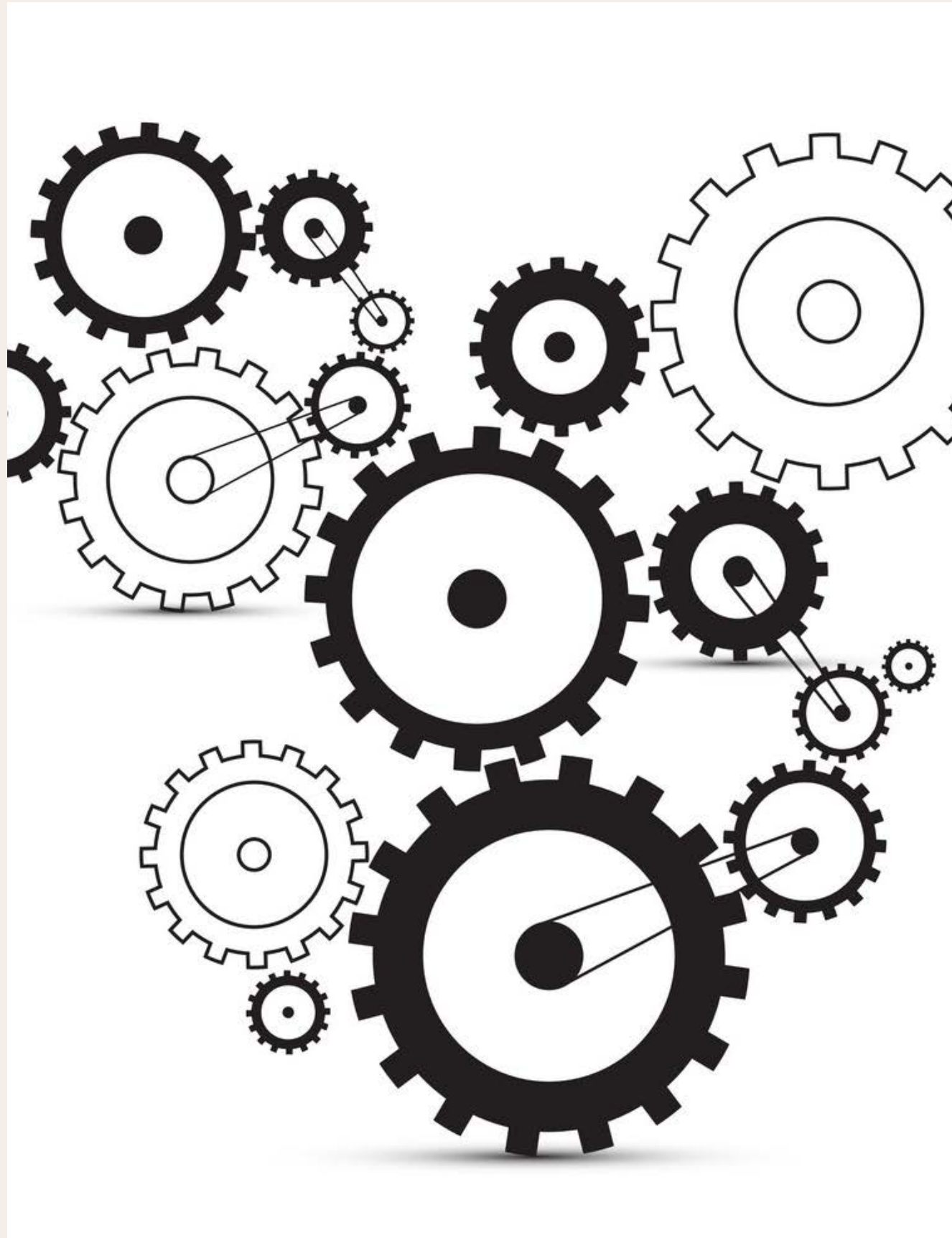
■ 4 variants:

SALT 1 – Sloping Agricultural Land Technology

SALT 2 – Simple Agro-Livestock Technology

SALT 3 – Sustainable Agroforest Land Technology

SALT 4 – Small Agrofruit Livelihood Technology



Development of agroforestry tools by multidisciplinary teams.

■ Examples:

Agroforestry Land Capability Assessment and Mapping Scheme (ALCAMS)

by: Institute of Agroforestry, UPLos Baños (IAF-UPLB)

Methodology for Evaluating Agroforestry Systems (MEAS)

by: International Centre for Research in Agroforestry's (ICRAF)

■ These tools were developed to attain productivity and sustainability of the land, while improving the economic well being of the farmers and at the same time conserving the forests resources.



Development of training courses and learning laboratories (Instruction)

■ Examples:

- 1) Agroforestry Project Planning Management Course (**APPM**)
- 2) Seed Technology and Nursery Management Course (**STNM**)
- 3) Agroforestry Production and Postproduction Systems Course (**APPS**)
- 4) Learning Laboratory for Agroforestry (**LLA**)
by: Institute of Agroforestry, UPLos Baños (IAF-UPLB)

■ Courses and laboratory provide technical capability building opportunities for various development agents and learning for students.

Challenges and Issues

FOR AGROFORESTRY



RESOURCE DEGRADATION

Agroforestry should be able to assert its significant role in alleviating pressure on soil, water and biodiversity through proper management and governance.



Agroforestry has to respond by providing sustainable management systems capable of improving resource productivity in the upland, reducing poverty, increasing farmer's income, and enhancing environmental stability.

RECONCILING AGRICULTURE AND FORESTRY

Conscious effort between the agriculture sector (Dept. of Agriculture) and forestry sector (Dept of Environment and Natural Resources) to support agroforestry initiatives should be put in place.



Agroforestry is recognized to be the convergence of the development initiatives to restore, rehabilitate, and conserve resources in the uplands.

INCREASING FARMER'S INCOME AND ALLEVIATING POVERTY

Productivity will increase as a result of the adoption of agroforestry technologies, but this has to be translated into increased incomes to alleviate poverty among households in the uplands.



Input and output markets should be made available to help the upland poor.

Need to make the uplands accessible through roads and adequate transportation facilities.

Postharvest technologies and value-adding enterprises in the whole value chain need to be considered as well.

AGROFORESTRY PROMOTION AND RESOURCE PRODUCTIVITY IMPROVEMENT

How can the agroforestry technologies be extended to farmers in the uplands considering the tenurial constraints and overlapping mandates of government agencies (i.e., DA, DENR, and LGUs).



Provision of basic support services for the upland farmers to use the technologies to enhance their resource productivity, at the same time effectively manage the uplands.

Summary and Conclusion

Agroforestry has been widely accepted as one of the effective approaches in ensuring sustainability in the uplands.

Agroforestry integrates multiple natural components and is at the crossroads of tradition and modernity, it necessarily brings together people from diverse fields of knowledge: agronomists, animal care specialists, landscape planners, foresters, economists, soil analysts and many more.

(But) **Agroforestry** technologies are only partial solution to upland problems. Secure tenure is essential and required support services must be mobilized, otherwise agroforestry efforts will not truly benefit resource-poor farmers.

Some Recommendations

Incentivize adoption of technologies that promote sustainable sloping land management.

Monitor and regulate use of glyphosate and raw/ semi-processed chicken dung.

Enact the national land use and management bill pending in Congress as main vehicle to contribute in achieving SDG 15 (Life on Land).

どうもありがとう
ございました！