agricultural production and environmental management

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Introduction

- ❖ Agriculture is one of the most important sectors in the development of Myanmar Economy.
- ❖ Future economic development of Myanmar also is based on agriculture sector,
- ❖ which plays a vital role to achieve food such as
  - ✔ food sufficiency,
  - ✔ food safety,
  - ✔ food security,
  - ✔ food quality, and
  - ✔ healthy food

  for the mass of people and national economic progress.
- ❖ Arrangements are being made to extend sown acreage and boost production of food crops for self-sufficiency and for export to

earn foreign exchange.

- ❖ Mono-cropping has been practiced in most of the crop growing areas in Myanmar.
- ❖ As it is a clean-culture crop, this is not much chance for an accumulation of organic matter in the soil.
- ❖ The long- term use of chemical fertilizers in crop production has created serious problems such as higher cost of production with lower net income for farmers.

❖ The heavy application of agricultural chemicals as over dose

of ✔ fertilizers,

✔ pesticides,

✔ herbicides,

✔ growth regulator, and

✔ relevant materials in attempting

to increase crop production has resulted in soil fertility and consequently in lower soil productivity.

❖ Under such circumstances, it is important to formulate agricultural system which would increase sustainable production with decreased use of expensive and hazardous agricultural chemicals (Cho Cho Myint, 1991).

❖ The **decline in soil productivity and crop yields** from degradation of farmland, environmental pollution of from agrochemicals and the hazards to human and animal health from modern agriculture, have become important social problems

(Arakawa, 1991)

❖ The **high price of chemical fertilizers** and their unavailability at the time when they are needed are also major constraints in agricultural production in several developing countries including Myanmar (Cho Cho Myint, 1991)

❖ Myanmar needs farming systems with low cost, low risk, increased output, increased profit and long term sustainability. ❖ This could be achieved by recycling the organic waste material such as crops and animals residues back to the soil.

❖ If this could be implemented successfully, the need to import agrochemicals would greatly be reduced and consequently the cost of production would be broth down to a considerable extent (Cho

ChoMyint, 1999)

Land and soils

- Soil degradation is a real and escalating **threat caused** by unsustainable land uses and management practices, and climate extremes that result from various social, economic and governance drivers.
- The current rate of soil degradation **threatens** the capacity of future generations to meet their needs.
- This trend **can be reversed** through a concerted effort towards its sustainable management.
- As **soils are at risk**, this compromises sustainable agriculture,

food security and the provision of ecosystem services.

❖ **Sustainability and environmental management**

Land use change is fundamental to the operations of the biosphere because alterations in the relative proportions of land dedicated to urbanization, agriculture, forest, woodland, grassland and pasture have a marked effect on the global water, carbon and nitrogen biogeochemical cycles.

❖ Global scale **sustainability and environmental management** involves **managing**

- ✔ the oceans,
- ✔ freshwater systems,

✔ land and atmosphere,

✔ according to **sustainability principles**

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Sustainable agriculture was as an **ecosystem approach to agriculture**.

❖ Farmer's practices can incident long-term damage to soil as leading to erosion and irrigation without adequate drainage as leading to salinization.

- ❖ The most important factors for an individual site are sun, air, soil, nutrient, and water.

- ❖ Of the five, water and soil quantity and quality are most amenable to human intervention through time and labor.

- ❖ Crops depend on cultivated soil nutrients and the availability of water.

- ❖ When farmers grow and harvest crops, they remove some of these nutrients from the soil.
- ❖ Without replenishment, land suffers from nutrient depletion and becomes either unusable or suffer

from reduced yields.

Overview

❖ Soil is a core component of land resources and the **foundation of agricultural development and ecological sustainability.**

❖ It is the basis for food, feed, fuel and fibre production and for **many critical ecological services.**

❖ Soil is a **complex, dynamic living system** and its suitability varies from place to place.

❖ The area of productive soil is limited and is under increasing pressure of intensification and competing uses for cropping, forestry and pasture/rangeland, and to satisfy demands of the growing population for food and energy production, raw materials extraction, and so forth.



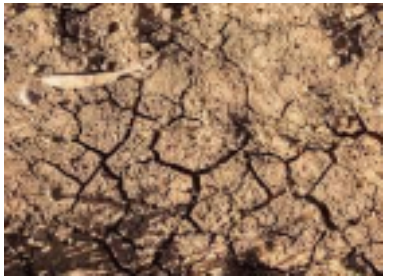
What needs to be done?

The challenges outlined above give rise to five key principles for guiding the strategic development of new approaches and the transition to sustainability:

Principle 1: Improving efficiency resources

Principle 2: protect and enhance natural resources

Principle 3: to protect and improve rural livelihoods and social well-being is unsustainable



Principle 4: resilience of people, communities and ecosystems, especially to climate change

and market volatility

Principle 5: Good governance is essential both the natural and human systems

- ❖ Sustainable agriculture depended on replenishing the soil while minimizing the use or need of non-renewable resources, such as natural gas as used in converting atmospheric nitrogen into synthetic fertilizer, or mineral ores as phosphate.
- ❖ Possible sources of nitrogen that would, in principle, be available indefinitely, include;

1. Recycling crop waste and livestock or treated human manure 2. Growing legume crops and forages such as peanuts as alfalfa that form symbioses with nitrogen-fixing bacteria called rhizobia 3. Industrial production of nitrogen by the Haber process uses hydrogen, which is currently derived from natural gas (but this

hydrogen could instead be made by electrolysis of water using electricity ; perhaps from solar cells or windmills) or

4. Genetically engineering (non-legume) crops to from nitrogen fixing symbioses or fix nitrogen without microbial symbiosis.

❖ More realistic, and often overlooked, options include long-term crop rotations, returning to natural cycles that annually flood cultivated land (returning lost nutrients indefinitely) such as ✔ the flooding area,

✔ the long-term use of biochar, and

✔ use of crop and livestock landraces

✔ that are adapted to less than ideal conditions such as

pests,

drought, or

lack of nutrients.

❖ Crops that require high levels of soil nutrients can be cultivated

in a more sustainable manner if certain fertilizer management practices are adhered to develop.

❖ Without efforts to improve soil management practices, the availability of arable soil will become increasingly problematic.

Some land management techniques

❖ No-tillage farming
❖ Keyline design
❖ Growing windbreaks to hold the soil
❖ Incorporating organic matter back into fields ❖
Stop using chemical fertilizers (which contain salt)
❖ Protecting soil from water run-off (soil erosion)

6 steps to improve your fertilizer use efficiency

in the soils

2. Reduce losses as ammonia
3. Reduce nitrate leaching
4. Apply the right rate
5. Apply at the right time

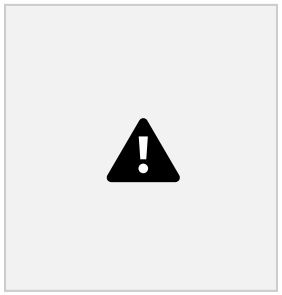
6. Apply accurately

1. Other nutrients and soil pH

Low groundcover

Dust source

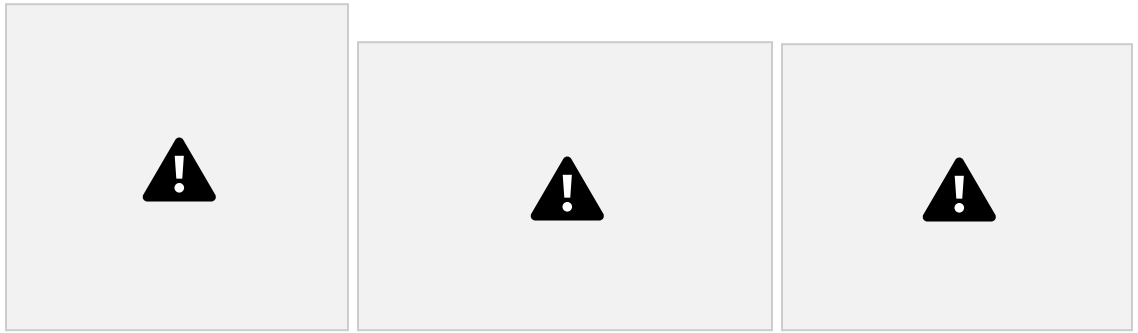
Declining resource condition

Good
ground over

No dust

Improve/ maintain
condition



Sustainable Development

Sustainable Resource Management

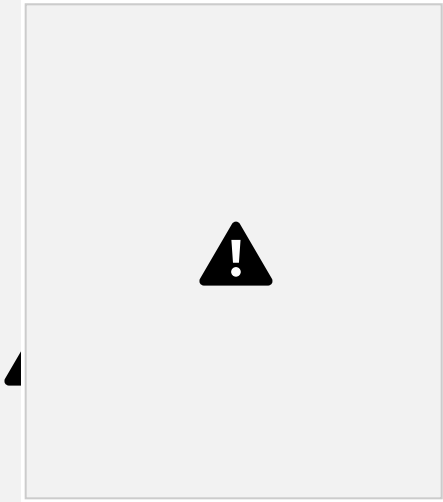
Sustainable Land Management

Sustainable Agriculture

Sustainable Soil Management

Fertilizer Application Management

Riparian Forest Buffers
Windbreaks



Windbrea

Riparian Forest Buffers

putting the right plant, in the right location, for the right reason.