ORGANIC MATTER MANAGEMENT
A STRATEGY FOR CLIMATE CHANGE ADAPTATION

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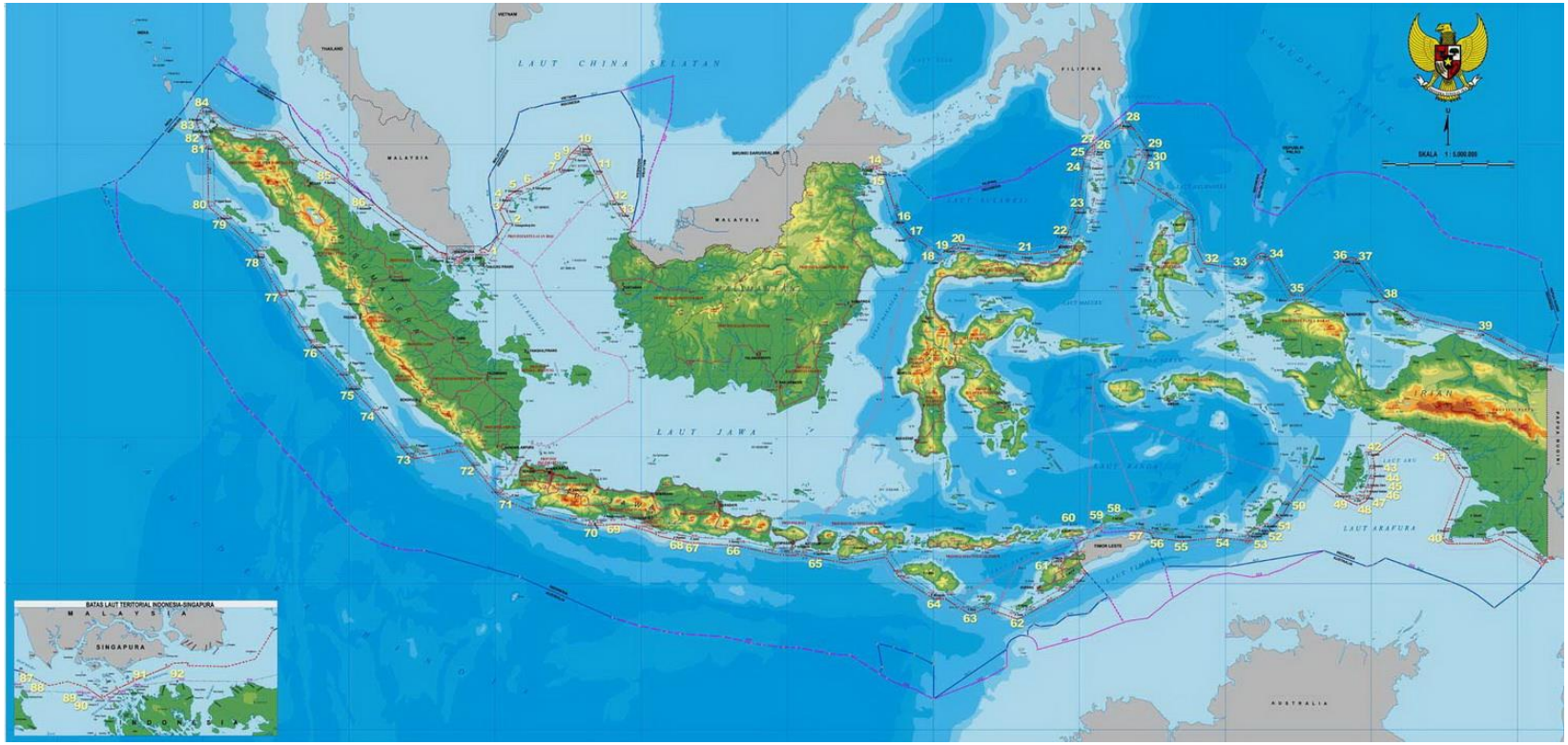
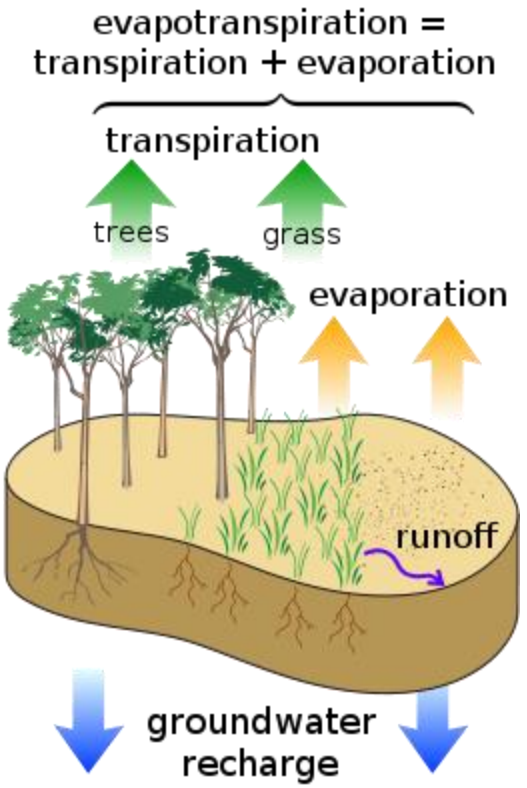


Climate change, especially global warming, is a serious threat to agriculture. In the near future, shifts in local climatic conditions and the frequency of extreme weather events are expected to occur even more frequently, with potentially reducing agriculture productions. As an archipelago, Indonesia is vulnerable to climate change and devastating effect for food production.

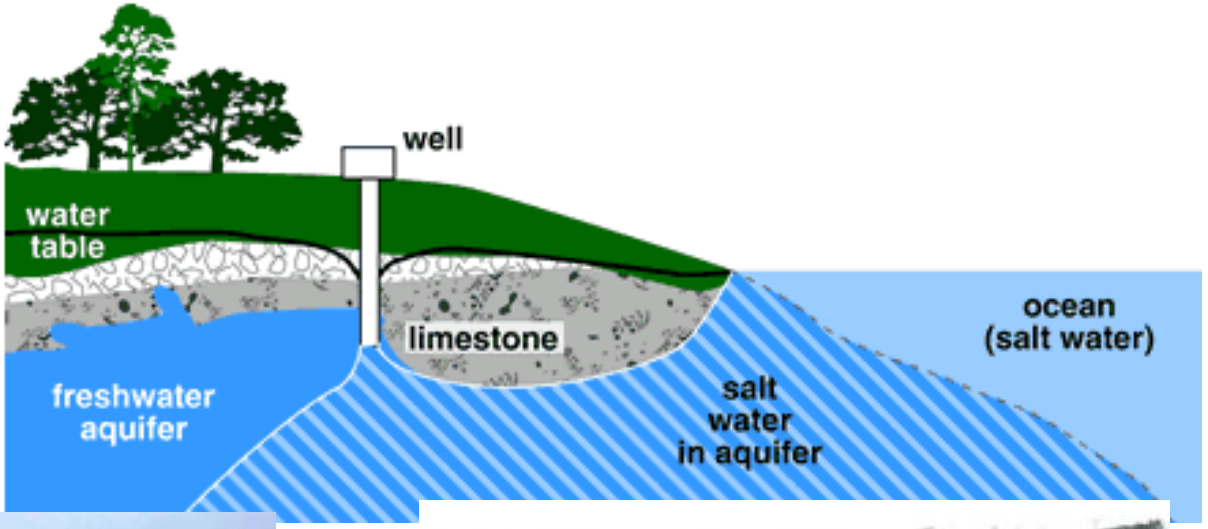
Climate change causes **Earth's average surface temperature will increase, sea water level rise. changes in distribution patterns of rainfall, floods and extreme drought**.

Soil surface Temperature increasing



The increase in surface temperature causes an imbalance between water uptake and transpiration of plants. High soil evaporation leads to reduce water content in the soil and availability of water for crops will decline. As a result, the plants grown under conditions of water stress.

Sea water level increasing



The increase in global temperature, causing the melting ice in the polar regions and sea levels will rise ..

Intrusion of sea water at the time of the tide caused pollution of the soil solution in the root zone. The concentration of salt can damage plant root tissues through the process of plasmolysis. Cell fluid will be drawn out and the roots will be damaged.

Changes in rainfall distribution pattern

Most of the rice farmers rely on rainfall as a source of water. Experience over many years has been providing information to farmers when they have to start planting. Changes in rainfall distribution, requires farmers to adapt, because the rainy season it becomes difficult to predict. Rice production may decline as a result of the failure of farmers in predicting the rainy season.

Flooding and extreme drought

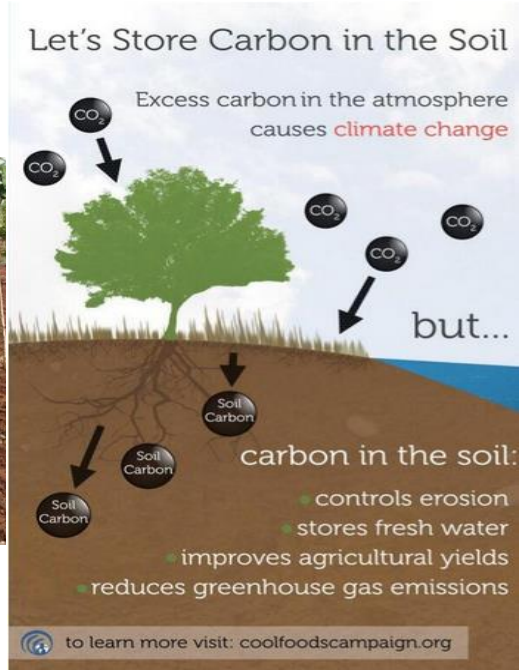
Climate change causes climatic conditions become difficult to predict. High intensity rainfall can occur in the dry season, causing floods that can reduce crop production .

Climate change also can lead to a severe drought, and cause the plants grow under conditions of water stress.

UTILIZATION OF ORGANIC MATTER AS A SOLUTION FOR MANAGING CLIMATE CHANGE

Climate change is main environmental issue which has broad implications for sustainable agriculture and food production system in Indonesia. The strategy in responding climate change problem is depending on farmer capacity to reduce emission of Green House Gas and increase Carbon storage in the soil.

The main strategy to manage climate change has been implemented by local farmers. Implementation of the strategy is focused **on technical improvements of land management, Increasing carbon deposits in the soil and greening the earth's surface.**



TECHNICAL IMPROVEMENT OF LAND MANAGEMENT

MINIMUM TILLAGE

Intensive soil tillage cause the soil carbon will be converted to form of **CO_2** and will be released to the atmosphere.

Intensive tillage also make the land will be susceptible to erosion, especially on the land with a high slope. Intensive tillage for a long time will increase the erodibility of soil due to a decrease in soil aggregate stability.

Minimum tillage tends to maintain the quality of soil aggregates and can maintain carbon storage in the soil. and this means it can reduce carbon emissions.

LAND PREPARATION WITHOUT BURNING

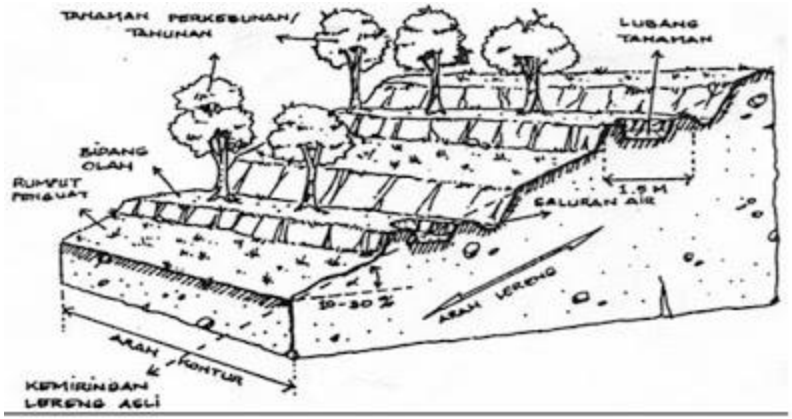
Farmers are accustomed to burn crop residues in preparing their land. Land clearing with burning can release **CO_2** into the atmosphere and can increase greenhouse gas emissions.

The practice of land preparation with burning should be discontinued. Farmers should be trained to turn agricultural waste into a source of organic fertilizer.

The use of organic fertilizer may increase the carbon deposits in the soil and reduce **CO_2** emissions.

REDUCTION OF EROSION PROCESSES

Erosion is a form of land degradation processes. Eroded soil can lose sources of land productivity. Organic matter and humus are the key of land productivity. Exfoliation of soil surface causes organic matter and humus to be oxidized and the fraction of carbon released into the atmosphere.



Gbr. 7 : Teras kebun

Some technical procedures has been developed to reduce soil exfoliation. Mechanical treatment and vegetation method are the best way for this issues. Terracing the slope would be able to reduce the water flow speed over soil surface (run-off), and Vegetation planting is practical way in increasing soil organic matter content and reduce soil erodibility.

INCREASING CARBON DEPOSITS IN THE SOIL

REDUCING SYNTHETIC FERTILIZER

The use of synthetic fertilizers, especially nitrogen fertilizers can stimulate the greenhouse gases. **N_2O** and **N_2** from denitrification process is one of negative contribution of agriculture to the greenhouse gas effect.

Improvements of application of synthetic N-fertilizer should be taught to farmers. Methods of broadcasting application should be reduced. Replacing synthetic fertilizer with organic fertilizer is not an easy method. But a combination of both (synthetic and organic fertilizers) is an initial step towards organic farming.

MULTIPLE CROPPING/INTER CROPPING

Multiple cropping is planting method with two or more crops on the same field in one year. Multiple cropping systems result in efficient use of land resources

Growing two or more crops in the same field during the same year is usually done either simultaneously (intercropping) or in sequence (double cropping)

Intercropping is defined as the growth of more than one crop species or cultivar simultaneously in the same field during a growing season. It is the practical application of ecological principles such as biodiversity, crop interaction and other natural regulation mechanisms.

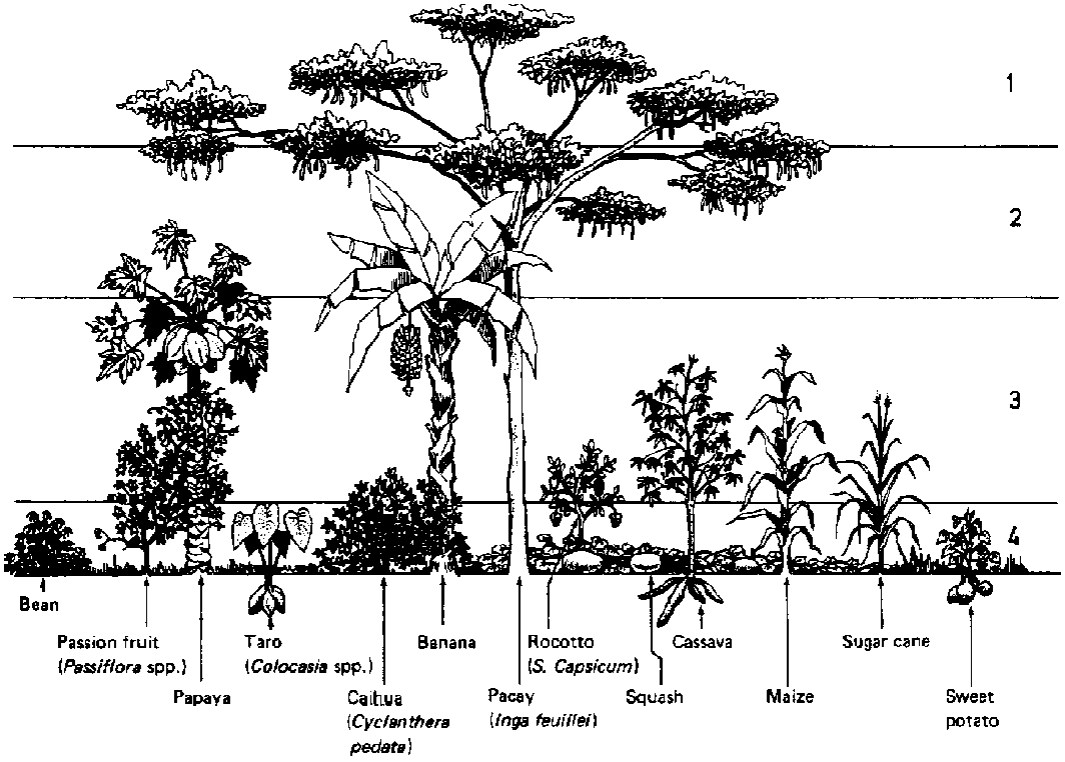
Intercropping has many advantages, mainly related to the complementary use of environmental resources by the crops component which results in increasing and more stable yields, better nutrient recycling in the soil, better control of weeds, pests and diseases and an increase biodiversity.

GREENING THE EARTH's SURFACE

REVEGETATION, AGROFORESTRY

Revegetation is changing the face of rural landscape. Based on this idea, vegetation play a major role in regulating the global C-cycle. Vegetation is an efficient system in reducing carbon concentration in the atmosphere and this is mean can control the climate change.

Agroforestry can boost synergy between adaptation and mitigation of climate change. Agroforestry performs well on the 2 above criteria and thus is a preferred approach to develop synergies between adaptation and mitigation



thank you