Environment and Soil

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The year 2015 was International Year of Soils

2015

International
Year of Soils

Extended to 2024 as
International Decades of Soils

Why Soil Year 2015?

- Healthy soil is a basis for healthy food production.
- Soils support our plant's biodiversity and they host a quarter of the total.
- Soil is a non-renewable resource, its preservation is essential for food security and our sustainable future.

Why Soil Year 2015?

- Soil stores and filter water improving our resilience to flood and drought.
- Soils are foundation of vegetation which is cultivated or managed for feed, fibre, fuel, and medicinal plants.
- Soils help to combat and adapt to climate change by playing a key role in the carbon cycle.

International Years preceding and following the Soil Year

Mountain (2002), Freshwater (2003),
Rice (2004), Microcredits (2005),
Deserts and Desertification (2006),
Polar Year (2007), Potato (2008), Natural Fibres (2009),
Biodiversity (2010), Forests (2011), Cooperatives (2012)
Quinoa (2013), Family Farming (2014), Soil (2015),

Pulses (2016), Sustainable Tourism for Development (2017)
Millets (2019), Plant health (2020),
Fruits and Vegetables, or Tea (candidates for 2021)

What is Soil ? (1)

Soil is a Natural product.

- Soil is created from minerals, water, air, and biota under the interrelationships between these factors, reflecting the surrounding environments on the surface of earth.
- Soil is one of the bases for all the living activities on the earth.

Soil is a product of natural environment.

- Geology
- Land shape
- Amount and quality of water
- Climate and meteorological condition
- Vegetation
- Soil microbes, Soil animals
- Time

Definition of Soil by JSSPN

(Interim, unofficial translation by K.Tsutsuki)

- Soil exists in the surface or below shallow water on the surface of earth. Under the interaction of the weathering of rocks, transportation by water and wind, sedimentation and biological processes, organic matter and minerals are mixed and constituted naturally. It supports the life, holding and circulating substances on earth, but changes according to surrounding environment.

What is Soil ? (2)

Soil is a Man-made product.

- Human can work on soils, and change the soil properties so that he can obtain his desired products.

- → Soil is a basis for agricultural production.

Soil is an artificial product for human

- Soil maybe deteriorated depending on the human activity on it.
- It is due to the bias in the purpose of human, and also because human does not have a long vision.
- Human can not create soil. He can only change it.

Soil is controlled by human environment

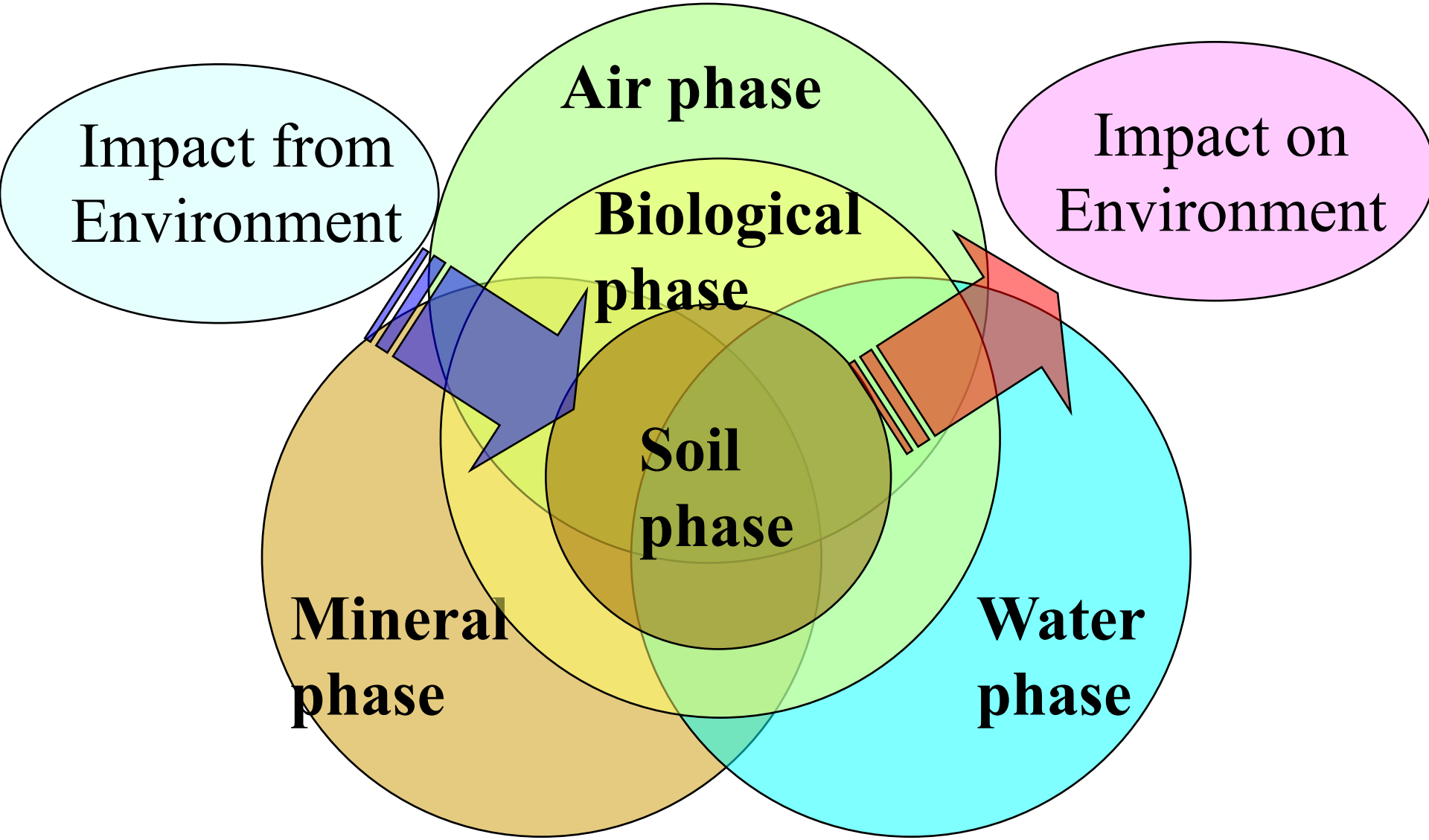
- Agricultural land development, irrigation, and drainage
- Crop cultivation
- Plowing（Man・Animal・Machinery powered）
- Organic matter application
- Fertilizer application
- Weed and pest control
- Soil contamination（Fertilizer, pesticides, radio-active pollutants）
- Agricultural policy. State of agriculture in national consensus.

We are making light of soils

- Soil is educated little in the Japanese compulsory education.
- It is due to the guideline for teachers issued by the ministry of education.
- Education of soil is left to the hands of individual teachers, but without the official manual and sufficient time, it is difficult.

Why soil is not respected in education?

- Though soil exists universally, it also differs from place to place.
- Soil is composed from various constituents.
- Soil is too complicated and it is difficult to propose a fixed educational method or a scientific study method.
- Functions of soils are deemed to be replaceable by another means.



Evaluation of Soil Phase

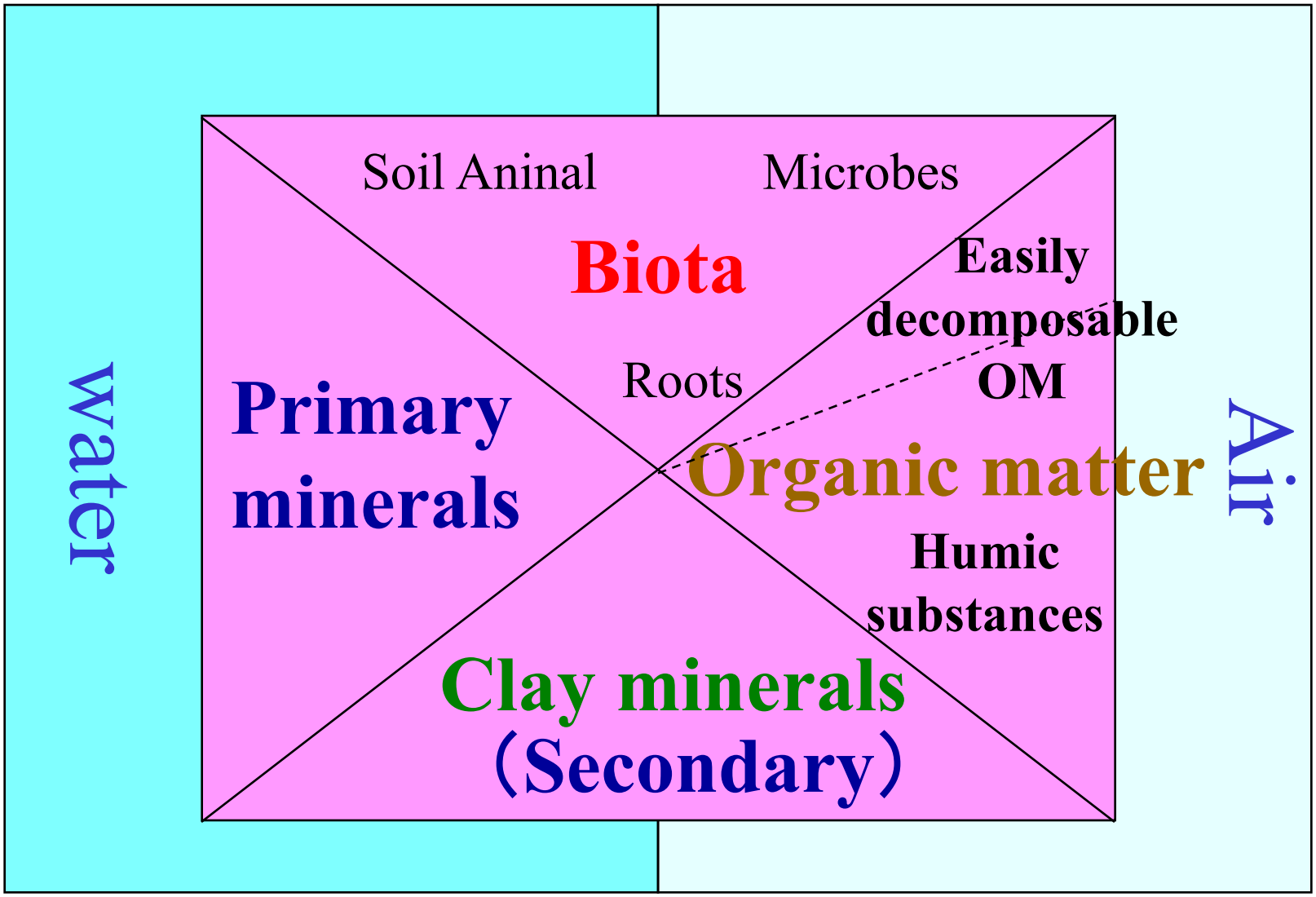
History of Earth and Soil

Years B. P.	Events	Air	Soil
4.6 billion	Birth of Earth		
4.0 billion	Sea of HCl	CO_2 97 %	
	Dissolution of minerals, neutralization of sea water		
	Precipitation of $CaCO_3$ in the sea (Lime stone)		
3.8 billion	Development of aquatic lives		
2.0 billion	sea algae (cyanobacteria, stromalite)		
		O_2 0.2 %	
0.6 billion	Lichen, terrestrial lives.	O_2 2 %	Initial Soil Formation
0.4 billion	Landing of Plants	O_2 21 %	Soil Formation
0.3 billion	Ferns, cycads		
65 million	Dinosaurs perished		
10,000	Homo sapience		
6,000	Start of Agriculture		Soil degradation

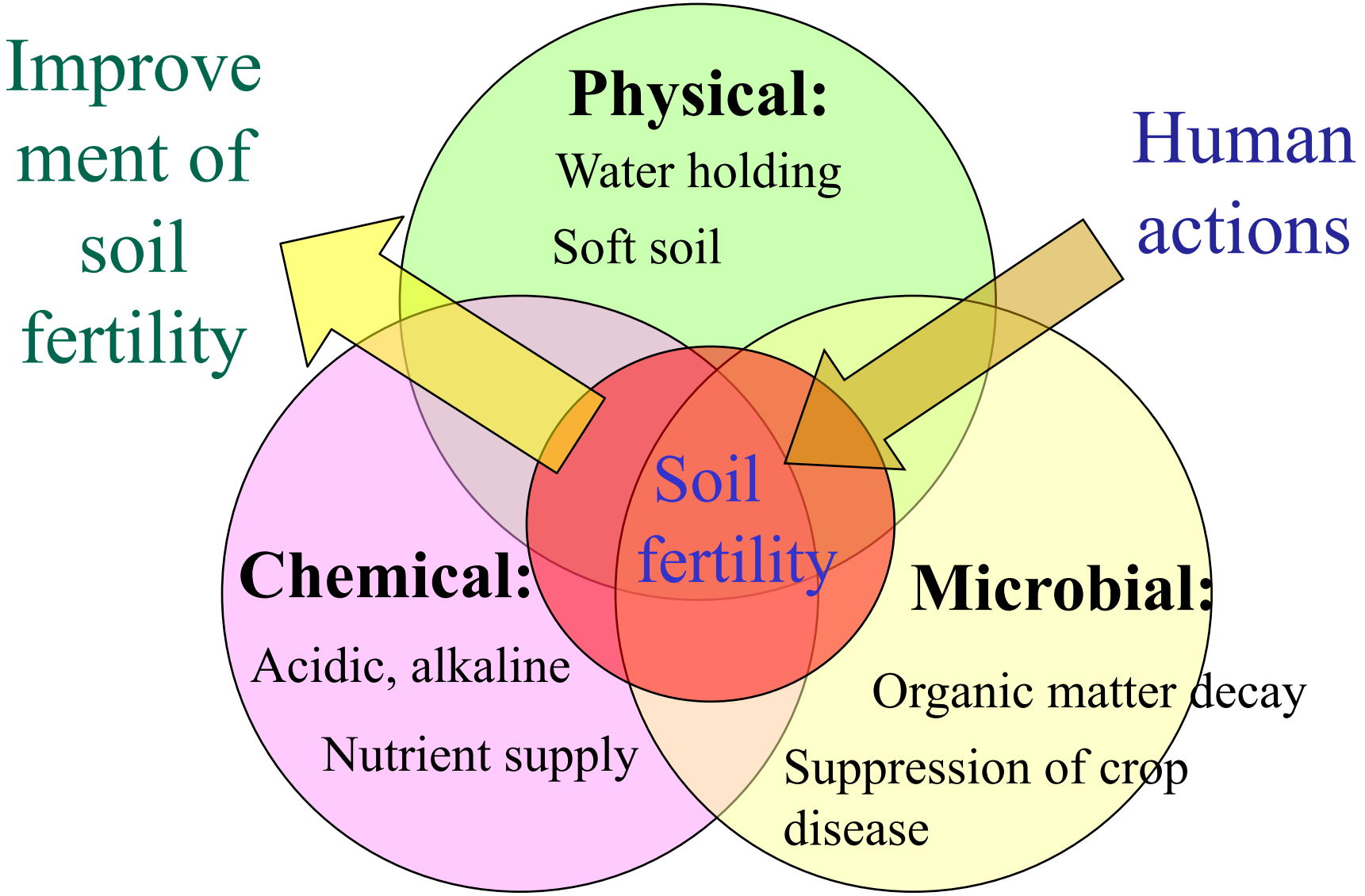
Fossil of Stromatolite

Initial photo-synthetic bacteria, released oxygen

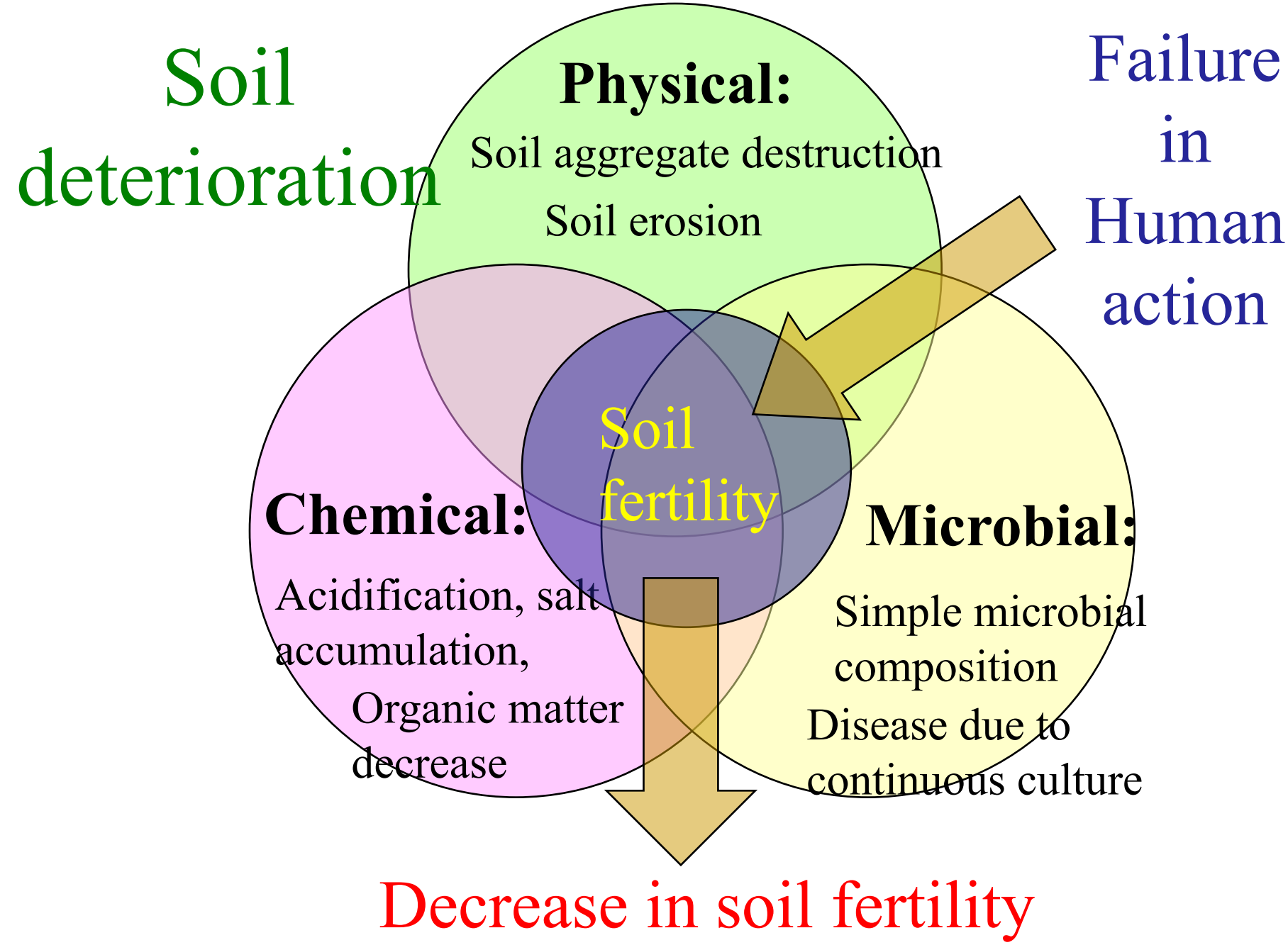
Bridging of anaerobic world to aerobic world



Composing factors of soil



Action of farmers on Soils


Soil deterioration
Physical:
Soil aggregate destruction
Soil erosion
Failure in Human action
Soil fertility
Chemical:
Acidification, salt accumulation,
Organic matter decrease
Microbial:
Simple microbial composition
Disease due to continuous culture
Decrease in soil fertility

What is Soil Fertility?

State I: Natural fertility

State II: Fertility realized by establishing the environmental condition so that crops can absorb nutrients smoothly

State III: Fertility realized by securing the quantity and quality of necessary nutrients to support the crop production

Human action

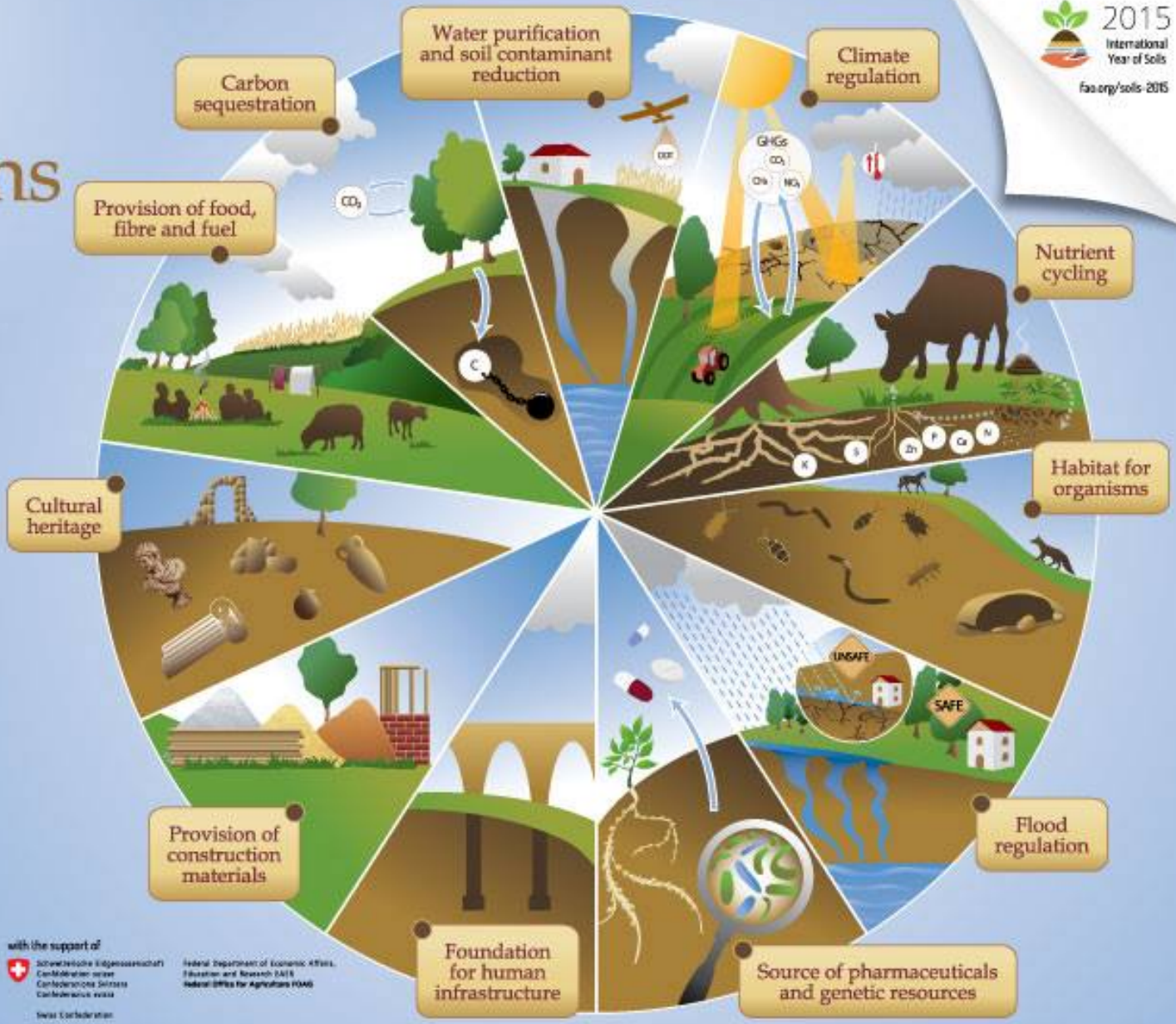
(Proposed by K. Kikuchi)

Functions of Soils

- **Supply nutrients to plants, animals and human**
- **Support the growth of plant roots**
- **Decompose organic matter（Complete circulation）**
- **Hold water**
- **Adsorb harmful substances**
- **Provide amenity for human life**

Soil functions

Soils deliver ecosystem services that enable life on Earth



2015 International Year of Soils

faoorg/soils-2015

Food and Agriculture Organization of the United Nations

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Functions of soils (FAO)

- Soil provides various services on ecosystem, and enables the continuance of life on earth.

Functions of soils (1)

- Provide foods, fibers, and fuels.
- Sequestration of carbon（Stabilization）
- Purification of water and remediation of soil pollutants.
- Climate adjustment
- Nutrient cieculation
- Habitat for soil lives

Functions of soils (2)

- Adjustment of flooding
- Supply medical and genetic resources
- Basics of infra-structure for human life
- Supply construction materials
- Preservation of human cultural heritage