Status and challenges of soils for nutrition

Vinisa Saynes Santillán
FAO-Global Soil Partnership Secretariat

SOILS: WHERE FOOD BEGINS

Global Symposium on Soils for Nutrition | 26-29 July 2022

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Soils perform functions, directly and indirectly, related to ecosystem services

95 % of our food comes from soils

99 % of calories and 93 % of protein come from plants and animals … that all depend - directly or indirectly - on soils!

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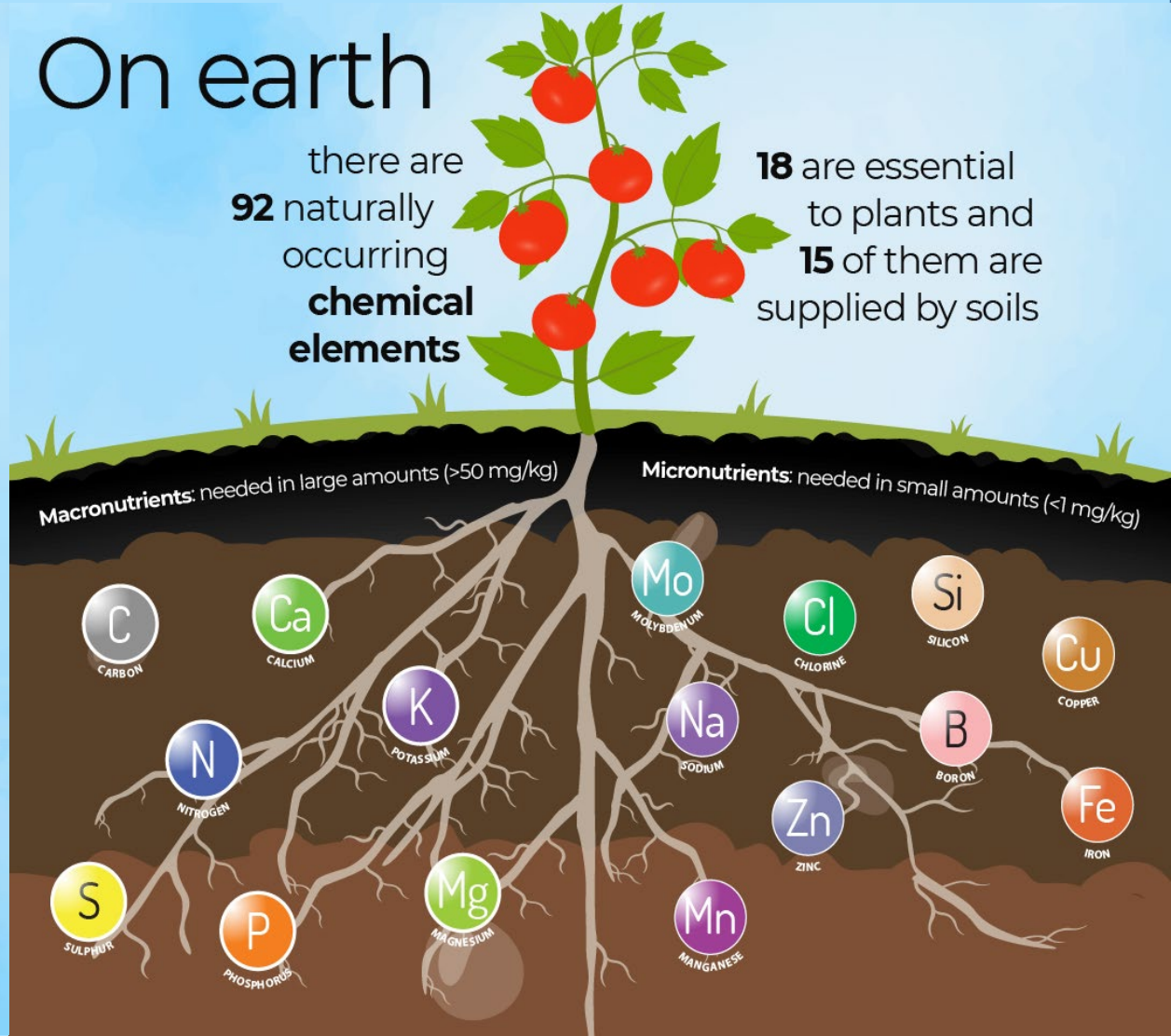
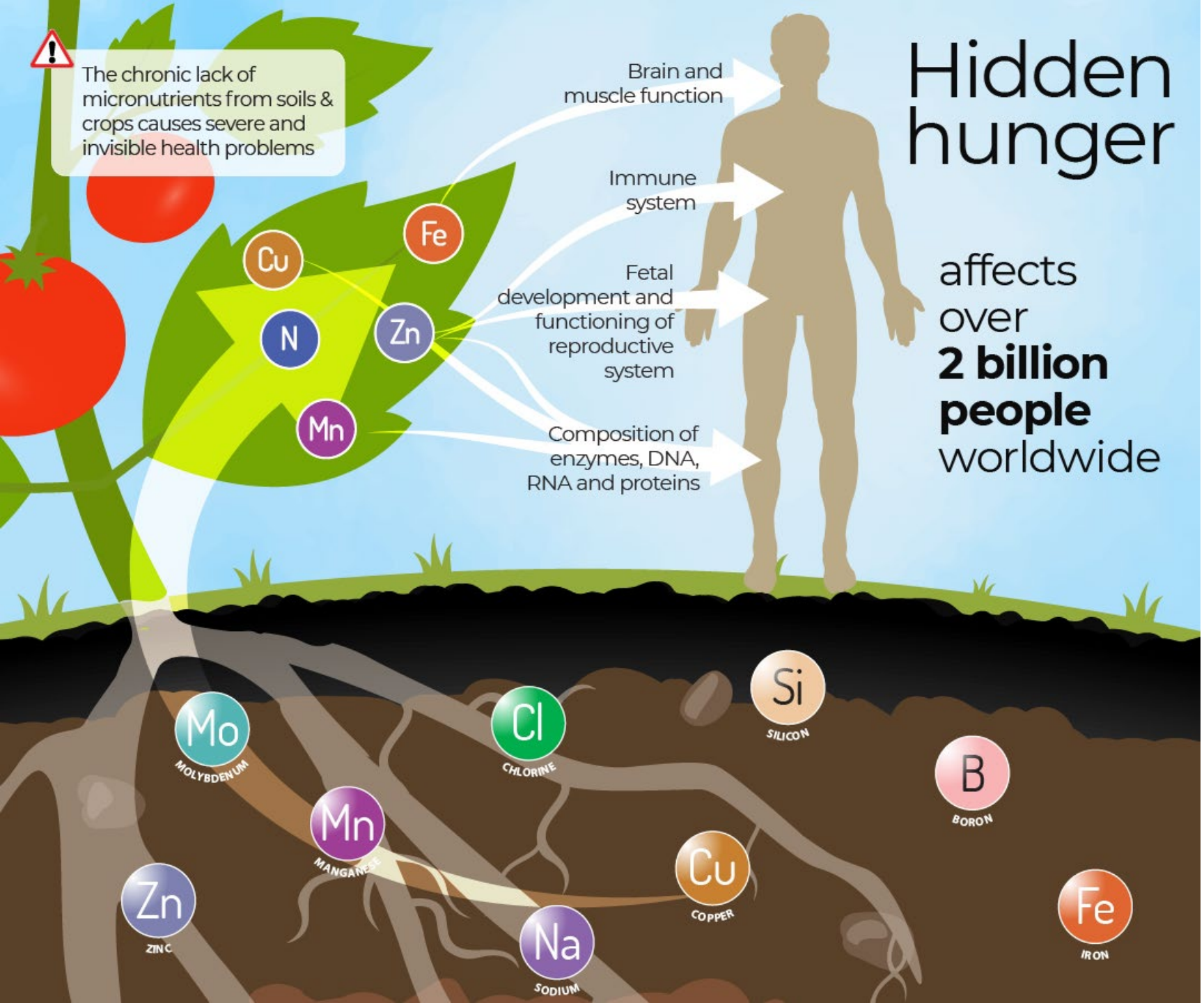
What do soils have to do with nutrition?





What do soils have to do with nutrition?

Fe deficiency: anemia

Zn deficiency: central nervous system gastrointestinal, immune, epidermal, reproductive, and skeletal sytems

Micronutrient deficiencies are now recognized as one of the leading causes of worldwide illness burden.

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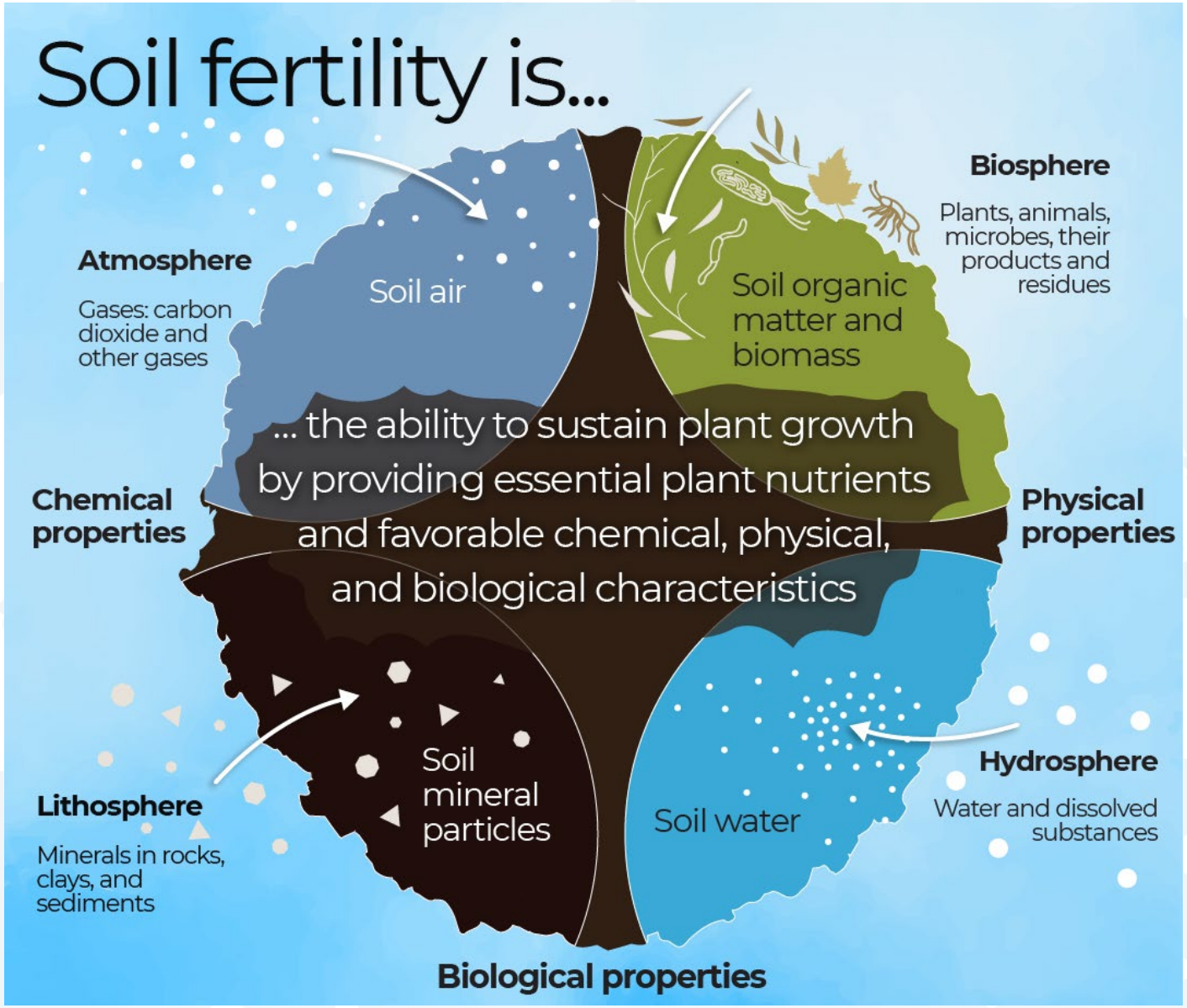


What makes the transformation and availability of nutrients in soils possible?

Soil fertility!

Soil fertility depends on three key features, **physical**, **chemical** and **biological** properties, on which the supply of nutrients and the support for plant growth are based.

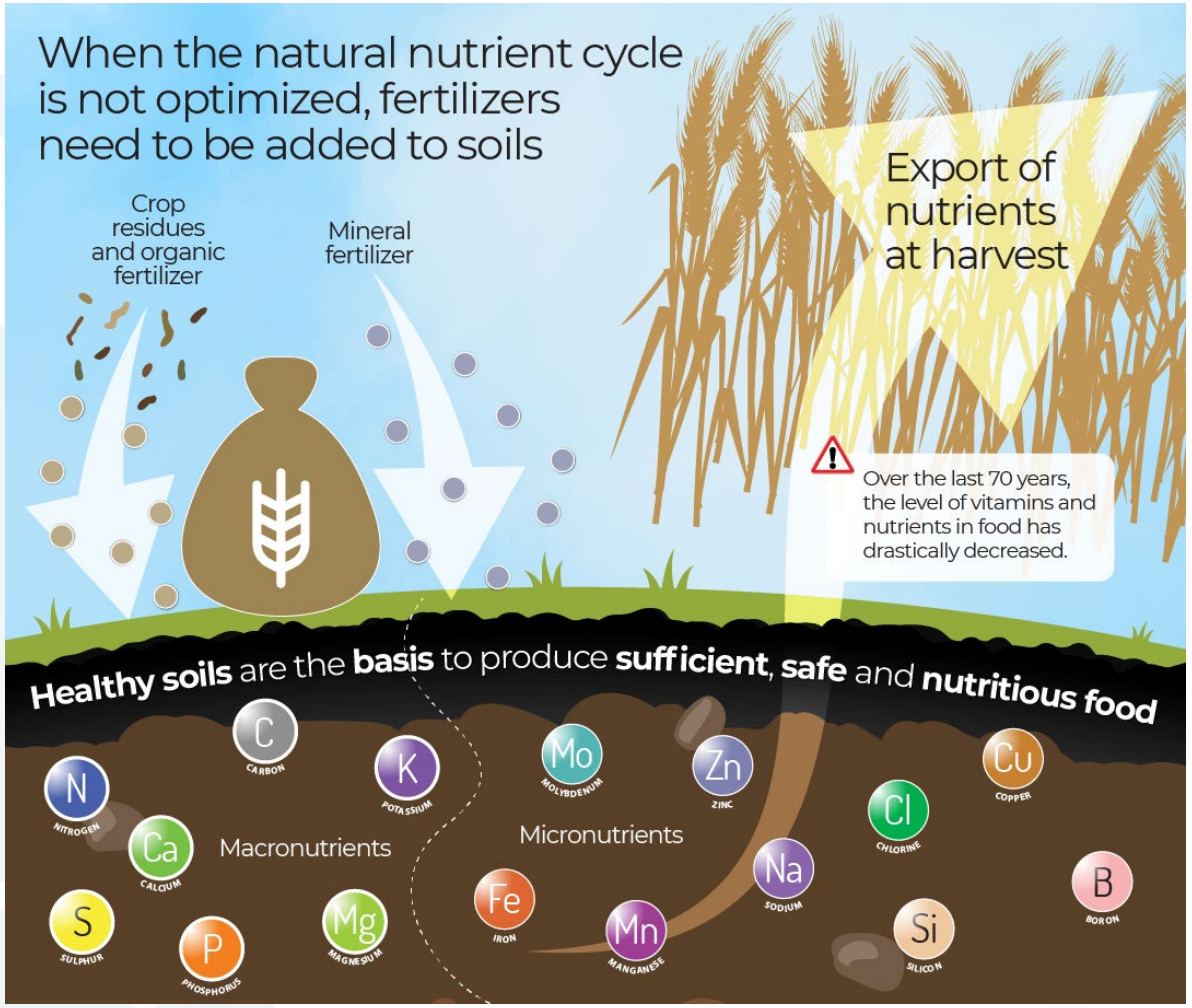
Soil fertility is being lost

- ✓ Unsustainable agricultural practices such as,
  - Intensive tillage
  - Lack of soil organic matter
  - Monocropping systems
- ✓ Misuse and overuse of nutrients
- ✓ Underuse of nutrients
- ✓ Affectations to soil biodiversity
- ✓ Soil degradation

Unawareness that soil is a living resource, not renewable in a human time scale

Unawareness of all the benefits that we obtain from soils.

….Soil is a hidden resource



Unprecedented global challenges

Food insecurity and malnutrition

66%

Two-thirds of the world's population is at risk of deficiency in one or more essential mineral elements

Hidden hunger affecting more than **2 billion people** in the world .

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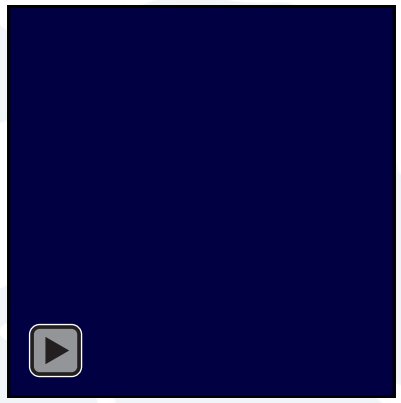
Soil degradation

33%

One third of the soils in the world are degraded.
Nutrient imbalances is one of the primary causes leading to soil degradation.



Global climate change and pollution

12% of annual anthropogenic GHG emissions worldwide

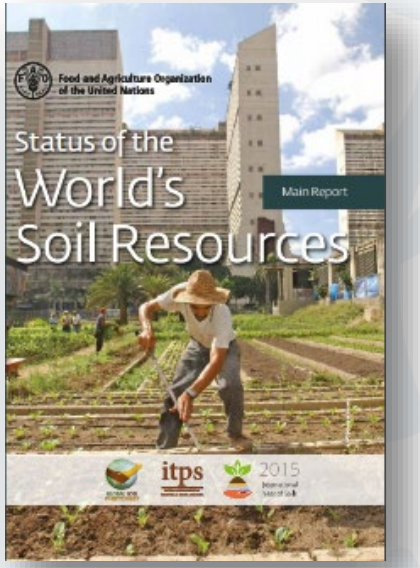
50% Half of the world's anthropogenic N_2O emissions are released during agricultural activities, which are dominated by N additions to croplands

Poverty, migration, war

26% Of the world population live in poverty

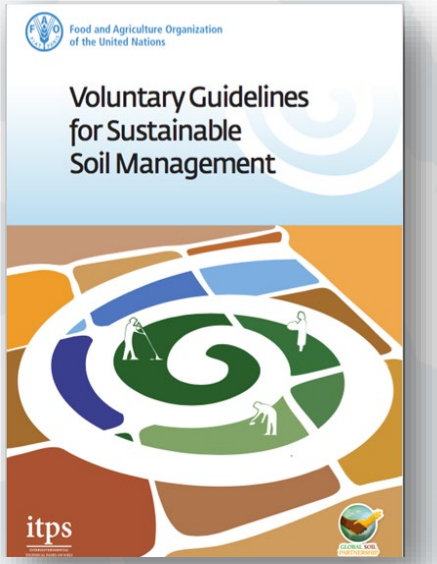
In 2017, there were **258 million international migrants**
In 2016, climate and water-related disasters were responsible for **23.5 million displacements.**

Soil threats and how to combat them



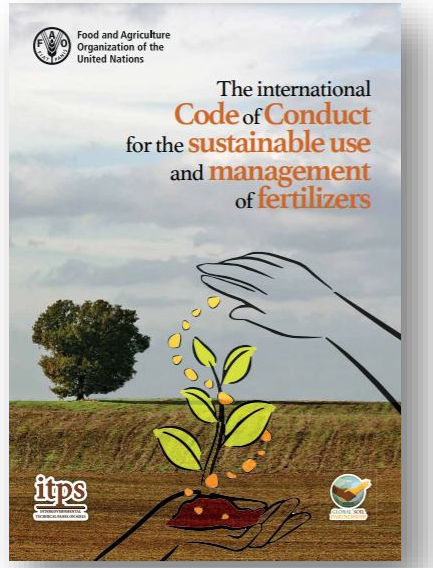
Main soil threats

1. Erosion
2. Soilorganic carbon loss
3. **Nutrient imbalance**
4. Salinization
5. Soil biodiversity loss



What to do?

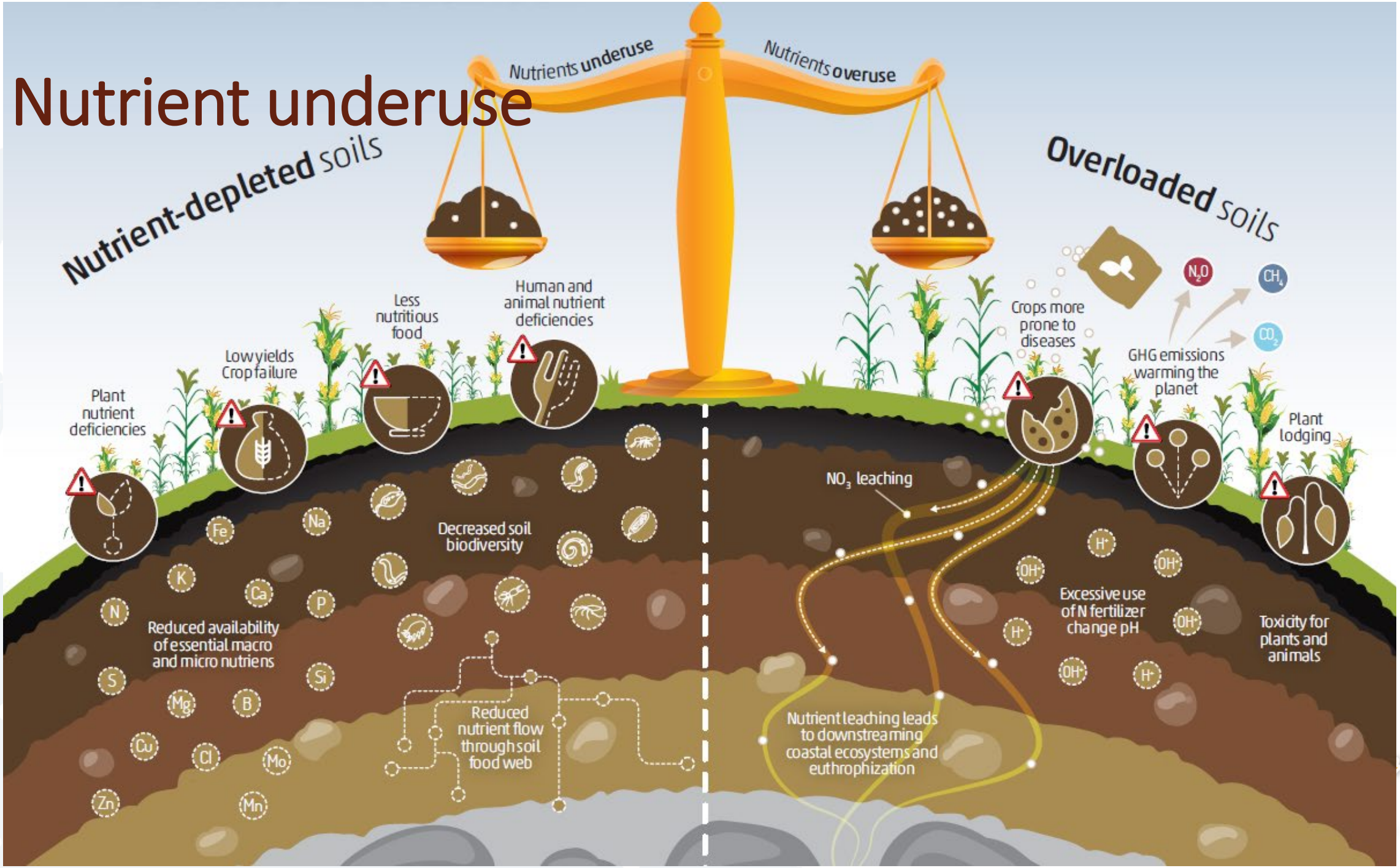
1. Minimize soil erosion
2. Increase the organic matter content of the soil
3. **Promote soil nutrient cycling and balance**



Avoid nutrient imbalances

1. Underuse
2. Misuse
3. Overuse

Nutrient underuse



Efficiency: about or lower than 50% for N, 10% for P, and 40% for K, meaning huge water and atmospheric losses to the environment.

Excess nutrients in agricultural soils lead to serious downstream **water-quality problems**.

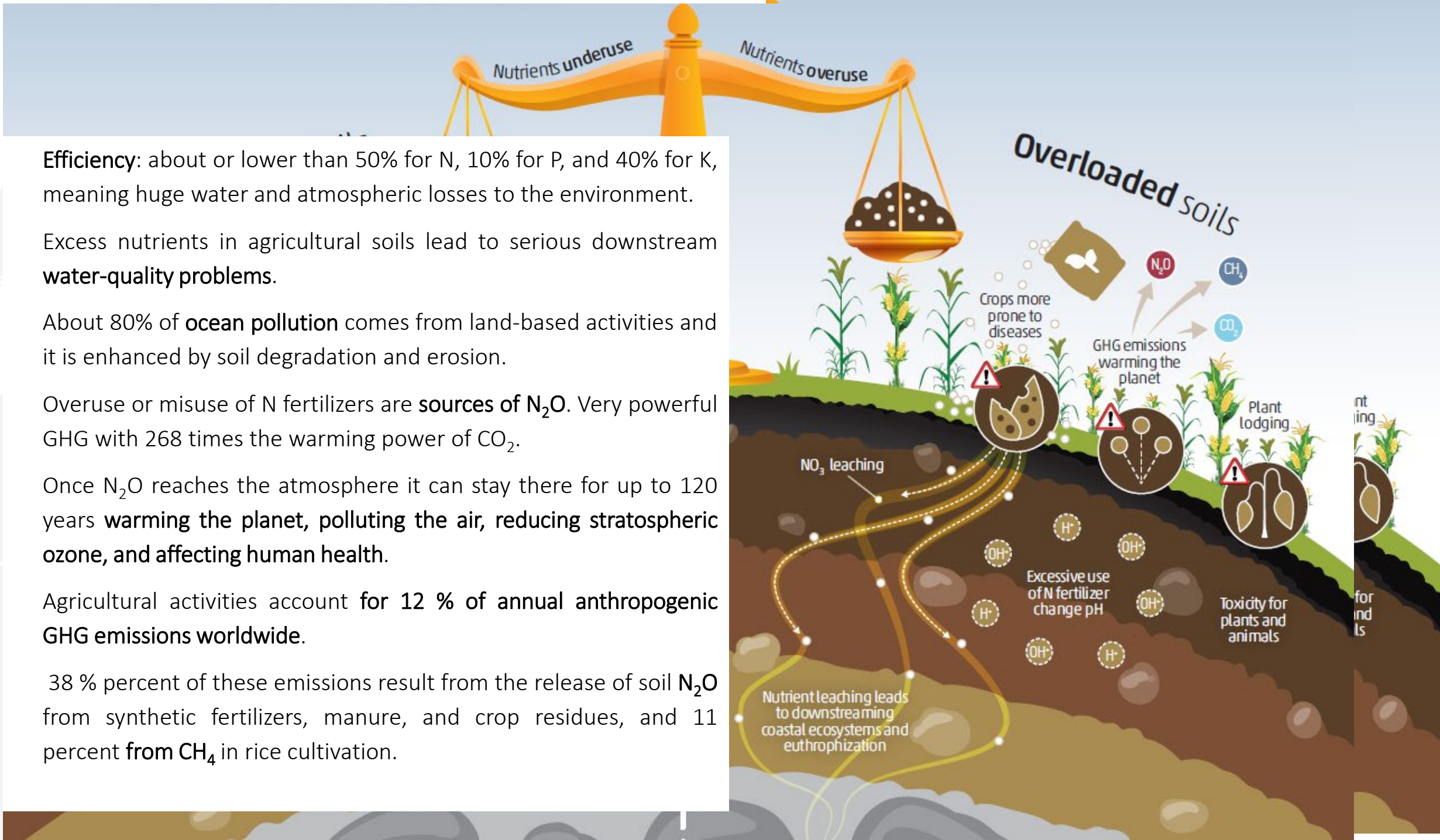
About 80% of **ocean pollution** comes from land-based activities and it is enhanced by soil degradation and erosion.

Overuse or misuse of N fertilizers are **sources of N_2O**. Very powerful GHG with 268 times the warming power of CO_2.

Once N_2O reaches the atmosphere it can stay there for up to 120 years **warming the planet, polluting the air, reducing stratospheric ozone, and affecting human health**.

Agricultural activities account **for 12 % of annual anthropogenic GHG emissions worldwide**.

38 % percent of these emissions result from the release of soil **N_2O** from synthetic fertilizers, manure, and crop residues, and 11 percent **from CH_4** in rice cultivation.



What are the alternatives?

INTEGRATED SOIL FERTILITY MANAGEMENT TOOLS

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imagery, models, calculators, and web tools

Soils4Nutrition Project

Federal Ministry of Food and Agriculture

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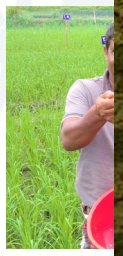

Crop

organic matter

cation

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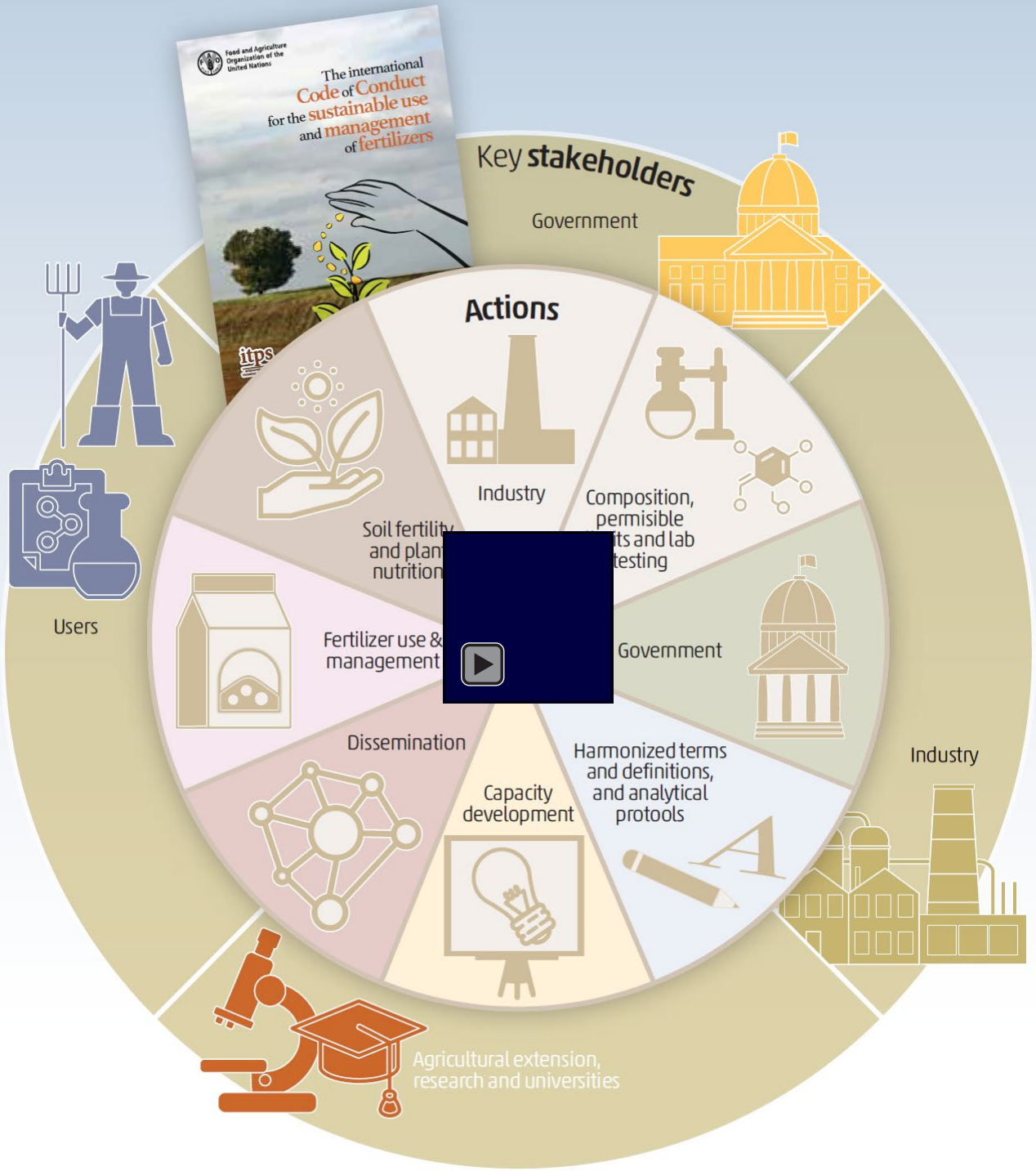

Tools to avoid nutrient imbalances

Fertilizer use must be guided by crop requirements, climatic conditions, and information on soil health status.

The Fertilizer Code shall guide the right use of fertilizers to avoid the misuse and overuse of fertilizers.

It is the product of the work of more than 50 top worldwide experts and associations.

The Fertilizer Code provides a locally adaptable framework and a voluntary set of practices to serve the different stakeholders directly or indirectly involved with fertilizers since the needs are different among stakeholders

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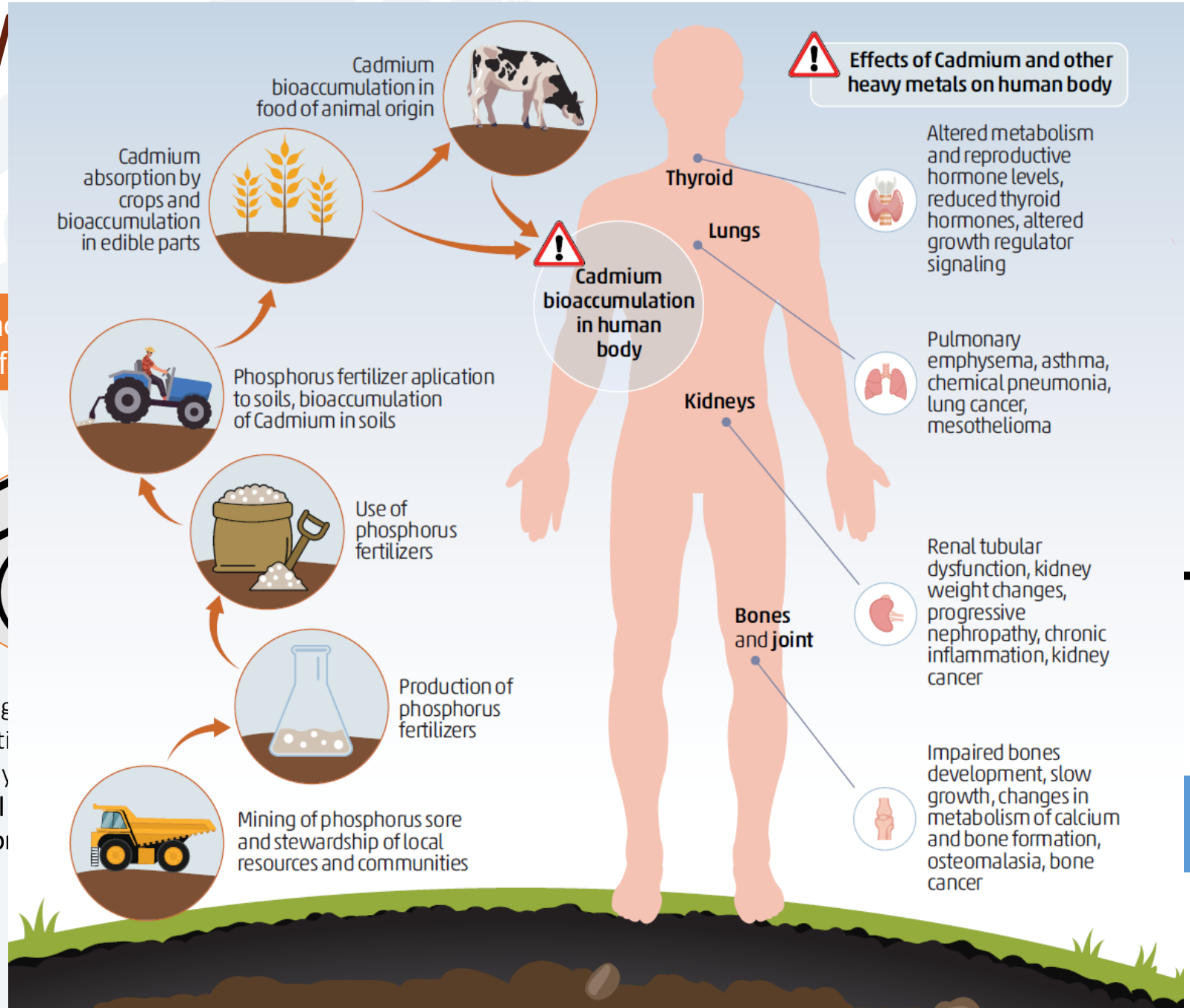


Strengthening of national capacities on sustainable soil nutrient management and **rising awareness** on the importance of physical, chemical, and biological soil properties for nutrient availability and cycling

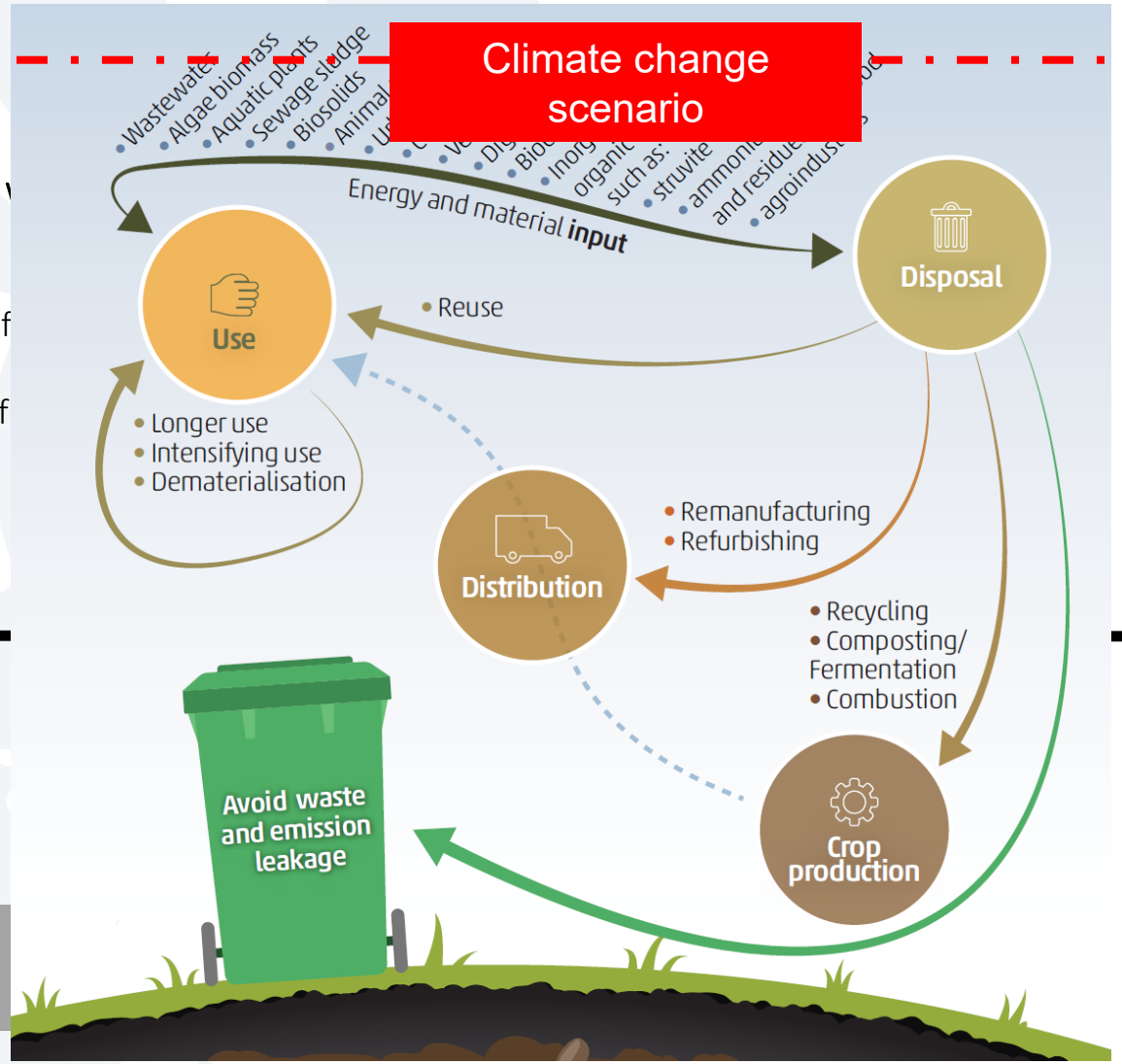
Empowering of farmers
Capacity development

What are the challenges?

Nutrition-sensitive agriculture

Not just more food, but also better food.
Attention must be put on the nutritional value of food looking also at micronutrients and not only focusing on crop yields.

Climate change scenario



Health and social and economic crisis.
COVID-19 and other diseases, social and military conflicts, and and fertilizer price increases aggravate food insecurity and further threaten soil health and fertility

Pandemics, social conflicts, and economy

What is expected from the symposium?

Global Symposium on Soils for Nutrition

Aims to:

Review the state of the art on the role of soil fertility in delivering sufficient, high quality, safe, and more nutritious food for better nourished plants, animals, and people.

It is expected to:

Identify critical knowledge gaps and provide the basis for discussion among key stakeholders on the: Creation of solutions that can provide more nutritious food
Enhanced One health
Protecting the environment.

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The four themes of the GSOIL4N

Plenary panels

Participation and interaction of experts from different perspectives

Parallel sessions and posters

The latest research and findings on the GSOIL4N themes

Key questions to be addressed

What is the outlook for soil fertility in the face of a challenging global scenario dominated by health crisis, food insecurity, fertilizer crisis, war, migration and poverty?

What are the alternatives to boost soil nutrients?

How do fertilizer misuse and overuse impact the environment and cause climate change?

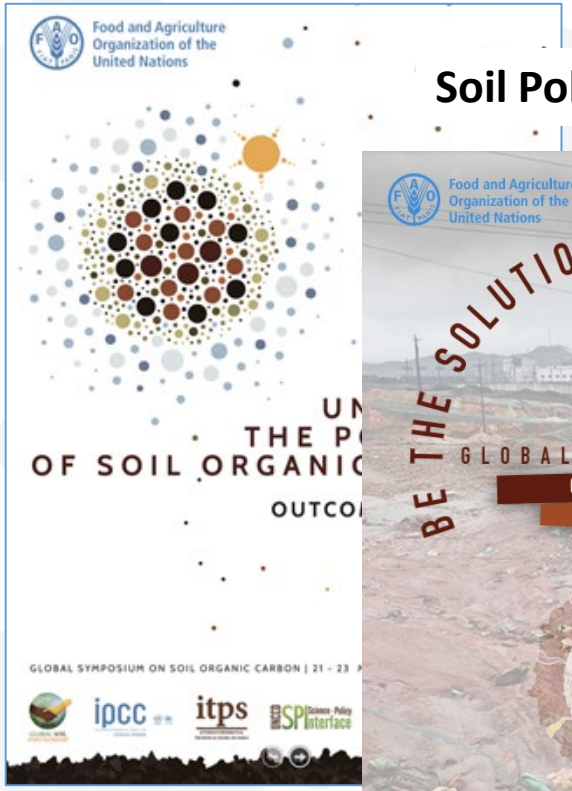
Do we really need fertilizers to grow crops?

How do policies and governance can support to overcome soil fertility loss and underuse, misuse and overuse of fertilizers?

What is the insight of the fertilizer industry in the face of a global scenario of underuse, misuse and overuse of fertilizers?

Symposium outcomes

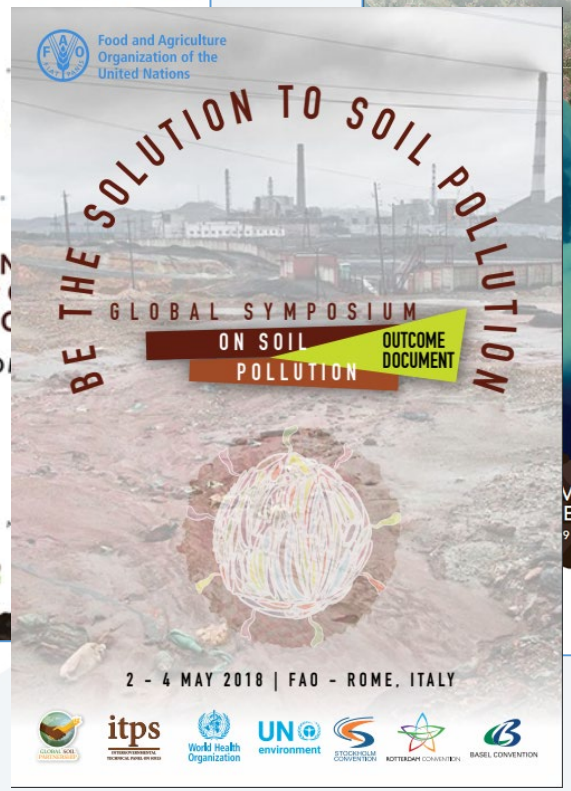
Soil Organic Carbon (2017)



Soil Erosion (2019)

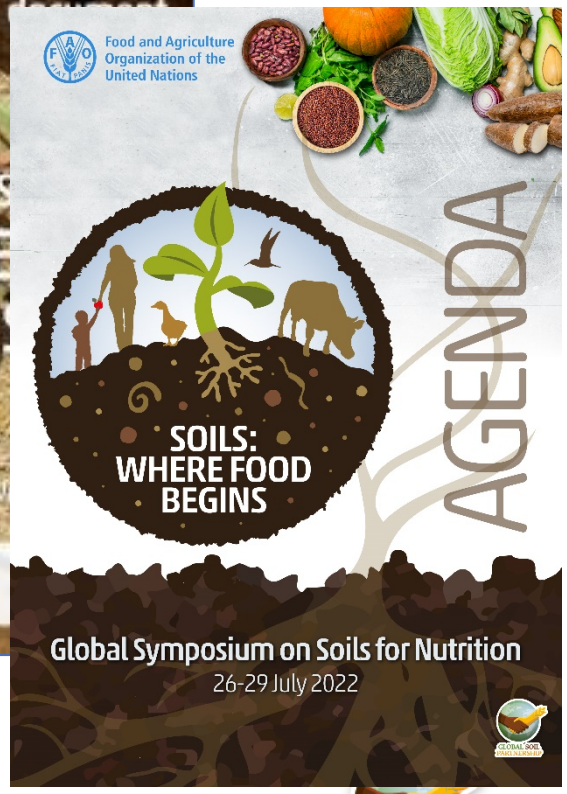
Soil Salinity (2021)

Soil Pollution (2018)



Soil Biodiversity (2021)

Soils for Nutrition (2022)



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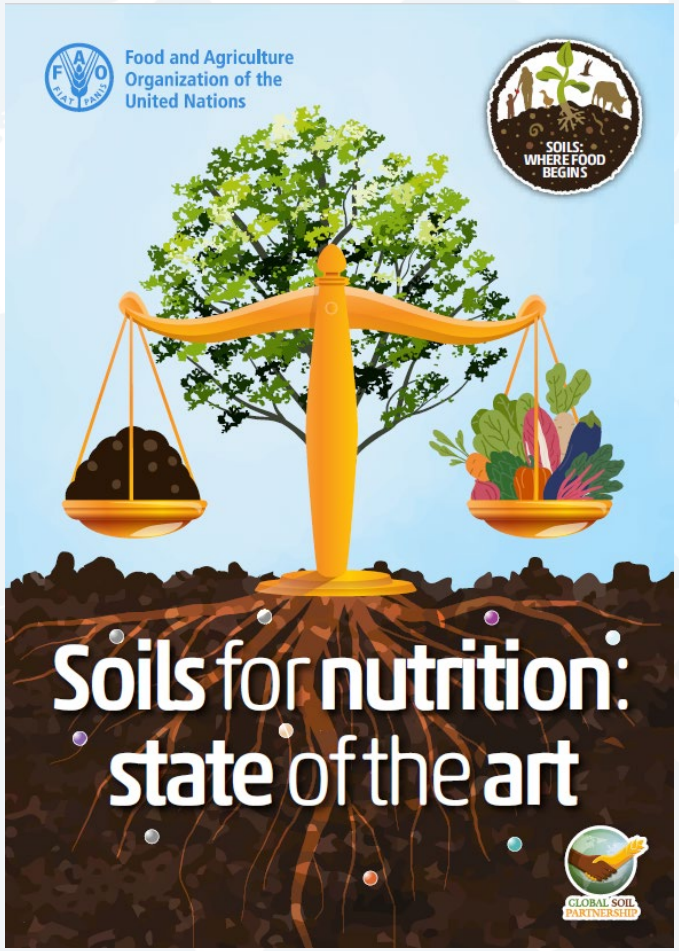
Soils for nutrition: state of the art

Federal Ministry of Food and Agriculture



- Available information & Knowledge gaps
  - Status and trends of nutrients needs and efficiency
  - Role of soils on nutrient assimilation
  - Impacts on misuse and overuse on environmental pollution and climate change
- Information to disseminate
  - Enhance soil health
  - Enhance nutritional food value
  - Ensure food quality and safety


Thank you !
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