HRZZ (Croatian Science Fundation) project:
"Assessment of conservation soil tillage as advanced methods for crop production and prevention of soil degradation"
ACTIVEsoil: IP-2020-02-2647

1st International Scientific Conference

"Agricultural Challenges to Climate Change"

"The role and status of modern agriculture in climate change – innovative and sustainable approaches"

Potential of conservation agriculture principles as respond on climate changes in crop production

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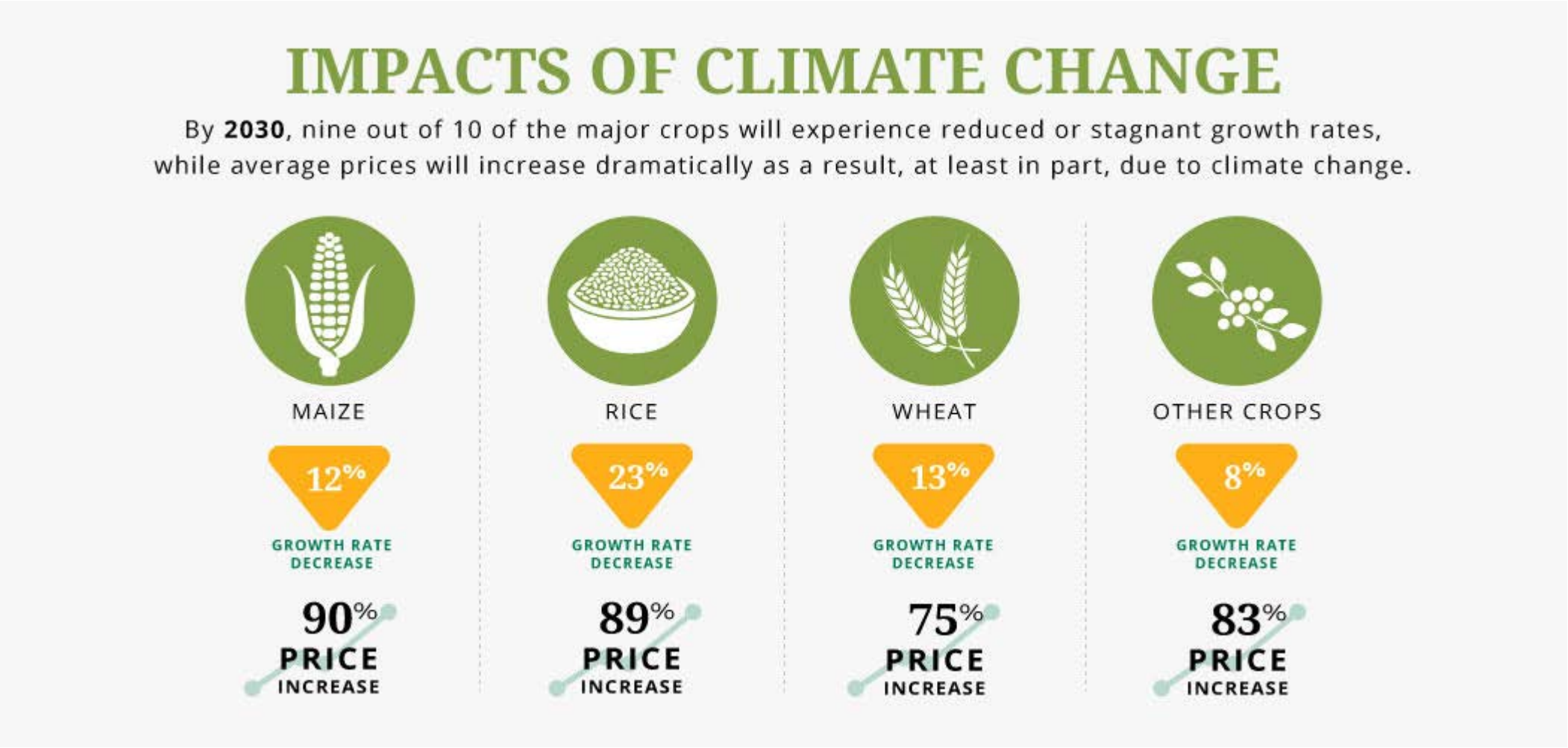
- Sustainable food production is one of the major challenges of the twenty-first century in the era of global environmental problems:

Climate change

Increasing population

Natural resources degradation

Agriculture is more vulnerable to climate change than any other sector. A warming climate could reduce crop yields by more than 25%, according to the World Bank



- Soil is most vulnerable natural resources and its quality status directly and indirectly influence human possibilities in food production.

- Healthy soil is essential for crop production (for human and livestock)
- Soil providing stable base to support plant roots, water and nutrient storage required for plant growth
- Industrial and modern agricultural practices lead to soil degradation

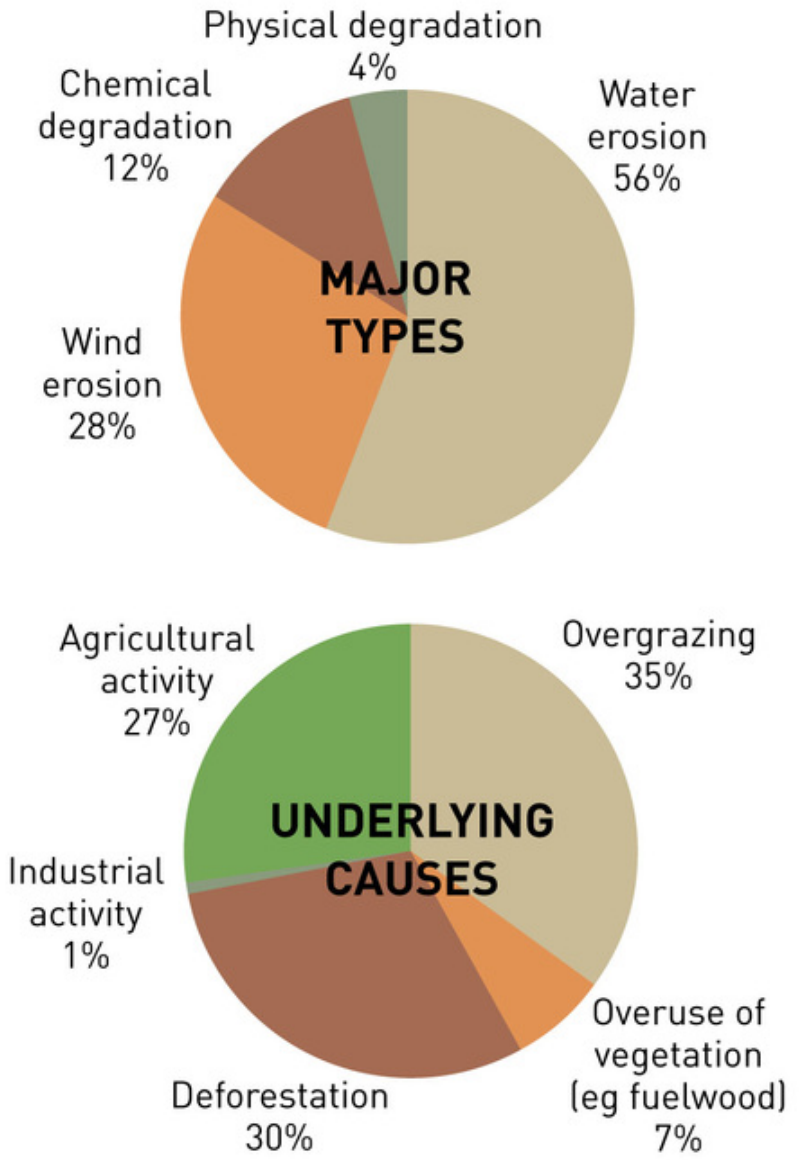
Soil degradation has multiple and complex impacts on the global environment through a series of direct and indirect processes that affect a large number of ecosystem functions and services, including climatic regulation, carbon sequestration, greenhouse gas emissions and increased biodiversity.

- Soil degradation is the decline in soil condition caused by its improper use or poor management, usually for agricultural, industrial or urban purposes.

- Soil degradation is a serious environmental problem.

- Soils are a fundamental natural resource, and are the basis for all terrestrial life. Avoiding soil degradation is crucial to our well-being.

Major types and causes of soil degradation



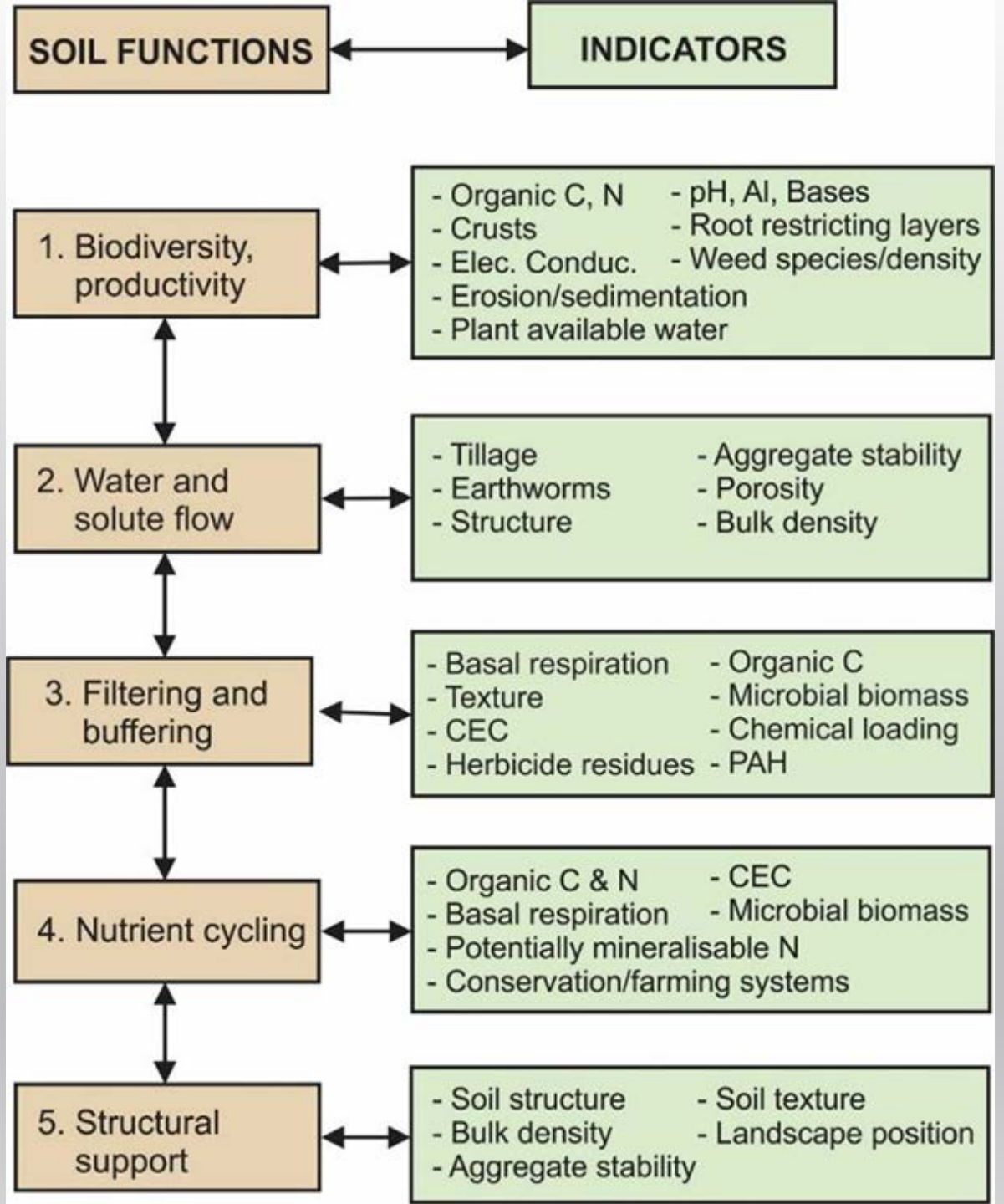
Source: FAO/UNEP

soil degradation is a decline in soil quality

SOIL QUALITY?

The capacity of specific kind of soil to function, whithin its natural or managed ecosystem boundaries, to sustain animal and plant productivity, maintain or enhance air and water quality and support human health and habitats.

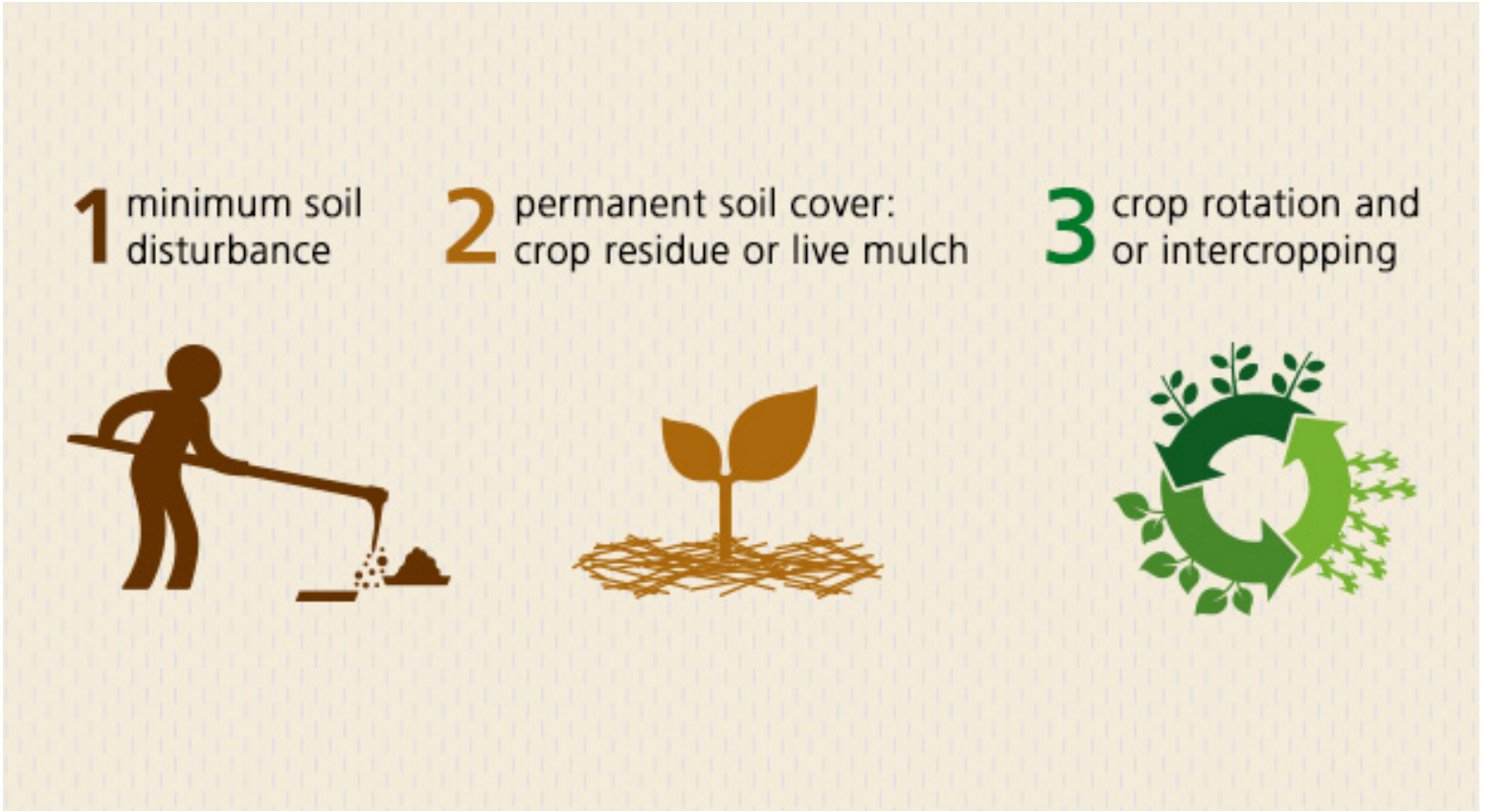
USDA (1994)



- soil quality can not be measured directly
- Indicators of soil quality should give some measure of the capacity of the soil to function with respect to plant and biological productivity, environmental quality, and human and animal health.

CONSERVATION AGRICULTURE (CA)

- ✓ a concept for resource-saving agriculture crop production which is based on enhancing natural and biological process above and below the ground
- ✓ CA has emerged as an alternative strategy for conserving natural resource



Conservation agriculture

CA affects many soil quality aspects:

- erosion (by water and wind),
- biogenity (organisms),
- organic matter (SOM),
- water content (storage, infiltration),
- compaction (anthropogenic or natural causes),
- nutrient status,
- pest and diseases (potential risk),
- weed infestation, in word physical,
- other physical, chemical and biological aspects.

- With application of proper crop management can decrease negative influence of climate changes
- CA need to be adapted and implemented according every single production area – agroecological conditions
- With application of crop management closer to CA principles, we can expect less damages and potential problems and risks

Issues	Conservation agriculture	Traditional agriculture
Tillage	Minimum soil disturbance	Disturbs the soil
Soil cover	Soil surface permanently covered	Leaves naked surface
Erosion	Minimum	Maximum
Soil physical health	Good	Poor
Soil compaction	Potential problem in initial stage!!! **can solve by using mulch and promotion of bio-tillage or some conservation tillage eq. subsoiling**	Reduces compaction by tillage operation/recompaction
Soil biological health	Enhancing biodiversity	Poor biodiversity
Water infiltration	Best water infiltration	Lowest water infiltration
SOM	Build up SOM	Oxidizes SOM and causes its lost
Soil temperature	Moderate	Variable
Production cost	Low	High

BENEFITS OF CONSERVATION TILLAGE

RESOURCES: TIME & MONEY

DECREASED labor time

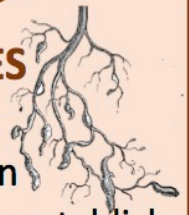
MORE family time

FEWER passes & **LESS** equipment wear & tear: **Average** - $5 per acre savings[1]

REDUCED fuel costs: **Average** - 3.5 gallons per acre savings[1]

SOIL HEALTH

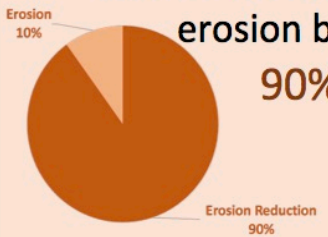
IMPROVES soil aggregation for roots to establish



INCREASES organic matter

FEEDING the biology

REDUCED soil erosion by 90%[1]



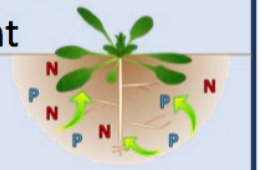
WATER

IMPROVES water availability

REDUCES sediment loading

IMPROVING water clarity

REDUCES nutrient runoff



REDUCING algal blooms & dead zones

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[1] Values cited from "Top 10 Conservation Tillage Benefits," Conservation Technology Information Center at Purdue University (2017)

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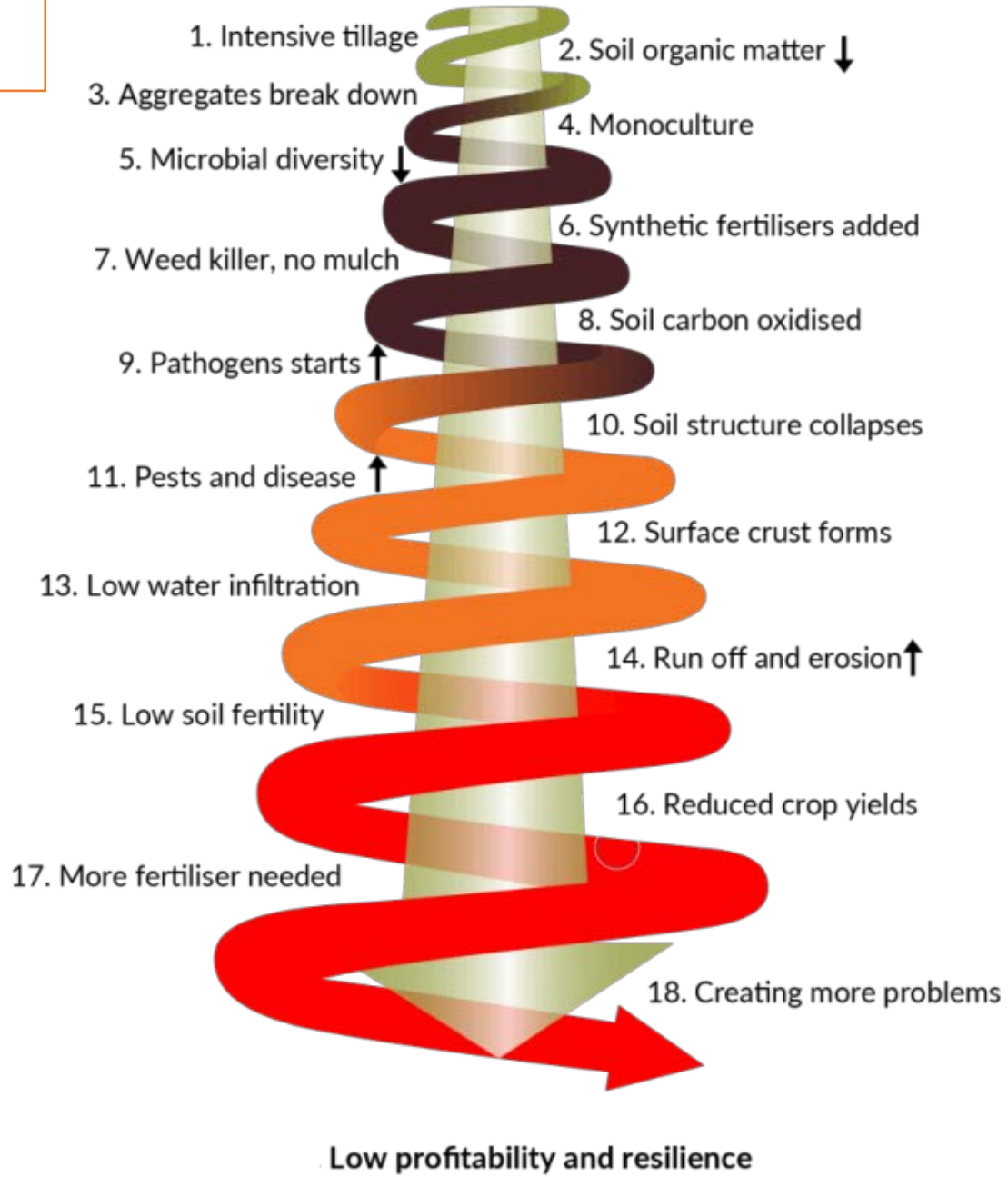
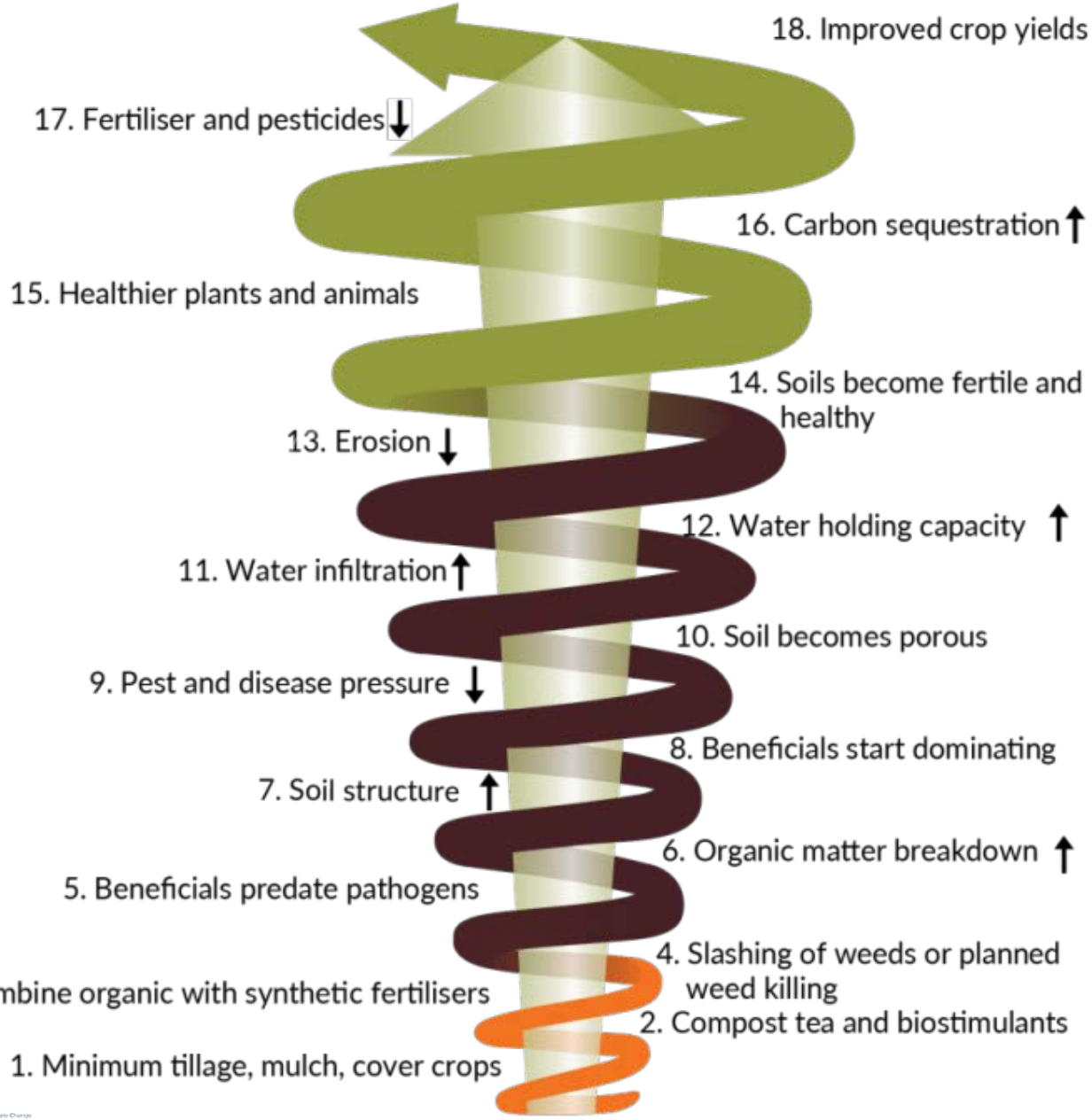
Conclusion



Higher Profitability, Resilience and Continuous Soil Regeneration



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ACTIVEsoil

http://www.activesoil.eu/index.php/en/

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