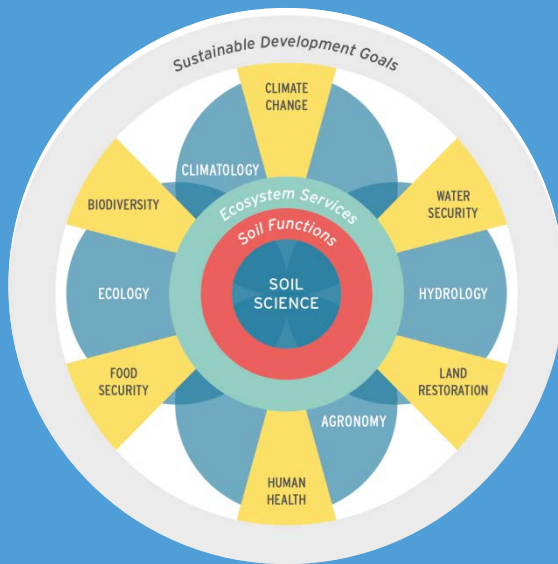


# Land and soil in the Sustainable Development Goals

Saskia Keesstra

19 September 2019





# SUSTAINABLE DEVELOPMENT GOALS:

## 1 UNIVERSAL AGENDA, 17 GOALS





# BUT:



FORUM paper: The significance of soils and soil science towards realization of the UN sustainable development goals (SDGs)

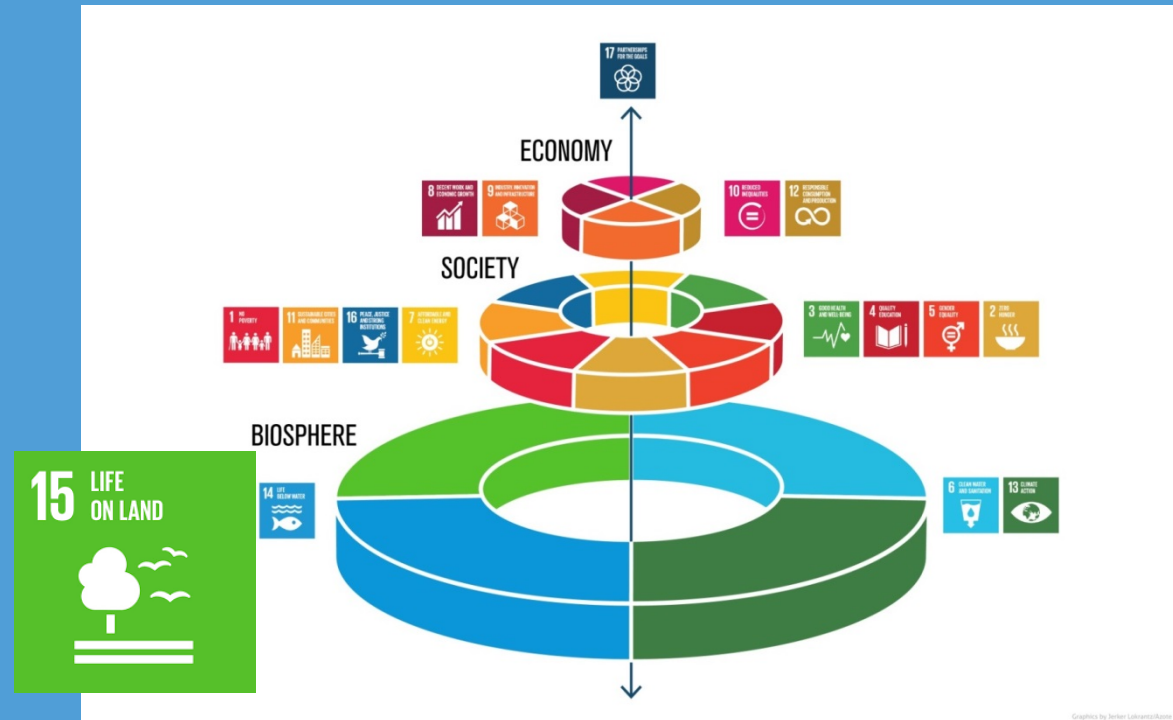
Keesstra, S.D., Bouma, J., Wallinga, J., Tiftonell, P., Smith, P., Cerdà A., Montanarella, L., Quinton, J., Pachepsky, Y., van der Putten, W.H, Bardgett, R.D, Moolenaar, S., Mol, G., Fresco, L.O.



# 2030 is tomorrow!

Growing pressure on land and ecosystem services:

- Growing population and middle class
- Growing needs for natural resources
- Climate change





# 2030 is tomorrow!

- Political agenda, policy processes and bio-physical processes not at the same pace
- Political agenda: SDGs achieved in 2030.
- BUT: after almost 5 years: limited implementation of SDGs at national, European and global level





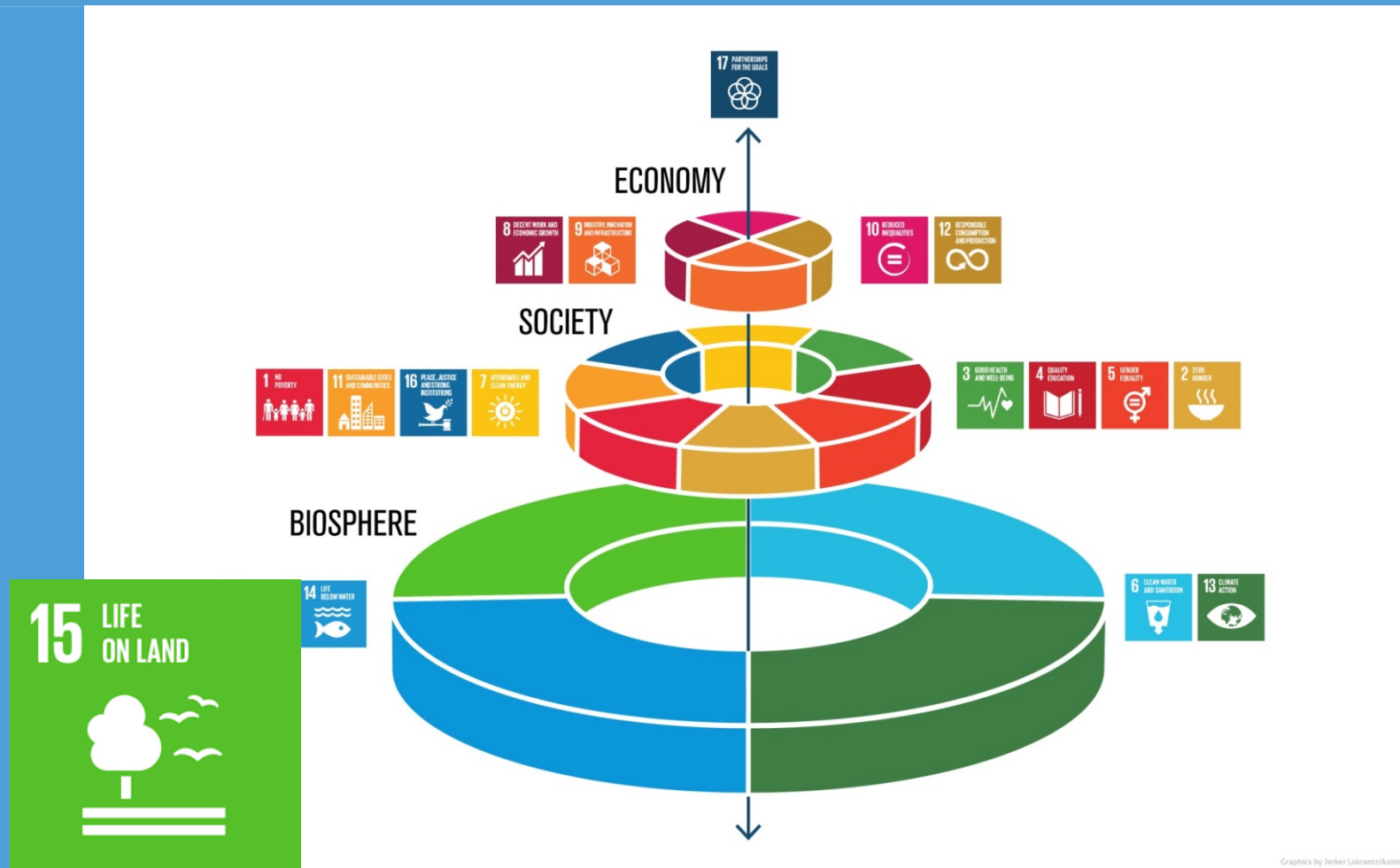
# What do we need to solve this problem

- Create ambition to protect and restore the eco- and geosystem services the environment provides
- Develop **economic** measuring and modelling tools
- Create economical sustainable solutions  
based in science: Sustainable robust economy





# Systems approach: Soil-sediment-water system: basis for solutions for societal issues

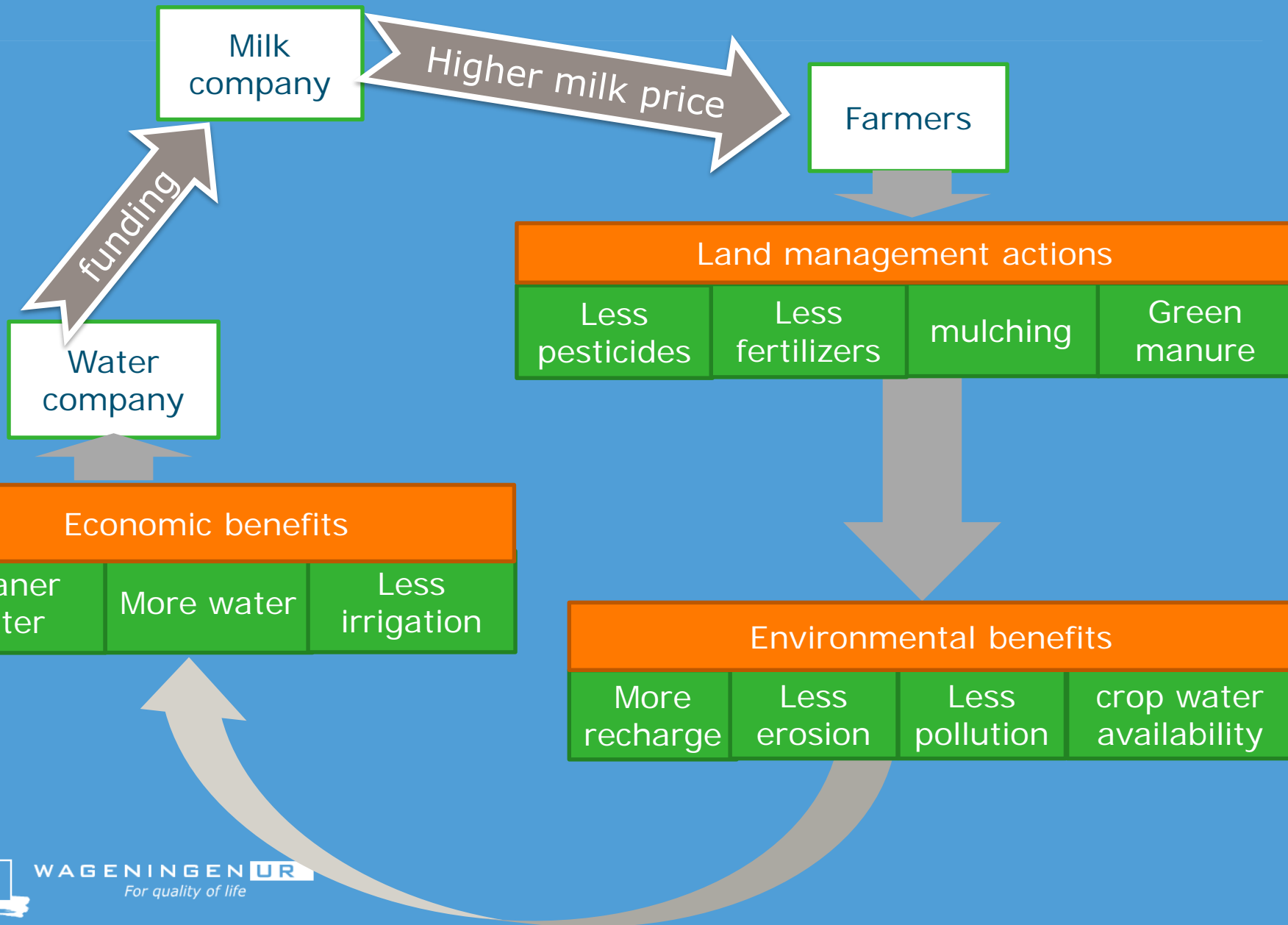


Graphics by Jerker Lohrman/Kaste



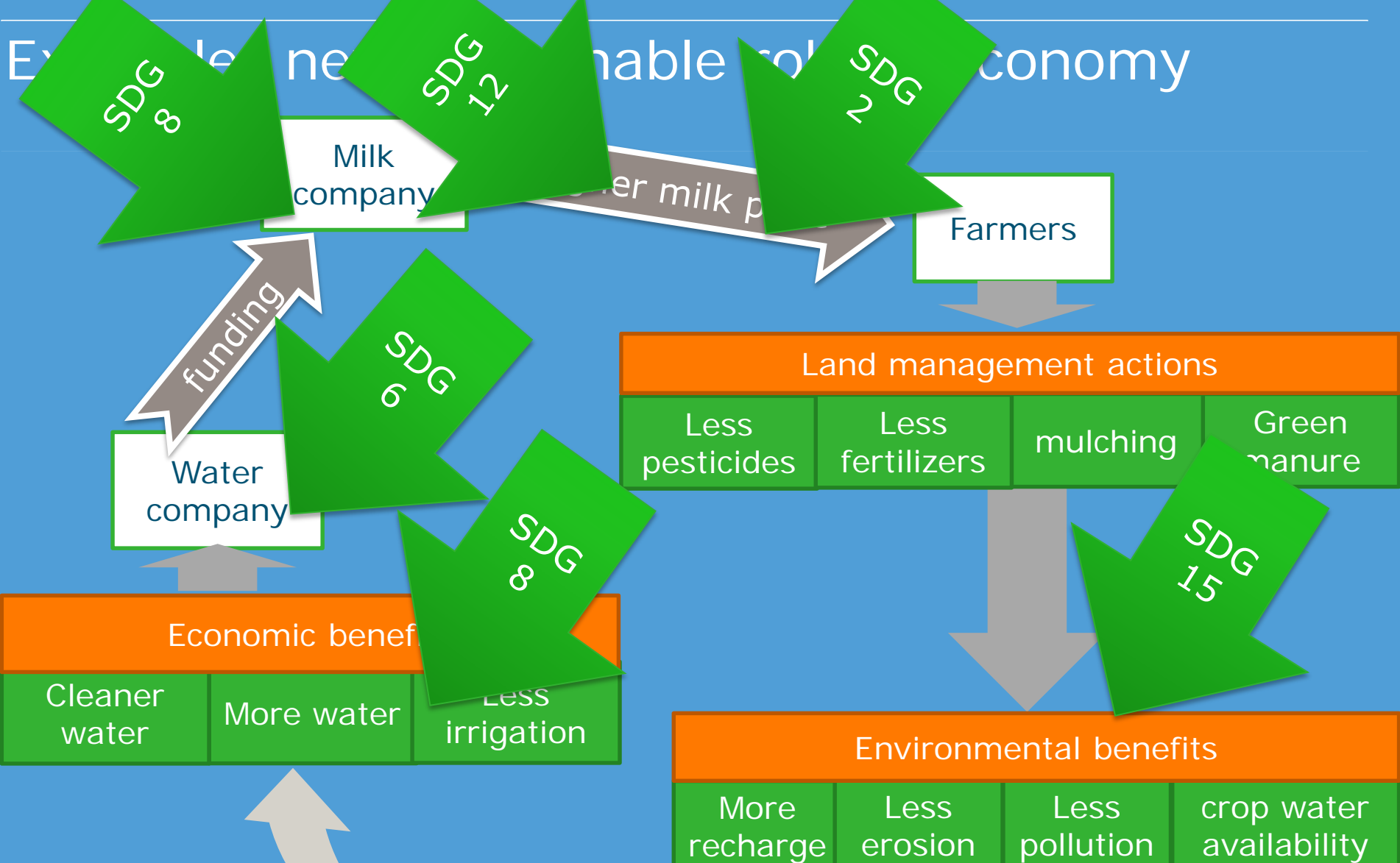


# Example: new sustainable robust economy





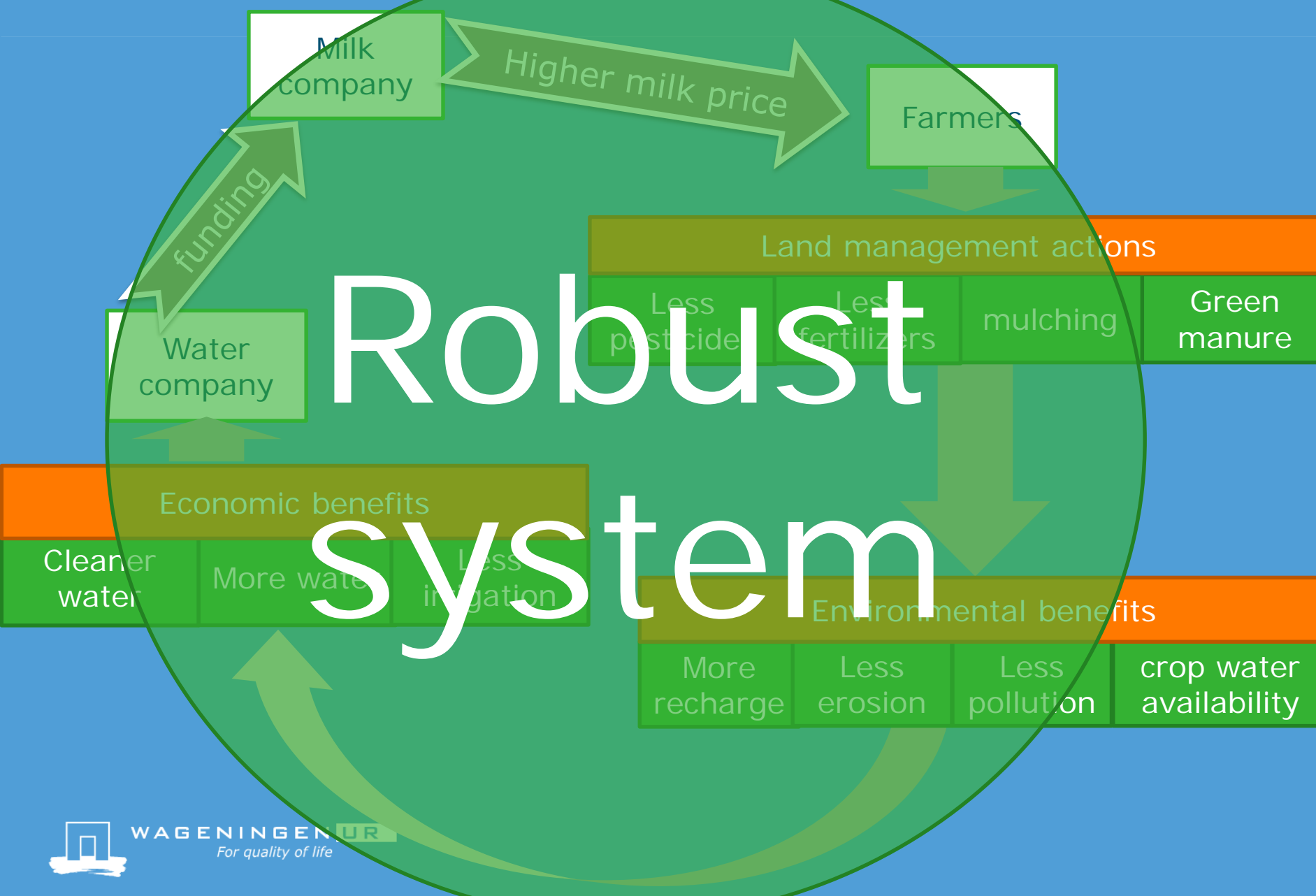
# Example: new sustainable solution for economy



2	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
6	Ensure availability and sustainable management of water and sanitation for all
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work
12	Ensure sustainable consumption and production patterns
13	Take urgent action to combat climate change and its impacts
15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss



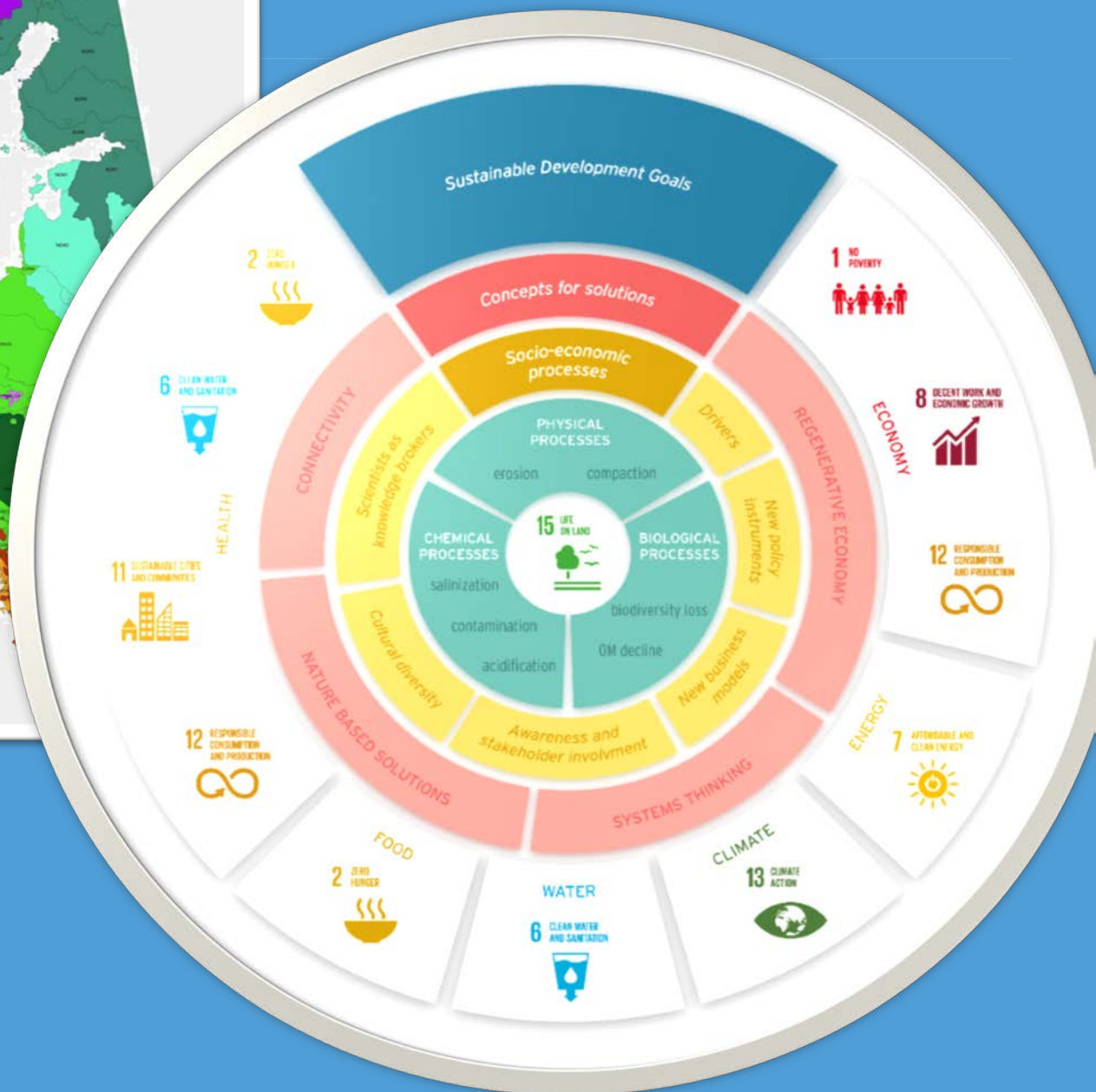
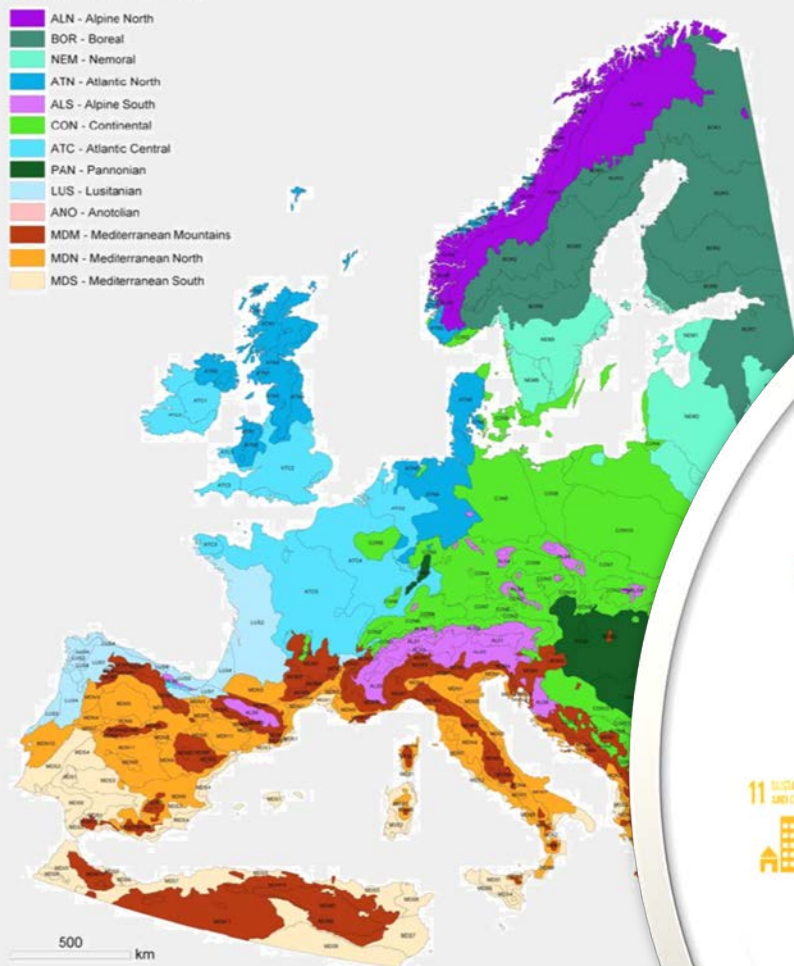
# Example: new sustainable robust economy





# Environmental Zone

- ALN - Alpine North
- BOR - Boreal
- NEM - Nemoral
- ATN - Atlantic North
- ALS - Alpine South
- CON - Continental
- ATC - Atlantic Central
- PAN - Pannonian
- LUS - Lusitanian
- ANO - Anotolian
- MDM - Mediterranean Mountains
- MDN - Mediterranean North
- MDS - Mediterranean South



**WAGENINGENUR**  
For quality of life



# European Joint Program SOIL: Towards climate-smart sustainable management of agricultural soils

Keesstra, S.D.<sup>1,2</sup>, Visser, S.M.<sup>3</sup>, NiChoncubhair O.<sup>4</sup>, Mulder, V.L.<sup>5</sup>, Constantini, E.<sup>6</sup>, Priori, S.<sup>6</sup>, Sousanna, J.F.<sup>7</sup>, Kuikman, P.<sup>1</sup>, Olesen, J.<sup>8</sup>, Barron, J.<sup>9</sup>, Kotzia, K.<sup>10</sup>, Halberg., N<sup>8</sup>, Borchard, N.<sup>11</sup>, Zechmeister-Boltenstern, S.<sup>12</sup>, Chenu, C<sup>7</sup>.

A close up of a desert

Description automatically generated



**WAGENINGEN UR**  
For quality of life





- **The main aim of the EJP SOIL is to construct a sustainable framework for an integrated community of research groups working on related aspects of agricultural soil management.** One important aspect of agricultural soil management to be addressed in the EJP SOIL is to strengthen the European research community on agricultural soil management, through a concerted alignment of research, training and capacity building; and co-construct with stakeholders a roadmap for agricultural soil research;



# EJP SOIL consortium

24 countries, 26 partners





## WHAT: EJP SOIL DELIVERABLES

## HOW: EJP SOIL ACTIVITIES

## WHY: EJP SOIL TARGETS

### Good agricultural soil management for:

1. Climate change mitigation
2. Climate change adaptation
3. Sustainable agricultural production
4. Eco-system services
5. Soil restoration

Novel soil management practices/ ICT tools

Roadmap for soil research

Scientific papers/ international reports

Policy analyse and advice

Policy briefs

Training schools

Outreach, narratives

Established science-society network

Conferences for science-society interaction

Capacity building fora for stakeholders and young scientists

Shared (e-) infrastructures on soil information

Standardized monitoring tools

Harmonized soil databases

Harmonized carbon accounting

Contribution to LUCAS database

Evaluated protection measures for soil erosion and water retention

Regional soil management guidelines

Nutrient management guidelines

Access to field labs/long-term field sites

Science-policy networks

Science-science networks

Science-society networks

Stock takes

Internal calls

external calls

Short term scientific missions

Co-funded PhDs

Support soil databases

Training schools

## IMPACTS of EJP SOIL

1. Understand soil management impacts on:
  - climate adaption and mitigation (soil carbon sequestration)
  - Sustainable agricultural production
  - Land and soil degradation
2. Understand how carbon sequestration contributes to regional CC mitigation
3. Establish soil networks and build capacity
4. Harmonize soil information and support international reporting
5. Foster adoption of sustainable soil management
6. Develop region and context-specific fertilization practices

## HELPS TO IMPLEMENT & REALIZE

- CAP
- CLIMATE TARGETS
- SDGs (2, 13, 15)

Support farmers in their role as stewards of land and soil resources





**WP1 Coordination**

**Lead INRA (FR), Dep lead: WR (NL)**

**WP2 Developing a Roadmap for EU Agricultural Soil Management Research**

**Lead: WR (NL), Dep-lead: AU (DK); Dep-lead: INRA (FR)**

**WP3 Research alignment.**  
Internal calls

**Lead: LUKE (FI)**  
**Dep-lead: BIOS (AT)**

**WP4 External calls**

**Lead: Jülich (DE)**  
**Dep-lead: Teagasc (IE)**

**WP5 Education, training and capacity building**

**Lead: SLU (SE), Dep-lead: IUNG (PL)**

**WP6 Supporting harmonised soil information & reporting**

**Lead: CREA (IT), Dep-lead: IUNG (PL)**

**WP7 Synthesis and knowledge integration - access to infrastructures**

**Lead: BIOS (AT), Dep-lead: SLU (SE)**

**WP8 Science to policy interaction**

**Lead: Teagasc (IE), Dep-lead: CREA (IT)**

**WP9 Dissemination and outreach for European scale impacts**

**Lead: AU (DK), Dep-lead: TAGEM (TR)**



- Identified soil research knowledge gaps for (roadmap):

- Sustainable production/food security
- Climate change mitigation
- Climate change adaptation
- Ecosystem services
- Soil restoration

- Policy advice/briefs
- Scientific papers
- Long-term field sites for research

knowledge  
development

- Capacity building (training schools, PhDs)
- Established networks (science-science; science-society, science-policy)
- Continuous knowledge synthesis and feedback loops
- Dissemination, outreach
- Stakeholder participation

knowledge  
sharing  
& transfer

- Improved sustainable soil management guidelines
- Certification principles for tools and advisory services
- Decision support ICT tools
- Improved and harmonized nutrient & fertilization guidelines
- Demonstrations at long-term field sites
- Good policy and incentives
- International reporting

knowledge  
application

- Soil data acquisition and harmonization
- Standard protocols for soil analyses
- Open soil data bases
- Geodatabases of soil indicators, properties, management systems
- Long term field experiments meta-database

knowledge  
harmonization,  
organization &  
storage



# Connect to society

- National Hubs
- Workshops in all MSs:
  - Aspirational targets
  - Knowledge availability and use
  - Barriers and opportunities
- Roadmap for soil research in Europe





Each project is linked to one or more of the challenges of EJP SOIL

**Challenge 1:**

Soil and climate mitigation (soil carbon sequestration)

**Challenge 2:**

Soil and climate change adaption

**Challenge 3:**

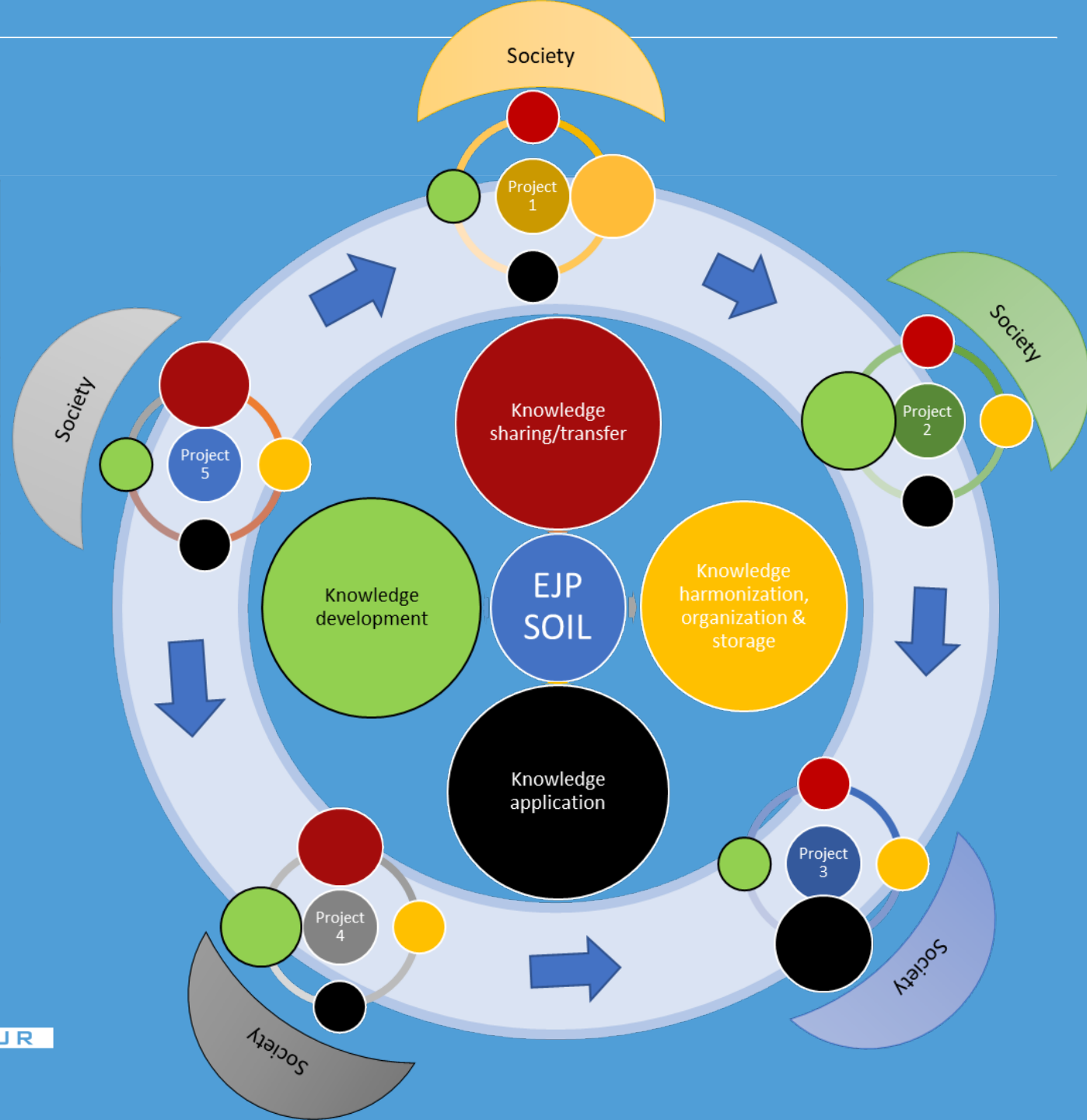
Sustainable agricultural production

**Challenge 4:**

Environment, ecosystem services

**Challenge 5:**

Land and soil restoration, soil fertility and soil erosion prevention



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# Take home message for soil scientists

- One discussion point:
- Soil organic matter as a key attribute of soils?  
Can this be our CO<sub>2</sub>??





# Thanks for your attention

- Questions?

transdisciplinary  
approach  
responses temporal aspects  
defines spatial scientists ranging under  
SDGs land soil act key results studies soils  
level broad systems USE issues within type poll  
climate capacity agronomic need feedbacks  
considering scales interacting present  
strongly regional processes  
development stakeholders working  
land-related circumstances  
ecosystems

