Soy and agroecology: can regenerative practice deliver on Paris and Montreal goals? A bird's eye view

08-02-2024 (15:00-16:00)

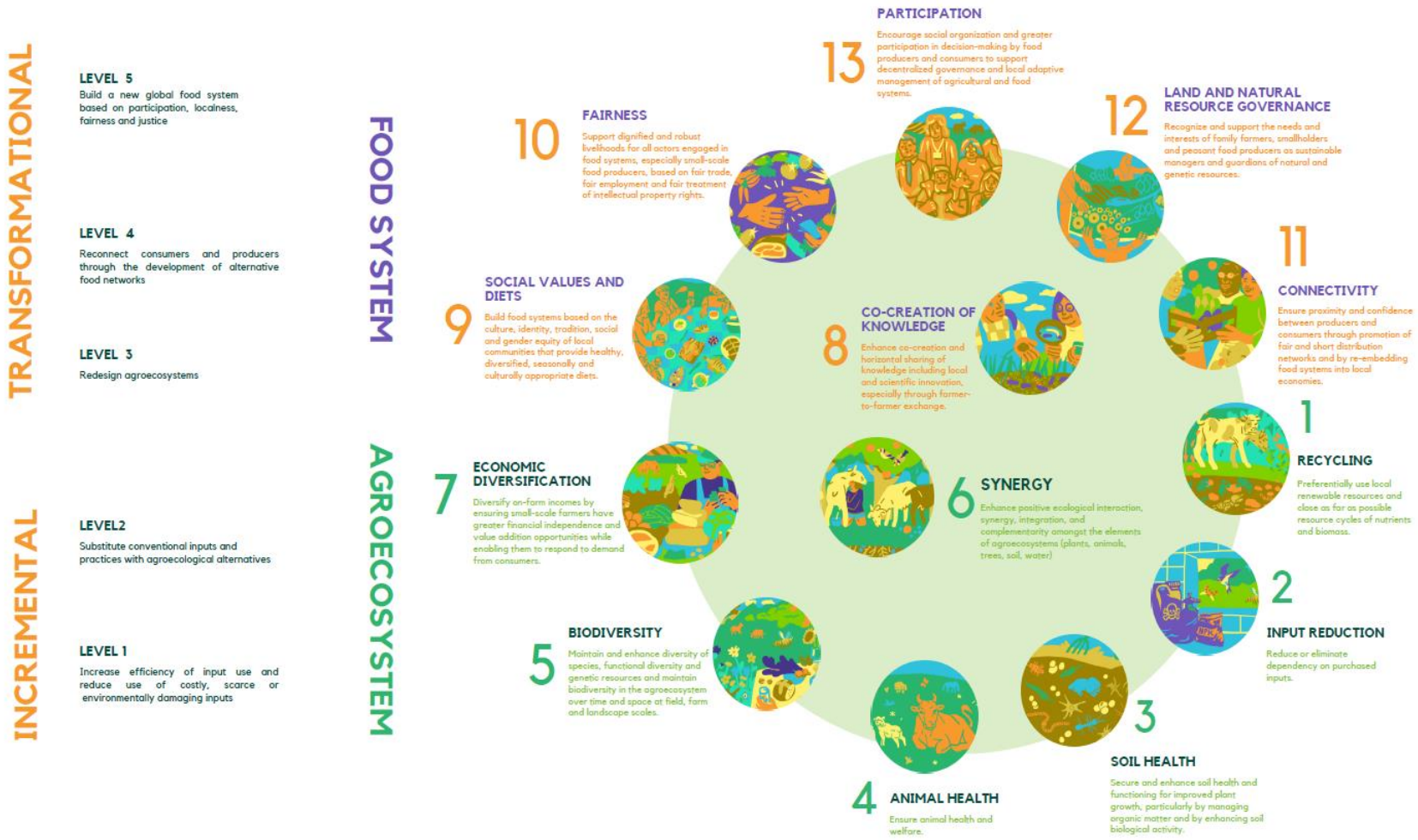
Agroecological as science and practice

- According to Agroecology Europe "as a science, it (agroecology) gives priority to action research, holistic and participatory approaches, and transdisciplinarity that is inclusive of different knowledge systems"

- As a practice, it is based on sustainable use of local renewable resources, local farmers' knowledge and priorities, wise use of biodiversity to provide ecosystem services and resilience, and solutions that provide multiple benefits (environmental, economic, social) from local to global.

The five layers of agroecology

- **level 1:** increase effeciency of input use and reduce of costly scarce or environmentally damaging inputs
- **- level 2**: substitute conventional inputs and practices with agroecological alternatives
- **Level 3:** Redesign agroecosyems
- **Level 4:** reconnect consumers and producers through the development of alternative food works
- **Level 5:** build a new global food systems based on participation, localness, fairness and justice

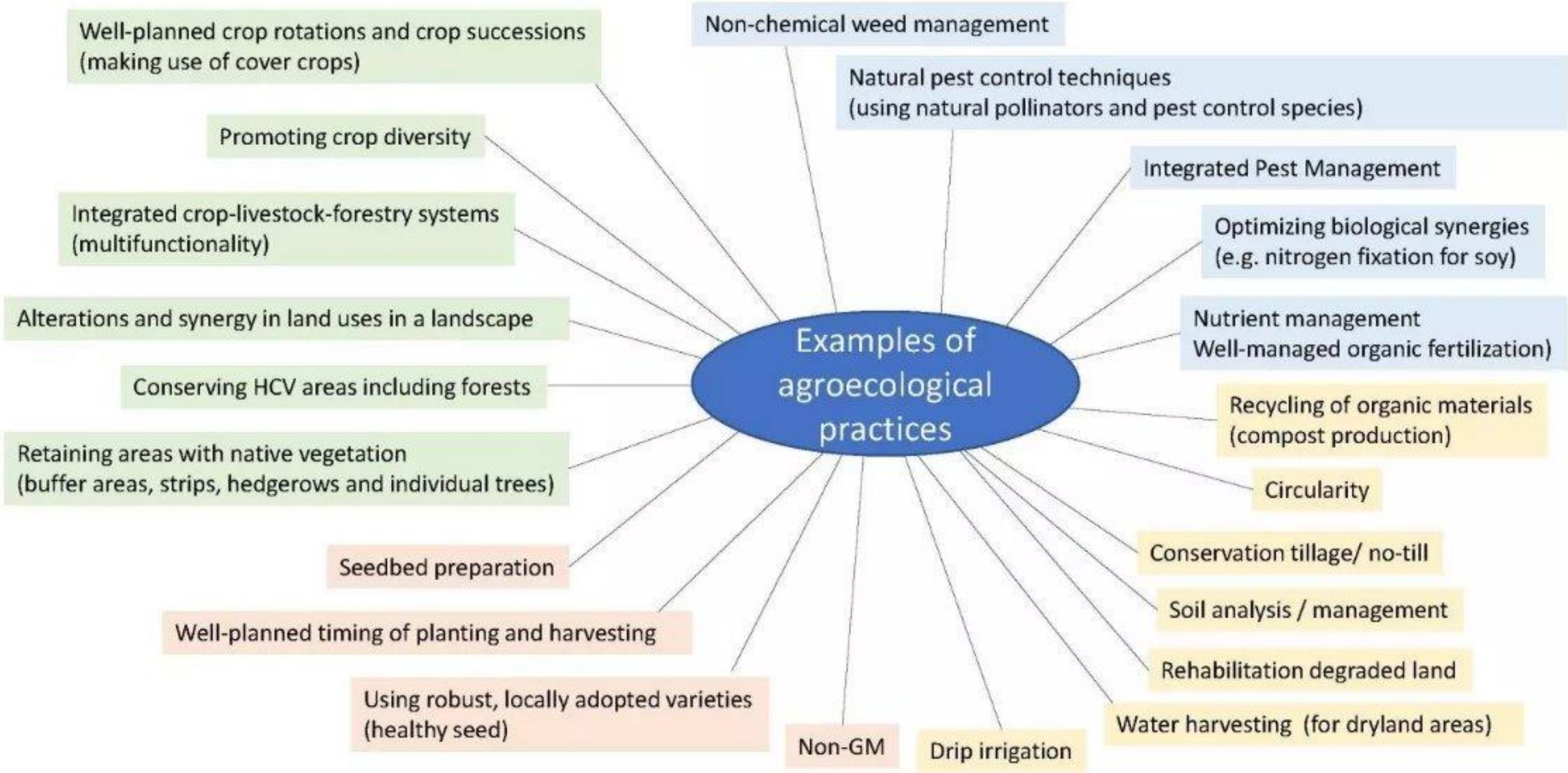


SOURCE: HLPE (2019)FIVE LEVELS OF TRANSITION TOWARDS SUSTAINABLE FOOD SYSTEMS AND RELATED PRINCIPLES OF AGROECOLOGY

AGROECOLOGY EUROPE

Global context, but zooming in on practice

- Heleen/ CSI or one of us about Paris and Montreal goals-→ other webinar on carbon, extra attention to biodiversity now. Beyond deforestation and conversion.
- All closely related in sustainable agrcultural practice. What are key practical elements?
- Earlier IUCN NL- University of Argentina publication had an infographic with 4 elements, we also will cover today.
- Agenda: Machteld Scholte (with help of other experts), Leo, Ana, etc



Source: (IUCN NL & Universidad de Buenos Aires, 2021)

Regenerative agriculture definition

- "Regenerative agriculture builds on conservation agriculture in that it seeks to enhance and sustain the health of soil by restoring its organic matter, boosting its fertility and productivity"
- To reduce the reliance on agrochemicals through regenerative agriculture
- (IUCN 2021)

Here the switch to Machteld:

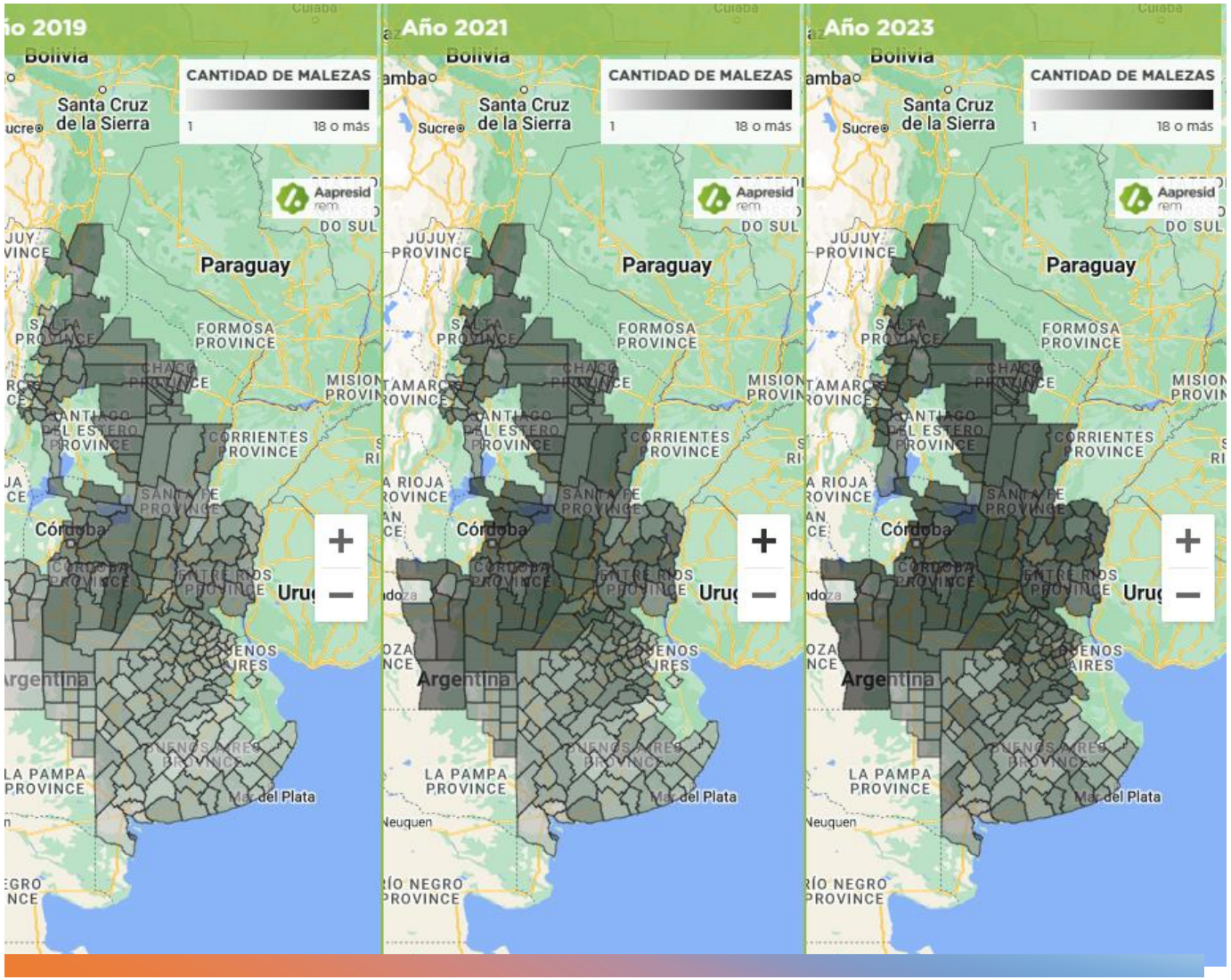
Environmental challenges in conventional soy production

- Extensive deforestation and ecosystem conversion
- Biodiversity loss
- Soil erosion and degradation
- Monocultures with low species diversity
- Intensive water use

- Concerns regarding chemical use

Chemical use and seeds

- Introduction of GM soy in 1996 in Latin America
- Adopted by Argentina (97%) , Brazil (97%), Bolivia (100%), Paraguay (95%) and Uruguay (98%)
- Herbicide predominantly glyphosate
- Glyphosate often combined with herbicide: 2,4-D, paraquat, dicamba, atrazine, glufosinate, metalochlor, & paraquat (Paraguay) and insecticide: cypermethrin, cloripyrifos) (more data on specifications available?)
- Through aerial (planes) or terrestrial (tractors) spraying (both at what scale?)
- Increasing emergence of glyphosate-resistant weeds



- Glyphosate-resistant weeds occurrence in Argentina (Aapresid, 2023)

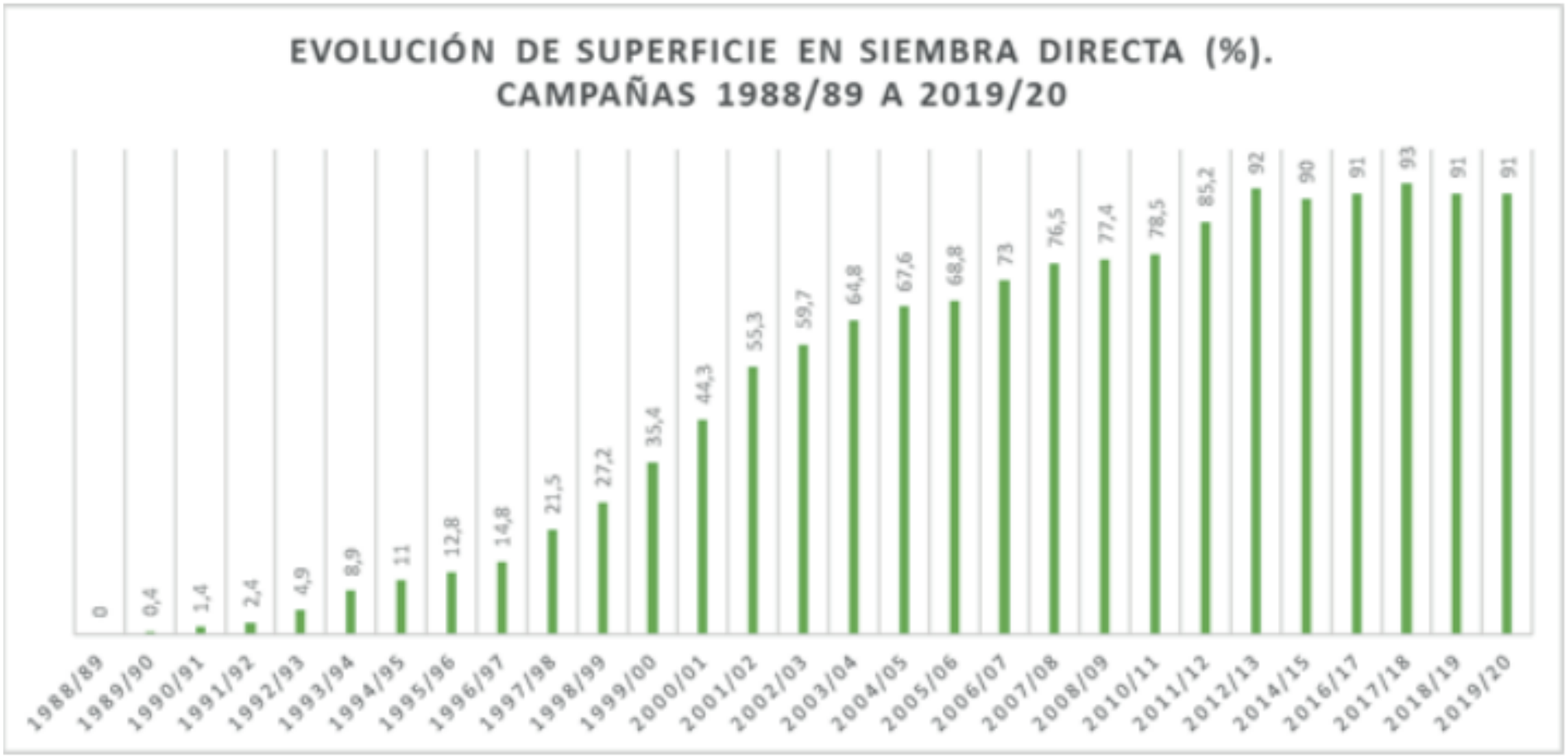
Common water and soil practices in LA soy

Reduced or no-tillage (90% adoption Argentina)

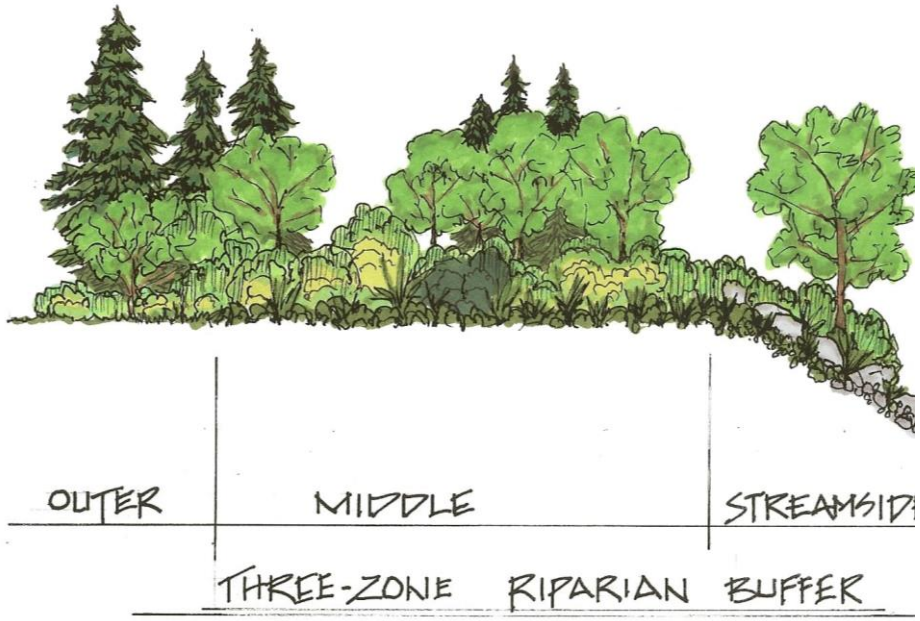
- Conserve soil structures and reduce erosion
- Minimal soil disturbance to retain organic matter and improve water infiltration
- Allows arable farming on erosion-sensitive soils like slopes and wetlands
- Sequesters carbon from the air

-> Just having no-tillage practices renders many benefits, but it should be complemented with other management practices like crop rotation or integrated pest management

No-tillage adoption Argentina (1988-2020)



Aapresid, 2020)



Common water and soil practices in LA soy

(Riparian) buffer zones

- To reduce pesticide contamination through drift and runoff into terrestrial and aquatic ecosystems
- Aim to improve water quality for nearby water streams
- Act as terrestrial habitat for wildlife
- Requirements are context-specific
- Legislation and standards differ in Latin America

Crop rotation methods

- Before GM soy adoption, livestock and crop rotation was a common practice. Known as mixed agriculture.
- Mixed agriculture has benefits for soils
- Now, soybean often rotated with wheat and corn or sunflower in four-year cycles in Argentina
- Crop rotation systematically reduces pesticide needs when winter and spring crops are rotated
- Soybean directly sown after harvest of winter crops
- Inclusion of cover crops to protect soil in wintertime
- Usage of mulch after removal of cover crops for protection of land

Other trends in agriculture

Precision agriculture: data collection through sensors and information systems

- Enables farmers to deliver specific inputs (water, fertilisers, chemicals etc.) for the crop at the right time
- Precision agriculture is gaining interest for its efficiency
- 18% of cropping systems in Argentina are under precision agriculture

Pesticide container management

- Pesticide containers are still considered as hazardous waste, therefore harmful to the environment
- Due to lack of collection sites, containers disposed in the environment
- Collection sites for recycling containers are in development but still not sufficient in Argentina, Brazil and Paraguay
- 80% of empty pesticide containers re-used in Argentina according to Buenos Aires Times in 2021
- Establishment of Campo Limpio as initiative from industry to enhance recycling

Risks of chemical use

- Biodiversity impact: affecting non-target organisms and ecosystems, especially in developing stage
- Human health: surrounding communities and rural workers affected by unintentional exposure (women primarily vulnerable)

Through: pesticide drift, runoff or leaching to non-target sites

Due to:

- Limited uptake of personal protective equipment (PPEs)like overalls and respirators
- Limited legislation to fully protect environmental and human health
- Limited monitoring and registration systems to monitor poisonings and other adversities

Alternative agroecological methods

Integrated Pest Management (IPM)

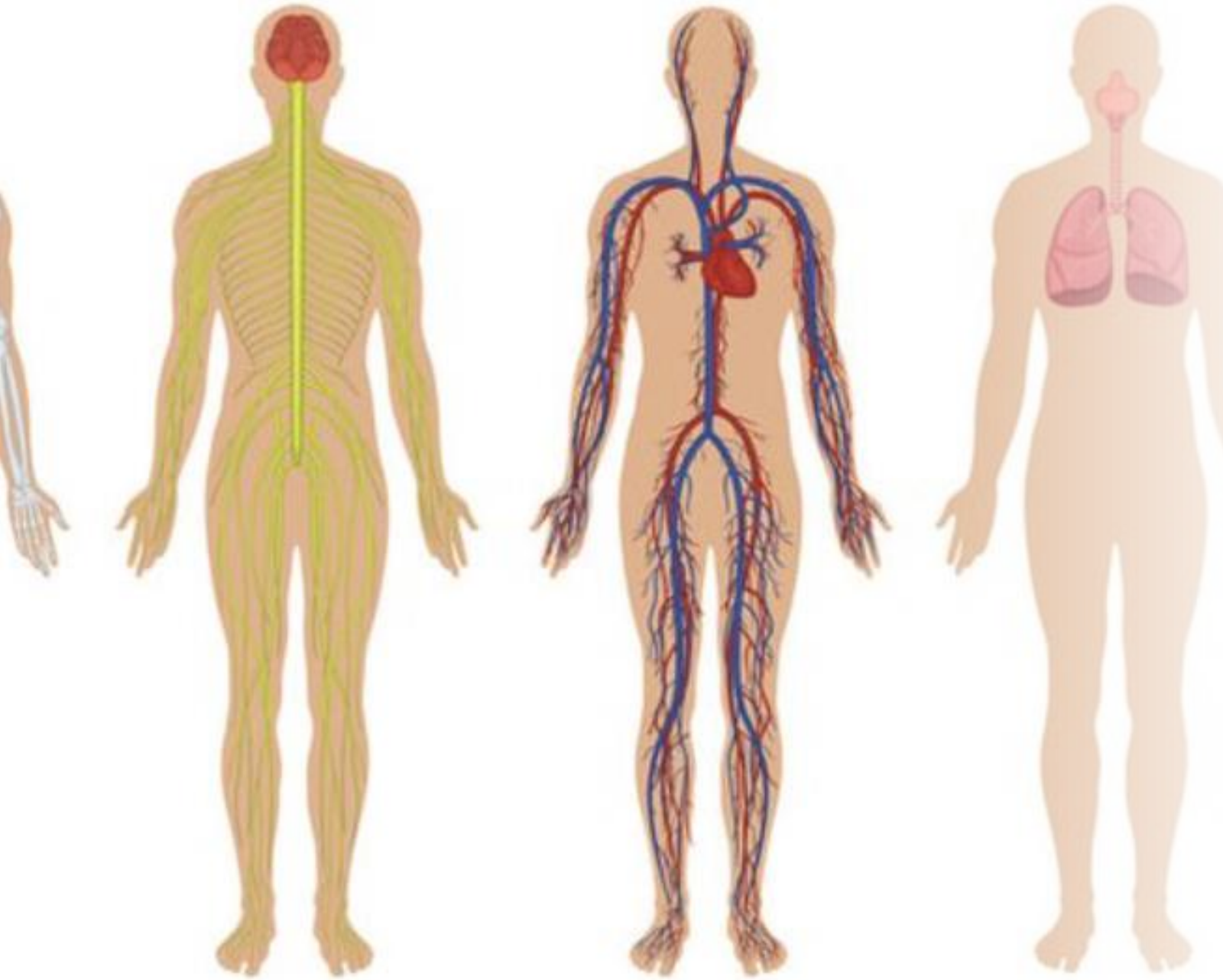
- From input-intensive production to sustainable crop production through integration of different control measures
- Usage of beneficial organisms for pest control or biologicals

Crop rotation

- Have proven to be an effective strategy to suppress weeds through competition
- Happens to some extent in Latin America

Examples of impact; biodiversity

- Fish communities like Zebrafish and Streaked prochilod native to Argentina and Paraguay showed signs of DNA damage after coastal research in 2021. Concentrations of insecticide cypermethrin were found in the water streams of La Plata Basin that fish communities were exposed to.
- South American Broad-snouted caiman reported to show DNA damage after exposure of glyphosate, but embryos and hatchlings most vulnerable
- Amphibians both exposed in terrestrial and aquatic ecosystems, thereby increasing exposure, experiencing malformations in body



Examples of impact; human health

- Risks vary from acute effects (actute unintentional pesticide poisoning) to chronic effects (exposure over time)
- Direct use of pesticides can lead to damage to nervous system, malformations in body, endocrine disrupting changes (hormonal system) or cancer
- Long-term exposure can increase incidence of cancer, infertility problems or problems in fetal development

Still a lot to be researched

- More ecotoxicological (biodiversity) and epidemiological research is vital to gather more data on the exact incidences of pesticide contamination or poisonings
- Monitoring systems can contribute to gathering data from the field
- Based on this data, pesticide legislation can be developed further

Policy measures to improve regulation

- Promote and invest in alternative agroecological sound methods on regional and local level
- Invest in more research on the effects of pesticide use on biodiversity and human health
- Capacity-building for authorities (control and compliance) and producers (correct pesticide use) in Latin America
- International harmonization of Maximum Residue Limit (MRL = highest legally tolerated limit) legislation according to Codex Alimentarius