Cocoa agroforestry and social-ecological resilience

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Social-ecological resilience

**Resilience** = ability to withstand stress factors while maintaining functions, productivity, and the ability to reorganize (Adger 2003; Folke et al. 2010)

**Social-ecological resilience** joins the social and the ecological system
What makes cocoa farming resilient?

Social-ecological systems approach:

1) **Buffer capacity**: agroecological factors, livelihood assets, diversity of system components

2) **Self-organization**: reorganization after disturbance (ecosystems), social organization

3) **Capacity for learning and adaptation**: access to and exchange of knowledge, learning opportunities, capacity building
Cacao  Palto  Flor de mayo  Cacao  Mara  Guanábana  Plátano  Yaca  Cacao  Papaya del monte  Ceibo
Pacay  Plátano  Cacao  Majo  Solimán  Cacao  Manzana brasileria
Chima  Cacao  Palmera  Cacao
Agroforestry studies show:

- Improved soils, less water stress, manifold products
  (Niether 2019, Tscharntke et al. 2011, Sperber et al. 2004)

- Conservation of (agro) biodiversity

- Livelihoods and food security
  (Jacobi 2016, Altieri et al. 2012)

- System yield >10 times monoculture yield
  (FiBL 2021, Niether et al. 2020, Schneider et al. 2016)

- Carbon sequestration 2-3 times higher
  (Niether et al. 2020, Jacobi et al. 2015, Nair et al. 2009)
Complementary agroforestry results from Switzerland

Apple trees and arable crops: **humus enrichment** of 18% in seven years (Seitz et al. 2017).

No **root competition** between arable crops and tree strips (sown meadow, apple and pear trees) (Siedler, 2019).

More **pollinators** (Kühn 2016).

Agroforestry on 9% of Europe's agricultural land could **mitigate up to 43%** of agricultural greenhouse gas emissions (Kay et al. 2019).

Source: Agroscope
Syntropic agriculture and system thinking in cocoa production

- **System thinking**: cooperation instead of competition, relationships instead of structure
- Work with *ecological principles* (succession, diversity, density, energy...)
- **Recovers soils** and ecosystem functions
- **Includes humans** in a creative instead of destructive role

Source: www.agendagotsch.com
Soil restoration: The same view in Cochabamba, before dynamic agroforestry was implemented (left side) and seven years after (right side) (Source: Noemi Stadler-Kaulich, Mollesnejta)
How to increase social ecological resilience of cocoa farms?

Resilience is systemic

Human-ecosystem interaction

- **Diversity** on farm (dynamic agroforestry)
- **Organization**, e.g. in cooperatives to strengthen farmers
- **Learning** and adaptation
Thank you!

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Image: Olivier Roupsard
1. Cocoa monoculture

2. Simple agroforestry

3. Dynamic agroforestry