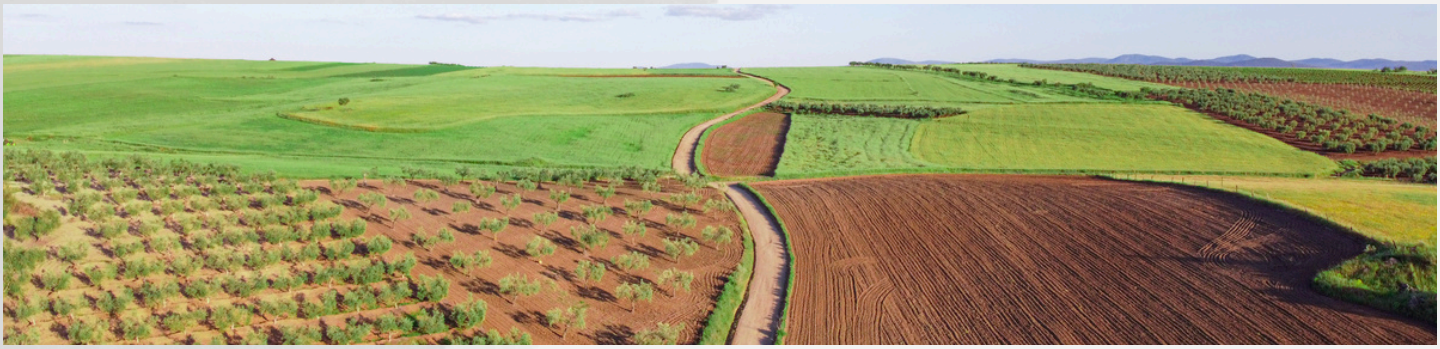

Regenerative fruit-crop-livestock system in East China

Established around 2018 in Weifang City, Shandong Province, the 50-hectare regenerative farm integrates four Nature-based Solutions (NBS): (1) permanent living cover crops in apple, peach and apricot orchards; (2) conservation tillage establishment of winter wheat after summer maize; (3) agroforestry strips with cereals grown between fruit rows; and (4) Adaptive multi-paddock grazing by remotely-controlled sheep flocks. Together, these practices create a closed nutrient loop, reduce GHG emissions and agro-chemical inputs, increase soil carbon sequestration ability, and increase the farm's resilience to extreme weather, farm biodiversity and net-benefits.

Challenges addressed by the NBS

- Low and volatile profitability of conventional grain and fruit production in the North China Plain.
- Increasing frequency of extreme rainfall and drought that degrade fruit quality and reduce grain yields.
- Declining soil organic carbon and soil structure under intensive tillage and straw removal.
- Need for cost-effective alternatives to synthetic fertiliser and herbicide without sacrificing yield or quality.

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Which indicators/criteria are used to assess the success of the NBS in addressing the challenge?

The success of the NBS in addressing its challenges is assessed using the following indicators/criteria:

- Fruit recovery time after extreme rainfall events.
- Winter wheat grain yield.
- Soil health: soil organic carbon, soil bulk density, soil moisture content, water-use efficiency, earthworm density, etc.
- Farm economics: gross margin, input cost savings.
- Resilience metrics: yield stability across dry and wet years.

Which biophysical, agronomic, and farm management implications does the NBS have at field and farm level?

1.Biophysical

- Orchard living cover crops lower maximum soil temperature by 2-3°C in summer, cutting evapotranspiration and buffering against drought and waterlogging.
- Minimum-till plus full maize residue retention (conservation tillage) raises soil organic carbon and increases water-stable aggregates.
- Dung from on-farm sheep adds fresh organic matter, accelerating nutrient cycling.

2. Agronomic

- Peach flavour recovery after extreme rainfall (normally in July and August) is shortened from 3-4 days to 1-1.5 days under living cover crops, improving marketability.
- Wheat established with conservation tillage (straw throwing, minimum tillage, planting, and fertilisation simultaneously, once machinery entry) after maize shows equal yields to conventional tillage (crushing corn & straw twice, rotary tillage twice, sowing and fertilising, suppressing, 4-5 times machinery entry) while reducing diesel use by 60%.

3. Farm management

- Input savings: 60-80¥ mu^{-1} (≈130-170$ ha^{-1}) from conservation tillage wheat.
- Net profit under rain-fed conservation wheat reaches 280¥ mu^{-1} (≈600$ ha^{-1}), identical to irrigated conventional wheat, saving ≈ 1,000-1,500m^3 ha^{-1} of underground or groundwater.
- Remote-controlled sheep reduce mowing costs and provide organic nutrients for the farm, generating additional revenue from lamb sales.

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What methods/tools are used for the NBS assessment?

- **Plot design with tillage treatments in wheat-maize rotation; paired-tree rows with/without living cover crops in orchards.**
- **Simple economic analysis including cost, income and profit.**

NBS site and scale

Weifang City, Shandong Province, China

50 ha regenerative farm established in 2018.

Contact NBS team

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trans4num

trans4num is a four-year project funded under the Zero Pollution call as an EU-China international cooperation action on nature-based solutions (NBS) for nutrient management in agriculture.
trans4num ambition is to broadly enhance the NBS implementation in Europe with an integrative and tested multi-level approach, in dialogue with academic partners, practice partners and societal stakeholders.

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