



KB34-2C-5 Redesign of horticultural production for a circular economy

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Background

Greenhouse horticulture is an innovative sector that produces high-quality fruit, vegetables and plants, whilst using many of its resources very efficiently. Take for example the recirculation of water and nutrients within the greenhouse. Despite this high efficiency, supply chains are mostly linear, not circular. Like many other sectors, greenhouse horticulture depends on finite natural reserves spread out across the globe: for example, natural gas for energy and CO₂; or phosphate rock (P) and potash (K), which are mined to make fertiliser; basalt and peat for substrate; or crude oil for plastics. **The challenge we face is to develop an integral approach towards closed loops for horticulture material flows to support the (re)organisation of supply chains.**

Project objectives

- Quantify material flows in greenhouse systems: water, fertilisers, CO₂, substrate, plastics and biomass
- Visualise material flow data
- Define future vision + transition scenarios towards circular horticulture
- Identify challenges and opportunities towards circularity targets
- Assess potential of solutions/alternatives, including cross-overs with other sectors

Results so far

- Guiding vision towards circular horticulture to start discussions/acquisition and increase sense of urgency within/outside the sector
- Database of material flows for multiple greenhouse crops + Sankey diagrams
- Recorded kick-off lectures research theme Circular Horticulture
- Recorded knowledge sessions theme experts
- Report + website transition scenario's towards Circular Horticulture
- Whitepaper Cross-over Greenhouse Horticulture & Aquaculture
- Whitepaper Cross-over Greenhouse Horticulture & Pig Farming
- Whitepaper Cross-over Vertical Farming & Cities
- Workshop Circular Plastics in Greenhouse Horticulture
- Journal paper on material flows in Dutch tomato greenhouses

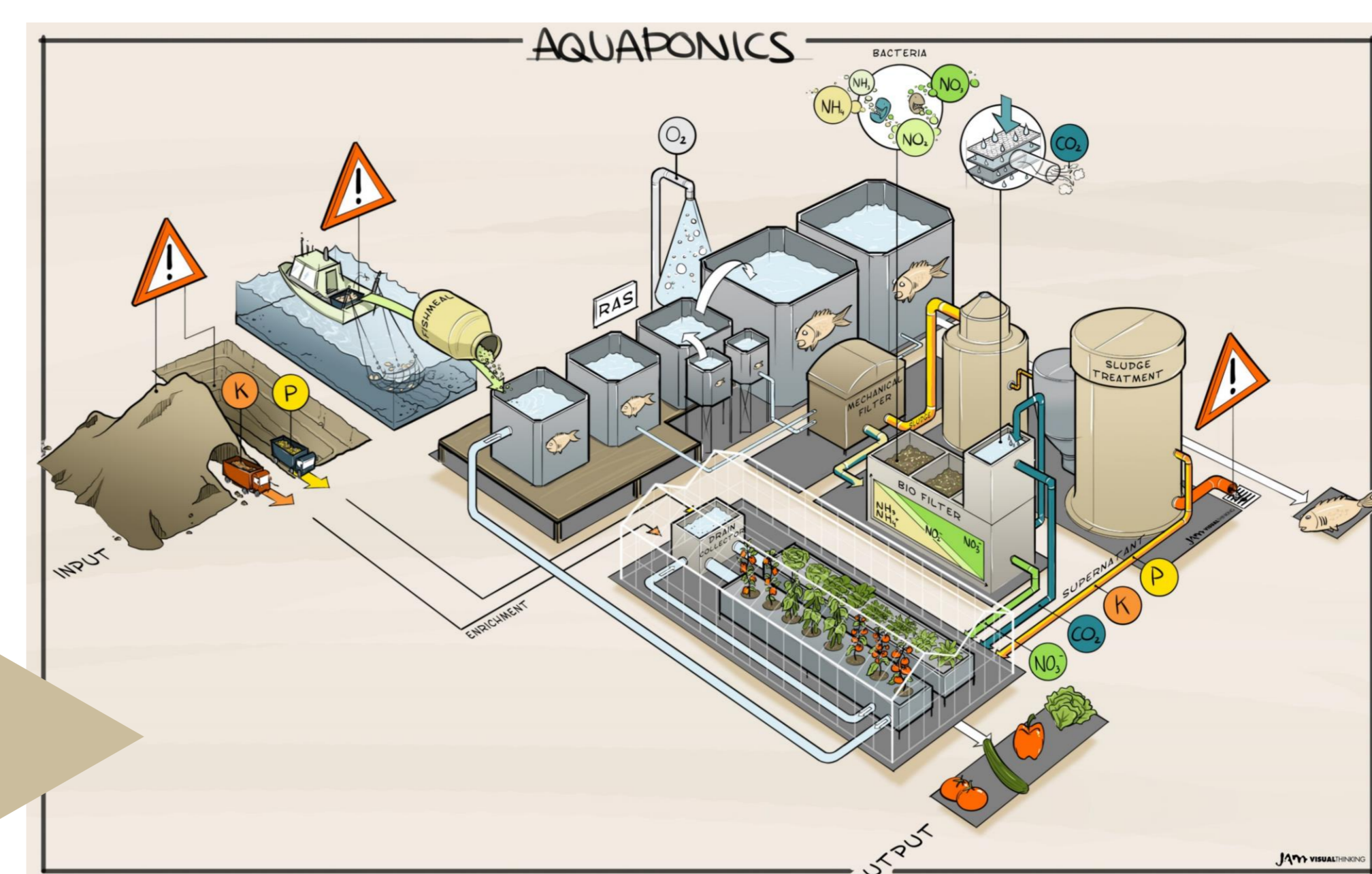
Expected impacts

- Awareness and sense of urgency within the greenhouse horticulture sector
- Identified (high-potential) innovations that shape and initiate follow-up projects
- More interdisciplinary research that focuses on connecting sectors in a safe and profitable exchange/valorisation of waste flows to resources

Abovementioned impacts all lead to new stakeholder groups and supply chain partnerships as well as implementation of innovations that: 1) reduce the input of and dependency on primary resources for greenhouse horticulture, 2) valorise waste flows of multiple sectors and 3) decrease the overall environmental impact of emissions. Achieving these goals will require expertise from all groups within WUR!

Research and outreach plans remaining time

- Quantify the impact of identified innovations/practical applications
- Explore the cross-over between Greenhouse Horticulture & Mushroom Farming
- Symposium Circular Horticulture @ Floriade 2022
- Scientific Conferences, Club of 100 (B2B), Cross-over work groups towards joint PPP proposals, Company/site visits



YEARLY MATERIAL FLOWS OF DUTCH TOMATO GREENHOUSE PRODUCTION

