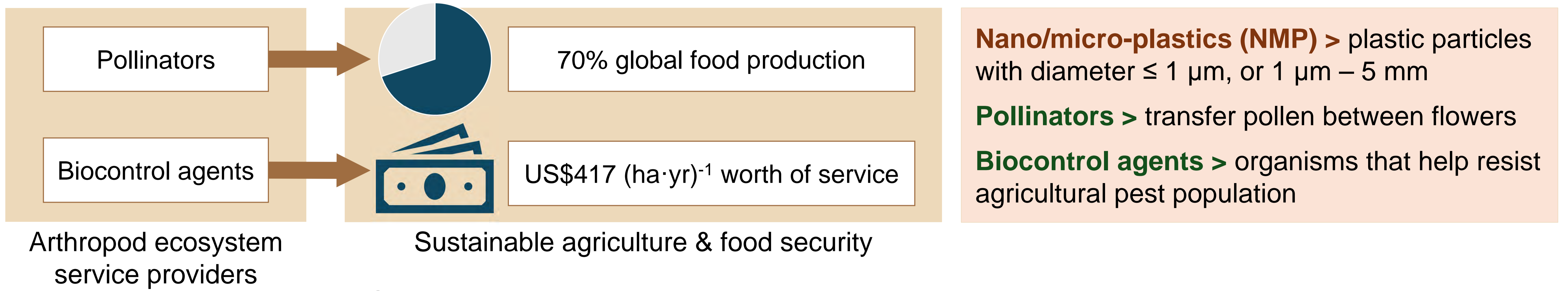
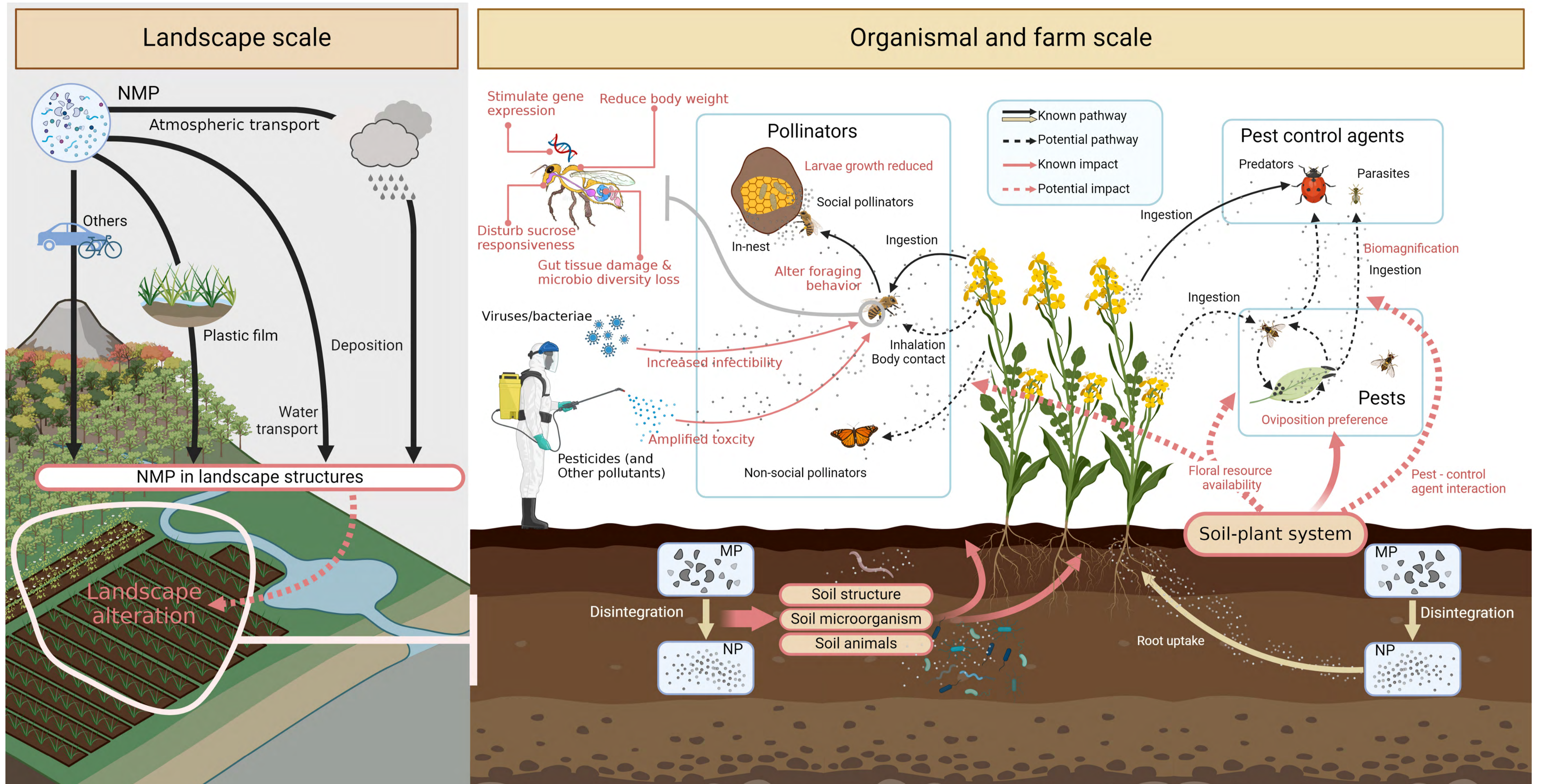


# Nano/micro-plastics effects in agricultural landscapes: an overlooked threat to pollination, biological pest control, and food security

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## Cross-scale NMP effects on pollinators and biocontrol agents



## Roadmap for future researches

### Methods to detect NMP in environmental samples.

- Detection of small-sized plastics in real environments and in organisms remains
- Methods to automate sample preparation in NMP research, especially in terrestrial systems
- Standard methods to effectively track NMP and their interaction effects in vivo

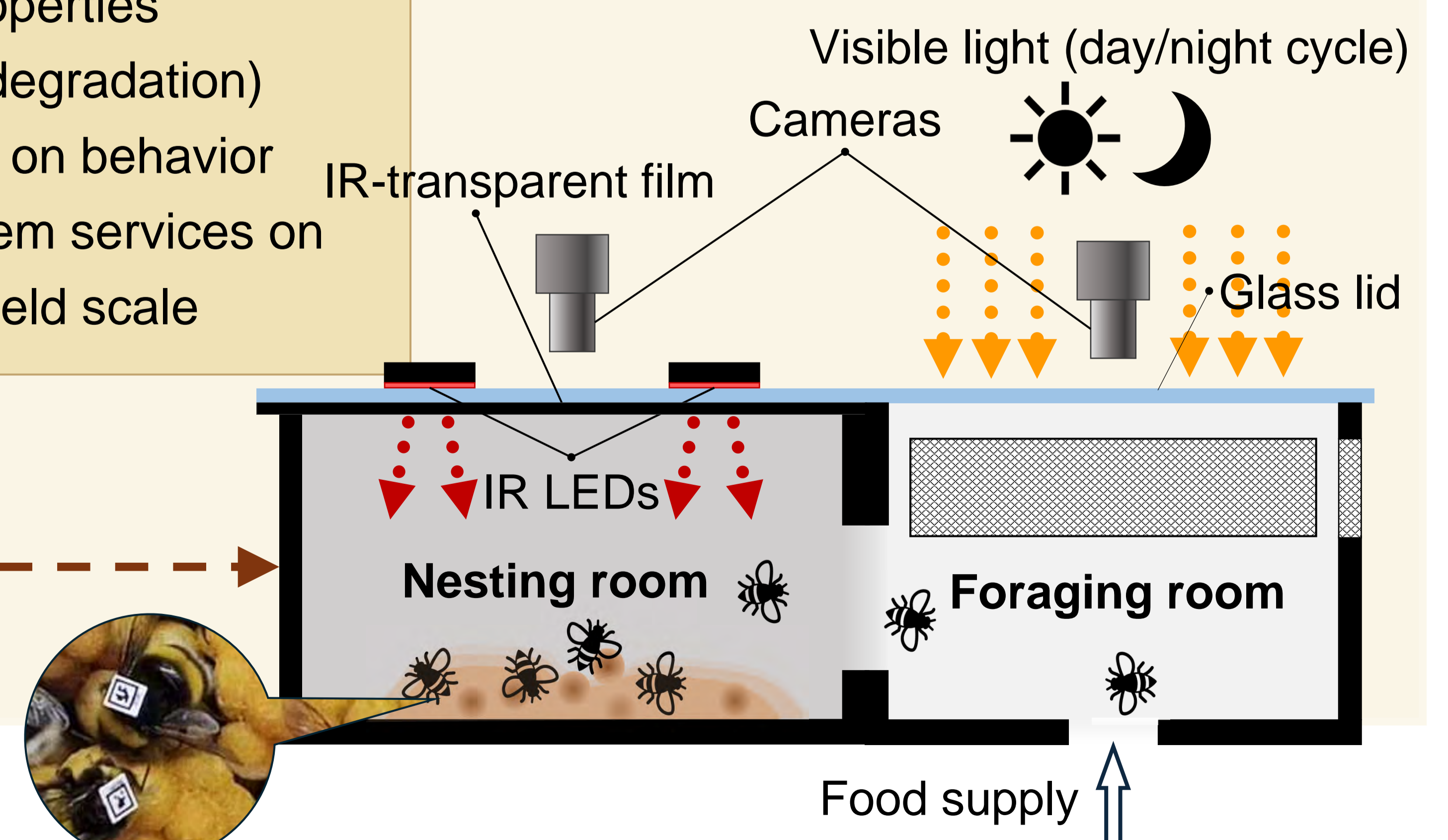
On-going project: microplastic effects on bumblebee (*Bombus terrestris*) individual behaviors and colonial development, based on computer-vision, object detection and miniature matrix code detection.

### Ecosystem Ecotoxicology of NMP.

- Ecotoxicity of NMP on pollinators and biocontrol agents
- Realistic exposure concentrations
- Systematic perspectives involving various ecosystem agents
- Realistic NMP properties (weathering and degradation)
- Quantified effects on behavior and their ecosystem services on the semi-field to field scale

### NMP impact mitigation.

- Vegetation barriers for airborne NMP transfer
- Mitigation by landscape heterogeneity
- ... ..



## References

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2. Costanza, R. et al. *Nature* **387**, 253–260 (1997).
3. Sheng, D. et al. (2024) DOI: [10.48550/arxiv.2403.04920](https://doi.org/10.48550/arxiv.2403.04920).
4. Crall, J. et al. *PLoS ONE* **10**, e0136487 (2015).