

# Assessing sediment disconnection in fragmented agricultural landscapes

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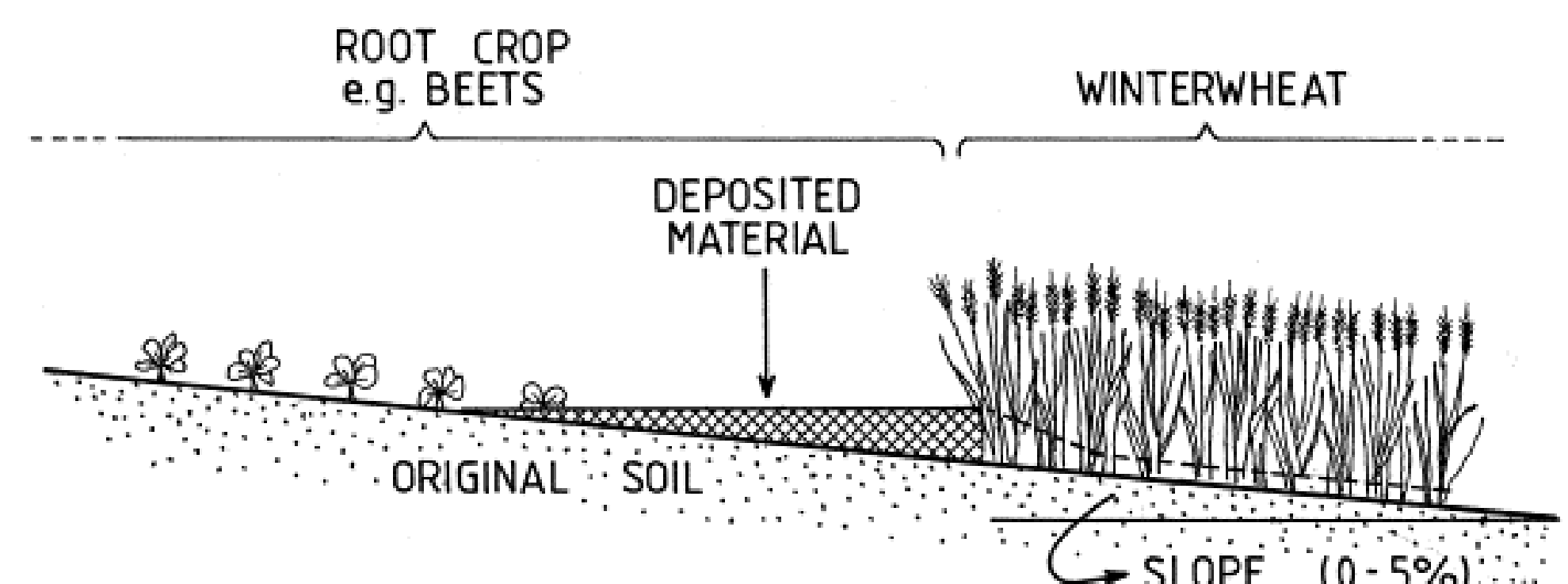
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## CONTEXT

Sediment transfer from agricultural land to rivers generates major off-site impacts. Although land use is known to affect this process, the role of field patterns and landscape fragmentation in controlling sediment connectivity is still poorly considered.



**Fig. 1** – The effect of vegetation barriers at field boundaries caused by differences in vegetation cover [1].



## OBJECTIVES

1

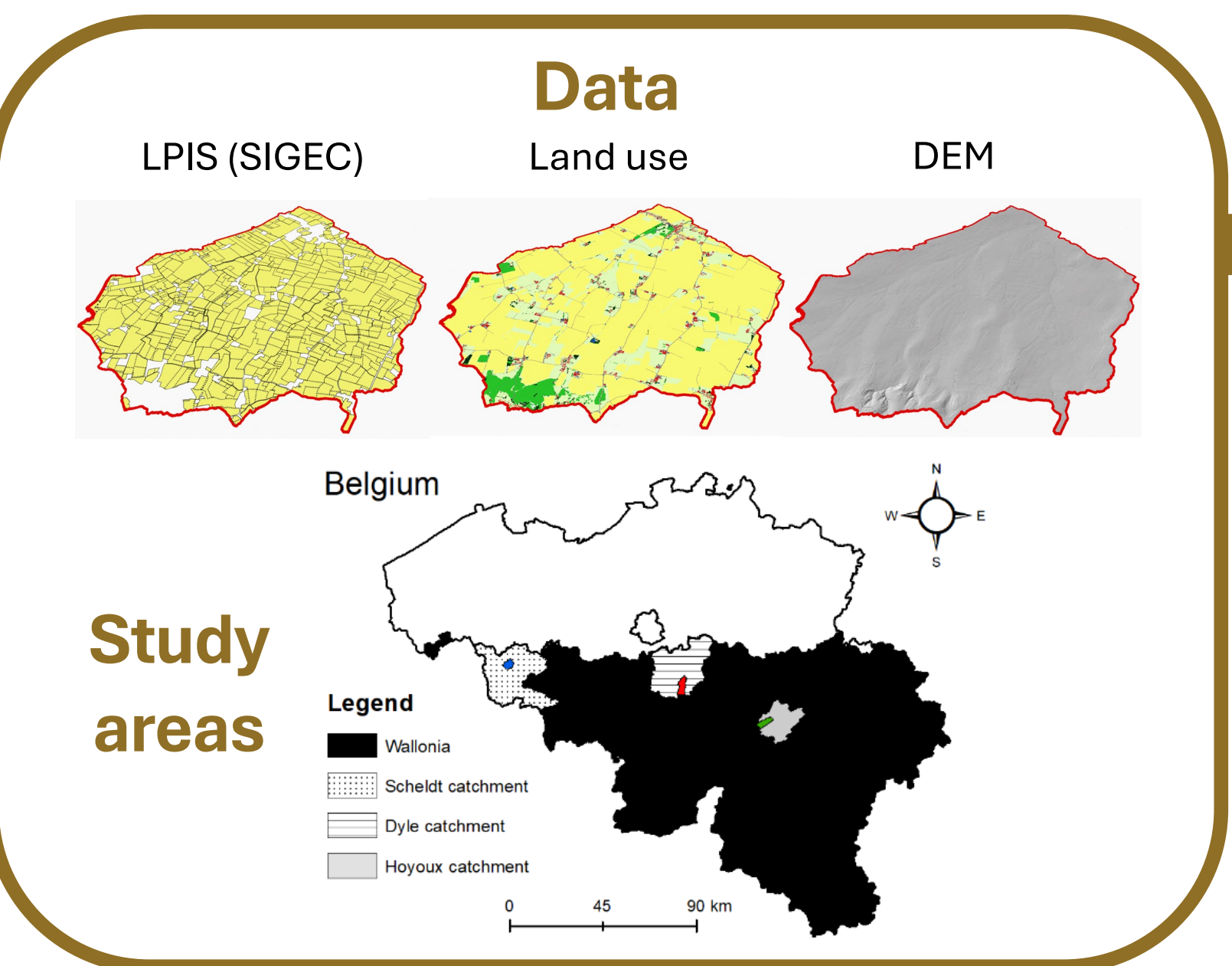
Propose a revised sediment connectivity index accounting for parcel connectivity.

2

Evaluate the efficiency of contrasting parcel configurations in reducing sediment delivery.

## METHODOLOGY

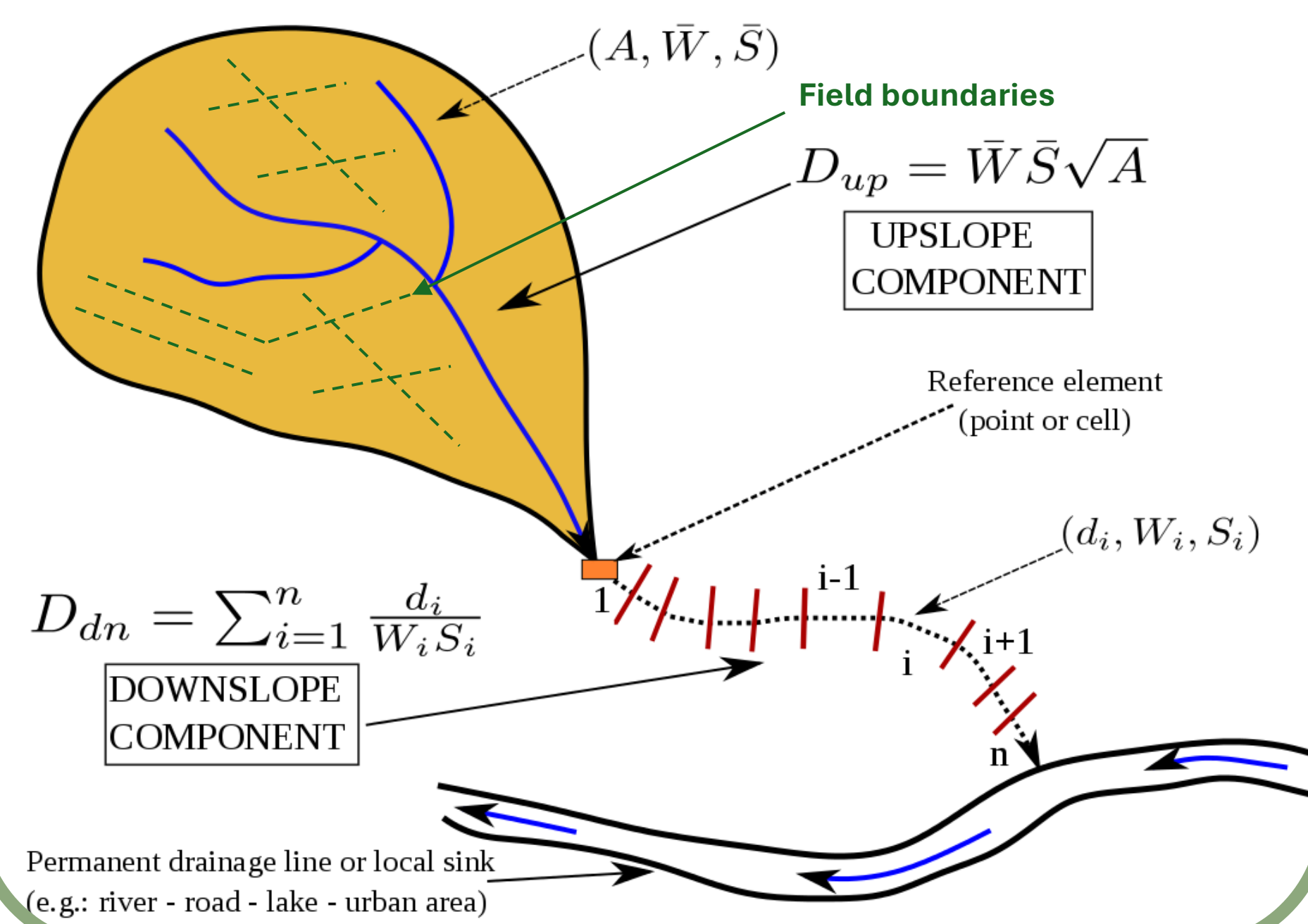
- Compile topography, land use and LPIS parcel data.
- Compute the standard and revised sediment connectivity indices.
- Compare connectivity patterns across four parcel configuration scenarios.



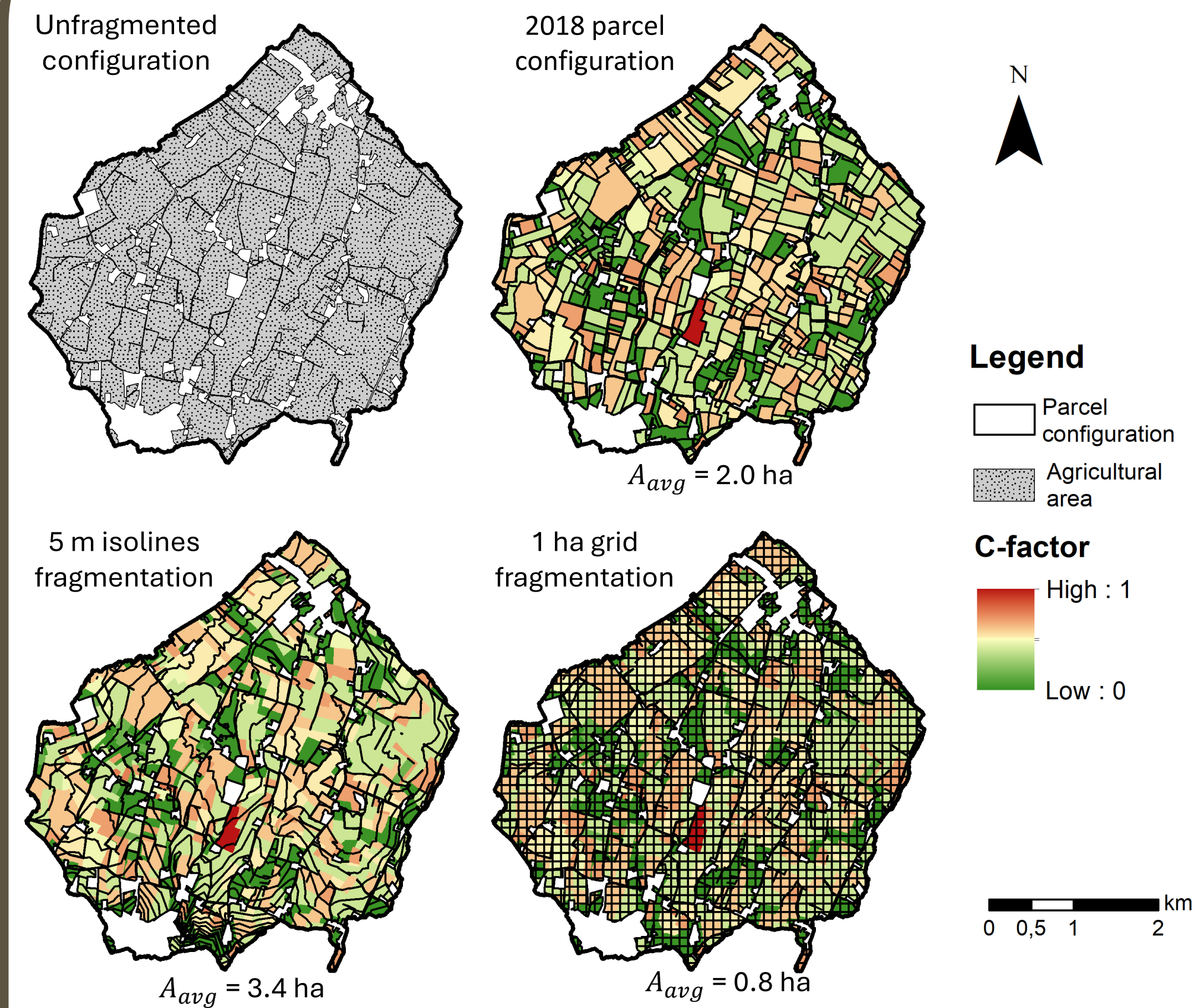
### Sediment Connectivity Index (IC) [2]

$$IC = \log_{10} \left( \frac{D_{up}}{D_{dn}} \right)$$

Assess the potential for sediment transport from production to sinks.



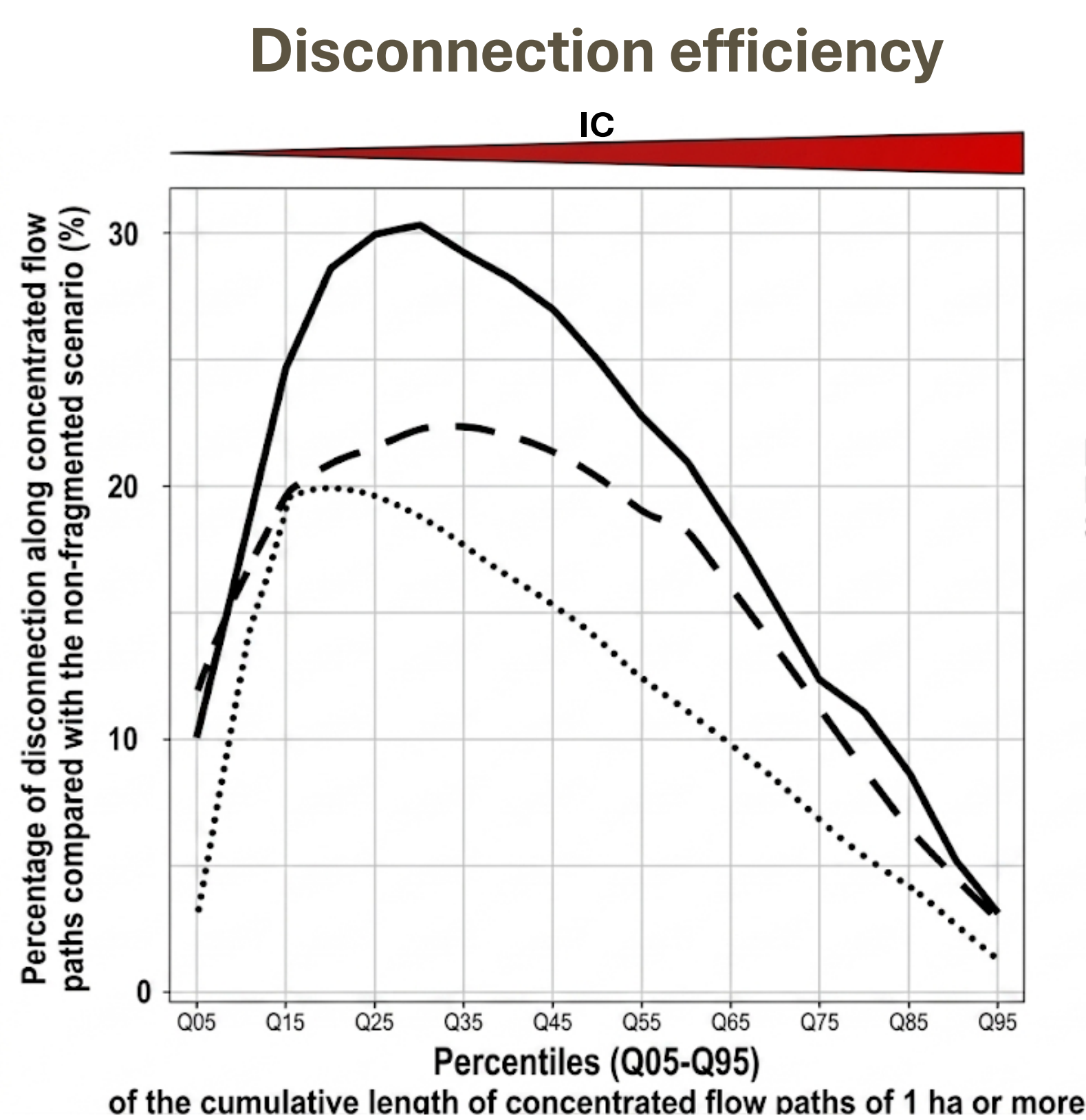
### Tested parcel configuration scenarios



**Fig. 2** – Comparative analysis of spatial structures under identical land use: Evaluating Standard IC (Unfragmented) versus Revised IC (Fragmented). Fragmentation scenarios include a 1-ha grid, 5-m isolines, and the 2018 parcel configuration.

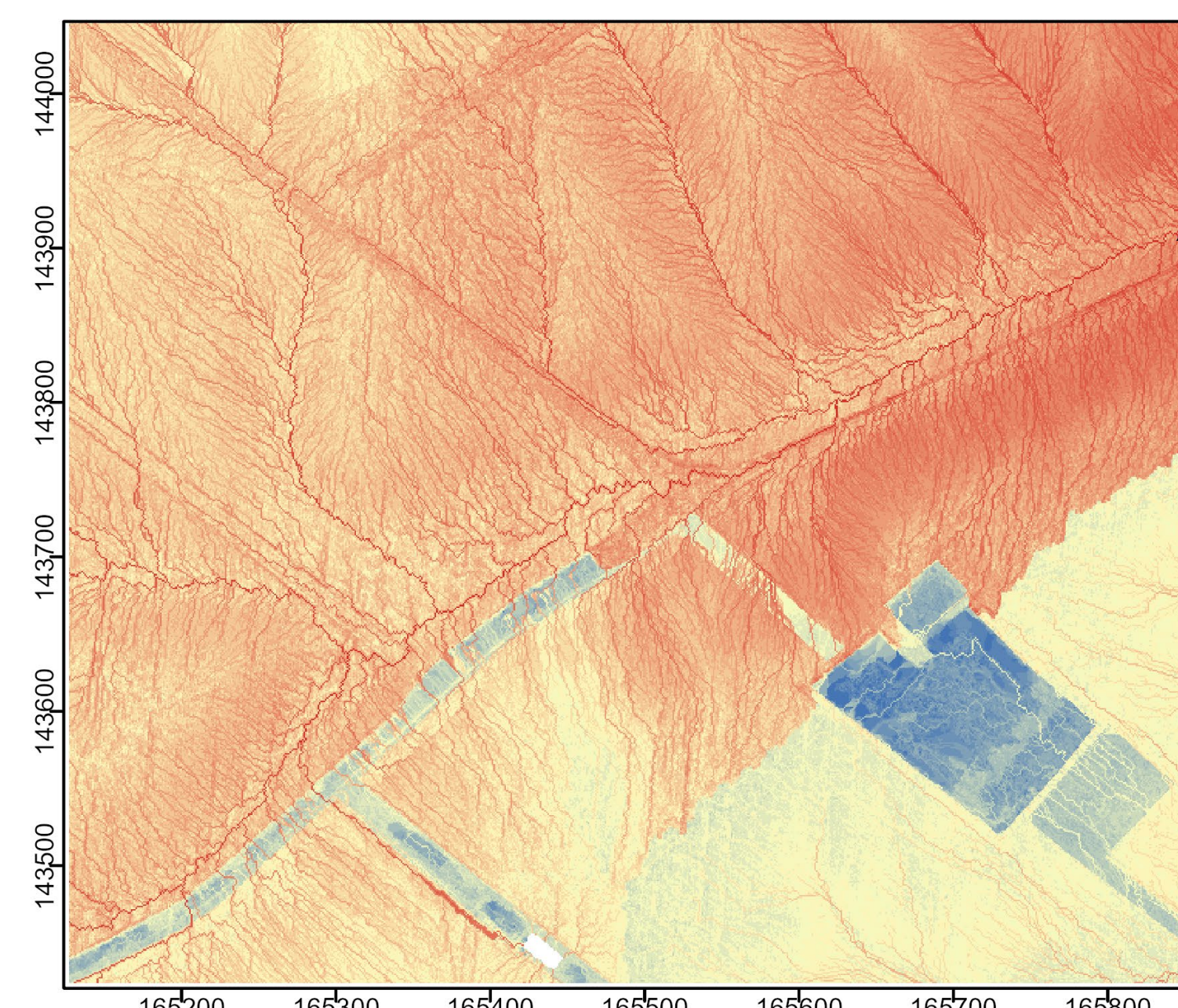
## RESULTS

➤ Parcel structure controls sediment transfer.

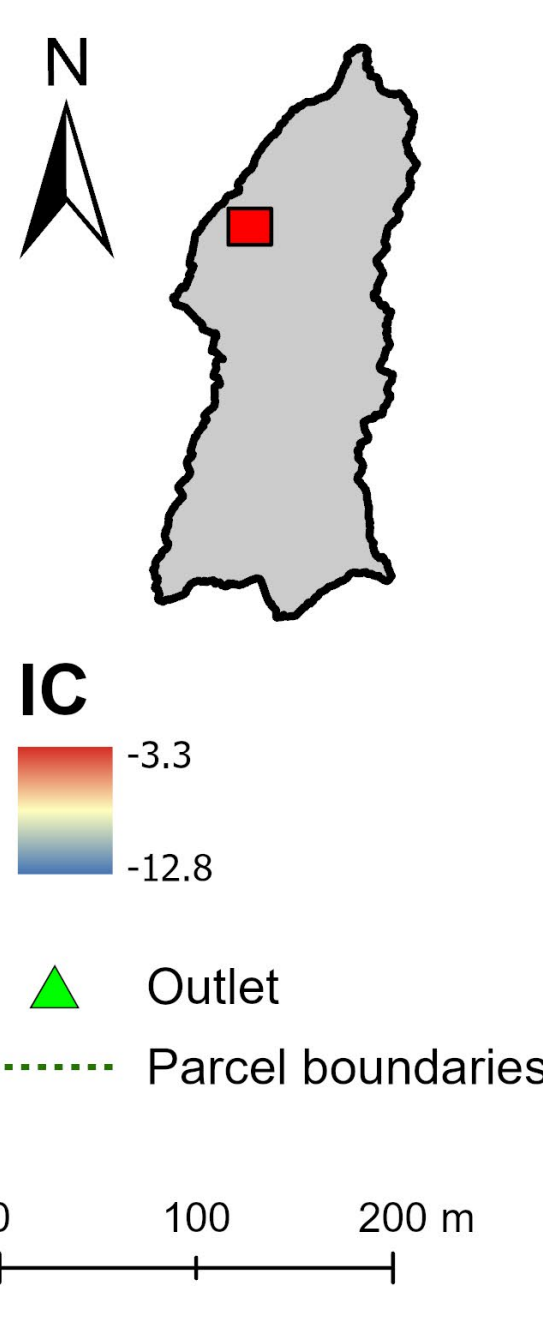
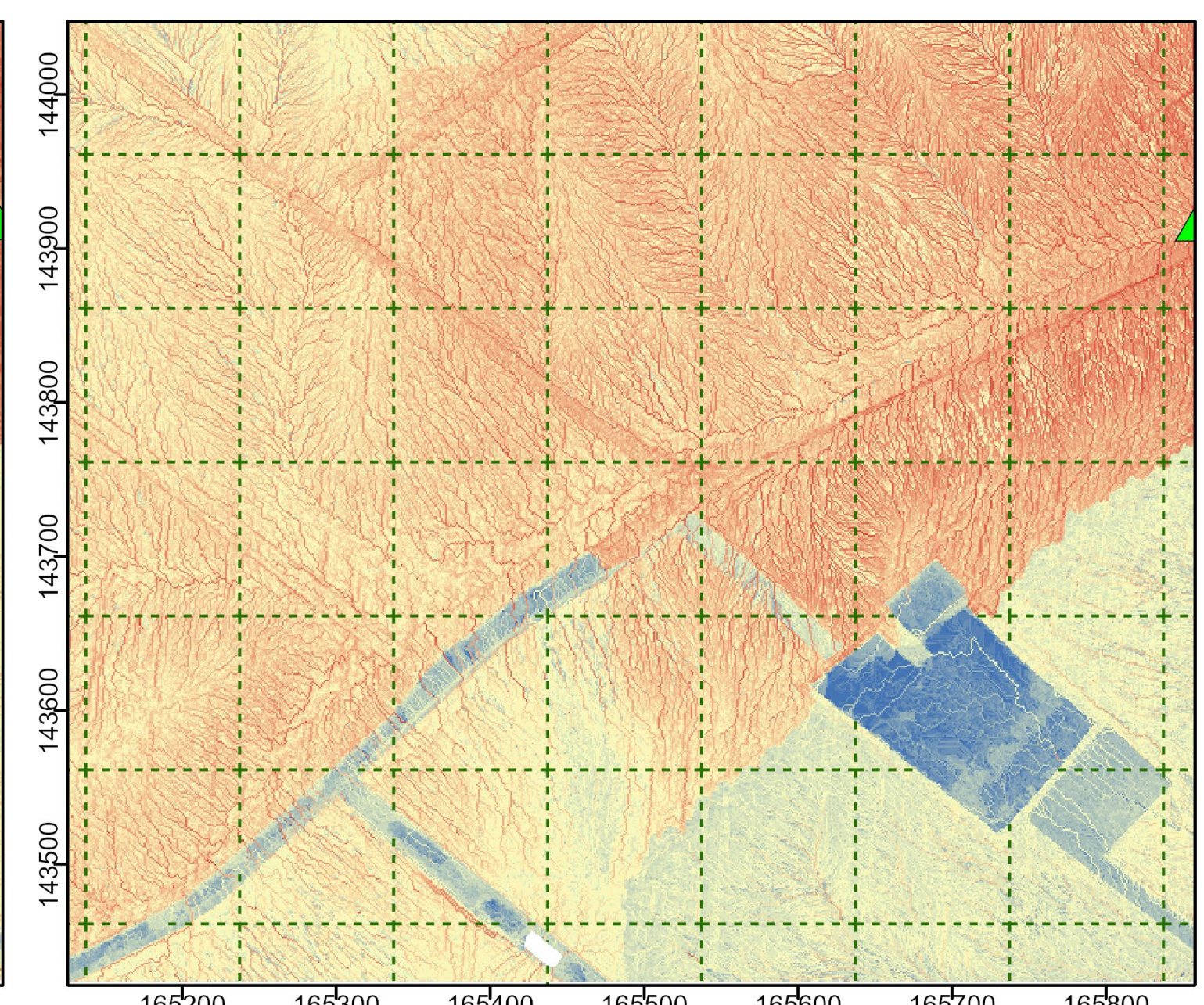


**Fig. 3** – Comparison of the spatial connectivity patterns of the two indices.

### Unfragmented parcel configuration

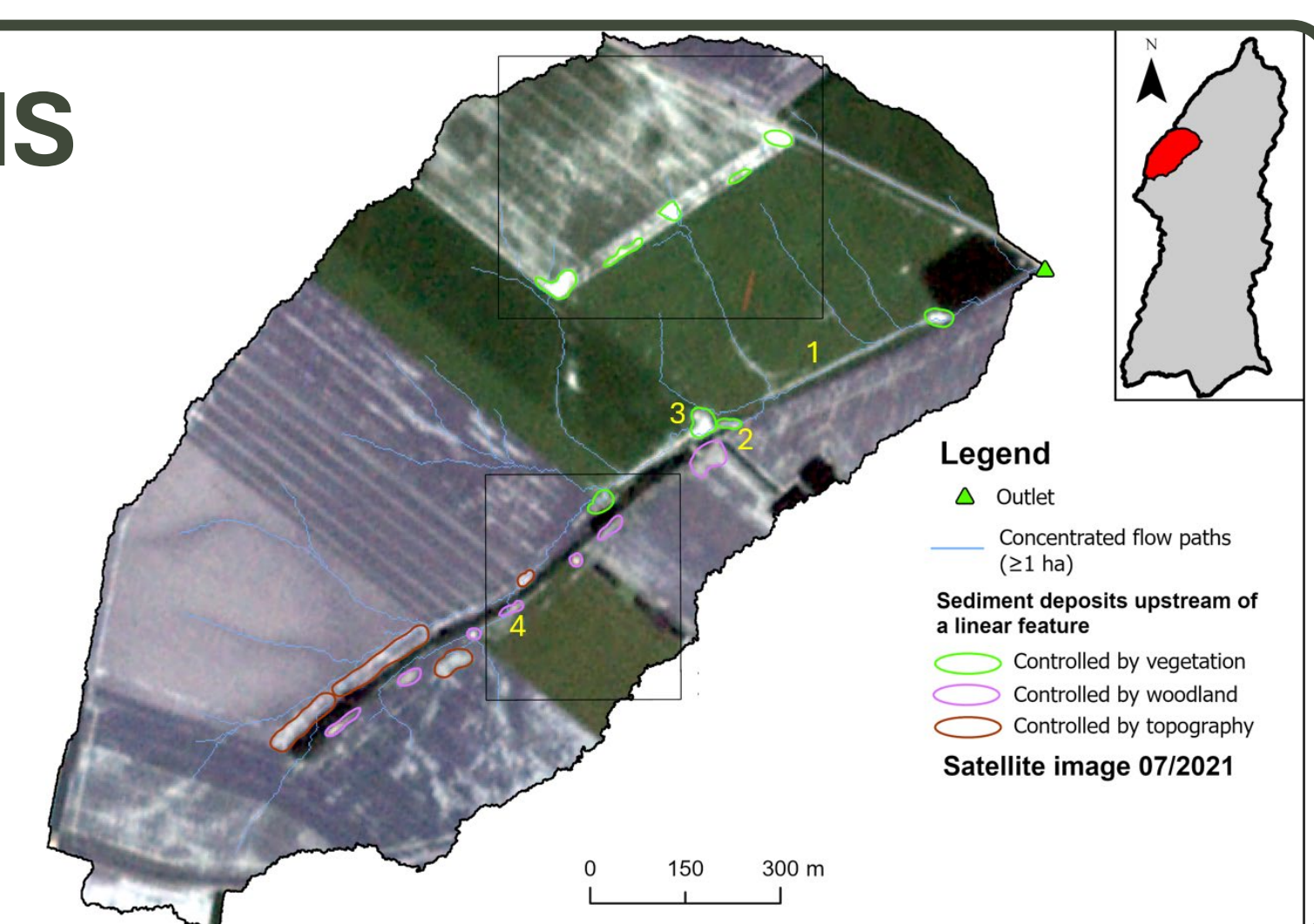


### Fragmentation based on a 1 ha grid



## FIELD OBSERVATIONS

**Fig. 4** – Satellite imagery (July, 2021) highlights sediment deposits located upstream of linear landscape features, supporting the role of field boundaries in interrupting sediment transfer.



### Key References

- [1] Takken, I., Beuselinck, L., Nachtergaele, J., Govers, G., Poesen, J., & Degraer, G. (1999). Spatial evaluation of a physically-based distributed erosion model (LISEM). *CATENA*, 37(3), 431-447.
- [2] Borselli, L., Cassi, P., & Torri, D. (2008). Prolegomena to sediment and flow connectivity in the landscape: A GIS and field numerical assessment. *CATENA*, 75(3), Article 3.

## KEY MESSAGES

- Parcel fragmentation **decreases** sediment connectivity.
- **Boundary placement matters** for sediment disconnection.
- Fragmentation along **isolines** performs best.

