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Serious game design uncovering the Δ ENIGMAs for flexible and adaptive flood risk management



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A productive (learning) aim

The Δ ENIGMA research infrastructure monitors sustained and in high-resolution water and sediment dynamics to support nature-based flood management in the Dutch Delta.

- **The Productive Knowledge interaction facility** joins university labs creating interfaces (**Fig. 3 bottom**) and tools to support and document collaboration within and beyond Δ ENIGMA.
- **This poster shows a game prototype co-developed** with support of TUDelft serious game design students (Kontaxopoulou et al., 2024) to communicate about dike-wetland strategies (**Fig. 1 right**).

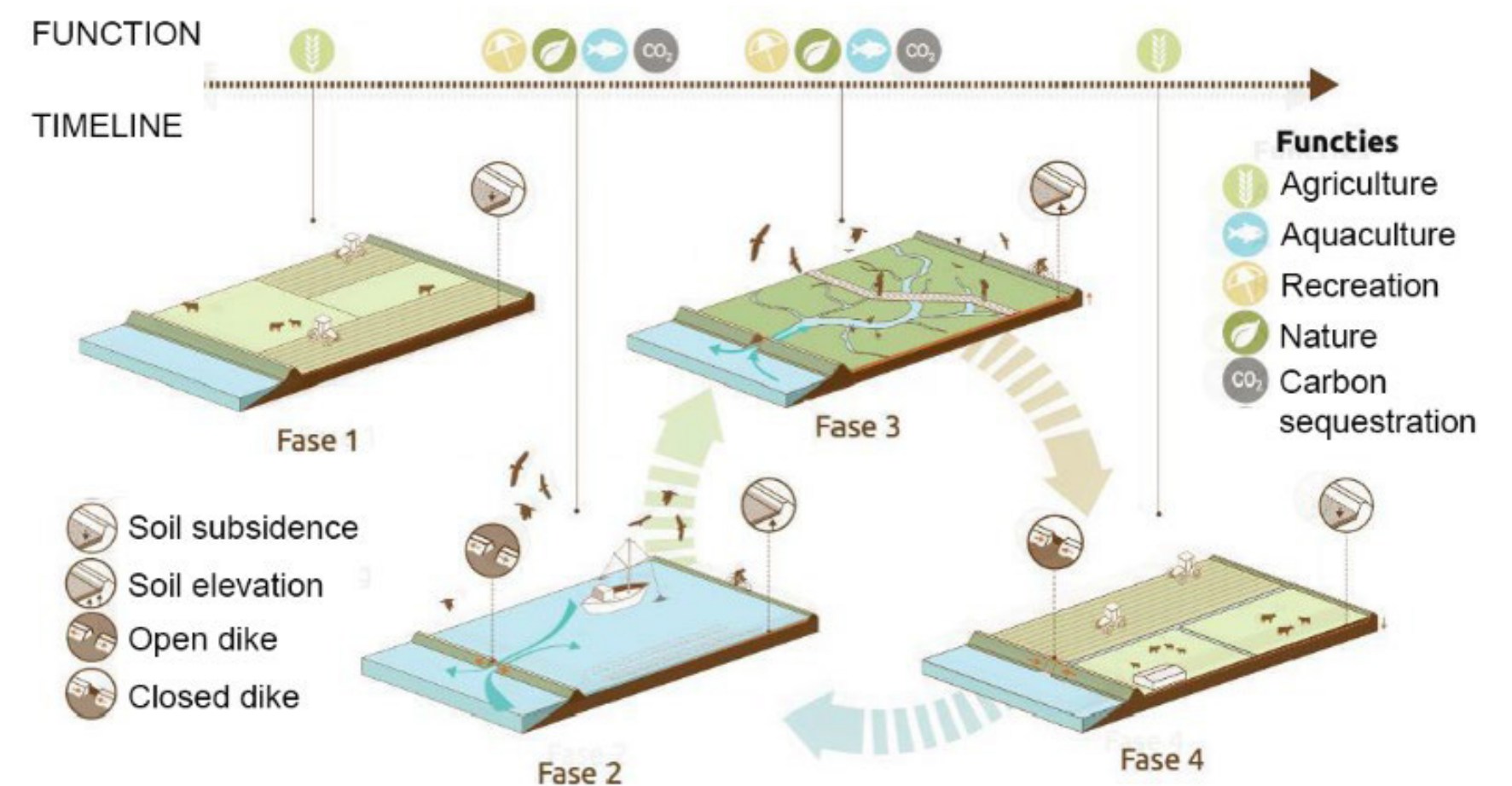


Figure 1. Combining dikes with wetlands (van Belzen et al. 2021)

following a collaborative design to define game requirements



Currently at step 1 of the **Fig. 2**, we involve various stakeholders from public, private and civic organisations representing the nested processes behind the prototype as informants or co-designers based on mutual benefit from their involvement.

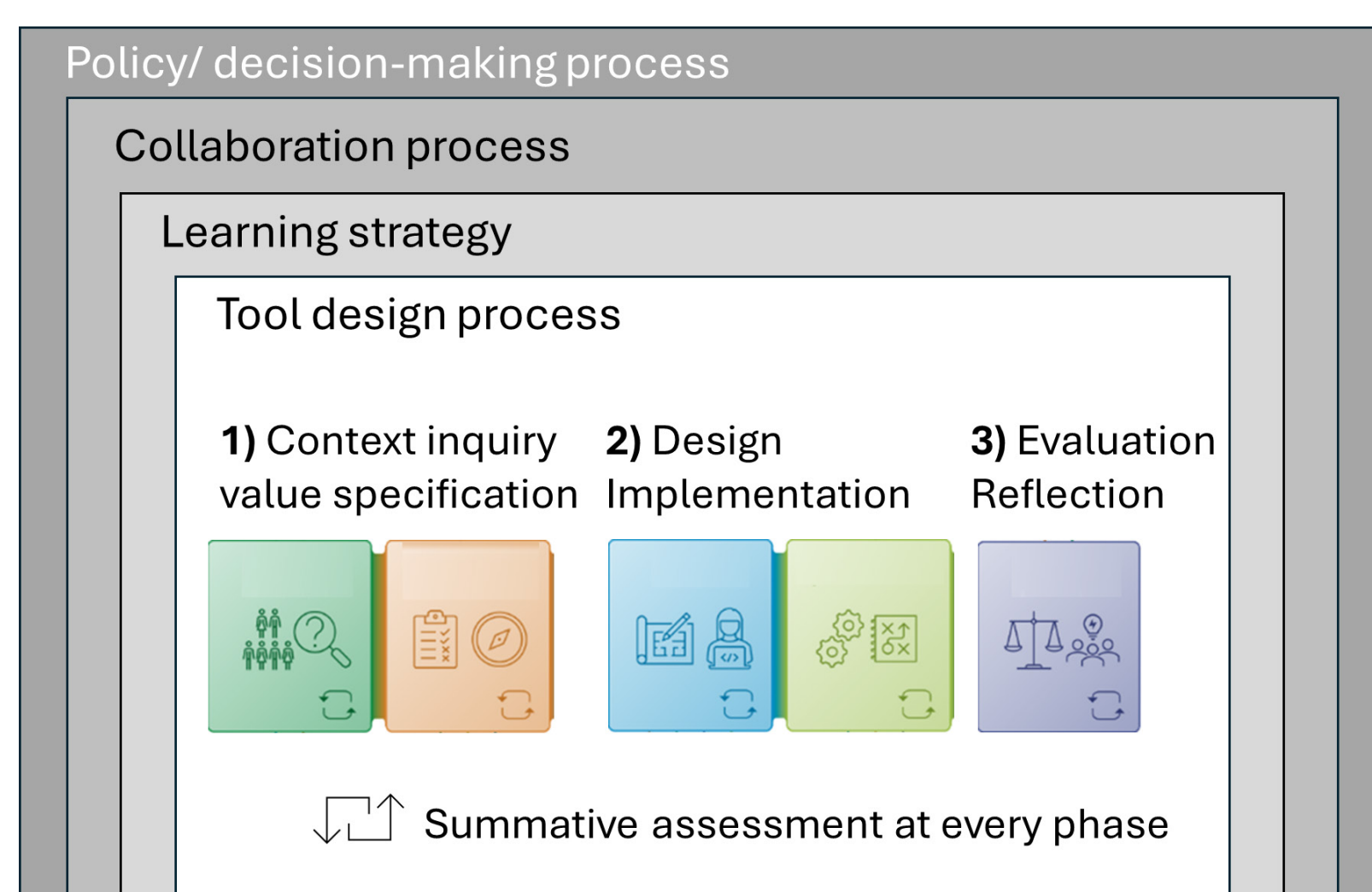


Figure 2. Collaborative design framework (Adapted from Kip et al., 2025)

Policy-making context: Delta communities and managers prioritized land reclamation over long-term flood safety and nature.

Decision and collaboration value: Combining dikes with wetlands needs space, long-term vision, and community support.

Learning strategy

1. Role of water-sediment dynamics in the delta's resilience and long-term sustainability,
2. Benefits and challenges of combining protection,
3. Collective reflection and responsibility on past management to enable flexible and adaptive futures.

and explore prototypes addressing all generations

Audience	School students	Their families
Learning Goal	Water and sediment dynamics	Manage expectations and emotions
Setting	Classroom	Exhibition or field visit

(Future) managers and experts.

Envision and discuss adaptation pathways

Ice-breaking of meetings with elements customised to the areas explored through the Δ ENIGMA (**Fig. 4**)



Figure 3. Top: Preliminary game design (Kontaxopoulou, A., Boudewijn, B., Theodoropoulou, M.-A., & Zygogiannis, P., 2024). Bottom: Snapshot of featured tools per university lab.

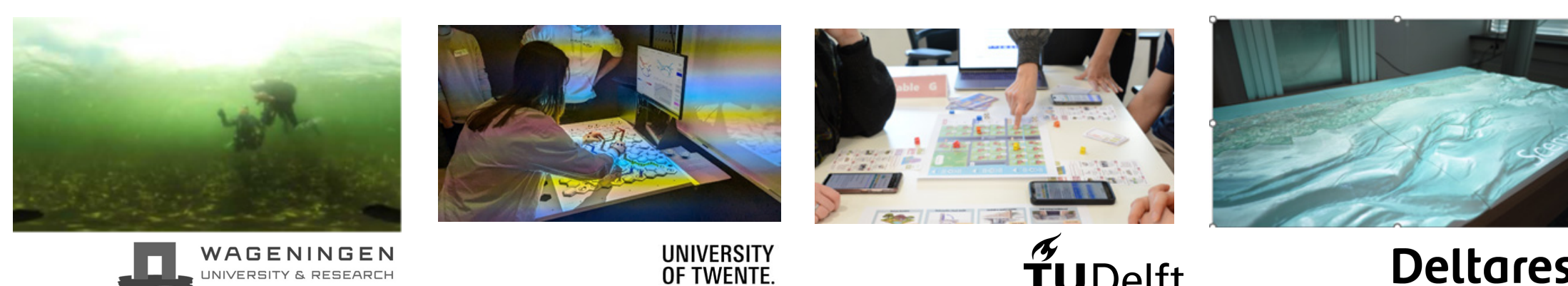


Figure 4. Δ ENIGMA areas where sustained high resolution observations are collected in rivers (1) estuaries; (2) rivers (and (3) beaches and dunes