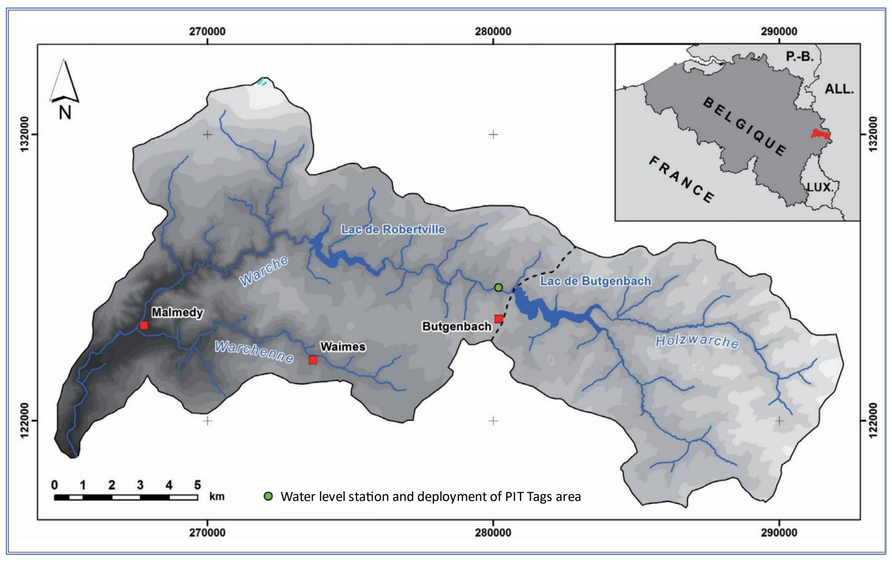
Long-term impacts of hydropower plants on the sedimentology and morphology of the Warche riverbed (Belgium)

CONTEXT

- **Dam** in operation since **1933**
- Volume of the storage reservoir: **11.000.000 m³**
- A **pre dam** for the **hydropower plant of Robertville** (7km downstream)
- Production of electricity : **2.200.000 kwh.year⁻¹**
- **Flow turbinated : 10 m³/s** for about **50 days/year** *(between 10 and 15 days/year for unregulated discharge)*
- **ω ≈ 50 W/m²** (for 10 m³/s)



Map modified from Hallot *et al.*, 2012

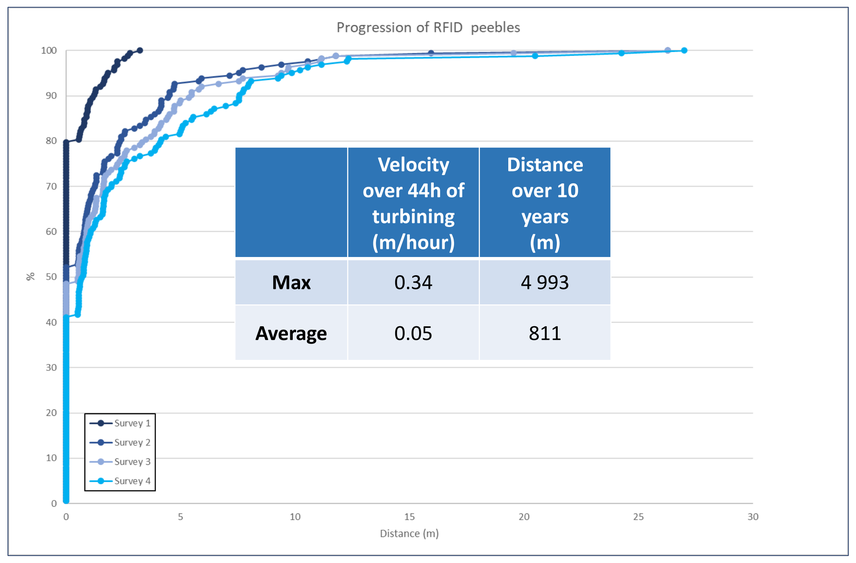
Assani's Results (*Assani & Petit, 2004*)

- **Doubling** of the **width** in 45 years (between 1951 and 1996)
- **Incision** has **stopped** between 1966 and 1996

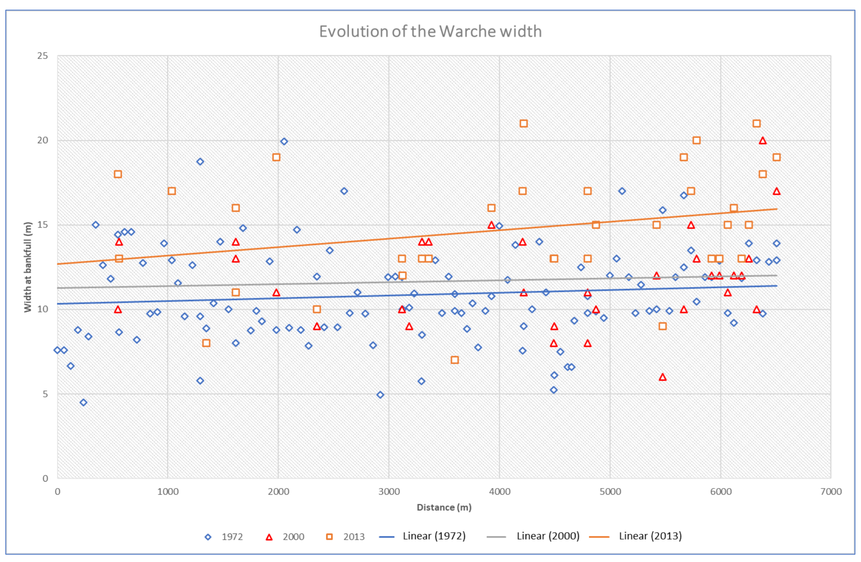
METHODS

1. **Comparison of the widening** between **1972** (topographic survey) – **2000** (DTM LIDAR) and **2013** (DTM LIDAR)
2. **RFID tracers** (N = 167)
3. **Riverbed width comparisons**

RESULTS

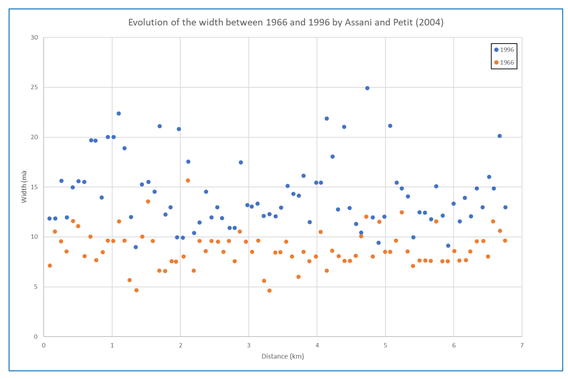


	Velocity over 44h of turbining (m/hour)	Distance over 10 years (m)
Max	0.34	4 993
Average	0.05	811

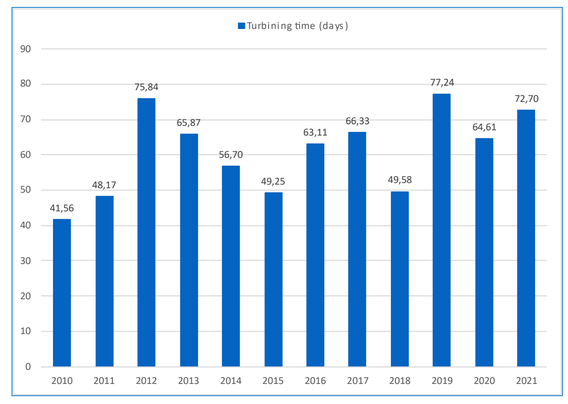


DISCUSSION

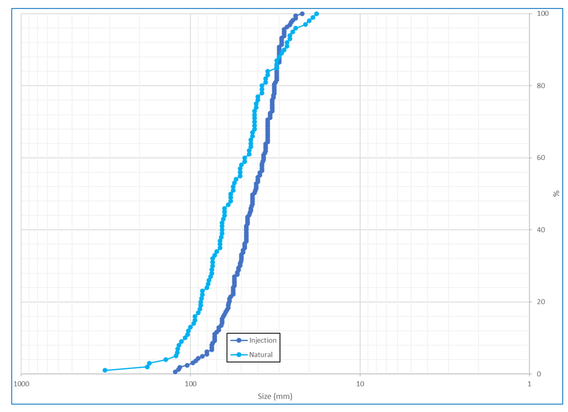
- **Longer time of survey** will give **better estimation** of **bedload velocity and its slowdown**
- **90 years after** the construction of the dam the **river is still widening**. **No equilibrium** has been reached yet



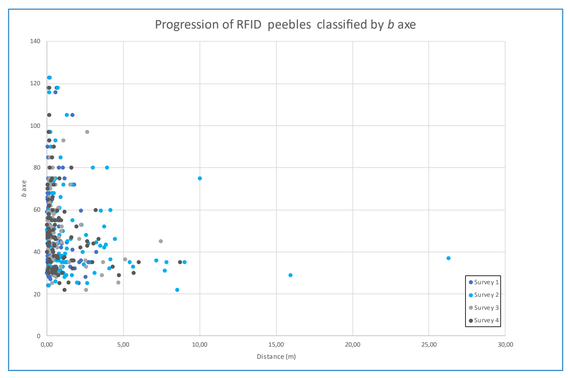
Results from Assani & Petit (2004) about the **evolution of the width riverbed**



Hydrograph of the **turbining time since 2009**



Granulometric comparison between **RFID tracers** and **natural riverbed**



Progression of RFID tracers classified by ***b* axe**

Assani, A. & Petit, F., 2004. Impact of hydroelectric power releases on the morphology and sedimentology of the bed of the Warche River (Belgium). *Earth Surface Processes and Landforms* 29, 133–143

Hallot E., Benoit M., Stasse G., Boulvain F., Leclercq L., Petit F., Juvigné E., 2012, L'envasement du lac de Butgenbach (Ardenne, Belgique). *Bulletin de la Société Géographique de Liège* 59, 39-57

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