

RESEARCH INSTITUTE NATURE AND FOREST

# Complete invasion of *Impatiens glandulifera* in the Scheldt basin

#### prospects for 'hydrological control'?

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In a second for the

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# The species

- Impatiens glandulifera Royle (1850)
  - Balsaminaceae
  - (very) tall annual
  - riverine habitats
- Invasion history
  - native to the Western Himalayas
  - naturalized in temperate regions worldwide
  - Belgium:
    - first record overall : 1891
    - first record of establishment : 1920
    - wider spread : 1940s onwards
    - (source: Verloove <u>URL</u>)





# The **S**cheldt

- overall length : 355 km
- catchment area
  - 21 863 km<sup>2</sup>
  - ± 10 million inhabitants
  - 477 inhabitants / km<sup>2</sup>



- typical rain-fed lowland river
- funnel-shaped
- tide up to Ghent (160 km) and into tributaries
- salinity gradient



# Methods

- permanent plots
  - On <u>banks</u> ...
  - in the <u>freshwater</u> tidal zone ...
  - of the <u>Scheldt and tributaries</u>.
  - # : <u>85</u>
  - bi-/triennial from <u>1995 to 2013</u>
- current objectives
  - documenting *I.g.* invasion
  - understanding *I.g.* niche



### Results



Frequency (bars) and mean cover (circles, ± st.dev.) of *I. glandulifera* through time.

>> invasion is complete

#### Results





Frequency (bars) and mean cover (± st.dev.; circles) of three dominant species through time.

species-poor and uneven; *I.g.* among the oligarchs
> slight decrease in species number over time

# Fuzzy set ordination : example

- Roberts (1986) Vegetatio
  - relatively little-used
  - yet, powerful method to test the importance of environmental variables on floristic composition with a minimum of assumptions



### Fuzzy set ordination : results (1)



Ordination graph of the 2007 relevé data with regard to inundation frequency. Grey line represents equality. The general diagonal trend indicates that environmental factors correlated with inundation frequency exert a significant influence on vegetation composition.

#### inundation frequency was the best predictor

## Fuzzy set ordination : results (2)



Overlay of previous figure, indicating the cover of Himalayan balsam in plots. Most of the respective plots cluster above the equality line.

# I.g. plots appear 'dry' while being frequently inundated

# Fuzzy set ordination : results

- Data suggests that the microhabitat of *I.g.* in the study system is controlled by drainage.
  - *I.g.* performs well when water seeps away rapidly following inundation
- Exacerbated by high tidal amplitude, squeezed habitats...

# **Implications for restoration**

- Sigma plan
  - flood defence plan
  - including 4000 ha (re)creation of floodplains
  - controlled inundation areas (CIA)
    - flooded during storm surge only
  - CIA with controlled reduced tide (CIA-CRT)
    - limited tidal range installed
    - focal spots for nature





# Conclusion

• CIA-CRT

>> less extreme drainage conditions
>> less favourable habitat for *I.g.*>> dominance may be broken
>> in accordance with apparent
observations at pilot site

>> good prospects for landscapewide control of *I.g.* in restored floodplains along Scheldt (?)



#### The end

Photo credits : Yves Adams, Bram D'hondt, wikipedia, sigmaplan.be

