

Applying the CSR framework to plant communities of disconnecting side channels: a case study along the lower Loire River (France)

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Structuring processes in plant communities

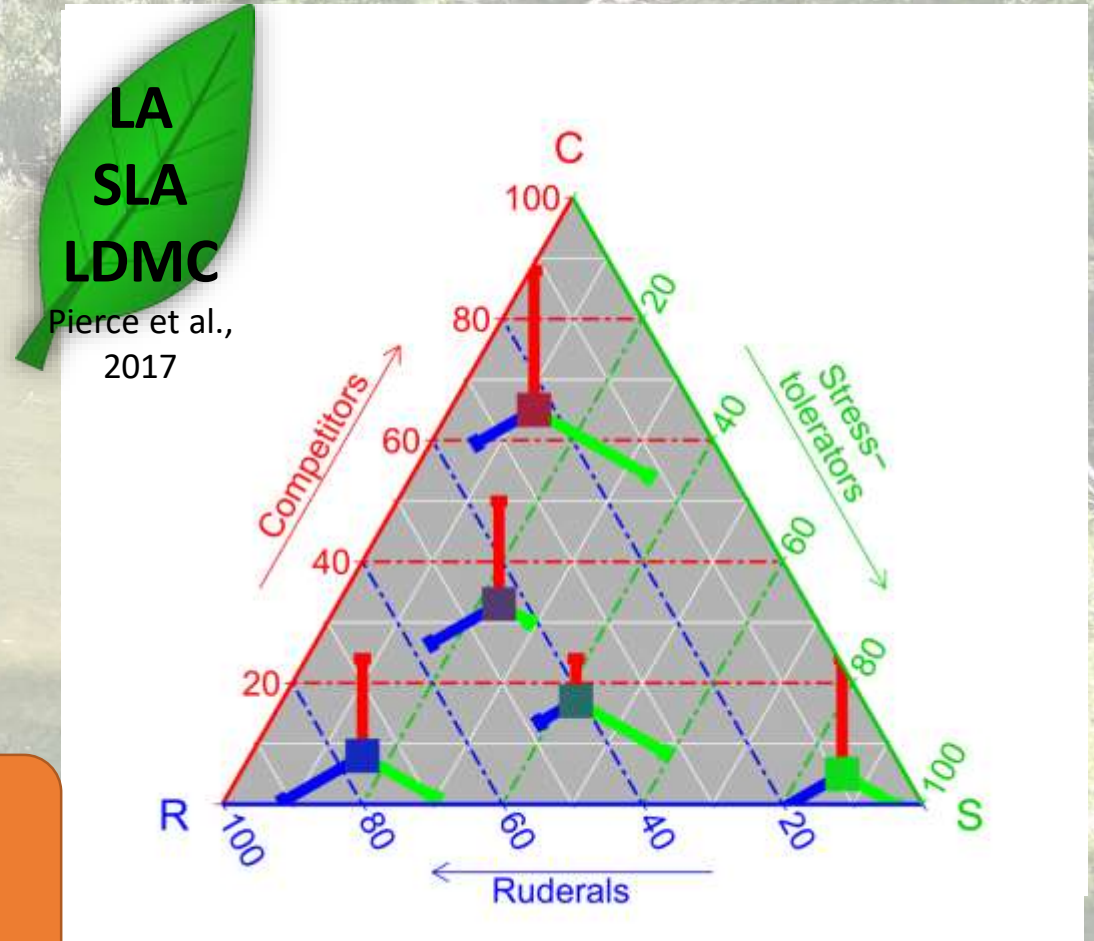
- Grime's CSR theory
 - Optimal conditions → Competitive
 - Lacking resources → Stress-tolerant
 - Disturbance → Ruderal

- Community level (Li and Shipley, 2017)
 - Community Weighted Mean (CWM)
$$C_{CWM} - S_{CWM} - R_{CWM}$$
 - Functional dispersion (FDIS)

$$C_{FDIS} - S_{FDIS} - R_{FDIS}$$

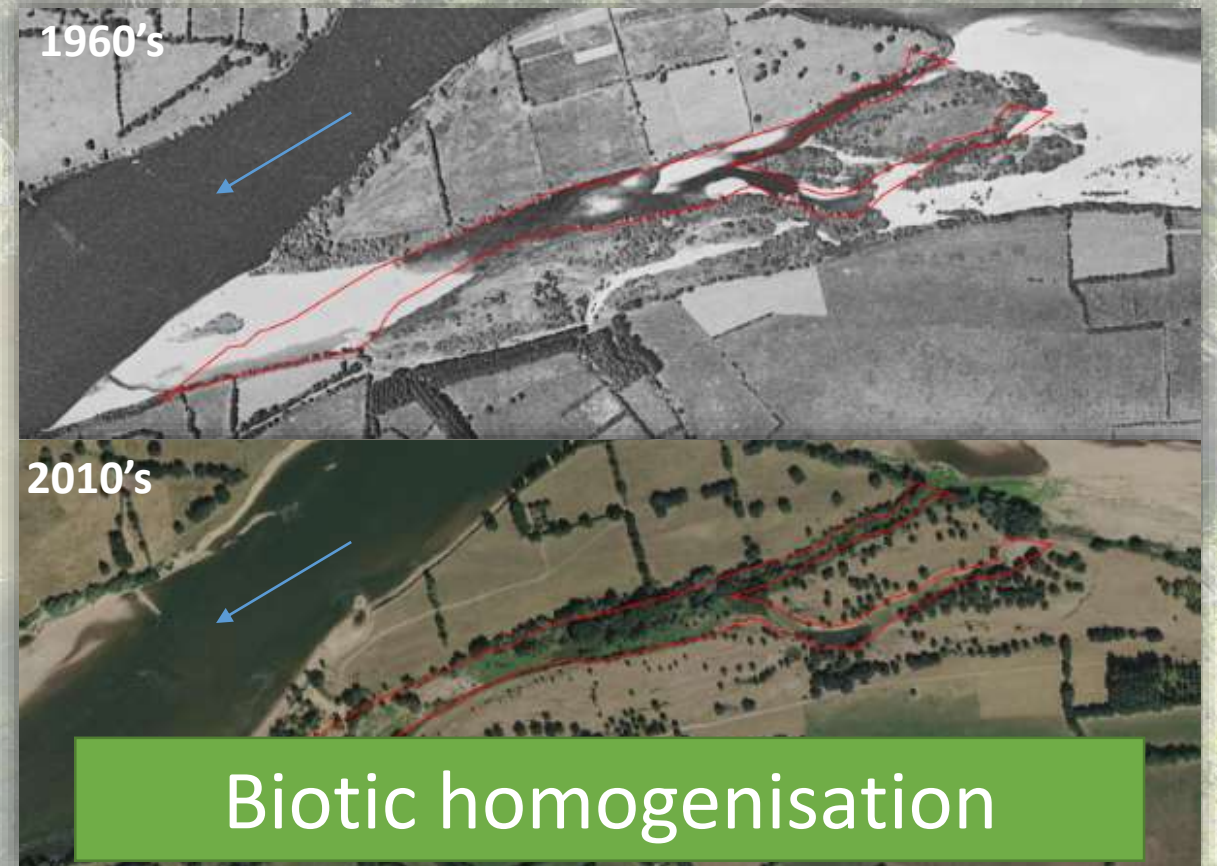


Adaptation to
environmental
gradients



Gradients in side channels

- Terrestrialisation feedbacks
 - Channel aggradation
 - Narrowing
 - Canopy closure
 - Sediment fining

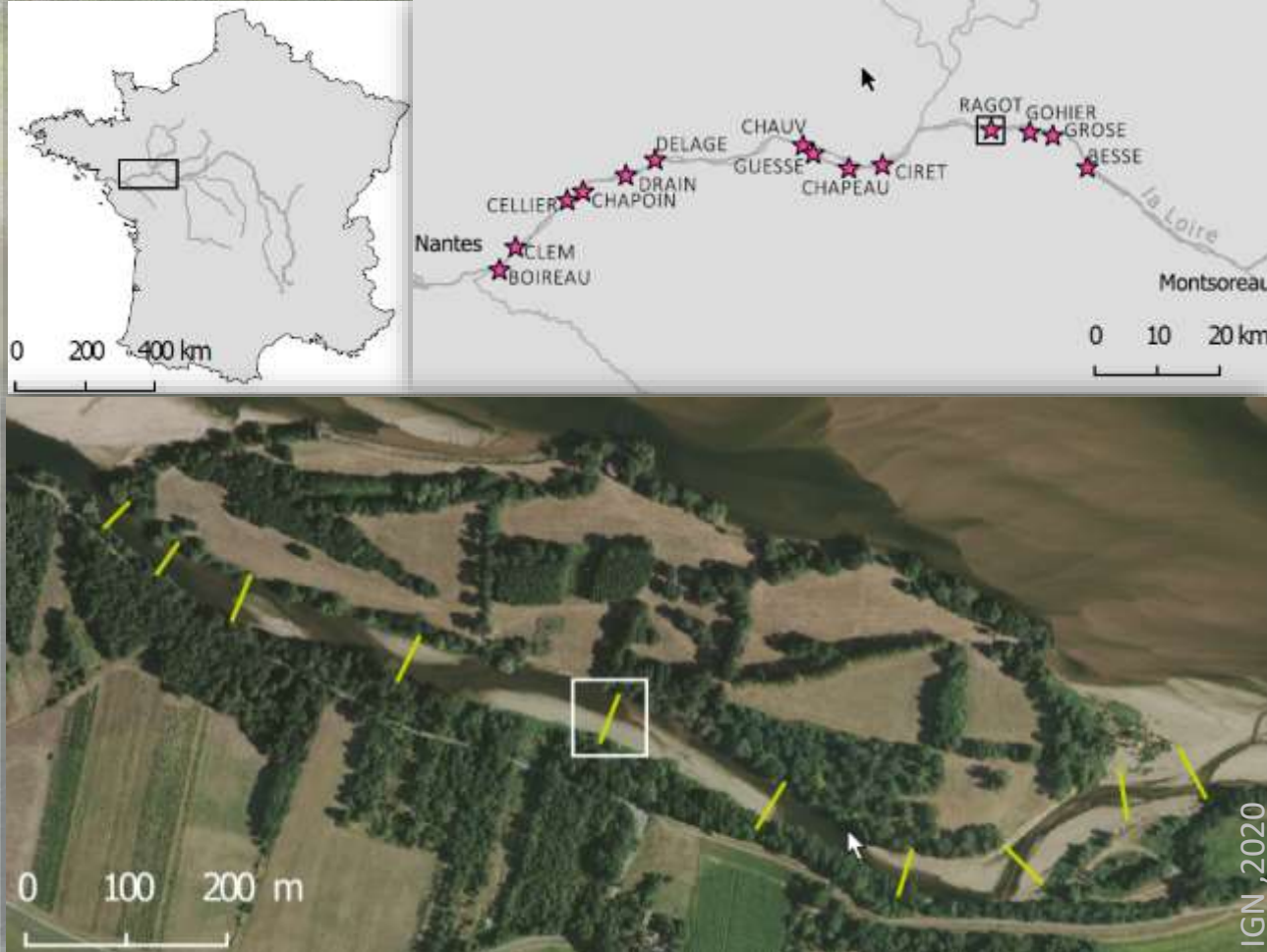


La Pierre de Drain (049, France),
Geoportail.gouv.fr , 2019

Which environmental gradients affect the community strategies?

- Does CSR framework works ?
 - CSR traits (CWM and FDIS) respond to environmental gradients
 - Increasing resources (light and nutrients) reduce S_{CWM} and S_{FDIS}
 - Lowering disturbance (high elevation, low distance from connection point and low slope) reduce R_{CWM} and R_{FDIS}
- We expect to find interactions between morphological and resources variables

Study sites and vegetation survey



Late July 2019 & 2020



Field survey

Resources gradients

Sediment grainsize

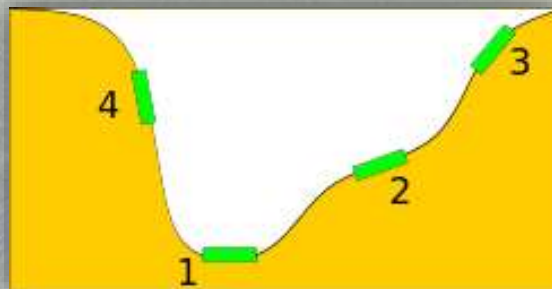


Light availability

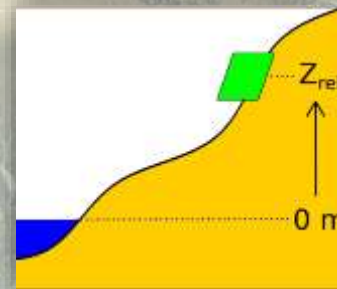


Morphological gradients

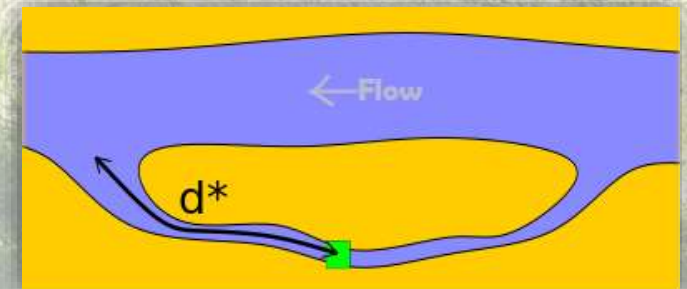
Slope inclination



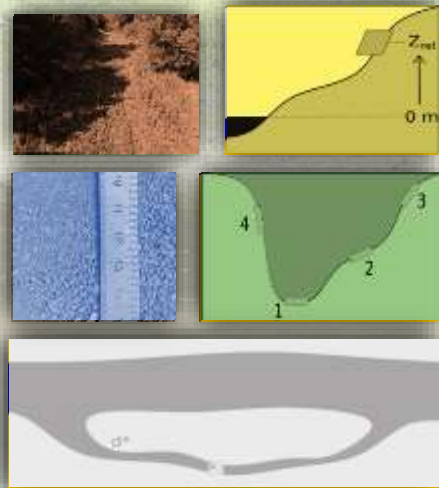
Relative elevation



Relative distance from downstream connection



Statistical analysis



Explanatory

72 mixed effects models

Response

3 covariates

Site = random effect

C_{CWM}	S_{CWM}	R_{CWM}
C_{FDIS}	S_{FDIS}	R_{FDIS}

LA
SLA
LDMC
TRY
database

Model ranking

Based on AICc weight

Model averaging

AICc weight > 0.95

Parameters estimation

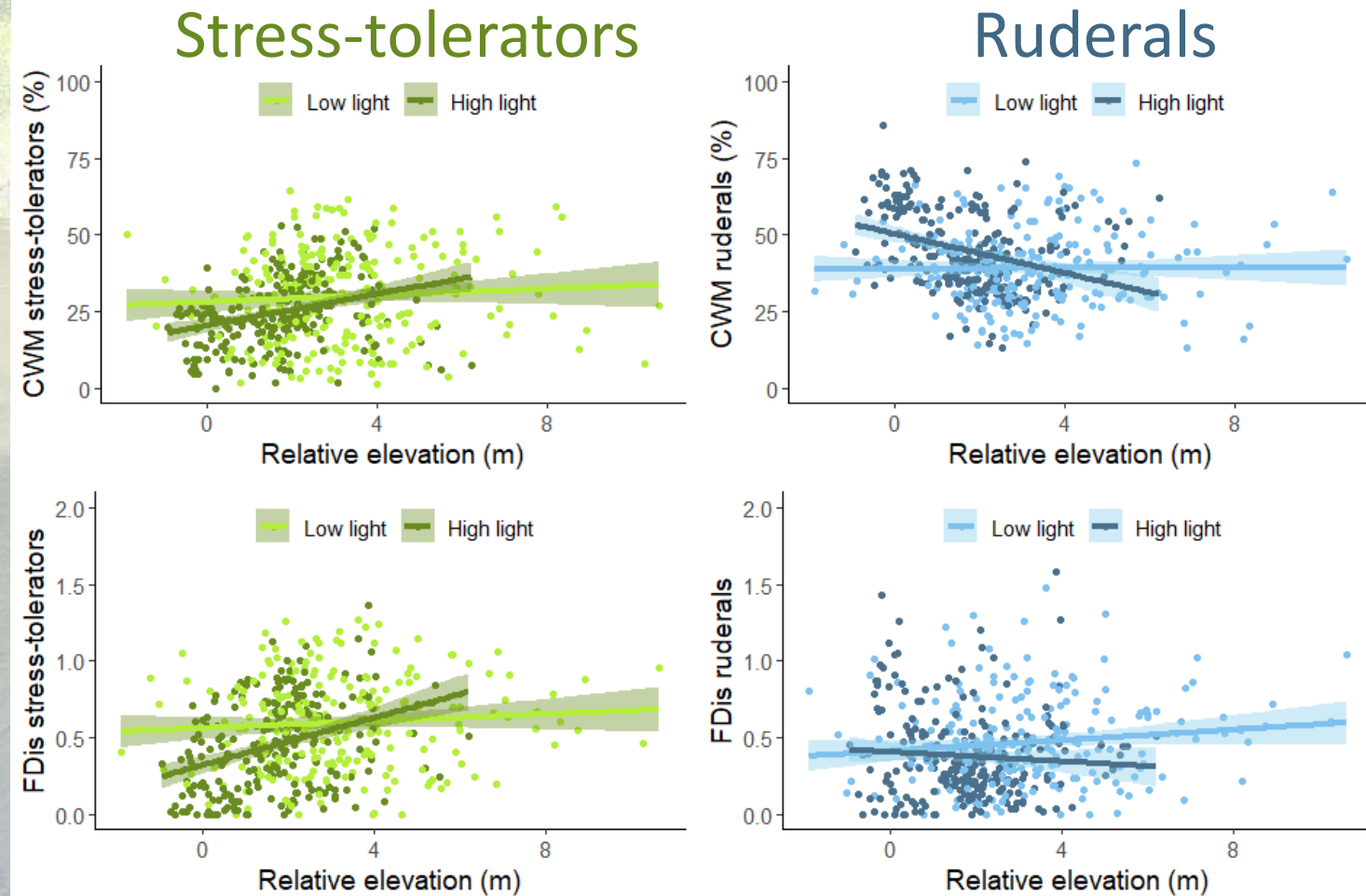
Best models

Measure	Variable	Top-ranked model (fixed effects)	k	AICc	W	R ² marginal	Null model
							ranking
CWM	C	null	6	3573.8	0.076	0.130	1
	S	slope + light * elevation	10	3767.0	0.342	0.084	69
	R	slope + light * elevation	10	3679.5	0.942	0.223	68
FDIS	C	elevation * grainsize	9	282.6	0.186	0.067	52
	S	light * elevation	9	331.5	0.200	0.099	68
	R	distance + light * grainsize	10	149.6	0.258	0.105	72

Light and elevation interaction

Community
weighted
mean

Functional
dispersion



Mitigation of the elevation gradient

Specialization



Homogenization



Take home message

- CSR framework works for S and R
 - But for competitors ?
- Resources and morphological gradients interacted
 - Light increases hydric stress on top
 - Shade reduces resources on the bottom
- Management policies
 - Tree management and sustainability ?
 - Hydrosedimentary continuity and prevention ?

A photograph of a lush green field with tall grass and wildflowers in the foreground, leading to a dense forest of trees in the background. The scene is bathed in soft, natural light.

Thank you for listening!