

RIVEAL PROJECT

RIPARIAN FOREST VALUES AND ECOSYSTEM SERVICES – FIELD SAMPLING



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FIELD SAMPLING

Has the purpose of collecting and gathering data in order to provide representative samples that will characterize the case studies. Essential step to produce scientifically defensible data with the aim of supporting accurate analytical data and reliable results.

SAMPLING DESIGN

► Objective:

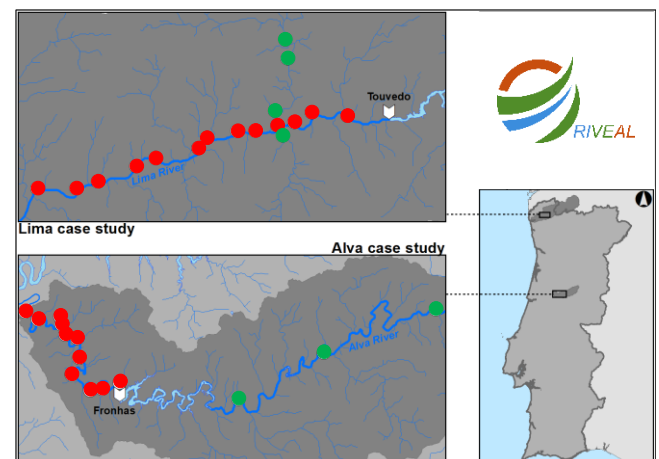
- Determine the response of different biological groups to river regulation
- Assess the influence attributed to the type of flow regulation
- Capture a regulation intensity gradient along the river

BIOLOGICAL ELEMENTS

- Riparian woody: macrophyte woody species living in river margins with wet substrates
- Aquatic herbaceous vascular plants: aquatic (hydrophytes) and emergent plants (helophytes)
- Bryophytes: non-vascular aquatic plants including liverworts, hornworts and mosses
- Macroalgae: macroscopic aquatic single-celled plant-like organisms
- Diatoms: unicellular microalgae either solitary or forming colonies
- Macroinvertebrates: macroscopic aquatic backboneless organisms including snails, mussels, crayfish, worms, leeches and insects

► Approach:

- Two case studies (rivers) facing different flow regulation types
- Sampling sites along the longitudinal dimension of the river
- Free-flowing and regulated sampling sites
- Mesohabitat level sampling (riffle, run and pool) at each sampling site



Distribution of the sampling sites along the study sites (river Lima and river Alva).



Example of a sampling site surveyed in its three existing mesohabitats.

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MESOHABITATS

General characterization of the mesohabitats considered during sampling.

Mesohabitat	Flow velocity	Water depth	Substrate	Flow
Riffle	Very high/High	Low	Coarse	Turbulent
Run	Moderate	Moderate	Moderate	Laminar
Pool	Very low/Null	High	Fine	-



Biological sampling of macroinvertebrates (top left), diatoms (top right), and sample preservation and storage (bottom); sampling done in June-July 2019.

- Parameters assessed during the environmental sampling
 - Mean flow velocity
 - Mean water depth
 - Substrate
 - Water temperature
 - Water pH
 - Water conductivity
 - Dissolved oxygen
 - Channel width
 - Shading

Mesohabitats considered during sampling: riffle (top left), run (top right) and pool (bottom).

SAMPLING METHODS

Sampling methodology according to the biological element.

Biological element	Method
Riparian woody	Identified to the species level in the field when possible or collected and identified in the laboratory of João Carvalho e Vasconcellos Herbarium (LISI)
Vascular herbaceous	
Mosses	Sample collection along the sampling site, posterior identification to the species level in the laboratory and deposited as vouchers in the Porto Herbarium (PO)
Macroalgae	Sample collection along the sampling site, preserved with formalin in jars and identified posteriorly to the genus level in the School of Agriculture (ISA) laboratory
Diatoms	Three 1 dm ² stones scrubbed with a soft brush, preserved with formalin in glass bottles and later identified to the species level in the laboratory of Aveiro University
Macroinvertebrates	Collected with hand-net by kick sampling covering a 3x1 m ² area, preserved with formalin in plastic bags until posterior sorting, identification to the highest possible taxonomic level of resolution in the Coimbra University laboratory



Environmental sampling: substrate assessment, water quality and flow velocity (respectively, left, top right and bottom right).

SAMPLE COLLECTION

- 31 sampling sites
- 64 surveyed habitats
- 18 riparian woody species
- 42 aquatic herbaceous vascular plant species
- 20 bryophyte taxa
- 16 macroalgae
- Over 13,000 diatom valves from 155 species
- Approximately 72,000 macroinvertebrate individuals distributed by 80 families

