Copernicus Tools for Monitoring Global Change Effects in Rivers and Riparian Zones

(Cop.RIVER)

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Deliverable 11: Scientific contributions

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1 BACKGROUND

Cop.RIVER aims to promote the use of Earth Observation (EO) in applications and services related to the ecological status of riverscapes (*i.e.*, rivers and their associated alluvial plains, floodplains and riparian forests). The action will strengthen the Copernicus user uptake by supporting regional and national authorities in the implementation of the EU Biodiversity Strategy to 2020, the Habitats and Birds Directives and the Water Framework Directive by applying GAP analysis, to complement available Copernicus information on the state and characteristics of rivers and riparian zones.

2 SCIENTIFIC CONTRIBUTIONS

The results of this action are of interest of multiple agents of interest, including the scientific community. In this regard, multiple scientific publications were envisioned during the development of Cop.RIVER. In 2024, an oral contribution related with the use of Copernicus data and services for ecosystem monitoring was presented at the XXII Congress of the Iberian Association of Limnology (AIL) "Aquatic Ecosystems Under Threat: Advancing Our Knowledge to Mitigate the Effects of Global Change, Promote Adaptive Management, and Engage Citizens".

2.1 Oral contribution presented at the XXII Congress of the AIL

The XXII Congress of the AIL, titled "Aquatic Ecosystems Under Threat: Advancing Our Knowledge to Mitigate the Effects of Global Change, Promote Adaptive Management, and Engage Citizens," aimed to bring together limnologists from Portugal, Spain, and other regions/nationalities to share and exchange knowledge and experience. It also aimed to gather political and environmental stakeholders, industry representatives, and all those interested in aquatic ecological research and building an environmentally sustainable future.

One of the primary goals of the congress was to provide a platform for presenting and debating new scientific advancements necessary for improving the management and conservation of continental water ecosystems (from lakes to deltas and estuaries, including rivers and wetlands). This is set in a context of global change that requires new models of cooperation between human society and nature. The congress also served as a space for exchanging new technological tools that will greatly assist us in the future and are currently reshaping our surroundings.

Here, the work “Riparian forests are key regulators of thermal conditions across European rivers” was presented. This work aimed to advance our knowledge about the drivers of riverine thermal conditions. This is critical to preserving river biodiversity and functioning in the face of global change. In particular, riparian forests are a key ecosystem component providing shade and modulating air movement above the river and in exchange with the adjacent environment. To better understand the role of riparian forests as regulators of riverine thermal conditions, we investigated 20 sites in each of six basins from Southern Spain to Finland. Combining remote sensing data and in situ measurements, we studied how forest shade and land cover composition in the riparian zone influence river water and air temperature. Shade over the river was estimated with hemispheric photos taken in the field while land cover was defined using CORINE-Land Cover (Copernicus Land Monitoring Service). Daily water

and air temperature were measured in the field from spring to late winter over a year. Forest shade had a significant effect on water and air temperature, yet, the direction and magnitude of this effect was season-dependent. Also, the land cover composition was related to the seasonal regime of air temperature (i.e., the combination of seasonal mean, minimum, maximum, SD, and range), while the dominance of forest/non-forest cover was related to the seasonal regime of water temperature.

The findings of this work will help to predict the implications of warming and land use change for ecosystem functioning and suggest riparian forests as an important tool for climate change adaptation in rivers.

3 ACKNOWLEDGMENTS

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