Appendix 1. Biological factors.

Macroinvertebrates were collected following the multimetric Iberian Biomonitoring Working Party (IBMWP) protocol. At each sample point, 100 m longitudinal meters were sampled in 20 kicks, and care was taken to represent all different habitats (rocks, detritus, shoreline, sand, and fine sediments) at the sampling site. The substratum upstream of the kick-net (250 µm) was disturbed, and effort proportional to the relative importance of each habitat was expended to sample all microhabitats present at the site (multi-habitat sampling). All collected material was transferred into plastic containers and preserved in 96% ethanol. Samples were then examined under a stereoscope in the laboratory. Most animals were identified at the genus level. Riparian vegetation was sampled following the criteria set out in the LEDA traitbase (Kleyer et al. 2008). At each sample point, transects 25 m long and 2.5 m wide were sampled from both sides of the river. The total surface sample in each pint was 50 m × 5 m. Each individual found was sampled and identified in the laboratory.

Table A1.1. Biological sample points description. Sampled points were selected with the objective of having represented each of the geographical sectors in the Nacimiento (N) and Adra (A) watersheds but avoiding when possible very close sites in order to obtain the higher representation within each sector. Sites were also selected to be representative of the river course and considering adequate access facilitated by overland roads. Macroinvert: macroinvertebrates.

Sample point	UTM coord. (municipality)	Presence of freshwater	Description	Organisms sampled
Nacimiento watershed				
0	501237 4106096 (Hueneja)	Yes	High water flow, predominant habitat of rocks and vegetated shorelines, dominated by trees and shrubs (*Populus* spp. and *Salix* spp.). Type 12: Mediterranean calcareous mountain river.	Riparian vegetation Macroinvert.
1	507555 4129945 (Valle de Zalabi)	Yes	Water flow is very low. *Populus alba* is the dominant plant species, and there is abundant leaf litter in river. Type 12: Mediterranean calcareous mountain river.	Riparian vegetation Macroinvert.
2	507223 4117735 (Valle de Zalabi)	No	River bed is dry and there are no signs of recent water flow. Riparian vegetation is poor and dominated by *Retama sphaerocarpa*. Type 12: Mediterranean calcareous mountain river.	Riparian vegetation
3	507935 4117260 (Valle de Zalabi)	No	River bed is dry and there are no signs of recent water flow. Riparian vegetation is poor and dominated by *Retama sphaerocarpa*. Type 12: Mediterranean calcareous mountain river.	Riparian vegetation
4	507460 4108614 (Fiñana)	Yes	High water flow. Canopy is dominated by *Castanea sativa* and *Populus alba*. Type 11: Mediterranean siliceous mountain river.	Riparian vegetation Macroinvert.
5	511451 4110990 (Fiñana)	No	No water flow. *Pinus sylvestris* and *Quercus tundifolia* are abundant in the riparian community. Type 11: Mediterranean siliceous mountain river.	Riparian vegetation
6	522662 4120111 (Tres Villas)	No	No water flow during the sampling period. Riparian vegetation is scarce and dominated by Mediterranean shrubs (mainly *Stipa tenacissima*). Type 09: Mineralised Mediterranean mountain river.	Riparian vegetation
7	518719 4117118 (Abrucena)	Yes	Water flow is very low. Riparian vegetation is dominated by *Rubus ulmifolius* and *Thypha latifolia*. Type 09: Mineralised Mediterranean mountain river.	Riparian vegetation Macroinvert.
8	516676 4108329 (Abrucena)	Yes	High water flow. The dominant species are *Scirpus holoschoenus* and *Retama sphaerocarpa.* Type 11: Mediterranean siliceous mountain river	Riparian vegetation Macroinvert.
9	518434 4111940 (Abrucena)	Yes	No water flow, only some pools along the river. *Tamarix canariensis* is the most abundant plant. Type 09: Mineralised Mediterranean mountain river.	Riparian vegetation Macroinvert
10	522282 4111417 (Abla)	No	No water flow. The herbaceous community is highly diverse. *Tamarix canariensis* is the most abundant shrub. Type 09: Mineralised Mediterranean mountain river.	Riparian vegetation
11	528981 4115598 (Nacimiento)	No	No water during sampling period. *Euphorbia segetalis, Dittrichia viscosa* and *Scirpus holoschoenus* are the most abundant plant species. Type 09: Mineralised Mediterranean mountain river.	Riparian vegetation
Adra watershed				

0	491077 4102997 (Válor)	Yes	Water flow is very high. There are several trees species, predominantly *Pinus* and *Populus*. Type 11: Mediterranean siliceous mountain river.	Macroinvert. Riparian vegetation
1	497998 4106969 (Bayárcal)	Yes	Significant water flow, abundant leaf litter in the river bed. Riparian vegetation is dominated by herbaceous species (*Geranium*, *Bromus*). Type 11: Mediterranean siliceous mountain river.	Macroinvert. Riparian vegetation
2	498840 4102877 (Bayárcal)	Yes	No water flow, only some pools along the river, with abundant detritus. *Rubus*, *Populus* and *Dryopteris* are dominant. Type 11: Mediterranean siliceous mountain river.	Macroinvert. Riparian vegetation
3	500826 4102034 (Bayárcal)	No	No water during sampling period. *Dryopteris filix-mas* and *Rubus ulmifolius* are the predominant species. Trees are abundant, including *Populus, Quercus, Crataegus* and *Salix*. Type 11: Mediterranean siliceous mountain river.	Riparian vegetation
4	501849 4096377 (Bayárcal)	No	No water flow. *Euphorbia, Retama,* and *Rubus* are predominant in the riparian ecosystem. Type 09: Mineralised Mediterranean mountain river.	Riparian vegetation
5	502632 4092285 (Alcolea)	Yes	High water flow. Riparian community is dominated by *Hordeum, Polypogon, Scirpus, Populus* and *Rhamnus*. Type 09: Mineralised Mediterranean mountain river.	Macroinvert. Riparian vegetation
6	493665 4091322 (Ugíjar)	Yes	High water flow with abundant rocks. *Genista, Hordeum, Plantago* and *Scirpus* are abundant in the riparian zone. Type 09: Mineralised Mediterranean mountain river.	Macroinvert. Riparian vegetation
7	489030 4087049 (Ugíjar)	No	No water flow. High biodiversity in the shrub community, with *Tamarix, Avena, Genista* and *Salix* predominant in the riparian zone. Type 09: Mineralised Mediterranean mountain river.	Riparian vegetation
8	497456 4082054 (Berja)	No	No water flow. *Tamarix* and *Avena* are predominant. The invasive exotic species *Acacia saligna* was found. Type 07: Mineralised Mediterranean lowland river.	Riparian vegetation
9	503595 4089095 (Alcolea)	No	No water flow. Riparian community is dominated by herbaceous species (*Hordeum, Avena*, etc.). Type 07: Mineralised Mediterranean lowland river.	Riparian vegetation
10	505641 4080128 (Berja)	No	No water flow. No trees, only shrubs and herbaceous species. *Verbascum nevadense* was found (endemism). Type 07: Mineralised Mediterranean lowland river.	Riparian vegetation
11	504798 4086324 (Alcolea)	No	No water flow. *Eruca* and *Stipa* are predominant. Type 07: Mineralised Mediterranean lowland river.	Riparian vegetation

Table A1.2. List of traits and their subdivision into attributes used to calculate the riparian vegetation functional dispersion index (FDis veg). Species abundance was used as weigthting variable. Abundance was estimated as follows: 1) rare, isolated individuals; 2) occasional, 1-10% of species; 3) frequent, 10-50% of species; 4) abundant, 50-70% of species; and 5) dominant, > 70%. Gower dissimilarity matrix between all species using traits was also computed because it allows mixed variable types (continuous, categorical and binary).

Trait	Attributes	Type
Growth form	Geophytes (cryptophyte resting in dry ground) (0= non geophyte; 1= geophyte) Phanerophytes (projecting into the air on stems –normally woody perennials-with resting buds more than 50 cm above soil level) (0= non phanerophyte; 1= phanerophyte) Hemicryptophytes (buds at or near the soil surface) (0= non hemicryptophytes; 1= hemicryptophytes) Helophyte (cryptophyte resting in marshy ground) (0= non helophyte; 1= helophyte) Therophytes (annual plants which survive the unfavorable season in the form of seeds and complete their life-cycle druing favorable seasons) (0= non therophyte; 1= therophyte) Chamaephytes (projecting into the air on stems –normally woody perennials-with resting buds between 25-50 cm above soil level) (0= non chamaephytes; 1= chamaephytes)	Binary
Life span	Perennial (0= non perennial; 1= perennial) Annual (0= non annual; 1= annual) Biannual (0= non biannual; 1= biannual) Semi-deciduous (0= non semi-deciduous; 1= semi-deciduous) Deciduous (0= non deciduous; 1= deciduous)	Binary
Plant height	Average plant height (mm)	Continuous
Body flexibility	Capacity of body to bend without breaking (1=flexing angle <45º; 2=45º-300º; 3>300º)	Categorical
Early phenology	Growth mostly before the drought period (June-September) (0= April-September; 1=before April)	Binary
Vertical shoot architecture	Single apical meristem (0= no; 1= yes)	Binary
	Multiple apical meristems (0= no; 1= yes)	Binary
Specific leaf area (SLA)	Average specific leaf area (mm^2/mg)	Continuous
Leaf texture	Leaf texture (1=soft; 0=tough)	Binary
Physical defenses on stems	Presence of spines or spine-like, hairy structures on stems (0=non physical defenses on stems, 1=with physical defenses on stems)	Binary
Physical defenses on leaves	Presence of spines or spine-like, hairy structures on leaves (0=non physical defenses on leaves, 1=with physical defenses on leaves)	Binary
Root and underground structures	Simple root (0= non simple root; 1= simple root) Stolons (0= non stolons; 1= stolons)	Binary

Dispersal mode	Rhizomes (0= non rhizomes; 1= rhizomes) Tubers (0= non tubers; 1= tubers) Autochory (0= non autochory; 1= autochory) Wind dispersal (0= non wind dispersal; 1= wind dispersal) Water dispersal (0= non water dispersal; 1= water dispersal) Animal dispersal (0= non animal dispersal; 1= water dispersal)	Binary

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Table A1.3. List of traits and their subdivision into attributes used to calculate the macroinvertebrates functional dispersion index (FDis macro). Species abundance (in %) was used as weighting variable. Gower dissimilarity matrix between all species using traits was also computed because it allows mixed variable types (continuous, categorical and binary).

Trait	Attributes	Type
Maximal size	mm Trait $\log_{10}$ transformed for the analysis	Continuos
Life-cycle duration	3 = >1 year; 2 =1 year, 1= <1 year	Categorical
Potential no. Reproductive cycles per year	3 = >1 cycle per year; 2 =1 cycle per year r, 1= <1 cycle per year	Categorical
Aquatic stage	Egg (0=non egg; 1=egg) Larva (0=non larva; 1=larva) Pupa (0=non pupa; 1=pupa) Adult (0=non adult; 1=adult)	Binary
Reproduction	Ovoviviparity (0=non ovoviviparity; 1=ovoviviparity) Isolated eggs (0=non egg; 1=egg) Clutches (0=non clutches; 1=clutches)	Binary
Dissemination	Aquatic passive (0=non aquatic passive; 1=aquatic passive) Aquatic active (0=non aquatic active; 1=aquatic active) Aerial passive (0=non aerial passive; 1=aerial passive) Aerial active (0=non aerial active; 1=aerial active)	Binary
Resistance form	Yes (=1), None (=0)	Binary
Respiration	Tegument (0=non tegument; 1=tegument) Gill (0=non gill; 1=gill) Plastrom (0=non plastrom; 1=plastrom) Spiracle (aerial) (0=non spiracle; 1=spiracle	Binary
Food type	Plant detritus (0=non plant detritus; 1= plant detritus) Living microphytes (0=non living microphytes; 1= living microphytes) Living macrophytes (0=non living macrophytes; 1= living macrophytes) Dead animal (0= non dead animal; 1= dead animal) Living microinvertebrates (0=non living microinvertebrates; 1= living microinvertebrates) Living macroinvertebrates (0=non living macroinvertebrates; 1= living	Binary

	macroinvertebrates) Vertebrates (0=non vertebrates; 1= vertebrates)	
Feeding habits	Absorber (0=non absorber; 1= absorber) Shredder (0=non shredder; 1= shredder) Scraper (0=non scraper; 1= scraper) Filter feeder (0=non filter feeder; 1= filter feeder) Predator (0=no predator, 1=predator)	Binary
Locomotion and sustratum relation	Burrower (epibenthic) (0= non burrower; 1= burrower) Temporarily attached (0= temporarily attached; 1= temporarily attached) Swimmer (0=non swimmer; 1= swimmer) Crawler (0=non crawler; 1= crawler)	Binary

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