



Gli invertebrati acquatici

Alberto Doretto – Università del Piemonte Orientale
alberto.doretto@uniupo.it

Torino

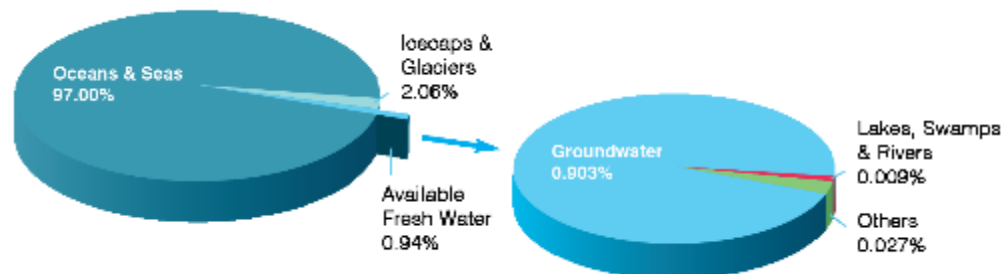
30 Settembre 2024

Macroinvertebrati bentonici: ottimi bioindicatori!

Organismi acquatici, invertebrati, visibili ad occhio nudo e la cui taglia corporea è superiore a 1 mm



I fiumi rappresentano solamente lo
0,0002% dell'acqua del pianeta



Ma dipendiamo proprio da
questa piccola frazione per:



A decade of weather extremes

Dim Coumou and Stefan Rahmstorf^{*}

The ostensibly large number of recent extreme weather events has triggered intensive discussions, both in- and outside the scientific community, on whether they are related to global warming. Here, we review the evidence and argue that for some types of extreme — notably heatwaves, but also precipitation extremes — there is now strong evidence linking specific events or an increase in their numbers to the human influence on climate. For other types of extreme, such as storms, the available evidence is less conclusive, but based on observed trends and basic physical concepts it is nevertheless plausible to expect an increase.



Dead fish on the banks of the Guadiaro River in southern Spain during severe drought.

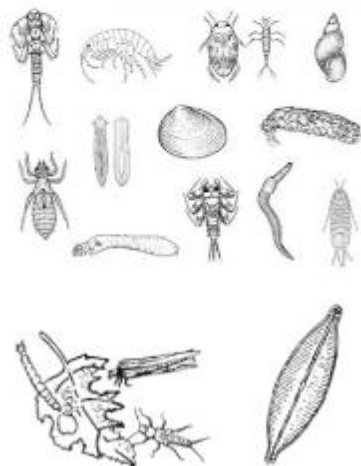


Prepare river ecosystems for an uncertain future

As the climate warms, we can't restore waterways to pristine condition, but models can predict potential changes, argue Jonathan D. Tonkin, N. LeRoy Poff and colleagues.

NO ACQUA

Risposte di comuNità e processi ecOsistemici in corsi d'ACQUA soggetti a intermittenza idrologica



???

???

Biodiversity ?
Ecosystem processes ?
Resistance vs resilience ?



UNIVERSITÀ
DI TORINO



UNIVERSITÀ
DI PARMA



RESEARCH ARTICLE



If Alpine streams run dry: the drought memory of benthic communities

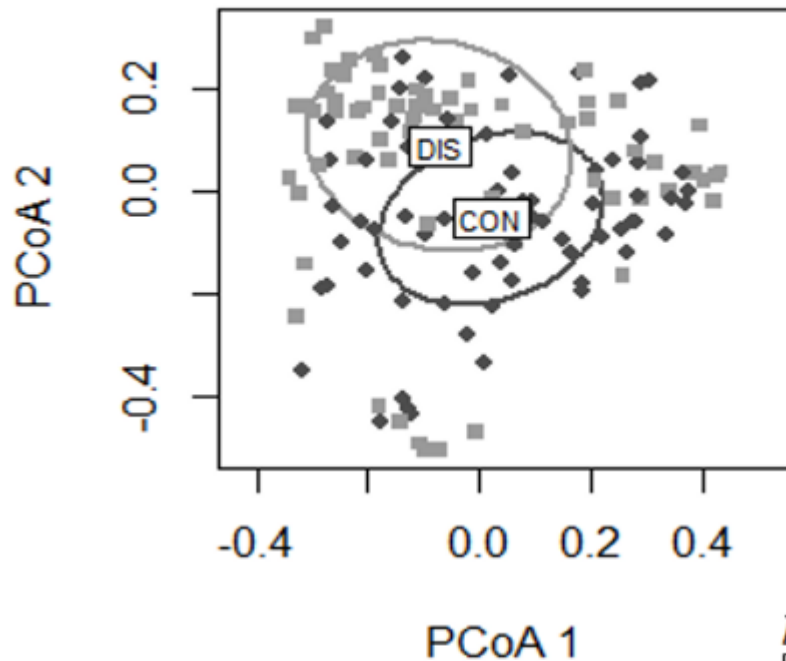
Elena Piano^{1,2} · Alberto Doretto^{1,2} · Elisa Falasco^{1,2} · Stefano Fenoglio¹ · Laura Gruppuso^{1,2} · Daniele Nizzoli³ · Pierluigi Viaroli³ · Francesca Bona²



- ✓ 13 fiumi alpini
- ✓ 2 stazioni di campionamento in ogni fiume: **perenne (CON)** vs **intermittente (DIS)**
- ✓ Macroinvertebrati

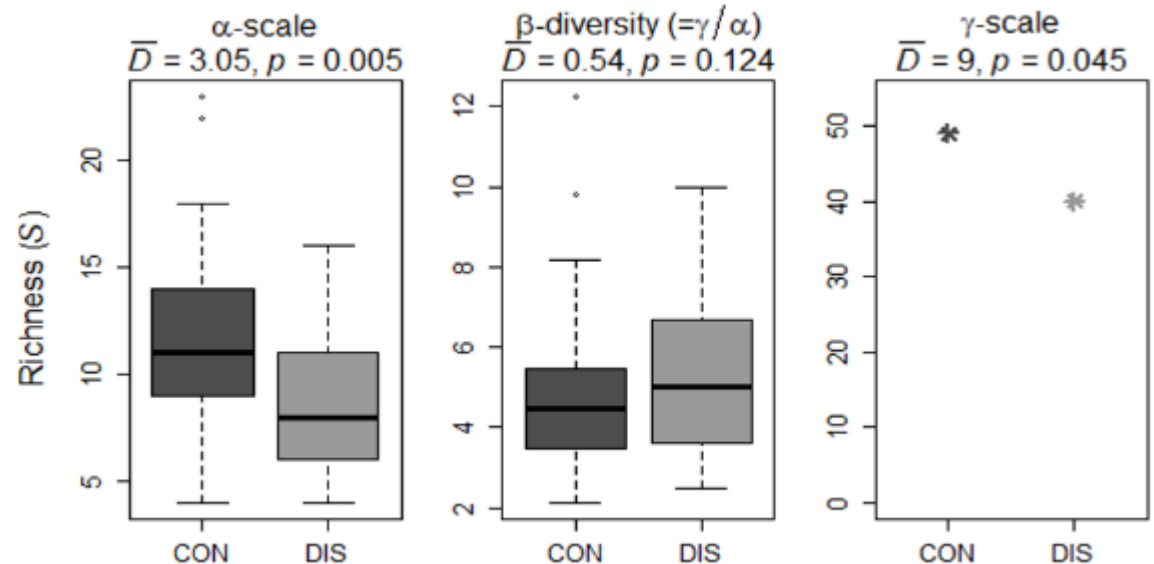


Macroinvertebrati



Diversa composizione in specie tra i siti perenni (CON) e quelli intermittenti (DIS)

L'intermittenza idrologica riduce la biodiversità



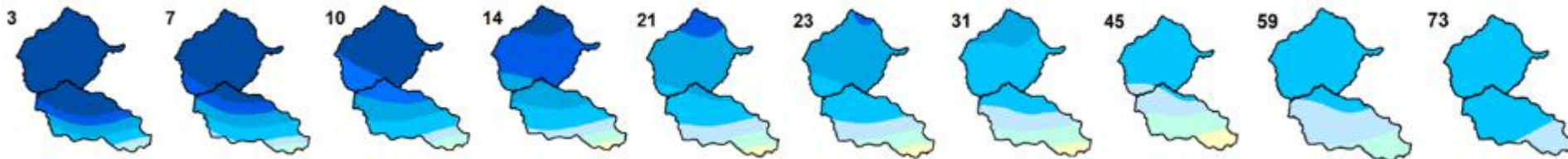
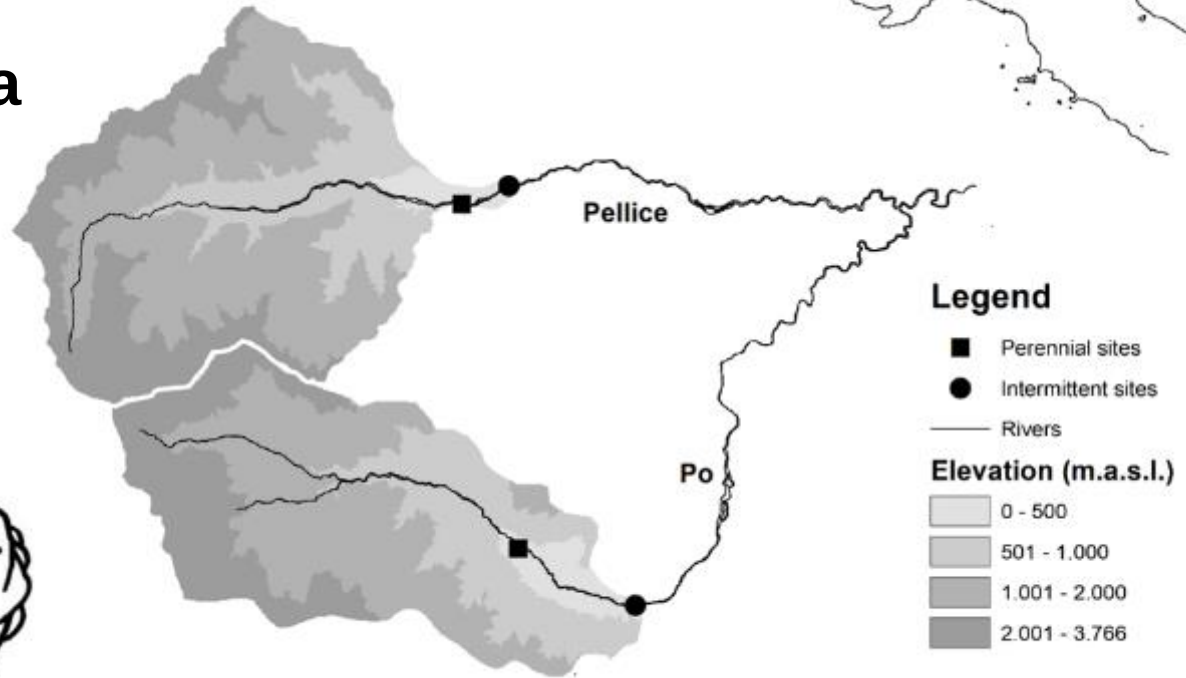
Stay with the flow: How macroinvertebrate communities recover during the rewetting phase in Alpine streams affected by an exceptional drought

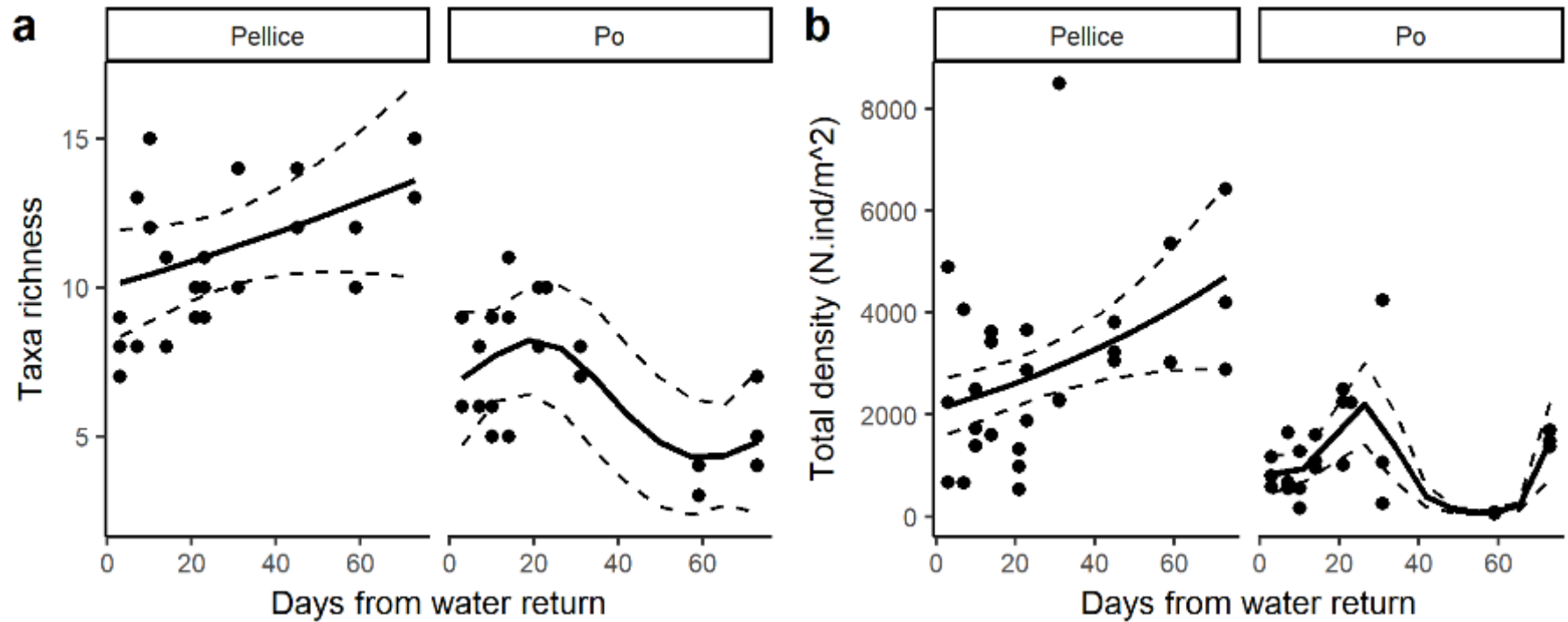
Alberto Doretto^{1,2,3} | Francesca Bona^{2,3} | Elisa Falasco^{1,3} |
Daniele Morandini² | Elena Piano^{1,3} | Stefano Fenoglio^{1,3}



Capacità di resilienza

- ✓ Rewetting
- ✓ 10 date di campionamento (Gennaio-Marzo 2018)





Differenze tra i due fiumi durante il rewetting

→ la capacità di resilienza varia da fiume a fiume!

Sintesi dei principali impatti del cambiamento climatico sui fiumi e sul loro biota:

- ✓ **Perdita di biodiversità e banalizzazione delle comunità**
- ✓ **Ridotta capacità di resistenza e di resilienza**
- ✓ **Perdita di servizi ecosistemici** (ad esempio: capacità auto-depurativa dei corsi d'acqua)
- ✓ **Maggiore vulnerabilità agli effetti di altre forme di alterazione**



https://www.regione.piemonte.it/web/sites/default/files/media/documenti/2021-07/report_di_sintesi_per_decisori_politici_0.pdf

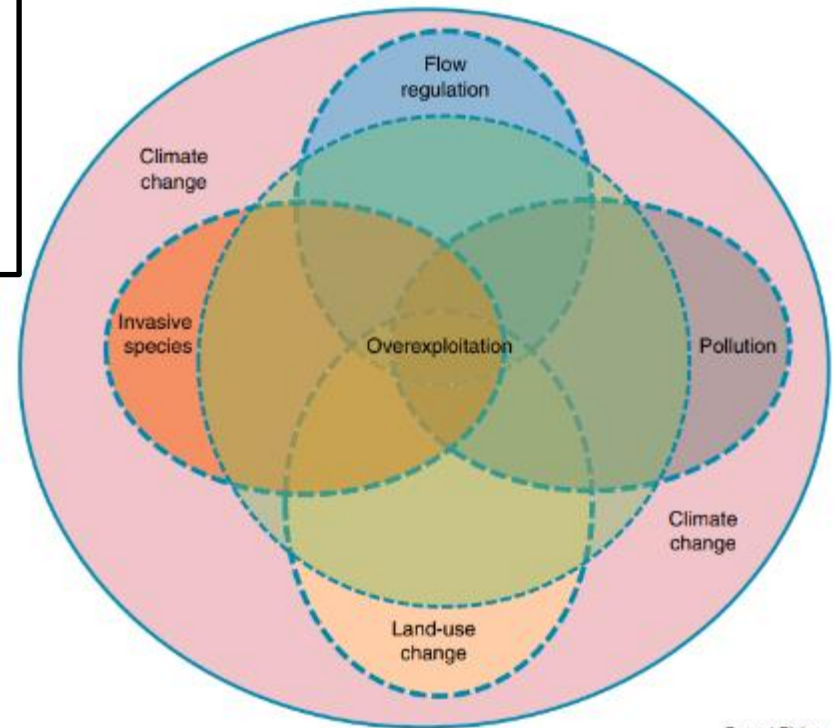
Essay

Multiple threats imperil freshwater biodiversity in the Anthropocene

David Dudgeon

Bending the Curve of Global Freshwater Biodiversity Loss: An Emergency Recovery Plan

DAVID TICKNER, JEFFREY J. OPPERMAN, ROBIN ABELL, MIKE ACREMAN, ANGELA H. ARTHINGTON, STUART E. BUNN, STEVEN J. COOKE, JAMES DALTON, WILL DARWALL, GAVIN EDWARDS, IAN HARRISON, KATHY HUGHES, TIM JONES, DAVID LECLÈRE, ABIGAIL J. LYNCH, PHILIP LEONARD, MICHAEL E. MCCLAIN, DEAN MURUVEN, JULIAN D. OLDEN, STEVE J. ORMEROD, JAMES ROBINSON, REBECCA E. THARME, MICHELE THIEME, KLEMENT TOCKNER, MARK WRIGHT, AND LUCY YOUNG



Ambio 2021, 50:85–94
<https://doi.org/10.1007/s13280-020-01318-8>

KUNGL.
VETENSKAPS
AKADEMIEN
THE ROYAL SWEDISH ACADEMY OF SCIENCES



PERSPECTIVE

Scientists' warning to humanity on the freshwater biodiversity crisis

James S. Albert , Georgia Destouni , Scott M. Duke-Sylvester, Anne E. Magurran , Thierry Oberdorff , Roberto E. Reis , Kirk O. Winemiller, William J. Ripple

Editorial: Freshwater biodiversity crisis: Multidisciplinary approaches as tools for conservation

Felipe Polivanov Ottoni^{1*}, Josie South², Valter M. Azevedo-Santos^{3,4,5}, Elisabeth Henschel⁶ and Pedro Henrique Negreiros de Bragança⁷



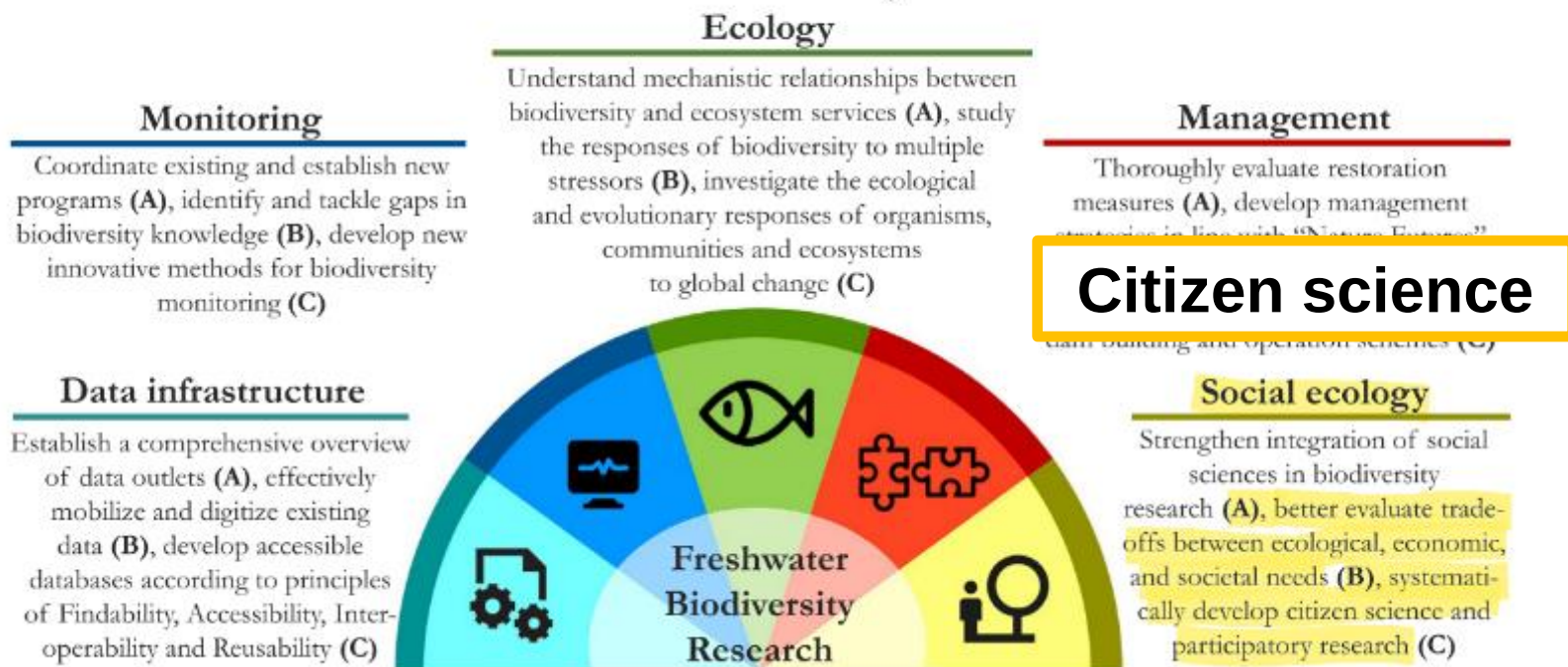
A global agenda for advancing freshwater biodiversity research

Alain Maasri^{1,2} | Sonja C. Jähnig^{1,3} | Mihai C. Adamescu⁴ | Rita Adrian^{1,5} |
 Claudio Baigun⁶ | Donald J. Baird⁷ | Angelica Batista-Morales⁸ | Núria Bonada⁹ |
 Lee E. Brown¹⁰ | Qinghua Cai¹¹ | Joao V. Campos-Silva¹² | Viola Clausnitzer¹³ |
 Topiltzin Contreras-MacBeath¹⁴ | Steven J. Cooke¹⁵ | Thibault Datry¹⁶ |
 Gonzalo Delacámara¹⁷ | Luc De Meester^{1,5,18} | Klaus-Douwe B. Dijkstra¹⁹ |
 Van Tu Do²⁰ | Sami Domisch¹ | David Dudgeon²¹ | Tibor Erős²² |
 Hendrik Freitag²³ | Joerg Freyhof²⁴ | Jana Friedrich²⁵ | Martin Friedrichs-Manthey^{1,5} |
 Juergen Geist²⁶ | Mark O. Gessner^{1,27,28} | Peter Goethals²⁹ | Matthew Gollock³⁰ |
 Christopher Gordon³¹ | Hans-Peter Grossart^{1,28,32} | Georges Gulembuga³³ |
 Pablo E. Gutiérrez-Fonseca³⁴ | Peter Haase^{13,35} | Daniel Hering³⁵ |
 Hans Jürgen Hahn^{36,37} | Charles P. Hawkins³⁸ | Fengzhi He¹ | Jani Heino³⁹ |
 Virgilio Hermoso⁴⁰ | Zeb Hogan⁴¹ | Franz Hölker^{1,5} | Jonathan M. Jeschke^{1,5,28} |
 Meilan Jiang⁴² | Richard K. Johnson⁴³ | Gregor Kalinkat¹ | Bakhtiyor K. Karimov⁴⁴ |
 Aventino Kasangaki⁴⁵ | Ismael A. Kimirei⁴⁶ | Bert Kohlmann⁴⁷ |
 Mathias Kuemmerlen⁴⁸ | Jan J. Kuiper⁴⁹ | Benjamin Kupilas^{50,51} |
 Simone D. Langhans^{52,53} | Richard Lansdown⁵⁴ | Florian Leese³⁵ |
 Francis S. Magbanua⁵⁵ | Shin-ichiro S. Matsuzaki⁵⁶ | Michael T. Monaghan^{1,5} |
 Levon Mumladze⁵⁷ | Javier Muzon⁵⁸ | Pierre A. Mvogo Ndonga⁵⁹ |
 Jens C. Nejtgaard^{1,28} | Oxana Nikitina⁶⁰ | Clifford Ochs⁶¹ |
 Oghenekaro Nelson Odum⁶² | Jeffrey J. Opperman⁶³ | Harmony Patricio⁶⁴ |
 Steffen U. Pauls^{13,65} | Rajeev Raghavan⁶⁶ | Alonso Ramirez⁶⁷ | Bindya Rashni⁶⁸ |
 Vere Ross-Gillespie⁶⁹ | Michael J. Samways⁷⁰ | Ralf B. Schäfer³⁶ |
 Astrid Schmidt-Kloiber⁷¹ | Ole Seehausen^{72,73} | Deep Narayan Shah⁷⁴ |
 Subodh Sharma⁷⁵ | Janne Soininen⁷⁶ | Nike Sommerwerk²⁴ | Jason D. Stockwell⁷⁷ |
 Frank Suhling⁷⁸ | Ram Devi Tachamo Shah⁷⁹ | Rebecca E. Tharme^{80,81} | James
 H. Thorp⁸² | David Tickner⁸³ | Klement Tockner^{84,85} | Jonathan D. Tonkin⁸⁶ |
 Mireia Valle^{87,88} | Jean Vitule⁸⁹ | Martin Volk⁹⁰ | Ding Wang¹¹ |
 Christian Wolter⁹ | Susanne Worischka³⁵

**97 ricercatori e
ricercatrici
internazionali
appartenenti a 90 enti
e centri di ricerca**

A global agenda for advancing freshwater biodiversity research

A Global Agenda for Advancing Freshwater Biodiversity Research

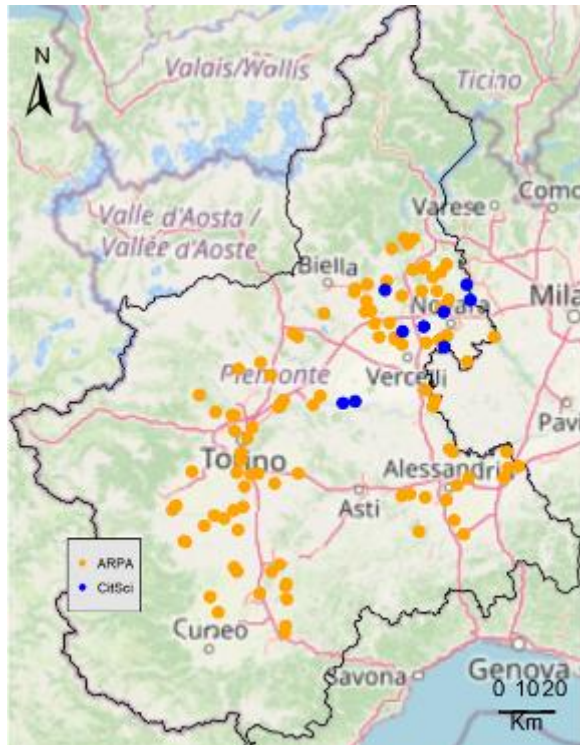


Approccio sperimentale per attività di citizen science

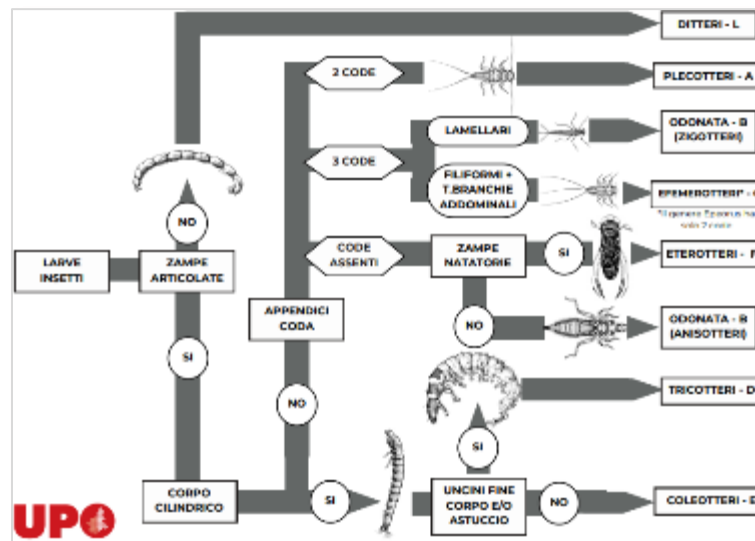
Dati ARPA 2008-2019
HER 6 - Macrotipo C
101 siti
905 eventi di
campionamento



Comunità macrobentonica semplificata con solo **36 taxa**: quelli **più frequenti**, tipici del territorio e **facili da riconoscere**!



10 uscite con i volontari (VC e NO)



12 uscite (Nov23-Set24): 242 volontari



Progetto: "The biocultural dimensions of Eastern Piedmont's waterlands: a multifaceted heritage to originate future development – H2O-lands. Heritage to Originate" Finanziamento: NextGeneration EU e Compagnia di San Paolo



GRAZIE PER L'ATTENZIONE!
alberto.doretto@uniupo.it

