



SEMINARIO INTERNACIONAL

# EL AGUA Y LOS ECOSISTEMAS FLUVIALES EN LA CIUDAD

23, 24 y 25 de noviembre de 2018



X aniversario de  
la Exposición  
Internacional 2008

#10ZGZH2O

## Urban River Restoration

Giancarlo Gusmaroli

Technical Director of the Italian Centre for River Restoration

Member of the Board of Directors of the European Centre for River Restoration



ITALIAN CENTRE FOR  
RIVER RESTORATION



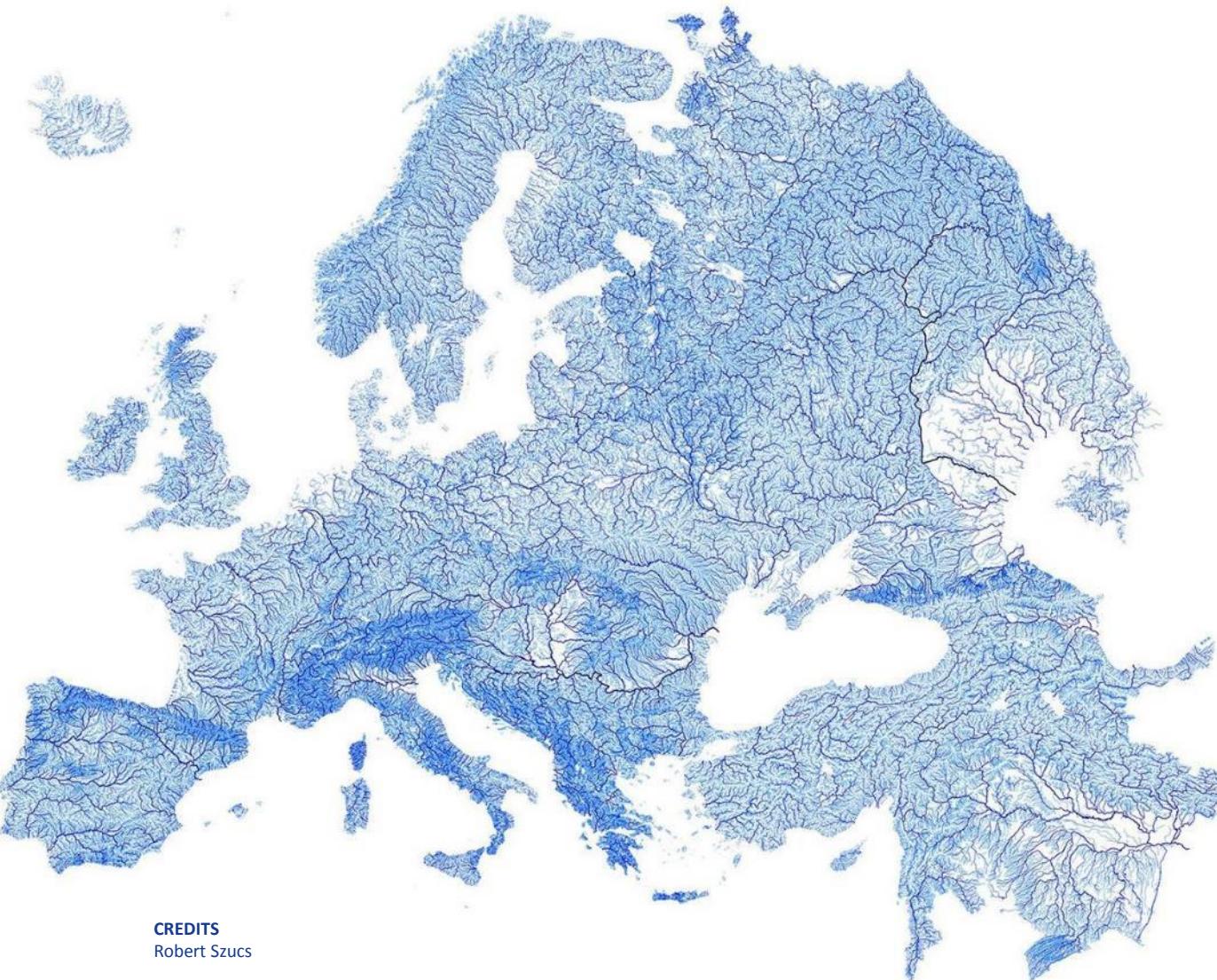
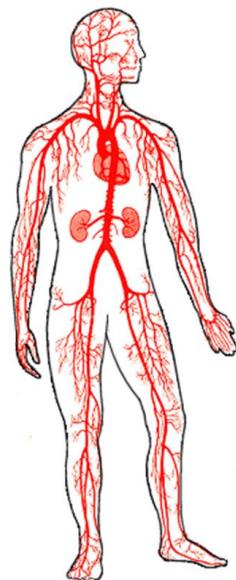
European Centre  
for River Restoration

Coorganizan:



Coorganiza y patrocina:





# RIVERS

are at the same time the **cardiovascular system** (feeding life) and the **lymphatic system** (draining excesses) of the land where we live



Excessive and disorganized  
land use is the **cholesterol**.



Occupation and modification of **fluvial space** are the thrombosis.



Occupation and modification of **fluvial space** are the thrombosis.



Occupation and modification of fluvial space are the thrombosis.

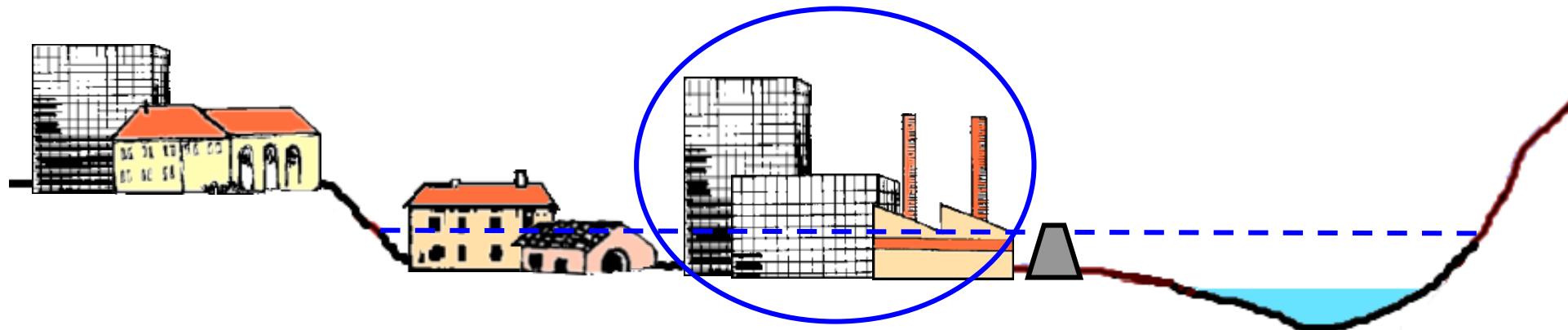


Cementation and culverting  
of river bed are the cancer.



when **RIVERS** cannot breath...

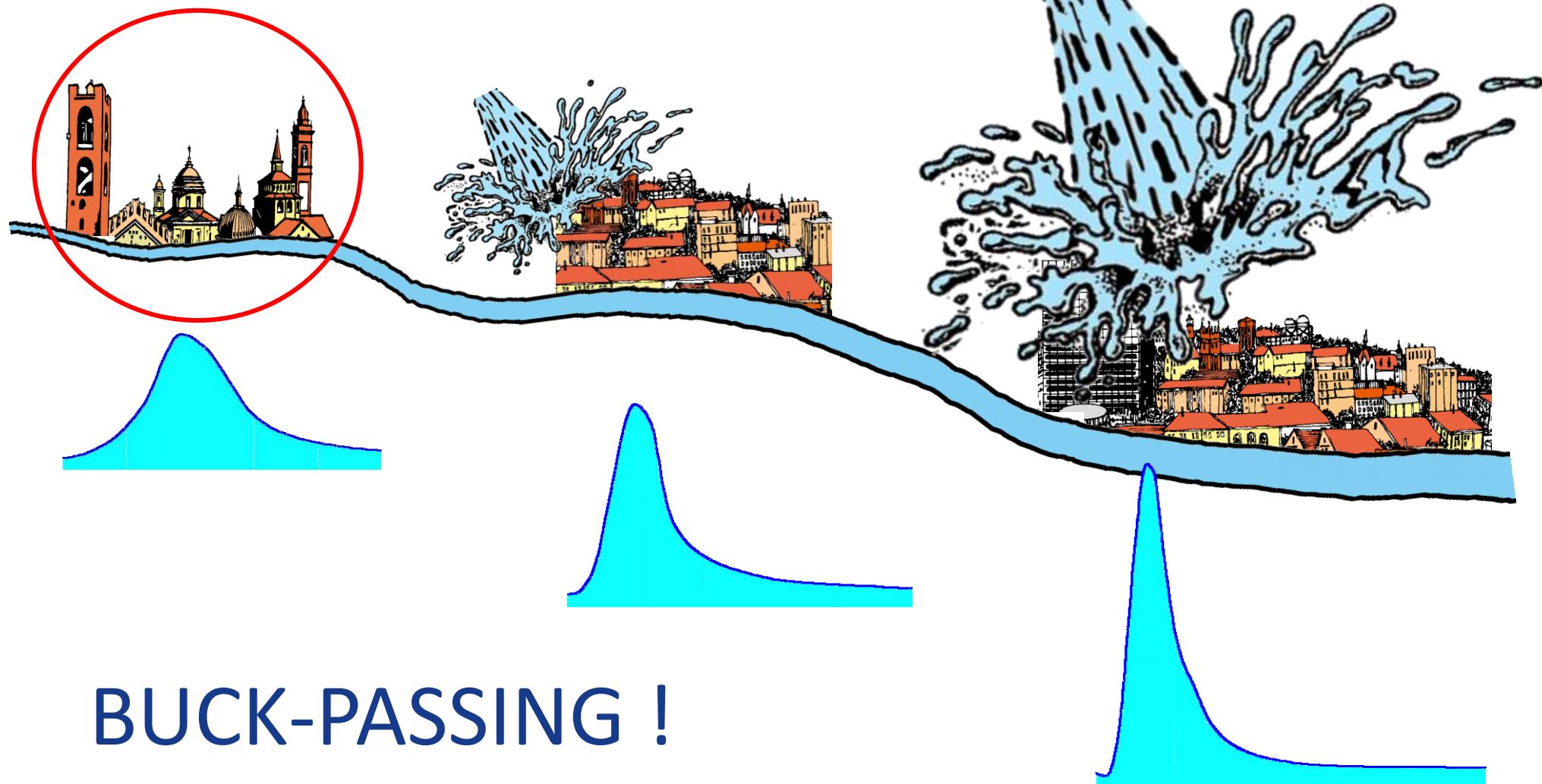
...the whole system they flow through get to collapse



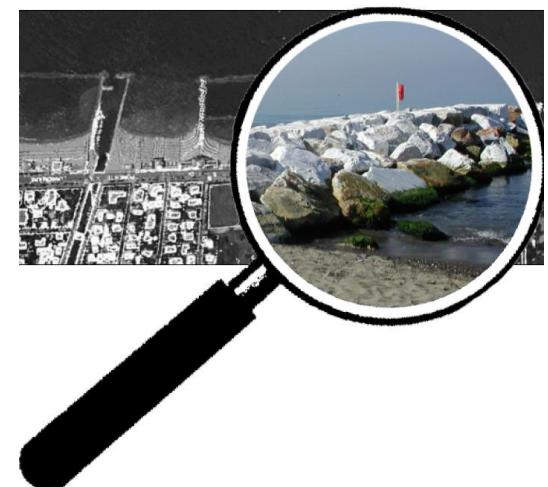
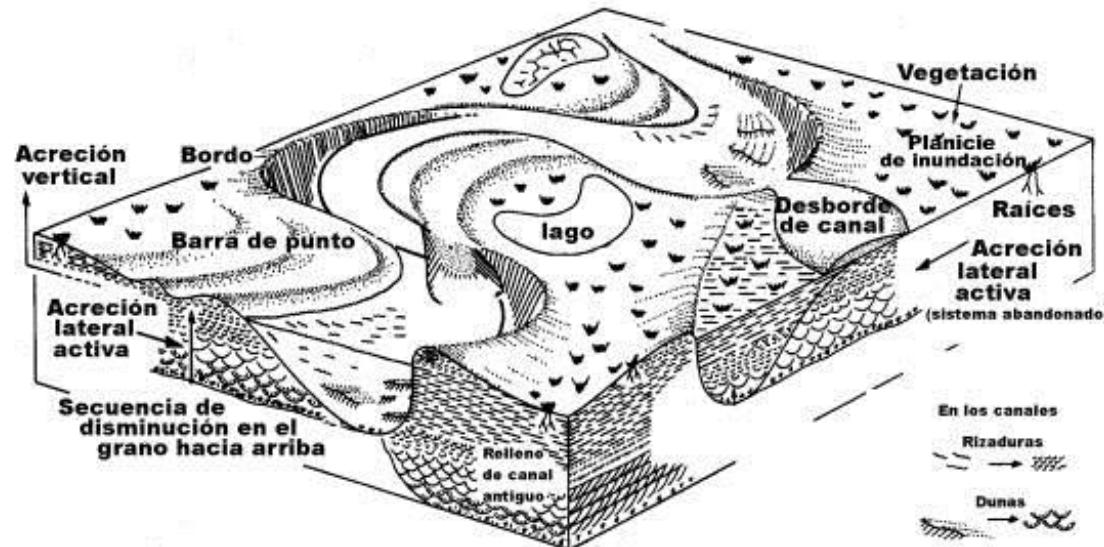
## FLOOD RISK INCREASE !

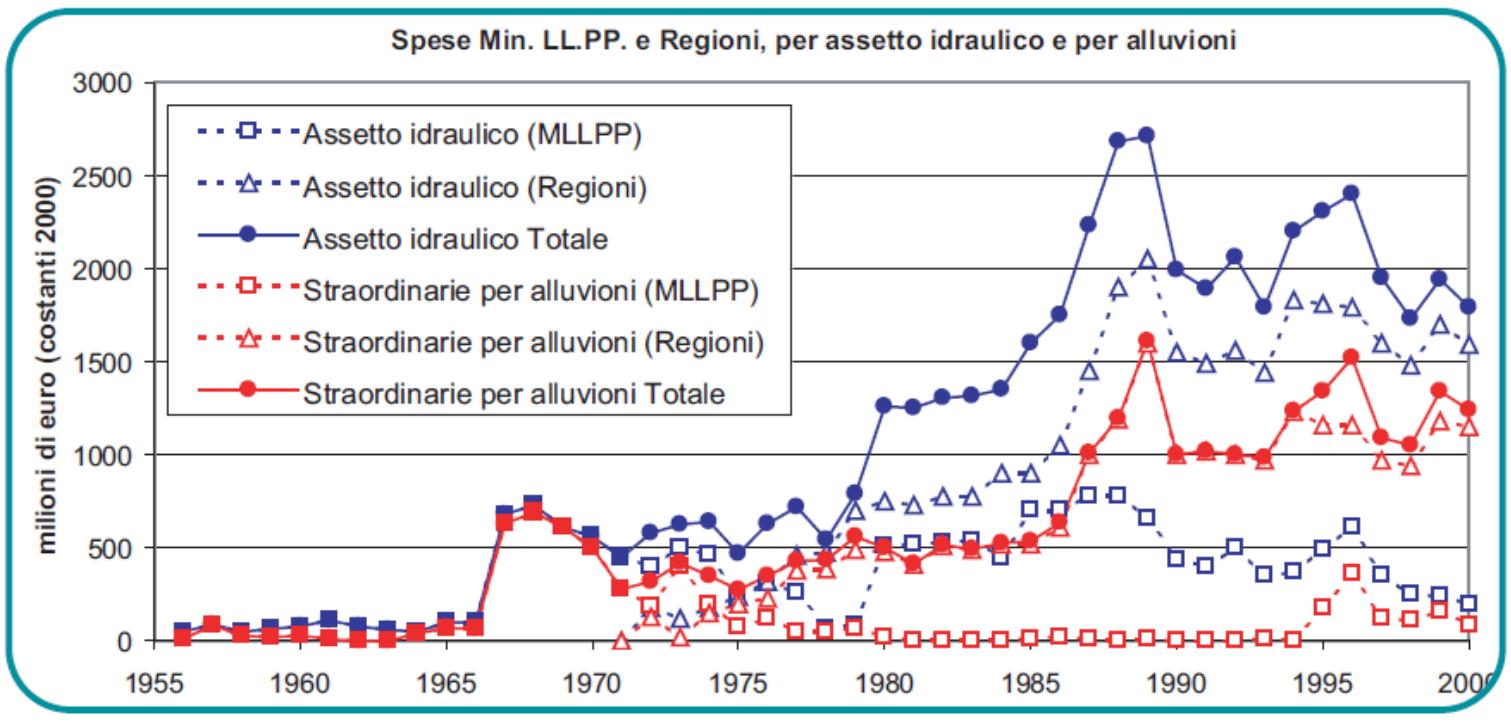


FLOOD PROTECTION  
FLUVIAL WORKS

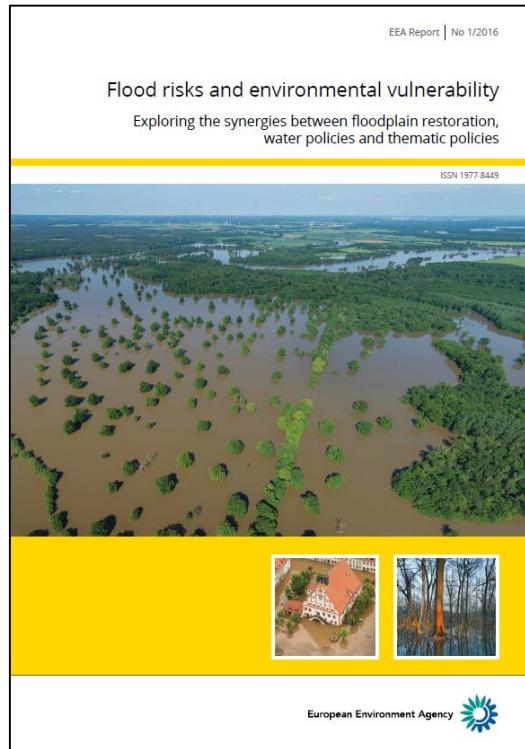


BUCK-PASSING !



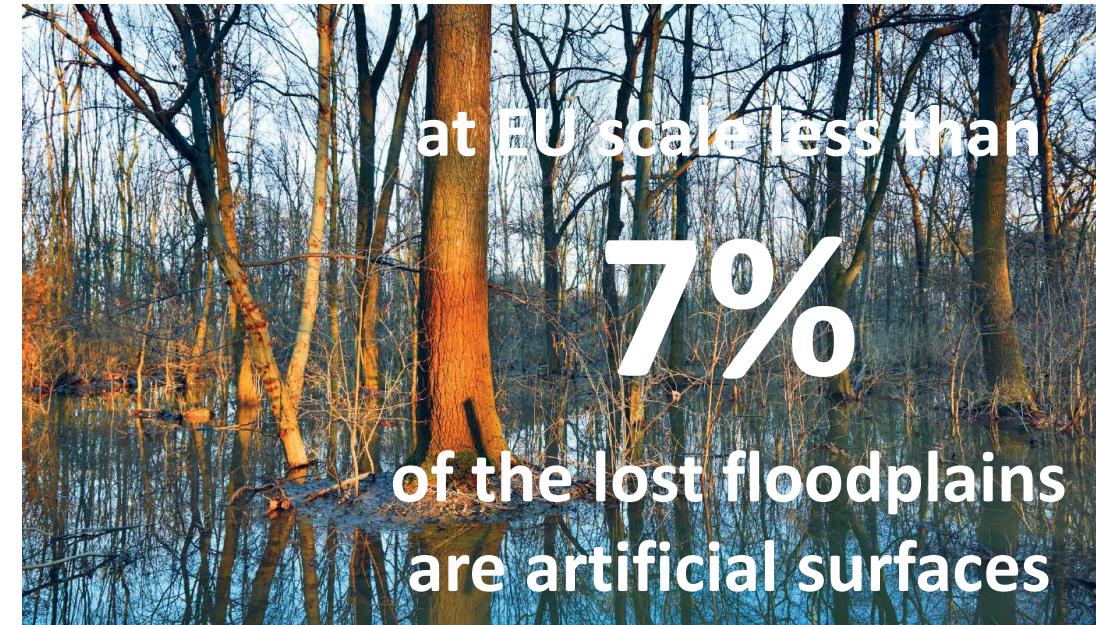
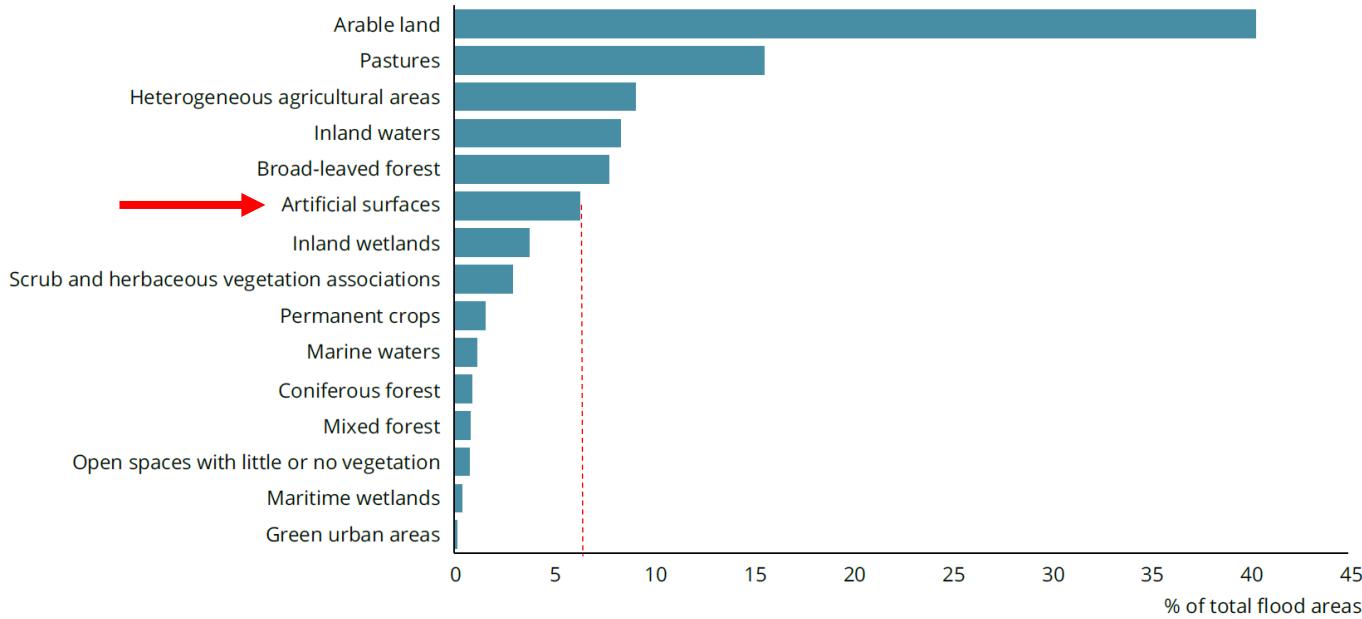


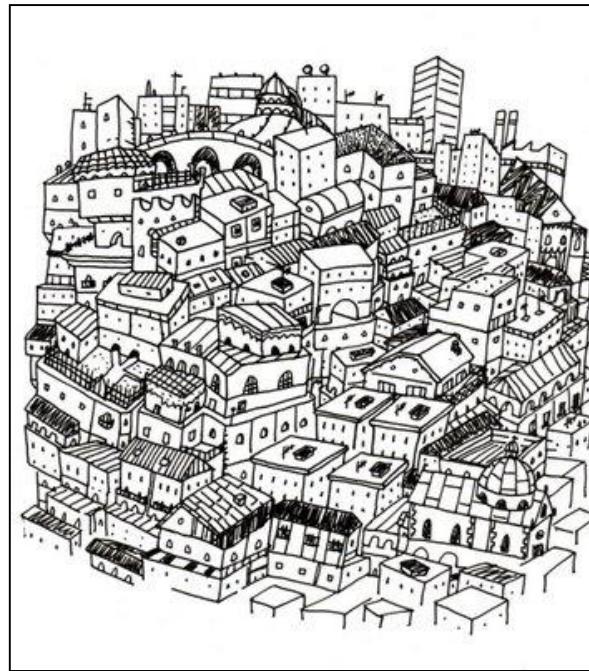
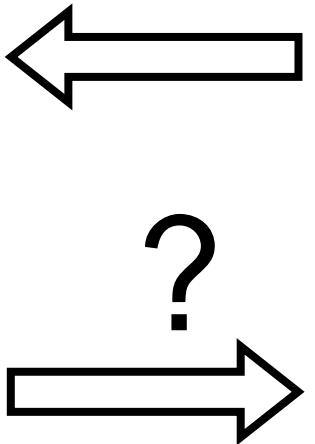
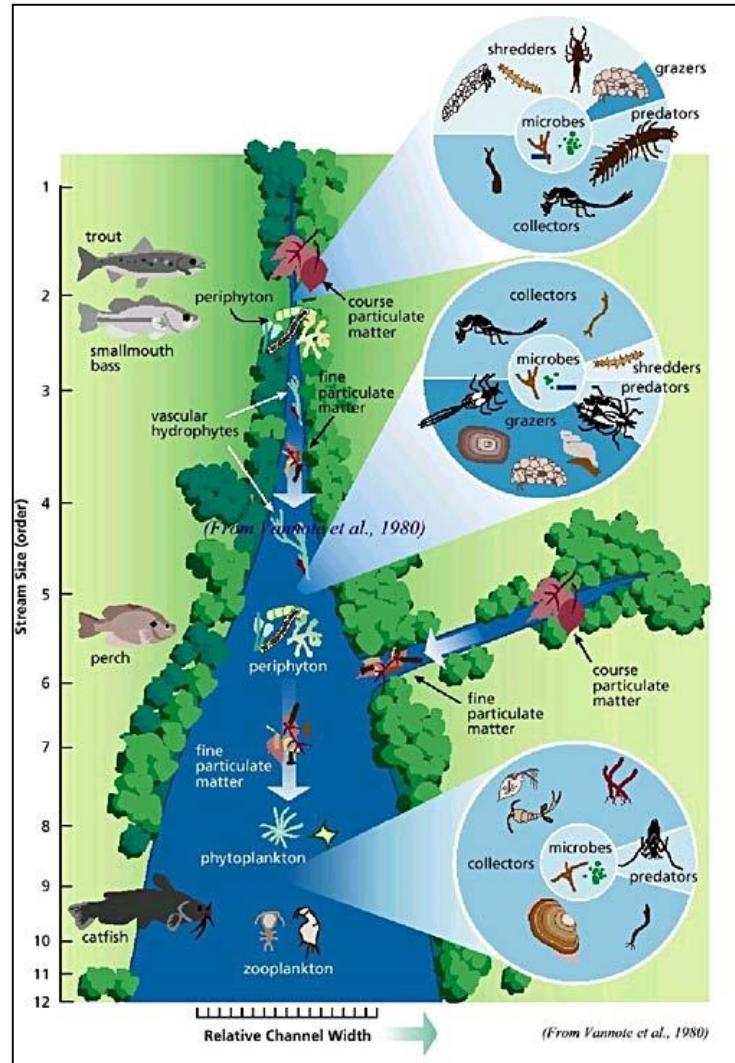
Fonte: CELLERINO, 2004 rielaborata da CIRF, 2006



River section	Morphological floodplain area (km <sup>2</sup> )	Remaining floodplain area (km <sup>2</sup> )	Loss of floodplain area (%)
Upper Danube (Austria, Germany) <sup>(a,b)</sup>	1 762	95	95
Central Danube (Croatia, Hungary, Serbia, Slovakia) <sup>(a)</sup>	8 161	2 002	75
Lower Danube (Bulgaria, Republic of Moldova, Romania, Serbia) <sup>(a)</sup>	8 173	2 193	73
Danube Delta (Romania, Ukraine) <sup>(a)</sup>	5 402	3 799	30
Tisza (Hungary, Romania, Ukraine) <sup>(c)</sup>	36 000	1 800	95
Upper Rhine (France, Germany) <sup>(d)</sup>			93
River Rhine (Austria, Switzerland, France, Germany, Netherlands) <sup>(d)</sup>	8 000	1 200	85
River Rhine (Germany) <sup>(b)</sup>	2 064	454	80
Rhine and Meuse (Netherlands) <sup>(e)</sup>			90–100
Seine (France) <sup>(f)</sup>			99
Oder (Germany, Poland) <sup>(g)</sup>	3 593	970	73
Oder (only Germany) <sup>(b)</sup>	941	94	90
Middle Ebro River (Spain) <sup>(h)</sup>			58

**Sources:** <sup>(a)</sup> Schneider et al. (2009); <sup>(b)</sup> Brunotte et al. (2009); <sup>(c)</sup> Haraszthy (2001); <sup>(d)</sup> Schmid-Breton (2015); <sup>(e)</sup> Rijkswaterstaat Waterdienst (2008); <sup>(f)</sup> Tockner et al. (2009); <sup>(g)</sup> WWF Germany (2000); <sup>(h)</sup> Ollero (2010).





**4 Europeans out of 5 live in an urban area (EC, 2006) and their quality of life is strictly connected with the quality of the urban environment they live (EEA, 2009)**

***urban settlements are the engine of economy (EC, 2006)***



## WATERFRONT DESIGN



## RIVER RESTORATION



*"Restoring towards the natural state and functioning of the river and the riverine environment. By assisting the recovery of river ecosystems that have been degraded, damaged or destroyed. River restoration promotes the sustainable multifunctional use of rivers providing multiple benefits to society"*

River Restoration  
according to



IS THIS A WATERFRONT ... ?



... FOR THE KINGFISHER TOO?

## A.R.M. Amenity Rehabilitation Model

- considering (urban) rivers as grey infrastructures
- enhancing aesthetic values
- satisfying anthopic needs first

### ARM disadvantages at urban scale

- flood risk exposure
- energy and material intensive
- fluvial ecology banalization

## E.R.M. Ecosystem Rehabilitation Model

- considering (urban) rivers as green infrastructures
- enhancing ecological values
- satisfying ecosystemic needs first

### ERM disadvantages at urban scale

- lack of available room
- altered water wuality and quantity
- high costs

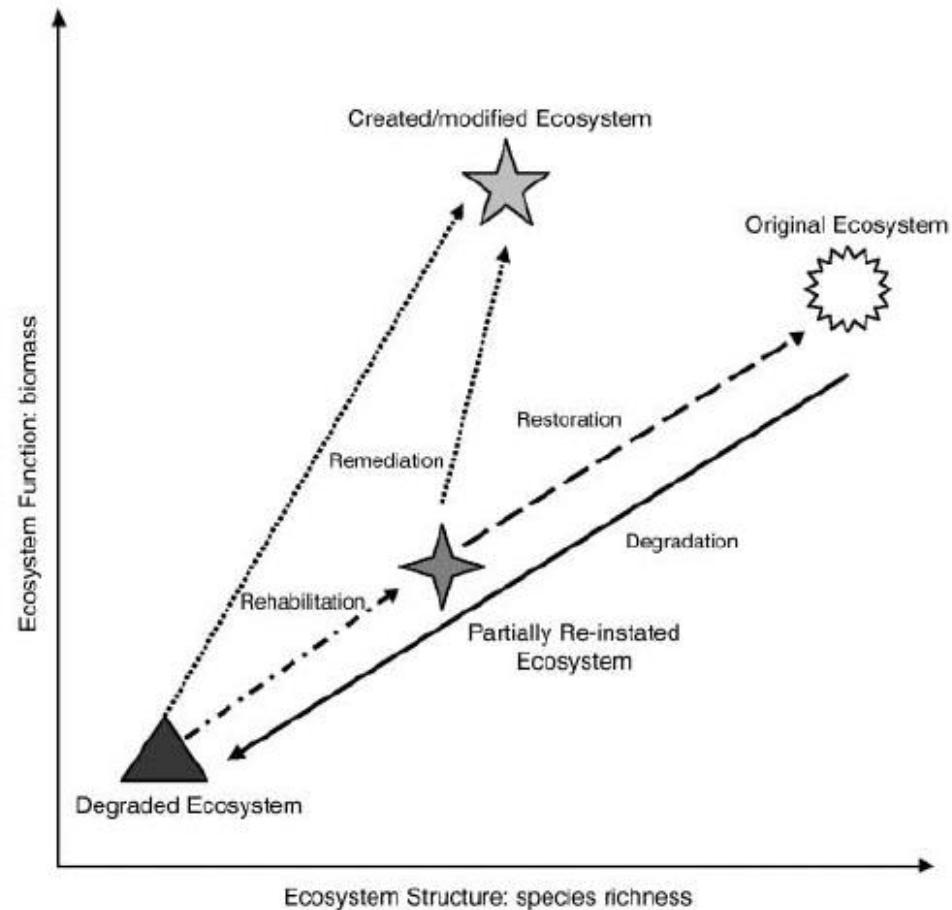
(Woo, 2009)

## ECOLOGICAL REFERENCE STATE

↑  
1 (E.R.M.)  
  
0 (A.R.M.)



**restore whenever possible ←  
intervene only when necessary ←**



Rutherford et al. (2000)

RIVER RESEARCH AND APPLICATIONS

*River. Res. Applic.* **24**: 1–14 (2009)

Published online in Wiley InterScience  
(www.interscience.wiley.com) DOI: 10.1002/rra.1239

## FROM THE MYTH OF A LOST PARADISE TO TARGETED RIVER RESTORATION: FORGET NATURAL REFERENCES AND FOCUS ON HUMAN BENEFITS

SIMON DUFOUR <sup>a\*</sup> and HERVÉ PIÉGAY <sup>b</sup>

<sup>a</sup> CEREGE, Aix Marseille University, CNRS, Europôle de l'Arbois, 13545 Aix en Provence, France

<sup>b</sup> University of Lyon, CNRS-UMR 5600, Site of ENS-Ish, 15 Parvis René Descartes, 69007, Lyon, France

**ACTIVE RESTORATION  
VS  
PASSIVE RESTORATION**

**semi- ERM → close to nature**



Cheonggye-cheon  
**SEOUL - COREA**



Cheonggye-cheon  
**SEOUL - COREA**



### **Improvement of the chemical-physical water quality:**

- adoption in urban buildings of the principles and techniques of sustainable sanitation;
- refinement of centralized wastewater treatment plants with appropriate tertiary processes (preferably natural systems in ecological connection with the river environment);
- remediation of contaminated sites (in-situ, on-site or off-site, based on the specific fluvial geomorphological dynamics that might be reactivated);
- improvement of urban drainage through appropriate treatment systems (preferably natural) of stormwater.

### **Improvement of the hydromorphological quality:**

- daylighting of culverted fluvial reaches;
- modification or removal of obsolete or non-functional river barriers;
- enhancement of the geomorphological condition;
- controlled restitution (eg. with “sleeping” longitudinal barriers) of riparian areas to river dynamics;
- realization of controlled flooding lamination site in the (upstream) peri-urban area.

### **Improvement of biological water quality:**

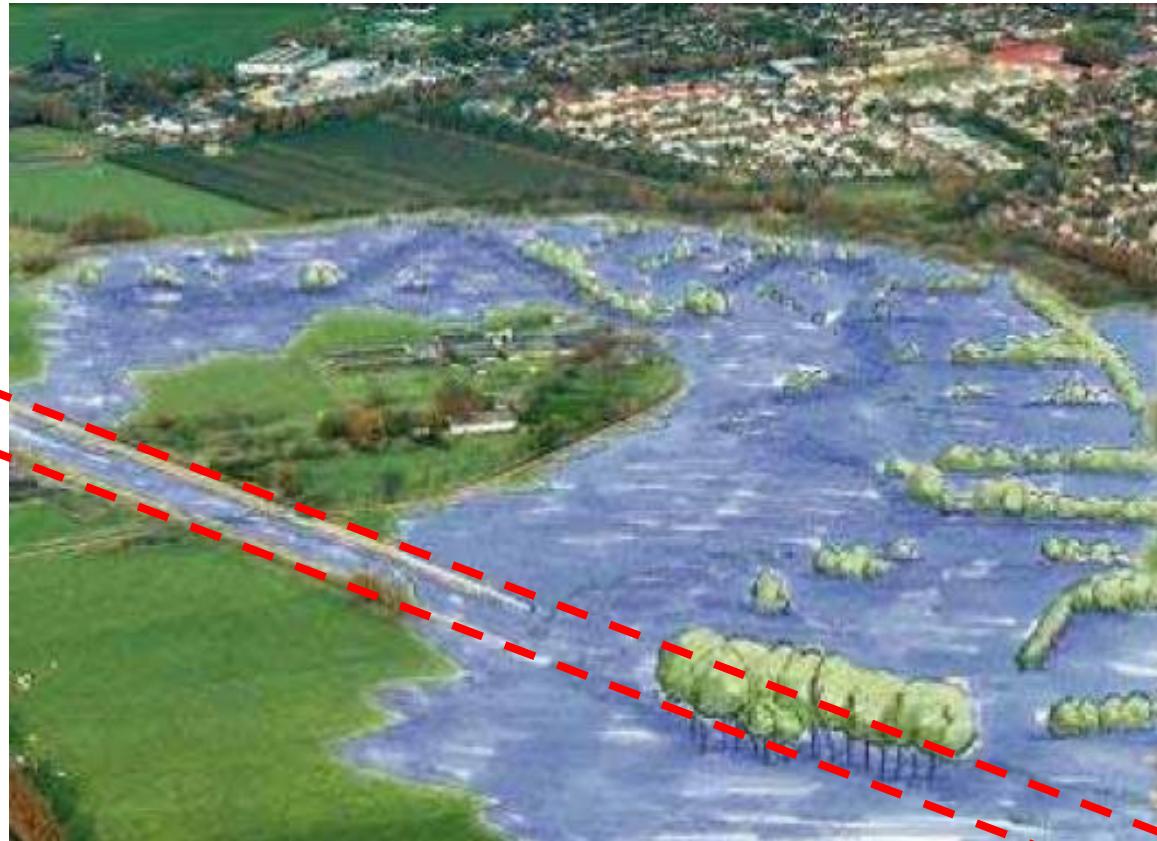
- realization of fish passages (where appropriate and relevant for the protection of fish fauna);
- creation of riparian habitats.

# STRIP THE RIVER (CANNOT IMAGINE HOW MUCH SEXY IT COULD BE)



river Isar, Germany

# DON'T REACH THE WATERFRONT AT ALL COSTS

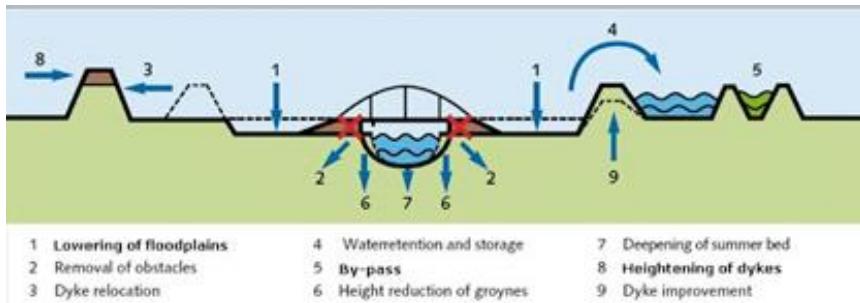


[www.nofdp.net](http://www.nofdp.net)

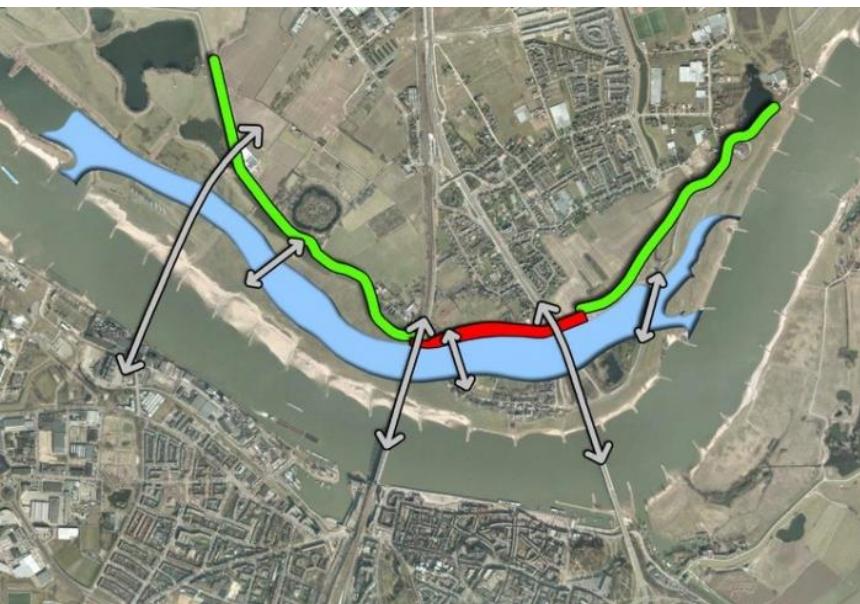
- 1,5 km river strect ecologically recovered
- 15 ha of renaturalized area
- 500.000 m<sup>3</sup> of room for flood management
- peak discharge (RP 10 yrs) reduction (12,5%)

river Aa, The Netherlands

# MAKE A STEP BACKWARDS



ruimte voor de rivier  
ruimte voor de rivier



river Waal, The Netherlands

# DEFEND THE TOWN (AS THE RIVER KNOWS HOW TO DEFEND ITSELF)



... AND MAKE PEOPLE CAPABLE TO DEFEND THEMSELVES





International Riverprize award



European Riverprize award



United Kingdom Riverprize award



#premioRF2018

Italian Riverprize award



since  
**1999**

since  
**2013**

since  
**2014**

since  
**2018**

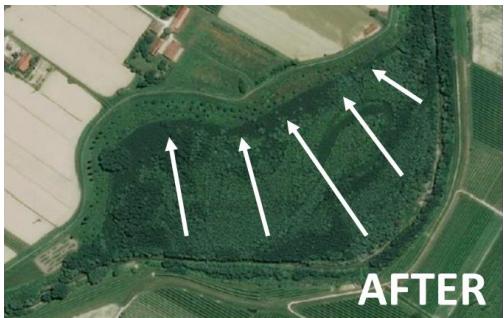
#premioRF2018 - #prizeRR2018  
CELEBRATING SUCCESSES  
IN RIVER MANAGEMENT  
FOR A BETTER WORLD



awarding ceremony (Bologna, 23rd October 2018)

# LET ROOM TO THE RIVER (UPSTREAM)

(AS THE RIVER KNOWS HOW TO DEFEND ITSELF)



Courtesy of



## MONTONE RIVER



# LET ROOM TO THE RIVER (UPSTREAM)

(AS THE RIVER KNOWS HOW TO DEFEND ITSELF)



Pagana stream, Venice (Italy)



Courtesy of



**CONSORZIO DI BONIFICA  
ACQUE RISORGIVE**

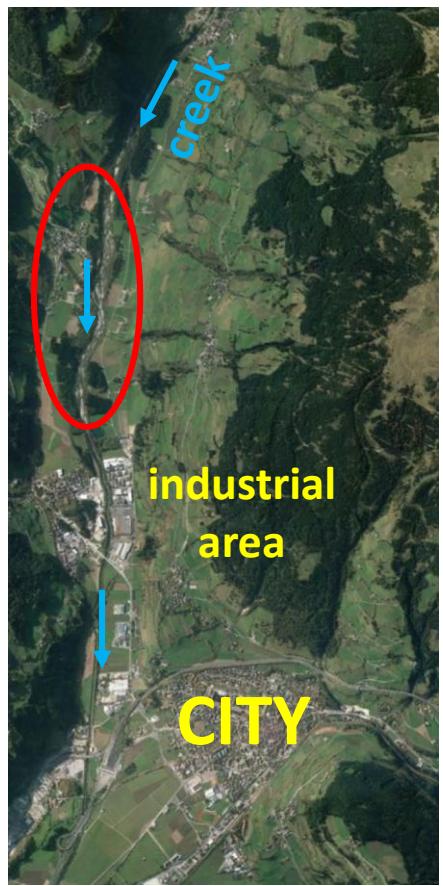
## VENICE LAGOON CATCHMENT

**WINNER  
(ex aequo)**

The map shows the location of the Venice Lagoon catchment area within the Alpine-Himalayan mountain system. Major rivers like the Po, Adige, Brenta, and Piave are shown flowing into the lagoon. The city of Venice is circled in red. The map also includes labels for Trentino-Alto Adige, Friuli-Venezia Giulia, and the Adriatic Sea.

# LET ROOM TO THE RIVER (UPSTREAM)

(AS THE RIVER KNOWS HOW TO DEFEND ITSELF)



AUTONOME PROVINZ  
BOZEN - SÜDTIROL

PROVINCIA AUTONOMA  
DI BOLZANO - ALTO ADIGE

PROVINZIA AUTONOMA DE BULSAN - SÜDTIROL

**MARETA  
CREEK**

**WINNER  
(ex aequo)**

The top part of the block shows logos for the Autonomous Province of Bolzano (Südtirol) and the Province Autonoma di Bolzano (Alto Adige). Below that is the title "MARETA CREEK". To the right is a red box containing the text "WINNER (ex aequo)". The bottom part consists of two maps: a large map of Italy with a red arrow pointing to the Trentino-Alto Adige region, and a detailed topographic map of the Maretta Creek area in the Dolomites, with a red circle highlighting the project site.

# MAKE RESILIENCE HAPPEN



柔道  
jūdō  
the path of softness

嘉納 治五郎 - Kanō Jigorō (1860-1938)



Orazio (65 a.C. – 8 a.C.)

**FRANGAR, NON FLECTAR**  
*I will break, but never bend*

**FLECTAR, NE FRANGAR**  
*I will bend in order not to be broken*



## SHARE YOUR SUCCESS !

Project location	Country
Project status	Themes / Drivers
River name	Project started date
Project contact/organization	Project completed date

Project summary
Reasons for river restoration
Measures / Techniques used
Project Picture

[www.restorerivers.eu](http://www.restorerivers.eu)

1153 river restoration case studies (Nov 2018)

31 countries

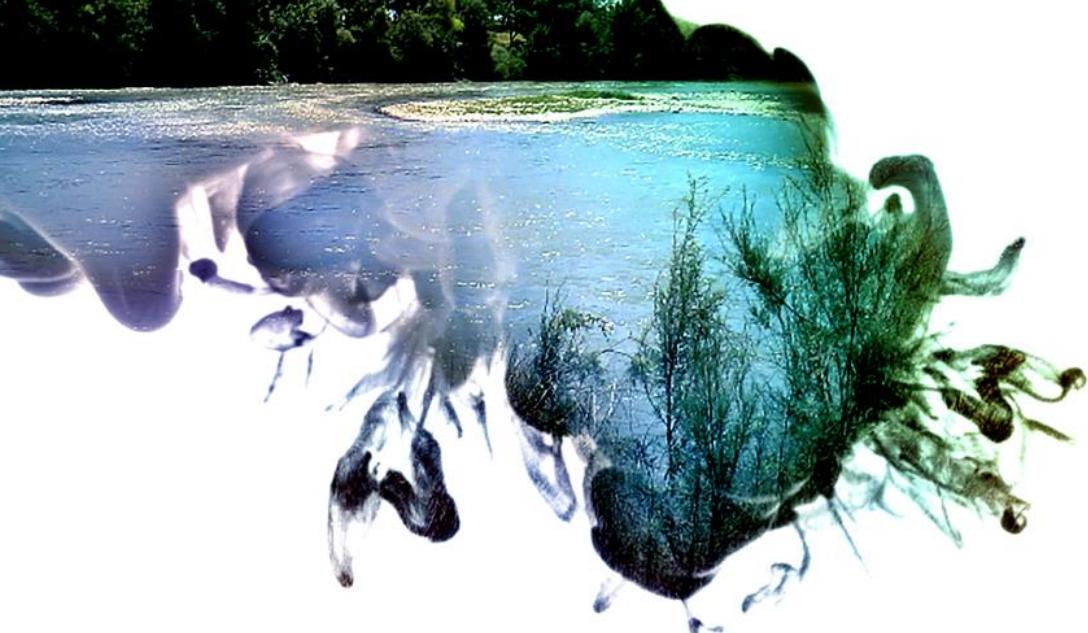
3 guidance factsheets

2 guidance videos



CREDITS: LIFE RESTORE PROJECT





## TO (NOT) CONCLUDE

*muchas gracias*



ITALIAN CENTRE FOR  
RIVER RESTORATION

[www.cirf.org](http://www.cirf.org)



[www.ecrr.org](http://www.ecrr.org)

(follow us on social channels)