

IMPROVING MATERIALS AND SOLUTIONS FOR CIVIL ENGINEERING APPLICATIONS

Design The Change concept started with 3-yr long R&D campaign that aimed at find out a more effective solution to protect river banks from erosion.

The physical test campaign was conducted by **Maccaferri Innovation Center** in collaboration with **Colorado State University**. It led to the development of Reno Mattress Plus with X-Ties and PoliMac® coating, the most effective response to the future hydraulic engineering challenges.



MACRA design environmentally sound bank protection



Maccaferri is committed to communicate reliable and comparable information about the life cycle environmental impacts of products. Discover more at maccaferri.com/epd-certification



Our products are certified and tested by leading institutes and in accordance with the latest guidelines and standards (ETAG027, EN10223-3, ISO 17746, ISO 17745). Product certifications include CE mark, BBA Agrément Certificate, NF mark, COPRO mark, and BAFU-FOEN homologation for snow-barriers. For more information contact our certification office.



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Engineering a Better Solution

GLOBAL ENGINEERS

In the second half of the 19th century, we invented Gabions and dramatically changed the civil engineering landscape. We are still changing it today. We work every day to find better solutions for our clients at every degree of latitude and longitude. Our worldwide network grows through innovation and diversification of sectors of activity and through an increasing range of high quality and environmentally friendly products and applications.

OFFICINE MACCAFERRI GROUP PROFILE

Founded in 1879, our Group soon became a worldwide reference in the design and development of advanced solutions, with offices in over 70 subsidiaries and 20 factories worldwide.

Our mission is to pursue excellence through continuous improvement, while delivering to customers engineered solutions that are innovative, advanced and environmentally friendly. We are committed to outstanding safety, quality and sustainability, to create value for all stakeholders as well as our communities.

 **RETAINING WALLS & SOIL REINFORCEMENT**

 **HYDRAULIC WORKS**

 **ROCKFALL PROTECTION & SNOW BARRIERS**

 **EROSION CONTROL**

 **SOIL STABILIZATION & PAVEMENTS**

 **BASAL REINFORCEMENT**

 **COASTAL PROTECTION, MARINE STRUCTURES & PIPELINE PROTECTION**

 **ENVIRONMENT, DEWATERING & LANDFILLS**

 **DRAINAGE OF STRUCTURES**

 **TUNNELLING***

 **LANDSCAPE & ARCHITECTURE**

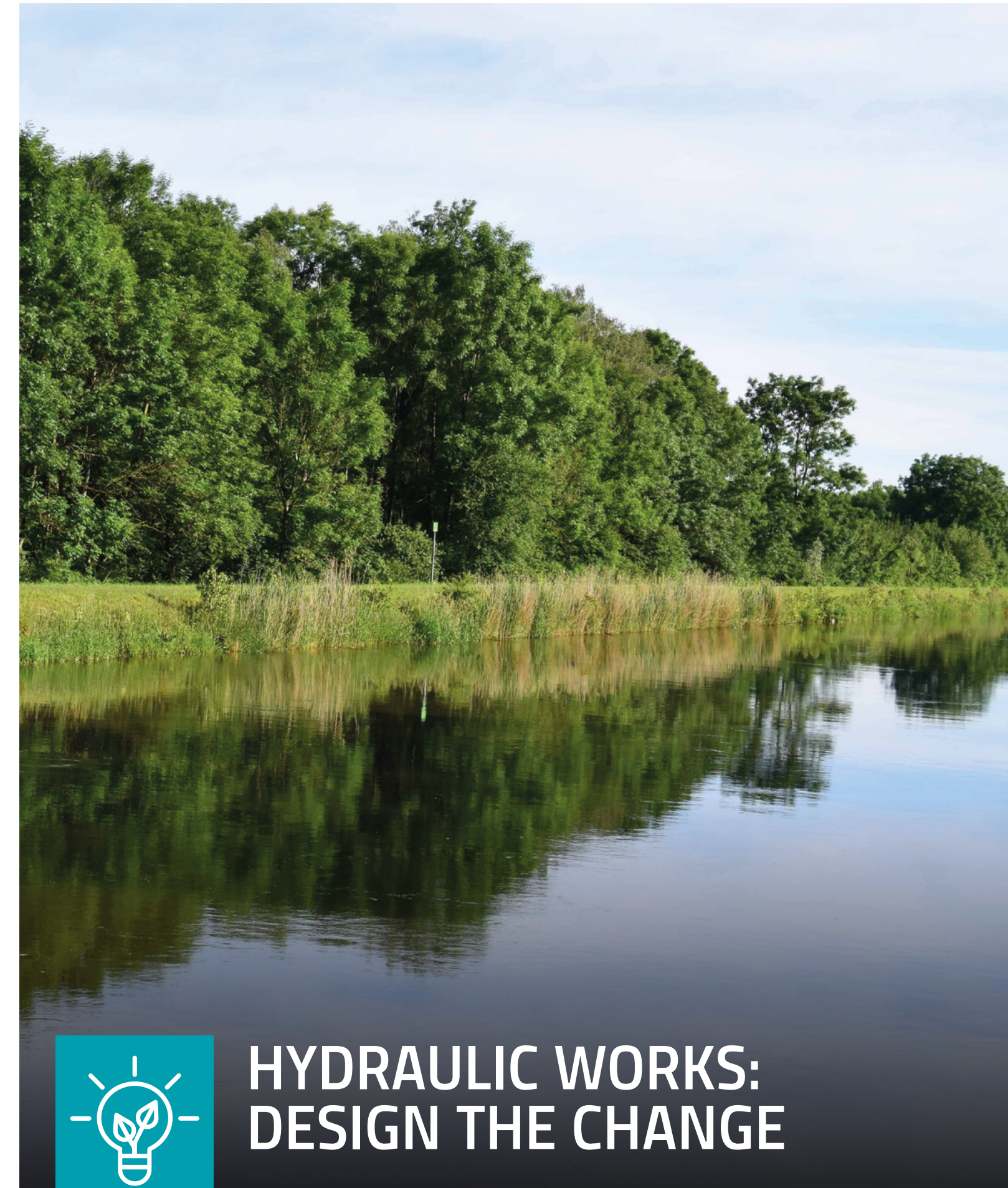
 **SAFETY & NOISE BARRIERS**

 **FENCING & WIRE**

 **AQUACULTURE NETS/CAGES**

 **CONCRETE FLOORING, PRECAST & OTHER USES***

 **INDUSTRIAL MANUFACTURING**



HYDRAULIC WORKS: DESIGN THE CHANGE

DESIGN THE CHANGE

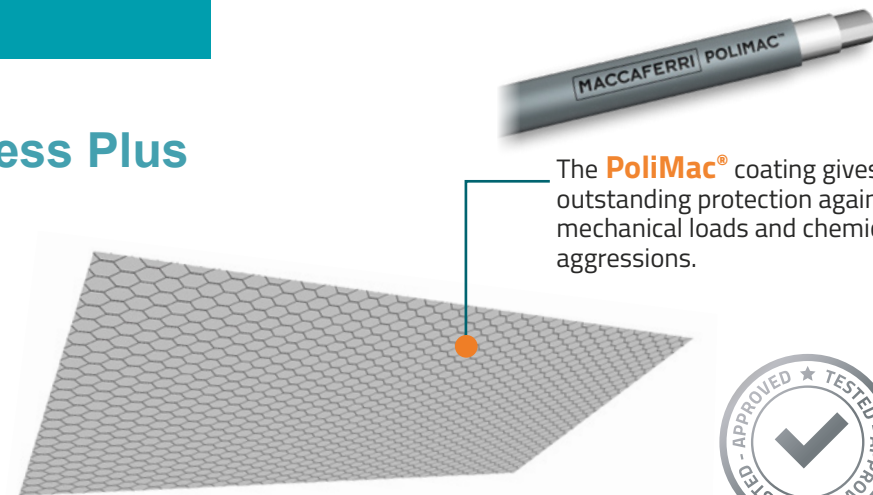
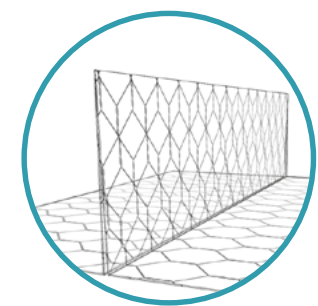
The approach to watercourse management is increasingly considering social and environmental aspects along with the economical impacts of hydraulic structures.

Sometimes referred to as Green Infrastructure approach, the incorporation of the natural environment and engineered systems has proved to be effective to enhance community health and safety, ecosystems and to boost the economy.

Understanding of hydraulic engineering and watercourse ecosystems enables us to find a better balance between the demands of our societies and environmental equilibrium.

+ Reno Mattress Plus with X-Ties

Vertical standing double diaphragm make filling operation easier.



The **PoliMac®** coating gives outstanding protection against mechanical loads and chemical aggressions.



X-Tie is the experimentally developed and patented tie to maximise the structural resistance of the mattress.

Download BIM from maccaferri.com/BIM or on

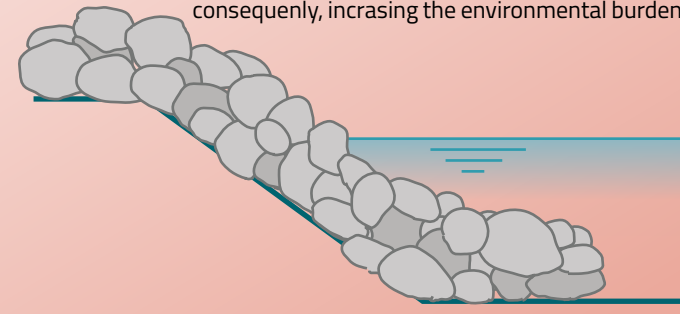


RENO MATTRESS PLUS: NATURALLY BETTER



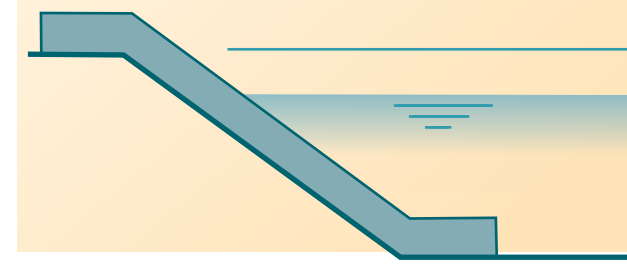
HYDRAULIC BANK PROTECTION RIP-RAP

Traditional river bank protections realised with **loose stones** (rip-rap) require thick layer of material to be effective. This is due to the fact that the stones are not confined and that the stones layer cannot be accurately placed resulting in higher stone consumption and, consequently, increasing the environmental burden.



HYDRAULIC BANK PROTECTION STANDARD MATTRESS

Standard Mattresses are over designed river bank protections compared to the actual load they are subjected to.

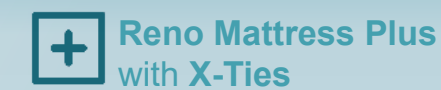


HYDRAULIC BANK PROTECTION OPTIMISED WITH TEST RESULTS

Reno Mattress Plus is the result of experimental tests at Colorado State University. A deeper understanding of the performance of the mattress enables us to make more cost-effective designs that will give to our solutions an increased competitiveness in comparison to equivalent and alternative (traditionals) systems.

OVER 70% OF STONE SAVINGS VS RIP-RAP

OVER 50% OF STONE SAVINGS VS STANDARD MATTRESS*

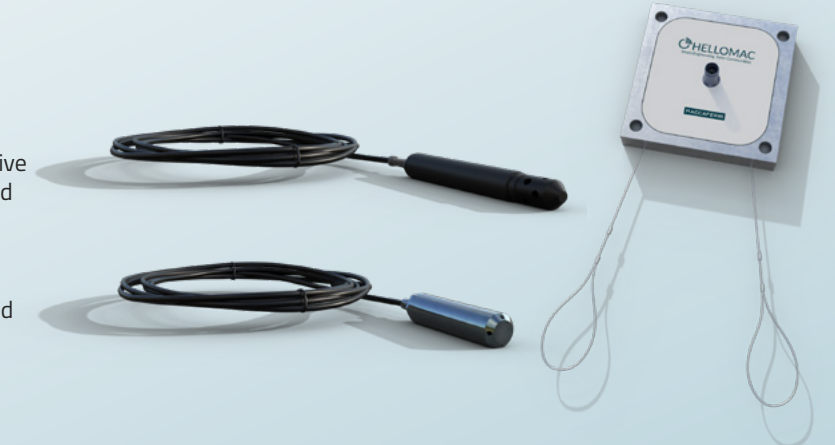


*Figures based on experimental campaign run at Colorado State University (1984; 2019)

"The mastery of reducing the amount of material while improving the serviceability of the structure"

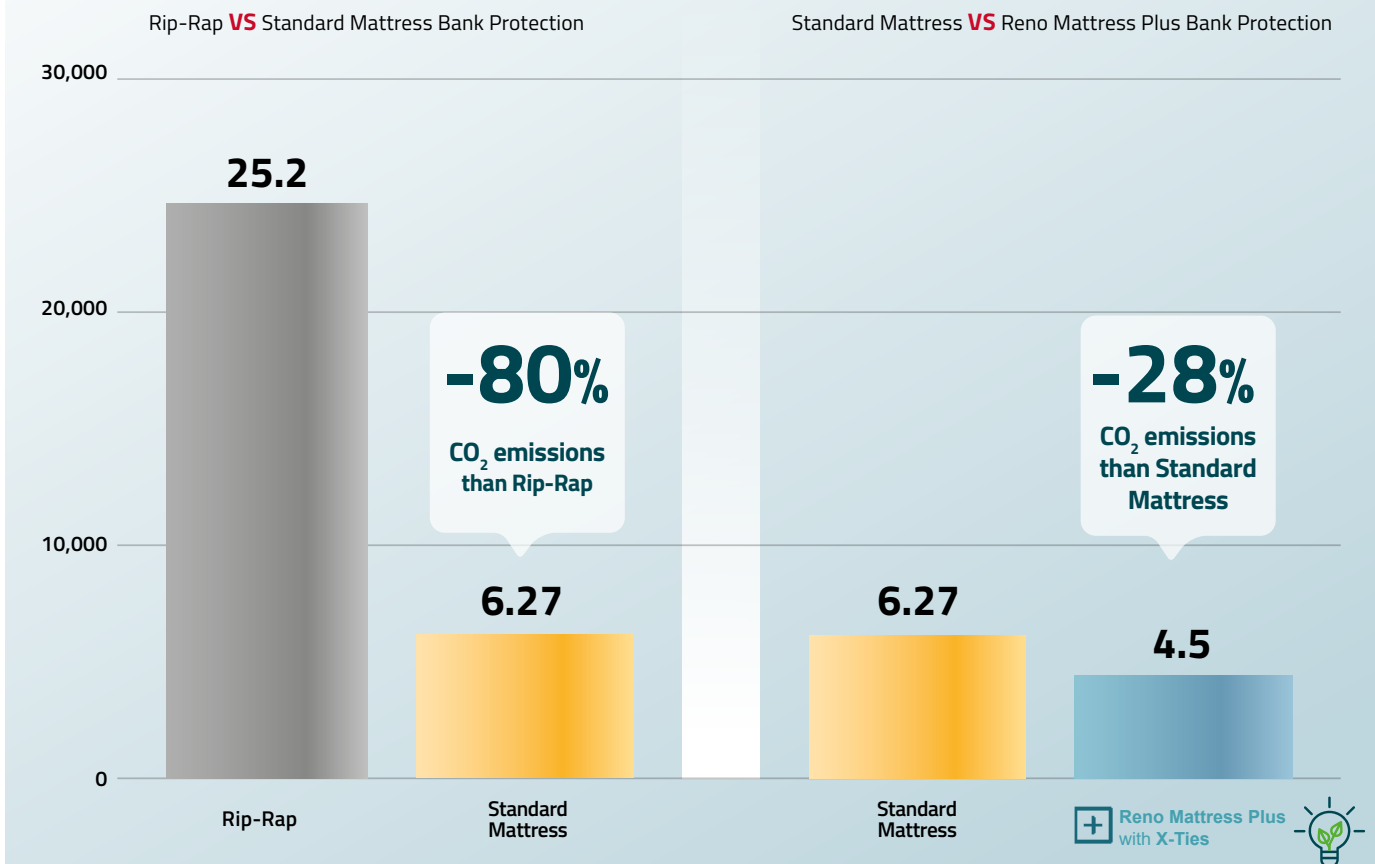


Reno Mattress Plus offers the most effective riverbank protection, but for truly comprehensive coverage—monitoring water level changes and setting alert thresholds—you can enhance it with IoT technology. Together, Reno Mattress Plus and HELLOMAC Hydro create a smart, low-effort solution to keep rivers protected and continuously monitored.



A GREEN THOUGHT DRIVES OUR SOLUTIONS

CO₂ (KgCO₂eq) emission for the construction of 1 sqm of river bank protection.



Data are based on Environmental Product Declaration (EPD). Figures refer to specific field condition (shear stress 400 N/m²). Additionally, not considered in the graph, Reno Mattress enhances the vegetation growth further increasing the environmental benefit of the solution.