System Scale Planning in Hydropower Development

WWF

HYDROELECTRIC POWER PLANTS

70%

of the world's renewable energy

17%

of global electricity production

FREE FLOWING RIVERS

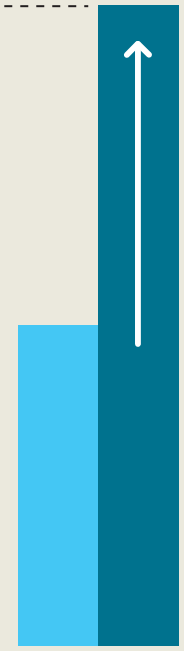
Only 23% of very long rivers (>1000 km) are free-flowing and still connected to the sea.

23%

HYDROPOWER INCREASE

Hydropower global installed capacity is projected to approximately double by 2050!

2x



DAMS IMPACT RIVERS IN 2 PRIMARY WAYS:

FRAGMENTATION

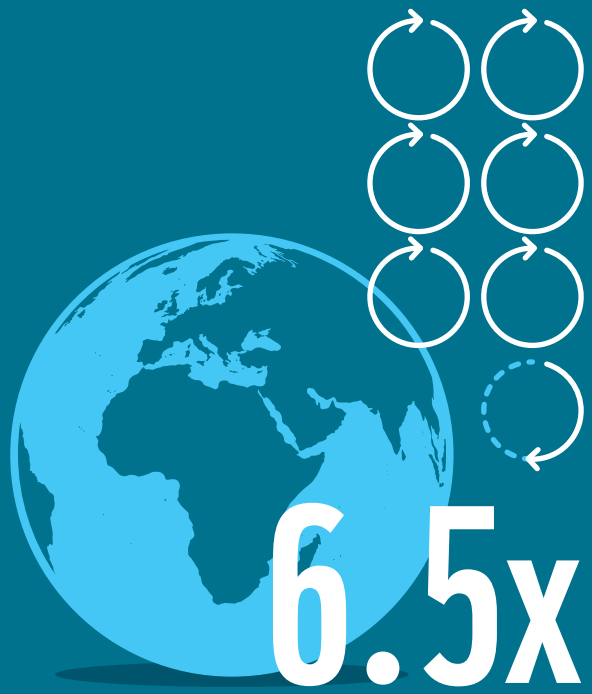
263,000 km

will lose longitudinal connectivity when dams that are currently planned or under construction will be realized.

REGULATION

130,500 km

of rivers globally will suffer changes to the flow regime and their ecosystems due to those dams – over 6 lengths of the Great Wall of China.



Some rivers will experience both, so that makes a total of

300,000 km

over ¾ distance from the Earth to the Moon.

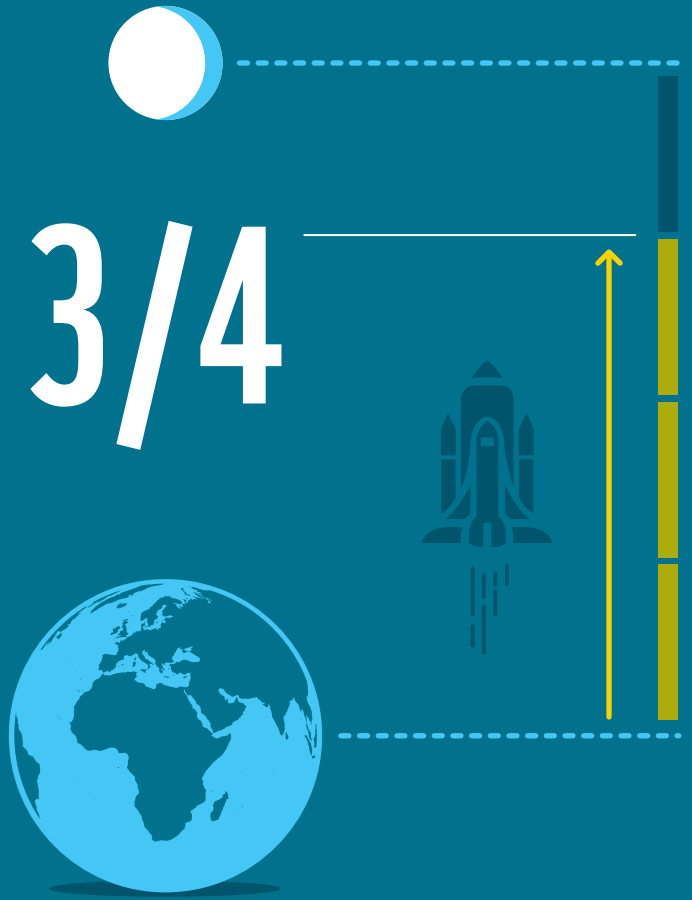


PHOTO: DURMITOR

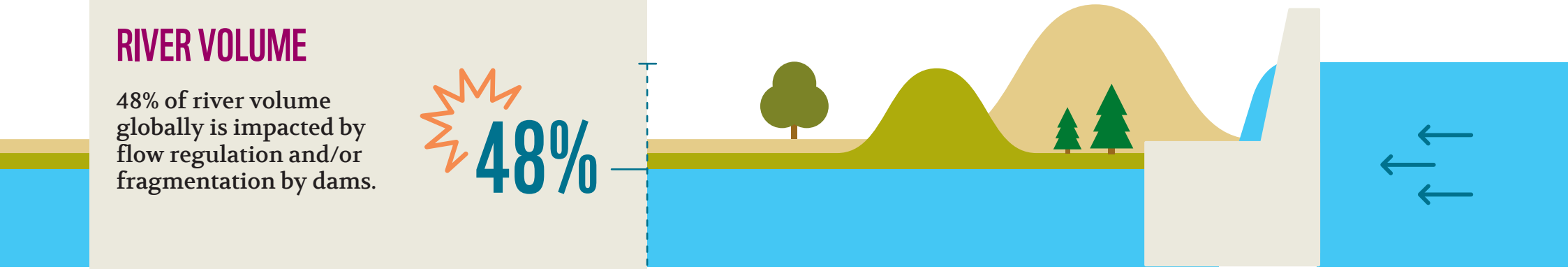
KEY MESSAGE 1

Balance between conservation of natural values of rivers and their economical and social usage needs to be established to optimize the value of water

RIVER VOLUME

48% of river volume globally is impacted by flow regulation and/or fragmentation by dams.

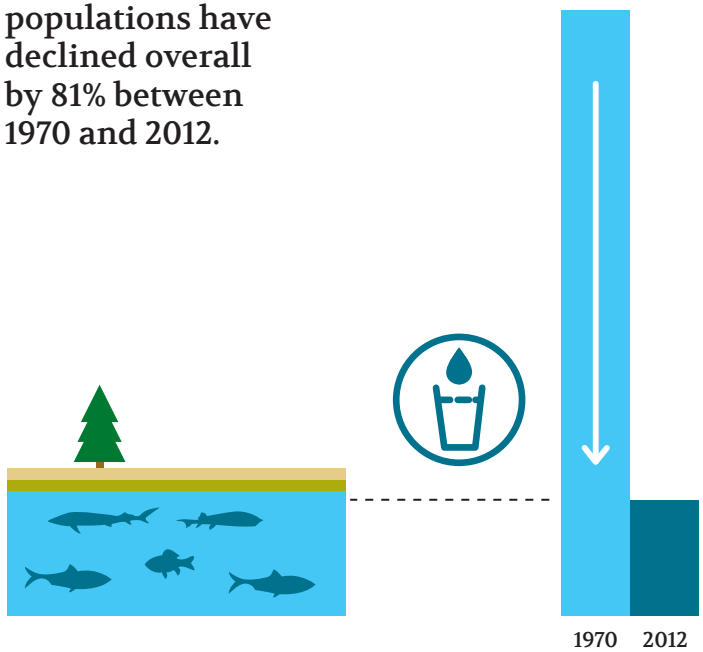
48%



FRESHWATER POPULATIONS

81%

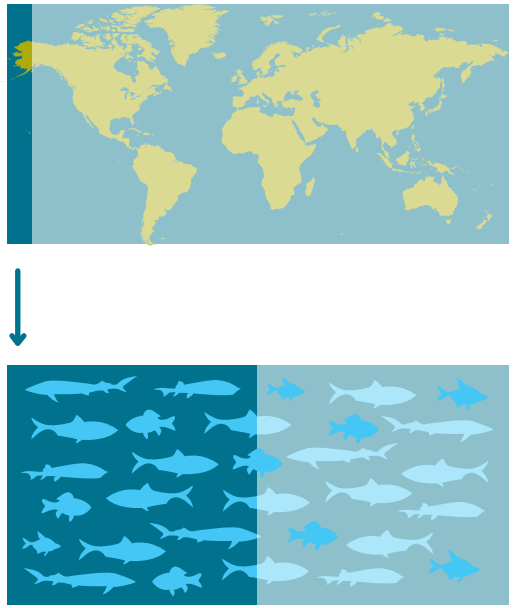
The freshwater populations have declined overall by 81% between 1970 and 2012.



RIVER FISH

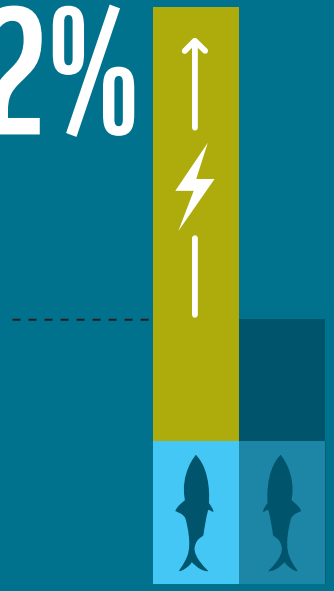
<1%

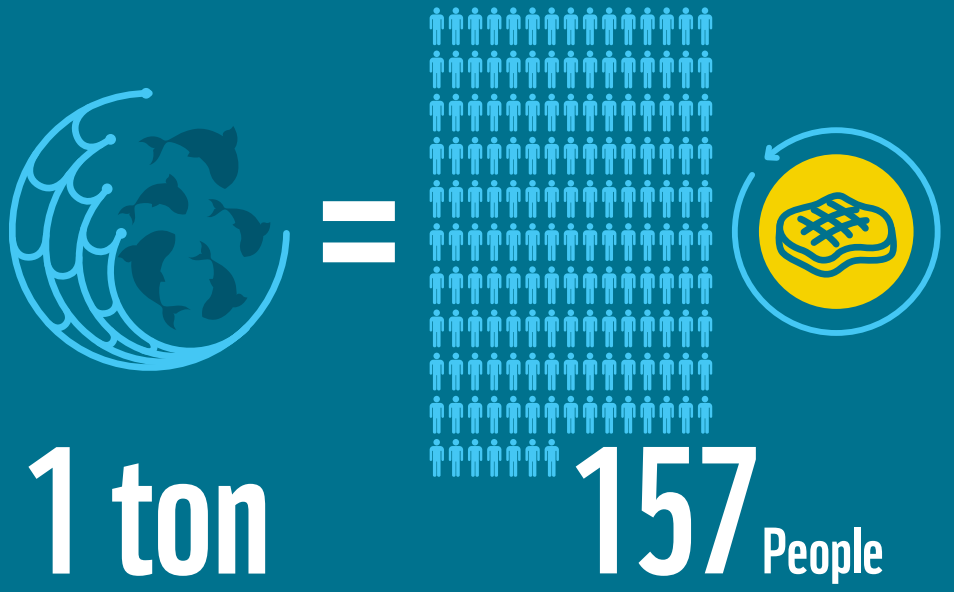
Rivers represent less than 1% of the Earth's surface, but nearly half of all fish species can be found in rivers.



HIGH RELIANCE ON FISH IN DEVELOPING NATIONS

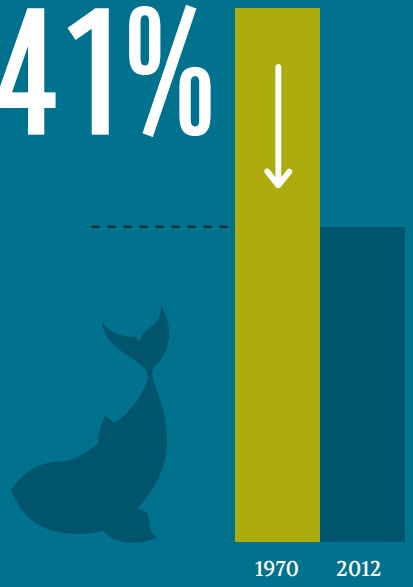
Freshwater fish has 72% higher nutritional efficiency than saltwater fish – one ton of inland catch supports the total annual consumption of animal protein for 157 people.





REDUCED MIGRATIONS

The abundance of fish species that migrate declined by 41% overall between 1970 and 2012 – as if from the total world population suddenly only people living in Asia could migrate.



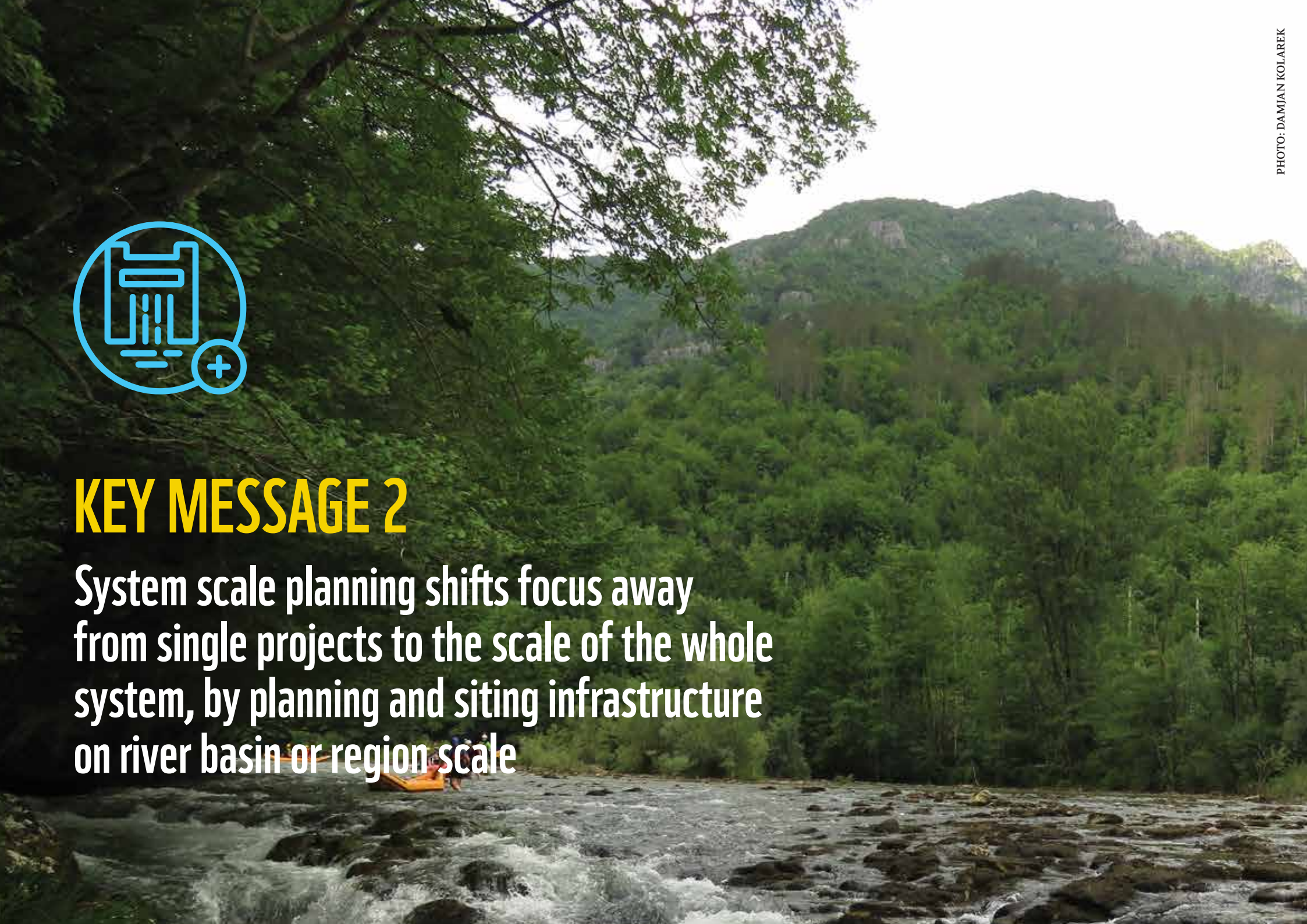


PHOTO: DAMJAN KOLAREK

KEY MESSAGE 2

System scale planning shifts focus away from single projects to the scale of the whole system, by planning and siting infrastructure on river basin or region scale

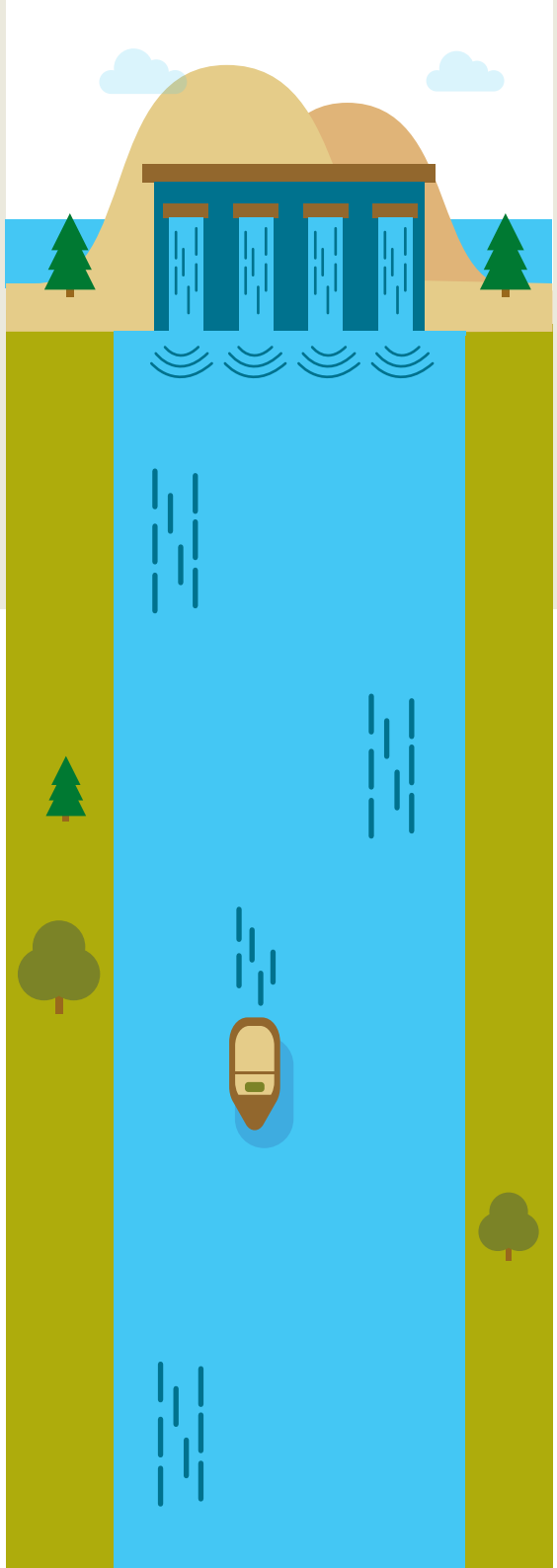
STRATEGIC APPROACH FOR BETTER POSITIONED DAMS

AVOID the most damaging sites

MINIMIZE impacts

RESTORE river functions

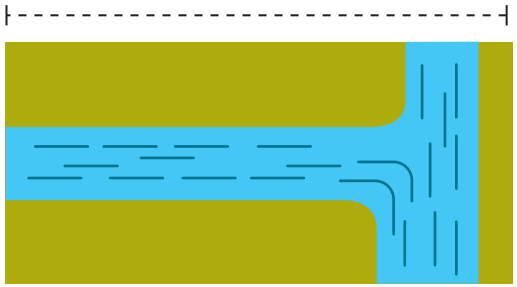
MITIGATE all remaining impacts



SYSTEM SCALE PLANNING CAN

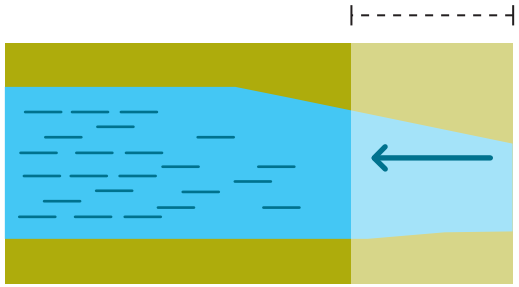
maintain twice the length of connected rivers compared to previous practice

2x



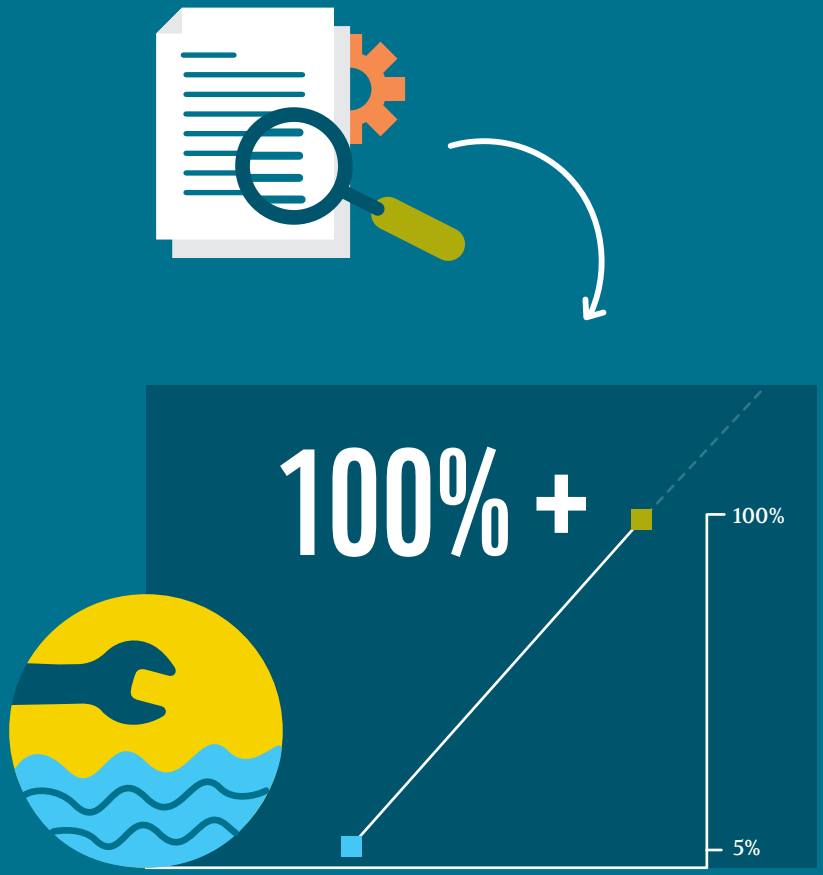
reduce the amount of river length lost to fragmentation by approximately

100,000 km



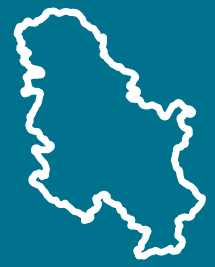
INCREASE OF ECONOMIC VALUES

Various system scale planning case studies showed the increase of water management economic values from 5% to more than 100% compared to usual approaches.



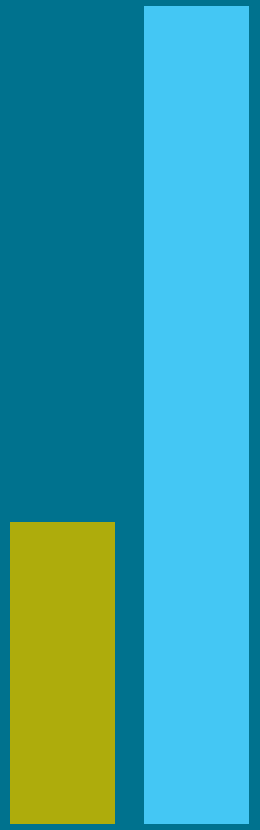
ADDITIONAL BENEFITS

Even a 5% improvement would produce $14 to $38 billion per year in additional benefits – a sum comparable to average annual investment in hydropower.



$38 b
total GDP of Serbia

$14 b
total GDP of Jamaica



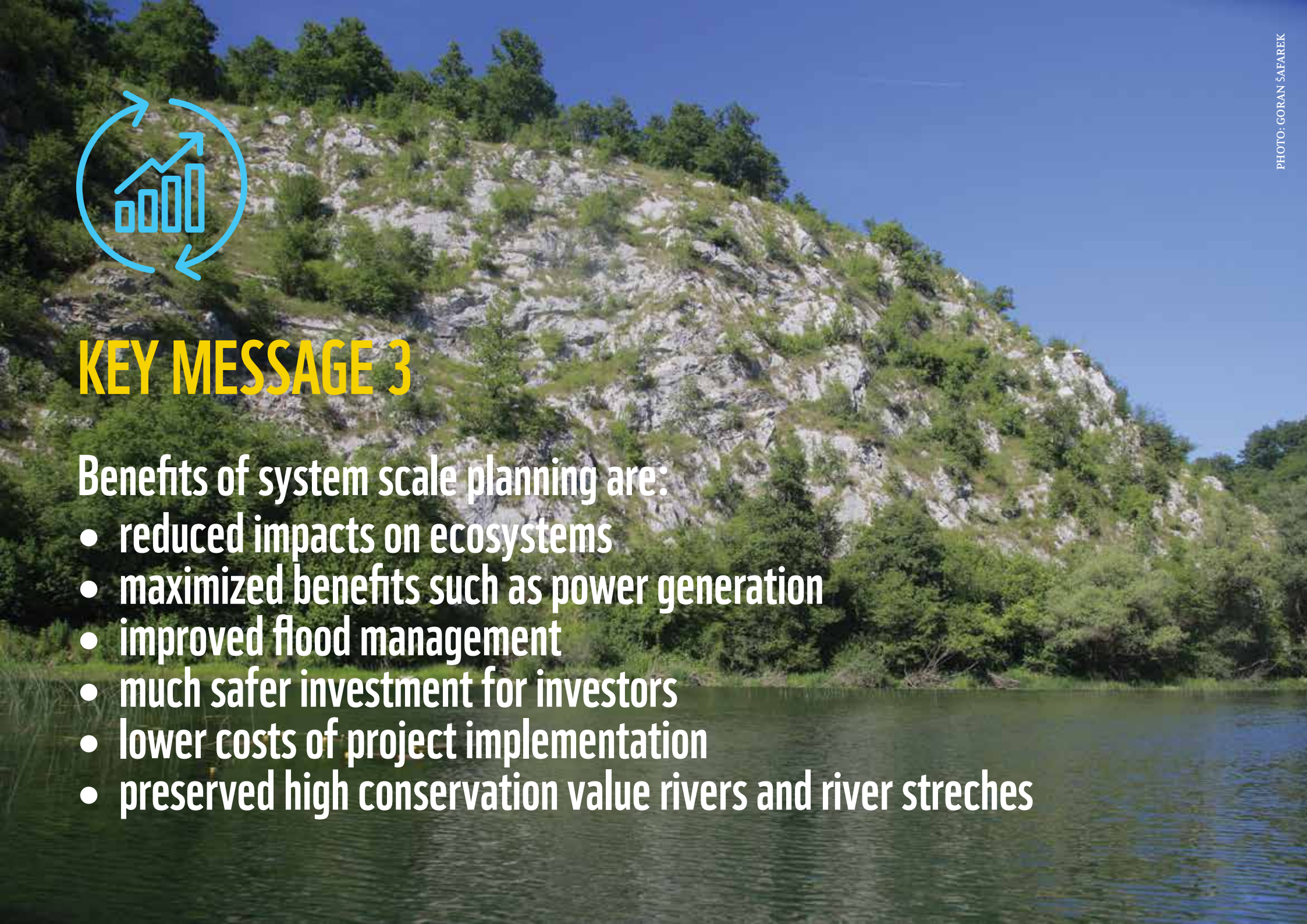


PHOTO: GORAN ŠAFAREK

KEY MESSAGE 3

Benefits of system scale planning are:

- reduced impacts on ecosystems
- maximized benefits such as power generation
- improved flood management
- much safer investment for investors
- lower costs of project implementation
- preserved high conservation value rivers and river streches

KEY MESSAGES – SUMMARY

BALANCING VALUES

Balance between conservation of natural values of rivers and their economical and social usage needs to be established to optimize the value of water

SYSTEM SCALE PLANNING

System scale infrastructure planning shifts planning away from focusing on single projects. It understands planning and siting of new dams at the scale of the whole system (river basin or region).

BENEFITS

Benefits of system scale planning are: reduce impacts on ecosystems, maximizing benefits such as power generation and flood storage, much safer investments for investors, costs of project implementation are lower, high-value rivers and river segments are conserved (exclusion zones).

FINAL MESSAGE

Bring in all relevant sectors together to make needed joint intersectoral decision as a basis for system scale planning through existing regulatory mechanisms.

PHOTO: TOMISLAV IKNAPIĆ

Opperman, J. J., Grill, G. and Hartmann, J., 2015. The Power of Rivers: Finding balance between energy and conservation in hydropower development. Washington, DC: The Nature Conservancy.

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