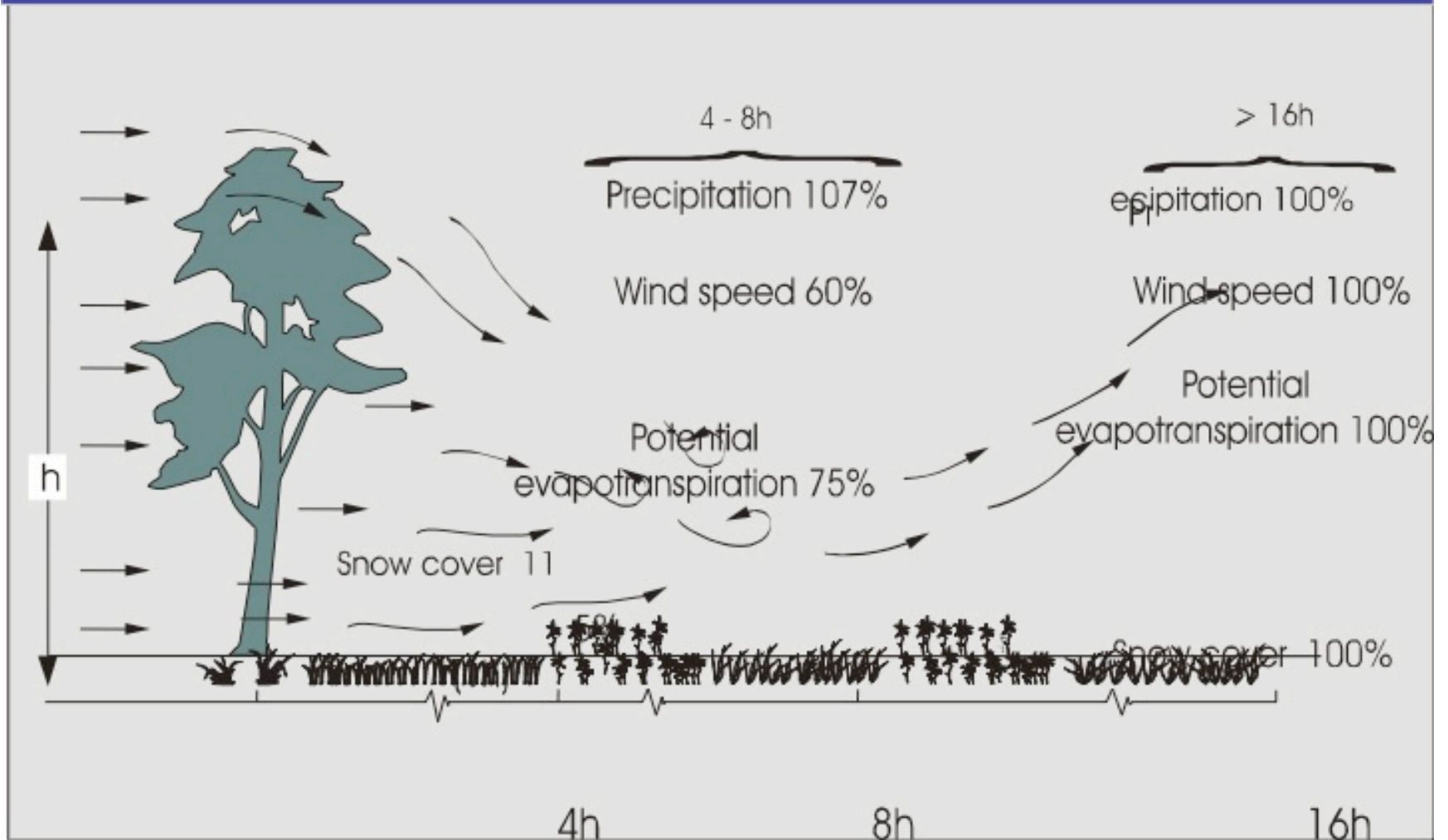


Long-term investigations show that proper shaping of landscape structures, mainly by creation of shelterbelts, strips of meadows, land-water ecotones and small water bodies, and improving soil structure by increasing organic matter content, is the best tools for achieving this goal

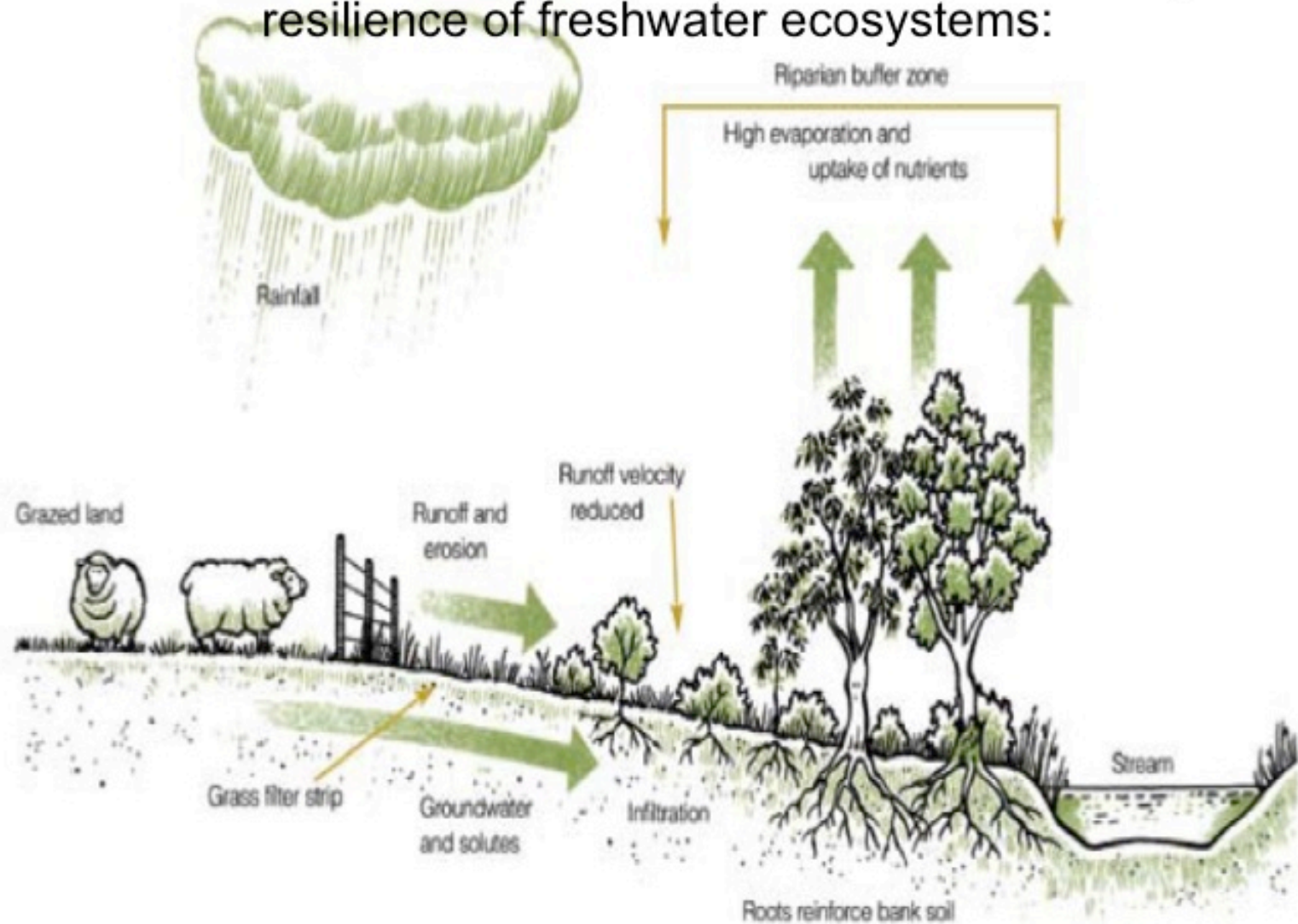
Shelterbelts introduced into landscapes change the **microclimatic conditions** of the fields as well as the **aerodynamic characteristics** of the active surface.

Impact of shelterbelt on microclimate of adjoining fields



Distance from tree shelter measured as multiple of the trees high (h)

The role of ecotone/riparian vegetation in maintaining the resilience of freshwater ecosystems:



Many birds nesting and feeding on insects and nectar

Many insects on leaves and bark

Insects, leaves and woody debris provide a steady year round input of food and shelter into the stream

Light shade allows abundant undergrowth with stable banks and good habitat for wildlife including birds, reptiles, marsupials and frogs

Many small animals including fish and platypus

Fallen branches form shelter for fish

Hollows in trees provide habitat for birds and bats

Source

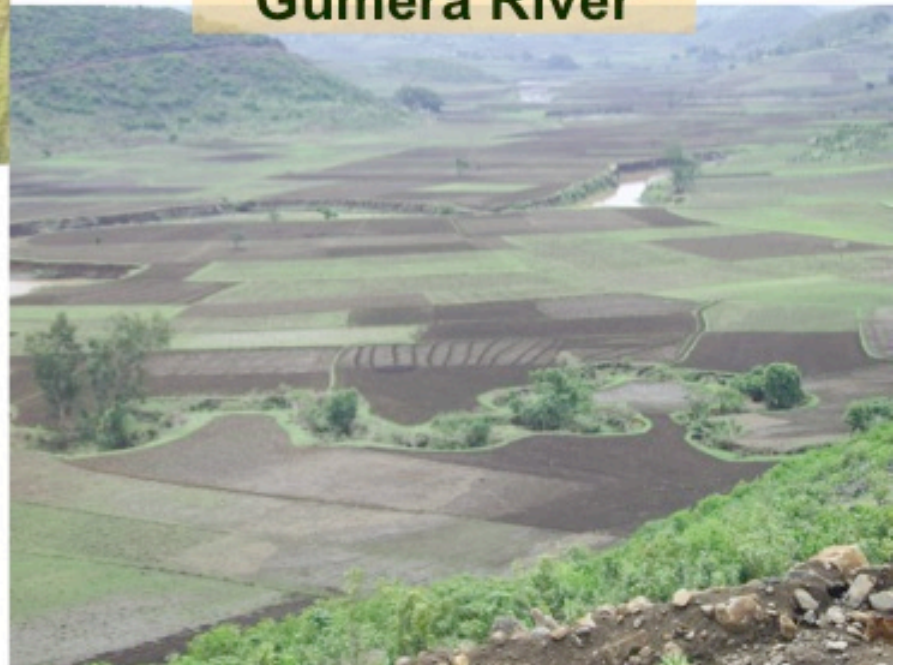
Buffering nutrient and sediment pollution of rivers



Need: Riparian vegetation regulates the flow of nutrients and sediment from uplands to the stream.

Riparian plant community (different trees, shrubs, herbs and grasses).

Gumera River



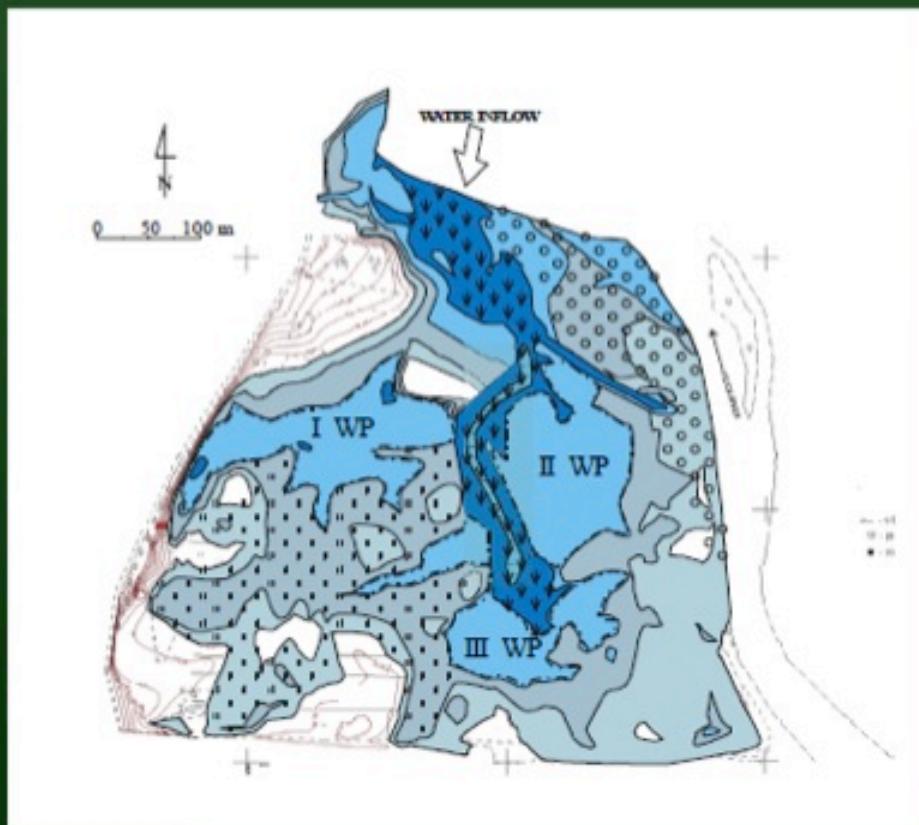
Manipulation and Enhancement of Flood Plain Properties for the enhancement of absorption Capacity



FLOOD PLAIN-POLAND
T. Wagner-Łotkowska

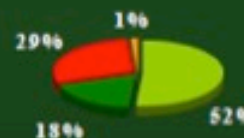
European Regional Centre for Ecohydrology UNESCO / Lodz, Poland

ENHANCEMENT OF ABSORBING CAPACITY OF FLOODPLAIN for nutrients trapping



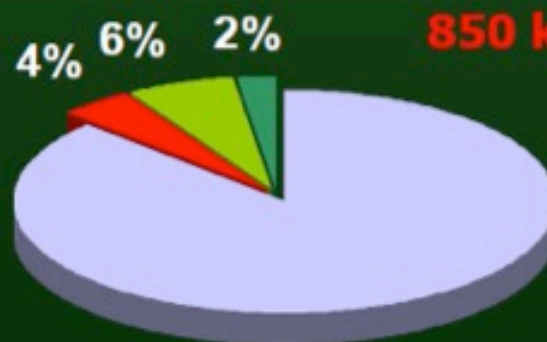
TOTAL PHOSPHORUS ACCUMULATION IN FLOODPLAIN BIOMASS

INITIAL



164 kg P

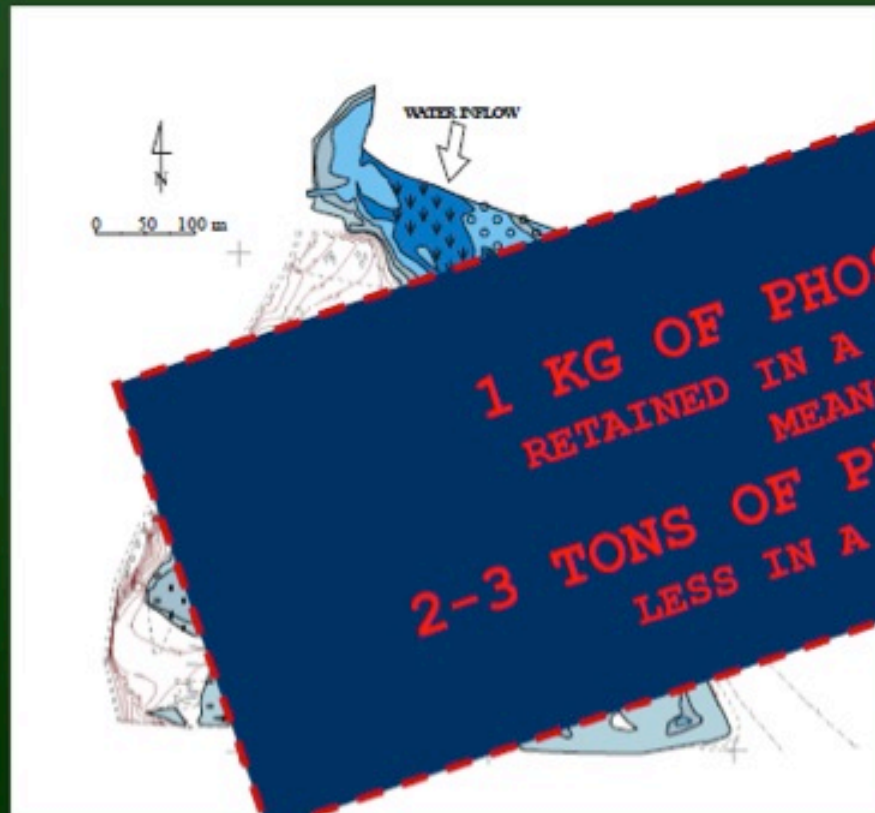
ENHANCED



850 kg P

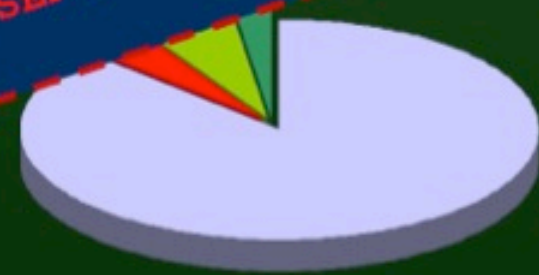
Meadow species
 Carex gracilis et vesicaria
 Phragmites australi
 Salix sp.

ENHANCEMENT OF ABSORBING CAPACITY OF FLOODPLAIN for nutrients trapping



**1 KG OF PHOSPHORUS
RETAINED IN A CATCHMENT
MEANS
2-3 TONS OF PHYTOPLANKTON
LESS IN A RESERVOIR**

TOTAL PHOSPHORUS
IN FLOODPLAIN

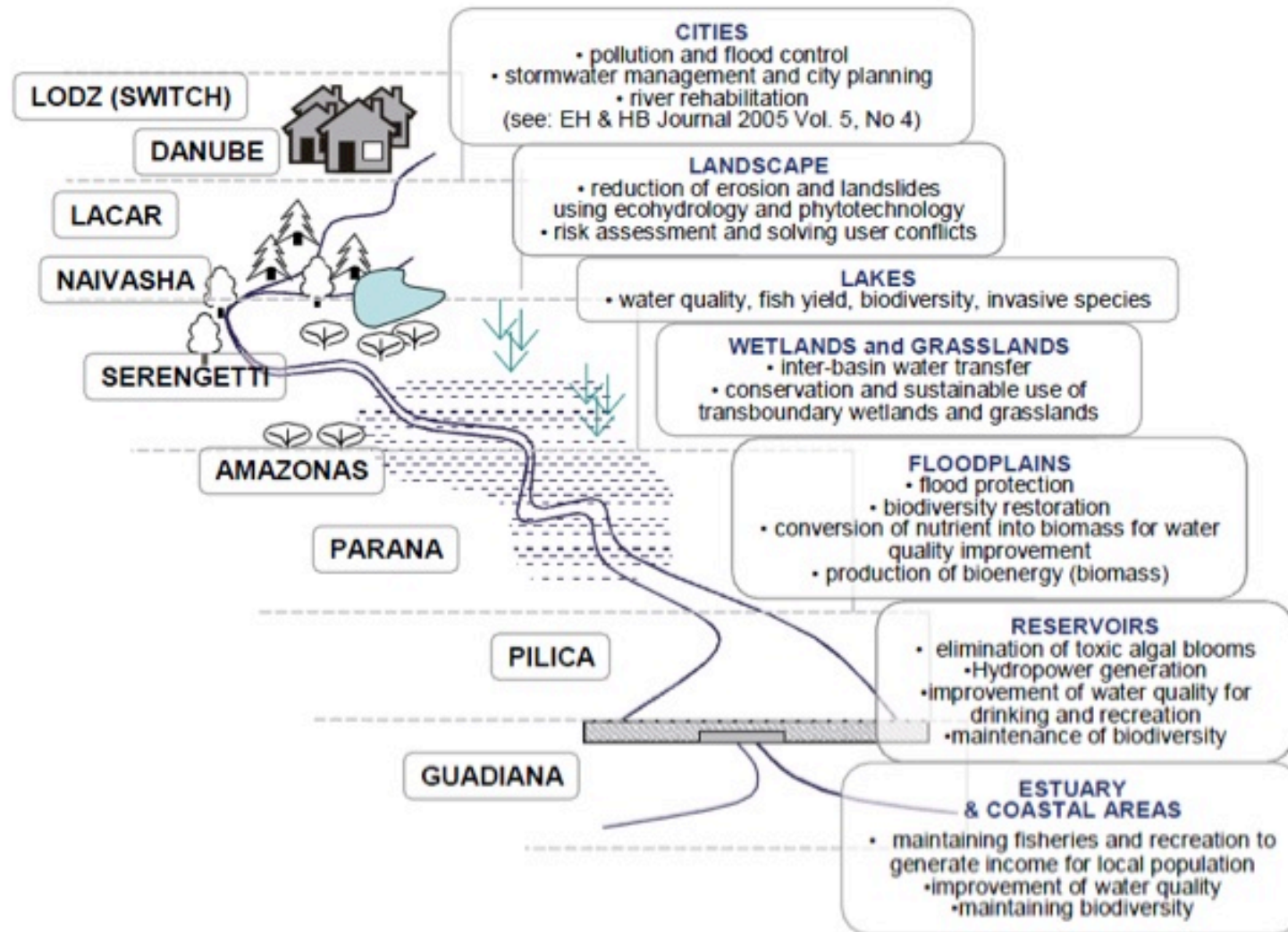


850 kg P

88%

- Meadow species
- Carex gracilis et vesicaria
- Phragmites australi
- Salix sp.

APPLICATIONS OF ECOHYDROLOGY



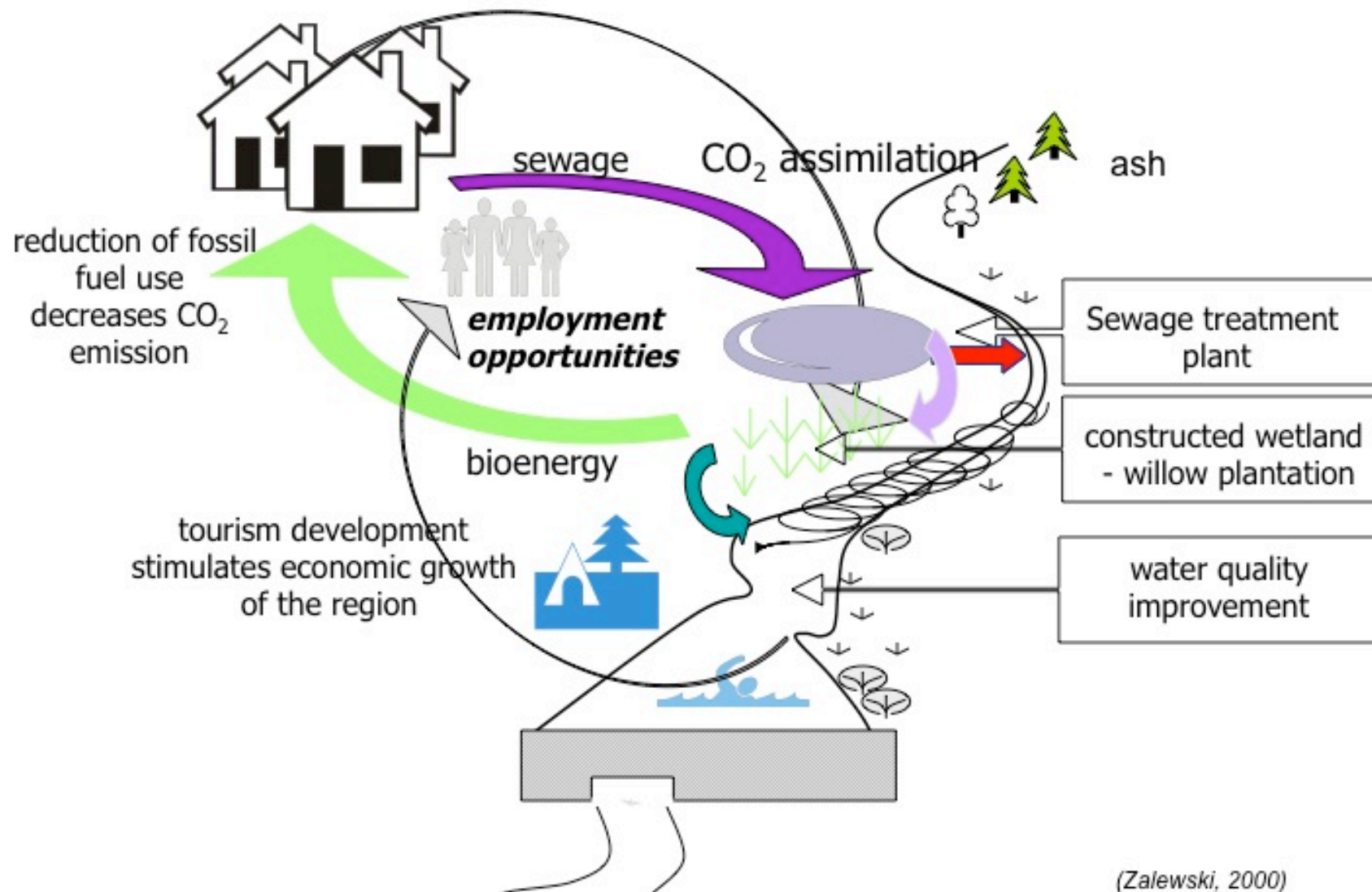
Effect of ground water **overexploitation** and **restoration**
on ecosystem structure and productivity (Spain, Donana)



3 years



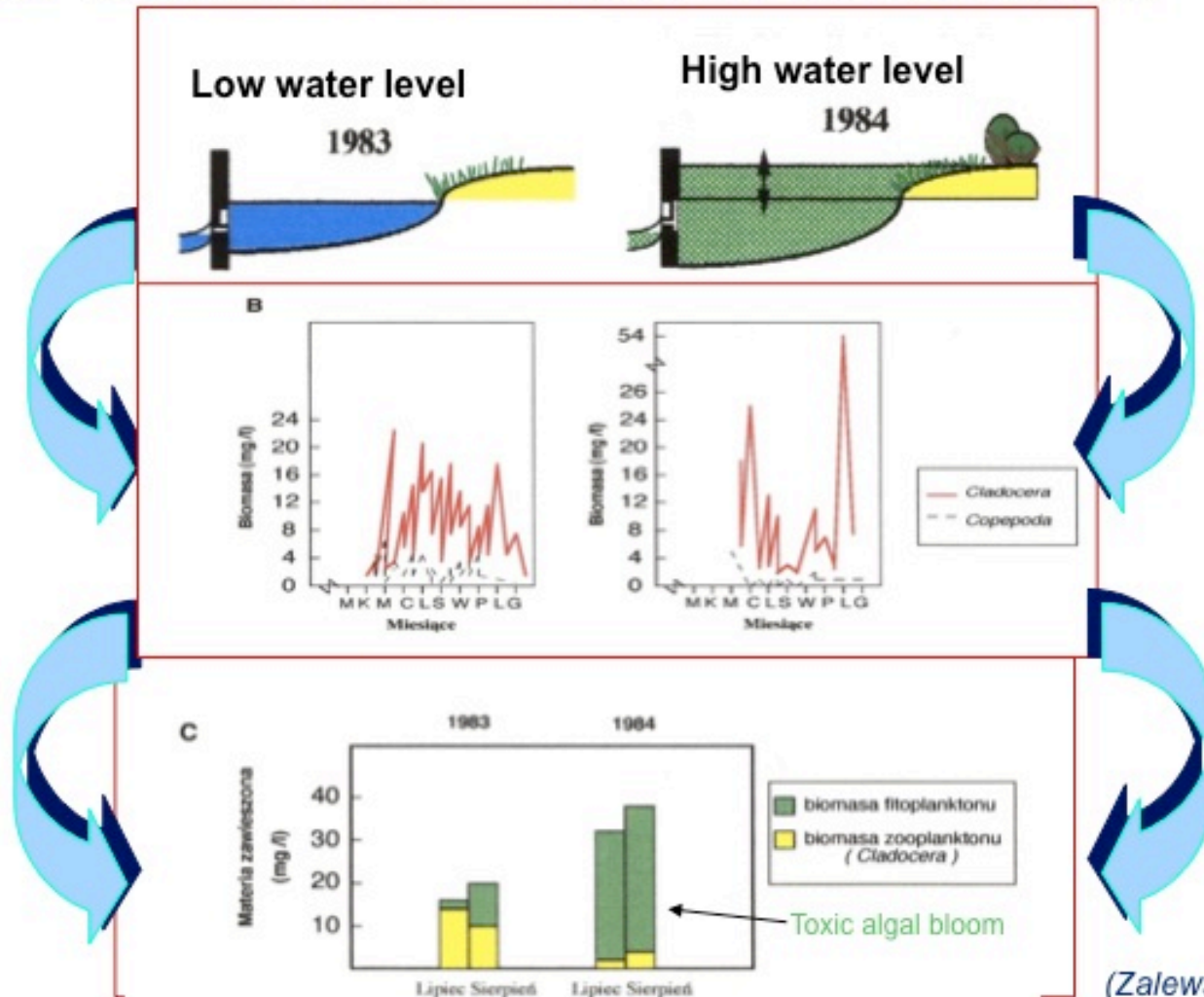
Ecohydrological system solution harmonized with societal needs



(Zalewski, 2000)

EH in the aquatic phase:

The regulation of water level in eutrophic reservoir for change of excess nutrients allocation - reduction of toxic algal blooms



Polish Aid Programme for the year 2008-2012

**“Implementation of Ecohydrology – A
Transdisciplinary Science for Integrated Water
Resources and Sustainable Development in
Ethiopia”**

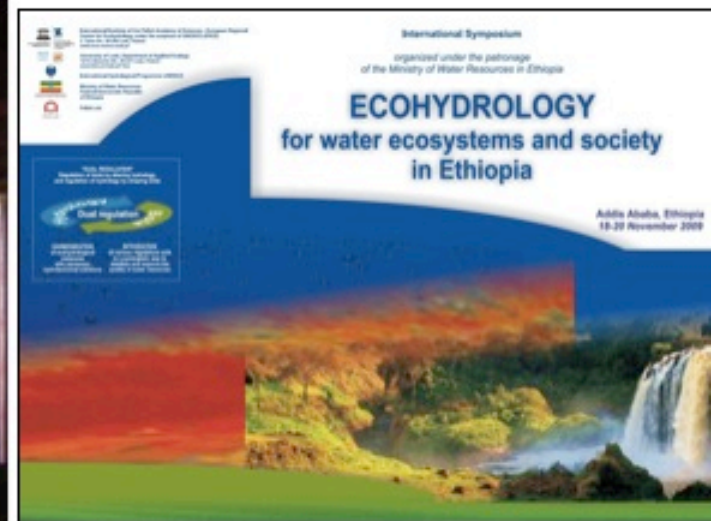


Polish aid

International Symposium

under the patronage of the Ministry of Water Resources in Ethiopia

„Ecohydrology for water ecosystems and society in Ethiopia” Addis Ababa, Ethiopia, 18-20 November 2009



109 participants

28 universities and research institutes from Ethiopia

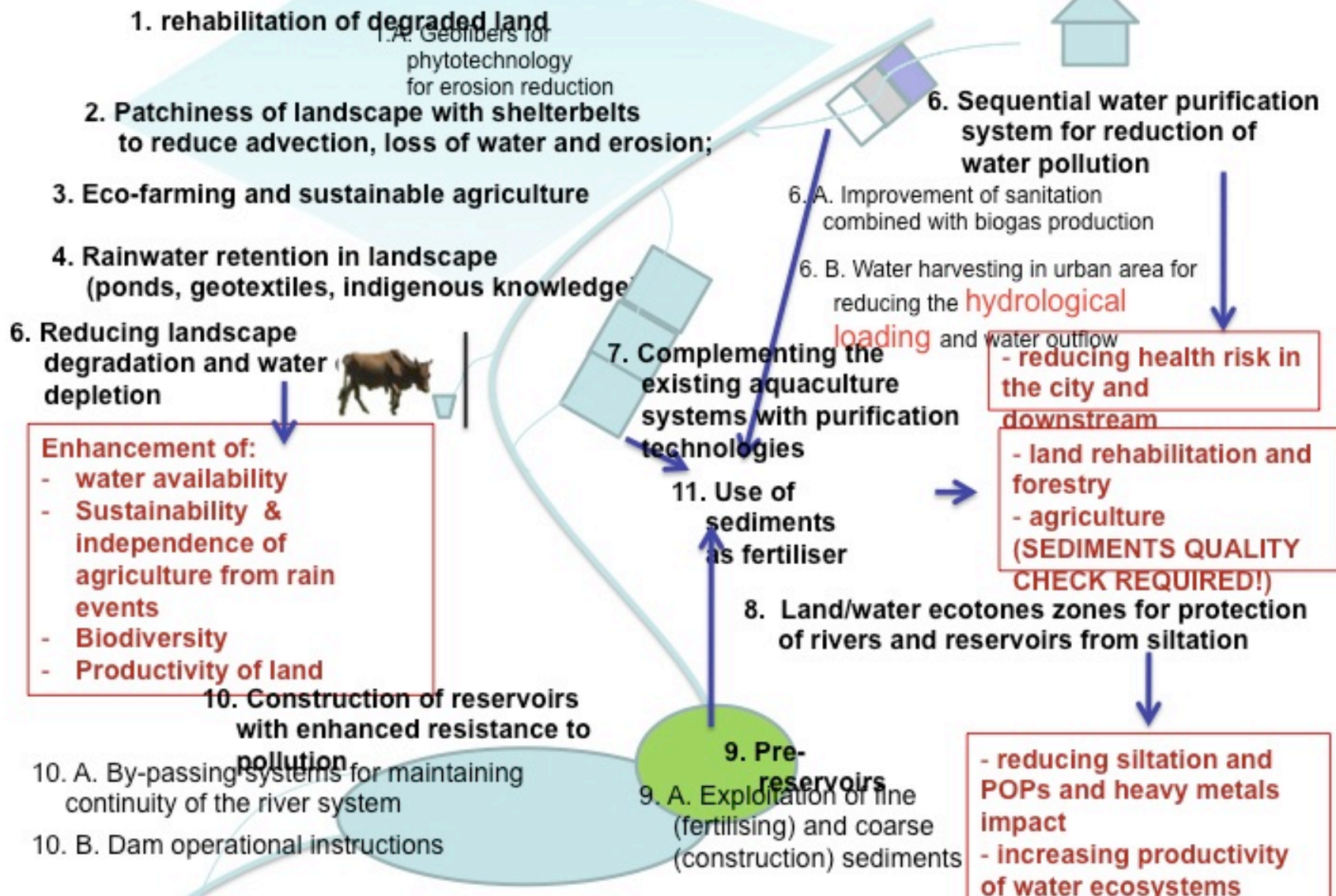
10 international universities and research institutes

UNESCO

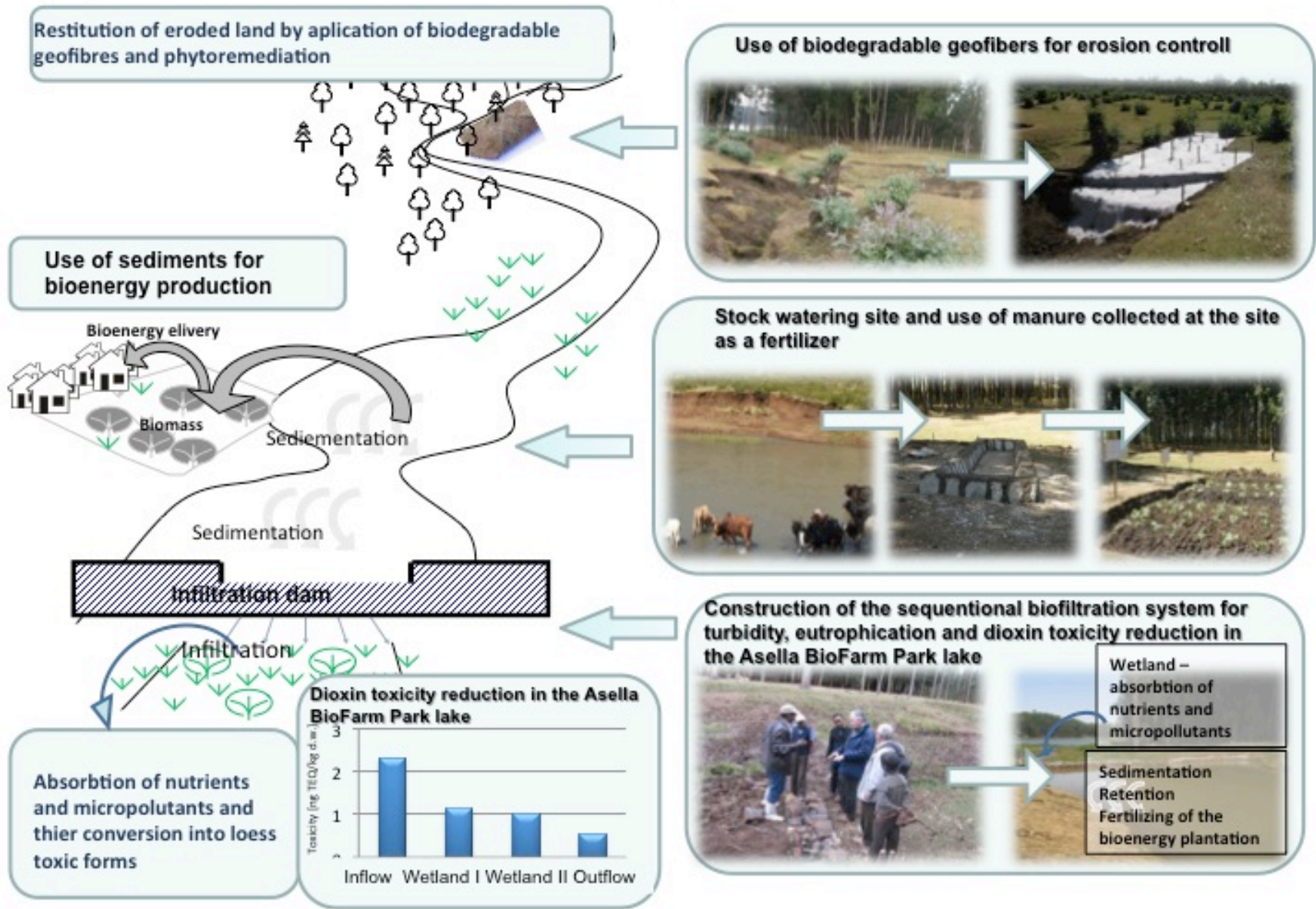
ECOHYDROLOGICAL SYSTEM SOLUTION FOR GUMERA RB

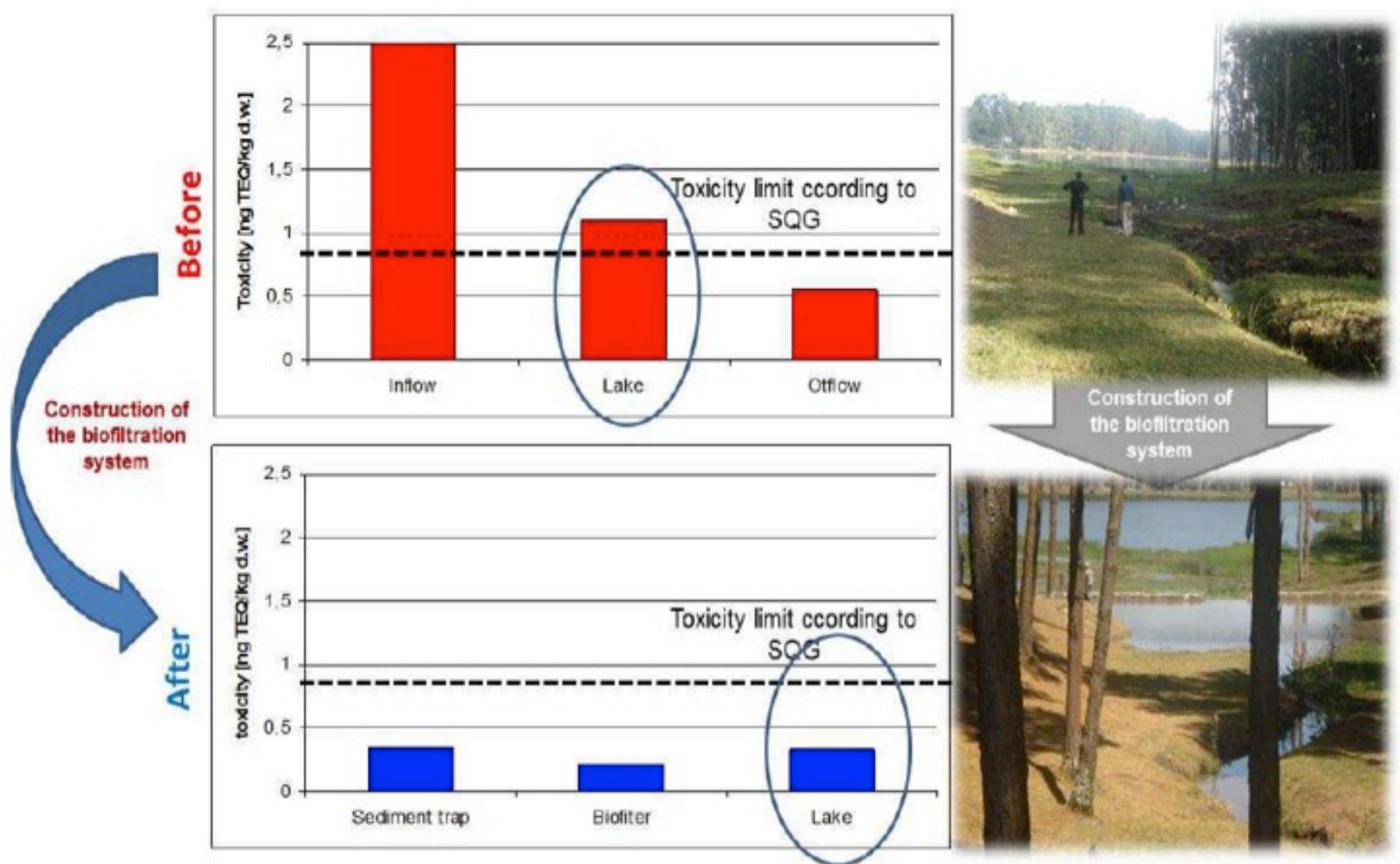
AGRICULTURAL AREA

URBAN AREA



Use of ecohydrology based systemic solutions for reduction of siltation, eutrophication and dioxin-induced toxicity in the Asalla BioFarm Park lake





Concentration of the dioxins before and after construction of biofiltration system

2nd EH Demo Site: Biodegradable Geotextile – for soil erosion control



July, 2012





Absence of Ecotone



2nd EH Demo Site:

Shelter belt 4 months young



Construction of second ecohydrological demonstration site

Agricultural Water Management

1 KG OF PHOSPHORUS

MEANS

2-3 TONS OF TOXIC CYANOBACTERIA BLOOM



Implementation of Ecohydrology – a transdisciplinary science for integrated water resources and sustainable development in Ethiopia



Optimizing fish production in pond for consumption and stocking purposes



Fish Pond covered with thermoinsulating foil in order to improve the production of stocking material and fish yield



No. of fish fingerlings reared

Cold season			Warm season		
Sampling date	Covered pond	Uncovered pond	Sampling date	Covered pond	Uncovered pond
1 - Jan	0	0	15- March	364	0
15- Jan	42	0	30- March	425	6
30-Jan	129	0	15- April	570	27
15-Feb	235	0	30- April	690	44
30-Feb	277	0	15- April	813	62
Total	683	0	Total	2862	139

Development and implementation of Ecohydrology concept

1/ Identification of „hot spots”

2/Assessment of cause-effect relationships/ Hierarchy
of factors

3 / Development of ecohydrological systemic solution,
and

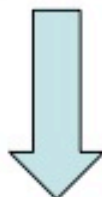
4/ Implementation by „adaptive assessment and
management”

Conclusion & Recommendation

EH addresses all problems related with water quality and quantity, biodiversity and Ecosystem services

EH enhance ecosystem Carrying capacity (resistance and resilience) against human and climate change impact

EH does not only eliminate/minimize threats but also amplify opportunities



Therefore, If implemented in large scale(basin) and disseminated in Ethiopia. It helps meeting the Ministry's vision, food security and maintaining biodiversity and ecosystem services

Short term plan:

Maintaining the existing demo sites

Disseminate the Ecohydrological systemic solution for water related problem solving in Ethiopia

Establishing EH demo sites in Urban areas

Establishing Ethiopian National Ecohydrological Center

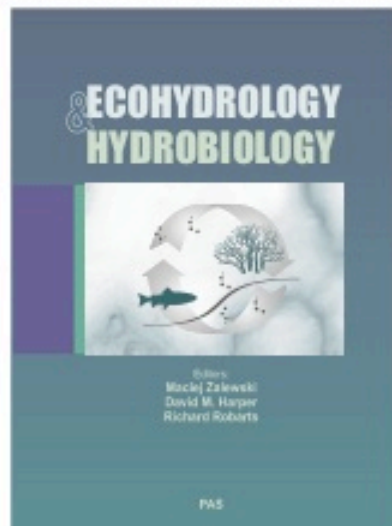
Establishing African Center for Ecohydrological

Long term plan

Establishing African Regional Center for Ecohydrological



International Journal of ECOHYDROLOGY & HYDROBIOLOGY



Guidelines for the Integrated Management of the Watershed – Phytotechnology and Ecohydrology



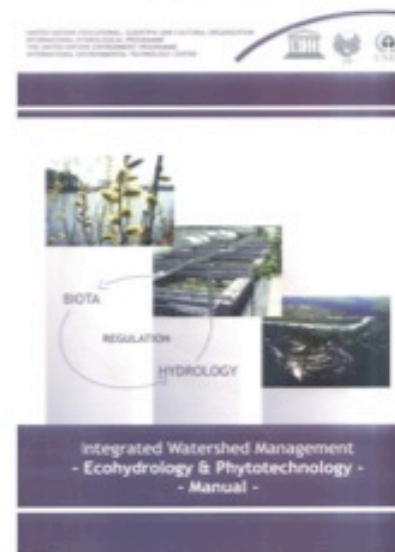
Guidelines for
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United Nations Environment Programme
Division of Technology, Industry and Innovation

INTERNATIONAL ENVIRONMENTAL
TECHNOLOGY CENTRE

Integrated Watershed Management - Ecohydrology and Phytotechnology - Manual



Implementation of Ecohydrology – a transdisciplinary science for integrated water resources and sustainable development in Ethiopia



Thank you!

