

Restoration of riparian vegetation in the Hunhe River basin, Liaoning, China

Shuai Yu[†]

Jinlei Zhu[‡]

19.12.2018

[†]Institute of Applied Ecology, Chinese Academy of Sciences

[‡]Institute of Landscape and Plant Ecology, University of Hohenheim

Acknowledgements

Analysis of Nitrogen and Phosphorus Content

Characteristic in Woody Plant and Vegetation Restoration

Research in Riparian Zone of Hun River

By

Shuai Yu

A Dissertation Submitted to
The University of Chinese Academy of Sciences
In partial fulfillment of the requirement
For the degree of
Doctor of Ecology

Institute of Applied Ecology, Chinese Academy of Sciences

May, 2015



Outline

1. Introduction
2. Situation & Problems
3. Solutions
4. Application

Introduction

Deforestation in Amazon

What is conservation biology?

Conservation biology is the study of attempts to protect and preserve **biodiversity***.

*<https://www.nature.com/subjects/conservation>

What is conservation biology?

Conservation biology is the study of attempts to protect and preserve **biodiversity***.

It focuses on

- both the biological and social factors that affect the success of conservation efforts,
- determining ecosystems and species whose conservation is a high priority.

What is conservation biology?

Conservation biology is the study of attempts to protect and preserve **biodiversity***.

It focuses on

- both the biological and social factors that affect the success of conservation efforts,
- determining ecosystems and species whose conservation is a high priority.

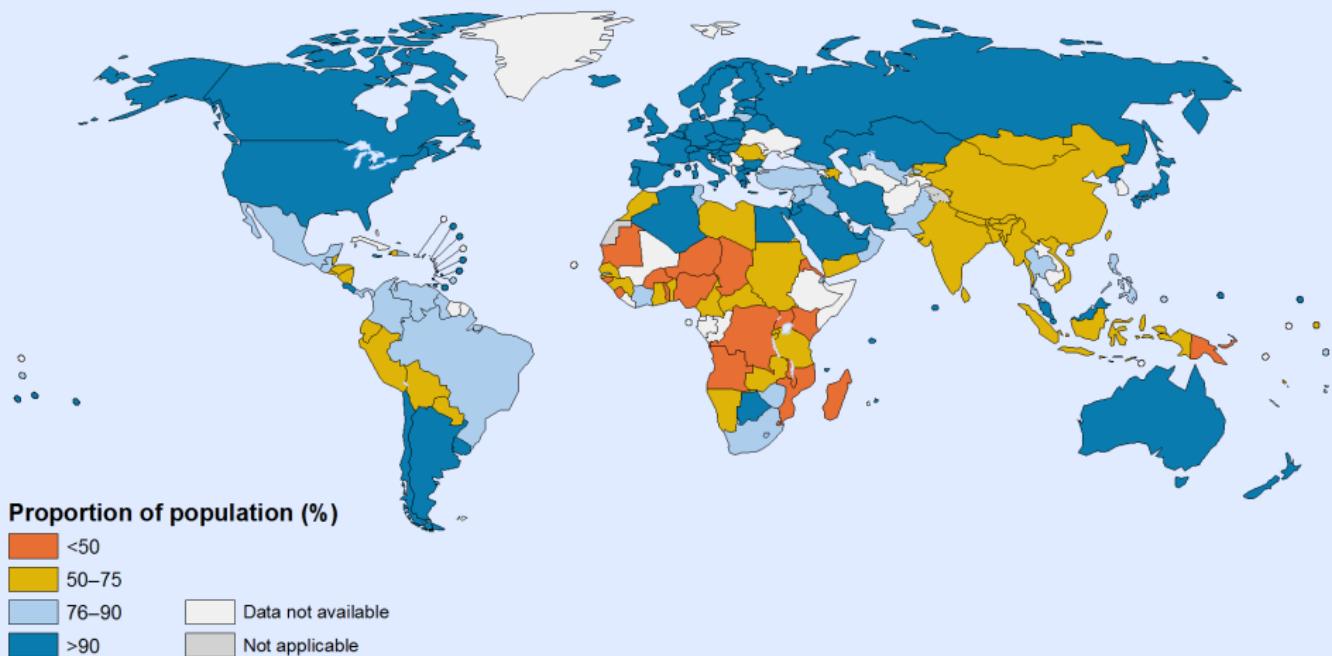
It has two central goals

- to evaluate human impacts on biodiversity,
- to develop practical approaches to prevent the extinction of species [2] (Soulé 1986, Wilson 1992).

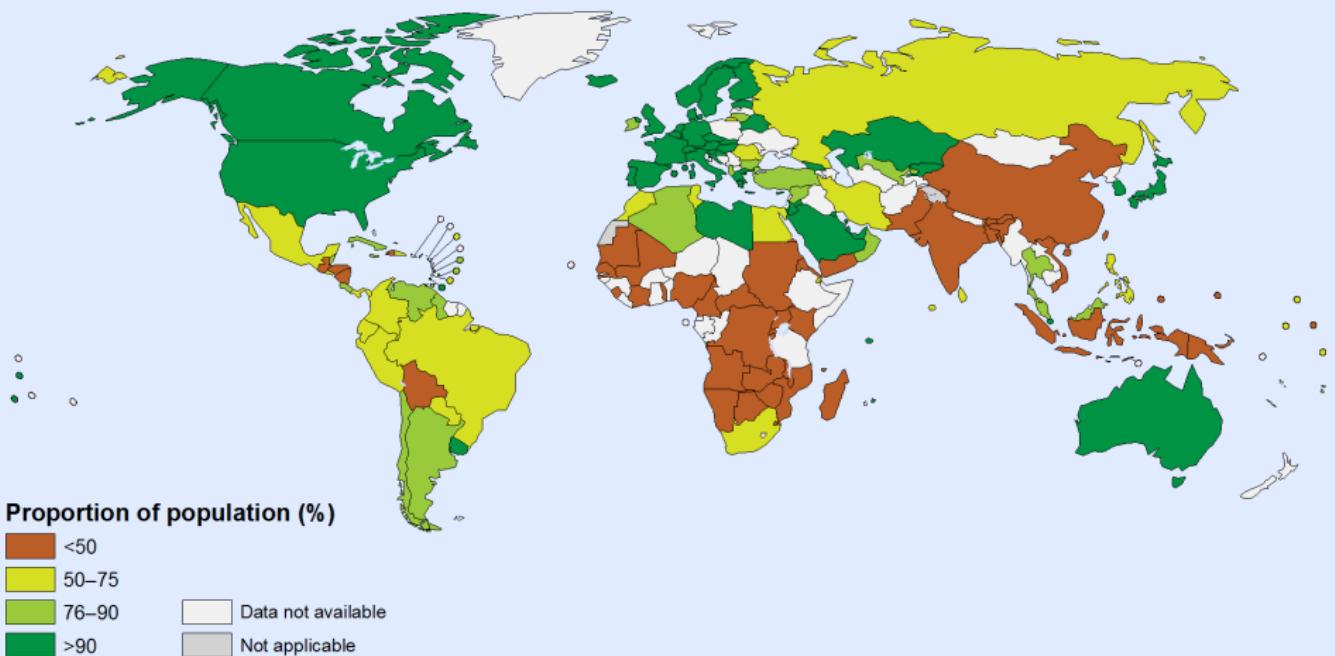
Why to preserve biodiversity?

- Modern extinction rates are at 100 to 1000 times greater than background extinction rates calculated over the eras [1].
- Existing species go extinct at a rate 1000 times that of species formation*.
- The primary cause of today's loss of biodiversity is habitat alteration caused by human activities.

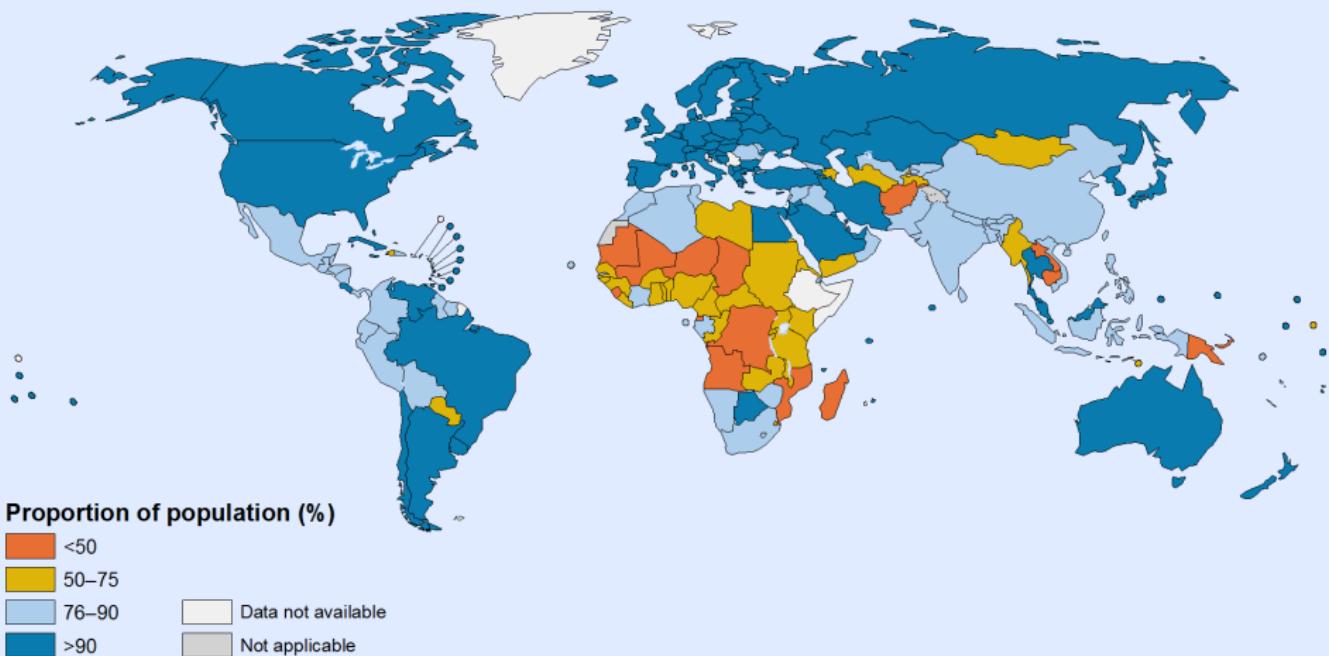
Proportion of population using improved drinking water sources (%), 1990



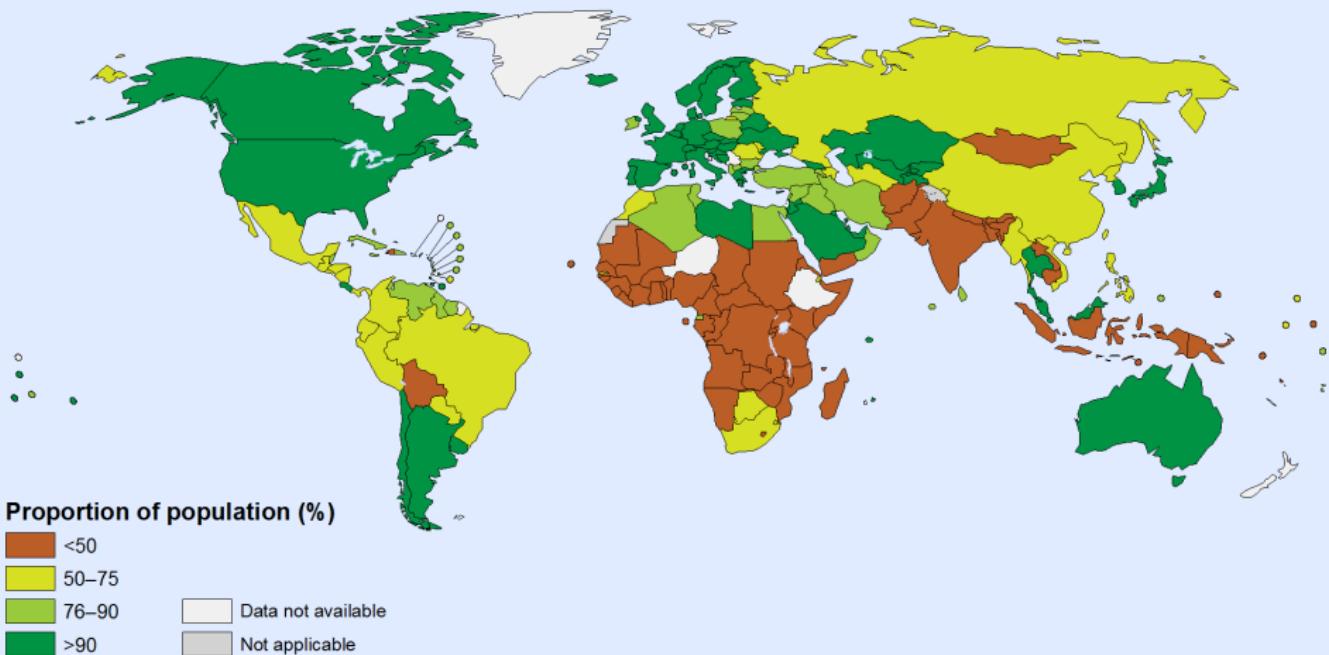
Proportion of population using improved sanitation facilities (%) (%), 1990



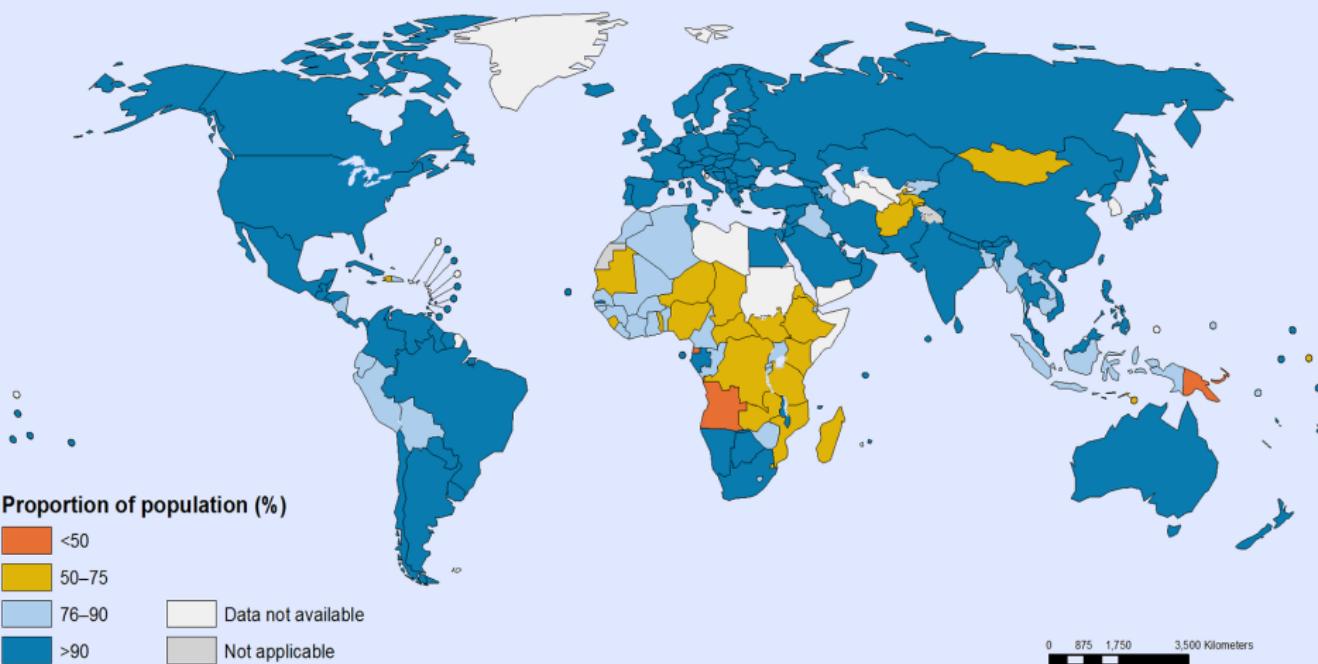
Proportion of population using improved drinking water sources (%), 2000



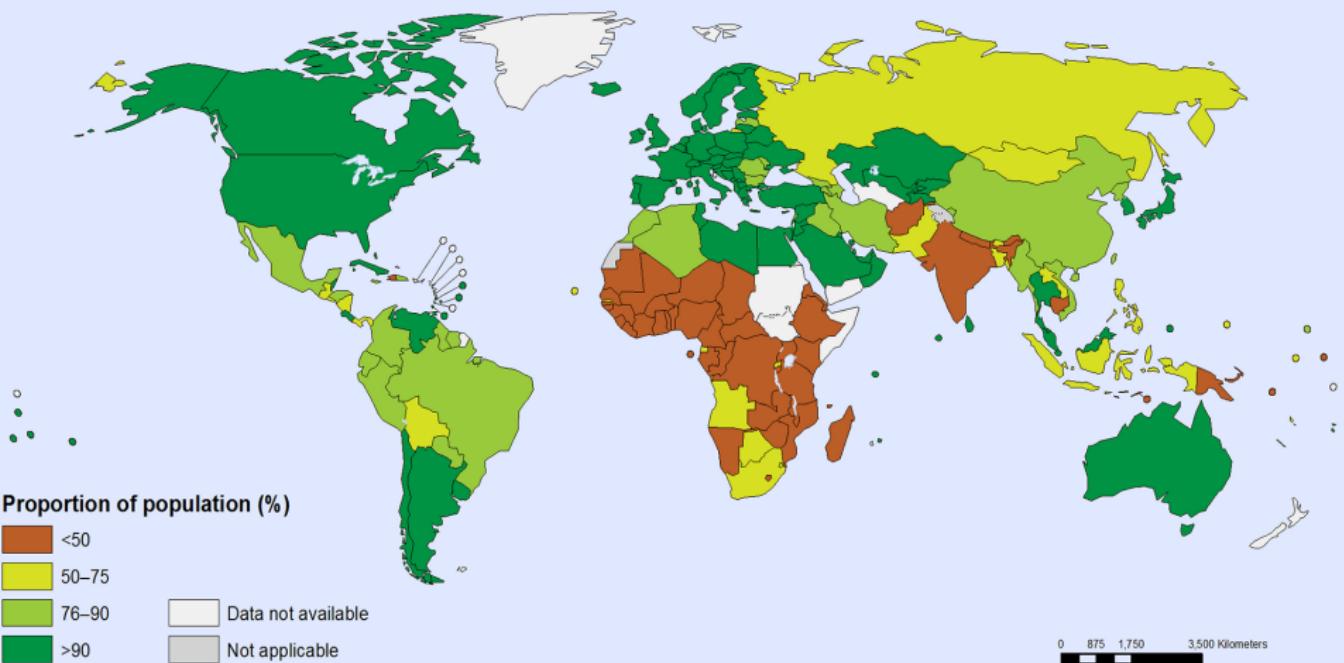
Proportion of population using improved sanitation facilities (%), 2000



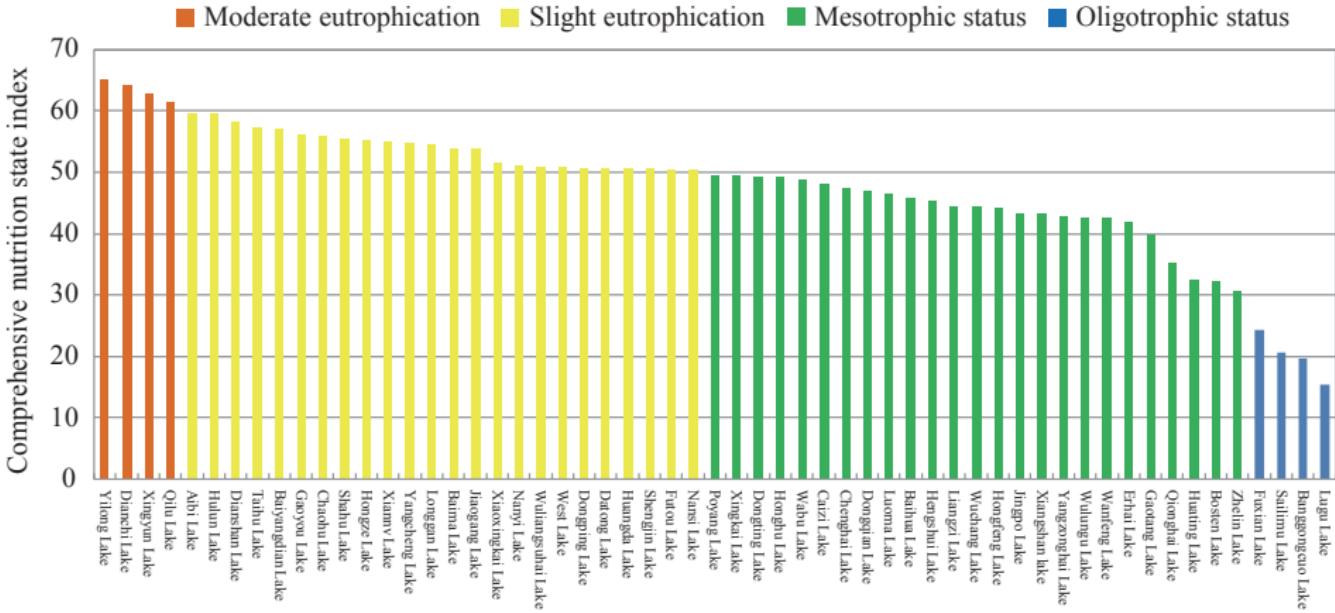
Proportion of population using improved drinking water sources (%), 2015



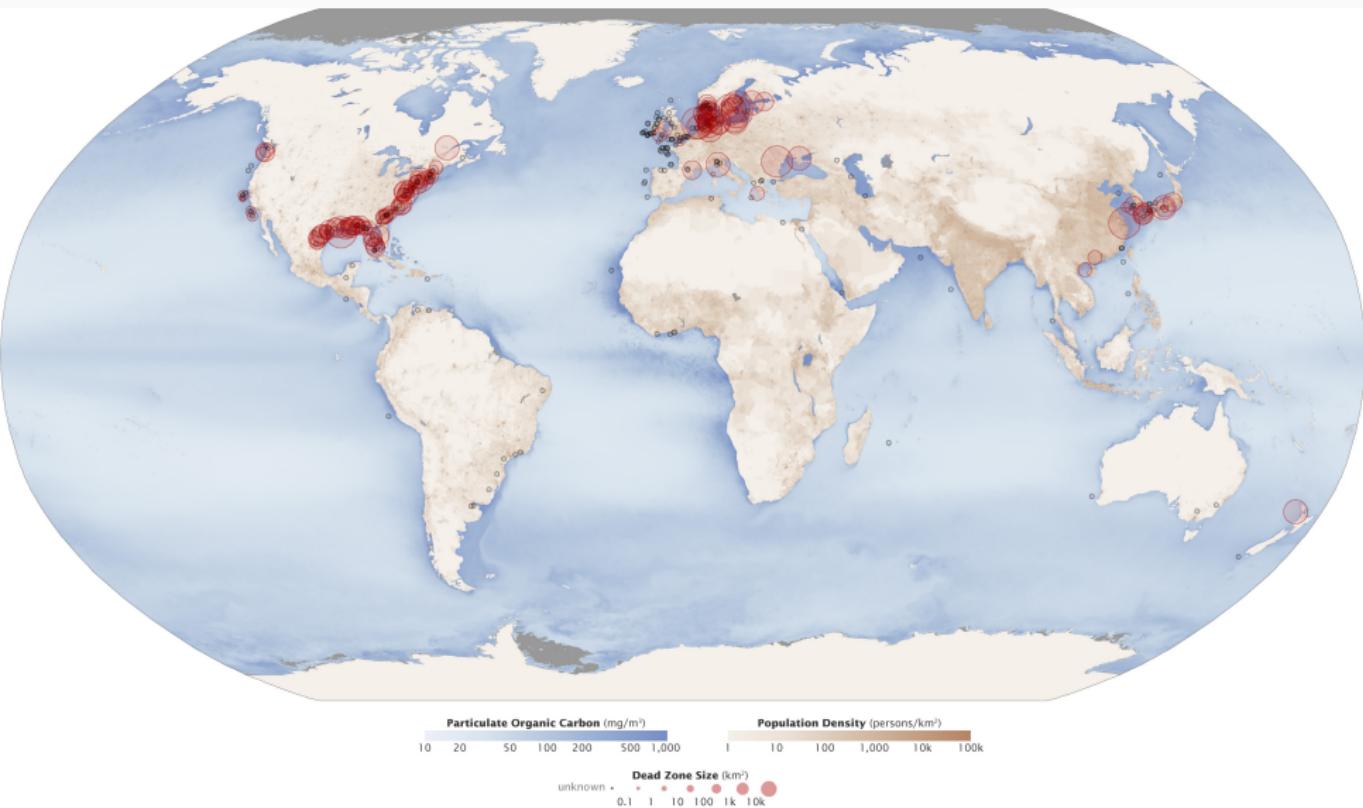
Proportion of population using improved sanitation facilities (%), 2015



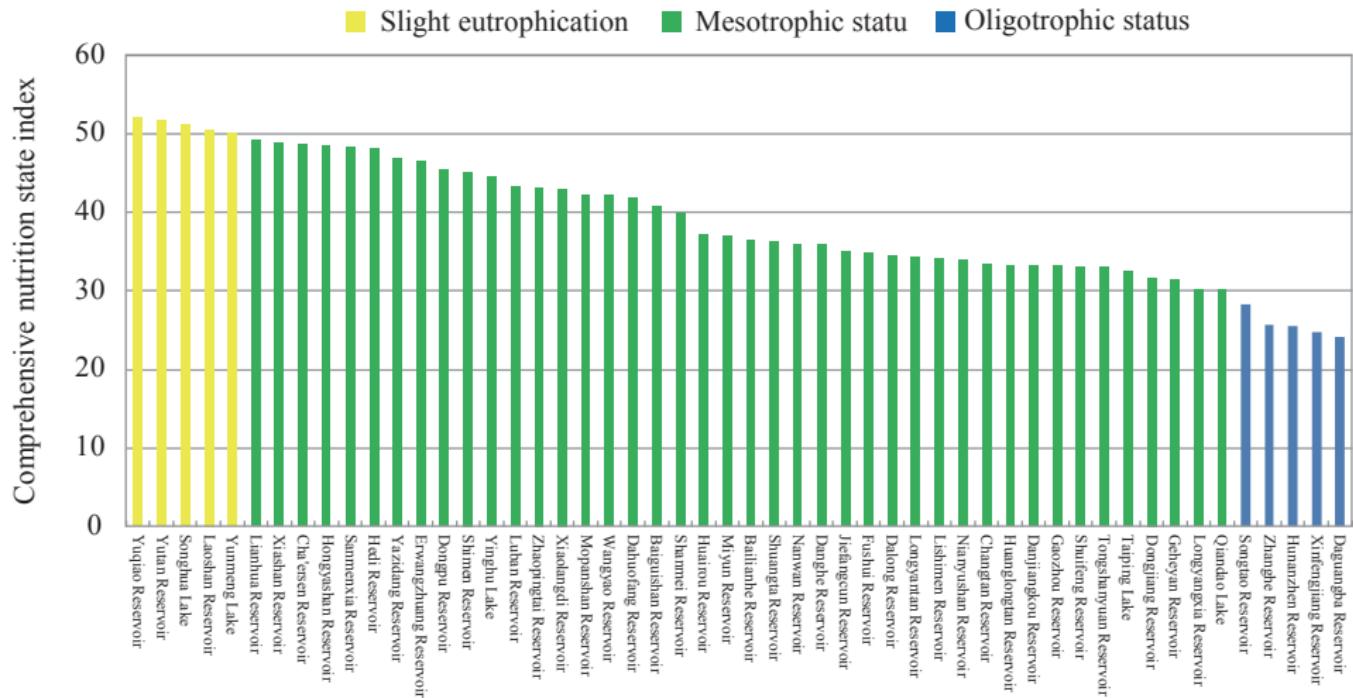
Trophic level index of China's major lakes in 2017



Dead zones around the world



Trophic level index of China's major reservoirs in 2017

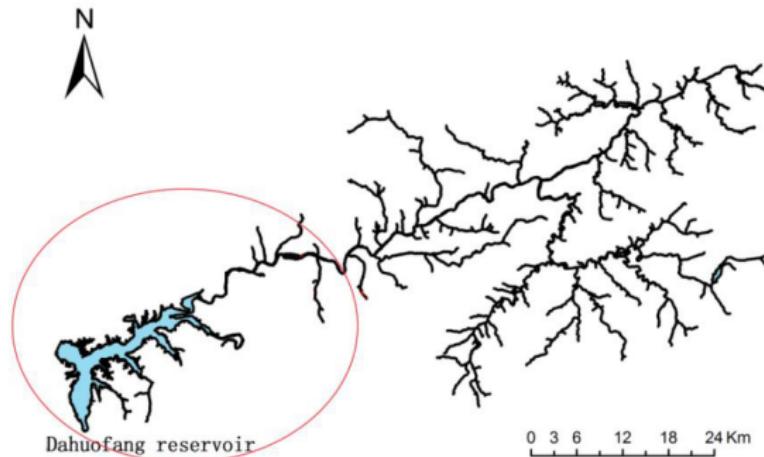


Situation & Problems

Current situation



- Water source of city group in the lower reaches
- 110 km^2 , 7 bil. m^3 water for 12 mil. people per year



Main problems

- Water pollutants: NH₃-N (9.73 mg/L, 3.87 times higher) and TP (0.84 mg/L, 1.1 times higher)

Main problems

- Water pollutants: NH₃-N (9.73 mg/L, 3.87 times higher) and TP (0.84 mg/L, 1.1 times higher)
- River bank damaged, riparian vegetation destroyed



Main problems

- Water pollutants: NH₃-N (9.73 mg/L, 3.87 times higher) and TP (0.84 mg/L, 1.1 times higher)
- River bank damaged, riparian vegetation destroyed
- Wetland degraded, soil and water conservation capacity decreased



Main problems

- Water pollutants: NH₃-N (9.73 mg/L, 3.87 times higher) and TP (0.84 mg/L, 1.1 times higher)
- River bank damaged, riparian vegetation destroyed
- Wetland degraded, soil and water conservation capacity decreased
- Water-conservation-stands (WCS) structure single and simple, ecological functions lost



Solutions

N, P accumulation ability

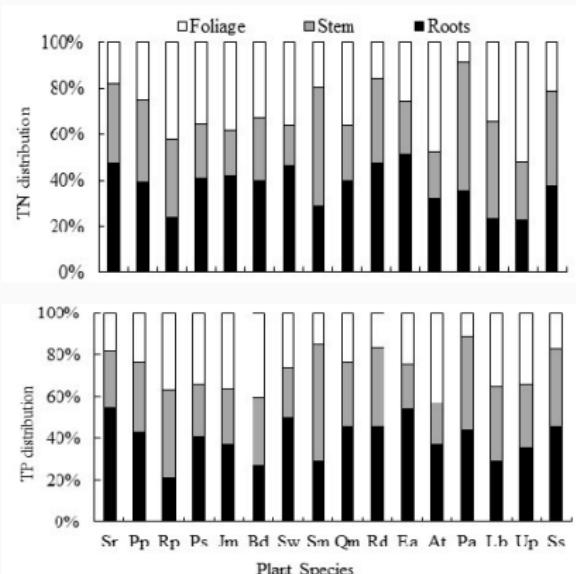
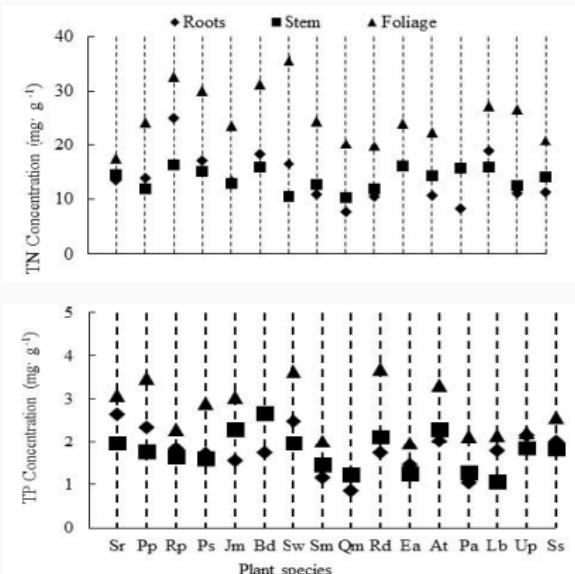


Figure 1: Concentration and distribution of total nitrogen (TP) and total phosphorus (TP) in plants. [3]

Effects of stand structure on species diversity and water-holding capacity

Table 1: Effects of stand structure on species diversity and water-holding capacity

Treatment	Species number						Water storage (t/hm^2)	
	First year			Second year			Total	Non-capillary
	Herb	Shrub	Tree	Herb	Shrub	Tree		
CK	3	7	14	3	7	15	1022	220
Weak	3	7	15	3	8	16	1054	260
Medium	4	8	16	4	8	18	1085	295
Intense	4	8	18	5	10	20	1100	324

Application

Demonstration projects

There were three demonstration projects.

Take home message

The study was successful. But it was expensive.

Questions?



Scan to download the slides

Thanks for listening!

Personal thoughts

Conservation is very complicated. It involves many things and corporation.

References i

-  C. Hambler and M. R. Speight.
Extinction rates and butterflies.
Science, 305(5690):1563–1565, 2004.
-  E. O. Wilson.
The diversity of life.
Cambridge, Mass.: Harvard University, 1992.
-  S. Yu, W. Chen, X. He, Z. Liu, and Y. Huang.
Biomass accumulation and nutrient uptake of 16 riparian woody plant species in northeast china.
Journal of forestry research, 25(4):773–778, 2014.