

CHINA
EUROPE

Water Platform

**Xuzhou International Forum on
Green Urban Development
10th to 12th of June 2019**

**Ecological
Restoration and
Rehabilitation:
Standards and Case
Studies**

FROM EUROPE AND CHINA

Mendes A; Fabião A; Jihanua L; Zhang A; Xu F;
Baiyinbaoligao; Ferreira T; Rabaça J



**REPÚBLICA
PORTUGUESA**
ENVIRONMENT



Summary of contents

Global and Regional policy drivers of restoration

Drivers of restoration in Europe

Drivers of restoration in China

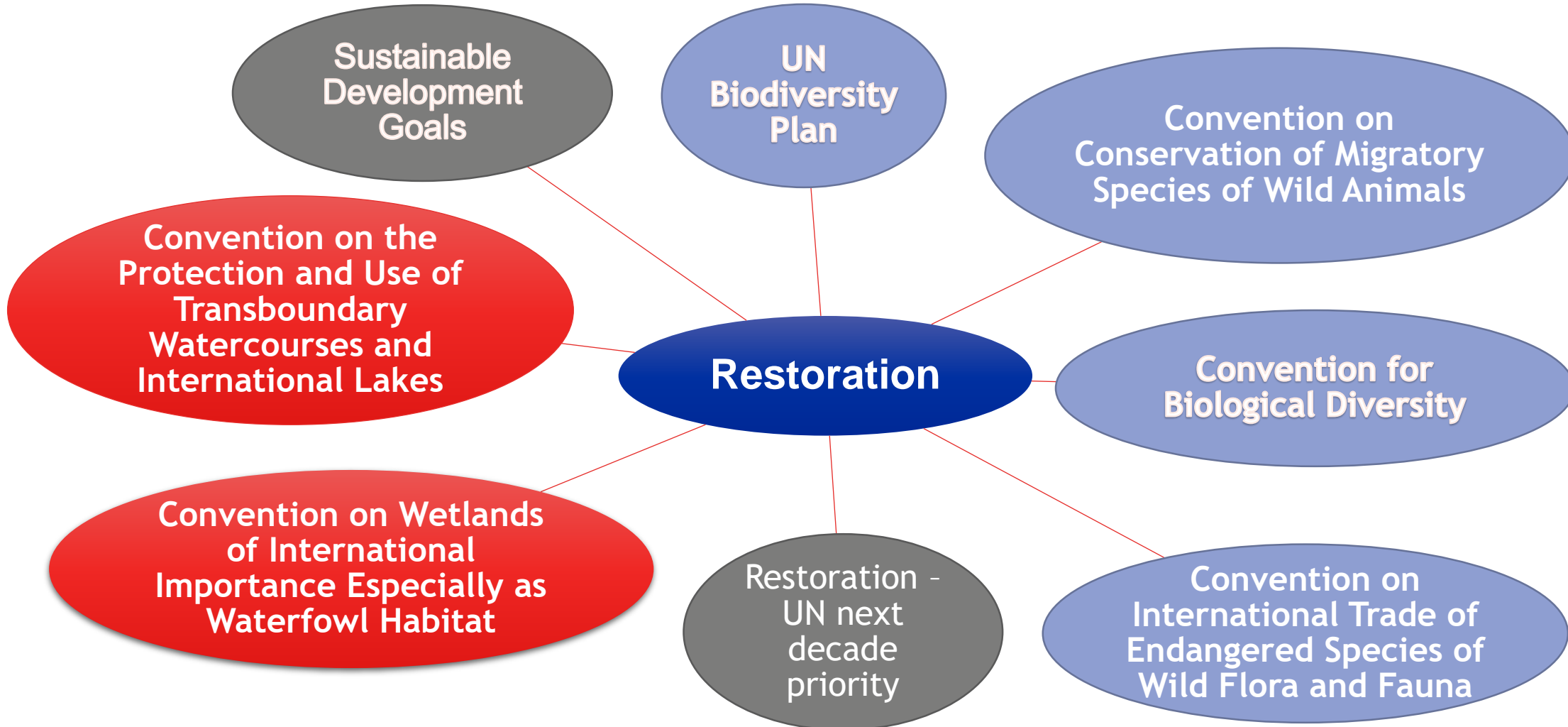
International definitions of restorations practices

Definitions of restoration practices in Europe

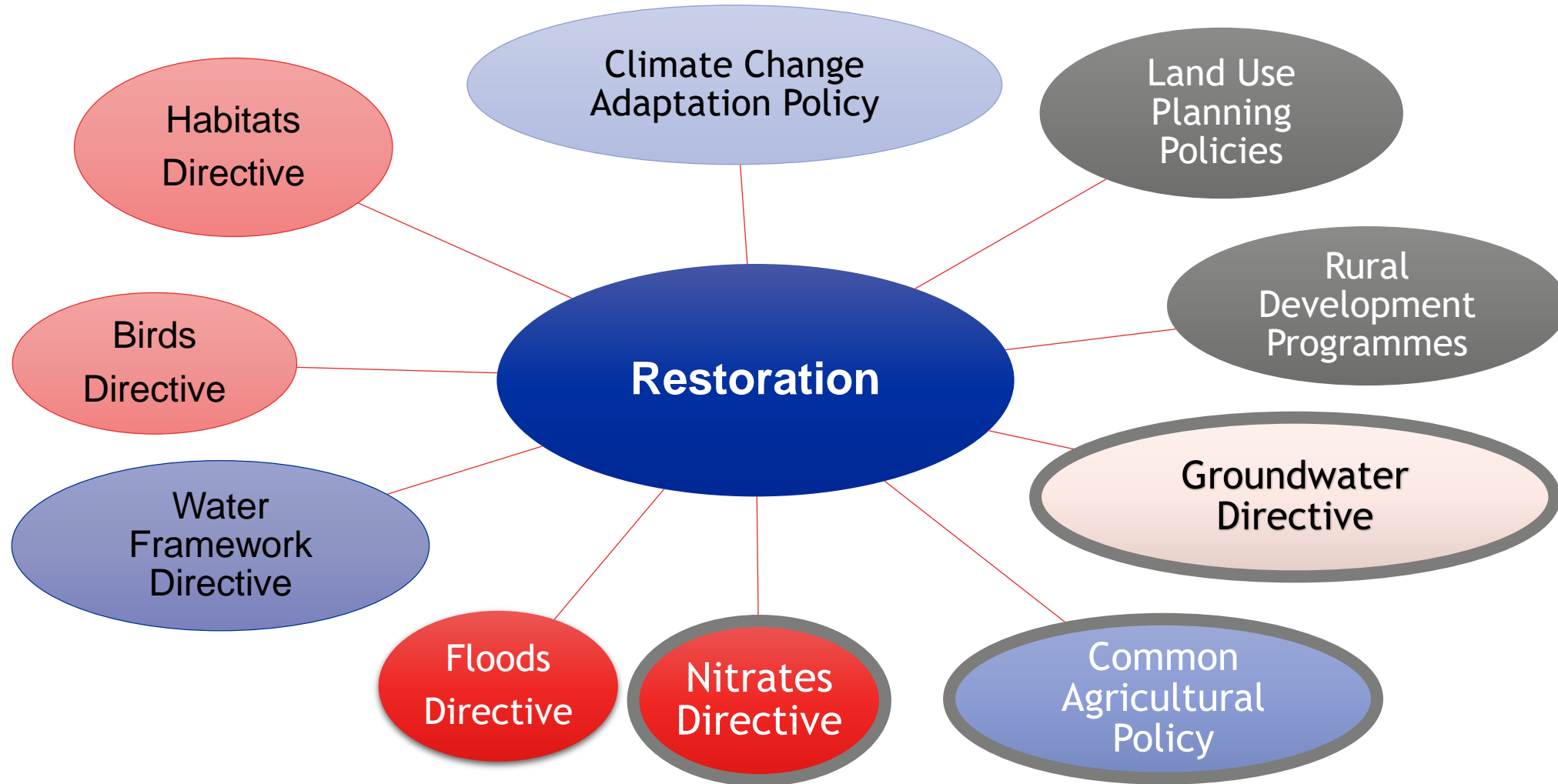
Case Studies

On-line inquiry - results and future work

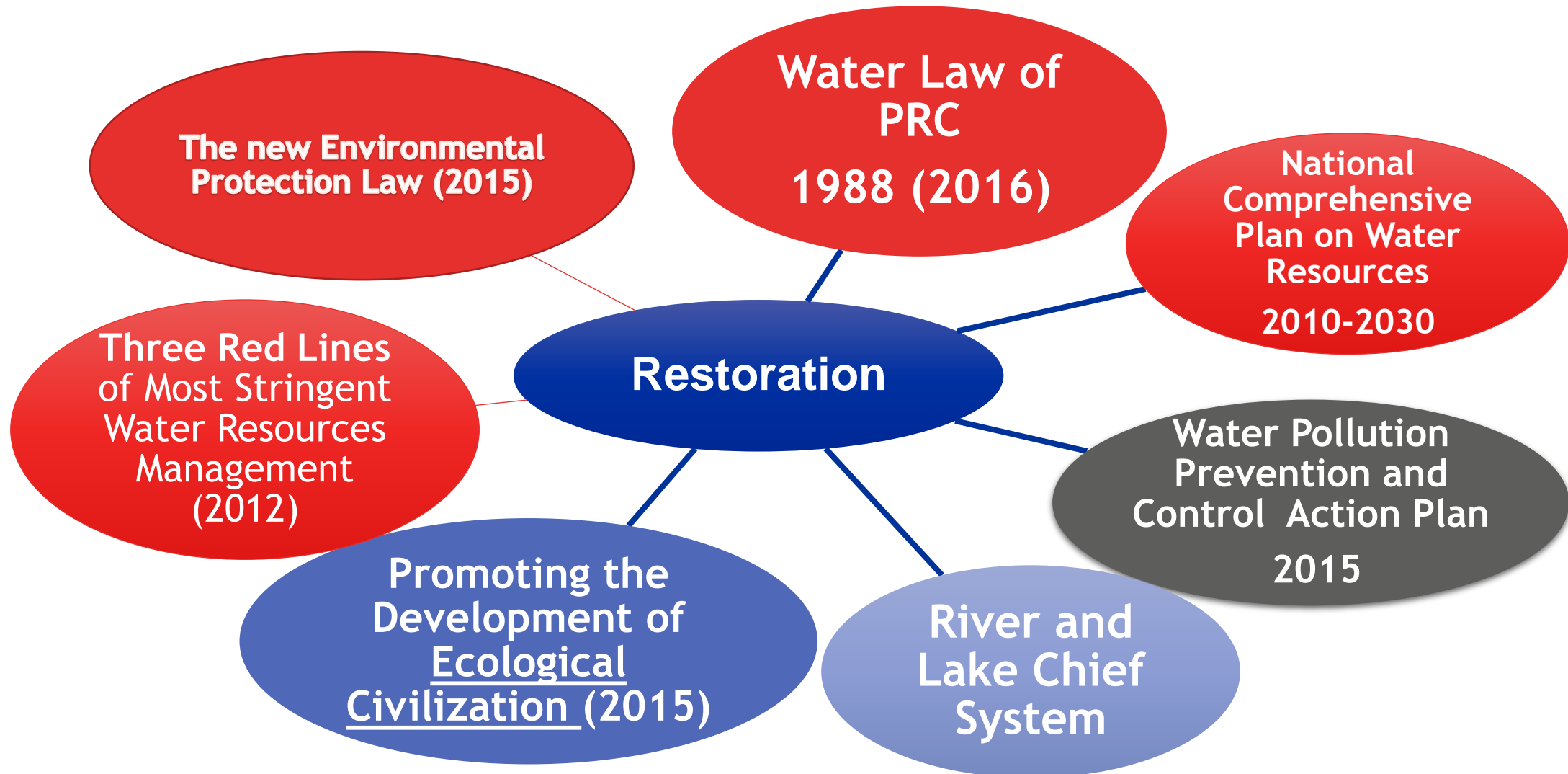
Global and Regional Policy Drivers of Restoration



Drivers of Restoration in Europe



Drivers of Restoration in China



International definitions of restorations practices



INTERNATIONAL STANDARDS FOR THE PRACTICE OF
ECOLOGICAL RESTORATION – INCLUDING PRINCIPLES
AND KEY CONCEPTS

FIRST EDITION December

Tein McDonald George D Gann Justin Jonson
Kingsley W Dixon



SER in collaboration with SER Australasia

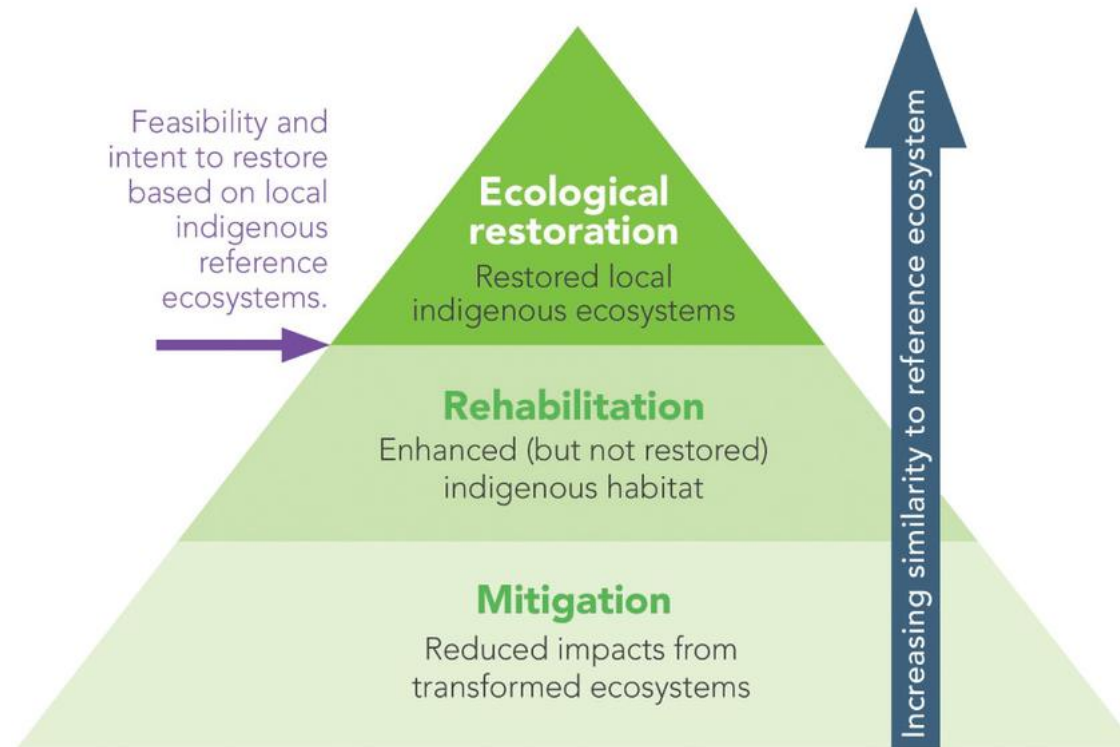
“Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed” (Society for Ecological Restoration, 2004)

McDonald, T., Gann, G.D., Jonson, J., Dixon, K.W.
2016. *International Standards for the Practice of Ecological Restoration - Including Principles and Key Concepts*. First Edition. Society for Ecological Restoration, Washington D.C.

Free download at:
<http://www.ser.org/?page=SERStandards>

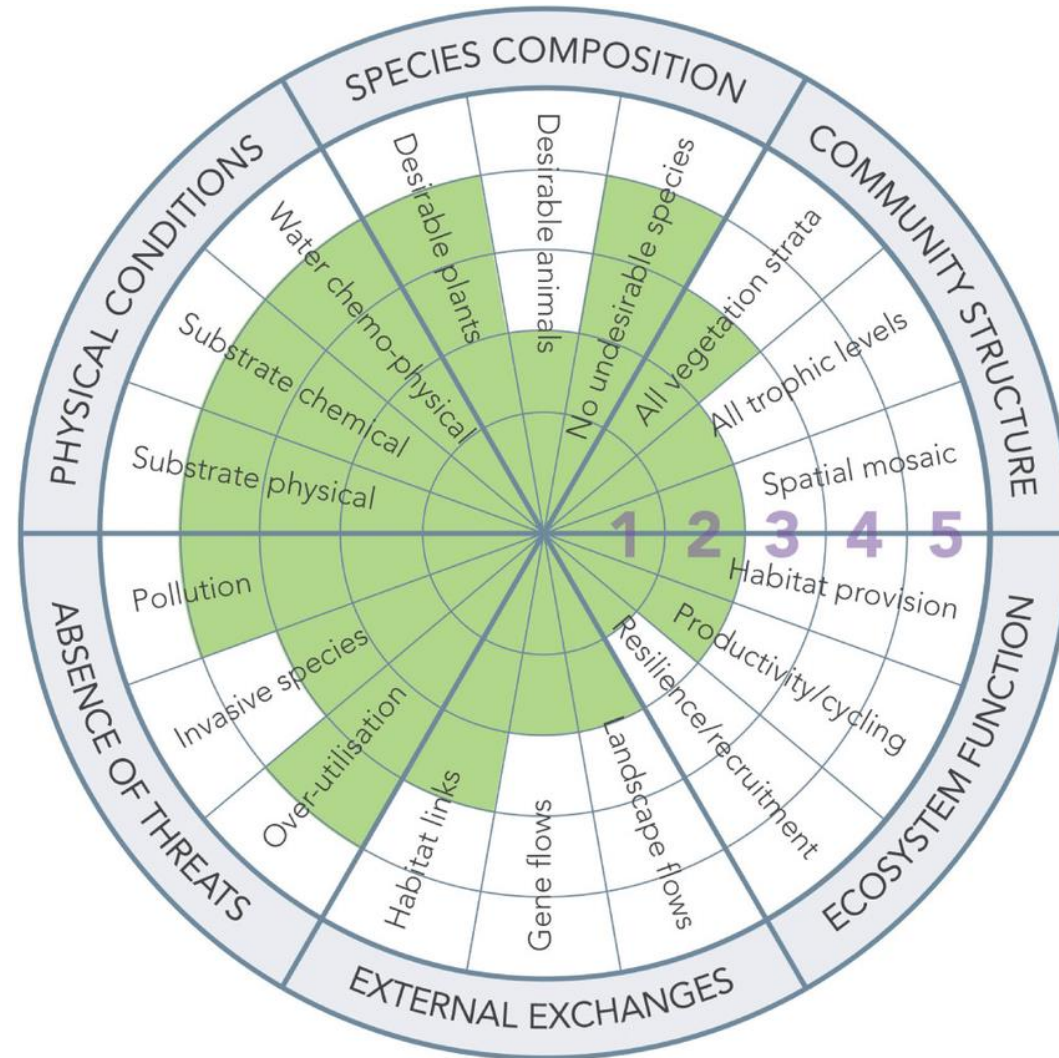
SER standards consider 3 levels of ecological restoration:

- Full recovery: key ecosystem attributes similar to those of the reference ecosystem.
- Partial recovery: ecosystem attributes have improved but do not closely resemble those of the reference ecosystem.
- Ecosystem maintenance: activities applied after full recovery to stop processes of ecological degradation.



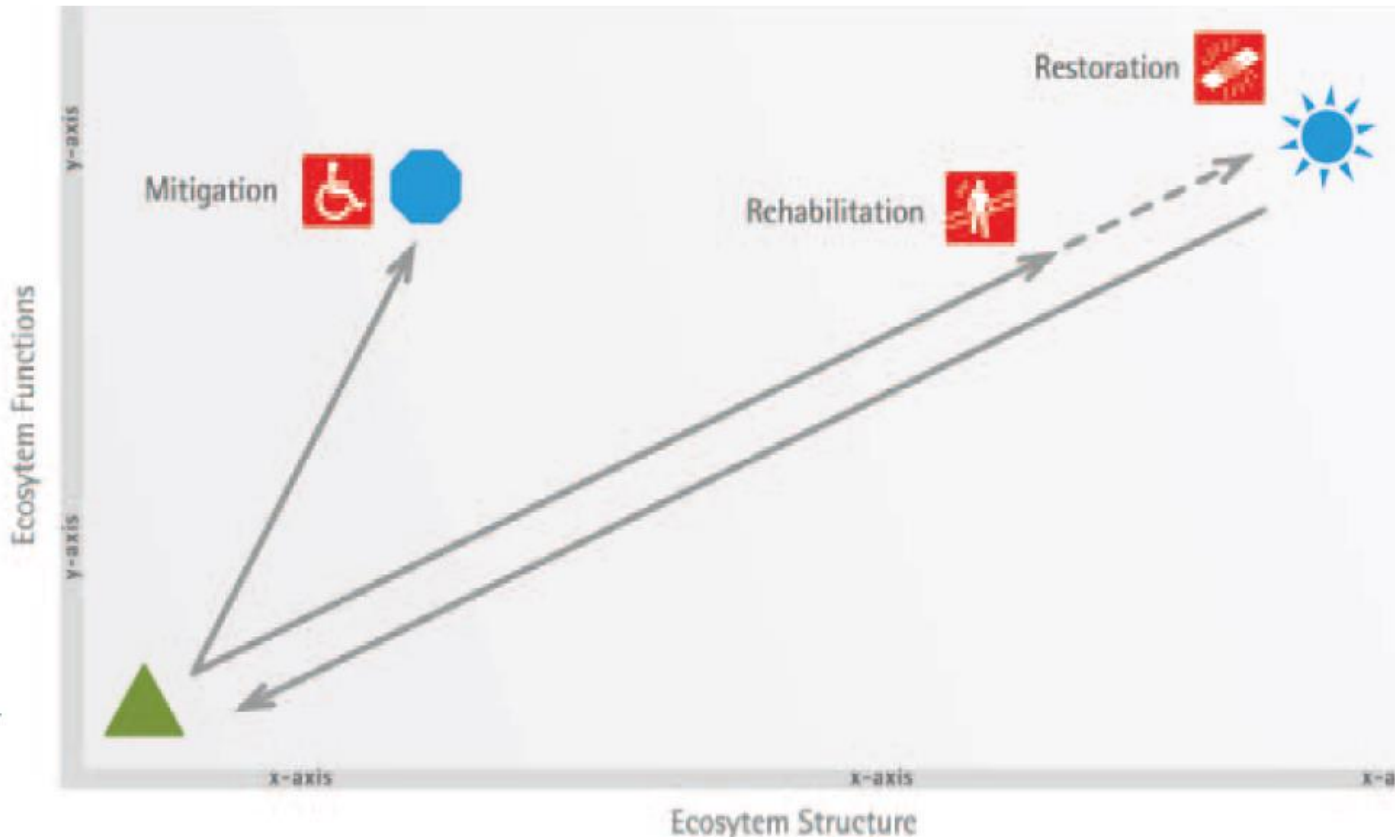
SER Five star classification system helps to track progress towards project goals over time. It uses six key ecosystem attributes to measure progress towards full restoration:

- Species composition
- Structural diversity (=Community structure)
- Ecosystem function
- External Exchanges
- Absence of threats
- Physical conditions



Source: McDonald, T., Jonson, J., Dixon, K.W. 2016. National standards for the practice of ecological restoration in Australia. *Restoration Ecology* 24:S4-S32. DOI: 10.1111/rec.12359

Definitions of Restoration in Europe



- **Restore**: to recover the natural composition, structure, processes and functions of a river, thereby allowing it to once again achieve full integrity and preserve its self-regulated dynamic balance
- **Rehabilitate**: to recover the composition, structure, processes and functions that are as close as possible to the river's natural conditions (reference scenario...)
- **Mitigate**: to achieve a status that is significantly different from river's natural state, but reaches a compromise with the inevitable limitations which the river is subjected.

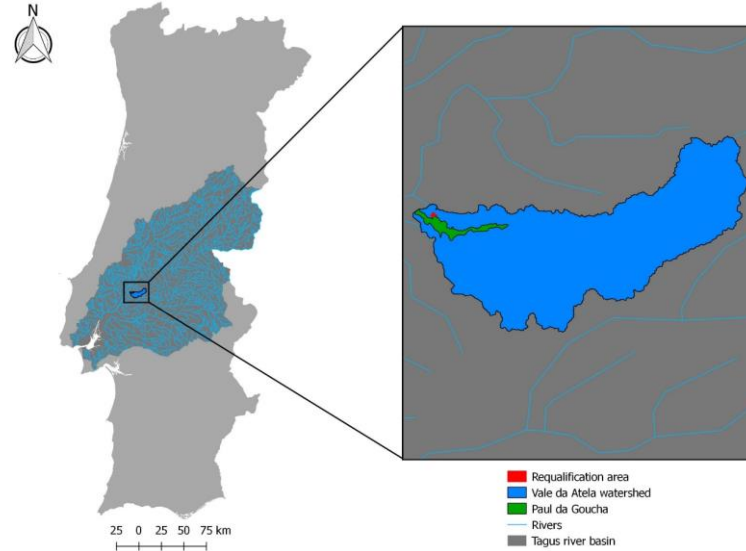
CASE STUDY – PAUL DA GOUCHA, PORTUGAL

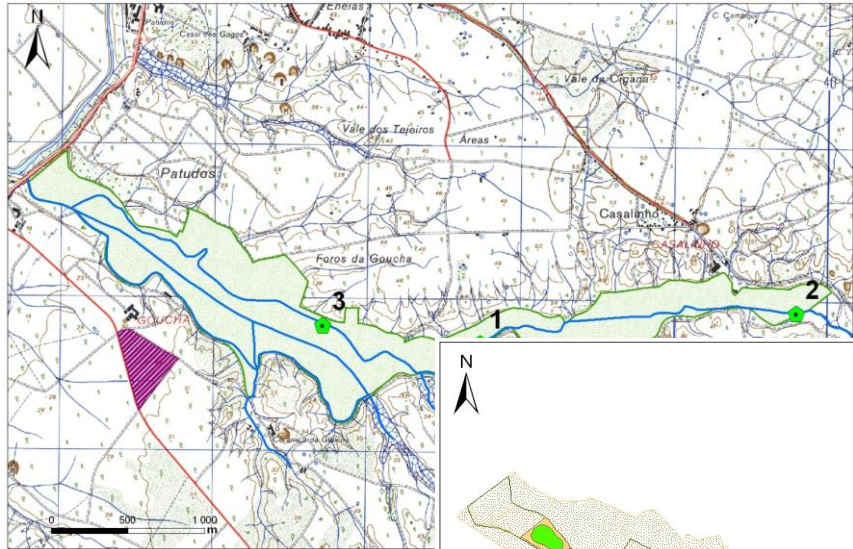
ENVIRONMENTAL
REHABILITATION

TRIGGER / IMPROVE
NATURAL RIPARIAN
VEGETATION
COLONIZATION

REHABILITATE THE
FEEDING, NESTING
AND RESTING AREA
FOR BIRDS

ENVIRONMENTAL
EDUCATION





Q-LOGOS

LABORATÓRIO DE
ANÁLISES, VIBRATÓRIOS,
E GEOTÉCNICAS
E GEOLÓGICAS

Farmácia do Vale do Tejo, Rua José Dias Simão
Alameda, 2205-922 Alameda
T: 241 373267, F: 241 373164
E: a@qlogos.com.pt
www.qlogos.com.pt

Cliente:
Município de Alpiarça
Rua José Rebelo, nº 374
2094-909 Alpiarça

Relatório de Ensaio Nr: 782

Tipologia de amostra: Águas de consumo humano
Código: Lagan (unio à antiga "Ponteira Hillário")
Zona de Abastecimento: Alpiarça
Código por Cliente:
Relatório ID: 500717 / 5003724

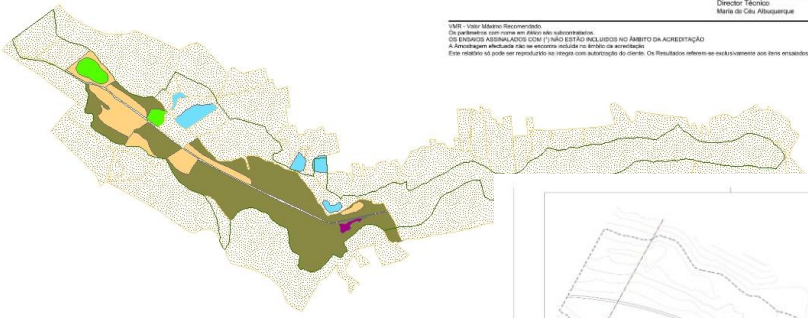
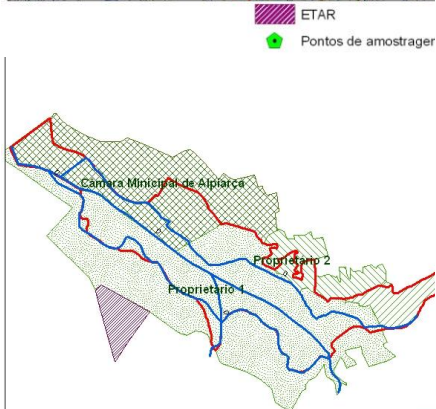
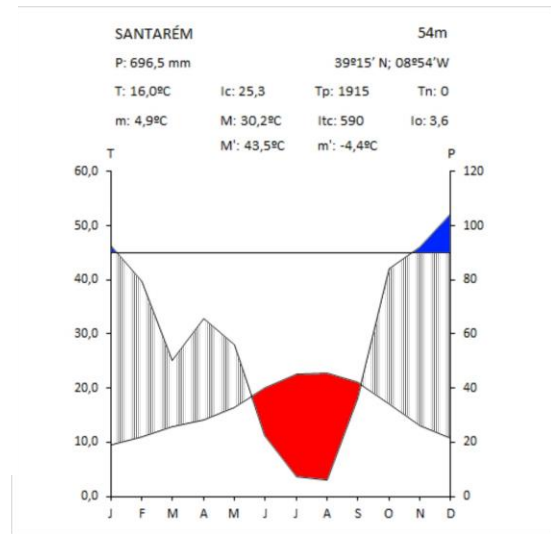
Versão: 1.0 Pág 1 de 1

Ensaio	Resultado	Unidade	Limite Lei	VMR
Amónio *	<1(L)	µg/L As	10	---
Arseniureto (PT12 13)	<0,5(L)	µg/L	5,0	---
Cádmio *	1,2e+2	µg/L Fe	200	---
Chumbo *	4,2e+1	mg/L Ca	---	---
Cloreto (PT12 13)	<2(L)	µg/L	25	---
Cromo *	3	µg/L Cr	2,0	---
Cobalto *	<0,5(L)	µg/L	50	---
Copérol *	22	mg/L Mg	---	---
Copérol *	16	µg/L Mn	50	---
Copérol *	<2(L)	µg/L	20	---
Copérol *	9,0	---	---	---
Copérol *	66	mg/L	200	---
Copérol *	<4(L)	mg/L	---	---

Nota:
Os resultados analisados cumprem os valores paramétricos do Decreto Lei 243/2001

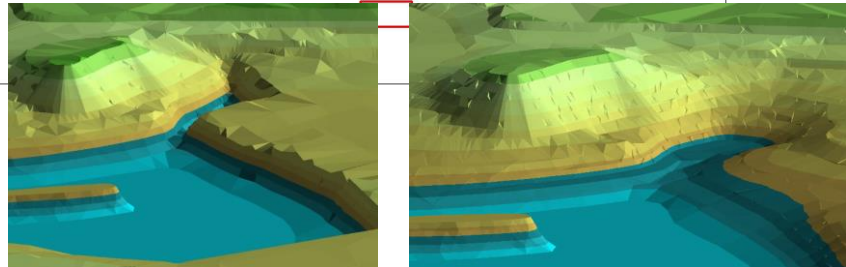
NOTA: Este relatório foi elaborado em conformidade com o Decreto Lei 243/2001. Os resultados obtidos são exclusivamente para fins de informação e não devem ser utilizados para fins de decisão legal. A responsabilidade pela interpretação dos resultados cabe ao utilizador. Este relatório não pode ser reproduzido ou copiado sem autorização da Q-Logos. Os resultados obtidos são exclusivamente para fins de informação.

Maria do Céu Albuquerque
A-Logos
Direção Técnica
Maria do Céu Albuquerque



- Zona Proposta para Classificação
- Outra
- Myriophyllum aquaticum
- Phragmites australis
- Salix atrocinera

- ETAR
- Rede Hidrográfica activa



Case Study - Alpiarça - Portugal

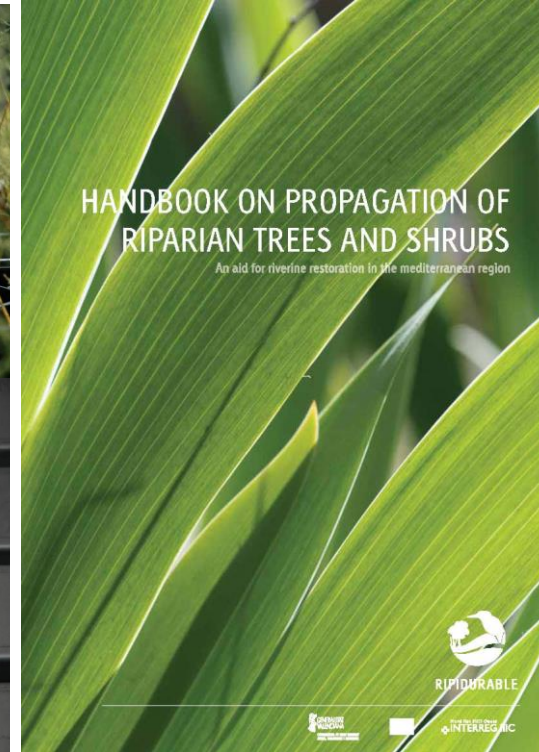
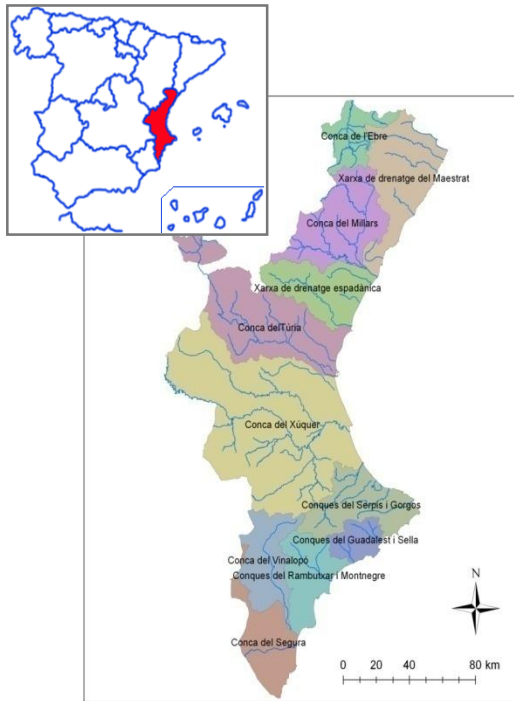


Developed activities - Direct Cost: 44 893€



Native Plant Propagation

The lack of suitable plant material from the same geographic region for pilot restoration projects was addressed

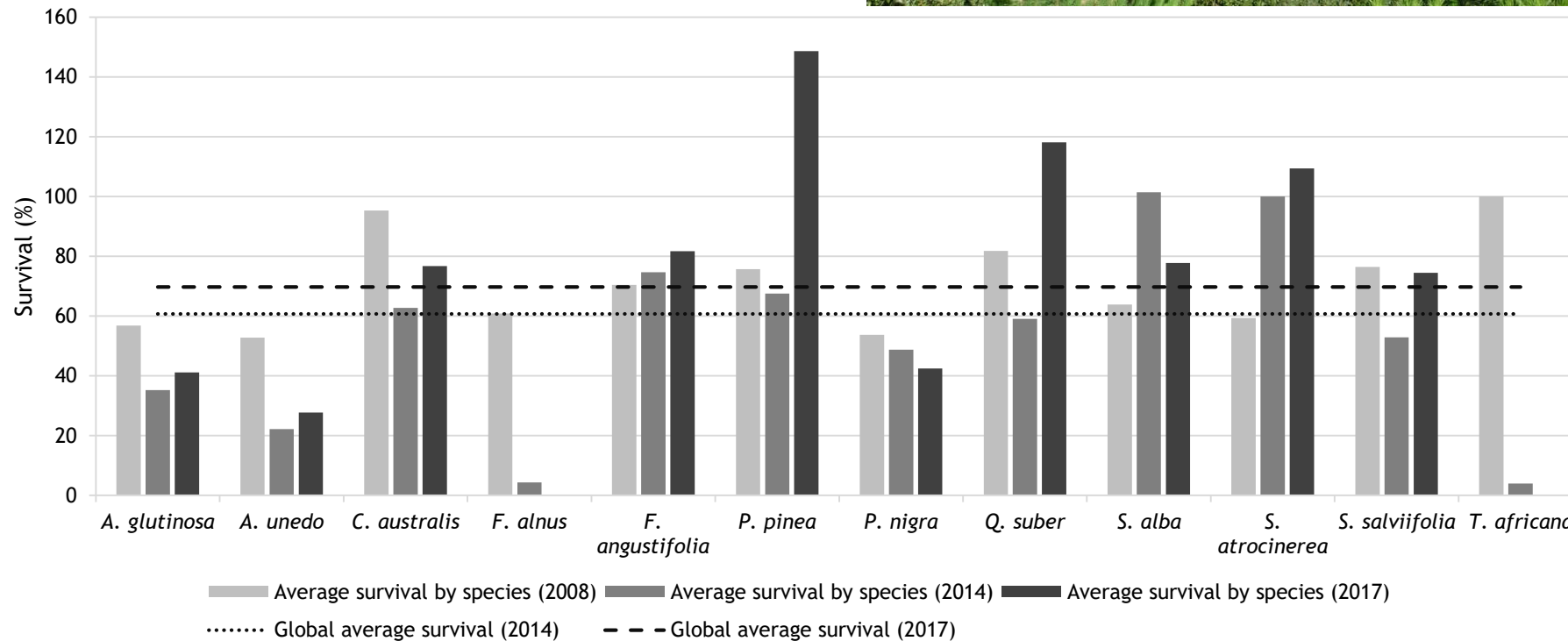


February 2008



MONITORING

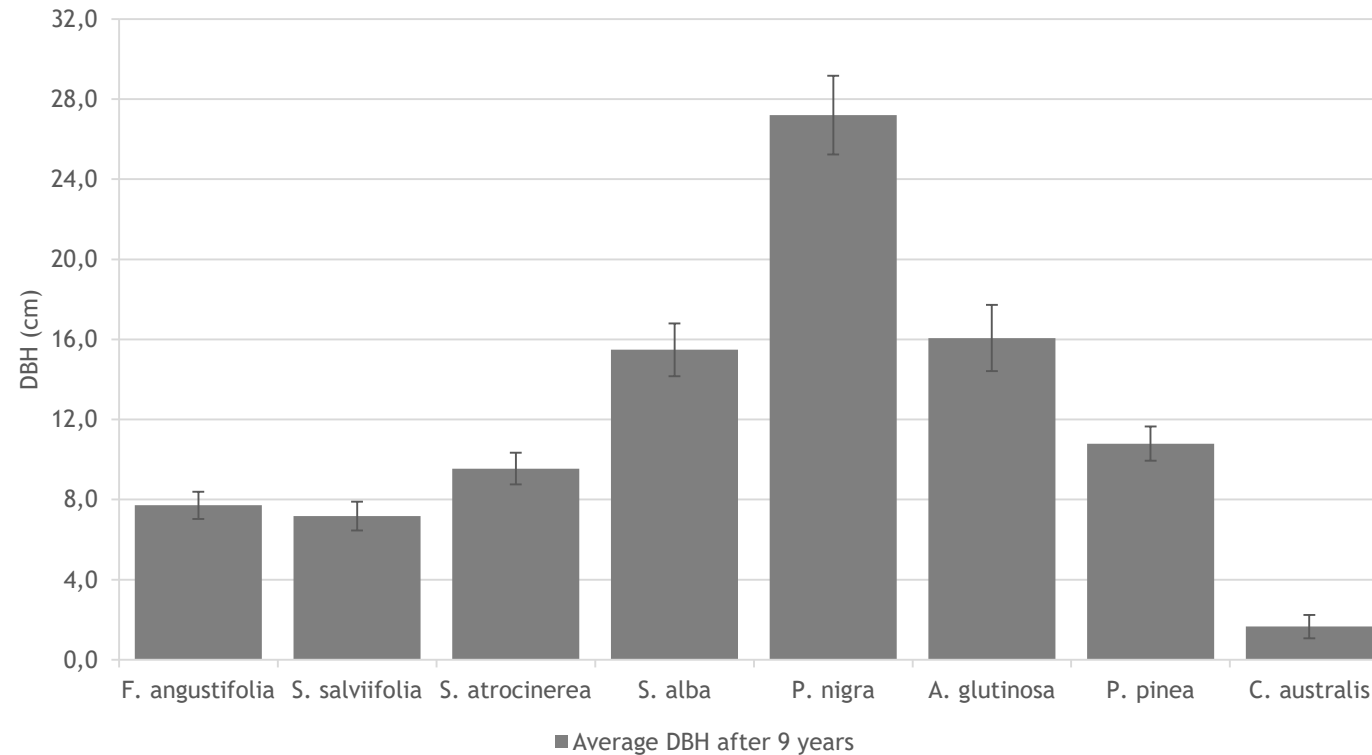
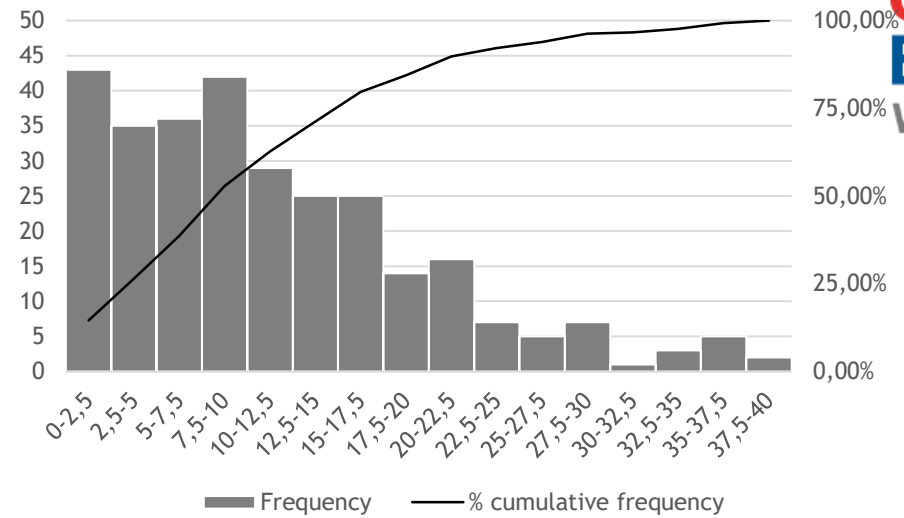
- Global average survival after 9 years was 70% (stolen plants were recorded, but counted as dead).
- About 7% of the plants were stolen with *Populus nigra* (23% of the plants stolen) and *Arbutus unedo* (17% stolen) being the most attractive for robbers.










MONITORING

- Most of the highest values observed 9 years after planting account for natural regeneration from the seed bank and adjacent reproductive tree sources.
- *Populus nigra* presented the highest average DBH (27.2 ± 2.0 cm), followed by *Alnus glutinosa* (16.1 ± 1.7 cm) and *Salix alba* (15.5 ± 1.3 cm).

Frequency histogram with DBH class distribution 9 years after plantation



Bioengineering Techniques

-  Plantation of yellow iris (*Iris pseudacorus*) rizhomes (>15x)
-  Live fascines (3x)
-  Wattle fences(2x)
-  Brush mattresses (1x)
-  Live cuttings combined with geotextile reinforced earth (1x)
-  Planted coconut fiber rolls (4x)
-  Vegetated log cribwall (1x)

Live fascines



Live fascines

After 6 months (October 2008)



After 41 months (September 2011)



Wattle fences



Photo: Cândida Rato

Wattle fences

After 15 months (May 2009)



After 41 months (September 2011)

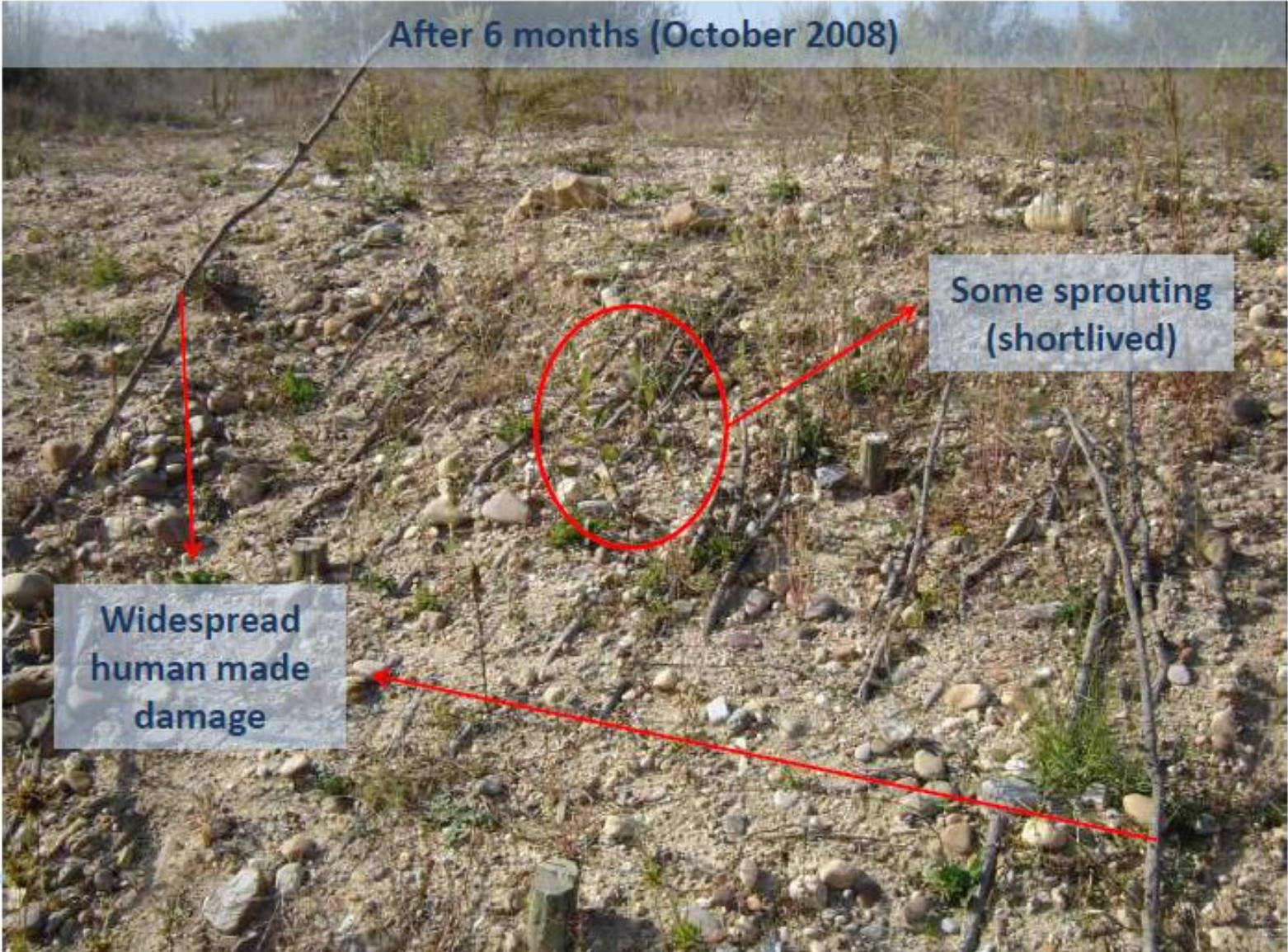


Brush mattresses



Photo: Cândida Rato

Brush mattresses



Planted coconut fiber rolls



Planted coconut fiber rolls

After 6 months (October 2008)



After 15 months (May 2009)



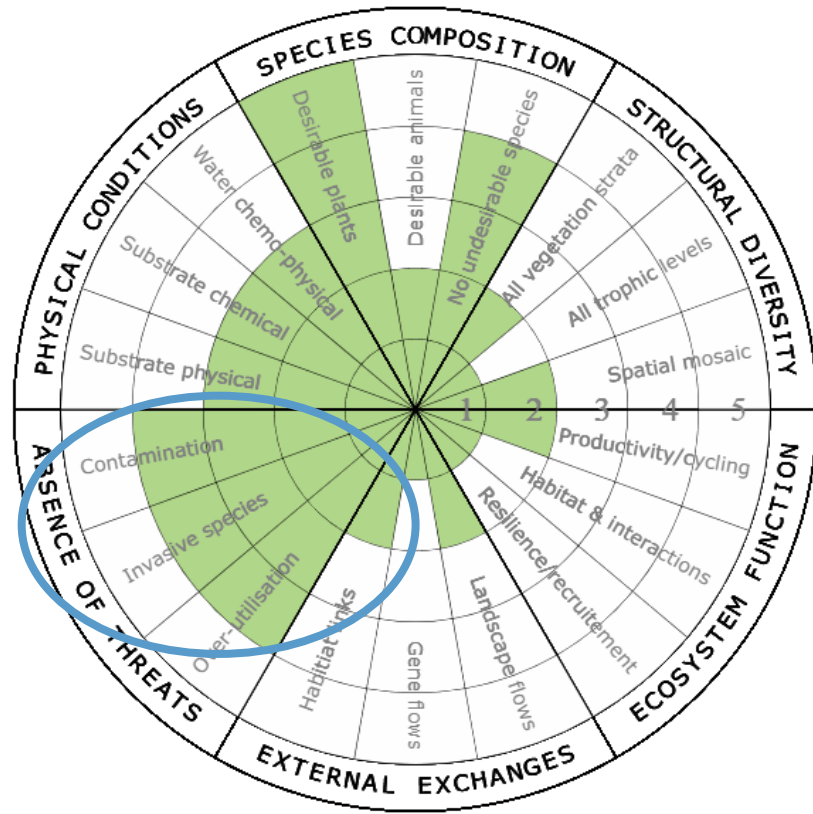
MONITORING - SOIL BIOENGINEERING

- Poles and live cuttings of *Salix atrocinerea* collected on the undisturbed sections of the Paul da Goucha
- Variable success, related mainly to the proximity to water and the use of live cuttings instead of rooted plants in the driest locations.

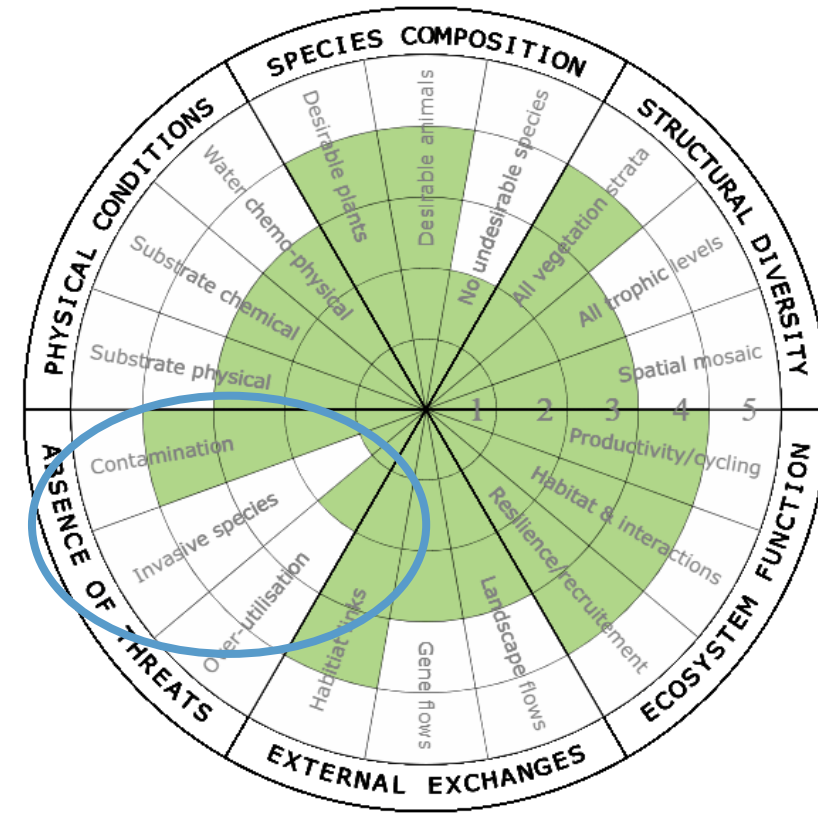


A, B e C: Cribwall
D: Brush mattress
E: planted coconut fiber rolls
F: Wattle fences
G: Live fascines

2008, after 6 months



2017, after 9 years



Adjacent threats being managed or mitigated and very low threat from undesirable species onsite. A moderate subset of characteristic native species are established and some evidence of ecosystem functionality commencing. Improved connectivity in evidence.



FEBRUARY 2008



SEPTEMBER 2011



AUGUST 2014

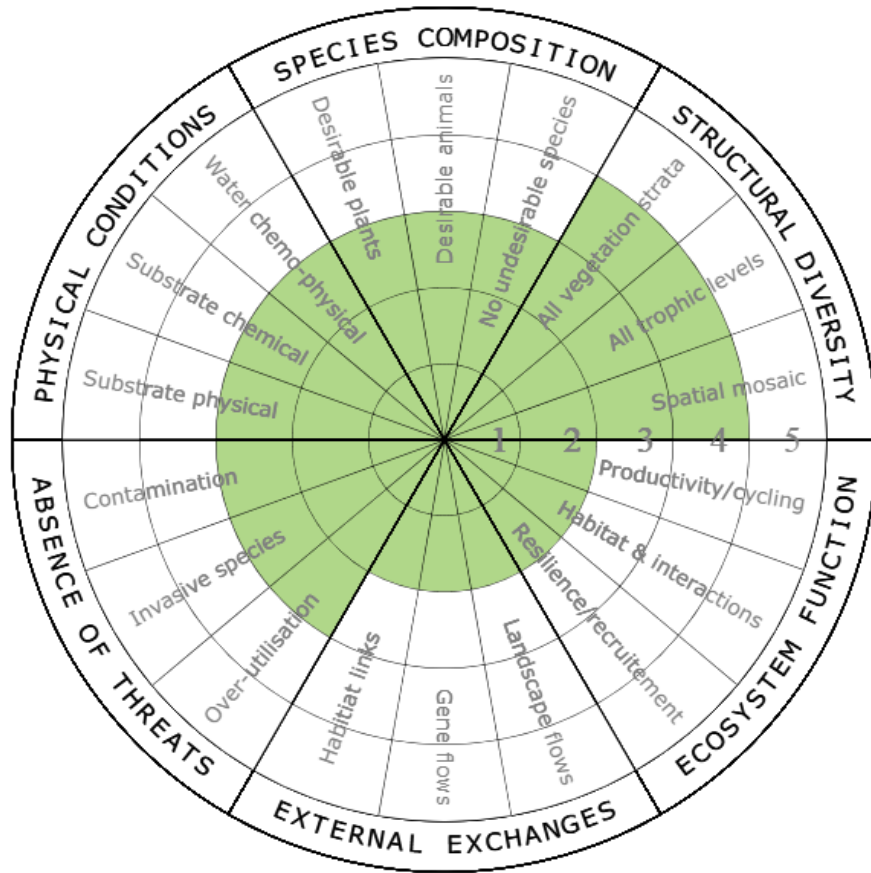
中欧水平台环境修复项目问卷调研 CEWP Restoration projects inquiry



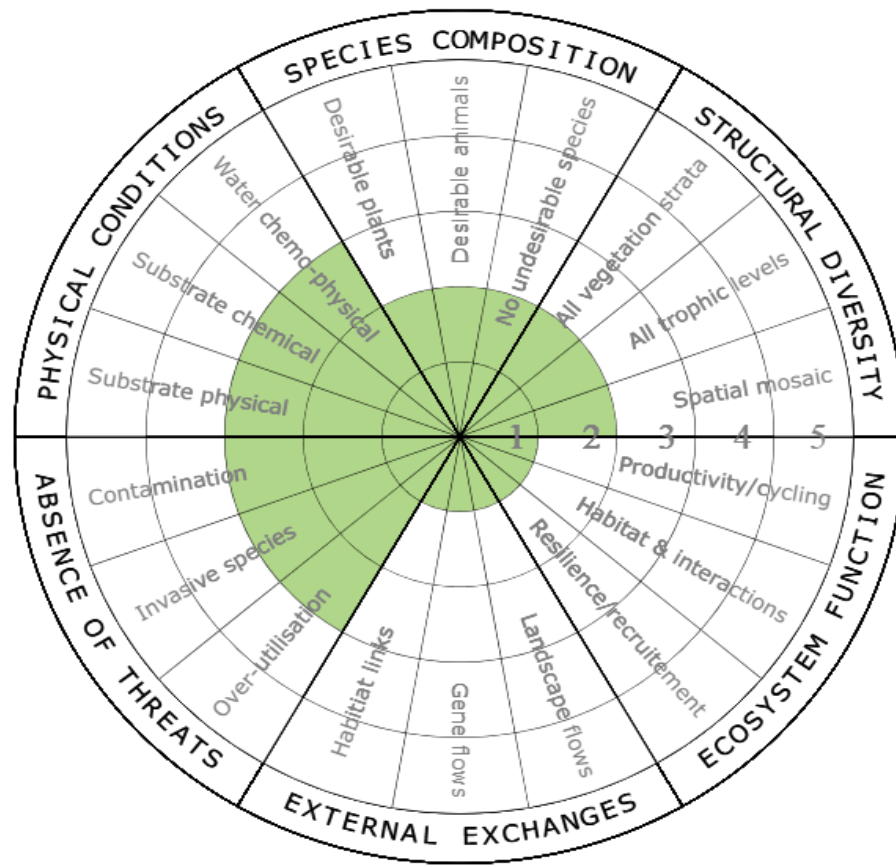
<https://pt.surveymonkey.com/r/8XYGB36>

In the context of China Europe Water Platform, the University of Évora, the China Institute of Water Resources and Hydro-power Research and Tongji University are promoting an **on-line inquiry to make an evaluation of restoration projects developed in Europe and China, with the objective of contributing to increase restoration standards.** By answering to this questionnaire, you will be contributing to a policy study that wishes to give support to European and Chinese policy makers on the most appropriate restoration standards to use when developing this type of project. The inquiry is targeted to restoration projects implemented in freshwater ecosystems.

Impact of policy on restoration projects



Europe



China

3 Star

Absence of Threats
Physical Conditions
Species composition

4 Star

Strutural
composition

2 Star

Ecosystem function
External Exchanges

3 Star

Absence of Threats
Physical Conditions

2 Star

Species composition
Strutural Diversity

1 Star

Ecosystem function
External Exchanges

Thank you!

www.cewp.eu



Twitter @ChinaEUwater

谢谢!

www.cewp.eu



Twitter @ChinaEUwater



<https://pt.surveymonkey.com/r/8XYGB36>



aimendes@uevora.pt

University of Évora
Portugal
PhD, Professor