Integrative Management of Green Infrastructures Multifunctionality, Ecosystem integrity and Ecosystem Services

IMAGINE

Philip K. ROCHE (IRSTEA, FR, Coordinator)

Funded projects final conference, 12-13 November 2019, Brussels

BiodivERsA COFUND Call (2015-2016)

« Understanding and managing biodiversity dynamics to improve ecosystem functioning and delivery of ecosystem services in a global change context: the cases of soils and sediments, and land- river and sea-scapes »


CONSORTIUM DESCRIPTION

IMAGINE Consortium: 6 partners from 5 countries

Partner 1 (coordinator): Dr. P. Roche, Irstea, France funded by ANR

- *Coordination, connectivity, ecosystem services and ecosystem integrity*
- *4 researchers, 1 PhD, 1 Post-Doc, 1 Engineer*

Partner 2 : Pr. M. Külvik, EMU, Estonia funded by ANR via Irstea

- *Stakeholder analysis and dissemination*
- *3 researchers*

Partner 3 : Dr. G. de Blust, INBO, Belgium funded by

- *GI attributes and vulnerabiliy, stakeholders and policy analysis*
- *4 researchers*

Partner 4: Pr. Dr. D. Hummel, ISOE, Germany funded by

- *Societal demand and stakeholders analysis*
- *2 researchers, 1 PhD*

Partner 5: Pr. Dr. T. Diekötter, Kiel Uni., Germany funded by

- *Biological functions and ecosystem services*
- *1 researcher, 1 PhD*

Partner 6: Dr. R. May, NINA, Norway funded by

- *Integrative modelling*
- *4 researchers*

irstea

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EMU Estonian University of Life Sciences

INSTITUUT
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Institute for
Social-Ecological
Research

NINA
Norwegian Institute for Nature Research


PROJECT DESCRIPTION

IMAGINE
BIODIVERSA 3

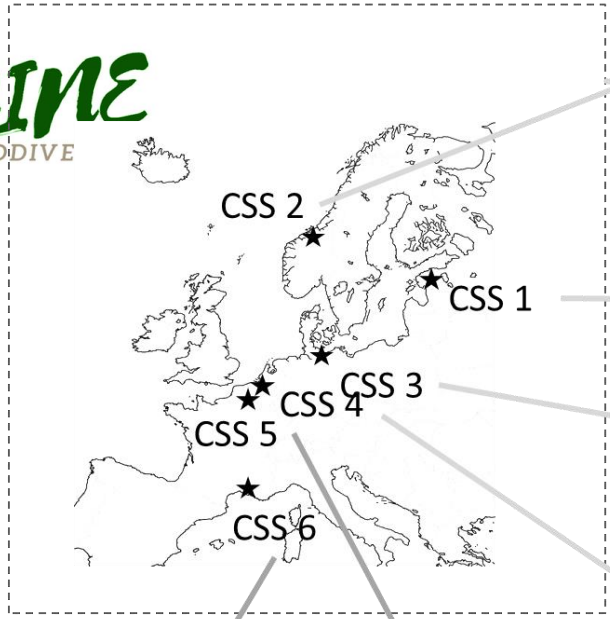
quantifying the multiple functions, ecosystem services and benefits provided by Green Infrastructures

- ***Ecosystem integrity*** *assessment and mapping*
- ***Ecosystem services and disservices*** *assessment and mapping*
- ***Species connectivity modelling***
- ***Stakeholder analysis, societal demand and policy conflicts***
- ***Integrated modelling*** *(BBN and muticriteria modelling)*

- ***CSS Contact Stakeholders*** *consulted at all stage of project*

PROJECT DESCRIPTION


IMAGINE BIODIVE



Trondheim Region

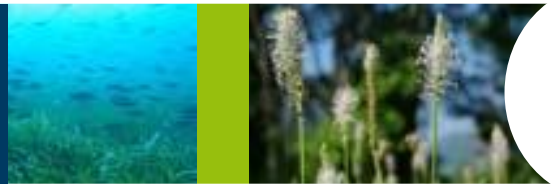
Tallinn Hinterland

Bornhöved Lake District

Grote Nete & Molse Nete

Scarpe Escaut Regional Park

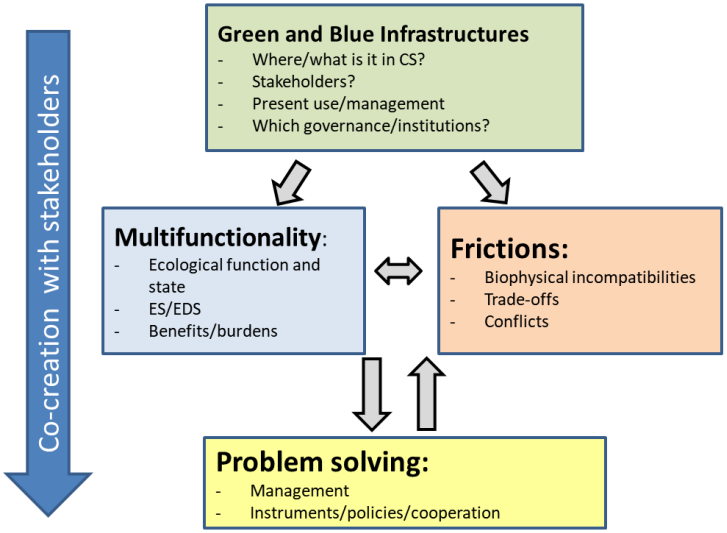
Thau lagoon Area



PROJECT DESCRIPTION

IMAGINE aims at quantifying the multiple functions, ecosys-tem services and benefits provided by Green Infrastructures

Operational framework



Case study sites

1. Tallinn City Hinterland ~ 4500 km^2
2. Trondheim Region ~ 1000 km^2
3. Bornhöved Lake District ~ 60 km^2
4. Grote Nete & Molse Nete ~ 180 km^2
5. PNR de Scarpe-Escaut ~ 800 km^2
6. SMBT Etang de Thau ~ 600 km^2

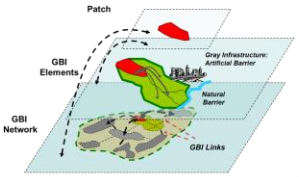
SCIENTIFIC OUTPUTS

Biophysical Side

Societal and Stakeholder analysis

Integrated modelling

Multiscale approach of GBI element condition and management from patch to landscape

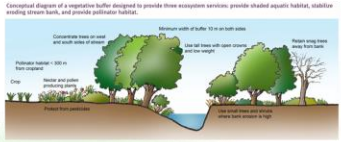


Habitat level Management and restoration

Interaction between GBI and Gray Infrastructure

Assessing the structural and functional connectivity of GBI

Managing GBI for ecological multifunctionality and multiple ES delivery



IMAGINE OPERATIONAL FRAMEWORK

GI:
- Where/what is it in CS?
- Stakeholders?
- Present use/management
- Which governance/institutions?

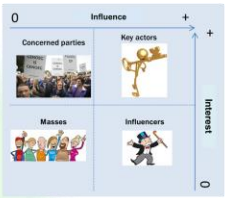
Multifunctionality:
- Ecological
- ES/DES
- Benefits/burdens

Frictions:
- Biophysical incompatibilities
- Trade-offs
- Conflicts

Problem solving:
- Management
- Instruments/policies/cooperation

Co-creation with stakeholders

Governance, Regulation and Stakeholders analysis

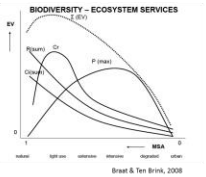


Analyze in each of the case study sites, the power-influence interactions of stakeholders

Engage demand, uses and involvement of local stakeholders

Identify conflicts and frictions at institutional and users levels

Linking Ecosystem Service delivery to Ecosystem Integrity of GBI elements and GBI Networks.

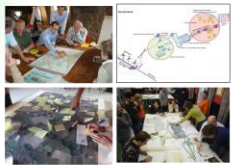


Braat & Ten Brink, 2008

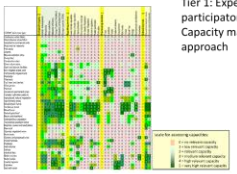
The quantity of ES capacity in non linearly linked to ecosystem integrity

Define and quantify a core set of ecosystem integrity indicators to support GBI analysis

Participatory Spatial Mapping



A Tiered approach of Ecosystem Services and Disservices capactity

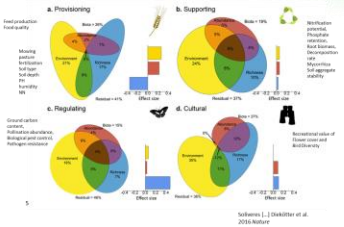


Burkhard et al. 2012 Ecol. Indic.

Tier 1: Expert based participatory ES Capacity matrix approach

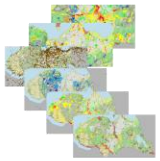
Tier 2: Observation and Statistical Assessment

Tier 3: ES and EDisS modelling

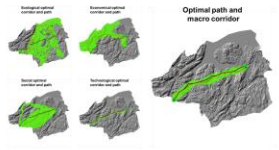


Solivares [...] Diekötter et al. 2016 Nature

Bayesian Belief Network



Multi-Criteria Land Use Planning

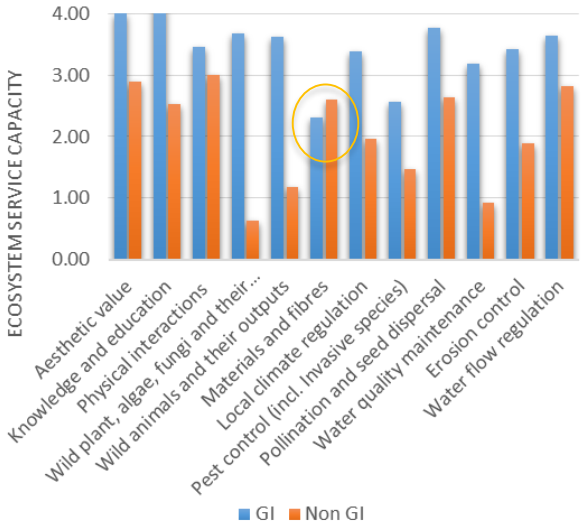


SCIENTIFIC OUTPUTS

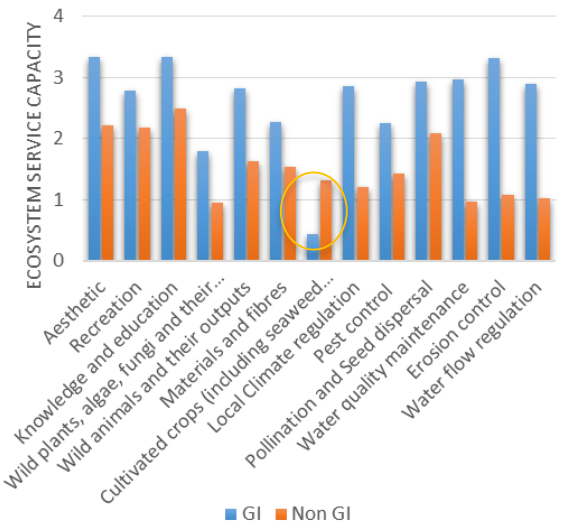
GI Elements have a higher capacity for all the ES considered excepted «Food production»

Between 1.5 and 2 times more ES capacity in GI Elements

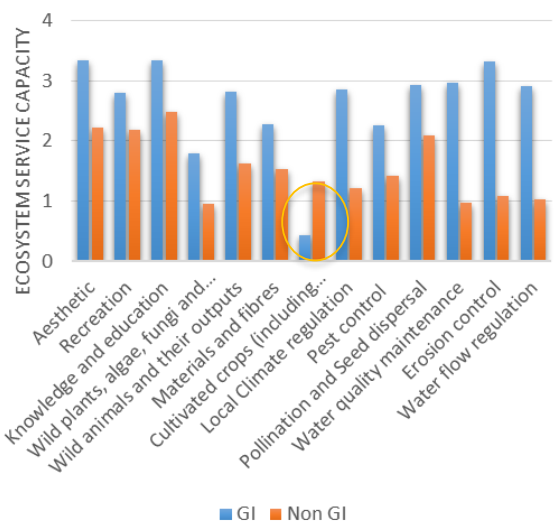
Trondheim, NO



Grote Nete, BE

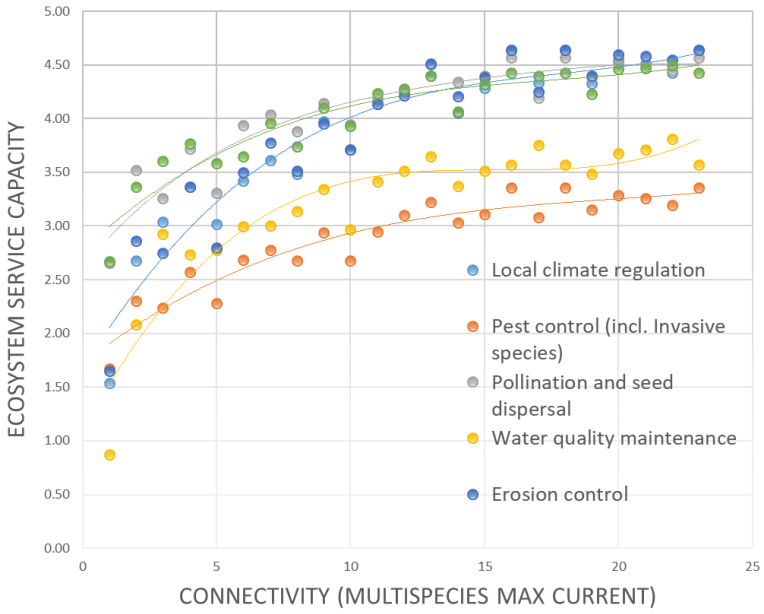


Scarpe Escaut, FR



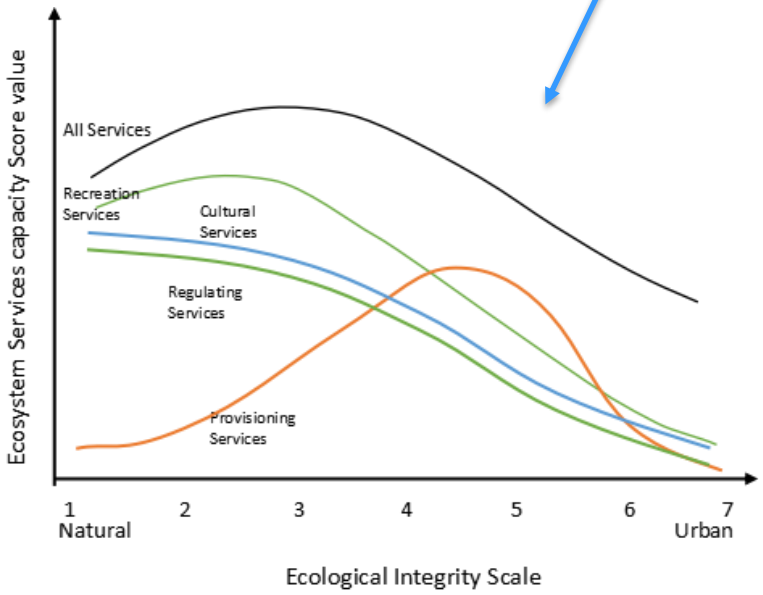

SCIENTIFIC OUTPUTS

ES Capacity is related to GI elements species connectivity



Based on IMAGINE assessments

ES Capacity is related to GI elements ecological integrity



Based on IMAGINE assessments


SCIENTIFIC OUTPUTS

- GI and more generally natural and semi-natural elements of Landscape are multifunctional
- Multi-species connectivity is positively associated with Ecosystem Service Capacity
- GI elements with the highest connectivity are also those having the highest ES Capacity

- 5 scientific papers published + 3 in-prep
- 5 presentations in conference (ESP, IALE, Alter-NET)
- 6 Imagine Cookbooks (Guidelines for methods)

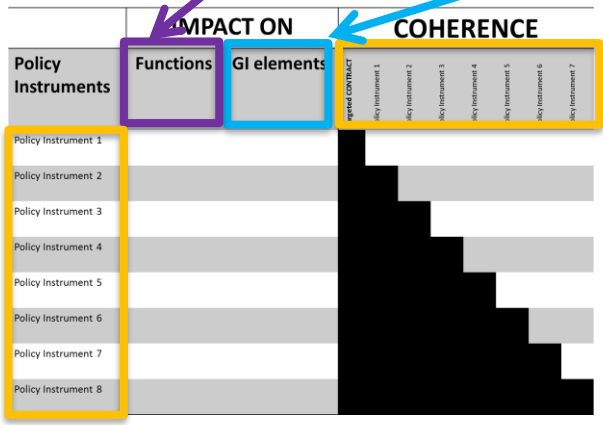
- 6 meetings in Case Study Sites with local stakeholders (last meeting April 2020)

SCIENTIFIC OUTPUTS

PolCA: Policy Coherence Analysis

Co-identification and validation of CS GI challenge

Key ES + functions + Key GI elements + Key Policy Instruments

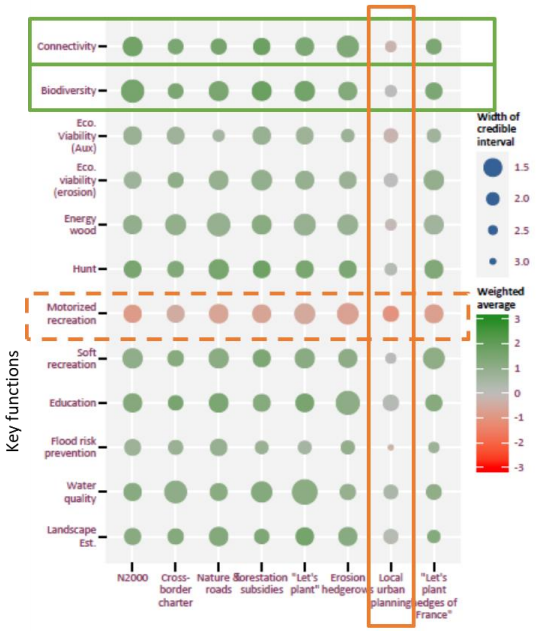


7 item Likert scale, -3 to +3, and '?' if unknown, **Variable scores**

INTERVIEWS

Policy expertise **AND** local knowledge

Scarpe Escaut




SOCIETAL / POLICY OUTPUTS

CSS level

- Provide State-of-the-Arts data regarding keys issues proposed by local stakeholders (ES/EDS, GI vulnerability and ecosystem quality, species connectivity, Integrated scoring of multifunctionnality, policy coherence analysis, evaluation of social demand)
- Support to their on-going important issues


SOCIETAL / POLICY OUTPUTS

Stakeholder analysis (first results)

6 cases: 2 Urban vs 4 Rural contexts (3 concern hedgerows)

VALUATION:

- Green Infractructure elements highly valued by all stakeholders
- More variation in value of ecosystem services and disservices

FRICTIONs: case-dependent, some paterns:

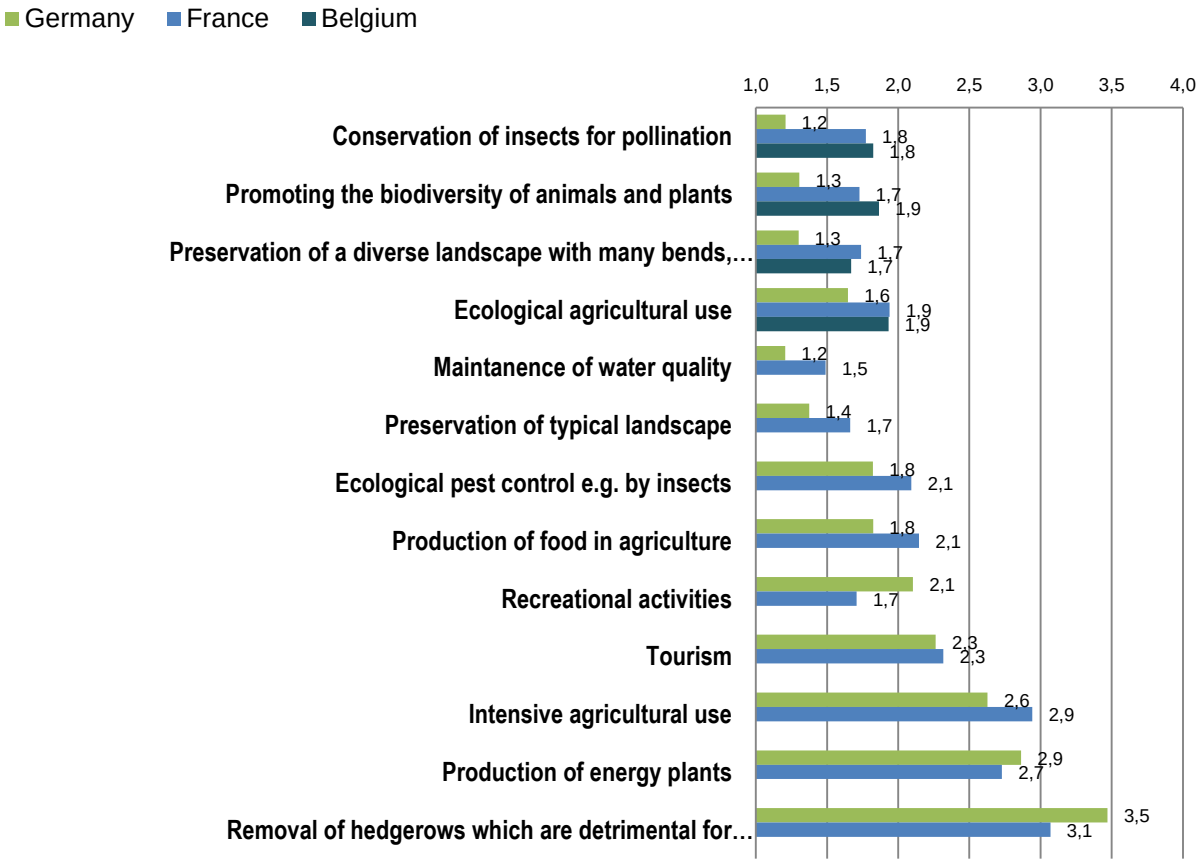
- Biodiversity & habitats vs Recreation/Production (food or biofuel)
- Biodiversity and regulating services rank high in overall valuation analysis → seen as important by all stakeholders

Next steps

- For Hedgerow cases: Differences in valuation by stakeholder categories?
- Clusters of stakeholders regarding impact, dependence, interest and influence?


SOCIETAL / POLICY OUTPUTS

Societal Demand: More demand for conservation and regulation services than for intensive agriculture and provisioning services!

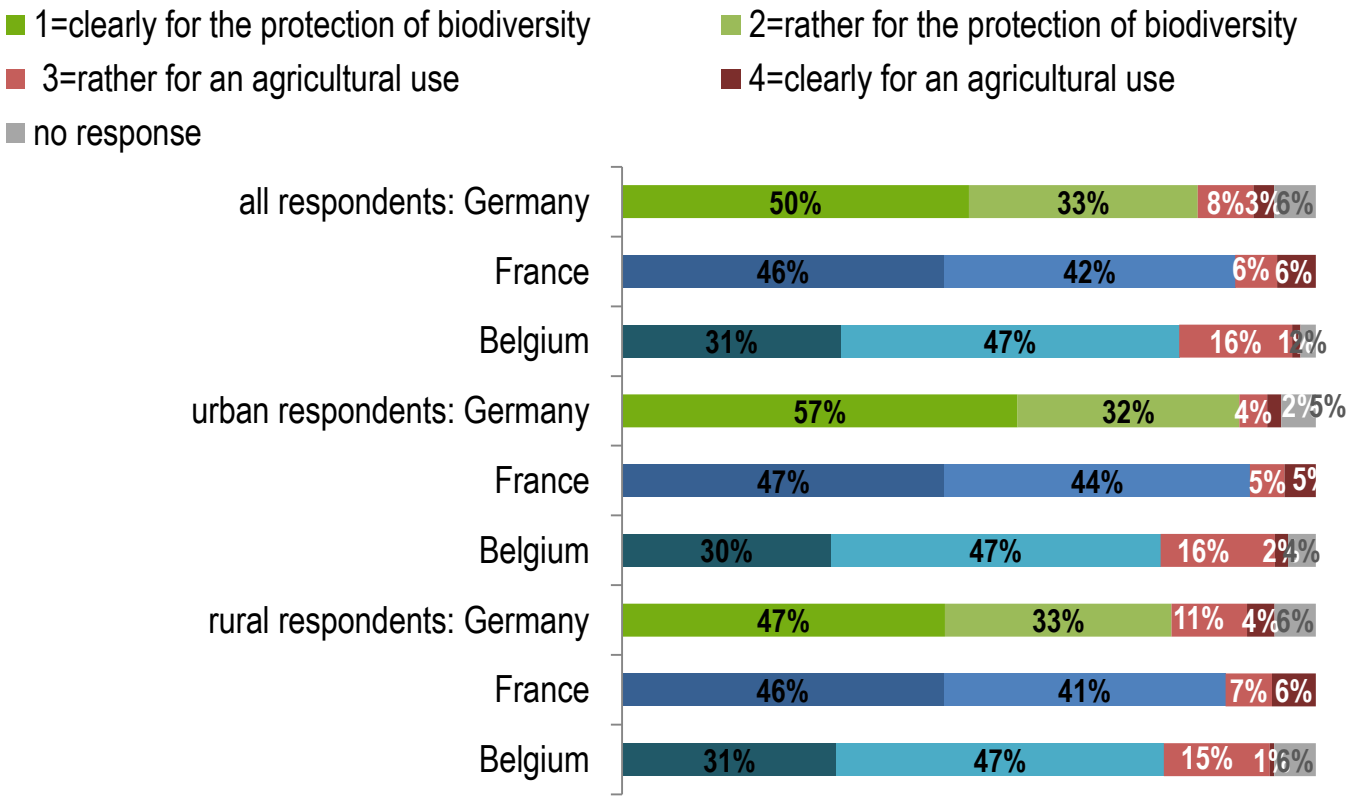


Average values:
Scale from
1=very important to
4= unimportant

Based on phone survey
(300 persons per sites)

SOCIETAL / POLICY OUTPUTS

- Strong societal demand toward protection of biodiversity
- No evidence of differences between urban and rural respondants



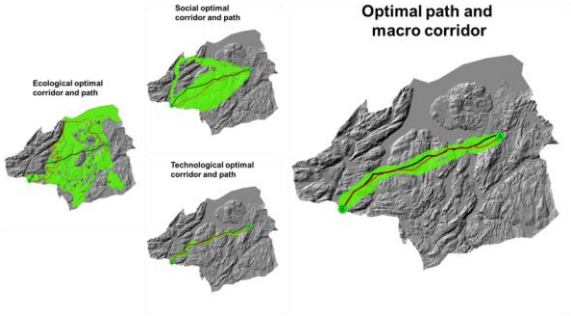
Based on phone survey
(300 persons per sites)

SOCIETAL / POLICY OUTPUTS

Overall vision

Science

- Strong evidences GI providing large set of ES and connectivity
- Vulnerable with variable ecological quality
- Operational framework and integrated modeling

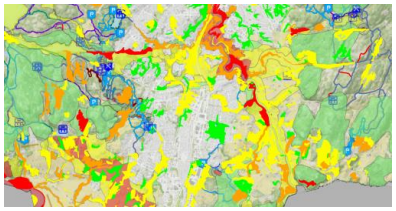


Policy

- Few policy instruments adressing specifically the management of the different GI functions.
- Diffuse regulation

Stakeholders

- Green Infractructure elements highly valued
- Opposition between Biodiversity, regulation services and provisioning services or recreation.



Citizens

- Strong societal demand for biodiversity conservation of GI and regulation services
- Agroecology and biodiversity preferred to intensive agriculture trade-offs.


ACKNOWLEDGEMENTS

We thank the stakeholders from the different CSS that were involved in many workshops, interviews, mail exchanges, meetings...

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- *Belgium: The Belgian Science Policy Office*
- *Norway: The Research Council of Norway*