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GRETA - “GReen infrastructure: Enhancing biodiversity and ecosysTem services for territoriAl development”

Applied Research

Randstad

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Authors
Katherine Irvine, Jessica Maxwell, Laure Kuhfuss, Scott Herrett The James Hutton Institute (UK)

Co-authors
Hugo Carrao, Mirko Gregor - space4environment (Luxembourg)
Jaume Fons, Raquel Ubach, Roger Milego, Anna Marín UAB (Spain)
Elin Slätmo, Eeva Turunen, Kjell Nilsson - Nordregio (Sweden)
Gemma-Garcia Blanco TECNALIA (Spain)

Advisory Group
Project Support Team: Blanka Bartol (Slovenia), Kristine Kedo (Latvia), Julie Delcroix (EC, DG Research & Innovation), Josef Morkus (Czech Republic)
ESPON EGTC: Michaela Gensheimer (Senior Project Expert), Laurent Frideres (Head of Unit Evidence and Outreach), Akos Szabo (Financial Expert).

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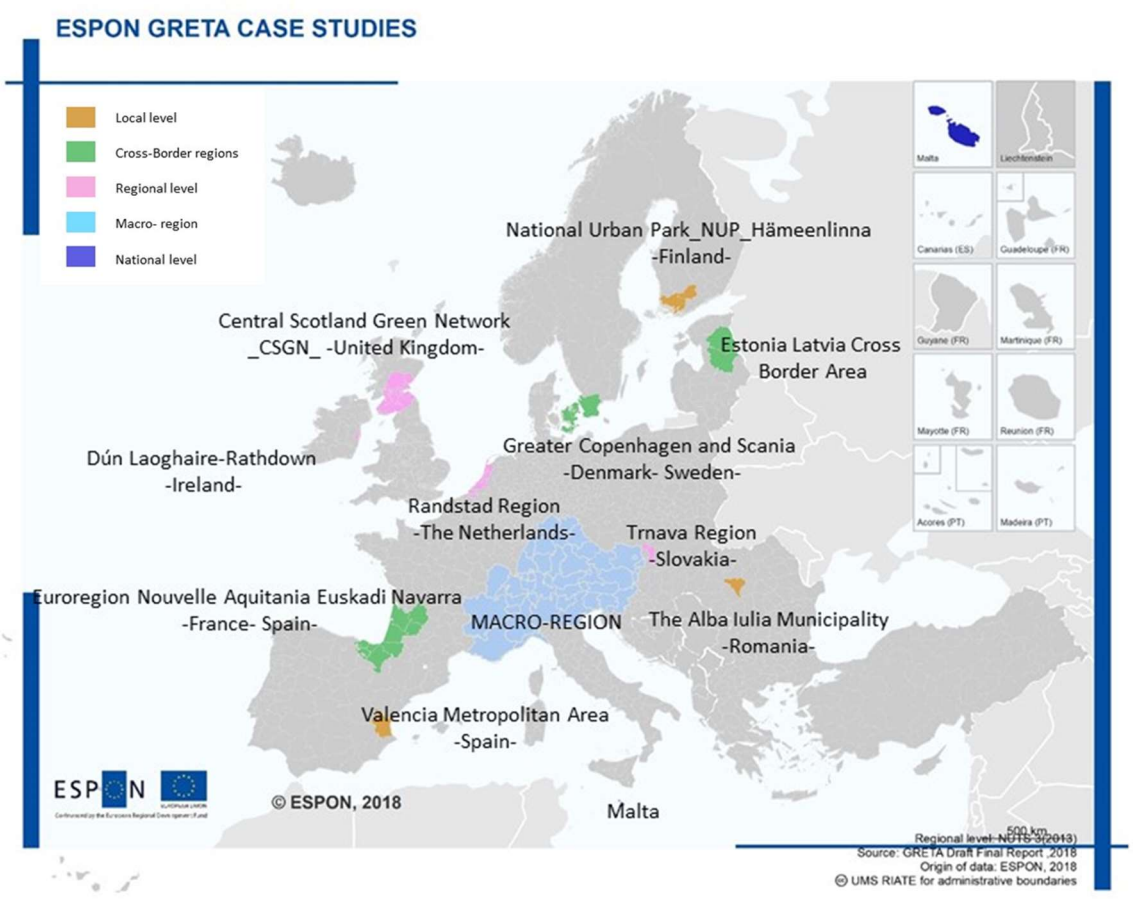
Abbreviations

EC	European Commission
EHS	Ecological Main Structure
ES	Ecosystem Services
ESPON	European Territorial Observatory Network
EU	European Union
FUA	Functional Urban Area
GI	Green Infrastructure
NUTS	Nomenclature of Territorial Units for Statistics
NNN	Natuur Netwerk Nederland

1 Introduction

GRETA investigated 12 case studies that represented different spatial, institutional and governance settings and that ranged from urban centres to rural countryside. The case studies served to:

i. gain knowledge on implementation factors, drivers and constraints in different planning systems and territorial realities;
ii. gain insights on the use and applicability of economic methods in decision making; and
iii. gather knowledge for policy and practice as input and inspiration for the policy recommendations.



Map 1. ESPON GRETA selected case studies

Method

The activities undertaken at the case study level incorporated a combination of desk-based analysis alongside online questionnaires and pre-structured interviews to key actors in each of the case study areas, including: (i) decision and policy making representatives; and (ii) those involved in designing, planning, implementing and managing green infrastructure (GI).

A series of three consultations were developed to gather relevant information from case studies on different aspects of GI spatial analysis, policies, planning and implementation. The consultation process was seen as a combined approach of an online survey and or a telephone interview (which used the survey questions as the basis) with stakeholders to facilitate getting good engagement and to address any clarifications needed.

Consultation A – Economic Valuation

The questionnaire included 20 questions structured in 2 main parts. The first part aimed at understanding the current use and awareness of valuation methods by respondents while the second part aimed at identifying their perceived barriers and interest of using such methods. We used a mix of open-ended and closed-ended questions to combine comparable results as well as qualitative material; respondents also had the possibility to comment on their responses. Analysis of Consultation A is described in Annex III-C.

Access to Consultation A

https://survey.tecnalia.com/limesurvey/index.php/214247?lang=en

Consultation B – Characterising green infrastructure and ecosystem services characterisation

The objective of this consultation was to identify good practice guidelines, opportunities and challenges that could be useful for a variety of regions and cities. Responses to Consultation B were used to assess the usefulness of the GRETA methodology, a methodology specifically developed to delineate and map the main green infrastructure (GI) elements and their multifunctionality, as well as identifying their capacity to support three main policy domains: Biodiversity, Climate Change and Disaster Risk Reduction, and Water Management. Questions in Consultation B were designed to help us gain further insight into the enabling factors that exist in different regions and cities. We also sought to gather information on the challenges and barriers that may compromise the implementation of GI. The final set of questions focused on identifying the general benefits and potential synergies and trade-offs associated with GI projects.

The maps produced for Consultation B in the GRETA project were intended to provide a starting point for discussion about the applicability of the GRETA methodology from European to local application. As such they did not aim to be a substitute for the maps or other planning material that already exist at local case study level nor were they aiming to characterize the GI on regional or local level. They were not developed to be used as an output from case study levels.

The landscape elements in the maps are produced based on standardized European data sets with a minimum mapping unit of 25ha (i.e. CORINE Land Cover 2012) – smaller geographical features are not depicted. The Consultation B aimed at finding the gaps between datasets produced at the European level and any other data sets produced at regional and local scales.

Access to Consultation B

https://survey.tecnalia.com/limesurvey/index.php/614564?lang=en

Consultation C - Analysis of governance, policy and financial frameworks

The successful implementation of green infrastructure (GI) projects requires a combination of governance structures, integrated policies and financial support. This consultation therefore aimed to investigate the governance systems in place in each case study area in order to determine how policies and policy makers enable the implementation of GI projects in the case study areas.

Responses to Consultation C aimed to help us identify: (i) how much funding (money and personnel) is currently used for GI in the case study regions; (ii) if this funding is sufficient for implementing and maintaining GI; and (iii) the main sources of funding (public tax-based funds, private investments, NGOs or others). Consultation C also examined whether policies compliment or conflict with GI and assesses policy makers' knowledge needs for making full use of GI development potential.

Access to Consultation C

https://survey.tecnalia.com/limesurvey/index.php/129674?lang=en

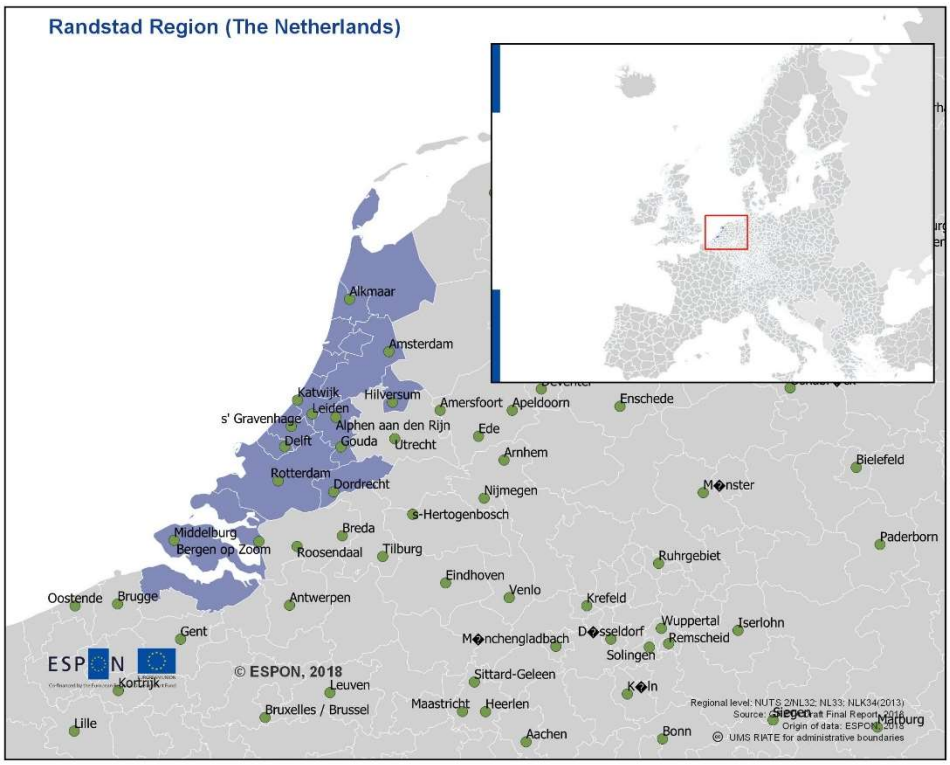
The content in this report is based on a mixed-method approach. The results presented are interpretations of semi-structured interviews, responses to a questionnaire on national policy and planning, responses to three consultations (Consultation A, B and C) via email, document analysis of plans and strategies (via desk-based analysis), and statistics.and spatial analysis using GIS resulting from the GRETA project. For all case studies, telephone conversations (and for some cases face-to-face meetings i.e. Copenhagen and Scania, Alpine region, Euroregion Aquitania- Euskadi-Navarra) allowed the completion of the consultations B and C.

The respondents who have contributed to this case study are people working in the public administration in the Randstad.

2 (Geographic) description of the Randstad

The Randstad is a polycentric urban area that is considered one of the largest metropolitan regions in Europe. It includes a large part of the territory of four provinces, namely North Holland, South Holland, Utrecht, and Flevoland. The Randstad (also referred to as the Dutch Deltametropolis) does not directly correspond to any administrative boundaries or a functional urban area (FUA). It is home to the four largest Dutch FUAs – Amsterdam, The Hague, Utrecht, and Rotterdam along with other small and medium sized FUAs. "Official boundaries for the Randstad do not exist and it does not fit into one of the three government tiers in the Netherlands. It remains an almost abstract concept as no government policies are implemented using it as the geographical basis for intervention" (OECD, 2007). The Randstad is an important European and international access point as it hosts the largest port in Europe, the port of Rotterdam, and a major international airport, Amsterdam Schiphol airport.

Geographically. the Randstad consists of a semi-circle of urban conurbations with a green area in its centre known as the Groene Hart (Green Heart) (OECD, 2007), bounded by the rising North Sea to the West (see Map 2). The Green Heart has acted as a way to preserve open space; it is a green belt that is surrounded by and intersected by urban belts (Zonneveld, 2007). The Green Heart serves important agricultural functions, in fact the alternative name for it was the 'Central Agricultural Area' (Zonneveld, 2007).



Map 2 Randstad Region

2.1 Case study outline

Region: As noted, the Randstad has no officially recognised boundaries .However, it consists of NUTS 1 – Western Netherlands (NL3), NUTS 2 – North Holland (NL32), South Holland (NL33).

Area: 8,287 km^2.

Population: 8,100,000 inhabitants[1].

Population density: 857/km^2.

Economy: Gross Metropolitan Product - €262,839, Gross Regional Product (GRP): €271,2 billion (2007), the Randstad region contributes to 51% of the national GDP[2]. With a GRP of EUR 367 billion, the Randstad region is the fourth-largest metropolitan region in Europe after

[1] https://www.nl-prov.eu/wp-content/uploads/2017/11/regio-randstad-monitor-2017.pdf

[2] https://www.nl-prov.eu/regional-offices/randstad-region/?lang=en

London, Paris and the Rhine-Ruhr. The Randstad, like other metropolitan areas, continues to grow and urbanise.

"*…although it only covers 20% of the Netherlands' land area, 42% of the population lives there, and about half of the national income is earned within its boundaries. The result is that its economic development has a huge impact on the economic development of the Netherlands as a whole. But it would not be correct to equate the Randstad economy with the Dutch economy. The Randstad economy is more services and trade oriented whereas industry is largely concentrated in the rest of the Netherlands. The Randstad economy is also more international: it generates three quarters of Dutch exports, and about 60% of foreign direct investment is invested there. Its population is more highly skilled and richer than that of the Netherlands of the whole*" (OECD, 2007).

2.2 Territorial challenges

The main territorial challenges include logistics, transport/access, trade, boundary issues, a dense population, and rising water levels. The Randstad is 40% below sea level and is a largely manmade landscape. Challenges are closely linked to climate change and flooding risks. The main challenge that drives policy, planning and action in the Netherlands is water management – related to sea level rise due to climate change. Containing urban sprawl (urban containment) is also an issue on which Dutch planning is focused.

The Netherlands as a whole is a small country and there are a number of different types of land uses that demand/require space, including green infrastructure. One GRETA consultation respondent stated that there is a need for integration between the different departments of government and a need to deliver land-use planning that ensures multiple benefits and multifunctionality. Further information about policy and planning challenges can be found in Section 4.

3 The green infrastructure network and its potentialities for territorial development in the Randstad

3.1 What is the approach to green infrastructure and ecosystem services in the Randstad

The Randstad 2040 vision ('Randstad Urgent') (Ministerie VROM, 2008) included a plan for more interactions between landscape, water system and urbanisation. This included a desire to build strong and sustainable cities. Approaches to green infrastructure (GI) are diverse within the Randstad, the Deltametropolis publication 'Blind Spot – metropolitan landscape in the global battle for talent' (2016) states the following main regional landscape policies, projects, and initiatives:

- Regional reserves, green belts and grids: Ecological Main Structure Nature development projects (which are now decentralised and the next generation of nature developments is part of Natuur Netwerk Nederland (NNN));

- Heritage and branding: Historic city cores, rural heritage, defence line of Amsterdam (Stelling van Amsterdam) (UNESCO world heritage);
- Mega events: Floriade;
- Attractive living in the landscape: Vinex compact suburb development program;
- Large sustainable transport/infrastructure projects: Zuidasdok, High Speed Rail South, A4 Midden-Delfland;
- Waterfront regeneration projects: North Sea boulevards, Urban river fronts, Dike reinforcements;
- Cycling strategies: National bicycle route network; and
- Urban farming and park initiatives: Land trust (Natuurmonumenten), Urban agriculture initiatives.

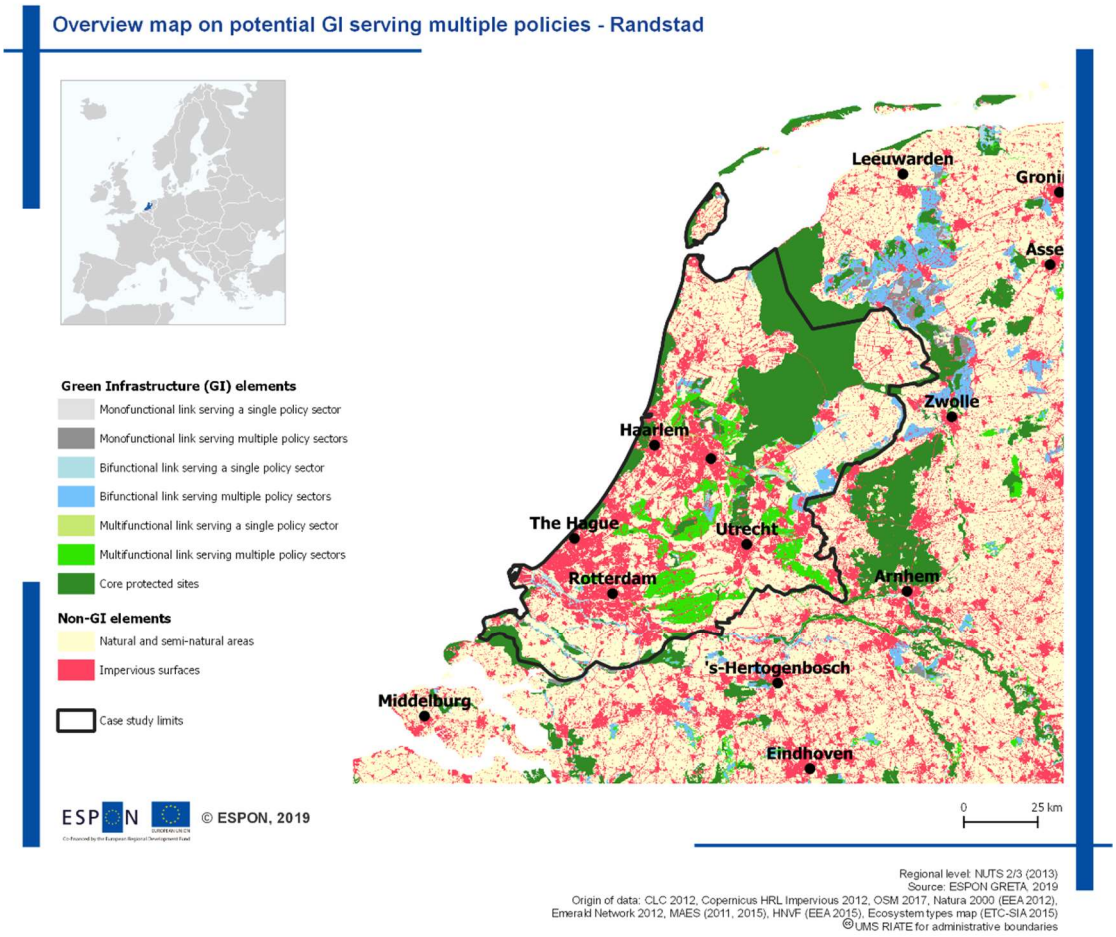
3.2 Benefits of green infrastructure and ecosystem services for smart, sustainable and inclusive territorial development

The Randstad Region encompasses the NUTS2 NL31 and NL32. This section describes the potential green infrastructure (GI) network in the Randstad area as delineated by the GRETA spatial analysis methodology. The analyses of synergies and trade-offs between the ecosystem services (ES) provided by the GI network and its potential for serving several policy objectives is also provided. This includes an analysis of the Randstad region relative to general EU patterns (Map 3, Table 1).

Table 1 Potentialities for green infrastructure network in Randstad Region.

Questions related to maps	**Description of phenomena in the case study**	**Implication for management**
Extent of GI	Potential green infrastructure (GI) covers about 30% of the region, which is higher than the coverage of the neighbouring regions.	Potential GI is probably close to maximum that could be attained given the geographic constraints. The relatively homogenous distribution in a highly dense area is remarkable. Therefore, it would be advisable to consolidate the network. Enlarging the GI would require the integration of some agricultural areas by appropriate agricultural practices.
Integration of protected areas	All protected areas are integrated and connected on the potential GI. About half of the GI is also covered by protected areas.	Given the high density and pressures from different land uses, it is critical to maintain the integrity of the links (all natural and semi-natural areas not protected). This would ensure the connectivity of the protected areas.
Support to policies related to: **Biodiversity, Climate Change and Disaster Risk**	The potential GI, and related ecosystem services (ES), are able to support water and climate change policies. There is less capacity to support biodiversity (habitat quality is relatively low).	Most of the area is able to provide multifunctionality. However, more detailed information, at local level, would be required to understand limitations on the biodiversity and how to improve it.

Reduction, and Water Management		
Synergies and trade-offs	Most of the ES have a neutral relationship, i.e. there is no interaction or no influence between ES.	There are no spatial issues related to synergies or trade-offs. It is not expected that improving certain conditions would have side effects on other ES.
City level	The share of green urban areas inside the city is below 40 % in most instances. Only Lelystad (87%) and Dordrecht (76%) have a high share. Moreover, these two cities have also a high percentage of protected areas inside the city (about 30%). Coverage of GI is relatively high in the peri-urban areas and for all cities. However, its distribution does not ensure the continuity between the city, the core-city and the landscape infrastructure. Green urban areas slightly decreased between 2006 and 2012.	Green infrastructure is relatively low in most of the cities. Although this could be counterbalanced by its coverage on the peri-urban area, the spatial pattern does not ensure the connectivity through different levels. Peri-urban areas are those with higher pressure for competition of different land-uses, therefore special attention is needed to ensure equal accessibility to GI.



Map 3 Randstad GRETA case study. Overview map of potential green infrastructure serving multiple policies.

Our stakeholder consultation on the application of the GRETA methodology at the case study level in the Randstad confirmed that the EU level data is not very representative of reality at the urban/city level. The analysis does not capture the building or neighbourhood style and character differences therefore making it unclear where to prioritise action. This type of detail/resolution would be important for decision making at the city level in terms of which neighbourhoods to prioritise. The results seemed to indicate that there were not many potential areas for green infrastructure implementation in the city areas. One respondent noted that it seemed as though the types of things that will be prioritised in the Randstad over the coming years were not captured by the GRETA methodology. Due to scale challenges the methodology does not capture activities that are driven by local level policies and action. The respondents understood that perhaps this was for each city to do with their own data and that the GRETA methodology was an approach that could be used with local data.

4 Capacity of GI network in Randstad to meet the demand of ES

The five key respondents that replied to the GRETA consultation on economic valuation methods were all technical experts. Most of them indicated that cost-benefit analyses are used in the decision-making processes related to green infrastructure (GI) and that this was done before the GI intervention (ex-ante). The following benefits were included in the cost-benefit analyses: flood mitigation, recreation, biodiversity, water quality, climate change mitigation or adaptation to climate change, and health. Respondents also added: cycling commute travel time, house prices, and preservation of historic monuments. The following information was included in the analysis to describe the benefits generated by GI: ecological information on benefits, socio-economic information on benefits in non-monetary terms, and socio-economic information on benefits in monetary terms. The methods used to assess benefits included: (i) comparison of benefits to cost of construction and maintenance; (ii) contingent valuation, hedonic pricing, cost based valuation; (iii) choice experiment or use token entries taken from other studies.

The respondents chose to use these different methods for different reasons, including: (i) "*they were available as research methods in the scientific institutes we work with*"; (ii) "*economic evidence is regarded important for (political) decision makers, involved in our program*"; (iii) "*sound methods and I have experience with them*"; (iv) "*relatively well-known in the Netherlands, even among some policy makers*"; (v) "*they are relevant and show different perspectives on decision-making*"; and (vi) "*depending on the impact, available information or availabe time a method was selected*". The main constraints and challenges included: lack of data, far fetched examples and numbers from other continents, hard to prove they apply here.

The main benefits of using economic valuation methods identified by the respondents included: (i) economic insights having a strong influence on decision makers and parts of the broader public; (ii) relatively easy to check the relevance and accuracy of the methods/results; (iii) the

methods help to provide a relevant and meaningful overview of costs and benefits; and (iv) the methods help to provide insight into the costs and benefits to society of impacts on nature. The results are often used for visioning, sometimes for decision making, in many cases the results are used to improve plans. They can be used to help determine how unforseen negative impacts can be mitigated; however, for this monetary valuation is not always necessary. Most of the respondents stated that access to data from valuation studies implemented for other GI projects would be most useful additional support for them/their organisation. One respondent also stated that technical support would be helpful.

4.1 What do GRETA analysis on ES supply and demand reveal?

GRETA have explored the capacity of GI network to meet the demand of ES where:

ES supply is defined as the capacity of ecosystems to provide ES, irrespective of them being used.

ES demand can be defined as the amount of a service required or desired by society in a given location and time. This demand depends on several factors such as socio-economic conditions, cultural/behavioural norms, technological innovations, availability of alternatives, among others.

	ES Supply – benefits provided	ES Demand -specific definitions	Approaches to quantify Demand
Regulating services	Benefits are provided by maintaining desirable environmental conditions	Amount of regulation needed to meet target conditions	Reduction of risk
Cultural services	Benefits are provided by experiencing the natural environment	Desired total use (if rival service) or individual use (if nonrival service)	Preference and values // direct use
Provisioning services	Benefits are derived from consumption of final goods	Amount of goods obtained per unit of space and time or per capita	Direct use // Consumption

Table 2 Relation between benefits provided by ES supply and the corresponding ES demand definitions and operationalisation approaches. Adapted from: Villamagna et al., 2013 and Wolff et al., 2015.

Demand for **regulating services** can be defined as the amount of those environmental conditions that ensure the provision of a desired regulation level. A reduction of risk approach has been usually applied to quantify demands for these services. Vulnerability to potential changes in regulating services may provide valuable insight into society's needs capturing main linkages from the socio-ecological system.

Demand for **cultural services** has been mostly assessed by preferences and values for attributes of certain landscapes, ecosystems or heritage sites. Preferences may be either quantified through stated preferences that relate to the desired level of services, or through revealed preferences (a proxy for the actual use of the service). Demand for cultural services has also been assessed by the direct use of a specific ecosystem, e.g. for recreation. This can

be quantified by total visitor days per year or the number of fishing/hunting licenses, the presence of tourists or accounting the accessibility or proximity to recreational areas.

Demand for **provisioning services** has been quantified based on direct use and consumption of final. It is worthy to note that there is normally a spatial mismatch between the area where the service is provided and the area where the service is consumed, especially true for provisioning services. For this reason, interregional linkages have to be considered in order to properly identify faraway dependencies and assess magnitude of potential impacts

Following the proposed conceptual framework, we have combined demand and supply for each of the selected ES. The focus of this approach was to highlight those areas where there is a high demand and a low supply, i.e. those areas where GI is unable to cover the ES demand. It should be noted that these results are of a more exploratory nature in the whole GRETA project considering the following limitations:

- This is a research area still under development;
- There is need for a higher resolution of the data sources given the nature of the phenomena analysed;
- Balance between supply and demand is semiquantitative; and
- In some cases, a more sophisticated modelling would be required to have an appropriate quantitative balance.

Therefore, these results should be seen as illustration on how this demand and balance could be approached.

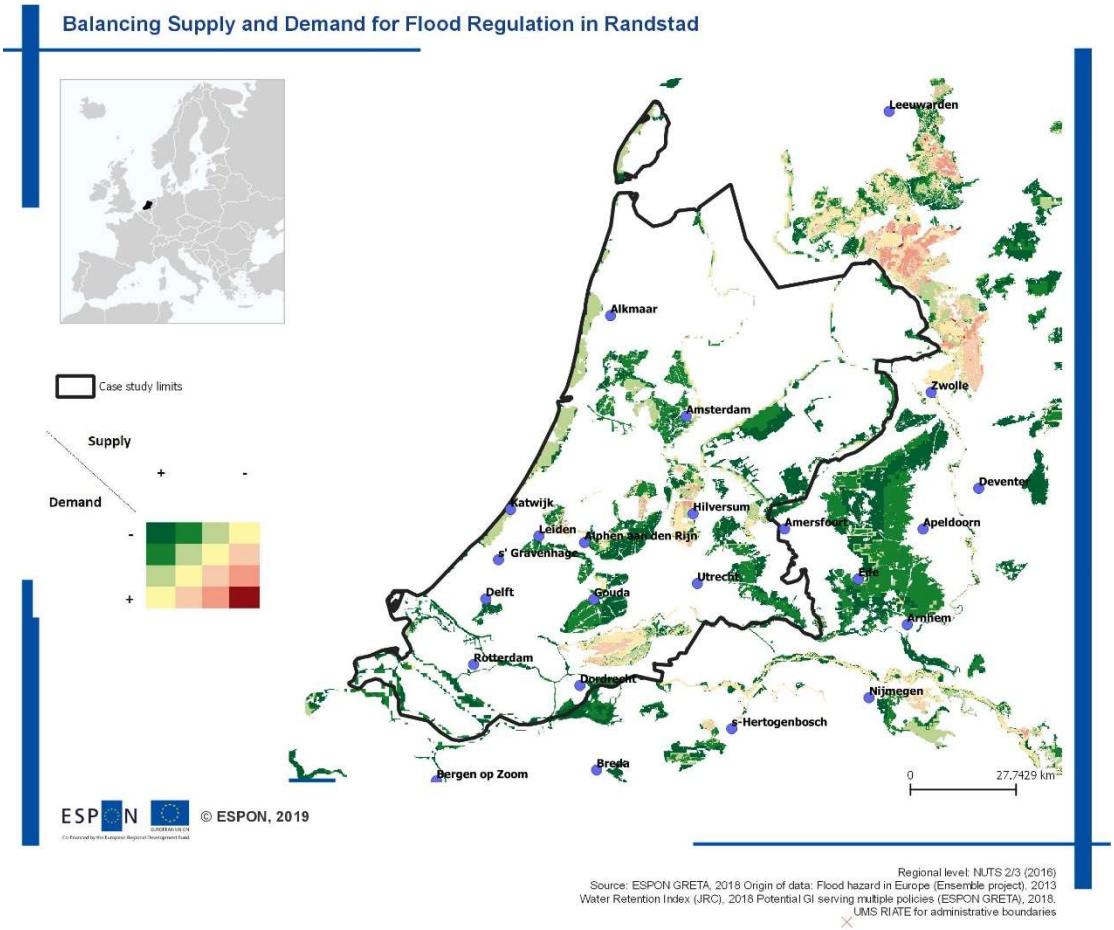
4.1.1 Analysis of supply and demand for Flood Regulation in Randstad

We have quantified demand for flood regulation based on the potential flood hazard. Exposure is described by the projected potential flooding risk[3]. On the other hand, benefits are provided by the water storage capacity of land to regulate floods. The supply for flood regulation is quantified by the Water Retention Index, which assesses the capacity of landscape to retain and regulate water passing through. This index is dimensionless and considers the role of interception by vegetation, the water-holding capacity of the soil, and the relative capacity of both the soil and the bedrock to allow percolation of water. The influence of soil sealing and slope gradient are additionally considered.

Map 4 presents a semi-quantitative analysis of the balance between supply and demand for flood regulation in the Randstad area. The maps shows a predominant pattern of dark green areas, which are those with maximum capacity of supply and demand is very low. These conditions are mainly met in core protected areas. The other parts of the Randstad that are still green could be considered areas where the balance tend to be positive, in the sense that the supply is slightly higher than the demand. In practical terms it would mean that improving or

[3] for the period 2011-2044 that results after applying the LISFLOOD model from the ENSEMBLES project

reinforcing GI with the objective of water retention will have a substantial benefit. The agricultural area between Dordrecht and Gouda requires special attention.



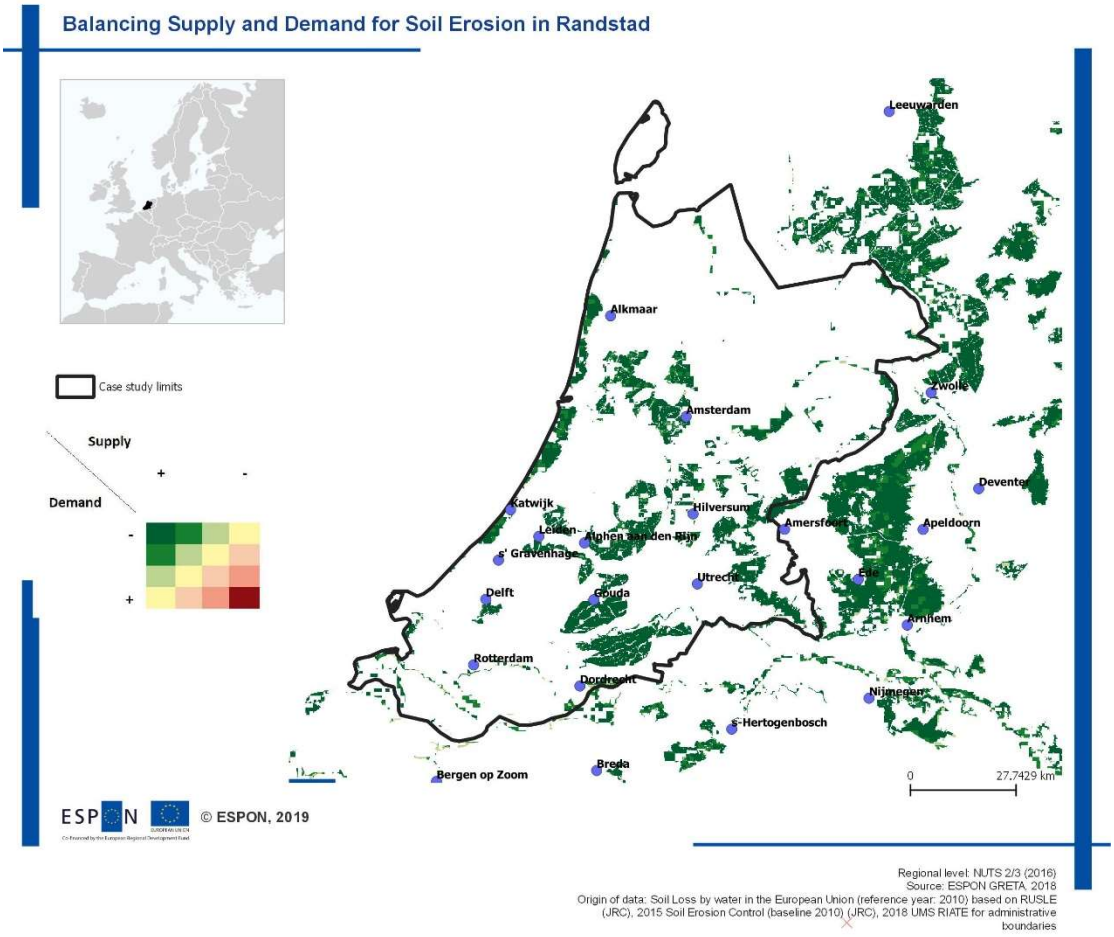
Map 4 Balancing Supply and Demand for Flood Regulation in Randstad.

4.1.2 Analysis of supply and demand for Reducing Soil Erosion in Randstad

We have assessed the demand for the reduction of soil erosion by water producing a negative impact on several ES; in particular to the ones related to crop production, drinking water and carbon stocks. Soil erosion by water is mainly affected by precipitation, soil type, topography, land use and land management. Exposure is described by the soil loss rate[4] (t ha^{-1} yr^{-1}). Benefits are provided by the capacity of vegetation to control or reduce erosion rates. The supply is quantified by the Soil Erosion Control dataset (JRC) that describes the capacity of ecosystems to avoid soil erosion.

[4] as estimated by the modified version of the Revised Universal Soil Loss Equation (RUSLE) model

From the resulting Map 5 we can observe that the GI network has the maximum capacity of supply and demand is very low so no policy actions seems to be required to reinforce this particular aspect.



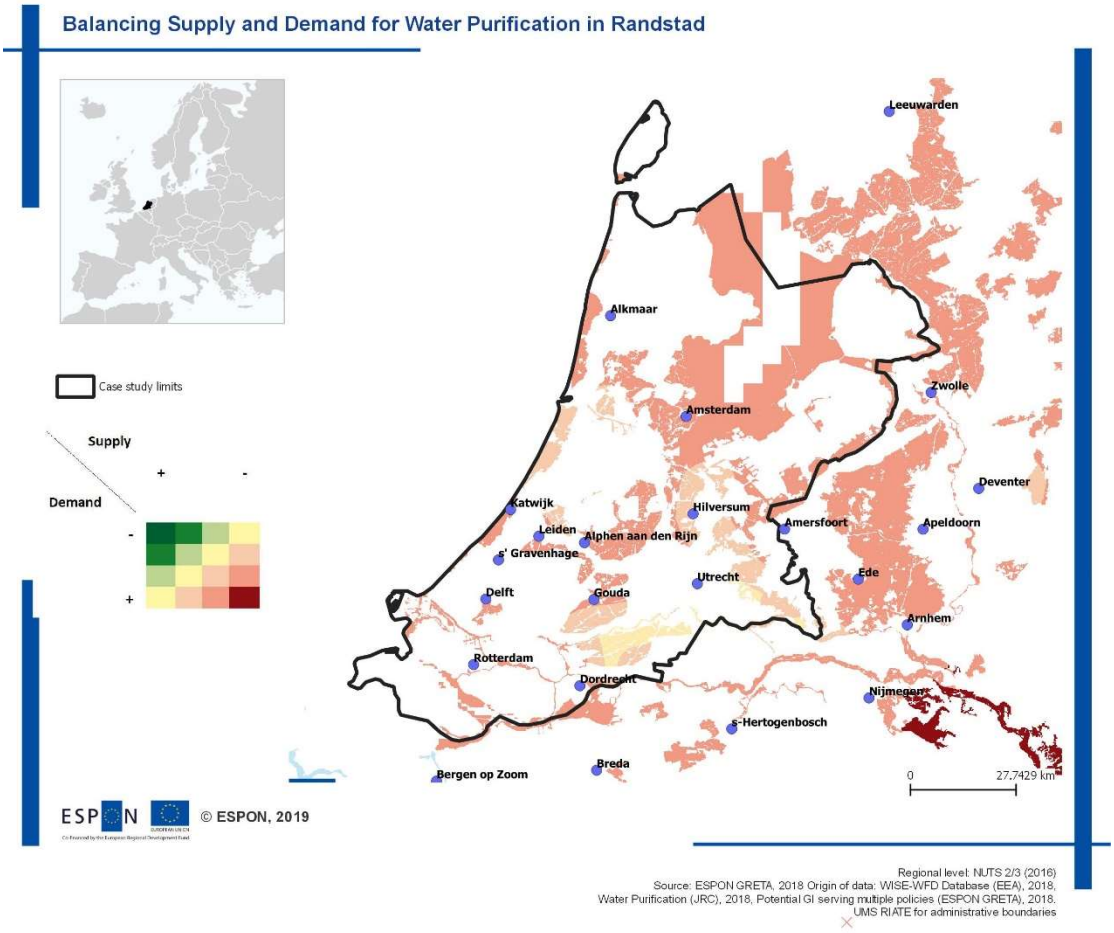
Map 5. Balancing Supply and Demand for Soil Erosion in Randstad

4.1.3 Analysis of supply and demand for Water Purification in Randstad

We have quantified demand for water purification based on the level of pollutants emitted to freshwater ecosystems by polluting sectors, primarily agriculture and waste water treatment discharges from industry and households. Exposure is described by mean annual concentration of nitrates in water [5](. The supply is quantified by the Water Purification dataset (JRC) that assesses the in-stream retention efficiency of ecosystems to dilute or degrade nutrients.

Resulting Map 6 shows that water pollution is still a big challenge and substantial increase on the provision of water purification is still required under current status in most of the Randstad area

[5] tonne per year) captured in monitoring stations and aggregated by rivers (the WISE-WFD database)



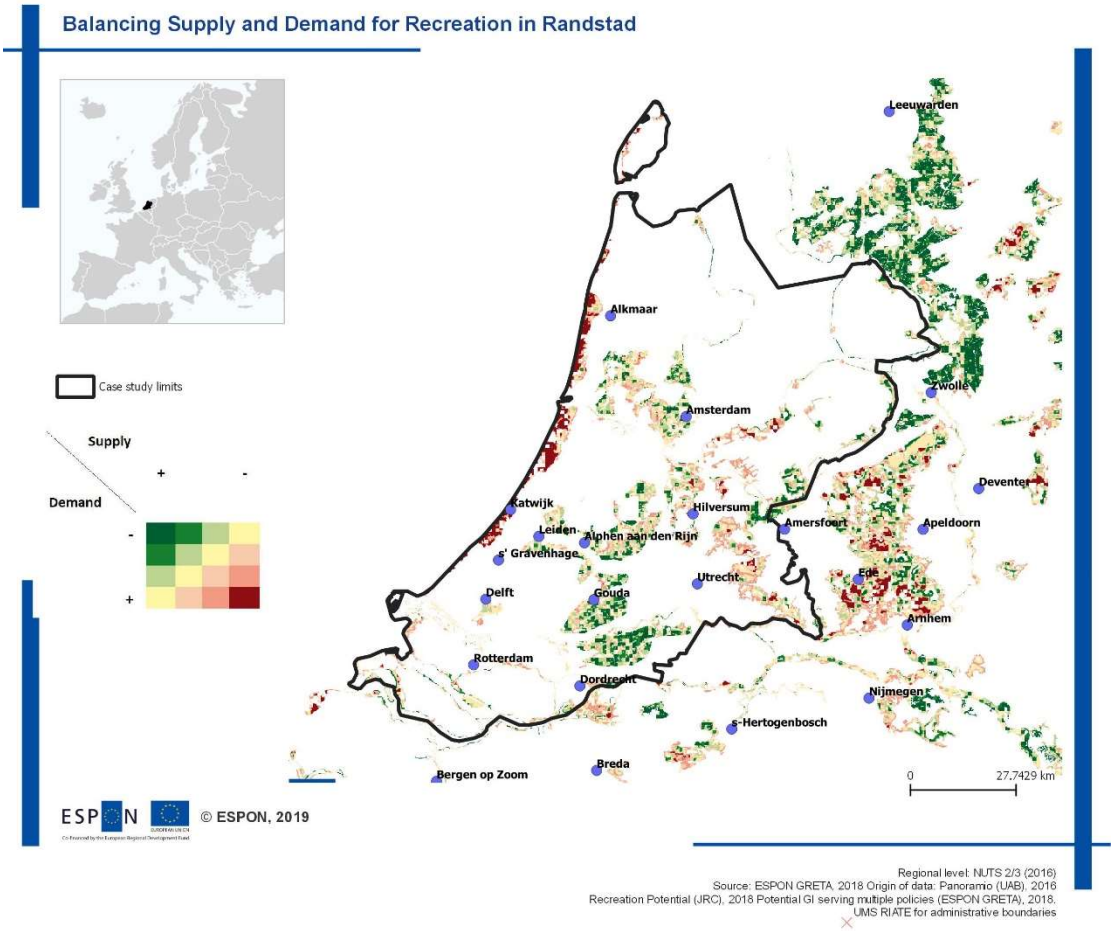
Map 6. Balancing Supply and Demand for Water Purification in Randstad

4.1.4 Analysis of supply and demand for Recreation in Randstad

We have described demand for recreation by means of a proxy for visitation. Recreation and tourism are important elements for national and local economies, that also contribute to other intangible benefits. Recreation directly depends on environmental attributes like species richness, diversity of habitats, and climate. The usability of crowd-sourced information by means of location photographs has already been shown to be as a reliable proxy for visitation rates to recreational sites. We have used the location of photographs in Panoramio as a proxy for landscape attractiveness for visitors. Demand is quantified by the number of pictures per square km. On the other hand, supply is described by the Recreation Potential dataset (JRC) that quantifies the potential for citizens for outdoor recreation.

The resulting **¡Error! No se encuentra el origen de la referencia.** does not show a clear pattern but a diversed mixed of areas where supply meet the demand together with areas in need for reinforcing supply A clear deficit of recreational service (low supply together with high demand) is shown in the coastal area, that could be partly explained as direct link with

industrialization and with population density. Particularly effort should be placed in the easter part of Uthrecth.



Map 7. Balancing Supply and Demand for Recreation in Randstad

5 Governance practices, policy and planning instruments to implement green infrastructure and enhance ecosystem services in the Randstad

There is no prevailing regional governance model for either economic or landscape development in the Randstad. The region does not have an elected mayor, but rather about 200 appointed mayors. It is therefore difficult to organise strong leadership and political mandate. A suggestion to appoint a 'curator' or 'curators' to bridge the gap between state decision makers and local associations and people was made in 2016 (Metropolitan Landscapes, 2016). The governance in this metropolitan area is therefore very diverse.

Since January 2017 the Ministry of Economic Affairs is obliged by the new Nature Protection Law (*Wet Natuurbescherming)* to develop strategic vision documents describing policy guidelines regarding nature protection and green infrastructure (WUR, 2017). The most recent vision is from 2014 and provides general guidelines for nature policy until 2025, not only

regarding conservation and expansion of nature and green infrastructure (GI), but also concerning the economic and societal assets of nature (EZ, 2014).

In Brussels, the 'Representation of the Randstad'[6] promotes the joint European interests of the provinces of North-Holland, South-Holland, Utrecht and Flevoland. The partnership primarily focuses on the following topics:

- Smart Randstad;
- Regional economy and accessibility;
- Circular economy and energy;
- Agrofood; and
- Environment, nature conservation and water.

The Randstad's polycentric configuration has resulted in a long search for governance structures that can help reconcile differences between scales: the Randstad, the provinces, and the municipalities. Over the years many informal governance arrangements have been proposed to address the mismatch between policy and planning realities and formal governance structures (Spaans and Zonneveld, 2016). There is a constitutionally defined three-tier structure of government in the Netherlands: (i) the national government; (ii) the provincial governments; and (iii) the municipal councils. Similar to many countries, the lack of integration between these different tiers and departments can make decision making challenging. Of relevance to the topics investigated in the GRETA project is a new 'Environment and Planning Act' (Omgevingswet) that is currently being developed to combine and simplify the regulations for spatial projects[7].

"*The Act seeks to modernise, harmonise and simplify current rules on land use planning, environmental protection, nature conservation, construction of buildings, protection of cultural heritage, water management, urban and rural redevelopment, development of major public and private works and mining and earth removal and integrate these rules into one legal framework*" (en Waterstaat, 2017).

The transition to new forms of governance and working has been slow and there is considerable uncertainty around what 'Omgevingswet' will mean for municiaplities in terms of planning processes and legal implications. "*Over the last decade the national landscape policies have undergone change, either being decentralized or abolished*" (Blind Spot, 2016: p. 124). One

[6] https://www.nl-prov.eu/wp-content/uploads/2017/11/regio-randstad-monitor-2017.pdf

[7] https://www.government.nl/topics/spatial-planning-and-infrastructure/revision-of-environment-planning-laws

respondent to the GRETA consultation on governance, policy and planning stated that in Dutch spatial planning, the overarching discourse is that decentralisation is good and academics warn that this has to come with some guidance and restrictions.

One respondent stated that the Ecological Main Structure (EHS) of the Netherlands (or the former national green grid of the country) has been decentralised and is now the responsibility of the provinces. They are developing their own strategies and plans, which are currently only at the preliminary stage. One challenge related to these provincial approaches is that the way they deal with the landscape differs and sometimes even their terminology and typologies differ. The provinces combined efforts plus the Natura 2000 conservation areas constitute the Natuur Netwerk Nederland (NNN), the current alternative for the EHS.The NNN is the major GI related policy plan that focusses on developing and maintaining the Natura 2000 network in the Netherlands and is developed by the Ministry of Agriculture, Nature and Food Quality.

Other formal and informal policies/plans

National Spatial-economic Development Strategy (ruimtelijk-economische ontwikkelingstrategie (REOS) 2016)

Action programme for implementation of REOS (2017).

National Vision on the Environment (NOVI) is due to be ready in 2019.

Randstad 2040 vision (Randstad 2040 Structuurvisie) includes a plan for more interactions between landscape, water system and urbanisation. This includes a desire to build strong and sustainable cities. It also includes a new vision for the 'green heart' of the Randstad that includes both development and protection. However, this has since been superseded/abolished.

The last and current Structuurvisie for the Netherlands is the SVIR of 2012: https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/rapporten/2012/03/13/structuurvisie-infrastructuur-en-ruimte/structuurvisie-infrastructuur-en-ruimte-4.pdf

Since then, a programme of new National Parks of World Class has started, based on regional bids. The former Green Heart is not one of them. (see map below). http://www.nationaleparkenwereldklasse.nl/

The Pact of Amsterdam (2016) – Urban Agenda for the EU

6 Lessons learned and good practice examples from the Randstad

The GRETA project showcased Amsterdam Rainproof as a good practice example from the Randstad area (see Good Practice Example 7, Annex IV-D). There were other examples of good practice that were suggested by respondents and discovered through additional desk based research, including some within and some just outwith the Randstad area:

- Economic valuation methods incorporarted into Quick Scan (Natural Capital Protocol)
- Natural Capital Coalition, Rabobank case study[8];
- A road infrastructure project, the A2 Maastricht project[9], involved an integrated and sustainable plan for the city and the motorway;
- 'Operation Stone Crusher'[10] in Groningen and other cities, involves breaking the dominance of stone/concrete in urban areas to help address flooding/water management challenges, air pollution, biodiversity loss, and the heat island effect; and
- Soft engineering structures[11] for coastal management and de-polderisation, such as: beach nourishment, dune replenishment, and planting vegetations to stabalise beaches and dunes.

One respondent to the GRETA stakeholder consultation on governance, policy and planning stated that fragmentation between different government departments results in some confusion regarding whose role is it to work on GI, which is part of the friction and current dynamic and changing nature of policy and planning in the Randstad. The respondent mentioned that an integrated analysis of the GI network is difficult as the authorities are not well networked internally or externally and the decision support systems then do not link to the work of civil servants. There is confusion about whether action should be guided by higher level government guidance or whether this should be left to be developed by local level capacity.

7 Policy messages and recomendations in the Randstad

Policy messages and recommendations that have emerged from the GRETA project that are relevant to inform green infrastructure (GI) at the case study level include:

- Need for clarity regarding how the newly integrated/simplified planning permission process will enable strategic decision making about larger landscape scale decisions. It is currently unclear where GI fits in to this new structure/process.

[8] https://naturalcapitalcoalition.org/connecting-finance-and-natural-capital-case-study-for-rabobank/

[9] http://www.a2maastricht.nl/nl/dp/english.aspx

[10] https://climateinitiativenoordnederland.nl/en/projecten/operation-stone-crusher/

[11] https://oppla.eu/amsterdam-nbs-greening-city-and-increasing-resilience

- Need for guidance about what the concept of the Randstad and Omgevingswet means for decision making at the local level.

- Given the considerable changes in policy/planning context over time, it is difficult to draw parallels and make comparisons in the Randstad. Rhere is likely a need for a clear and stable plan/strategy/vision for GI and ES in the area, with both national and local level buy-in/agreement.

- Need for guidance and bridges and a transition plan between the current situation and the beginning of the new planning law (Omgevingswet).

8 Appendix

Consultation (type of interaction)	**Type of Stakeholder**	**Type of Organisation**	**Timeline**
Preliminary outreach / baseline information	Technical expert	NGO	28/03/18
A – Econ valuation	Technical expert	Natural Capital	24/09/18
	Technical expert	NGO	01/08/18
	Researcher	Academia	08/10/18
	A policy maker/ decision maker	Government	09/10/18
	A policy maker/ decision maker	Government	10/10/18
B – Maps	Researcher	Academia	04/10/18
C - Governance	Technical expert	NGO	15/10/18
	Researcher	Academia	04/10/18
	Researcher	Academia	Reviewed material, still awaiting a time to speak, many resources shared.

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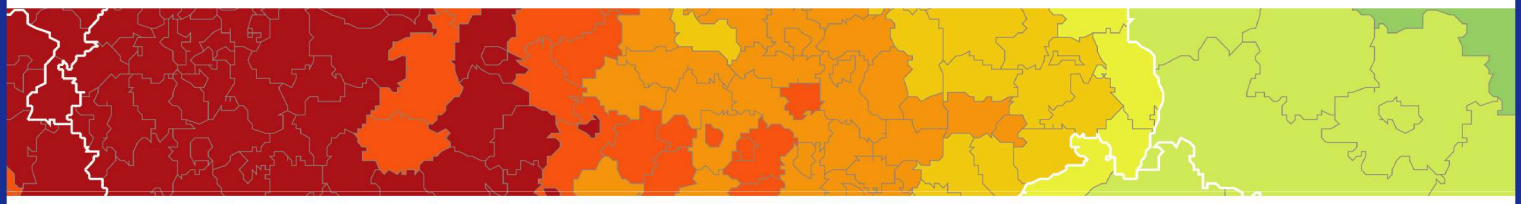

ESPON 2020 – More information

ESPON EGTC
4 rue Erasme, L-1468 Luxembourg - Grand Duchy of Luxembourg
Phone: +352 20 600 280
Email: **info@espon.eu**
www.espon.eu, **Twitter**, **LinkedIn**, **YouTube**

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