Economic valuation
Benefits of ecosystem services

Leo De Nocker

17/9/2025

Return on Investment thinking for healthy and resilient healthcare buildings and sites

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1. Benefits of urban green infrastructure ?

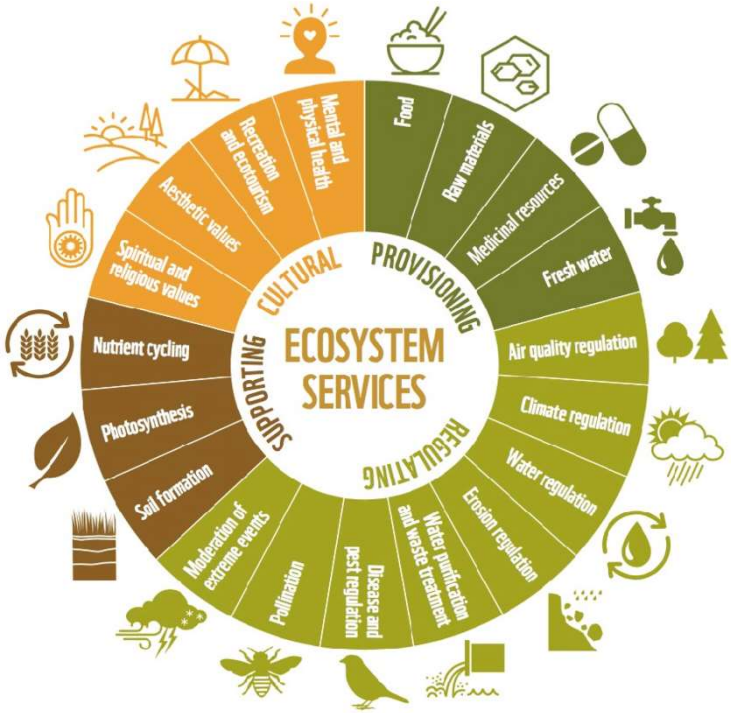
Urban “**green infrastructure**” offers several **ecosystem services**

Regulation services:

- Filtration of pollutants ***health***
- Flood protection & infiltration
- Urban heat island protection ***health***

Cultural services

- Daily recreation
- Amenity value
- ***Health***



Values depend on
(potential) **supply** , **demand** and actual **use**

Health benefits: scientific evidence

About 1000 studies, 70 % with positive impact of (urban) green & blue infra.

Epidemiological studies

Living in or having nearby (1-3 km) (urban) green area's
offers multiple benefits for physical health (mortality, cardiovasc. Disease, ..)
and mental health (depression, anxiety), well being & social contacts

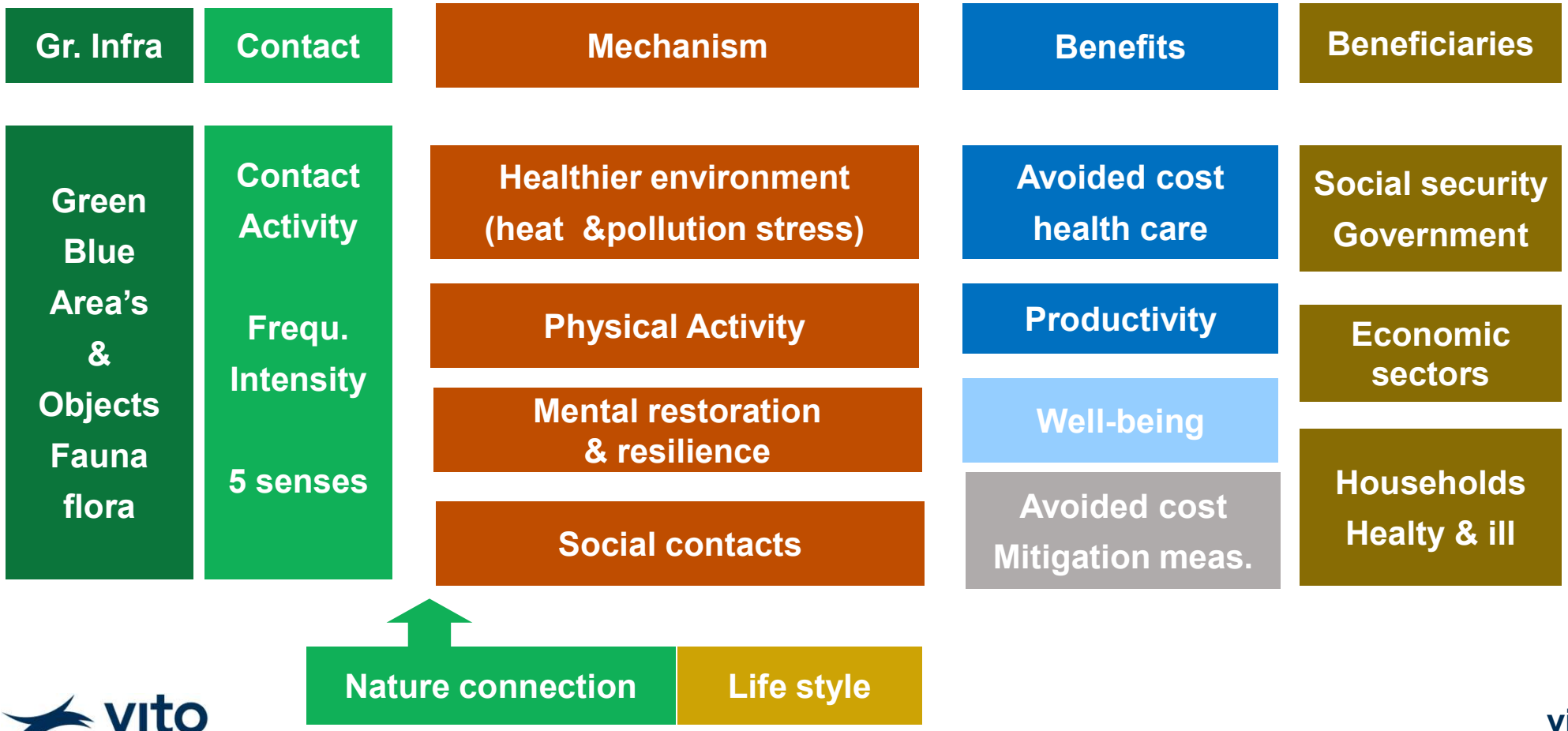
Experimental studies

Engagement with nature offer immediate benefits for physical and mental health

Impacts of Interventions

Green prescriptions for sick /vulnerable (e.g. forest bathing) : + if well executed
Green programs (e.g. 30 days green) : + for healty people
Greening the environment : + for well targeted programs

Health benefits: mechanisms



Factors for Calculation of health benefits

Green measure : e.g. creation of micro park in urban area

Benefit / person = change in health risk x value of the health risk , e.g. depression

Change in health risk

- Dose-response function: from epidemiology : RR = relative risk
  - (e.g. 0,96 for 10% more green area (ha) in 1 km range around the home adres
  - Assume micro park = 1 % extra green area
  - Impact micro park : 0,004 less cases of depression
- Prevalence data: baseline risk for depression

Cost data for depression

- Avoided health care cost for government and for patients and family
- Avoided absenteeism for patient and family
- Additional cost for suffering (if data available)

N° of beneficiaries = N° inhabitant 1 km around the micro park

Health impacts		Evidence & data	
Category	impact	Dose-response	Valuation
Mortality	Mortality all causes *	+++++	++
	Cardio-vascular mortality	++++	++
Physical health	Metabolic syndrome	+++++	++
	Cardio-vascular diseases	++++	+++
	Diabetes	+++	+++
	Obesity	++	++
	Sleep	+++	+
	Respiratory dis. & asthma	++	+
Mental health	Depression	+++++	++
	Anxiety	++++	++
	Other psych diseases	++	+
Other	Wellbeing	++++	+
	Cognitive impacts	++	+
	Loneliness	+	+

* Also important for heat stress & air pollution

Valuation: Modelling potential supply & demand & use

Mapping in detail of urban green infrastructure

+ Land use maps, high-low green, (official maps, earth observation,..)
+ Individual trees or micro parks in google maps
+/- Infrastructure (paths, banks, playgrounds) & naturalness
+/- Quality indicators (e.g. safety) (surveys, experts)

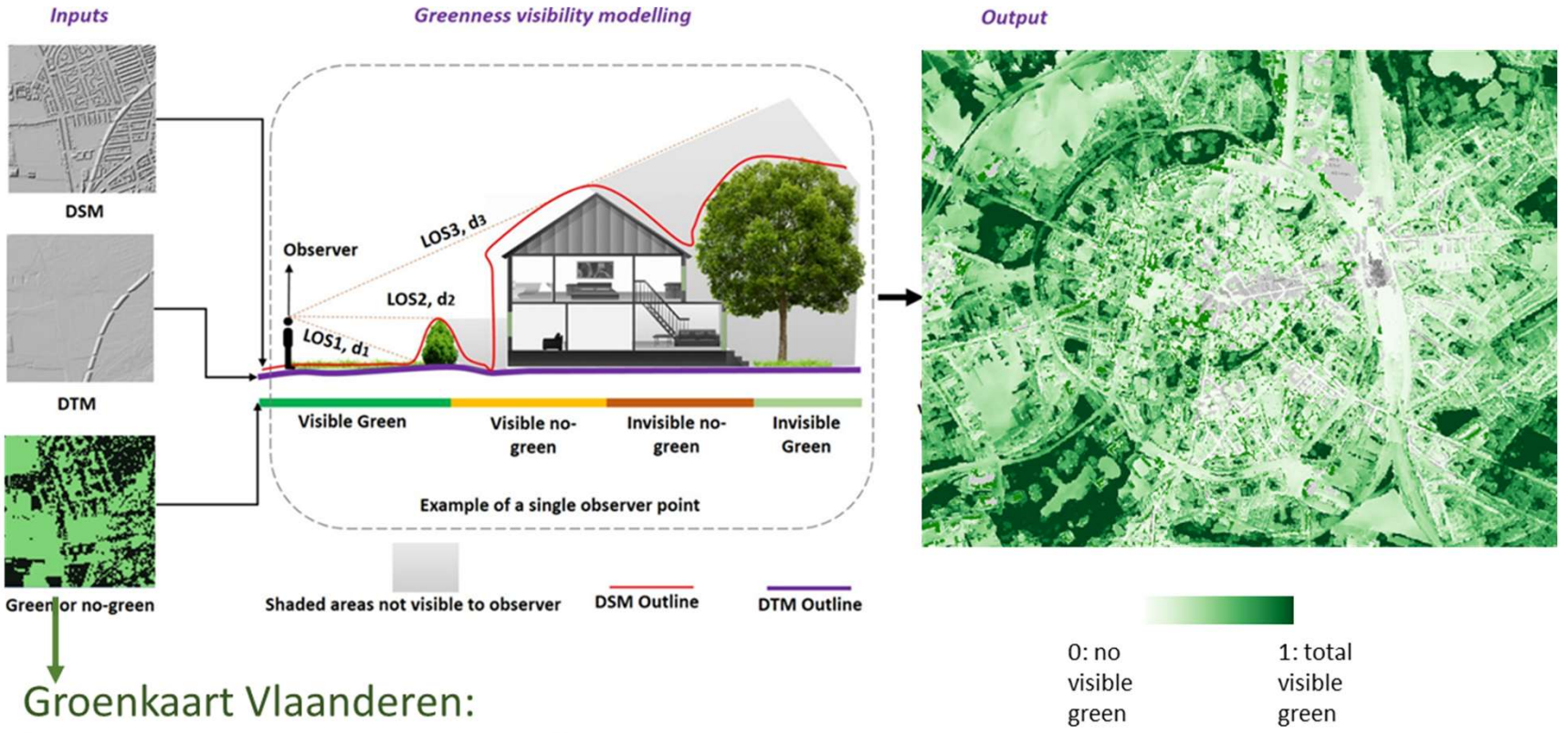
Supply Mapping Potential services from types of green infrastructure

Detailed modelling & Expert based evaluation systems
Map with ecosystems – potential impacts over a certain area

Demand : people and economic sectors that benefit

People, Socio-economic classifications
Assets and economic activities at risk for flooding, droughts
Current risks: heatwaves, flooding, air quality, lack of green area's nearby or transport

Example: mapping visuable green area & trees



Groenkaart Vlaanderen:
hoog groen, laag groen, landbouw

Concepts & methods to assess Economic benefits

Avoided costs

Health care: hospital costs, medicine
Productivity losses: absenteeism and labour participation
Flood protection: Avoided damages and repair costs
Heat waves: avoided air conditioning costs; health costs

Related markets & hedonics

Impact green infrastruct. on asset values (e.g. sale prices of houses)
Wage compensation for risky or unhealthy jobs
Additional income required to increase happiness or well-being

Travel costs

Time and expenses (public transport) to visit natural area's

Useful ?

Evidence to understand, model supply and demand for a range of ecosystems services

- **Incomplete**: not all services are covered
  Not all elements affecting supply and demand
- **Uncertain:** Integrated analysis combines uncertainties in all areas

Used in practice to:

- Identify **services** and their **beneficiaries**
- Account for them in selection and development of measures
- Rather a range, not exact numbers, not for fine tuning (e.g. as with building costs).
- Communication to and co-development with stakeholders.

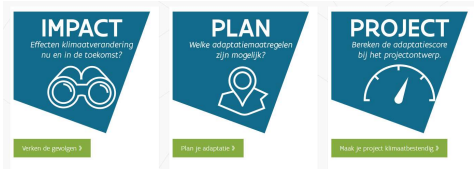
2. Tools to value benefits of urban green infrastructure

Tools using concepts of modelling ecosystem services of measures (benefit site)
(Co-) developed by Vito for Flemish Government

1. Nature value explorer : urban

NATURE VALUE EXPLORER

2. Climate adaptation tool: klimaatportaal



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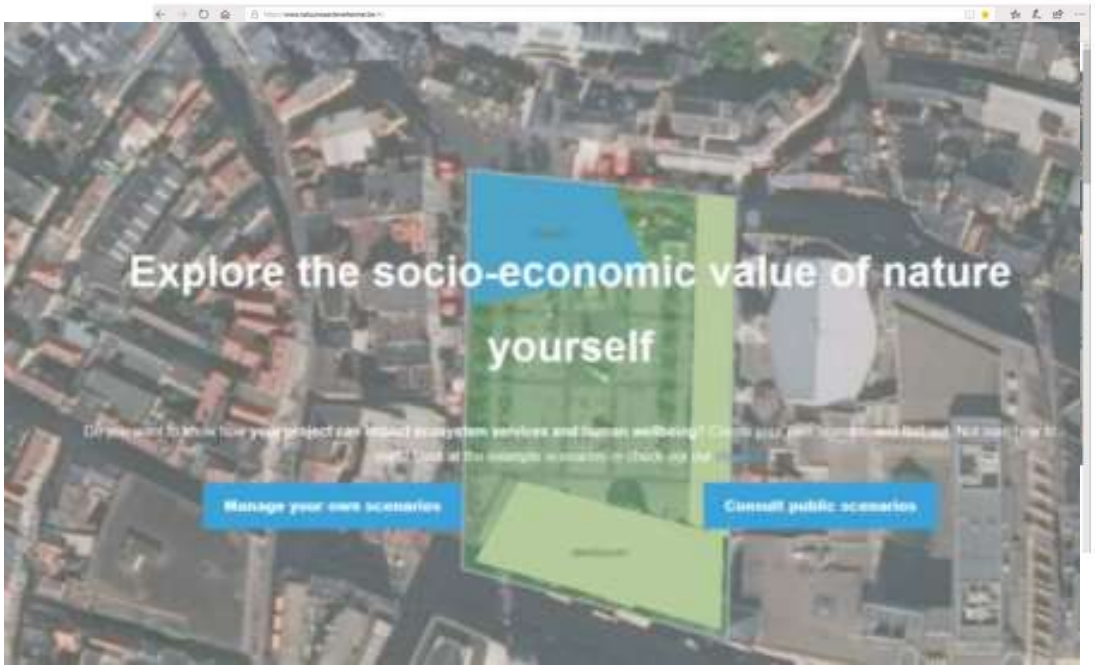

More info: video (english) on www.natuurverkenner.be

Tool to assess the impact of land use changes or NBS on ecosystem services

- Semi-Qualitative (score)
- Biophysical terms
- Monetary terms

Audience: professionals e.g.

- Planners/Developers
- Governments
- Land managers
- Landscape architects

Since 2018, 2500 scenario's created

2026: update

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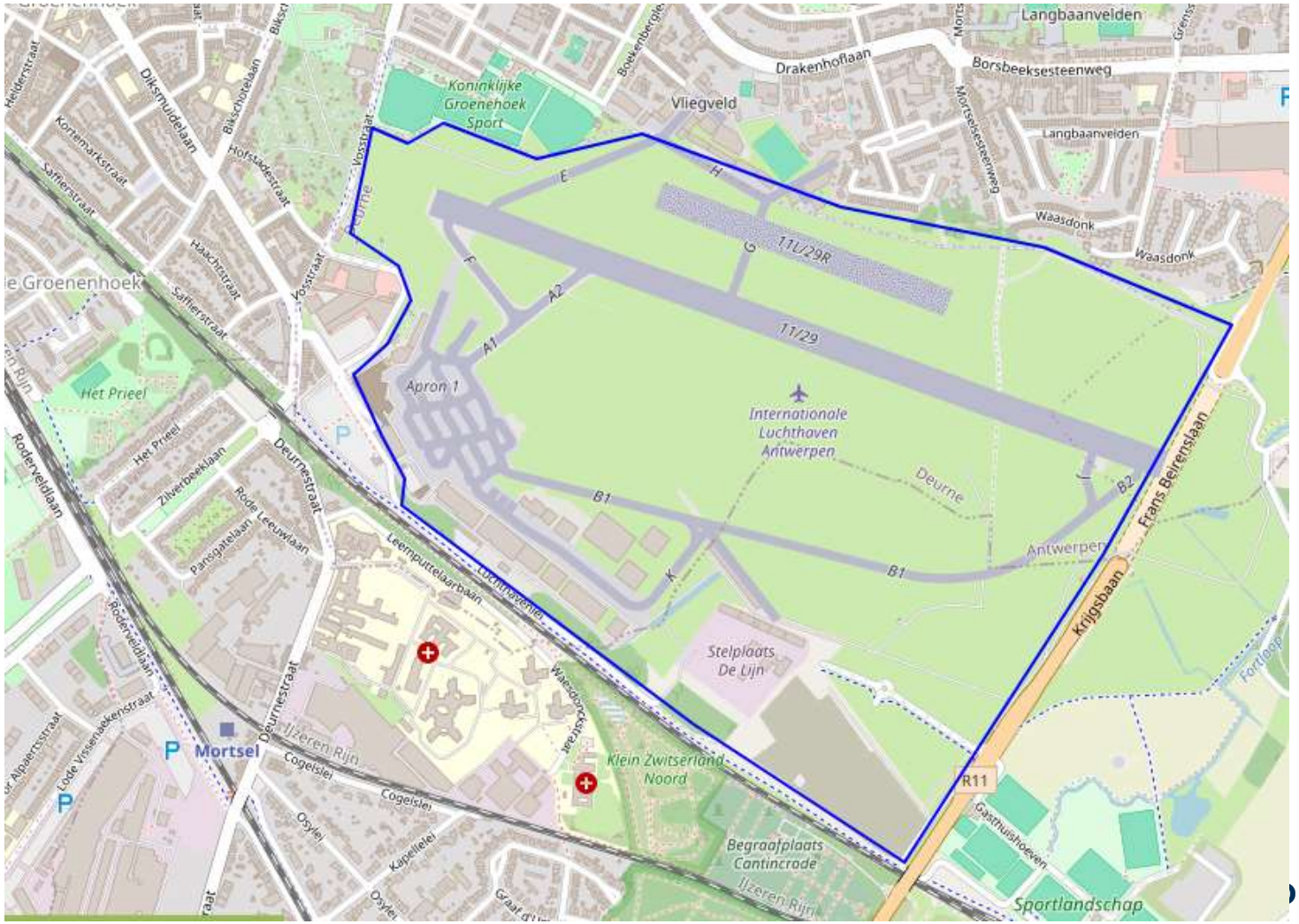
Airport Deurne: current situation

Source:
Public scenario
NVE, 2025

Grass & concrete



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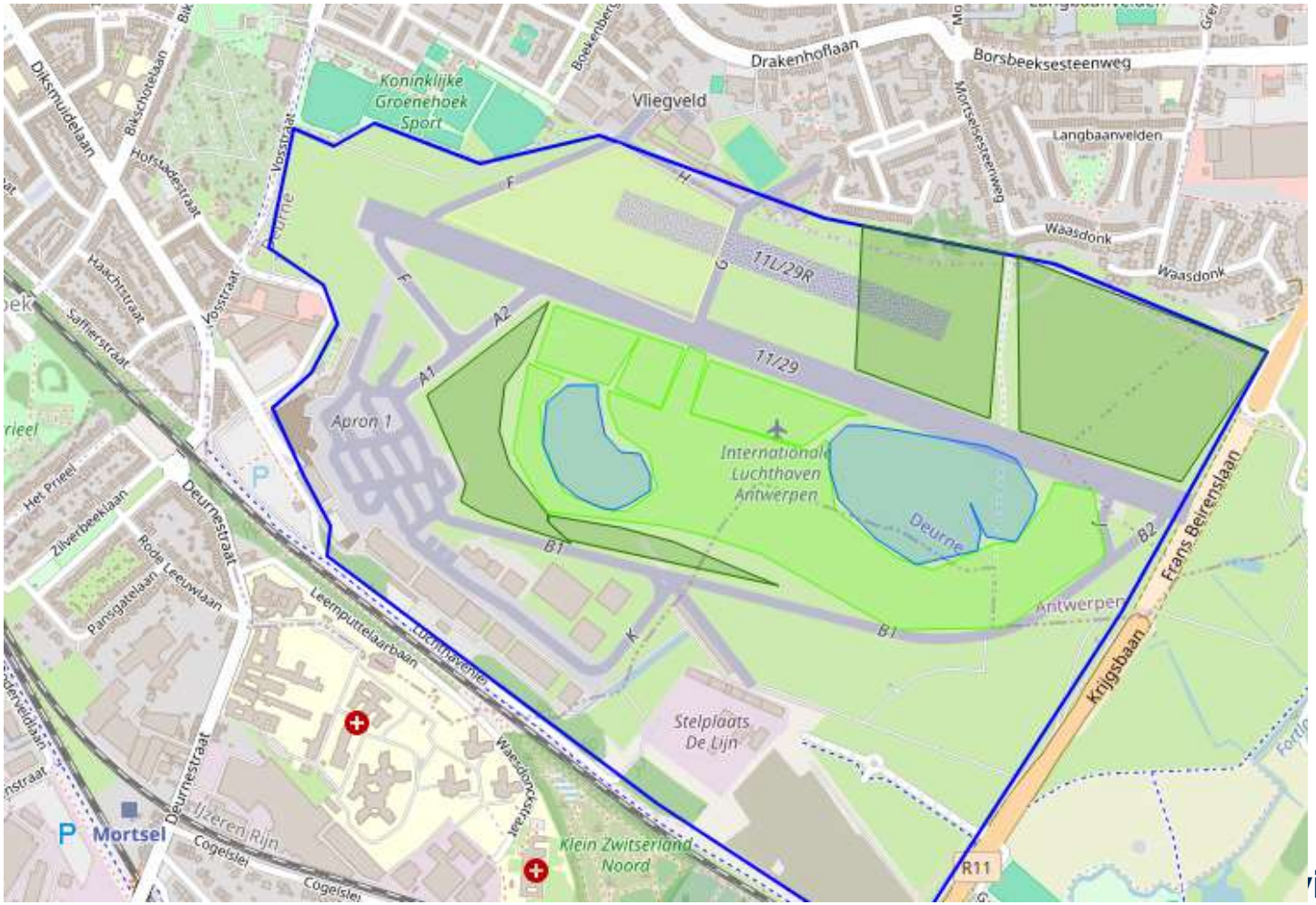
NATURE VALUE EXPLORER

Airport Deurne: greening measures

Public gardens
Forests broadleaf
Water
Grass field



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NATURE VALUE EXPLORER

Airport Deurne: impacts: quantification services

Qualitative value | **Quantitative value** | Monetary value

Quantitative valuation	Unit	Present		Future		Difference	
		Low	High	Low	High	Low	High
Food production	kg vegetables, fruit and nuts/ year	19.776,5	19.776,5	49.045,4	49.045,4	29.268,9	29.268,9
Fine particles global PM10	kg PM10 / year	1.281,9	1.281,9	1.778	1.778	496,1	496,1
Fine particles local	µg PM10/m^3	-	-	-	-	-	-
Avoided runoff	m^3 / year	553.367	553.367	710.648,1	710.648,1	157.281,1	157.281,1
Carbon sequestration biomass	tonnes C / year	37,9	219,2	198,1	446,4	160,2	227,2
Regional/local climate	Average decrease °C WBGT	0,2	0,2	0,5	0,5	0,3	0,3
Recreation	Number of visits /year	0	0	204.726,5	204.726,5	204.726,5	204.726,5
Extra value houses	% increase in housing value	5,6	5,6	6,2	6,2	0,6	0,6
Alternative method to compute the cultural services							
Health effects contact	DALY/year	5,9	5,9	6,6	6,6	0,7	0,7

NATURE VALUE EXPLORER

Airport Deurne: benefits of different services

Qualitative value | Quantitative value | **Monetary value**

Monetary valuation	Unit	Difference future - present	
		Low	High
Food production	€/year	43.277	43.277
Fine particles global PM10	€/year	35.717	35.717
Fine particles local	€/year	-	-
Avoided runoff	€/year	81.785	81.785
Carbon sequestration biomass	€/year	16.025	83.137
Regional/local climate	€/year	0	0
Recreation	€/year	307.090	307.090
Extra value houses	€/year	231.694	231.694
Total	**€/year**	**715.588**	**782.700**
Alternative method to compute the cultural services			
Health effects contact	€/year	28.085	28.085

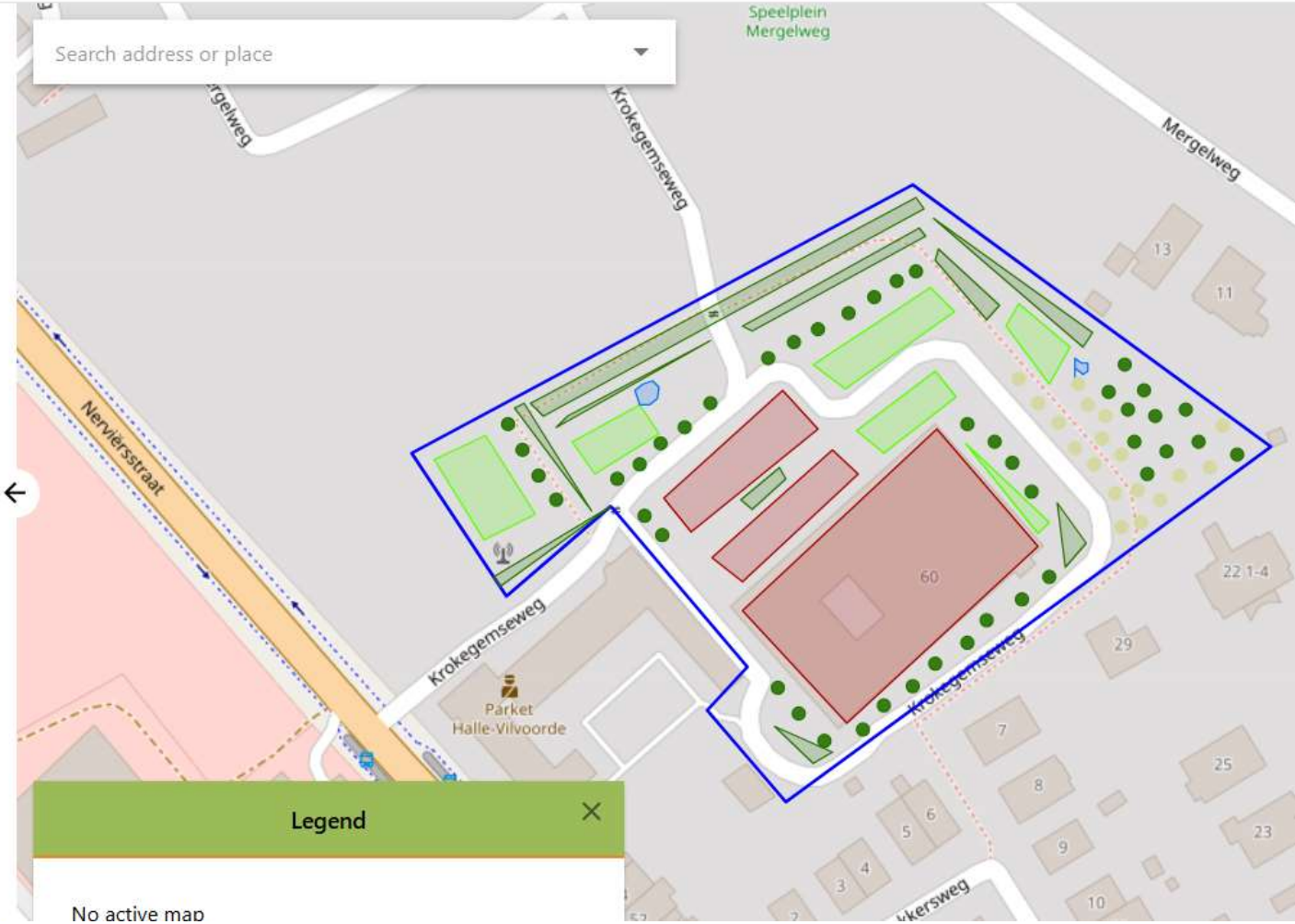
NATURE VALUE EXPLORER

E.g. smaller scale : campus police Asse

Scenario overview | Complex van de Federale Politie in Asse | Study area | Measures | Extra info | Services | Results

Measure overview

Bebouwde oppervlakte 1	Used input data	
Bebouwde oppervlakte 2	Used input data	
Bebouwde oppervlakte 3	Used input data	
Bloemenweiden en kruidachtigen 1	Used input data	
Bloemenweiden en kruidachtigen 2	Used input data	
Bloemenweiden en kruidachtigen 3	Used input data	
Bloemenweiden en kruidachtigen 4	Used input data	
Bloemenweiden en kruidachtigen 5	Used input data	
Bloemenweiden en kruidachtigen 6	Used input data	
Fruitbomen 1	Used input data	
Fruitbomen 10	Used input data	
Fruitbomen 11	Used input data	

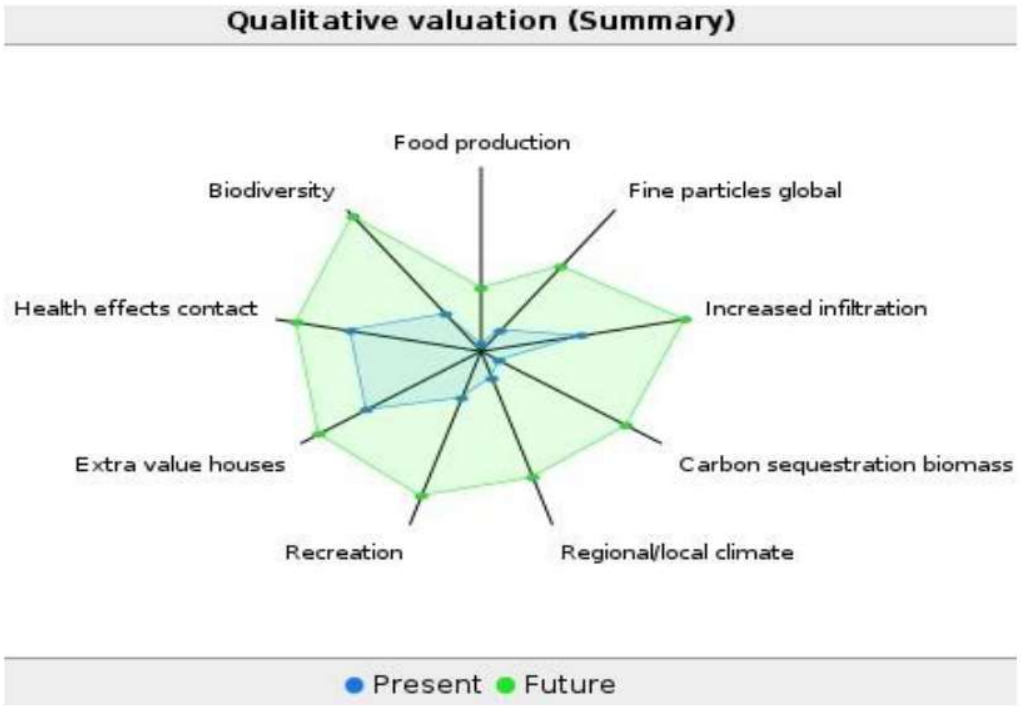


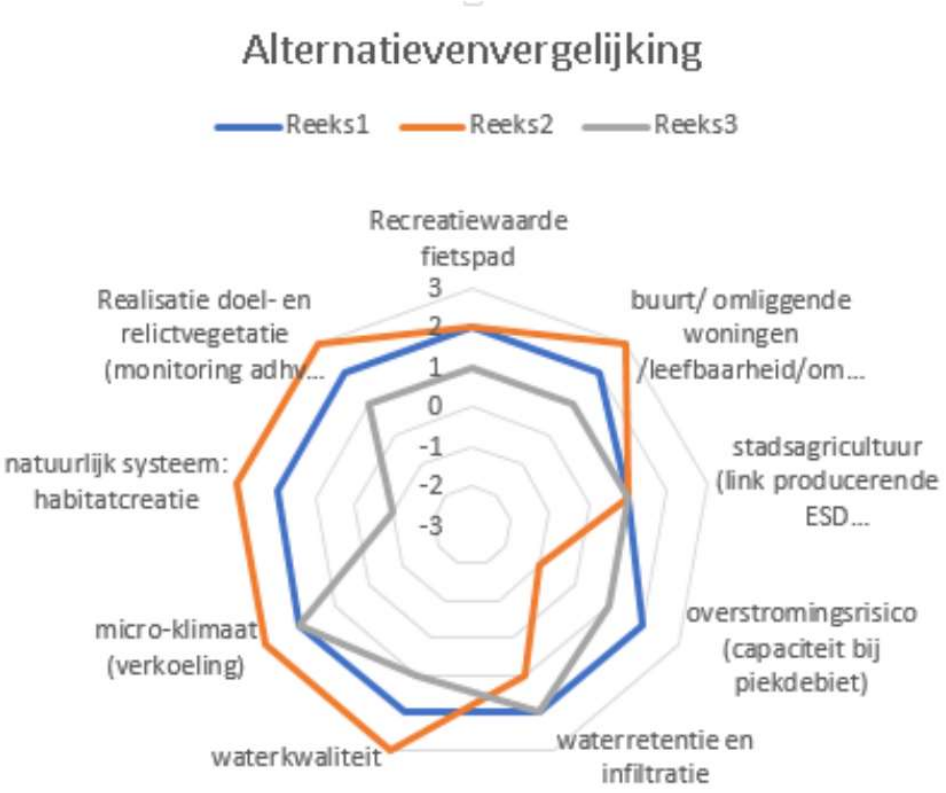
NATURE VALUE EXPLORER

Stakeholder cooperation
Bruges : kerkebeek (churh brook)

Figuur 2: Een voorbeeld van hoe een eerste verkenning met de natuurwaardeverkenner is gebeurd voor het deelgebeid boudewijnpark (Bron: Natuurwaardeverkenner, Vito).

kerkebeek: scenario's





More info: video (english) on www.natuurverkenner.be

NATURE VALUE EXPLORER

Transferablilty

- **For the moment only fully functional in Belgium**
- **Same ecoregions can use it but need to fill out all input data**
- **Cooperation in several Horizon projects to see how to expand-couple to other tools**
  - MOSAIC
  - SELINA (in Belgian Demonstration project)
  - Urbreath
  - Methods used in Smart Cities tool

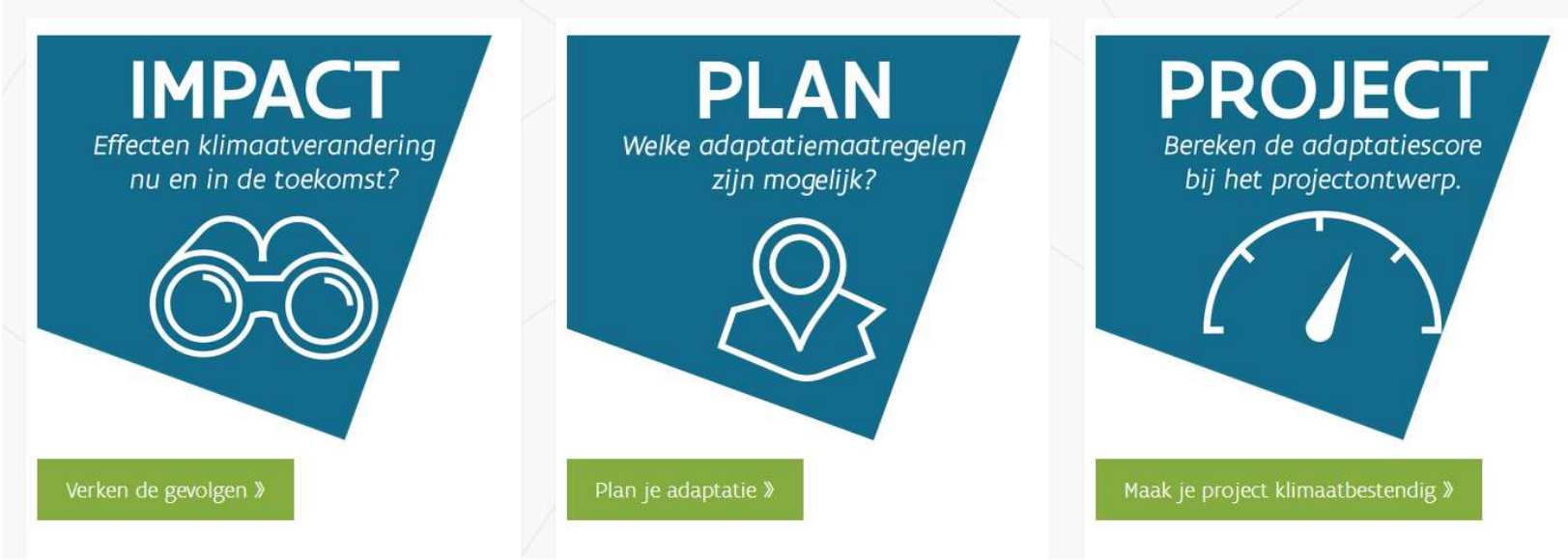
Climate adaptation tool: klimaatportaal

Assessment of local **measures for climate adaptati**on

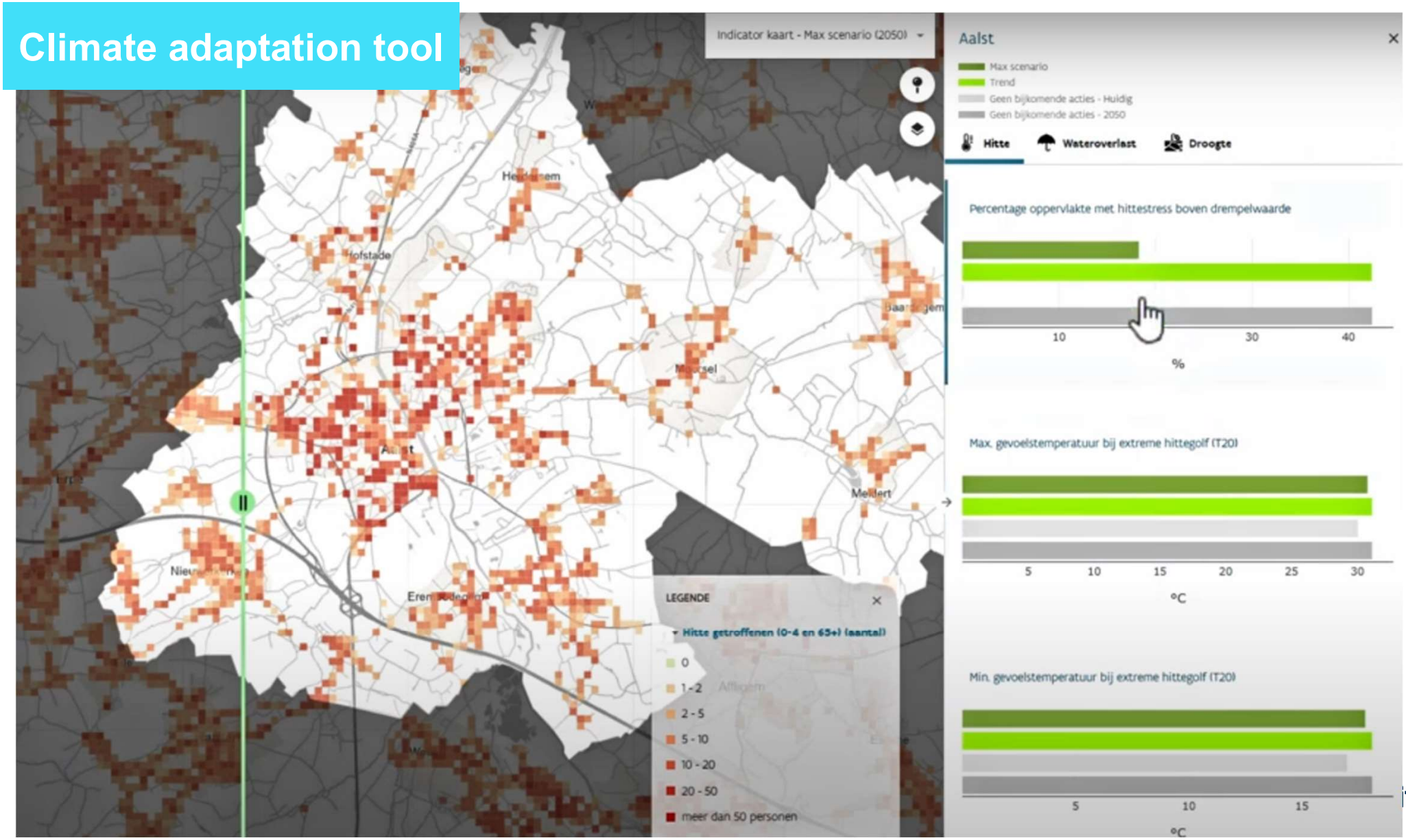
Potential impacts of **predefined packages of measures** (from minimum to max sc.)

Effectiveness : Need for measures (e.g. temperature, flood risks,) & impact

Efficiency: costs and benefits of predefined scenarios at local level



Climate adaptation tool



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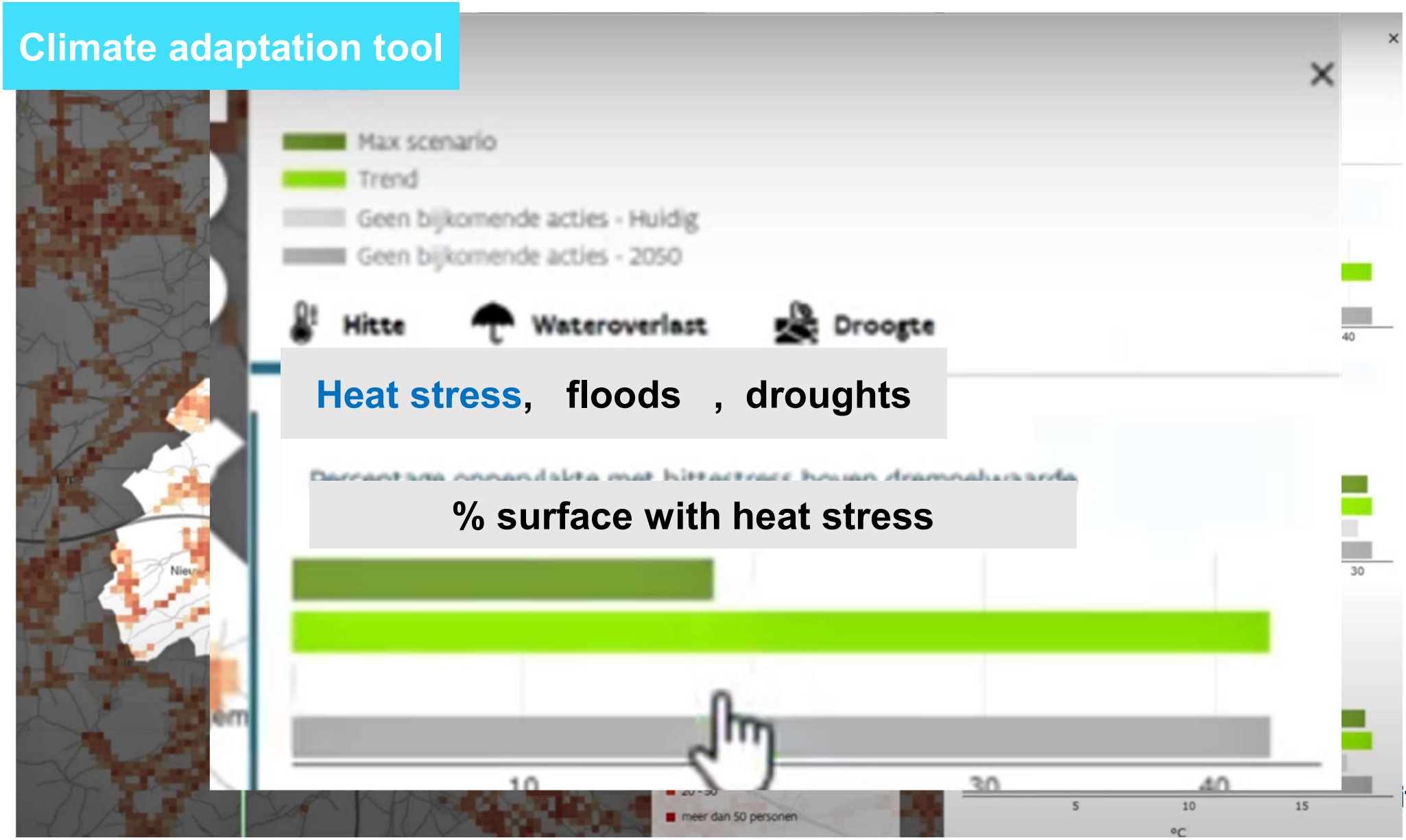
Climate adaptation tool



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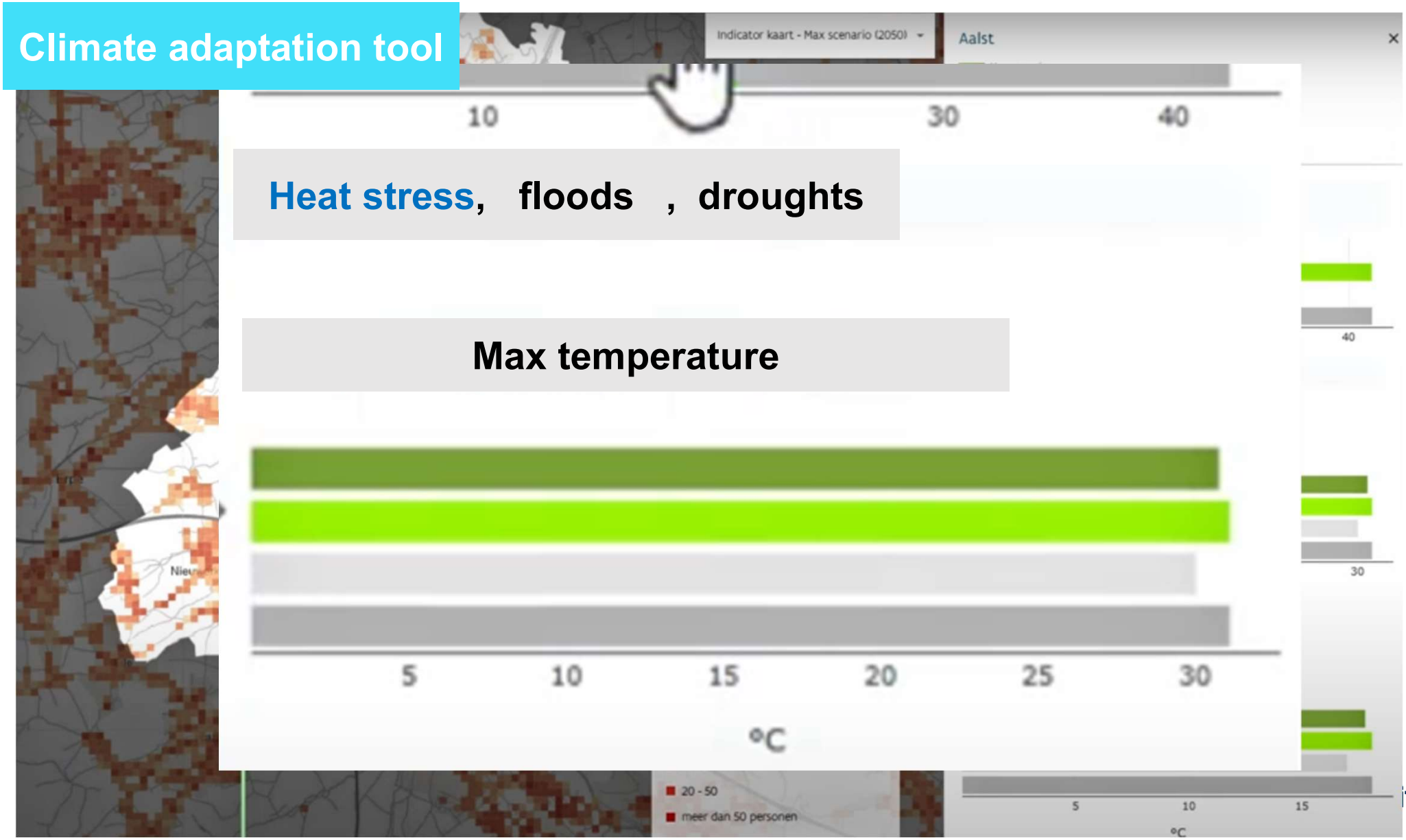
Climate adaptation tool



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Climate adaptation tool

Benefits of max scenario vs Trend

lst onder het Max scenario VS Trend

enteel o.a. de schade door droogte die kan vermeden

Avoided costs of floods

Avoided annual health costs for heat stress

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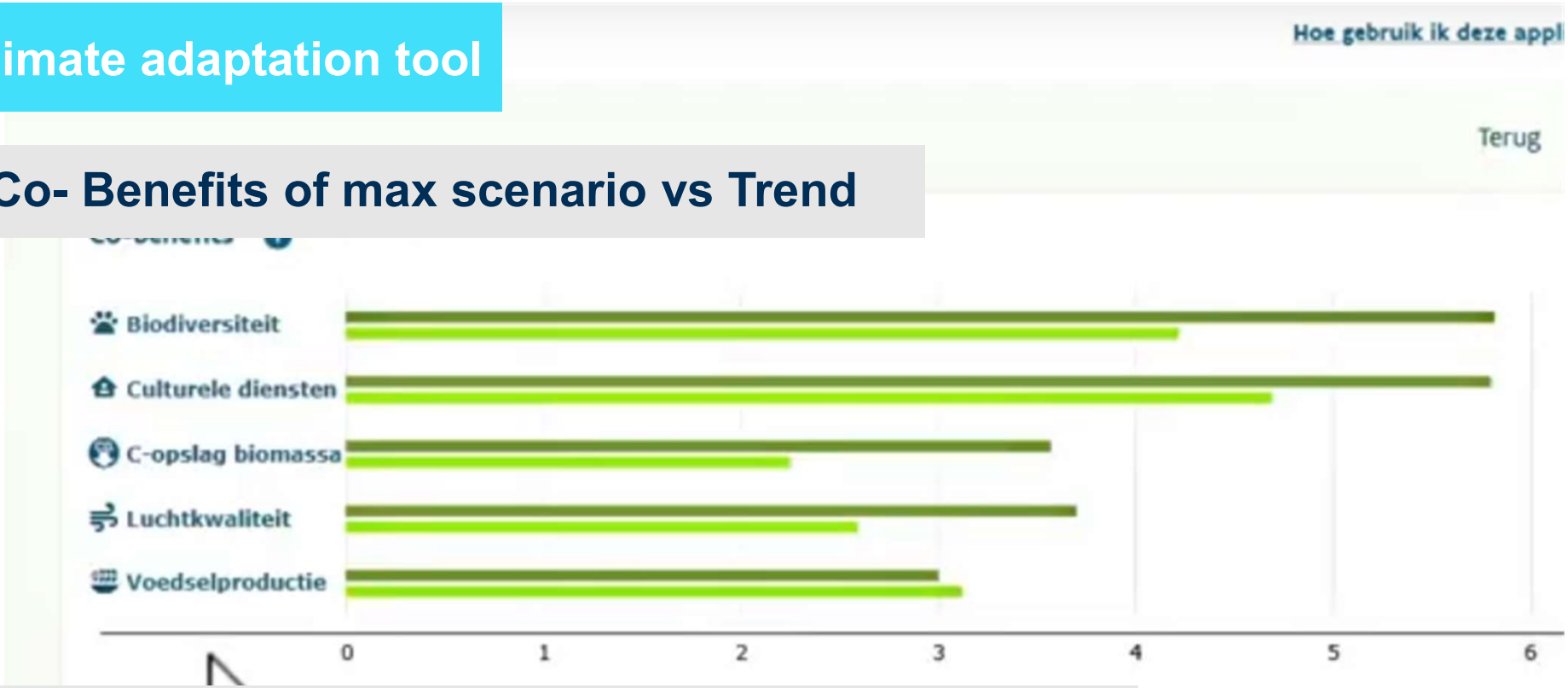
Climate adaptation tool

Co- Benefits of max scenario vs Trend



Additional annual costs max scenario vs Trend

3. Return on investment

Benefits depend on local situation and several factors

- Need for measures (heat stress, pollution, lack of green area for recreation)
- Effectiveness of measures (technical, design, …)
- Co-benefits (e.g. public garden)
- Actual use (N° of people)

Costs: integration in ongoing projects vs adaptation existing infra.
Need for early adaptation

ROI (only) guaranteed for well selected measures
But benefits not for those who pay for the costs

Return on investment

Many examples of projects in
Natural areas
With a great Return on investment

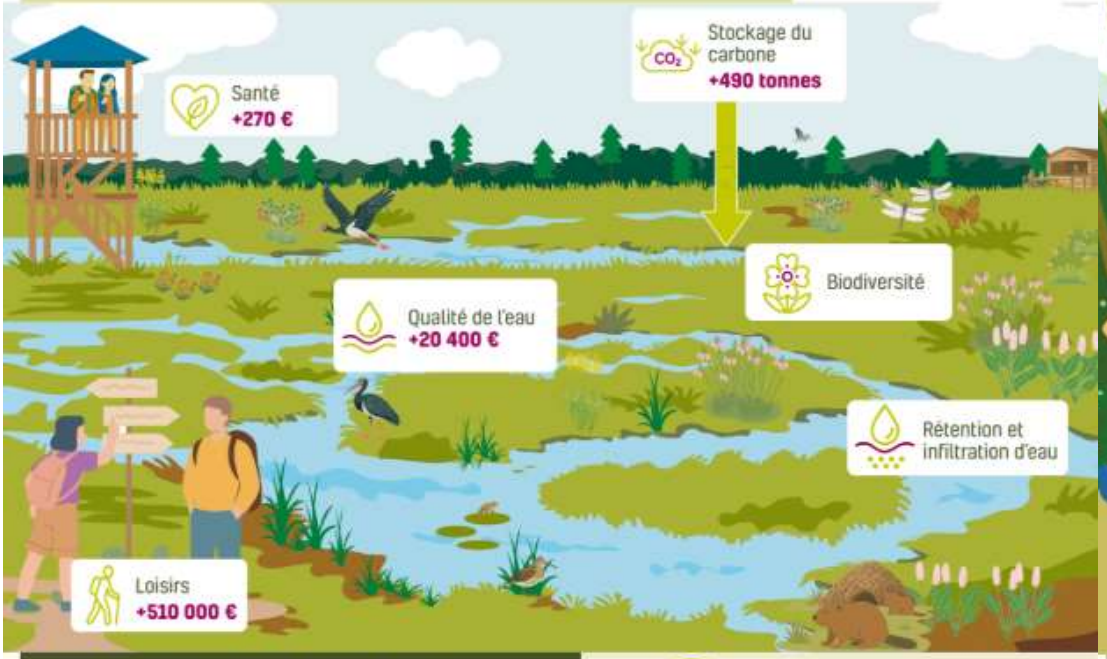
Dominated by different services

Depending on supply and demand

Illustrations from
Project for WWF Belgium

Étude menée par | vito | LIÉGE université Gembloux Agro-Bio Tech | À la demande de | WWF | natagora

RESTAURER LA NATURE : UN INVESTISSEMENT QUI RAPPORTE



PLATEAU DES TAILLES

Investir dans la nature porte ses fruits. Aujourd'hui, on a tendance à oublier que notre économie et notre bien-être dépendent fortement de la nature. Songeons par exemple à l'approvisionnement en matières premières comme le bois, l'eau ; à l'amélioration de la qualité de l'eau et de l'air ; à la protection contre

1 € DANS LA RESTAURATION DE LA NATURE RAPPORTE 25 €

Localisation
- Province de Luxembourg
- 380 ha

Biotopes
- Landes humides, tourbières
- Boulaies tourbeuses
- Prairie humide et mégaphorbiaies

Étude menée par | vito | LIÉGE université Gembloux Agro-Bio Tech | À la demande de | WWF | natagora

RESTAURER LA NATURE : UN INVESTISSEMENT QUI RAPPORTE

KASTANJEBOS

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1 € DANS LA RESTAURATION DE LA NATURE RAPPORTE 51 €

Situation
- Province du Brabant flamand
- Au nord de Veltem-Beisem et Winksele
- 165 ha

Beneficiaries and payments for ecosystem services

Who bears the costs differ from beneficiaries

A **lot of different** benefits and beneficiaries , often invisible and indirect
e.g. Different government departments (infrastructure vs health vs economy vs)

Limited **scope for collecting contributions** from beneficiaries

- may discourage use (e.g. green recreation)
- lower capacity to pay or contribute for vulnerable people
- high costs of implementation

Some benefits go to house owners or project developers
Examples :

- Indirect retribution: obligations to develop Green Infrastructure or social housing…
- **Co-creation** with different potential users-stakeholders

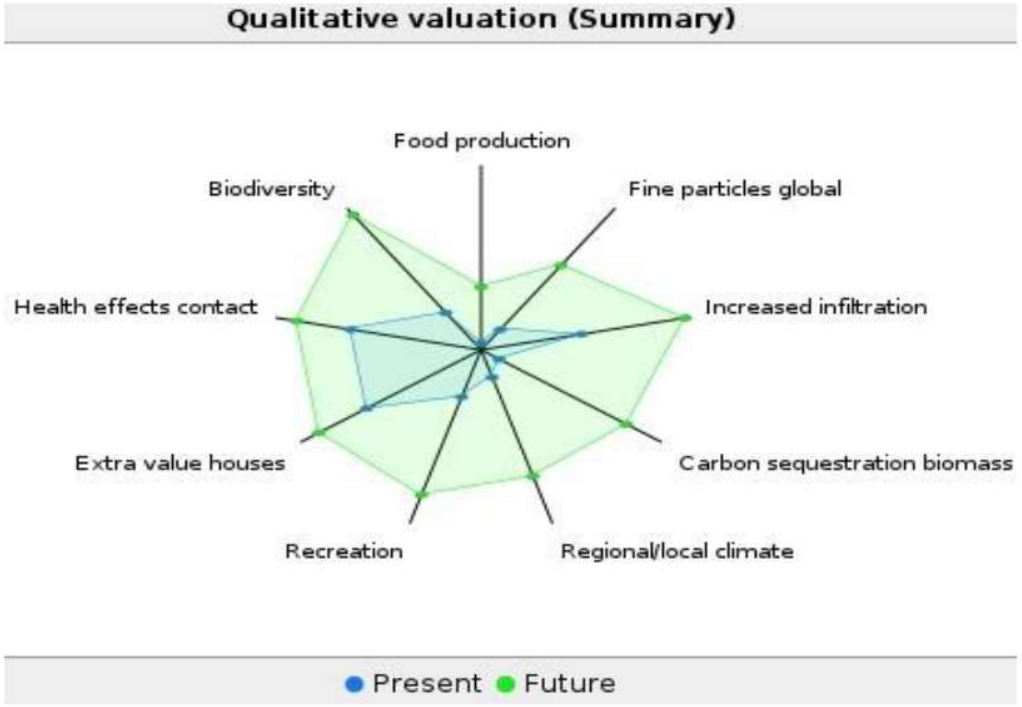
NATURE VALUE EXPLORER

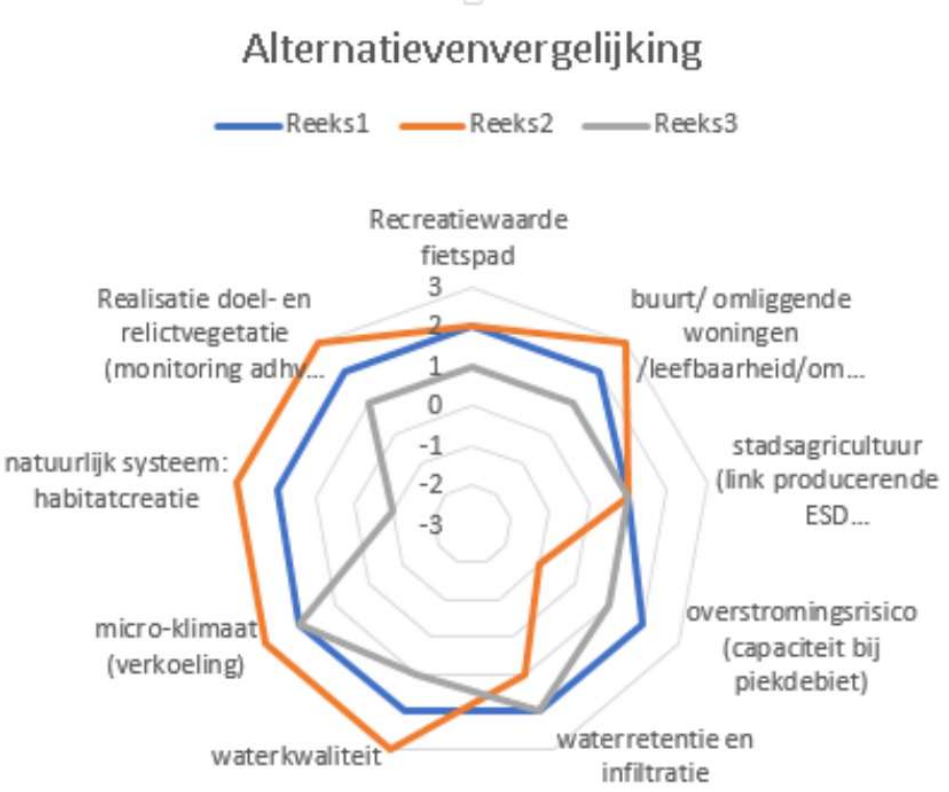
Bruges : kerkebeek (churh brook)

Figuur 2: Een voorbeeld van hoe een eerste verkenning met de natuurwaardeverkenner is gebeurd voor het deelgebeid boudewijnpark (Bron: Natuurwaardeverkenner, Vito).

NATURE VALUE EXPLORER

kerkebeek





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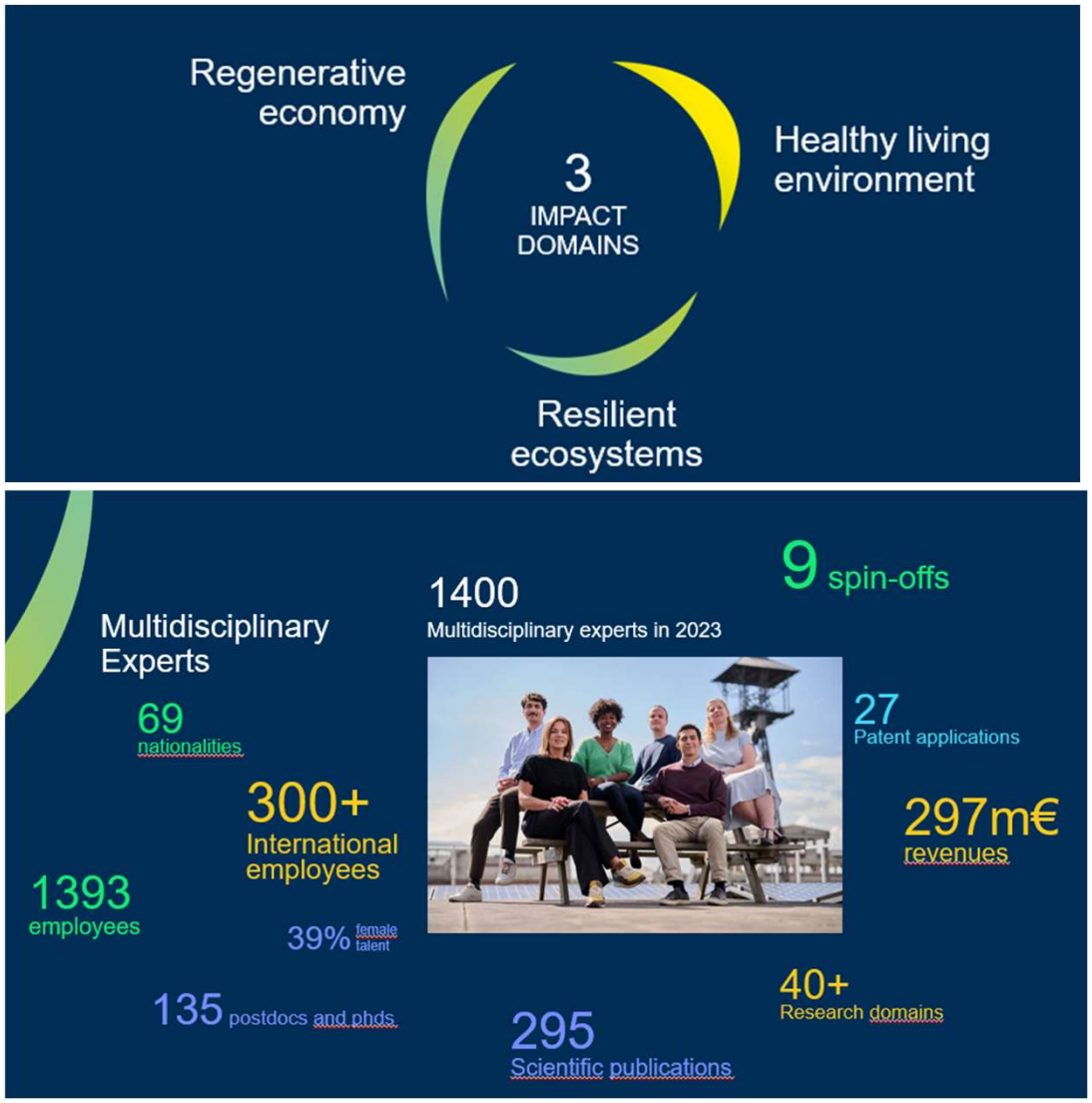
Vito
Research Institute
Flanders, Belgium

Leo De Nocker, senior researcher
Steven Broekx
Inge Liekens

leo.denocker@vito.be

Nature value explorer:
https://natuurwaardeverkenner.be/

https://vito.be/en/kennispunt-water



Question

- What are the main needs of information to convince other stakeholders of benefits for health sector
  - Type of green measures
  - Type of health benefits
  - Uncertainty and scientific evidence
  - Economic benefits : concepts and principles
  - Economic benefits: numbers