Monetary Valuation in SEEA EEA – Experiences in the Netherlands

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Experimental monetary valuation of ecosystem services and assets in the Netherlands

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Technical background report

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https://www.cbs.nl/en-gb/background/2020/04/monetary-valuation-of-ecosystem-services-for-the-netherlands

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Process

- Funding from Netherlands Government (thankfully acknowledged)
- Building upon pilots conducted in one province (Limburg) funded by Horizon2020 (thankfully acknowledged)
- Some 12-15 person-years of work
- Accounts produced for 2006 and 2013, now being updated to 2018 (new extent map and account recently finalized).
- 2020 supposed to be year focusing on outreach and connecting to stakeholders..

Ecosystem services (biophysical)

Provisioning services

- Crop production
- Fodder production
- Timber production
- Other biomass
- Water supply

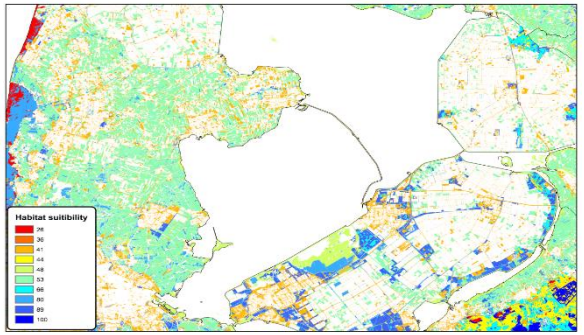
Regulating services

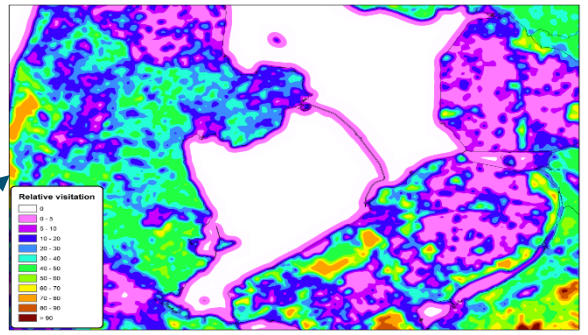
- Carbon sequestration
- Erosion control
- Air filtration
- Water infiltration
- Pollination
- Pest control

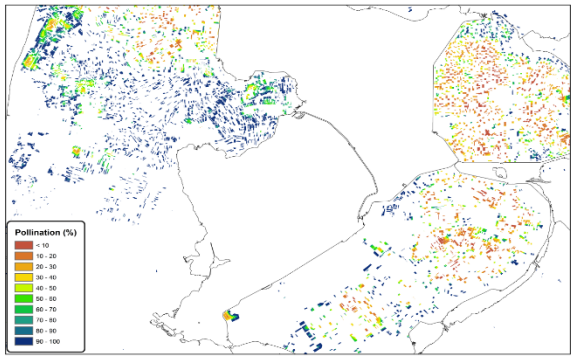
Cultural services

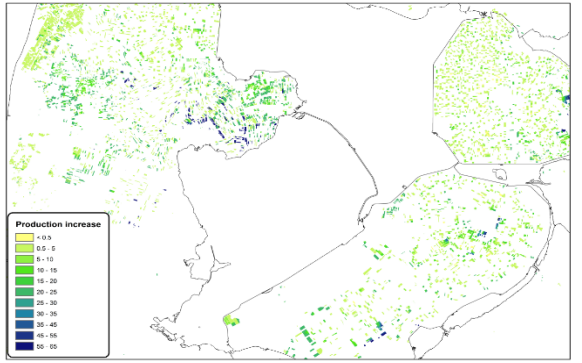
- Nature recreation (hiking)
- Nature tourism

Multiple datasets and models per service









Services in the Monetary accounts

- Crop and fodder production
- Timber production
- Water supply (filtration)
- Air filtration
- Carbon sequestration in biomass
- Pollination
- Nature recreation and nature tourism
- Amenity services: The value of living near nature: an analysis of Dutch house values

Focus

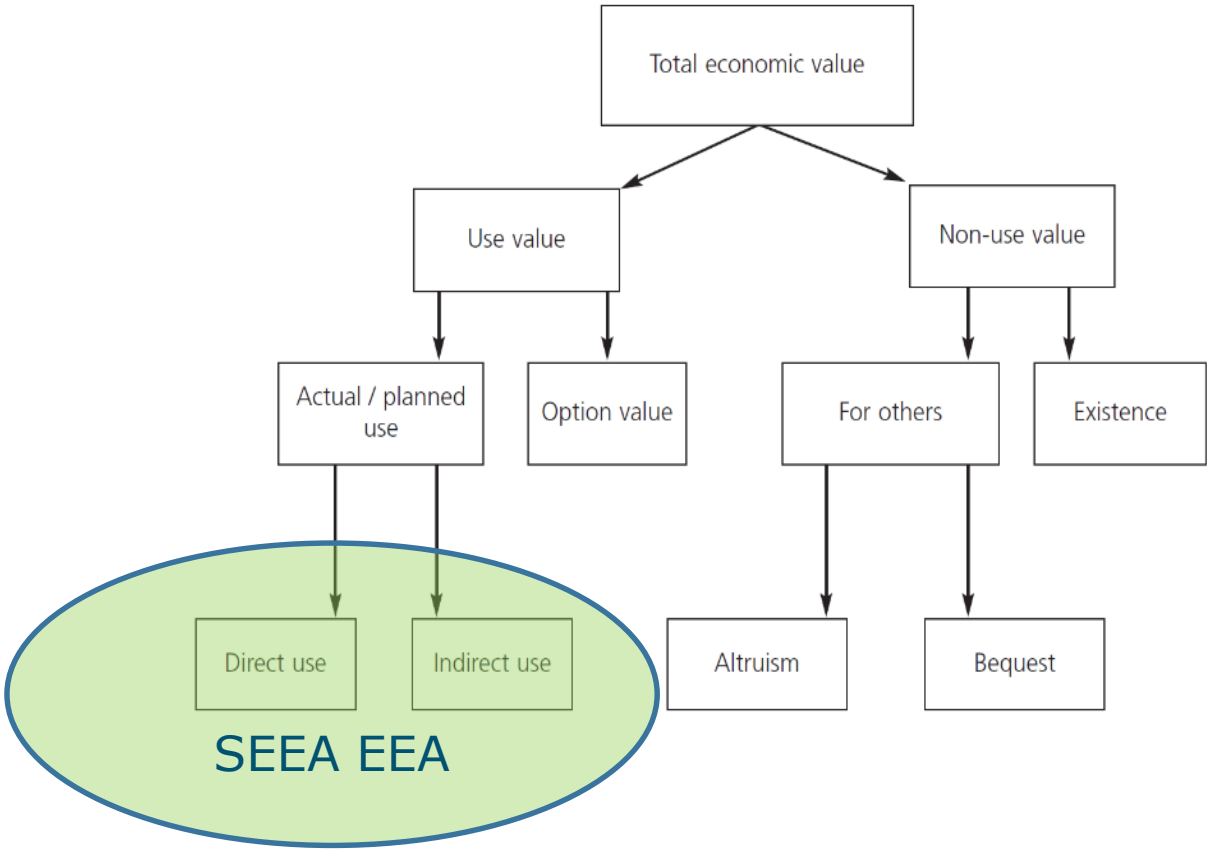
1. **Only estimate the monetary *value* of the contribution of ecosystems to *human benefits***. Non-economic values (e.g. the cultural value of a landscape) and so-called 'non-human' benefits (e.g. ecosystems as habitats for animals) have been excluded in this report.

2. **Focus on values of *final ecosystem services*** – produced by ecosystems and used in production activities (e.g. crops, timber) or consumption activities (e.g. avoided health damage of air filtration).

3. **Actual use of ecosystem services** rather than the capacity of ecosystems. This is consistent with the concept of actual transactions as recorded in the SNA.

4. We use valuation techniques that are **consistent with the principles of the System of National Accounting**. This implies that we calculate exchange values for ecosystem services rather than so-called welfare values.

Which values matter?

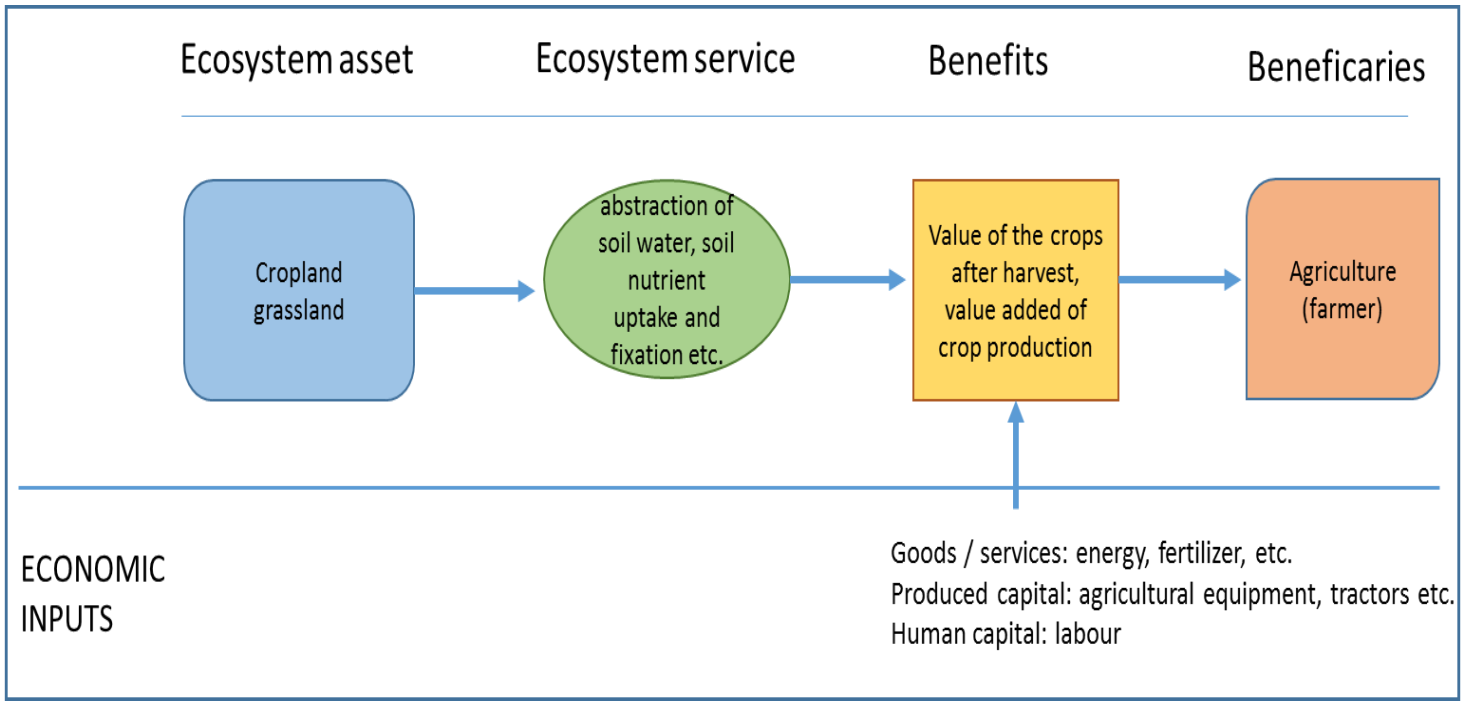


Intrinsic value

Tested methods for estimating the value of ecosystem services

Class	Ecosystem service	Exchange values			Welfare values	GVA/NVA approach
		Exchange values incorporated in GDP of the SNA		Exchange values not incorporated in GDP of the SNA		
		Contribution to production activities	Contribution to consumption activities			
Provisioning ecosystem services	crop production	resource rent rent prices user costs				GVA
	fodder production	resource rent rent prices user costs				GVA
	timber production	resource rent rent prices				GVA
Regulating ecosystem services	air filtration			avoided damage		
	carbon sequestration			avoided damage		
	water filtration			replacement costs		
	pollination			avoided damage		
Cultural ecosystem services	nature recreation		household expenditure			
	nature tourism	resource rent	household expenditure			
	amenity services	hedonic pricing				

Crop and fodder production



Three valuation methods

1. **Resource rent method**
2. **Rent prices**

   → Total value calculated (cropland and grassland) based on rent prices and data on the extent of agricultural land

3. **User costs of land**

   → Total value calculated based on land values and its capital services (long-term rate of return: 0.9%)

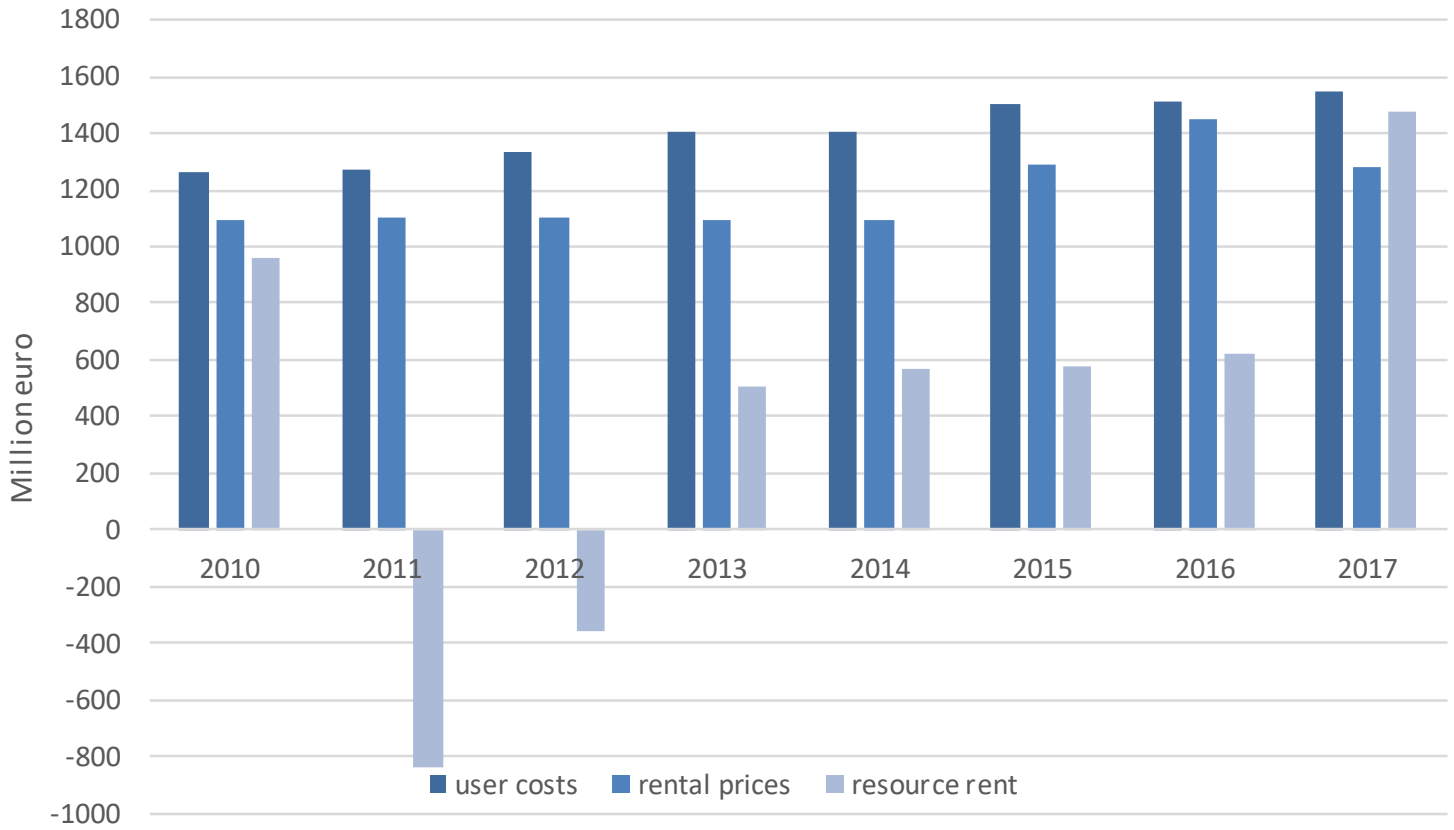
Output
less intermediate consumption
less compensation of employees
less other taxes on production
plus other subsidies on production
Equals gross operating surplus
less consumption of fixed capital (depreciation)
less return on produced assets
less labour of self-employed persons
Equals resource rent
= depletion + net return on environmental assets

The user costs of agricultural land (excluding any building or structures on the land) can be calculated as the real rate of return times the value of land (OECD, 2009):[4]

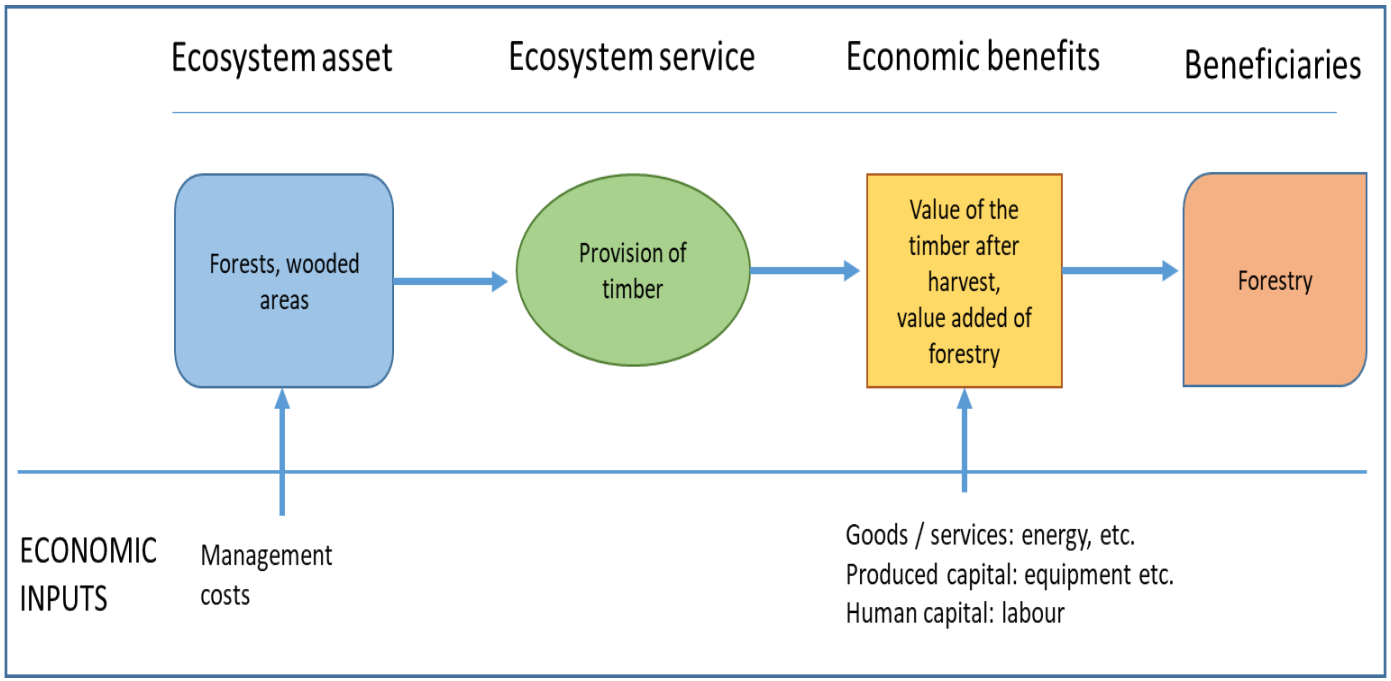
$$UC = (r - p)W$$

where r is the nominal rate of return, p is the general price change (inflation), and W is the land price. The rate of return for agricultural land in the Netherlands is annually calculated by Wageningen Research and is based on the return on risk-free fixed-income securities (Wageningen Research, 2018). It is calculated as:

Results: comparison of methods for valuing crop provisioning



Timber


Ecosystem asset
Ecosystem service
Economic benefits
Beneficiaries
Forests, wooded areas
Provision of timber
Value of the timber after harvest, value added of forestry
Forestry
ECONOMIC INPUTS
Management costs
Goods / services: energy, etc.
Produced capital: equipment etc.
Human capital: labour

Methods

1) Resource rent

→ Resource rent for ISIC 2

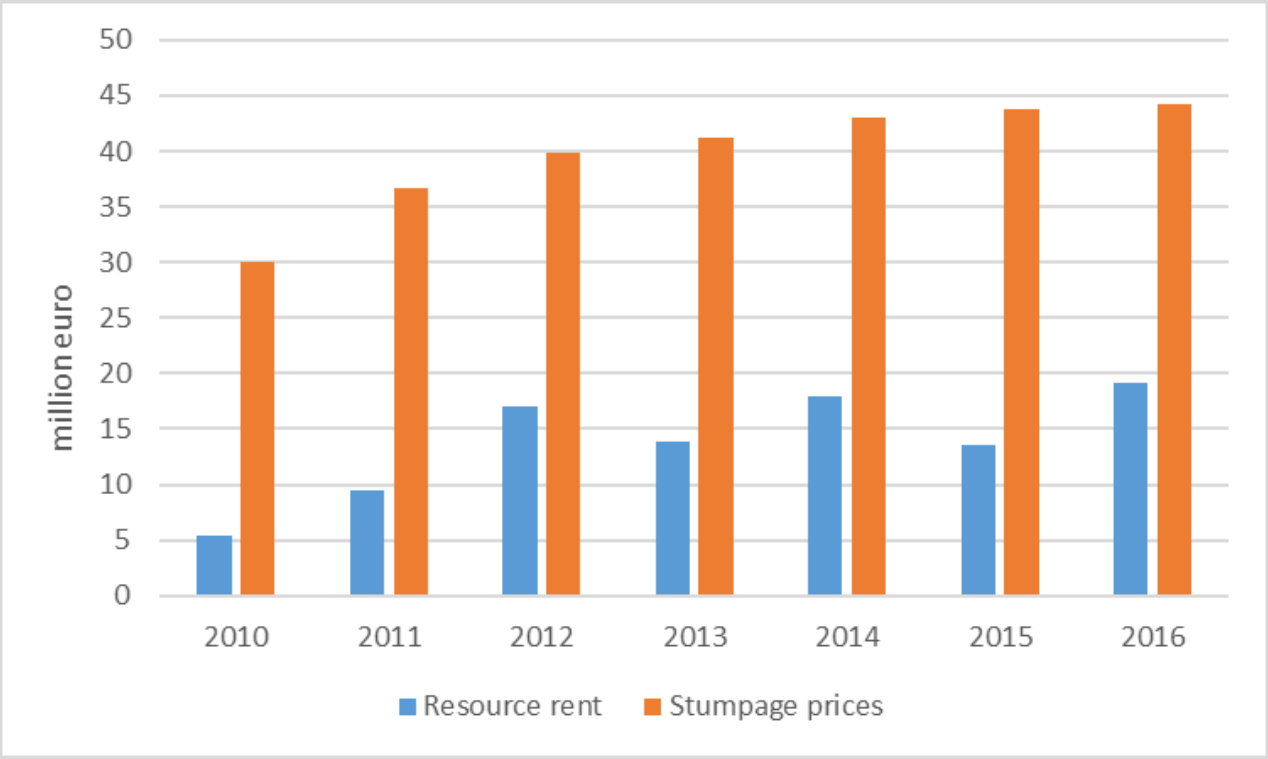
→ About 60 % output ISIC 2 related to timber production

2) Stumpage prices

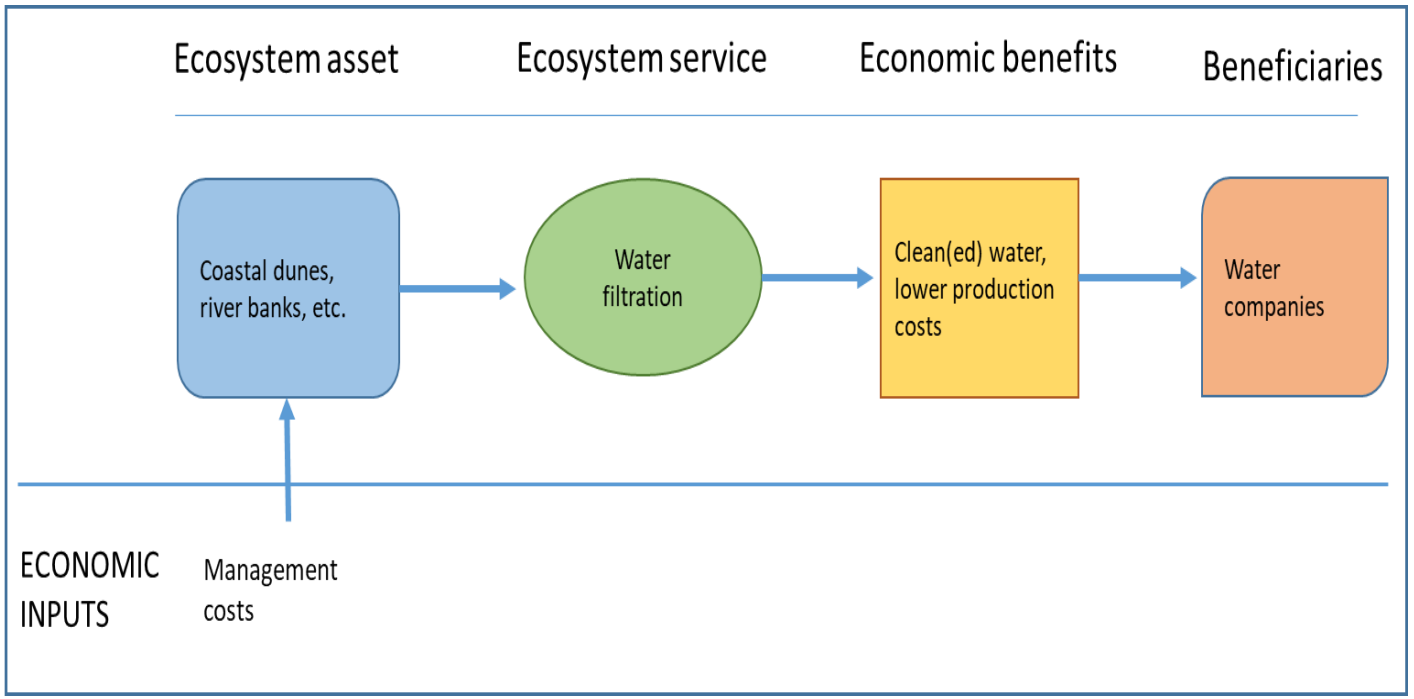
→prices paid per standing tree, including bark, for the right to harvest from a given land area

→ The value is calculated by multiplying the stumpage price (euros/m^3) with the total amount of wood harvested (m^3)

Results timber provisioning



Water supply / filtration

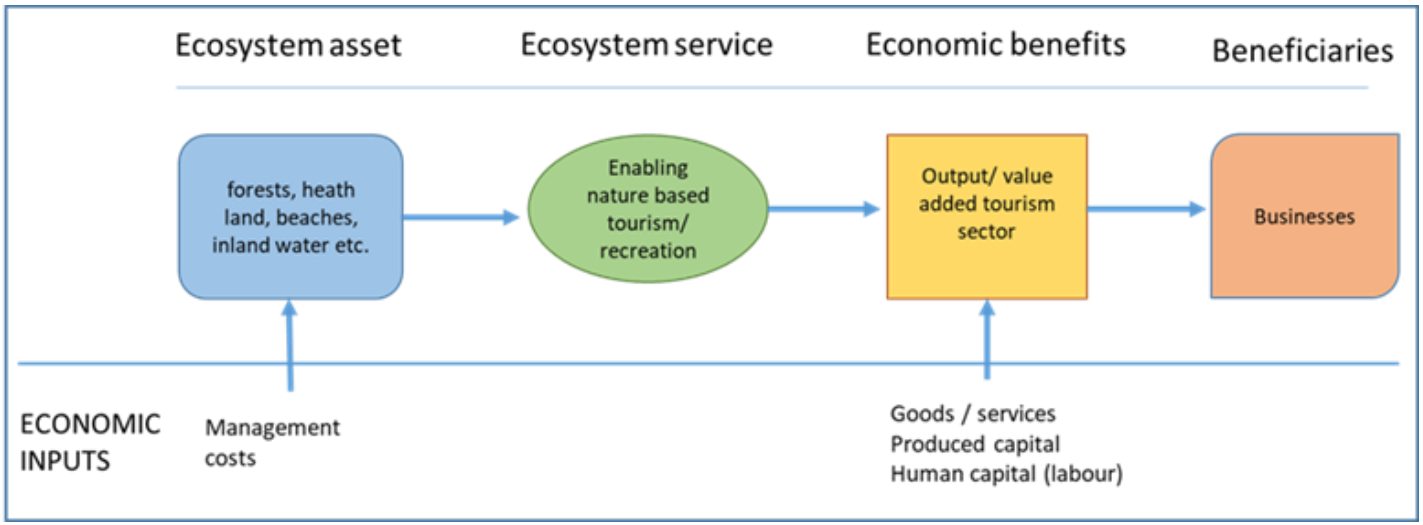


- Valuation with the replacements costs method
- Replacement costs are estimated by measuring the difference in production costs of drinking water from groundwater relative to surface water.

Results water supply / filtration

	2010	2011	2012	2013	2014	2015	2016	2017
Difference between the average production costs of groundwater and surface water companies (euro per m3, current prices)		0.35	0.40	0.41	0.44	0.42	0.49	
Total volume of groundwater abstracted for the supply of drinking water (million m3)	295	293	292	296	292	296	300	303
Total value of the ecosystem service water filtration in millions of euros at current prices		103.2	115.7	121.9	128.0	124.9	148.3	
Total value added of drinking water companies ('the benefit') in millions of euros at current prices	1012	987	1046	1063	1059	1064	1038	1026

Nature tourism and recreation



Methods

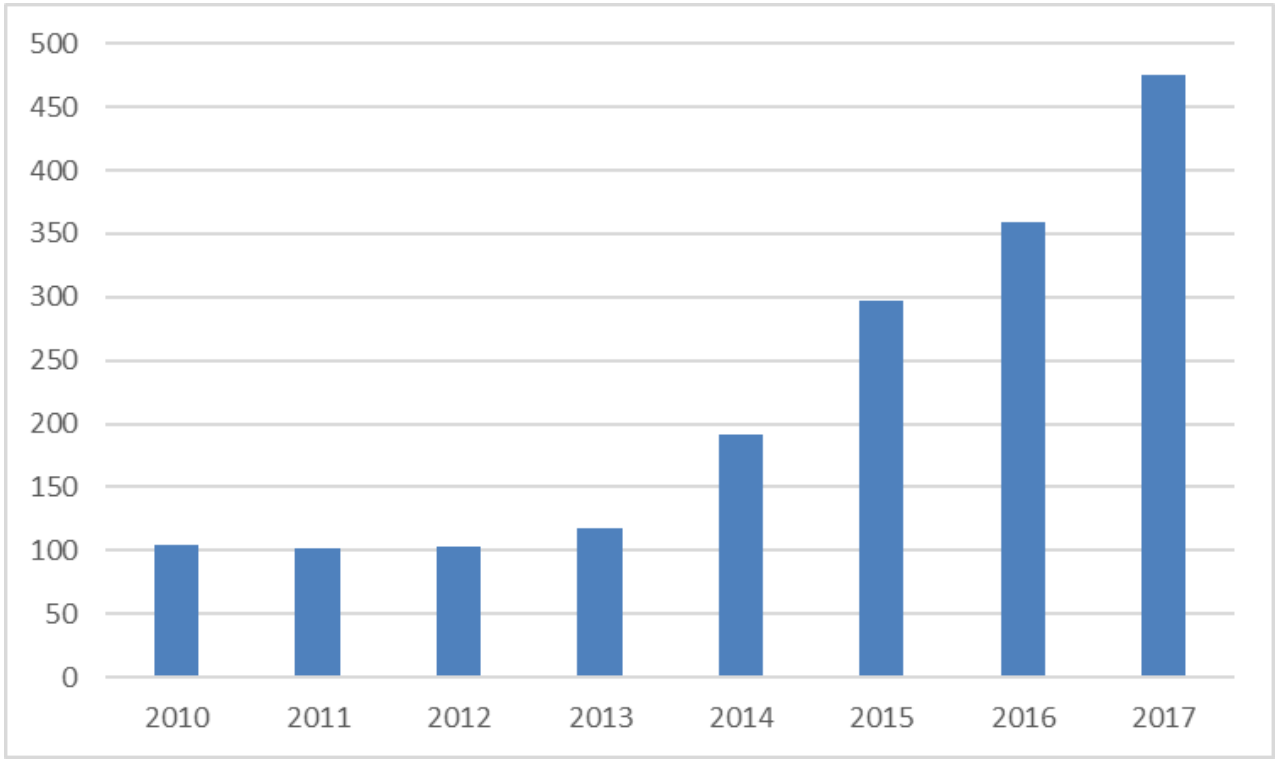
Resource rent

- The tourism sector was delineated based on the definitions and data from the Tourism satellite accounts.
- The part of the resource rent related to nature was calculated based on expenditure data from the tourism statistics.

Consumer expenditure

- Total consumer expenditure related to nature tourism/recreation was taken as an approximation for the related ecosystem service.
- Consumer expenditure was determined separately for a) nature recreation, b) nature tourism by residents and c) nature tourism by non-residents.
- Only expenditure related to outdoor activities were selected.
- With respect to expenditure categories we included a) travel costs, b) accommodation costs (only for tourism), c) costs for food and drinks, and d) other related costs (which includes admission fees etc.).

Resource rent tourism



The calculated resource rent is only 1% of the total output of tourism related industries

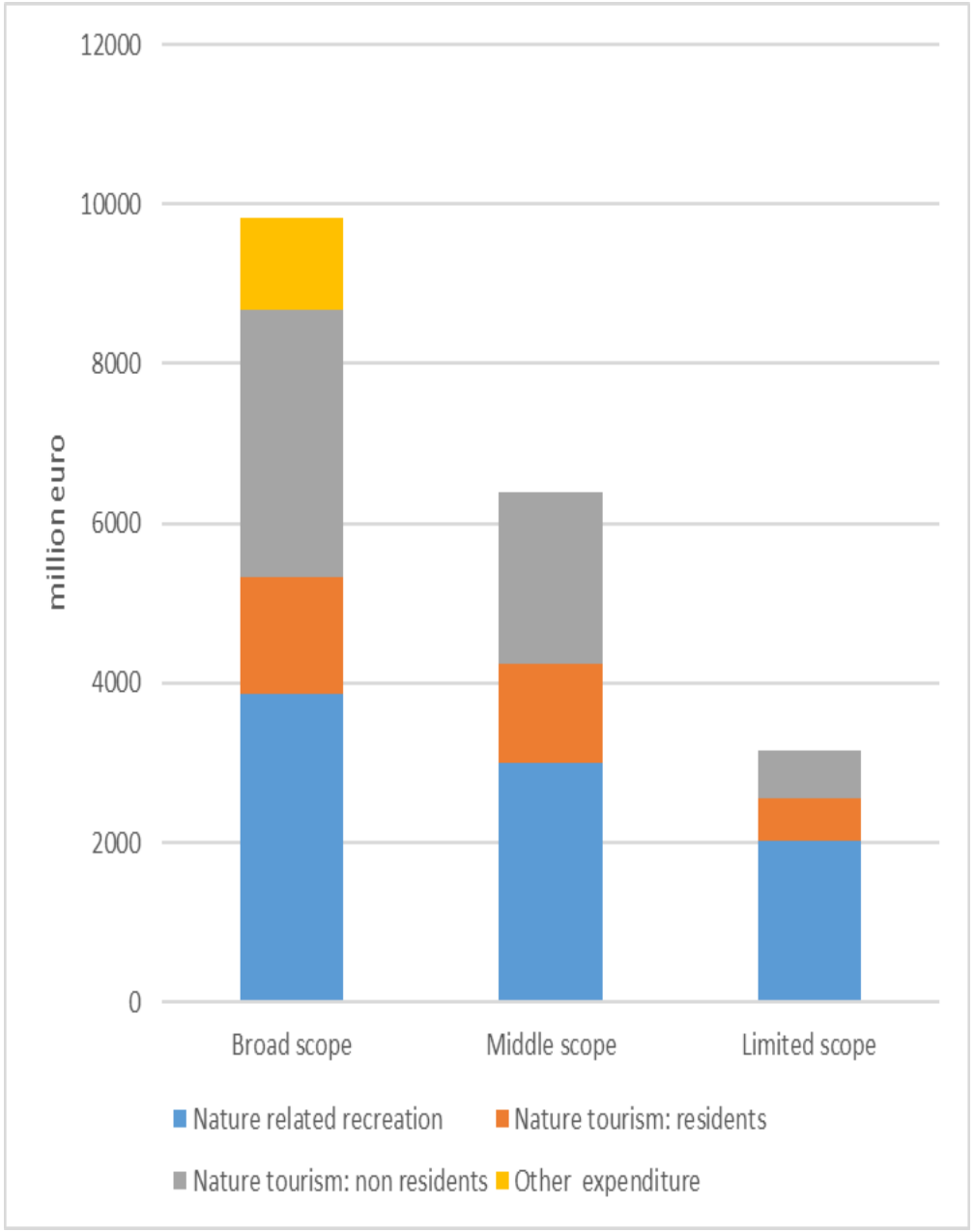
0

Expenditure on nature related recreational activities, 2015, million euro

	Admission fees, etc.	Travel costs	Food drinks etc.	Other	Total
Hiking	30,8	506,6	176,2	30,8	744,4
Cycling	25,1	65,7	185,5	25,1	301,4
Other outdoor receration	87,8	821,5	333,2	300,5	1543,0
Water sports	80,3	78,5	34,2	122,0	315,0
Outdoor sports	119,1	196,9	152,0	501,5	969,5
Total	343,2	1669,1	881,1	980,0	3873,4

Nature related expenditure for tourism and recreation activities calculated according to three scenarios

1) **Limited scope:** travel costs, admissions fees
2) **Middle scope:** travel costs, admissions fees, accommodation costs, other costs
3) **Broad scope:** travel costs, admissions fees, accommodation costs, other costs, food and drinks, other related expenditure (mainly consumer durables)



Monetary supply table

	million euro	Agriculture	Dunes and beaches	Forest	Heath land and inland dunes	Wetlands	(semi)natural grassland	Public green space	Other unpaved terrain	River flood basin and salt marshes	Built up terrain	Water	Other	TOTAL	
Provisio-ning services	Crop production	415	0	0	0	0	0	0	1	0	0	0	0	415
	Fodder production	849	0	0	0	0	0	0	2	21	0	0	0	872
	Timber production	0	2	41	0	0	0	0	0	0	0	0	0	44
	Drinking water	34	0	41	8	1	2	3	14	3	18	1	0	125
Regulating services	Carbon sequestration	35	5	102	1	2	2	3	11	10	1	0	0	171
	Pollination	136	0	73	5	6	15	11	70	36	7	2	0	359
	Air filtration	10	1	6	0	0	1	2	5	0	15	2	0	42
Cultural services	Nature recreation	910	329	949	135	78	75	547	532	58	26	235	1	3873
	Nature tourism	2489	1791	602	100	52	97	113	463	115	6	116	0	5946
	Amenity service	84	167	231	24	9	23	204	33	13	18	207	0	1014
TOTAL		4962	2295	2044	275	147	215	884	1130	256	91	563	1	12863

Monetary use table

	million euro	A - Agriculture, forestry and fishing	B,C - Mining and manufacturing	D - Electricity	E - Water supply	F-H - Contruction, wholesale and transportation	I,R - Accommodation and food service, culture, sports and recreation	Export	Households	Government	Investments	Inventories	TOTAL
Provisio-ning services	Crop production	415											415
	Fodder production	872											872
	Timber production	44											44
Regulating services	Water filtration				125								125
	Carbon sequestration									171			171
	Pollination	359											359
	Air filtration								42				42
Cultural services	Nature recreation								3873				3873
	Nature tourism							3341	2605				5946
	Amenity service								1014				1014
TOTAL		1690	0	0	125	0	0	3341	7535	171	0	0	12862

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Method asset value calculation

We have used a **net present value approach** to convert the estimated flow of ecosystem services into an estimate of the associated asset value.

Assumptions:

- The *future flow* of income for each ecosystem services is assumed *constant* and equal to the flow observed most recently.
- The discount rate equals *3 percent*, unless the ecosystem asset is thought to become scarcer and there are limited substitution possibilities, in which case a discount rate of 2 percent is used.
- The asset life is *100 years* for all ecosystem assets.

Example timber

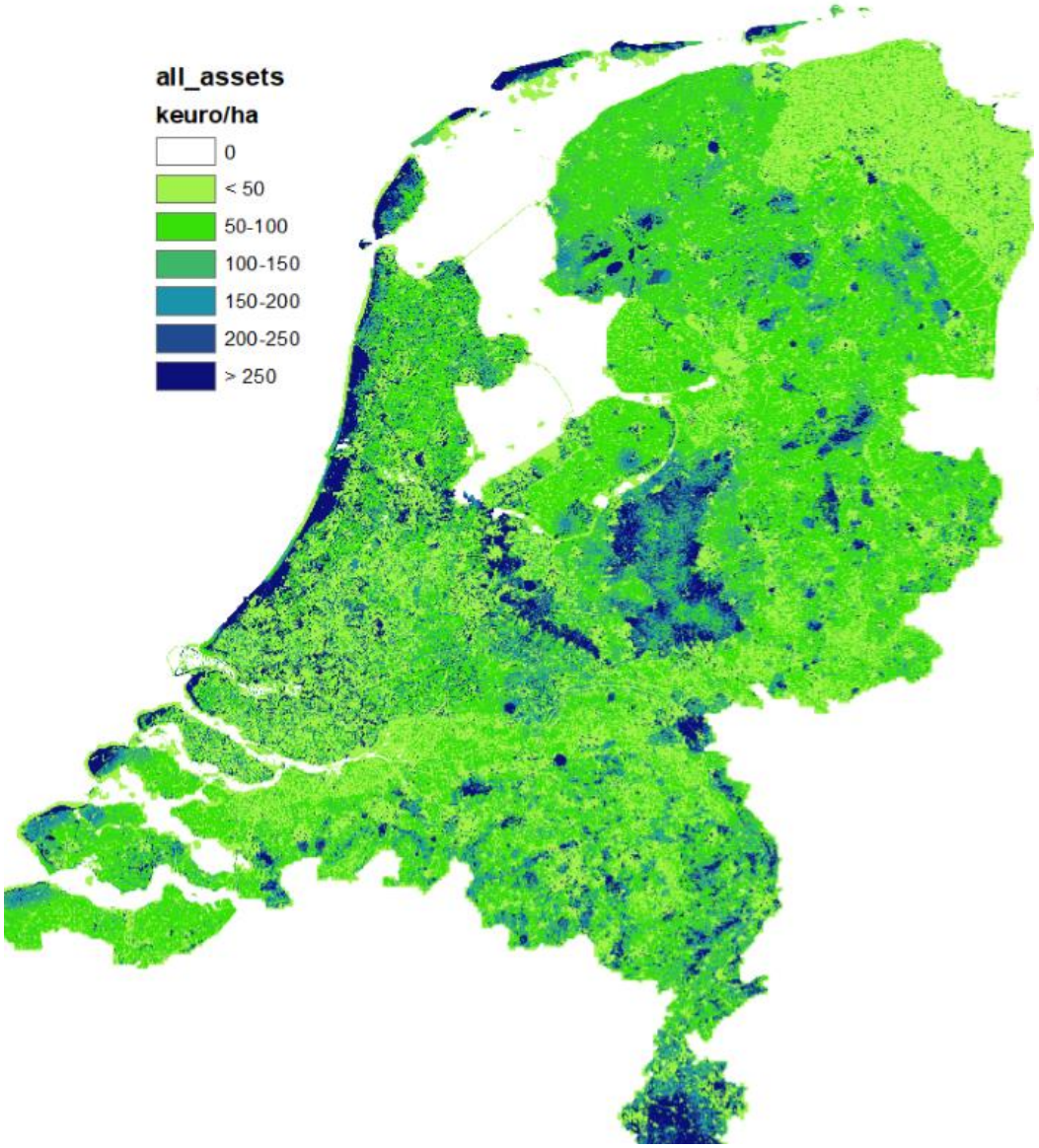
Value ecosystem service according to two methods

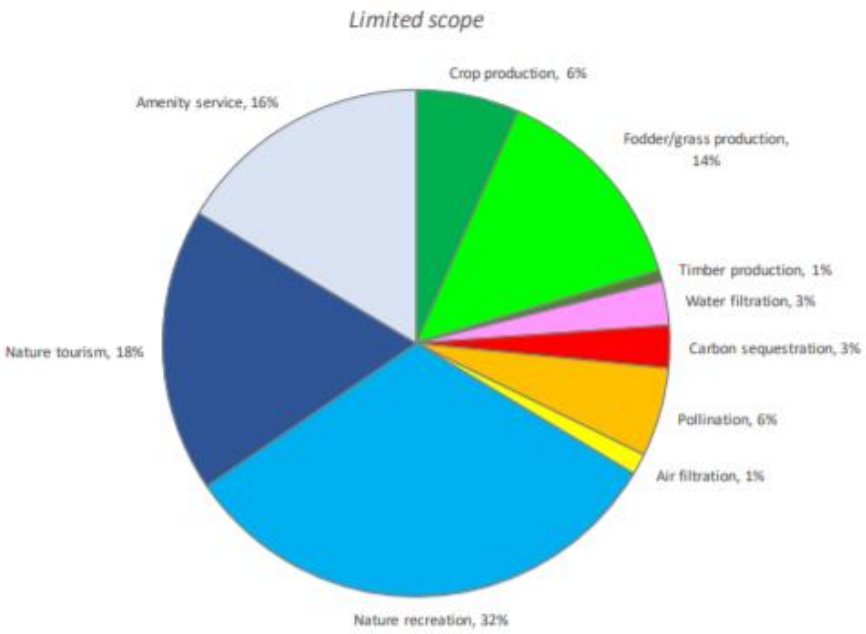
	2010	2011	2012	2013	2014	2015
RR methode	5,4	9,4	17,0	13,9	18,0	13,6
Stumpage prices	30,0	36,6	39,9	41,2	43,0	43,7

Value asset asset

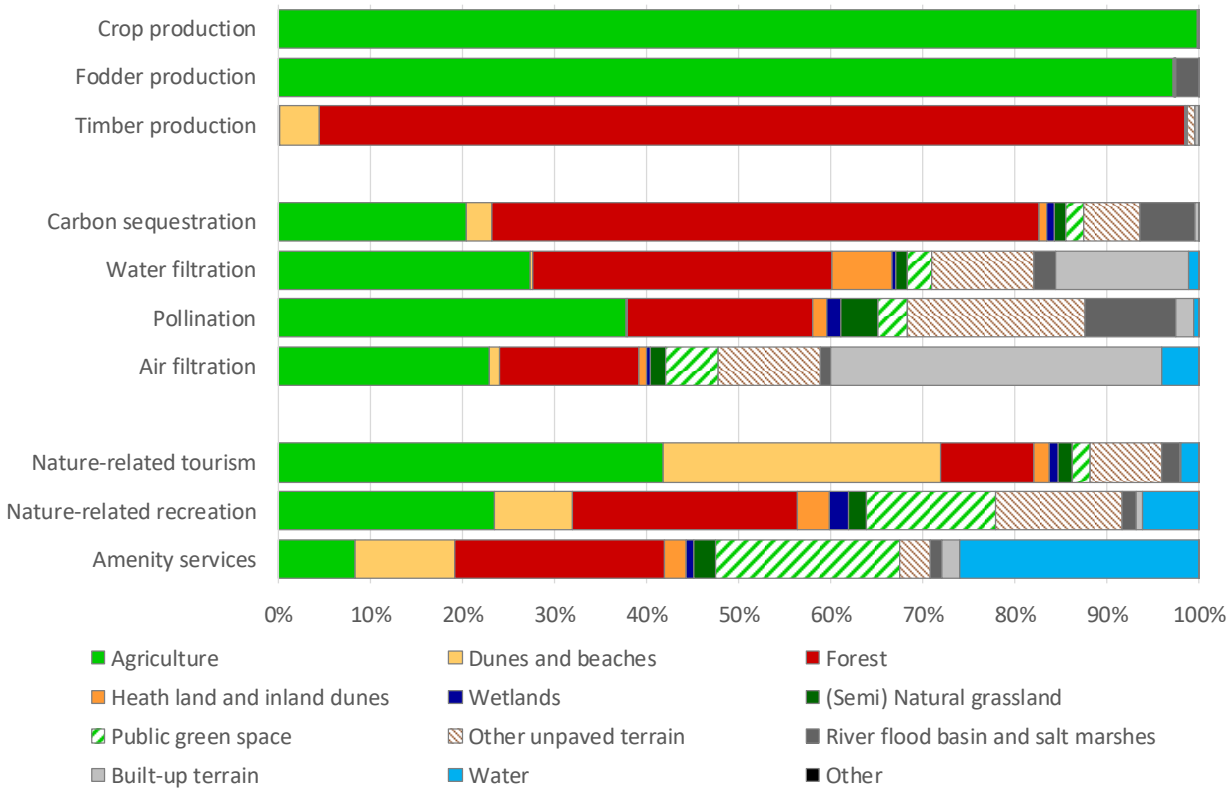
				2010	2011	2012	2013	2014	2015
r	0,03								
T	100		RR methode	170	298	537	440	567	430
a	1,05		Stumpage prices	949	1158	1261	1302	1358	1381
r*a	0,032								

Asset value of ecosystems in the NLs





Verdeling waarde per ecosysteemtype



Conclusions

- Technical challenges still remain, in some cases need for convention since no obvious ‘best option’
  - Discount Rate and Asset life
  - Valuing nature based recreation
  - Pollination vs crop provisioning
- Amenity service valuation with hedonic pricing not straightforward to apply at national scale
- Values found relatively low (compared to e.g. GDP)
  - GVA and NVA dependent upon ecosystems can be assed; but only in case of provisioning services and tourism (perhaps GVA and NVA dependent upon regulating services can be estimated??)
- Challenges in explaining the meaning of value to stakeholders