Nature-based solutions in brook catchments: Modeling land-use change and its impact on terrestrial carbon pools

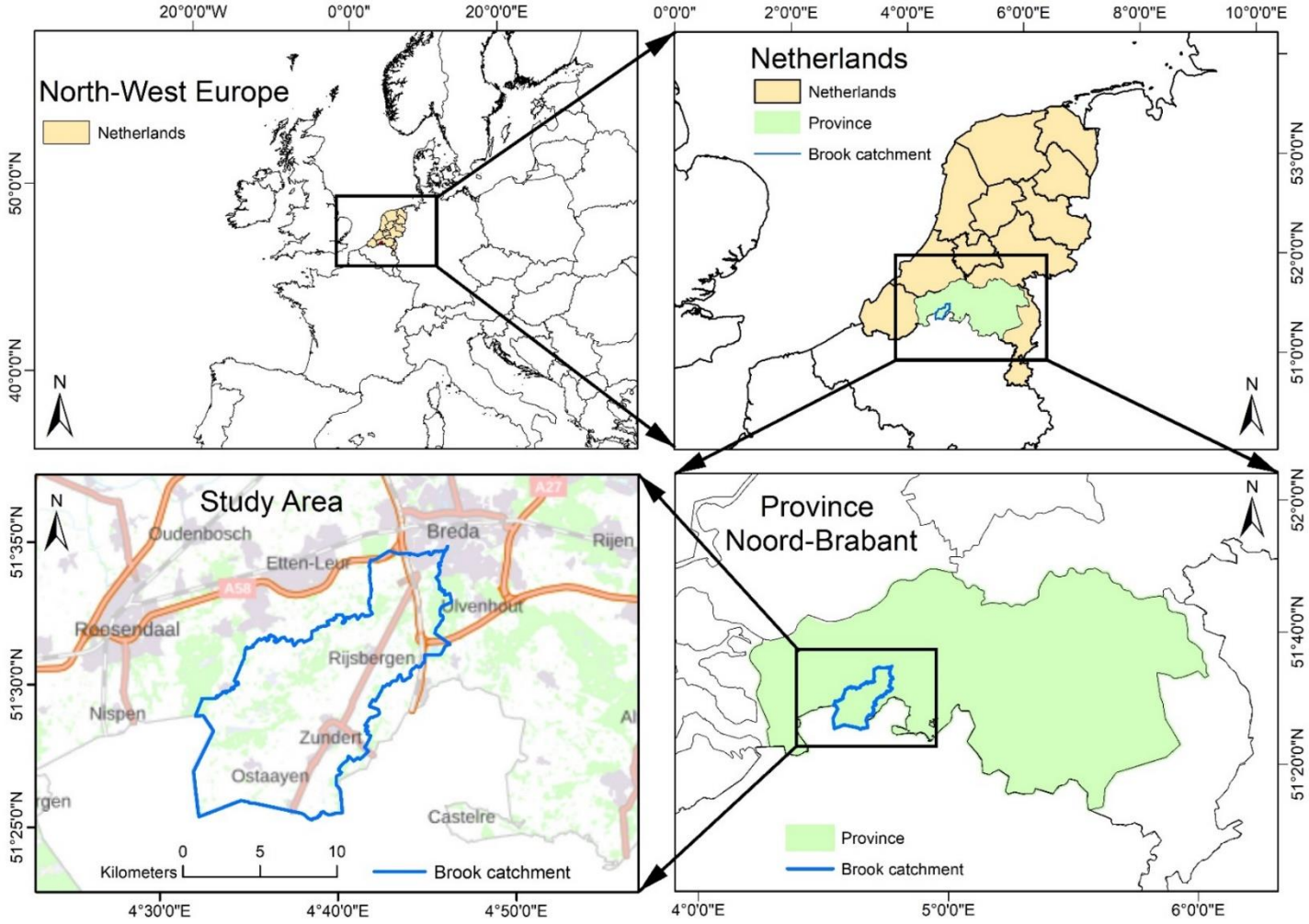
Display materials: Figures and tables

Figures and tables. Display materials related to:

Timmer, L., Van Wijnen, J., and Lansu, A.: Nature-based solutions in brook catchments: Modelling land-use change and its impact on terrestrial carbon pools (1960 – 2010 – 2050)., EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-4006, https://doi.org/10.5194/egusphere-egu22-4006, 2022.

Open Universiteit
www.ou.nl

Study area – Dutch Aa of Weerijs brook catchment (147 km^2)



Location of the study area starting on the left-top with the map of North-West Europe and then continues clockwise to the Netherlands, the province Noord-Brabant and finally on the lower-left the study area Aa of Weerijs brook catchment.

Terrestrial carbon pool parameters

Parameters (all in ton C ha-1) for the four carbon pools and the seven used land-use categories in 1960 and in 2010. The total carbon pool for a land-use category in 1960 or 2010 can be seen below the four carbon pools in italics (AGB: Aboveground biomass; BGB: Belowground biomass; DOM: Dead organic matter; SOC: Soil organic matter [for the first 30 cm of the soil]; n.d.: No data).

Pool	***Forest*** *1960*	*Source*	***Forest*** *2010*	*Source*
AGB	38	(Nabuurs et al., 2003)	92	(Arets, 2018)
BGB	11	(Nabuurs et al., 2003)	24	(Arets, 2018; IPCC, 2006)
DOM	5	(Nabuurs et al., 2003)	6	(Schelhaas et al., 2014)
SOC	86	(Nabuurs et al., 2003)	96	(Lesschen et al., 2012)
	140		*218*	
	Cropland *1960*	*Source*	***Cropland*** *2010*	*Source/remark*
AGB	n.d.	-	3	Several sources
BGB	n.d.	-	1	(Williams et al., 2013)
DOM	n.d.	-	0	Assumption
SOC	67	(Schulp & Verburg, 2009)	84	(Tol-Leenders et al., 2019, p.)
	67		*88*	
	Grassland *1960*	*source*	***Grassland*** *2010*	*source*
AGB	n.d.	-	7	(Arets, 2018)
BGB	n.d.	-	4	(Lesschen et al., 2012)
DOM	n.d.	-	0	(Lesschen et al., 2012)
SOC	67	(Schulp & Verburg, 2009)	93	(Tol-Leenders et al., 2019)
	67		*104*	
	Settlement *1960*	*Remark*	***Settlement*** *2010*	*Source/remark*
AGB	10	2010 data, forest analogy	20	(Hutyra et al., 2011; Wilkes et al., 2018)
BGB	2	2010 data, forest analogy	5	Based on an AGB:BGB ratio of 0.20
DOM	0	assumption	0	Assumption
SOC	75	Equal to 2010	75	(Cambou et al., 2018; Edmondson et al., 2014)
	87		*100*	
	Water *1960*	Remark	***Water*** *2010*	*Source/remark*
AGB	2	Equal to 2010	2	in analogy of the category cropland
BGB	1	Equal to 2010	1	(Sutfin et al., 2016)
DOM	0	Equal to 2010	0	Assumption
SOC	0	Equal to 2010	0	Incorporated in BGB
	3		*3*	
	Tree Nursery *1960*	*Remark*	***Tree Nursery*** *2010*	*Source/remark*
AGB	n.d.	1960 data, cropland analogy	3	2010 data, cropland analogy
BGB	n.d.	1960 data, cropland analogy	1	2010 data, cropland analogy
DOM	n.d.	1960 data, cropland analogy	0	2010 data, cropland analogy
SOC	67	1960 data, cropland analogy	84	2010 data, cropland analogy
	67		*88*	
	Wetland *1960*	*Remark*	***Wetland*** *2010*	*Source/remark*
AGB	5	Equal to 2010	5	(Lesschen et al., 2012)
BGB	8	Equal to 2010	8	(Lesschen et al., 2012)
DOM	0	Equal to 2010	0	Assumption
SOC	150	Equal to 2010	150	(Lesschen et al., 2012)
	163		*163*	

Results

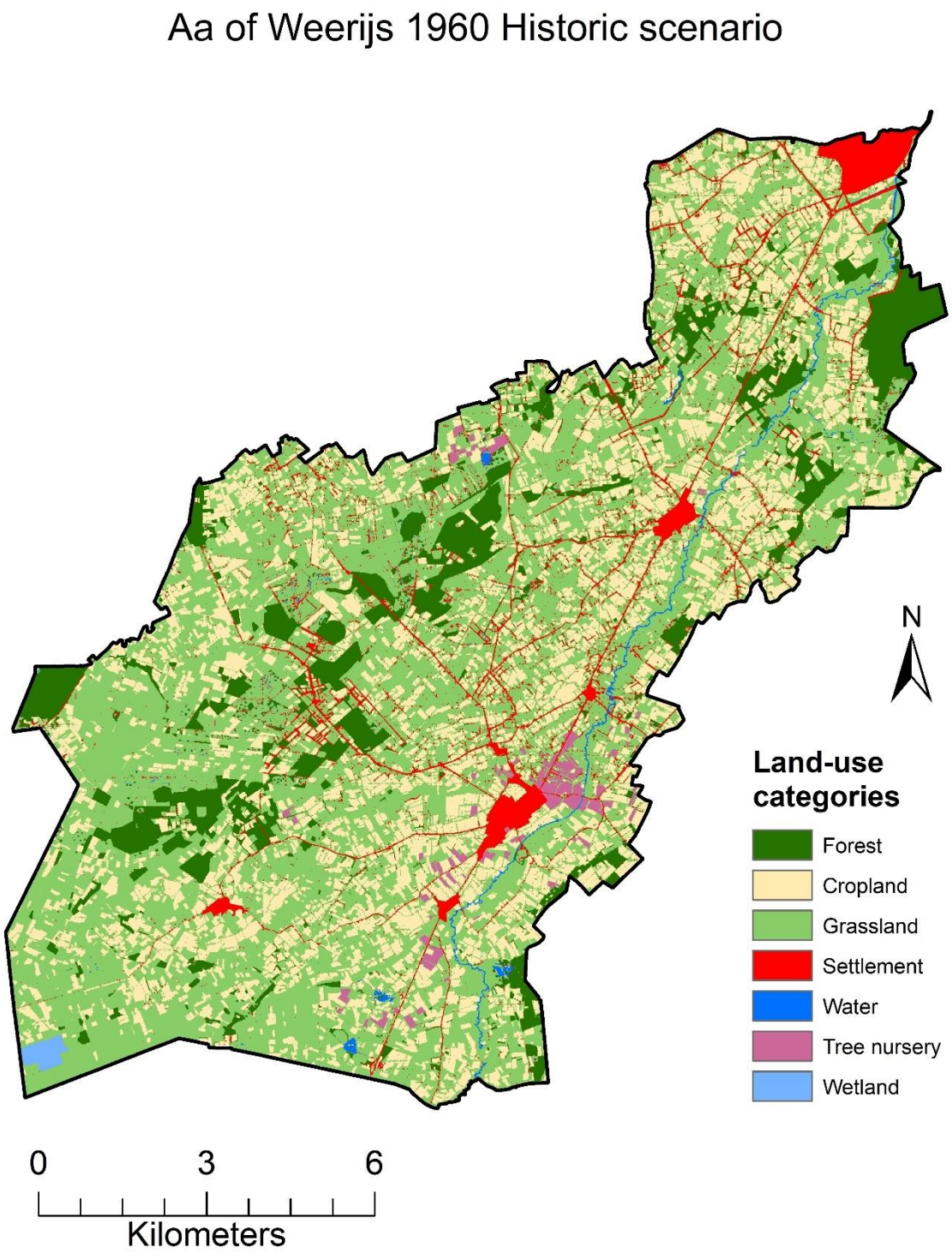
The following figures show the final land-use classification and carbon stocks results for 1960, 2010, and the two scenarios for 2050.

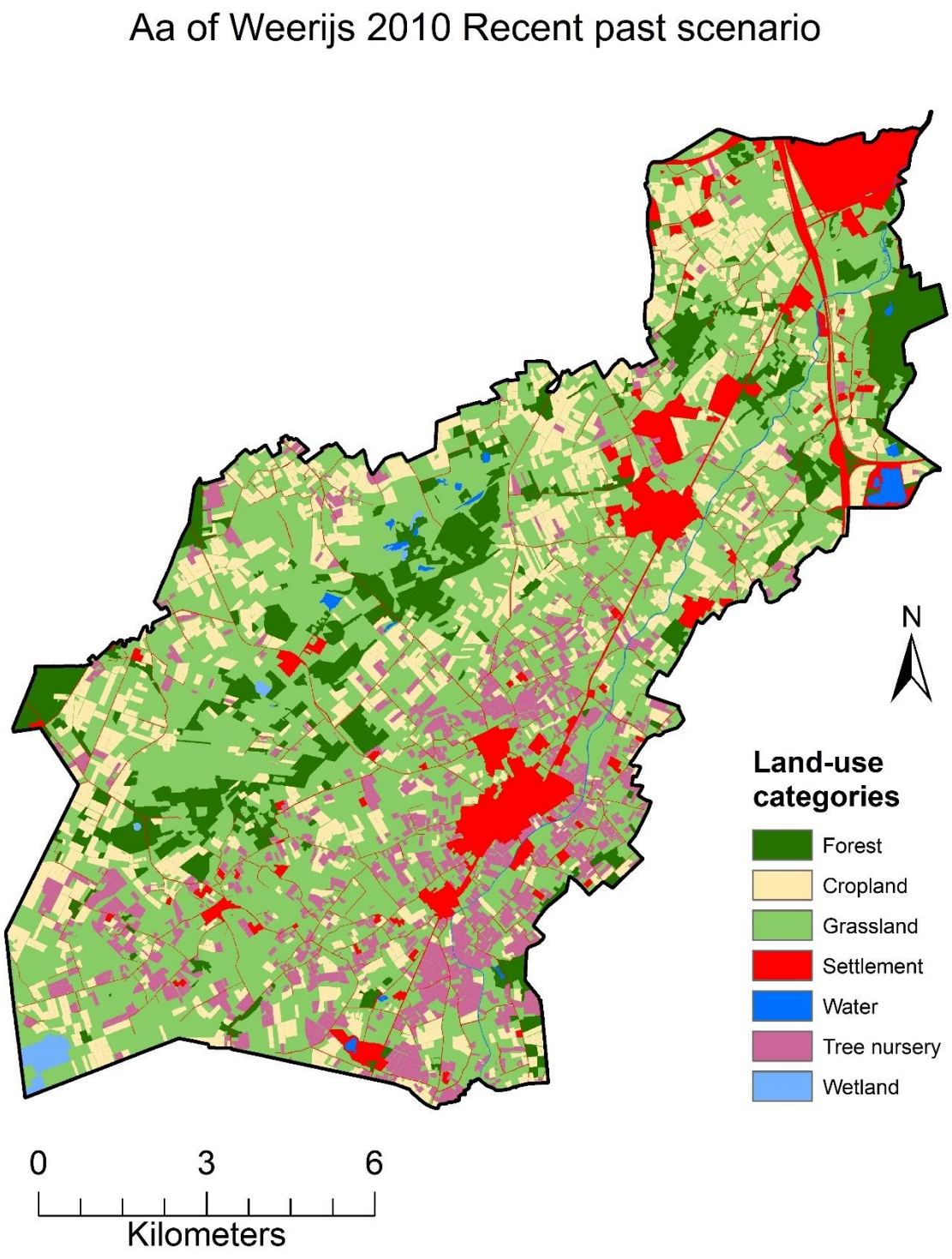
1960: Historic scenario

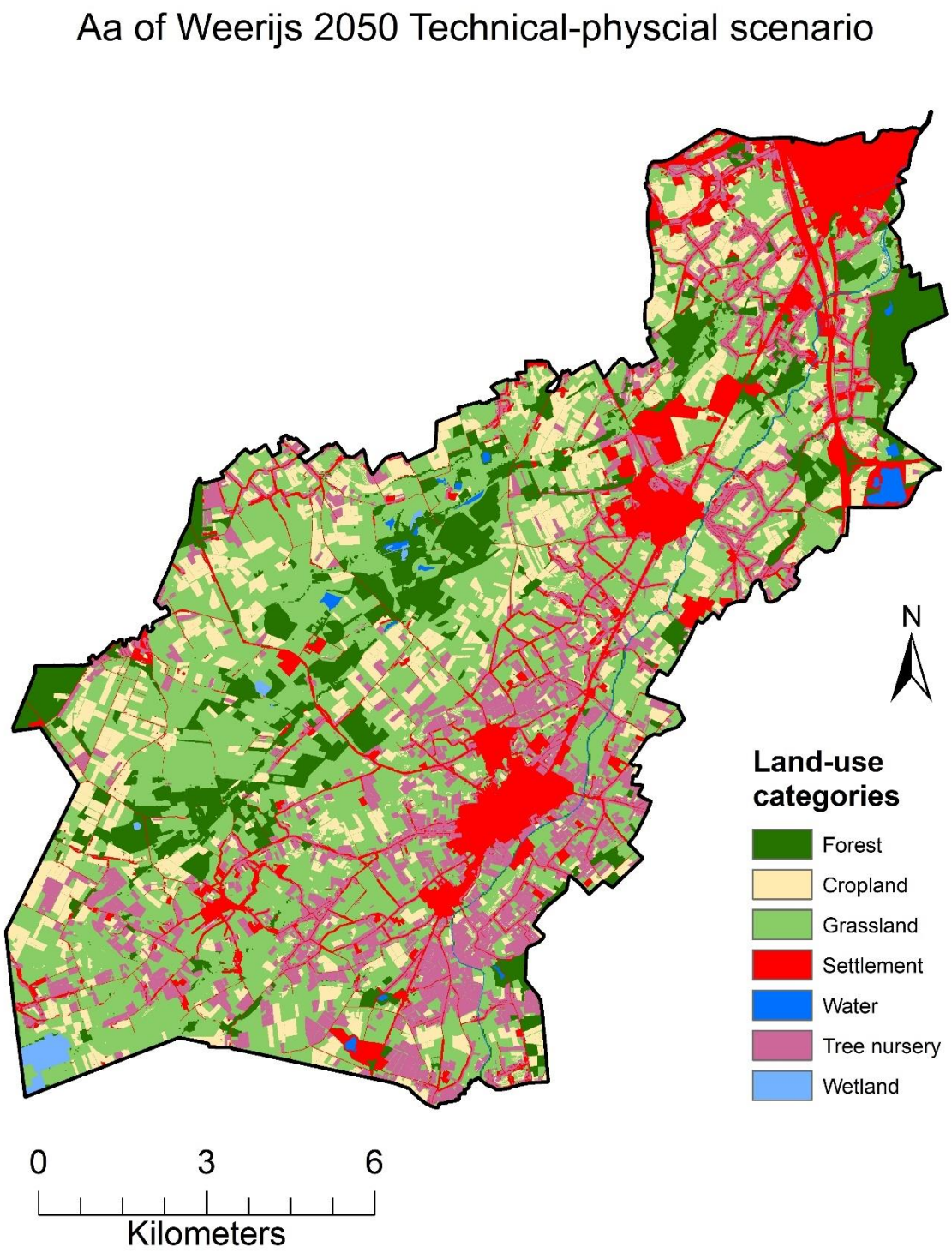
2010: Recent past scenario

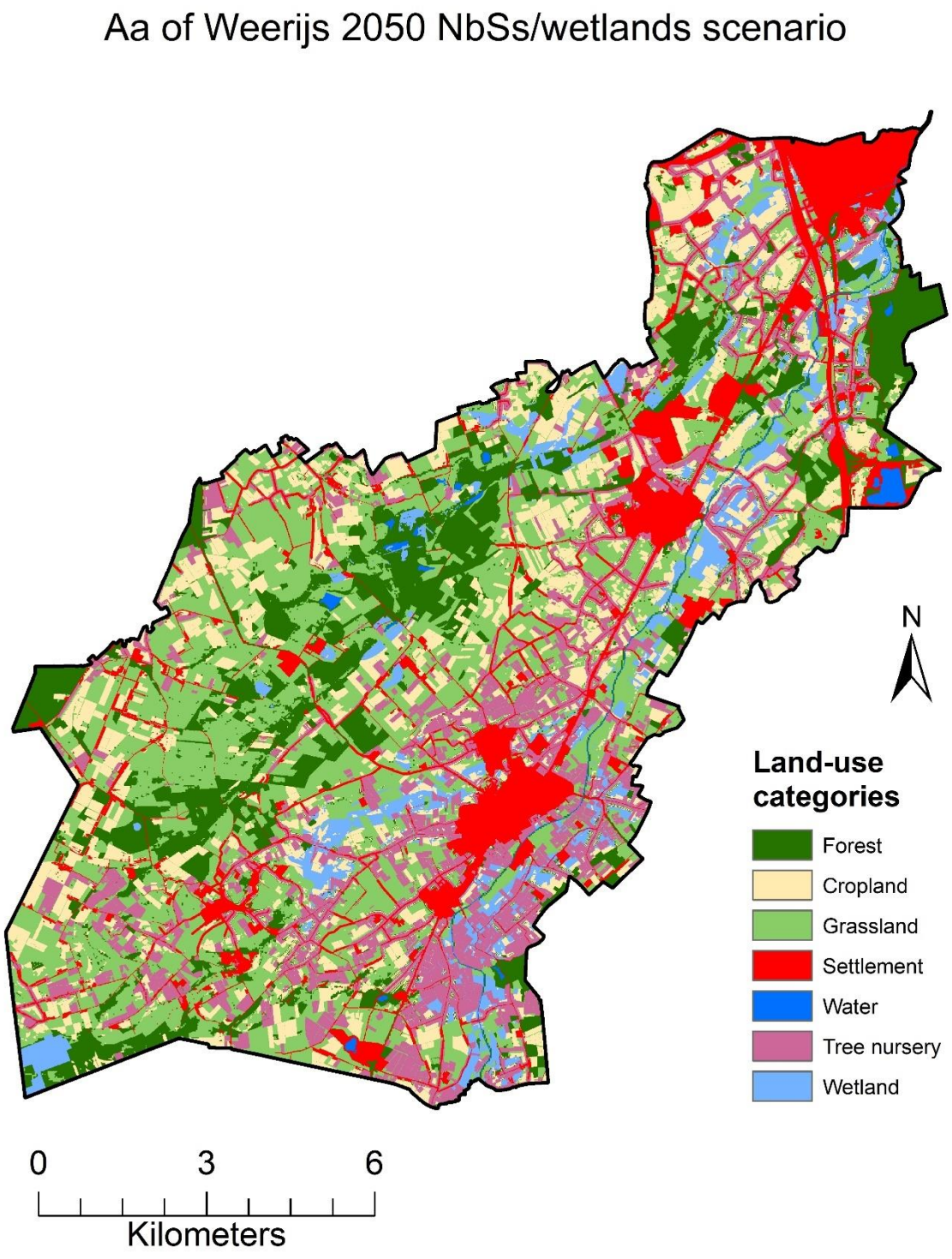
2050: Technical-physical scenario (which is a kind of business-as-usual scenario)

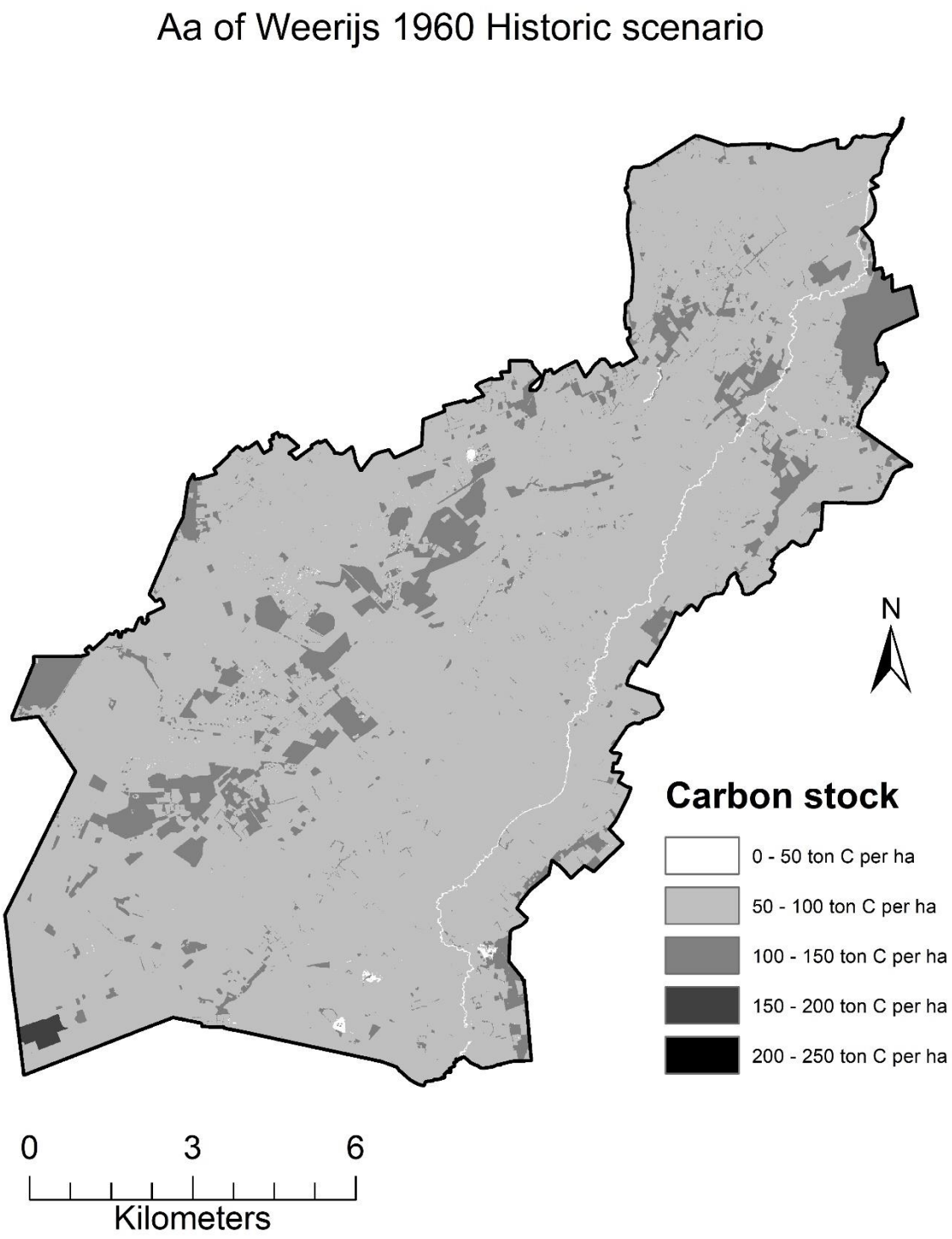
2050: NbSs/wetlands scenario (which is an environmental friendly scenario)

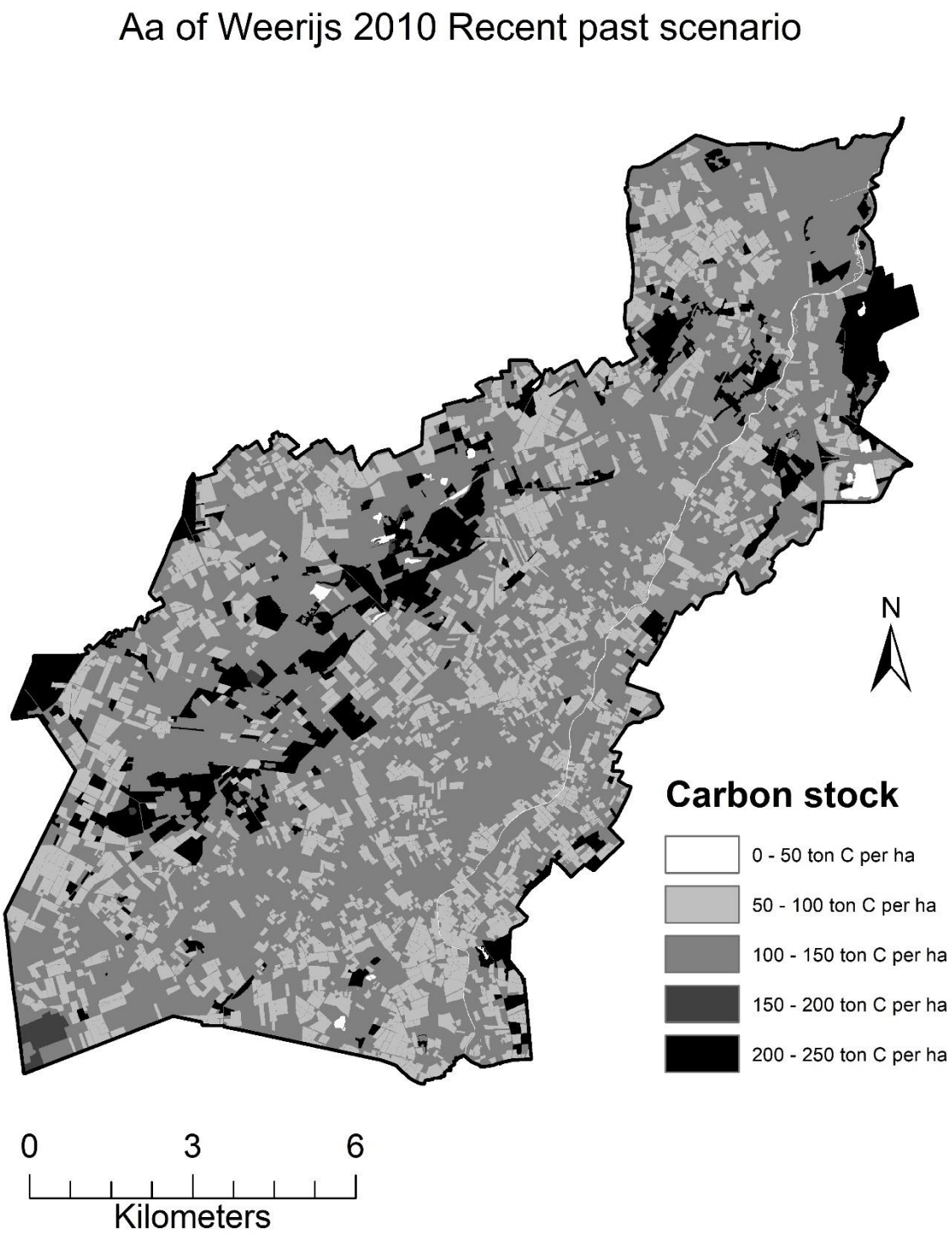

Aa of Weerijs 1960 Historic scenario
N
Land-use categories
Forest
Cropland
Grassland
Settlement
Water
Tree nursery
Wetland
0
3
6
Kilometers

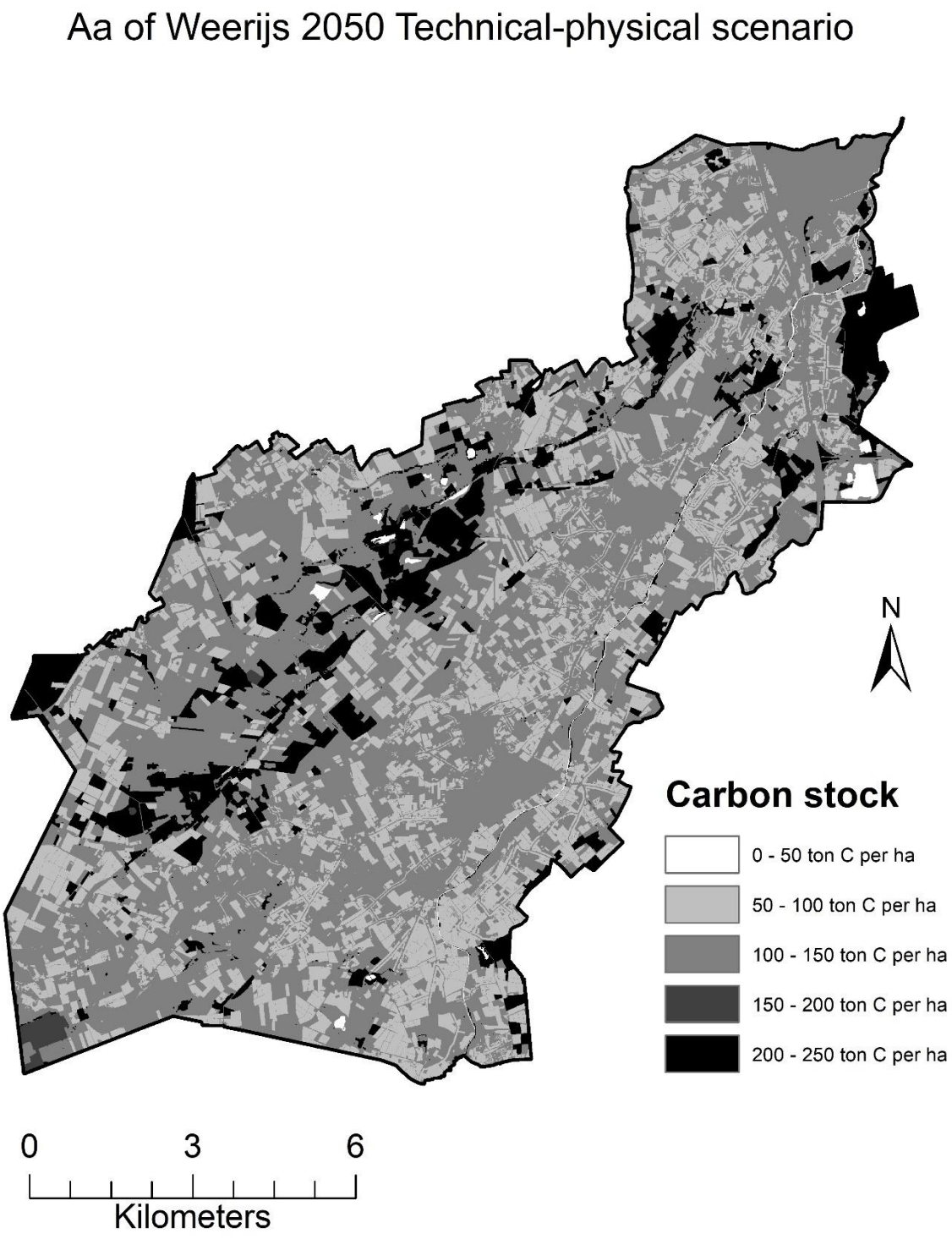

Aa of Weerijs 2010 Recent past scenario
N
Land-use categories
Forest
Cropland
Grassland
Settlement
Water
Tree nursery
Wetland
0
3
6
Kilometers

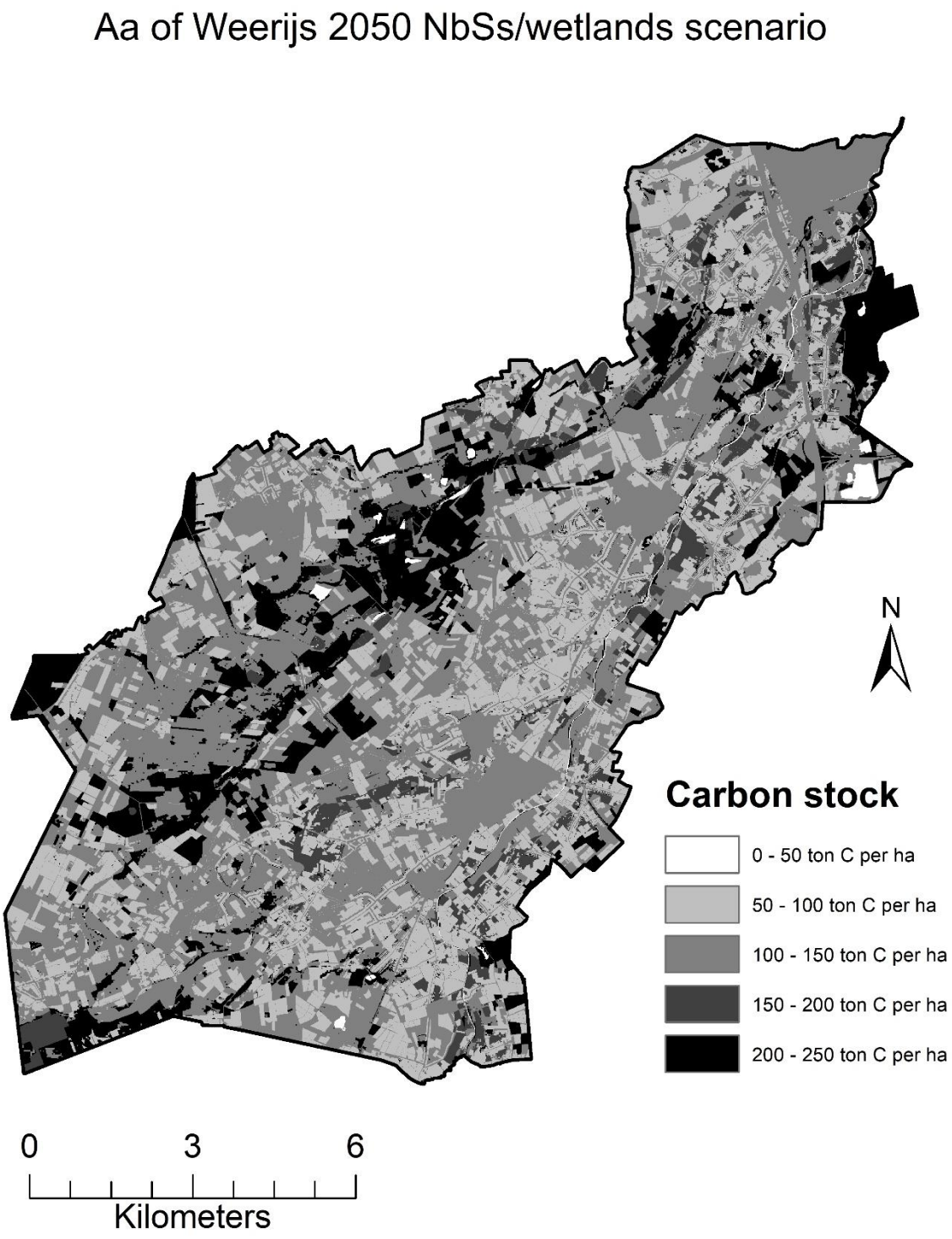

Aa of Weerijs 2050 Technical-physcial scenario
N
Land-use categories
Forest
Cropland
Grassland
Settlement
Water
Tree nursery
Wetland
0
3
6
Kilometers


Aa of Weerijs 2050 NbSs/wetlands scenario
N
Land-use categories
Forest
Cropland
Grassland
Settlement
Water
Tree nursery
Wetland
0
3
6
Kilometers


Aa of Weerijs 1960 Historic scenario
N
Carbon stock
0 - 50 ton C per ha
50 - 100 ton C per ha
100 - 150 ton C per ha
150 - 200 ton C per ha
200 - 250 ton C per ha
0
3
6
Kilometers


Aa of Weerijs 2010 Recent past scenario
N
Carbon stock
0 - 50 ton C per ha
50 - 100 ton C per ha
100 - 150 ton C per ha
150 - 200 ton C per ha
200 - 250 ton C per ha
0
3
6
Kilometers


Aa of Weerijs 2050 Technical-physical scenario
N
Carbon stock
0 - 50 ton C per ha
50 - 100 ton C per ha
100 - 150 ton C per ha
150 - 200 ton C per ha
200 - 250 ton C per ha
0
3
6
Kilometers


Aa of Weerijs 2050 NbSs/wetlands scenario
N
Carbon stock
0 - 50 ton C per ha
50 - 100 ton C per ha
100 - 150 ton C per ha
150 - 200 ton C per ha
200 - 250 ton C per ha
0
3
6
Kilometers

This is the end of the display materials. If you have any questions regarding this study, please do not hesitate to contact us.

The authors:

Luuk Timmer[1,2], Jikke Van Wijnen[1], and Angelique Lansu[1]
[1] Open University, Faculty of Science, Environmental Sciences, Heerlen, Netherlands (jikke.vanwijnen@ou.nl)
[2] Windesheim University of Applied Sciences, Zwolle, Netherlands (ltimmer@outlook.com)