



Brownfield regeneration in a circular economy

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Soil Protection Technical Committee (TCB)

Permanent advisory
Committee

National government

Soil Protection Act

Technical/scientific aspects
of environmental policy
regarding the soil and
watersystem

Some recent advisory reports (in Dutch):

- *Letter knowledge agenda circular economy*
- *Advice contribution of the groundwater layer and the soil top layer to circular economy*
- *Climate and the soil-water system*
- *Better decisions with ecosystem services*

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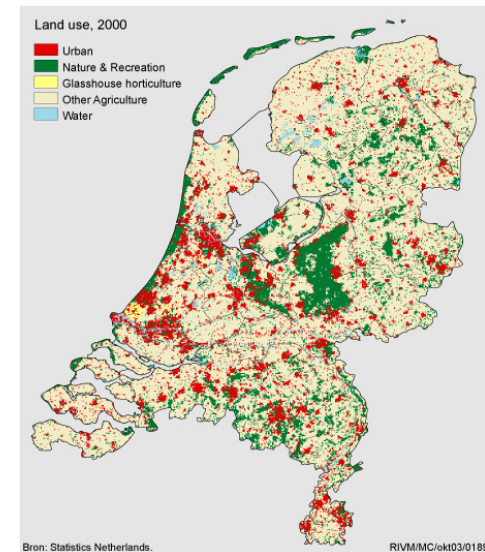


Content

- The Dutch context
- About brownfields
- Circular economy and recommendations TCB
- Opportunities for brownfields: natural capital
- Conclusions

Dutch context

- » Rapid urban development (Netherlands 400 inh./km²)
 - » Infrastructural projects
 - » Preservation of natural areas
 - » Industrialized (historic and present)
 - » Intensive land-use and turnover
 - » Public awareness for environmental issues
 - » Many stakeholders
-
- » Yearly demand for 80 to 100 millions tons of soil:
 - 70% from primary sand winning
 - 30% reuse of clean or slightly polluted soil



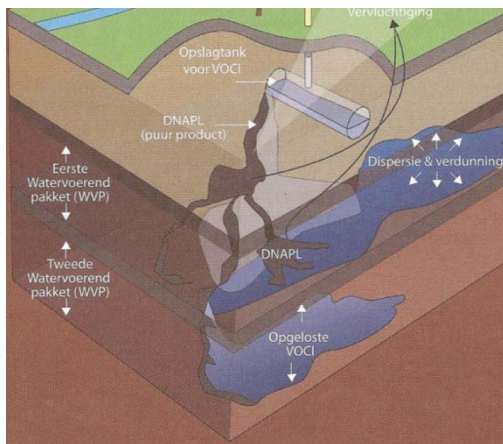
LAND USE	%
AGRICULTURE / NATURE	80
RESIDENTIAL	10
INDUSTRY	3
INFRASTRUCTURE	2
RIVERS / LAKES	5

Example in peat soil.

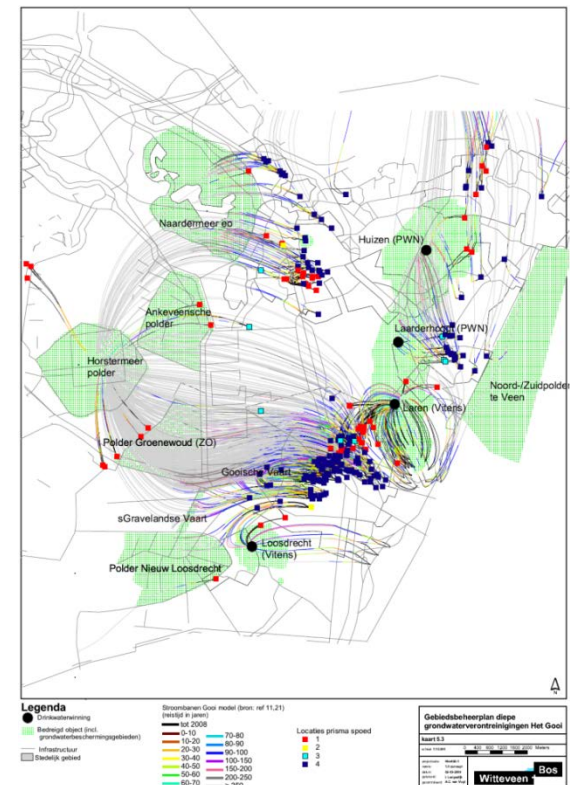
Volgermeerpolder, former dump-site of chemical waste



Example on sandy soil: groundwater contamination by chlorinated hydrocarbons due to dry cleaning



Source: SKB cahier



Source: Witteveen+Bos



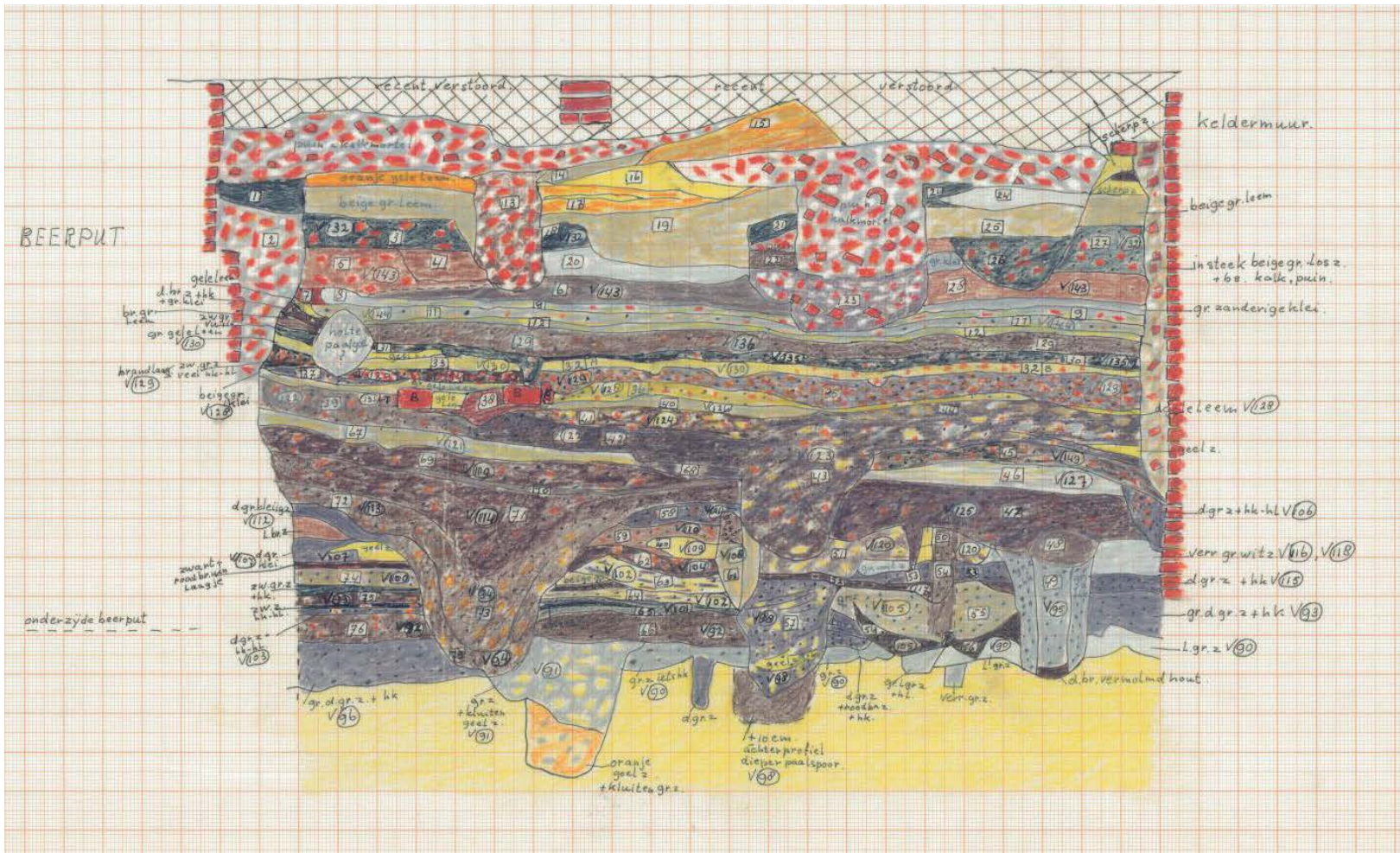
A brownfield is ...

(HOMBRE draft definition):

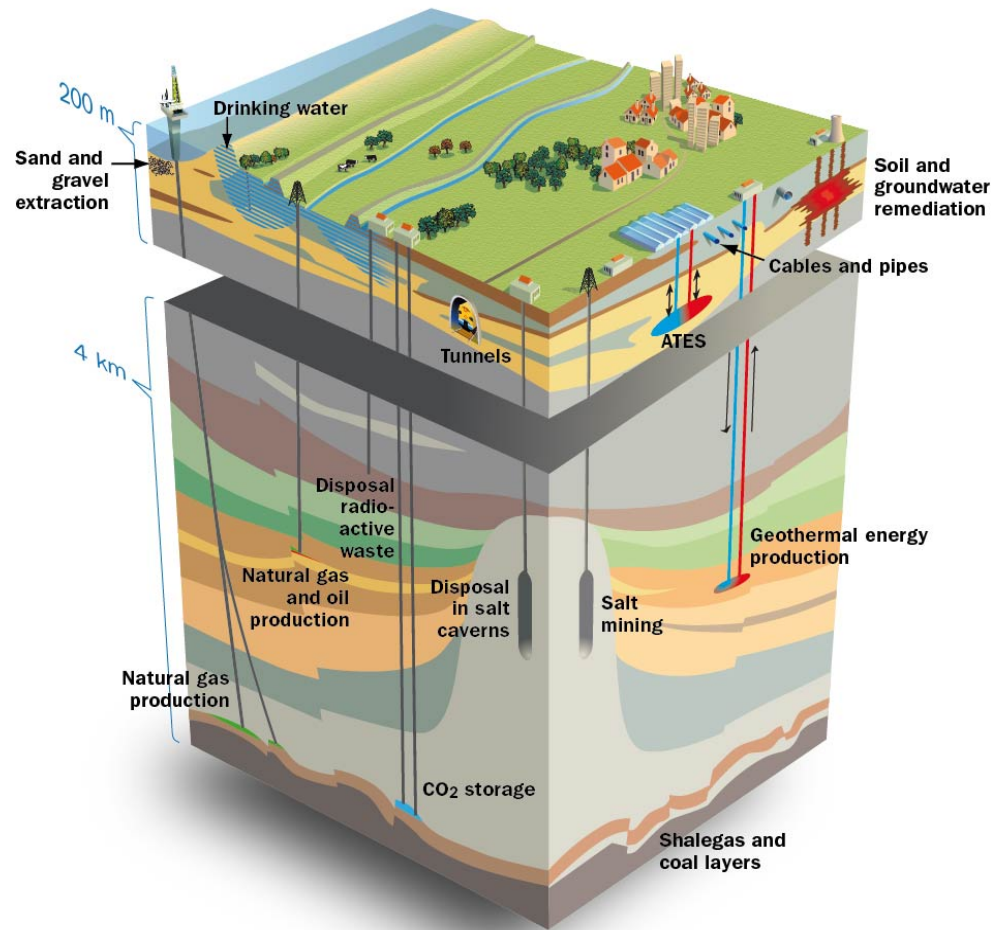
a site that has been affected by former uses of the site or surrounding land, is derelict or underused, mainly in fully or partly developed urban areas, require intervention to bring it back to beneficial use; and may have real or perceived contamination problems



Brownfield soil ?



Brownfields?



Source: TNO Geological Survey

(Former) draft Soil Framework Directive

Services*

- Biomass production, including in agriculture and forestry
- Storing, filtering and transforming nutrients, substances and water
- Biodiversity pool
- Physical and cultural environment
- Source of raw materials
- Carbon pool
- Archive of geological and archeological heritage

Threats**

- Loss of organic matter
- Compaction
- Sealing
- Erosion
- Flooding and land slides
- Salinisation
- Contamination
- Loss of biodiversity

*In SFD these are called functions

**Loss of biodiversity is not included as a separate threat in the SFD

From linear to circular economy

'Linear economy'

Take - Make - Dispose

Technical and biological
nutrients all mixed up



something useful



toxic
waste

'Circular economy'

Technical nutrients

Biological nutrients



Living systems

after W. McDonough and M. Braungart



Circular economy

an economic and industrial system that takes the reusability of products and raw materials and the resilience of natural resources as a starting point, minimizes the value destruction of the overall system and pursues value creation in each link of the system.

TNO, 2013





Circular economy: recommendations TCB

Consider self-sufficiency in relation to circularity

The degree of self-sufficiency that is needed for a circularity at national or regional scale needs thorough consideration, including the impact of the import of natural resources.

Spatial planning follows natural potencies

Spatial planning should preferably follow the natural potencies and resources. Than the effort needed for water-, energy- and foodsupply will be lowest.





Circular economy: recommendations TCB

Contaminants and pathogens.

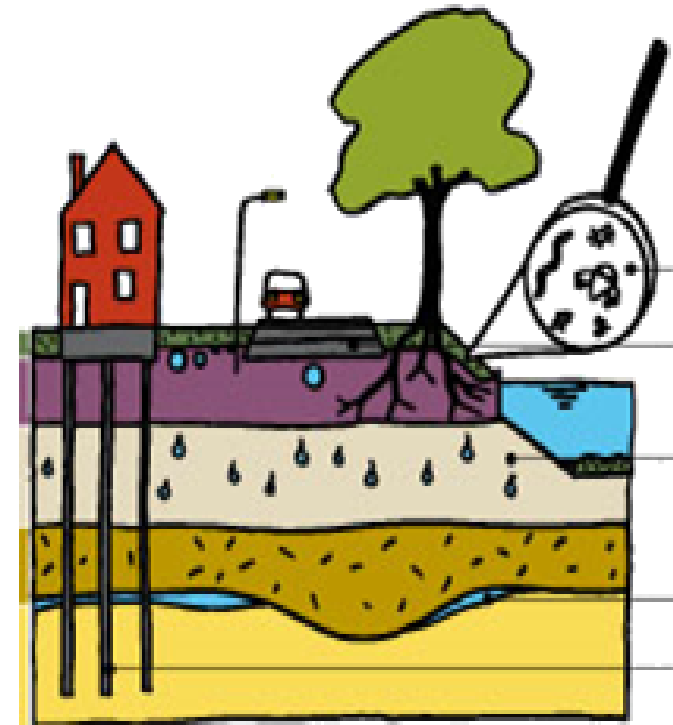
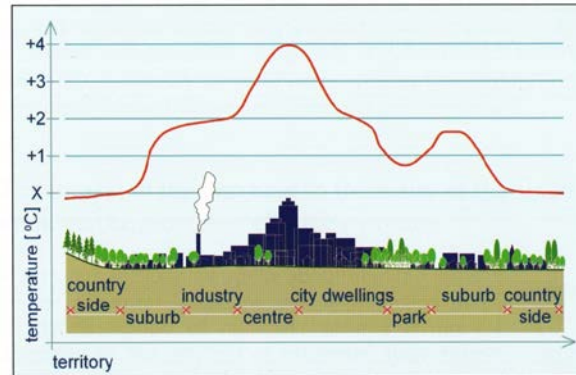
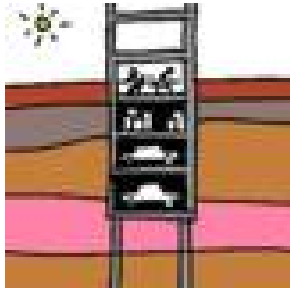
Attention is needed for the risks due to spreading and accumulation of contaminants and pathogens in the soil-water system due to the application of rest-products and residues

Organic matter.

Attention is needed for the decline of organic matter content in agricultural soils due to the use of organic rest-products in the circular economy



Opportunities



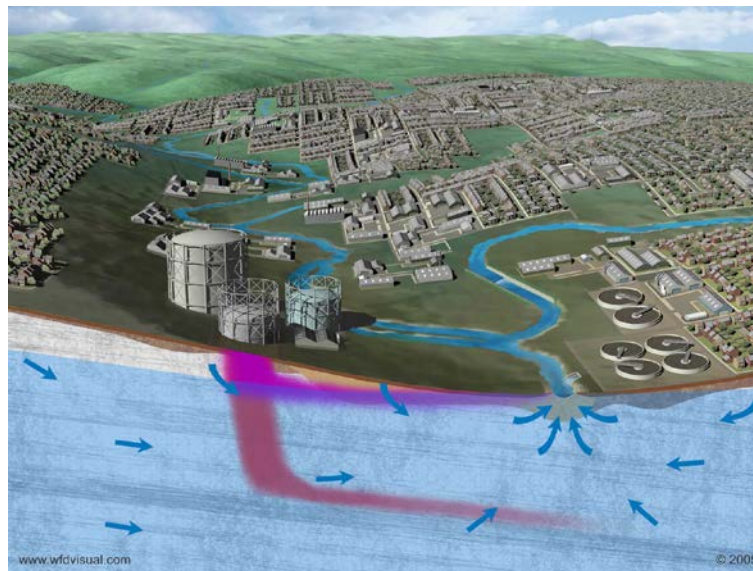
Opportunities: two concepts: “Urban oasis” and “City on preserved soil”

Book: “Discover the urban soil” (TCB and Natuurmedia, 2010, in Dutch)

TWEE CONCEPTEN		STAD OP BEHOUDEN BODEM			
		STADSOASE			
diensten	Intacte bodem/erfgoed	Water	Groen	Natuur	Koelte / leefklimaat
	Geologie, hydrologie, reliëf, bodem-behoud (veenpakket, archeologie), cultuurhistorie.	Waterkwantiteit en -kwaliteit, waaronder filtering door de bodem, afbraak vervuulende stoffen.	Tuinen, parken, oevers, plantsoenen, bermen, volkstuinten en stadslandbouw.	Biodiversiteit, leefgebieden, natuur in de stad.	[Opgaand] groen, water. Ontwerp van gebouwen.
					
Keuzes (1): BELEID Waar doen we wat? Vuistregel: landelijk gebied en kwetsbare bodems sparen, belonen van slim (her)inrichten.	(Her)ontwikkelen met behoud van bodem(archief) mogelijk?	Ontwerp watersysteem met genoeg waterberging en goede waterkwaliteit mogelijk?	Verstedelijken op basis van het huidige landschap mogelijk?	Welke plaats krijgt (bestaande) natuur in de ontwikkeling?	Kunnen we ontwikkelen met veel water en opgaand groen? Is de ligging qua temperatuur en luchtkwaliteit in orde?
Keuzes (2): INRICHTING Hoe kan de bodem in een plan tot zijn recht komen? Vuistregel: behoud van bodemdiensten, water en groen samen 40%. Ruimtebesparend bouwen, zo min mogelijk verharden (innovatie van verkeer en parkeren).	Ontwerp op basis van bodemeigenschappen en behoud van de bodem. Bodem bovengronds zichtbaar maken. Bodemarchief meenemen in ontwerp.	Watersysteem ‘natuurlijk’ houden, met balans tussen waterberging en voorkomen van overlast. Inspelen op landschap. Oude waterlopen in gebruik houden. Water zichtbaar maken.	Minimaal 30% openbaar groen, (volks)tuinen en landbouw in de stad, oude elementen behouden (bijv. weiland, heggen, een bosje).	Streven naar natuur van enige omvang en kwaliteit (flora, fauna, kringlopen). Inheemse bomen planten. Oude elementen behouden. Leefgebieden in ontwerp opnemen. Natuur zichtbaar maken.	Bomen! Water! Water en ‘oud groen’ plaats geven in ontwerp. Grote groenpartijen en bomensingels tactisch plaatsen (soortkeuze). Meer volwassen bomen.
Keuzes (3): MITIGEREN Met welke materialen en constructies kan verlies van bodemdiensten worden opgevangen? Vuistregel: mitigeren meenemen in ontwerp. Voorkomen is beter dan genezen.	Archeologisch erfgoed afdekken (conservering). Veenpakket intact houden: lichte wegfunderingen, lichte riolen, lichte bouwmaterialen.	Waterbergende wegen en daken, hemelwater afkoppelen van het riool, oevers verbreden met rietzones.	Parkeerplaatsen met groene verharding. Gevelbegroeiing, groene daken, grote bloembakken. Meer bomen volgroeid laten worden.	Groene corridors t.b.v. dieren, amfibietunnels. Nstdakpannen (o.a. voor mussen), vleermuispannen.	Groene daken, aangepast plaveisel, nodeloze afdekking verwijderen (onttegenen). Koelte in gebouwen: groene daken en wanden, warmte- en koude-opslag (wko).

Opportunity: area oriented approach for contaminated groundwater

- * combine quality and quantity aspects
- * accept a certain spreading, within a defined area; prevent risks; protect vulnerable objects



Wfdvisual.com

Example: groundwater Ugchelen

History:

- A paper mill used annually 8 million gallons of ground water
- Groundwater level dropped and kept the feet dry!
- Termination of the abstraction resulted in flooding
- A groundwater contamination was out of control

Solution: chain approach.

- Water is pumped, less than before
- Heat extraction from the groundwater and cooling for conservation
- Water supplied to a number of companies
- After use the process water is purified
- Purified water flows into a brook, which at that time was dry
- The water from the brook is supplied to the water company.



Conclusions

- Water, land, soil and biological systems are included in a circular economy
- Brownfield sites can be a challenge for innovators in sustainable development
- it is about 4D: space (subsoil) and time; look at different scale-levels!
- Nature provides opportunities!





Thank you for your attention!

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