

SUSTAINABLE DEVELOPMENT GOALS: ACHIEVING TRANSITIONS THROUGH SUSTAINABLE SOIL AND LAND USE

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1. 2030 IS TOMORROW!

In 2015, the United Nations adopted the Sustainable Development Goals or SDGs – as the route to be followed in tackling the most urgent problems in respect of poverty, hunger, education, the economy, the environment and climate change. These ambitions, formulated in the 17 SDGs, are far-reaching and demanding. As a consequence, a series of Dutch policy documents¹²³⁴⁵⁶⁷ have already indicated that achieving those goals will require serious societal transitions, for example in respect of energy and climate, food supply and the circular economy, mobility and liveable cities. For many of these transitions, sustainable use and management of soil, water and land are key elements.

In this opinion document, we aim to focus attention on the role of sustainable soil and land use, and to underline its urgent nature for the societal transitions facing us in the Netherlands. Our aim is to demonstrate that these societal challenges are too complex for a single sector approach. In order to arrive at sustainable solutions, a comprehensive approach will be required, with sound cooperation between all stakeholders. Let us tackle these challenges enthusiastically; the soil is a slow system and in that sense 2030 – the year by which the SDGs must have been realised – is tomorrow.

2. SOCIETAL TRANSITIONS AND SUSTAINABLE DEVELOPMENT GOALS

To successfully tackle the numerous urgent and complex societal challenges facing us today, what we need are transitions. Transition agendas are currently being developed for energy, climate adaptation, mobility, sustainable agriculture, circular economy and liveable cities. The ambitions contained in these agendas demonstrate considerable parallels with those contained in the SDGs. The aims of the various transitions and hence of the SDGs are closely interconnected in many different and often unexpected ways. This is illustrated in figure 1 with a sort of ‘layered approach’, that comprises the domains Biosphere, Society and Economy⁸. The arrow in the figure shows that the different domains and as a consequence the SDGs clearly influence one another. (Non) sustainable action in one domain clearly affects the possibility of realising the ambitions in another. This two-way traffic, that to a huge extent influences the relationships between the SDGs is the starting point for this article. We will discuss various examples of the traffic travelling in both directions.

¹ <https://www.rijksoverheid.nl/documenten/kamerstukken/2013/06/22/kamerbrief-over-uitvoeringsagenda-natuurlijk-kapitaal>

² <https://www.rijksoverheid.nl/documenten/kamerstukken/2016/05/24/aanbiedingsbrief-bij-een-brief-over-global-goals-implementatie-monitoring-en-rapportage>

³ <http://www.sdgnederland.nl/agenda/nederland-ontwikkelt-duurzaam/>

⁴ <https://www.rijksoverheid.nl/documenten/rapporten/2016/09/14/bijlage-1-nederland-circulair-in-2050>

⁵ <https://www.rijksoverheid.nl/actueel/nieuws/2016/11/21/voedselagenda-nederland-internationaal-koploper-in-gezonde-en-duurzame-voeding>

⁶ <https://www.rijksoverheid.nl/documenten/kamerstukken/2017/11/21/wgo-water-27-november-2017-innamestops-drinkwater>

⁷ <https://www.rijksoverheid.nl/documenten/kamerstukken/2017/02/28/wijziging-elektriciteitswet-1998-en-wijziging-gaswet-voortgang-energietransitie>

⁸ <http://www.stockholmresilience.org/research/research-news/2016-06-14-how-food-connects-all-the-sdgs.html>

In this article, SDG 15, Life on Land, is the central focus. SDG 15 reads as follows: “Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss”. This is a huge range of objectives, which can sometimes be achieved jointly and that sometimes act as competing claims; but whatever the case, they are always mutually dependent. The level of ambition for SDG 15 is high, referring not only to conservation but also to halt and reverse land degradation and halt biodiversity loss of



terrestrial ecosystems.

Figure 1: Relationship between the SDG and the domains Biosphere, Society and Economy. SDGs relating to natural resources such as soils and oceans fall into the domain Biosphere. The arrow symbolises the relationship between the domains and the goals; effectively, society and economy are embedded in the biosphere. On the one hand the arrow symbolises that many actions by society are non-sustainable, and can have massive consequences for the biosphere while on the other hand, the smart and sustainable utilisation of the biosphere in fact offers huge opportunities for realising the SDGs (source: Stockholm Resilience Centre).

Realising these ambitions is no simple task; the ever growing level of activity in the domains society and economy are bringing about ever greater pressure on the biosphere in general and on the soil, water and land, in particular. On the one hand this calls for a robust, resilient and healthy soil-water system capable of sustainably fulfilling all its (natural) functions and on the other hand for smart combinations in the use of soil and land by society. A smoothly functioning soil-water system is essential for realising the food transition, the transition to climate-robust and liveable cities, the transition to a circular economy and sustainable agriculture and the energy transition.

3. URGENCY AND OPPORTUNITIES

The words *urgency* and *opportunities* make it clear that on the one hand this paragraph refers to the pressures currently being applied to land and the soil and water system by (careless) actions by society, and the short time remaining for us to bring about a turnaround. On the other hand, it refers to the possibilities offered by soil and land if sustainably used and managed. We will illustrate these two aspects with a number of examples, to demonstrate the overall scope and to indicate that the

problems and indeed their solutions can be of a technical, economic, social, administrative or political nature.

3.1. THE INFLUENCE OF NON-SUSTAINABLE ACTIVITIES ON THE SOIL

Land and as a consequence soil, is used in an infinite number of ways; for food production, for building homes and offices, for burying cables and pipelines, for the discharge of rainwater, for filtering groundwater to make it drinkable, for storing carbon and for so much more. All too often, soil use is still sector based, with no overarching consideration being given to the total range of functions that can be fulfilled by the soil, or the extent to which planned sectoral activities can have an influence on the soil. In many cases this leads to (unintended) damage to the soil, and to society.

When we talk of damage to the soil, many people automatically think of chemical soil contamination and the soil remediation operation launched following the Lekkerkerk affair in 1980. After all, soil contamination even now means that land use is restricted. However (also in the Netherlands), land and soil degradation comes in many other forms besides chemical contamination. In other words, soil remediation alone is not enough. Although the fact is recognised in the Soil Covenant⁹, putting the goals of the covenant into practice remains problematic. The draft Environment and Planning Act may in principle propose a comprehensive approach, but a framework for integrating the sustainable use of the soil-water system remains absent. Many forms of land degradation such as sealing, soil compaction and erosion, soil subsidence, salinisation and acidification, soil contamination and reduction of the organic matter content of the soil, all relate to land use and land management. The dominant role of sectoral economic considerations has to a considerable extent meant that in many places, the soil is no longer able to successfully fulfil its functions, if at all. By way of illustration we offer three examples:

Short-term land leasing: Concerns have recently been expressed in Flevoland about the degradation of soil quality and fertility. Part of the explanation lies in the liberalisation in 2007 of the short-term land lease regime¹⁰. This has led to higher land prices and uncertainties, which have caused farmers to opt for crop rotations that offer short-term economic benefits (so as to be able to pay for the next lease instalment) but which rapidly exhaust the soil, and as a consequence, harm soil health (and fertility) in the long term. Both Central Government and local government are parties to these lease agreements, and as such are in a position to do something about these non-sustainable conditions.

Sealing in the urban environment: Many cities are 'manmade' environments that at first glance appear separated from the surrounding landscape. As a result of this 'makeability' perspective, urban areas are often heavily paved and metalled. As a consequence the natural functions of the soil-water system cannot be utilised.

Examples are the water-retention function that can mitigate the problems of flooding in the event of heavy rainfall and the function of growth medium for a greener city that for example suffers less from heat stress.

Soil subsidence (and the underground) infrastructure: Large parts of the Netherlands can be described as having weak soils, in other words soils with little load-bearing capacity, such as peat soils and clay. This is a problem many delta areas face, and as such is not restricted to the Netherlands. The Dutch delta is home to the Randstad conurbation, where around 70 percent of our national income is earned. The soil in this area is constantly subsiding, and this natural process is worsened by lowering the water levels and constantly raising the level of the built-up areas. This in turn leads to subsidence in roads and dykes, fractures in cables and pipes and for example pile rot. The impact for citizens, businesses and government is considerable. The continued

⁹ Convenant Bodemontwikkelingsbeleid en aanpak spoedlocaties 2009-2015 en vervolg Convenant Bodem en Ondergrond 2016-2020.

¹⁰ J.J.M. Staps, C. ter Berg, A. van Vilsteren, E.T. Lammerts van Bueren en T.H. Jetten, 2015. Van bodemdilemma's naar integrale verduurzaming – Casus: Vruchtbaar Flevoland, van bodemdegradatie en diepploegen naar integrale duurzame productie in Flevoland, www.ridlv.nl, 58 pagina's

existence of the natural historical and cultural heritage, for example in the inner cities of Gouda, Schiedam and Delft, is under threat. The attraction of deltas means that economic and social activities are becoming increasingly concentrated, which in turn is causing ever greater pressure on the soil and the underground system. The Slappe Bodem (Weak Soil) platform and the knowledge programme Climate, Water and Soil Subsidence have placed this situation on the agenda, and are able to contribute to solving this complex form of land degradation¹¹.

3.2. ACHIEVING SOCIETAL goals through TRANSITIONS in SUSTAINABLE SOIL AND LAND USE

The value of land to society, the economy and the ecology is evident. Traditionally, land is often designated a single function, but the necessary transitions are imposing greater pressure on land. If these transitions are implemented on a sectoral basis, this will lead to a shortage of land and ecosystem services. As a result, sustainable forms of multiple land use are called for. This in turn calls for a structural change in collaboration between stakeholders, partly due to the fact that much land is in private ownership, while the clear wish is to structure management in such a way that public goals are also achieved.

Attention for soil and land often only emerges once problems become visible. This late attention is due to the fact that soil is a robust system that responds slowly, a fact that in most cases makes recovery a time consuming and extremely costly matter. A clear awareness must grow among all stakeholders that the sustainable use of soil and land – within the natural boundaries of the system – must be considered explicitly and integrally at the start of the planning cycle, in respect of all considerations about land use, soil use and soil management. This applies both to activities that are traditionally related to land use such as agriculture, and to the transitions that do not directly seem to relate to land use, such as the energy transition, the development of a circular economy or the development of sustainable building. These all call for a thorough knowledge of the system and close harmonisation between users in order to arrive at a shared vision on multiple, sustainable land use. Only in this way can soil and landscape contribute to fulfilling the SDGs.

Technological solutions such as machines with caterpillar tracks to prevent compaction or streets built on crates to serve as water storage during heavy rainfall are generally insufficient. The possibilities offered naturally by a healthy soil-water system are often not considered (see Box). As a rule, technological solutions have a limited lifecycle and as a consequence are less robust than solutions considered on the basis of the natural system. Land use and land management focused on retaining the natural function of the system also help retain the economic value of the soil. This fact has been recognised in respect of water, and on that basis a top sector Water has been established. Soil (or land) is cross-sectoral, and its presence is barely felt in all the top sectors.

A raft of different approaches are currently being developed, that specifically respond to the change in land use and management. Once again we will refer to 3 quick examples:

4 Returns approach: Commonland® is attempting, via a comprehensive approach, to mitigate large-scale land degradation by operating a system in which 4 returns on investment are the central focus: Inspiration, Social capital, Natural capital and Financial capital¹². The underlying principle is that landscape recovery offers huge opportunities for sustainable economic development. This is achieved alongside a group of stakeholders including investors, land owners, businesses from the supply chain and agricultural operators, and in projects lasting 20 years or more, because landscape recovery demands considerable time. Successful projects are currently underway in Spain, Australia and South Africa, and Commonland recently also launched a project in the Netherlands to tackle the degradation of the peatland meadows of Noord Holland. Due to intensification, increases in scale and systematic drainage in agriculture, this peat land has come under serious pressure over the past few decades. The outcomes have included soil subsidence, impoverished biodiversity,

¹¹ <http://www.slappebodem.nl/home>

¹² <http://www.commonland.com/en>

additional CO₂ emissions, and farmers barely able to make a living. In an area of some 125,000 ha, Commonland is working alongside more than 50 partners on business cases for earning money within the natural limitations of this unique soil-water system. This includes higher groundwater levels, special crops such as reed mace or bulrush (used for producing insulation material) and other breeds of cow, that supply both meat and milk, therefore generating greater value.

Soil Health

Soil that is capable of fulfilling its natural functions is known as healthy soil. Healthy soil:

- *guarantees good food production due to natural and sustainable fertility;*
- *protects both groundwater and food crops against high concentrations of contaminants and fertilisers, by performing as an optimum filter;*
- *offers a good structure and thereby regulates the water management of both agricultural soils and in an urban environment;*
- *is an important reservoir for carbon and stores CO₂ in organic matter essential for the soil;*
- *has a rich and diverse soil life (high biodiversity) that sustainably maintains the above functions;*
- *offers capacity and space for human activity such as building and energy storage.*

In short, a healthy, naturally functioning soil-water system delivers a huge range of functions that form the basis for practically all societal challenges.

Landscape Based (Urban) Adaptation (LBA): The LBA approach recently developed by Wageningen Environmental Research attempts to re-establish the ties between the city and its landscape context, thereby increasing the natural resilience and liveability of cities, based on the logic of an optimally functioning natural system¹³. The stress test that municipalities, water boards and provinces are currently required to carry out deliver a 'wake up call' and chart out vulnerable locations. In the future, we will have mapped out vulnerable sites, but what then? A logical reflex would be to solve the bottlenecks from the stress test one at a time. In the LBA method, however, alongside stakeholders in the city, a systematic search is initiated into comprehensive solutions for flooding, drought and heat on the basis of the natural soil, water and land system of the city and its surrounding area. This is something that many cities urgently need in the framework of developing their environmental vision. Some 10 municipalities in the Netherlands, together with the Province of Gelderland and the Vallei en Veluwe Water Authority, have now started implementing this approach¹³.

Soil in the Circular Economy: Which material flows from the city can be effectively and sustainably employed in agriculture, green management in cities and in construction? Would it not be a great ambition for the Netherlands to have no resource footprint outside the EU? Would the well-developed reuse of raw materials in construction not offer a huge contribution to reducing the extraction of sand and gravel? As a result of regulations on contaminants and other substance requirements, more than half of all organic waste in the EU is currently not reused, but dumped in landfills or incinerated¹⁴. It seems likely that a proportion of this organic waste could be used, some of it following prior processing, for improving the organic matter content in the soil.

¹³ Masselink, L., H. Goosen, V. Grond, P. Vellinga, and R. Leemans. (2017). Climate Change in Cities: An Atelier Approach for Municipal Action. Solutions 8(1): 54-65.

¹⁴ http://ec.europa.eu/eurostat/statistics-explained/index.php/Municipal_waste_statistics

4. WHAT IS EXPECTED OF THE SOCIAL PARTNERS IN RESPECT TO SUSTAINABLE SOIL AND LAND USE?

The comprehensive realisation of societal goals related to land use clearly represents a huge challenge. The common feature of successful approaches is that they develop a vision on the area, making use of state-of-the-art knowledge about its natural system; then operate a system of coordination, harmonisation and co-creation between the stakeholders about the way in which the characteristics of the system can best be used; at this point all the relevant stakeholders work together to actually bring about this optimum use.

All stakeholders must play a role in structurally organising this quartet of characteristics within society and in that way mainstreaming sustainable land use. The (national) government can play an encouraging and facilitating role. The National Environment Vision can serve as a national framework within which land and soil use, management and recovery all have a place, and can be further elaborated at regional and local level. This means that a return is needed of a carefully conceived, integrated spatial planning policy, as recently also argued by Han Meyer, professor of Urban Compositions at the University of Technology in Delft, together with 40 colleagues from the fields of landscape architecture, urban architecture and the built environment and nature conservation¹⁵.

A second aspect that central government should consider relates to the future developments in land ownership. Both farmers and other users/managers of large areas of land urgently need clarity about who will own this land in the future. If they themselves are not the owners, how will it be possible to ensure that this land and the public services it provides are sustainably secured and managed?

A third aspect is good cooperation between the various levels of government. The various transitions and SDGs are the responsibility of several different ministries, as well as provincial and municipal departments, and water boards. (The situation for land-related SDGs has certainly not become any simpler; since the Rutte III Cabinet came into power, 4 instead of 2 ministries are now responsible for these issues: Infrastructure & Water Management, Economic Affairs and Climate Policy, Agriculture, Nature & Food Quality and Interior and Kingdom Relations.) In the face of growing pressure on land, the effective and multiple use of land can only be achieved through combined action. At present, the effects of all these transitions on soil and land are unclear, nor is there clarity on where the various transitions may compete with or reinforce one another. What is needed is a combined and overall analysis of the consequences and opportunities. An analysis of this kind, which will require considerable time, should not prevent a start being made on a process of including the importance of harmonisation of soil and land use in the transitions as quickly as possible. In this process, the various levels of government must work together and take responsibility. Answers are needed to the following questions, among others: What are the frameworks, playing field and operational perspectives of the various societal parties? What are the challenges for knowledge development and innovation? How can we measure whether the goals have been achieved? How can we realise transitions while making optimum use of land within the capacities of the system? Should the government continue to further elaborate and implement modern land use as a tool for realising the transitions? Besides the Environment and Planning Act, the Delta Programme and National Adaptation Strategy, in which policy fields or in respect of which policy agendas is land use important: the Construction Agenda, the Energy Agenda or the National Circular Economy programme? All of these are questions in respect of which the national government can introduce coherence and a sense of direction.

It is however not only government but also other stakeholders that should take responsibility. The stakeholder group is too extensive to discuss in detail here but we would like to make a few suggestions. Entrepreneurs (manufacturers), wholesalers and retailers, investors and bankers all play an important role in developing new business models and forms of investment that adequately appreciate and recognise the long-term return from sustainable land use. The 4 returns approach developed by Commonland can serve as a source of inspiration.

¹⁵ <https://www.nrc.nl/nieuws/2017/11/01/herstel-veerkracht-van-de-delta-eist-visie-van-rutte-13792586-a1579529>

Supply chain parties in food production can reach agreements on comprehensive sustainability of the chain, based on sustainable soil management. This is becoming increasingly clear, and certain initiatives are being taken. Eosta, distributors of organically grown fruit and vegetables, have for example developed a sustainability passport. In collaboration with WUR, Friesland Campina is currently investigating the operating perspective of farmers for raising the organic matter content in the soil. Agricultural entrepreneurs can call for the halting of destructive techniques such as deep ploughing or the use of excessively heavy farm machinery and together with the contract companies go in search of possible alternatives.

Knowledge institutions and universities must work hard to establish sound basic data. Without solid data on the soil and water system, even the most advanced state-of-the-art models are unable to calculate valid scenarios for possible area development. Nature organisations are at present above all focused on the perception and experience of nature above the ground, but they too could explicitly opt to seek ties with biodiversity belowground and its role in respect of aboveground nature. This approach should apply both to their management activities, and in their publications about the impact of their management work.

Finally, in our cities, our citizens own a large percentage of the land, in their homes and gardens. They too can play a major role in land-related transition, for example by turning around the trend towards low-maintenance paved gardens that contribute to the excessively rapid discharge of water during heavy rainfall, thereby aggravating the flood risk in our cities. There is an urgent need for positive forms of cooperation and cooperation tools between the municipalities and their residents. Citizens can also contribute to the circular economy by separating waste and can help to develop local, sustainable production by not only demanding that products be produced locally, but sustainably too.

5. CONCLUSION

This opinion document has only allowed us to touch on a small percentage of the urgent needs and the possibilities for sustainable soil and land use. What has become clear is that the pressure on land use is constantly growing, not only globally but specifically also in the Netherlands. This development calls for the smart combination of land use functions, in which all interests are carefully balanced and in which the natural potential of the soil-water system and its preservation are specifically taken into account.

The aim is to have realised the SDGs by 2030. The obstacles to making that possible for such goals as poverty, gender equality and education are above all human in nature. In respect of these goals the adage where there is a will there is a way clearly applies. This situation is different for the goals relating to our natural resources, such as the soil and the oceans; here, the inertia of the system itself also plays a role in the overall picture. Changing the management of these systems often requires a great deal of time in order to arrive at a new and sustainable balance. It is therefore essential that we start work as soon as possible on 'soil health' and 'land health'.

If we are to tackle these issues seriously, we will have to make use of state-of-the-art knowledge of the natural system; stakeholders will have to coordinate, harmonise and co-create in determining how the characteristics of the system can be optimally used for society; and far greater levels of cooperation will be needed between all stakeholders in order to actually realise optimum use. To bring about any of these outcomes, it is essential that Ministries work closely together in concerted action to play a stimulating and facilitating role in bringing about an integrated vision and policy on spatial planning, multiple sustainable soil and land use and fulfilling the societal transitions and SDGs.