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No net land take by 2050?

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Future brief: No net land take by 2050?

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Introduction

How to halt land take in the EU

Land take: increasing infrastructural and urban development means that ecosystem services of key importance to human life are being lost. Of high concern is the amount of land being covered with impervious materials, which halts natural soil processes. What measures can avoid, reduce or compensate for land take?

Land and soil are limited natural resources. 'Land', can be defined as the terrestrial bio-productive system that comprises soil, vegetation, other biota, and the ecological and hydrological processes that operate within the system (according to UNCCD Art 1e). It is fundamental for food and raw materials, for protecting biodiversity, for storing carbon emissions, for filtering contaminants and for recycling water, as well as hosting human development and infrastructure. Used efficiently, it can provide these key functions and 'ecosystem services' into the future.

However, demand for developed land continues to rise. This is driven by new lifestyles that require more space per capita, as well as by competition between municipalities to attract new developments because of the assumed economic revenues.

Soil is also a major natural resource, which provides several essential ecosystem services to humans: nutrient cycling, water purification, flood mitigation and climate regulation, as well as fuel, food and drink. Information about pedogenesis (soil formation) is rather scarce: the main challenge confronted by pedologists is the ability to describe the complete complexity of the soil system. Different soil formation processes operate at vastly different timescales, ranging from milliseconds (e.g. transport processes) to thousands of years (e.g. weathering), so it is an extremely complex process. However, there are some recent models that are beginning to simulate such processes; for example, the SoilGen model calculates soil evolution over a multi-millennial timescale, up to 15 000 years (Opolot *et al.*, 2015).

Well-functioning ecosystems on undeveloped land directly support all human life, albeit in seemingly indirect ways. Chemical weathering, as one example, is a key process for life on Earth. It is a process carried out by soil microbes, lichens, fungi and bacteria that are found on weathered rock surfaces, in groundwater, among the roots of trees and plants, and other places where the ecosystem is functioning healthily. These tiny organisms decompose inorganic nutrients, such as potassium, magnesium, iron, copper and zinc, and make them available for uptake by other organisms including, eventually, humans (Jackson, 2015).

Active and large-scale cultivation has meant many soils in Europe have endured long-term agricultural stress, and increasing infrastructural and agricultural development on previously undeveloped land ('land take') means that several services of key importance to human life are being lost. When the services provided by undeveloped land are lost, this is nearly irreversible (Ragnarsdóttir & Banwart, 2015) because the soil would take thousands of years, if not multiple millennia to recover, depending on the type.

We also lose the aesthetic value of the countryside and its value for recreation and mental health. And as well as losing its value as a carbon sink, the developments that replace it often drive up carbon emissions further because they are largely dependent on private car use for access.

City centres often make relatively efficient use of land, with high-rise buildings creating high density, a broad range of services provided locally and an established transport infrastructure. However, recent trends have included lower occupancy per household, a preference for living in semi-detached or detached houses on the urban outskirts and building out-of-town developments such as supermarkets and leisure centres (EEA, 2006).

Population growth can also drive land take, but built-up areas are expanding more quickly than populations are growing. Urban sprawl often continues even where populations are decreasing. Since the mid-1950s, the total surface area of cities in the EU has increased by 78% while the population has grown by just 33% (EEA, 2006).

The enormous loss of soil functions and ecosystem services is one of the major environmental challenges Europe is facing. To help address this global problem, the European Commission has proposed in the EU Environment Action Programme to 2020 (7th EAP) to have policies in place by 2020 to achieve 'no net land take' by 2050 and has also set targets for reducing soil erosion and the loss of soil organic matter:

> "By 2020, EU policies take into account their direct and indirect impact on land use in the EU and globally, and the rate of land take is on track with an aim to achieve no net land take by 2050; soil erosion is reduced and the soil organic matter increased, with remedial work on contaminated sites well underway." (COM (2011) 571)

This Future Brief, produced in the context of the 2015 International Year of Soil, focuses on the contribution that urban and rural land use planning can make to achieve the 2050 goal.

What is 'land take'?

Land take can be defined generally as the loss of undeveloped land to human-developed land. It can also be defined as the loss of agricultural, forest and other semi-natural and natural land to urban and other artificial land development. This includes areas sealed by construction and urban infrastructure as well as urban green areas and sport and leisure facilities (EEA, 2006).

Since the 1950s it has largely been driven by urban sprawl. As well as a simple conversion of land from non-urban to urban use, sprawl is characterised by a decrease in urban density, a decentralisation of urban functions and the transformation of a compact urban form to an irregular, discontinuous and dispersed pattern (Siedentop and Fina, 2010).

1. Monitoring land take

It is widely reported that an area the size of Berlin, almost 1000 km^2 of agricultural or natural land, disappears every year in the EU to be converted into artificial areas (European Commission, 2012).

However, the CORINE Land Cover (CLC) dataset used to arrive at this figure underestimates the area of urban fabric. The CLC project was built to map European land cover and land use in a harmonised way based on satellite images. A minimum mapping unit (MMU) is used, so that structures under 25 hectares and linear features under 100 m wide — such as transport infrastructure between urban areas — are not included in the analysis.

The same database is used to monitor changes in land use and land cover but only changes relevant to an area larger than five hectares are taken into account. Cumulatively this can cause a significant underestimation. For example, under this system only a third of all registered land use changes that took place in Germany between 2000 and 2006 are included.

Researchers have concluded that while the level of detail provided by the CLC project has allowed large-scale international comparisons and helped raise awareness of the extent of landscape changes across the EU, it cannot provide a meaningful database for local approaches (Decoville & Schneider, 2015). It can also lead to a high error rate in terms of interpretations (Batista *et al.*, 2013). So while it can be useful for general comparisons and observing trends, it is not ideal for measuring the evolution of land take within nations. Any figures based on the data should be considered a conservative estimate.

A complementary analysis is provided by the 'land use and land cover survey' (LUCAS). It provides "harmonised and comparable statistics on land use and land cover" across the 4.5 million km^2 of the 28 countries of the EU (Eurostat, 2015). For the years 2006, 2009 and 2012 a group of 750 investigators conducted surveys in more than 270,000 sample spots and methodically recorded data on the cover and use of land. As the survey is based on sample points, it can only be used to assess the overall extent of artificial areas for a country by extrapolation. In reality, the LUCAS results only reflect land cover changes for the selected spots included in the survey (Decoville & Schneider, 2015).

Researchers in Germany have concluded that the absence of an adequate measurement of urban sprawl unintentionally contributes to undervaluing its costs and non-monetary consequences and restricts the ability of decision-makers to form planning strategies that support economically, ecologically and socially acceptable land use patterns (Siedentop and Fina, 2010).

To address these limitations, the Copernicus Land Monitoring Service (http://land.copernicus.eu/) was set up and became operational in 2015. Coordinated by the European Environment Agency (EEA), the service provides global, pan-European and local components. The pan-European component focuses on five specific land-cover characteristics, including the high definition layers of the level of soil sealing by buildings, roads and pavements. One of the local components is the Urban Atlas (UA), a high-resolution mapping of nearly 700 larger cities in the EU28. The minimum mapping unit in urban areas is 0.25 ha and 1 ha in rural areas. Linear objects of a minimum width of 10m minimum are also mapped. As with CLC, changes in the UA are analysed between reference years.

Despite waiting for a means to accurately measure the extent of land take, some individual member states have already set targets for reducing it. In Germany, the Federal Government has set a goal of reducing the daily growth of the area used for human settlement and transport to 30 hectares per day by 2020, reduced from 129 hectares a day in 2000. In Luxembourg, the National Plan for sustainable development has set the objective to limit it to one hectare per day by 2020.

But how can national and local governments reliably assess their contribution to achieving the 2050 goal of 'no net land take'?

Swiss scientists recommend a 'Weighted Urban Proliferation' tool to measure urban sprawl (Jaeger & Schwick, 2014). They recommend starting with a clear definition of urban sprawl as follows.

A landscape suffers from urban sprawl if it is permeated by urban development or solitary buildings and when land uptake per inhabitant or job is high. The more area built over and the more dispersed the built-up area, and the higher the land uptake per inhabitant or job (lower utilisation intensity in the built-up area), the higher the degree of urban sprawl (Jaeger & Schwick, 2014).

The scientists developed a mathematical model to measure not only the size of built-up areas, but how widely buildings are dispersed and the number of people and jobs that are accommodated. They used the model to analyse maps at a scale of 1:25,000 and 1:100,000 and to measure the progress of urban sprawl for Switzerland over 67 years from 1935 to 2002.

They conclude that the method can be used to analyse sprawl at a local, regional or national level. Software and data are available to make this possible.

Siedentop and Fina (2010) present another 'multiple indicator' approach to measure three specific dimensions of urban sprawl — urban density, urban land use patterns (for example, the irregular, discontinuous and fragmented mosaic of sprawl), and the surface characteristics of land uses (for example the loss of agricultural land to impervious surfaces). The approach is suitable for monitoring and evaluation at a regional or national scale rather than across the EU.

The contribution of the Copernicus service is also expected to improve evaluation by allowing narrower linear traffic structures and smaller areas of land take to be taken into account.

What does 'no net land take' mean?

Sealing agricultural land and open spaces should be avoided as far as possible and the focus should be on building on land that has already been sealed. This might require greater investment, for example to redevelop land previously used as an industrial site (including decontamination). However, new houses still need to be built and the 2050 goal does not aspire to reduce sealing of new land to zero.

When land is taken, the aspiration is to ensure this is no more than is compensated for elsewhere. For example, unused land could be returned to cultivation or renaturalised so that it can once again provide the ecosystem services of unsealed soils.

2. How policy can drive change

In Germany the average living space per inhabitant has increased from 34.9m^2 in 1991 to 46.5m^2 in 2015 (Destatis, 2015). A similar trend is occurring globally. Such an increase is not possible within the confines of mature European city centres and it mostly occurs on their periphery. Villages and towns surrounding a city centre compete with each other for the revenue rewards of attracting new inhabitants and new businesses.

Researchers have identified the rural-urban fringe as being particularly vulnerable to powerful spatial, economic and social forces so it requires particularly innovative efforts to preserve it (Paül and McKenzie, 2013). Multiple studies forecast that urban expansion will continue at the expense of farmland contraction. But while towns and cities may be the draw for urban sprawl on their periphery, they are often unable to control it because the planning jurisdiction falls outside their area.

So what can be done to alter the forecast and move towards the 2050 goal? Jaeger and Schwick (2014) suggest that urban sprawl must be limited through social action by introducing targets and limits designed to regulate the use of landscape as a common property resource. As with water and air, if all potential users recognise the long-term value of land and the long-term consequences of uncontrolled land take, they may mutually agree to collective coercion.

Increased awareness of the common value of land ecosystem services and of the long-term economic impacts of losing it is an achievable first goal. Science can help provide the insights needed and they need to be effectively communicated to the public and policy makers.

EU and national-level policy and target-setting can provide a strategic direction. Six countries of the EU have already set quantitative objectives, though in very different ways. For example, Germany, Luxembourg and Austria have defined the level of land take that should not be exceeded. France has stipulated that the rate of agricultural land take should be halved by 2020. And Britain and Flanders have used a 60% target for new housing or urban development to be on brownfield land (Decoville & Schneider, 2015).

National governments can also introduce novel regulatory interventions to limit urban sprawl and land take. For example, Denmark's 'Station Proximity Principle' adopted in 1989 requires new offices over 1500m^2 to be located within 600m of a rail station. This has contributed to Copenhagen's efficient, compact urban form. The urban growth boundaries set by the Swiss Land Use Plan in 1970 have been successful in promoting increased building density and restricting most development to building zones (Gennaio *et al.*, 2009).

However, strong regional development policies are needed to complement a national strategy. Building on agricultural land is often the most economically competitive option due to its relatively low market value and the fact that — unlike some brownfield sites — no risky decontamination is needed. Regional policy can therefore be crucial for setting precise ceilings for the consumption of previously undeveloped land. This could be most effective if there is greater cooperation between regions — to reduce competition for investment and, in some cases, to offset expansion in one area with compensation in another.

Some countries have experimented with ways to increase the economic value to landowners of preserving agricultural land. For example, in a transferable development rights (TDR) market, landowners can sell their right to build. This can result in lower land consumption in areas where there is low demand and increased density where there is high demand. Menghini (2013) highlights the most successful programme in the US so far where, in Maryland,

> *...in a transferable development rights (TDR) market, landowners can sell their right to build. This can result in lower land consumption in areas where there is low demand and increased density where there is high demand.*

nearly 7,000 hectares of cultivated and uncultivated land was saved from development and farmers were able to sell TDR as compensation for discontinuing some potential development.

In Bulgaria, the Czech Republic, Slovakia, Poland and the Lombardy Region of Italy, the conversion of agricultural soils requires a fee dependent on the quality of the soil, category of the settlement area and the possibility of irrigation. Polish law gives local authorities the option to demand that when agricultural land is converted, valuable topsoil is removed and used to increase the fertility of other soils or contribute to the reclamation of degraded land somewhere else (European Commission, 2012). In all German regions, two Austrian provinces, Tuscany, and in the autonomous Italian province of Bolzano/Bozen, land planning guidelines already take soil quality into account and help steer new developments towards less valuable soils. The protection of soil functions in spatial planning is relatively new and depends on growing awareness of the consequences of soil degradation (European Commission, 2012).

In 1998, EU funding helped an agricultural park to be established near Barcelona, covering 621 mostly family-run farms. Researchers found that as well as such planning procedures, successful farmland protection requires a strategy to sustain the status of productive farmland. Paül and McKenzie (2013) found that, as long as it is close to a large agglomeration, peri-urban agriculture can be innovatively managed through Alternative Food Networks (AFNs). Instead of focusing on industrial-scale production for export, farms on the urban-rural fringe can help feed their nearest cities. This was found to work particularly well when farmers are actively involved, for example in selling direct to consumers.

In conclusion, national targets can be useful in creating broad awareness of the urgency of the situation. However, as recommended in the European Commission's Soil Sealing Guidelines (2012), goals to reduce soil sealing and land use should be defined on a regional level. Local strategies should define how to reach the goals: therefore federal states and municipalities are responsible for implementing appropriate measures in practice.

3. Containing land take

According to researchers from the EU-funded CircUse project, expansive development will weaken our ability to deal with climate change, demographic change, peak soil, peak oil and the rising costs of infrastructure. The researchers recommend a change in philosophy in how we use land, expressed as three actions: avoid, recycle and compensate.

Avoid: the conversion of now un-built open space or agricultural land into new developments is to be avoided.

Recycle: areas with uses that were once active and now exhibit no viable use should be recycled by either introducing new uses or through renaturation.

Compensate: compensation should be required when construction must take place on previously un-built land. This can take the form of renaturation projects or de-sealing measures in built areas, where soil sealing is no longer necessary.

Limiting soil sealing means preventing the conversion of green areas and the sealing of their surface. Re-using already built-up areas such as brownfield sites can be included in this concept. Targets have proved an effective tool for monitoring and spurring progress. Creating incentives to rent unoccupied houses has also helped in limiting soil sealing.

Where soil sealing does occur, some member states have used **mitigation** measures to maintain some soil functions and to reduce any significant direct or indirect negative effects on the environment and human well-being. These include using permeable materials instead of cement or asphalt where appropriate, supporting 'green infrastructure', and making wider use of natural water harvesting systems.

Where mitigation has been regarded as insufficient, member states have considered **compensation** measures. Although sealing cannot be exactly compensated for, the overall capacity of soils to fulfil most of their functions can be sustained or restored. (EC, 2012)

The EC's soil sealing guidelines highlight common elements of best practice, such as the integrated nature of spatial planning. This means all relevant public authorities are fully committed — not only planning and environmental departments. In particular, municipalities, counties and regions have to be involved.

A second common element is that specific regional approaches are developed, taking into account unused resources at local level, for example a particularly large number of empty buildings or brownfield sites. Finally, best practice has shown the value of reviewing existing financial policies for housing and for commercial and infrastructure development. In this way, subsidies that act as drivers for unsustainable land take and soil sealing can be identified and reduced. And the income received by local authorities from urbanisation fees and levies can be reassessed.

Altes (2009) considered whether taxes on building in green spaces could serve as a useful instrument for balancing urban growth and the protection of the landscape. He concluded that a simple tax on development does not distinguish between leapfrog development that divides up green areas and the clustering of urban development that leaves larger green spaces undeveloped. So it would not abolish the need for planning control in green spaces.

Floater *et al.* (2014) warn that leapfrog development can also inadvertently arise as a result of urban containment strategies. Urban containment is one of the best-known planning instruments for managing urban sprawl. The two main types are greenbelts and urban growth boundaries. While Gennaio *et al.* (2009) found the Swiss growth boundaries largely successful, in London and Seoul commuter towns have developed on the urban periphery, with workers travelling long distances into the city. Policies here have incentivised development to 'jump the greenbelt'. This may be partly explained by the dominant place of such cities in the British and Korean economies.

However, the EC's soil sealing guidelines still recommend greenbelts around major metropolitan areas and smaller cities as an effective way to limit land take and soil sealing. The benefits include controlling the unrestricted sprawl of large built-up areas, preventing neighbouring towns from merging one into another, preserving the setting and special character of historic towns and assisting in urban regeneration, by encouraging the recycling of derelict and other urban land.

4. Preventing land take with brownfield development

The European Environment Agency (EEA) has estimated that there are as many as three million brownfield sites across Europe. The Concerted Action of Brownfield and Economic Regeneration Network (CABERNET) defined brownfields as sites which:

- have been affected by former uses of the site and surrounding land;
- are derelict and underused;
- may have real or perceived contamination problems;
- are mainly in fully or partly developed urban areas;
- require intervention to bring them back to beneficial use (CABERNET 2006).

The Science for Environment Policy (2013) Thematic Issue on Brownfield Regeneration draws attention to the valuable opportunity presented by brownfield remediation and regeneration, not only to prevent the loss of pristine countryside, but also to enhance urban spaces and remediate sometimes contaminated soils. It highlights the key role that their reuse and redevelopment could play in achieving the 'no net land take' goal. The EC's soil sealing guidelines recommend that even temporarily converting them into urban greenspace and recreation areas is beneficial.

Brownfield sites are often located within urban boundaries with good connections to local infrastructure, making them a competitive alternative to greenfield investments. However, this competitiveness is often undermined by real or perceived contamination.

In the US, the Environmental Protection Agency started a brownfield initiative in 1994 to clean up environmental hazards and remove neighbourhood eyesores while, at the same time, creating jobs, providing housing and promoting general economic health in local communities of all sizes. The initiative blossomed into a major national programme that has changed the way that contaminated property is perceived, addressed, and managed (Thornton *et al.*, 2007).

Federal funds, tax incentives, grant schemes and technical support programs have been crucial to success. Finance is particularly important in the current economic climate in which investors are cautious.

There is also a new generation of brownfields to consider as a result of the worldwide financial crisis — from commerce, housing, infrastructure and tourism. In these cases, contamination of soils should not pose serious problems.

The CABERNET project identified the three A-B-C categories of brownfields. 'A' sites can be redeveloped in the free-market economy without the need for public funding. 'B' sites are 'potential development' sites which require some form of public funding. These projects will generate only marginal profit so risks are often shared via public-private partnerships. Regeneration of the 'C' category of 'non-developing' sites would incur a financial loss for the investor and requires public sector finance. It includes reclaiming contaminated land or making sites structurally safe before planting woodlands, creating bodies of water or providing land for the grazing of livestock.

Investment in category 'C' regeneration can pay off in the longer term in terms of boosting the local economy by making a location a more attractive place to live. A more direct pay-off is possible if the site becomes suitable for building (Doleželová *et al.*, 2014).

Pressure for quick results can create incentives for local governments to be involved in reclaiming category A 'ready' regeneration sites that would have been brought back into use by private sector investment alone. However, only modest adjustments to perceived costs and values may be required for the market to redevelop category B land (CABERNET, 2006). Meanwhile, category C sites remain underused despite the availability of investment.

While national planning policy can help ensure that new developments are mainly built on brownfield land, as was the case in England, local governments are best placed

to provide locally relevant incentives to encourage redevelopment of all categories of brownfield. These might include subsidised insurance, development fees waivers or property tax abatements to reduce risks for private investors.

At the European level, the European Regional Development Fund is the main source of financial support. Authorities in Member States can also set up revolving funds via the Joint European Support for Sustainable Investment in City Areas (JESSICA). Developers obtain low-interest funds and the interest they pay flows back into the fund pool.

The results of a study by Atkinsons *et al.* (2014) suggest that the process of regenerating a site can also create social and environmental benefits. However, they warn against assuming that benefits will simply arise as a result of completing a project. A disconnect often exists between the laudable objectives of regeneration activity and the practices required to meet them. Through a workshop exercise with practitioners, they produced a model to map social and environmental objectives against specific project delivery stages. The model can be used to signpost the steps required to translate project objectives into real beneficial outcomes.

Bartke and Schwarze (2015) emphasised that land management and in particular decisions between greenfield and brownfield development must trade-off different stakeholder, societal and ecological demands. Balancing development and conservation goals is not easy.

In the longer term, developers and planners need to recognise that all new construction is essentially temporary and we therefore need to plan for its second life. For example, avoiding high risks — such as pollution — that prevent second uses, using flexible design construction techniques and new innovations such as building with modular concrete that can be re-used in situ (Ramsden, 2010).

5. Conclusion

Land is the ultimate common resource as it provides habitat for flora and fauna, is the basis for most human activities and supplies the resources for meeting most human needs. It is the space required for living, as well as natural space, cultural space, economic space, and recreational space.

Urban sprawl is a prime example of the tragedy of the commons (Jaeger and Schwick, 2014). The benefits of using land go to a single citizen or commercial outlet while the detrimental effects are shared by society.

Valuable farmland is built over, the surface of the ground is sealed and most ecological functions of the soils are destroyed. Infrastructure costs, noise, and the distance between home and work all increase while carbon pools, open landscapes and biodiversity hotspots are lost. In low-density built-up areas, energy use for transport is an order of magnitude higher per person than in high-density urban areas (Kenworthy *et al.*, 1999). All efforts for sustainability will ultimately fail if land use is not organised in a sustainable way.

A modelling exercise conducted by the Joint Research Centre (Lavalle *et al.*, 2013) shows that, in order to reach no net land take by 2050, the average land consumed by 2020 should be approximately 1.6 m^2 per capita per year. This average is lower than in two other scenarios: the Reference Scenario (driven by demographic and economic trends) and the Linear Growth scenario (extrapolating previous trends in land use). The average increase in land consumption per EU citizen for these scenarios is estimated, respectively, at 2.2 and 1.9 m^2 per capita per year. Moreover, land-use intensity trends vary between Member States, which suggests detailed assessment at a national level on how to contribute to the EU-wide objective is required.

By proposing their own national targets to the EU, Member States can decide on the contribution they can afford to make according to their level of development. The authors of a study supporting potential land and soil targets under the 2015 Land Communication (Van Long *et al.*, 2014) propose a framework of relevant indicators and future research that could facilitate future target setting.

For example, they recommend using indicators based on a revised version of the CLC datasets, developed by the Joint Research Council (Van Long *et al.*, 2014). Their accuracy has been improved by including data of higher resolution such as the spatial distribution of artificially sealed areas. They recommend testing the feasibility of the Weighted Urban Proliferation model for different types of cities in the EU, following the example of Switzerland. And to support land recycling, they recommend introducing a requirement on Member States to establish a system to record and maintain information on the extent of brownfield land in their territories.

The EU, and other inter-country unions, could provide a strategic vision for their Member States as well as guidance, and facilitating the sharing of best practice. Regional and local government can also determine more specific targets. For example, reducing land take by a given percentage in a given timeframe; setting a minimum utilisation density for new developments; and setting limits for soil sealing.

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Further Reading

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News Alert articles

Potential for more efficient energy, land and phosphorus use by 2050

There is a large potential to improve the global efficiency of energy, land and phosphorus use, finds new research which modelled the effects of four worldwide scenarios between 2010 and 2050. An 'ambitious resource strategy' could moderate the increases in energy use (+25% globally instead of +80% in the baseline scenario), phosphorus use (+9% instead of +40%) and arable land (-9% globally, instead of + 4%).

http://ec.europa.eu/environment/integration/research/newsalert/pdf/potential_for_more_efficient_energy_land_phosphorus_use_by_2050_451na2_en.pdf

Soil management in China and the EU

Following rapid urbanisation, management of contaminated soil has become a political priority in China. In this study, researchers reviewed the current system in China as compared to Europe and provide recommendations for the sustainable management of soil.

http://ec.europa.eu/environment/integration/research/newsalert/pdf/soil_management_china_eu_447na4_en.pdf

Public participation in land use planning in Romania

Approximately 1000 km^2 of agricultural or natural land is lost every year in the EU due to land-use change. When this occurs close to residential areas, it can lead to conflict with local people. This study explored the views of local people in Romania, and compared them to experts. The authors discuss similarities and differences, and say that participation, where both locals and experts communicate, is key to developing effective land use policies.

http://ec.europa.eu/environment/integration/research/newsalert/pdf/public_participation_in_land_use_planning_in_Romania_440na4_en.pdf

New map of soil loss by water erosion across Europe

Soil erosion is an important issue in Europe, with consequences for water quality, ecosystem services supply and crop production. In this study, researchers enhanced an existing model to estimate soil loss and create an updated map of soil erosion across the EU. The authors say the tool can simulate the effects of land use changes and management practices and will support effective policy decisions.

http://ec.europa.eu/environment/integration/research/newsalert/pdf/new_map_of_soil_loss_by_water_erosion_across_europe_439na1_en.pdf

Thematic Issues

Soil and water: a larger-scale perspective — November 2015

Land use changes over time have altered relations between soils and water cycles throughout the world. Soils have been lost and degraded, and the closely interlinked processes of soils and water have become an urgent issue for European policymakers. This Thematic Issue aims to provide a review of new research into the links between soil and water issues in Europe, including a message that the soil-water links must be considered at their proper spatial scales.

http://ec.europa.eu/environment/integration/research/newsalert/pdf/soil_and_water_larger_scale_perspective_52si_en.pdf

Brownfield Regeneration – May 2013

Brownfield regeneration and land use planning are complex issues which encompass many different environmental, economic and social dimensions. This Thematic Issue brings together quality research into brownfield regeneration, which highlights insights and successful strategies from across Europe and beyond

http://ec.europa.eu/environment/integration/research/newsalert/pdf/39si_en.pdf

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