

# Land and soil jeopardized: Anthropic pressures

## Foreword

### **The soil : preserving the grounds of life for the coming centuries!**

Dominique Dron, engineer from the Corps des Mines, and André-Jean Guérin, engineer from the Corps des Ponts, des Eaux et des Forêts

## 1 – Land and soil degradation: the stakes and issues

### **Soil, the Earth's critical zone**

Christian Valentin, Institute of Research for Development (IRD), iEES-Paris, Academy of Agriculture

As the place of exchanges between energy, water and organic matter, the soil is the Earth's central critical zone. In this heterogenous zone close to the Earth's surface, complex interactions involving rock, soil, water, air and living organisms regulate the natural environment and determine the availability of biological resources. The public, decision-makers and even the scientific community know little about this key topic, which figures in three United Nations conventions (on desertification, climate, and biodiversity); and few university courses are devoted to it. Nonetheless, the soil is a major element for handling the big questions of climate change, food security and land restoration. Threatened by several forms of degradation (erosion, impermeability, salinity, etc.), the soil and land – despite being neglected by French, European and international law – are the ground for many a contention about uses related to urbanization, land-grabbing, organic products (not just food), etc.

### **Soil fertility: Quality through life**

Luc Abbadie, professor at Sorbonne University

The concept of “fertility” corresponds to a utilitarian view of the soil with a focus on the physical, chemical, biological and spatial properties that supposedly account for agricultural yields and, by extension, explain the healthiness of ecosystems. This view sees a container (the right soil) and its contents (plant life). However living organisms do not just adjust to the properties of their environment. By looking at changes and modifications, we realize that plants take control of the soil by adopting physiological and morphological characteristics, or interacting with microorganisms, and thus break free of certain exigencies. We thus come to see not the soil opposite plant life, but a soil-plant system. This knowledge leads us to thoroughly revise farming and forestry practices.

### **The state of the soil in France: “Artificial” land uses and others sources of degradation**

Véronique Antoni in charge of the project “Soil and natural

risks”, Ministry of the Environmental Transition and Solidarity, Commissariat Général du Développement Durable, Service de la Donnée et des Études Statistiques (MTES/CGDD/SDES); and Marlène Kraszewski in charge of studies on sustainable development (MTES/CGDD/SDES)

The soil lies at the center of key environmental issues, such as the availability of a quality water supply, the conservation of biodiversity, food security, or climate change. However it is regenerated very slowly. Despite its importance, the soil is undergoing degradation owing to various factors: erosion, the loss of organic matter, compression, contamination, etc. Among the causes are farming, forestry, industry, changes in land uses and the construction of housing and infrastructures. This “artificialization”, whereby land is devoted to urban areas, infrastructures, industry and roads, is apparently the major cause of soil degradation. In 2015, 9.4% of France's surface area had thus been “artificialized”.

### **The soil, a factor attenuating, or exacerbating, climate change**

Suzanne Lutfalla, PSL Research University, CNRS-ENS UMR 8538, Paris; Lauric Cécillon, Grenoble Alps University, IRSTEA, Saint-Martin-d'Hères; and Pierre Barré, laboratory of geology, PERSONNEL Research University, CNRS-ENS UMR 8538

How does the soil, as a dynamic carbon sink, affect the climate? The origin, nature and future of CO<sub>2</sub> in the soil are described before showing that the movement of carbon between the earth and the atmosphere is a major factor in this gas's concentration in the atmosphere. The uncertainty surrounding carbon sequestration is examined on all scales by discussing the policies adopted locally (in particular by groups of communes in France) and internationally for storing carbon in the earth. The soil has a strong potential for attenuating climate change. If realized, this potential would, in turn, have major benefits for the quality of the soil.

### **The land's legal status pertaining to human uses: An inventory and prospects**

Philippe Billet, *agrégé* professor of public law at Jean-Moulin University (Lyon 3), director of the Institute of Environmental Law (CNRS, UMR 5600, EVS-IDE) and member of Labex IMU (Intelligence des Mondes Urbains)

As the basis of most human activities, the ground – soil and land – has been more or less overlooked by the law when the intent is to protect it from being built or covered, i.e., “artificialized”. The Environmental Code ignores it as a natural environment, whereas the Code of Urbanism tries to see to it that the use of land is “economical”. After futile efforts for drafting a framework directive, EU law has turned toward issuing guidelines, with no binding effect, for preventing these “artificial” uses of the land and toward a scattershot

policy of dispersed protective measures without any guiding principle. Under the French ALUR Act of 2014, the concept of “densification” underlies a new policy of land planning and use. This act has voided the earlier arrangements that favored urban sprawl; and it calls for a consideration of the issue of “artificialization”, which devotes pieces of land to urbanization, infrastructures, industry and roads. Neutrality with regard to the land and soil degradation implies providing incentives and, perhaps, recognizing a “communitarization” of the services provided by the ground.

## 2 - Official responses

### Orientations and tools for managing “land consumption” on the national scale

**Laetitia Conreaux-Mantzaras**, architect and urban planner, head of the bureau on urban and rural planning and quality of life, Direction de l’Habitat, de l’Urbanisme et des Paysages, Ministry of Territorial Cohesion; and **Hélène Faucher**, head of a project on urban and rural planning, Direction Générale de l’Aménagement, du Logement et de la Nature (DGALN), Ministry of Territorial Cohesion

For nearly twenty years now, the DGALN in the French Ministry of Territorial Cohesion has been the vector of public policies for limiting the “artificialized” land consumed (built or covered) by urban areas, infrastructures and industry. It assists local authorities with land and real estate management by improving the quality of documents on urbanism and by more effectively bringing environmental issues into town and country planning. Policies conducted by other ministries also take part in the effort to curb urban sprawl, for example, by providing fiscal incentives for building in areas that are already urbanized or by backing farming projects. Owing to a gradual awareness, the conservation of lands that have not been “artificialized” is a major issue for improving the quality of life in France.

### Industrial wastelands, a new secondary resource?

**Philippe Merle** and **Jean-Luc Perrin**, Direction Générale de la Prévention des Risques, ministère de la Transition écologique et solidaire

The concept of industrial wastelands is hard to define, given its many meanings. Defining it as unused lots of land tells us nothing about the land’s characteristics and even less about its potentials. We must shift perspectives. First of all, the issues related to sites previously occupied by industry are local – the national statistic obtained by adding the surface areas of all wastelands covers cases that are much too diverse for effective remedial actions. Once we shift perspectives, we can analyze these former industrial sites in terms of waste management in general. We must, first of all, avoid soil degradation by treating the causes –with the objective of making it possible to reuse the land in the future. This reuse is now to be defined before building any new installation. Secondly, we must try to reuse as many of these sites as possible and not declare offhand that a location is polluted and thus unfit for any use. Thirdly, we must outline approaches (some of them opened under the ALUR Act on housing and urbanism) for reconvertng wastelands by placing the land to be rehabilitated in a broader view of a “circular economics”.

### Boosting the reuse of business wastelands

**Michel Valdigué** and **Philippe Schmit**, Commission Nationale d’Aménagement Commercial

Retail stores in France have grown on the periphery of urban areas instead of revitalizing downtown business area. Businessmen and investors have not pursued the same rationale. The game between these players threatens neighborhood stores while increasing the surface area devoted to retail businesses that can be reached by car – the purpose being to form a customer catchment basin. Other lands in Europe (in particular Great Britain, Germany, Spain and Catalonia) prefer installing new businesses in areas with a dense population. Since January 2018, European law admits criteria related not only to territorial planning and the environment, but also to the conservation of downtown areas; but this has not yet stimulated much legislation in France. As the world’s leading tourist destination, can France continue jeopardizing its assets by developing unaesthetic business zones that consume farmlands, which provide the produce needed for our food supply? The question of a model for retail business in the coming years should be discussed.

### Can tax policies help limit “land artificialization”?

**Guillaume Sainteny**, GS Conseil

The nearly thirty taxes on using the land for urbanization, industry and infrastructures have not proven capable of limiting this “land artificialization”, a process that mainly stems from the price difference between unbuilt lots of lands depending on whether they are “urbanizable” or not. Part of this difference comes from the lower value of rural real estate owing to taxes and to provisions in the French Rural Code. A recent proposal for a new tax on “land artificialization” would not be any more effective; and it lacks incentives. To moderate this trend in land use, adjusting current taxes would be more effective for reaching this goal than introducing a new tax. This could be done by modifying current tax rates as a function of geographical criteria, by exempting fewer persons or granting fewer deductions when such measures stymie reaching the goal, or by cutting taxes on unbuilt land so that such properties yield a net positive return.

### Opinion of the CESE of 13 May 2015: The management of farmlands, a societal issue

**Cécile Claveirole**, member of the Conseil Économique, Social et Environnemental (CESE) and head of the agriculture network of France Nature Environnement

The UN’s Food and Agriculture Organization declared 2015 to be the “international year of soils”. In France, the Economic, Social and Environmental Council (CESE: Conseil Économique, Social et Environnemental) took account of this topic in its work on agriculture. Attended by representatives of nonprofit organizations, the council’s third assembly addressed the societal issues of farmland management. The CESE’s division on agriculture, fishing and the food supply has decided to study this question both quantitatively (the farmlands and natural areas converted to other uses, in particular for building, the impermeability of the soil) and qualitatively (soil fertility, modes of production,

produce, the conservation of biodiversity). The Council's plenary assembly adopted this opinion on 15 May 2015.

### Recovering degraded land in arid zones

**Monique Barbut**, executive secretary of the United Nations Convention to Combat Desertification

Representing nearly 41% of the land above sea level, arid zones are home to more than two billion people who suffer from the ongoing degradation of the land and soil that provide them sustenance. Owing to desertification and droughts, nearly twelve million hectares of land are no longer arable each year. It is urgent to halt this trend related to unsustainable uses of the land, unfavorable climate conditions and population growth. The target of "degradation neutrality" has been set. Based on the restoration of degraded land and sustainable land management, this goal is important to the decision-makers in charge of land planning and development. Apart from degradation neutrality, only an amplification of good practices on a large scale can provide security for the water and food supplies, for energy and for human beings.

## 3 - Local or private actions

### The "consumption" of natural areas in Île-de-France: The assessment, issues and the tools

**Martin Omhòvère**, head of the Département Habitat et Société at the Institut d'Aménagement et d'Urbanisme d'Île-de-France; and **Martin Wolf**, expert on local finances at the Institut d'Aménagement et d'Urbanisme d'Île-de-France

Île-de-France, a region encompassing not only the capital, Paris, but also vast farmlands and natural areas, has long experienced strong pressures on land uses. With special powers in matters of urban and rural planning, the region is constantly striving for a balanced development of its territory and, in particular, for a conservation of open, un-built areas. Owing to its experience, Île-de-France is a noteworthy example of how to use tools for monitoring and managing the land, for studying the rationales underlying land uses, and for drafting policies to maintain the dynamics of natural and agricultural ecosystems.

### Conserving the land, stimulating farming: Thirty years of urban and rural planning in Bouches-du-Rhône

**Marc Beauchain**, former head of the departmental services: Direction de l'Agriculture et de la Forêt, then of the Direction des Territoires et de la Mer 13

For fifty years now, Bouches-du-Rhône, a French department with more than two million inhabitants, has experienced major changes. In this metropolitan department, several cities, including Marseille, have sprawled out over farmlands and rural areas. Since the end of the 1960s, the need to conserve the land and preserve farming has inspired a rural planning policy based on: knowledge of local environments, the conciliation of farming with environmental issues, cooperation, contractualization, and adjustments to economic changes. This long-term policy has averted the "expected extinction" of farming; and 148,600 hectares have been saved, thus producing nearly €500 million/year

of added value and placing the department in the lead of organic agriculture in France. An urgent call for a national awareness of our "overconsumption" of farmland...

### What governance for the relations of a city with its hinterland?

**Fabienne Trolard**, INRA; and **Guilhem Bourrié**, AAF

Since 2008, more than half the world's population is living in cities. This global change forces us to switch paradigms; the Earth should now be seen as a place of limited resources and with limited land. This calls for a systemic vision, integrated and dynamic, of cities and their hinterland, the goal being to satisfy the population's basic needs. The major obstacles to this change are pressures on the land, lack of knowledge about the soil, regulations, and the organization of decision-making by sector and by program. An inclusive approach calls for designing indicators of risks from simulations that, shared by all stakeholders, take account of resources related to the land, the water supply and food production. Following the Rio Summit in 1992, local and international programs were implemented that signaled commitments; they need to be diffused, shared and furthered.

### Curbing urban sprawl: (im)possible?

**Christian Garnier**, engineer ECP, head of the network Villes et Territoires Soutenables of France Nature Environnement

"Land consumption" comes along with urban growth and demographic trends. The anthropic use of more and more land, though evident, has long been overlooked by professionals and decision-makers. For them, it was normal, it was not a problem. The population density in France is among the lowest of the major countries in Europe. The principle of reducing "land consumption", though recently introduced in the law, has barely had any concrete, social or political, effects. However the new environmental and geopolitical situation signals a turning point. Hopefully, attempts by local authorities to address this issue will move beyond the stage of prototypes. In partnership with Veolia, France Nature Environnement has made an unsparing diagnosis and examined possible concrete solutions based on feedback from the field.

### After remediation, the challenges of land restoration and soil improvement

**Corinne Leyval**, research director, CNRS

The strong development of industry from the start of the 19th century till its decline at the end of the century has had a considerable impact on vast swaths of land. Given the scarcity of land and mounting pressures on it, a major question is how to restore the land and regenerate the soil, which human actions have heavily affected. Beyond the need to remove pollution and the question of risks to the environment and health, we must turn attention of land restoration and the reuse of wastelands and abandoned areas. The land is to be improved not just for uses such as the production of biomass but also as a reservoir of biodiversity. Industrial wastelands, though often seen as a burden, can become an asset to be developed.

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