

METHODOLOGY SHEET: INDICATOR N° 9**Title:****SUSTAINABLE LAND USE****Headline indicator: Percentage of protected areas****Measurement:**

- a) **Artificial areas:** artificial surfaces as a percentage of the total municipal area
- b) **Derelict and contaminated land:** extent of derelict land (area, m²) and contaminated land (area, m²)
- c) **Intensity of Use:** number of inhabitants per Km² of “urbanized land” area
- d) **New development:** quota of new edification taking place on virgin area (greenfield) and quota taking place on derelict and contaminated land (brownfield in total area as soil projection) in % per year¹
- e) **Restoration of urban land**
 1. Renovation/conversion of derelict buildings (total number)
 2. Renovation, conversion of derelict buildings (floor surface in m²)
 3. Redevelopment of derelict land for new urban uses - including public green spaces (area, m²)
 4. Cleansing of contaminated land (area, m²)
- f) **Protected areas** as a percentage of total municipal area

1. Definition

This indicator is concerned with sustainable development, restoration and protection of land and sites in the municipality. Urban expansion tends to increase the urbanised area at the expense of virgin land and green areas. Moreover, in many European cities, the socio-economic transformation of the last century led to the abandonment of developed and contaminated land. Sustainable land use means efficient land use within the city through targeted urban development, minimising the take up of agricultural and natural land (greenfield sites), and enhancing developed land through restoration and upgrading.

Other definitions essential for the correct use of the indicator:

Municipal area: area under the administration of the Municipality (including rural areas; Metropolitan areas should include the whole territory under administration);

Developed/urbanised land: land occupied by buildings, in a continuous or discontinuous manner, corresponding to the Corine Land Cover «artificial surfaces» category of land use;

Virgin land (greenfield): land “uncovered” by artificial surfaces, corresponding to any of CORINE land cover classes, except for “artificial surface”;

Derelict building: building no longer in use; both their renovation and conversion have to be accounted as the sum of floor surface expressed in m² for each interested floor;

Derelict land (brownfield): part of developed/urbanised land (artificial surfaces) no longer in use (for housing, industry or services);

¹ As regards the concept of “new buildings” on greenfields and brownfields, the indicator explicitly refers to what has happened in the previous year.

Contaminated land (brownfield): land affected by levels of pollution of the soil or subsoil that are high enough to require remediation before safe reuse is possible;

Protected areas: areas where vegetation and landscape are under specific protection and land cover can't undergo major changes.

2. Question

Is the municipality committed to a sustainable land use policy, though targeting development, increasing land use efficiency, protecting underdeveloped land and ecologically sensitive sites and restoring and redeveloping derelict and contaminated land?

3. Context

A sustainable city is one that enhances the efficiency of land use within its territory, protects highly valued unbuilt land, biodiversity value and green areas from development and restores contaminated and derelict land (brownfield sites). Most cities and urban-regional authorities implement policies aimed at increasing urban densities through targeted development. There is also a wide range of policies at all levels for protecting sites with agricultural, landscape and ecological value and able to sustain biodiversity, as well as European policies for the restoration of derelict and contaminated land.

In order to monitor the sustainable use of the land, it is advisable to adapt data produced for all EU countries by the Corine Land Cover (see box). The first indicator will be the **artificial areas** one: it will give information on the **size of the developed area as «artificial surfaces» and the percentage of the whole municipality area** it corresponds to. The advantage of this indicator is its capacity to record both the effective protection of ecologically sensitive sites (Habitats Directive) and the restoration and reuse of derelict land: all policies aiming to limit the expansion of the city in agricultural or natural areas will allow a smaller exploitation of the areas not classified as «artificial surfaces».

To measure efficiency of land use an indicator of the **intensity of use** is envisaged. The indicator will be defined as number of inhabitants per ha of urbanised area;

The first indicator only measures large-scale changes: an increase or reduction of just a few hectares of the artificially modelled areas makes little difference to the percentage. Neither can the density or quality of the developed area be deducted from the size of the developed area alone. Moreover, it does not record initiatives for the restoration of derelict or contaminated land intended to allow for its reuse - that is, when derelict sites are reused for new housing or productive activities, but the size of the 'artificial' area does not change. In order to monitor these phenomena, it is advisable to introduce other indicators: one is the **proportion of new building taking place on virgin area (greenfield) and the fraction on derelict or contaminated land (brownfield)**.

To have a better understanding of the restoration and renovation activity some specific information should be supplied concerning: **Renovation: conversion of derelict buildings (floor surface in m²)**, **Redevelopment for new urban uses, including public green spaces (area, m²)**, **Cleansing of contaminated land (m²)**.

Finally, it is advisable to monitor the capacity of the municipality to safeguard the areas of greatest ecological value through the creation of protected sites - in other words, through the introduction of legal instruments or constraints that guarantee land protection. In this case the appropriate indicator is **the area of protected sites as a % of the total municipal area**.

The first indicator records the large-scale phenomena (spatial and temporal), shows whether the urban development is of the dispersed or compact type - in the latter case, with a tendency to limit the use of land. The second measures the capacity of the city to begin processes of regeneration and avoid the waste of land. The third measures the ability of the city to protect biodiversity and the areas having greatest natural and landscape value.

Monitoring Land Use in Europe

Land use is monitored in Europe by means of the Corine Land Cover, itself a subprogram of the CORINE program. It includes thematic maps representing the area and dividing it into categories according to the way the land is used. The database is constituted by 44 categories of land use. Data are acquired through the interpretation of satellite photographs and processed by computers with the addition of supplementary data (maps, aerial photographs, statistics, local knowledge, etc.). The 44 categories are divided into groups, each having 3 levels. The main levels comprise:

1. artificial surfaces
2. agricultural areas
3. forests and semi-natural areas
4. wetlands
5. water bodies

For each of the main levels there are two lower levels: for example, in category 3 (forests and semi-natural areas), wooded areas (3.1) are distinguished from scrub and heath (3.2); in the wooded areas, broadleaf woods (3.1.1.) are differentiated from conifer forest (3.1.2).

The Corine Land Cover database provides identification and mapping of the 44 categories for minimum mappable areas of 25 ha, using a map scale of 1:100,000.

The existing database was created on the basis of satellite data collected at the beginning of the 1990s. Currently, the whole database is being updated for reference year 2000, using a similar methodology as in the past. A lowering of the digitalisation lower limit from 25 ha. to 5 ha. for some classes is proposed. In addition, a change of 5 ha. of an existing class will be attributed for in the updated version. Furthermore, the updating process should be such that trend analysis with the previous version is feasible. Thus, it is carried out in terms of digitalisation (editing) of change only, rather than of an entirely new digitalisation.

Sustainability principles covered: 1, 3, 5, 6.

4. Targets

The increased efficiency and quality of urban environments should be firmly placed within the European Spatial Development Perspective (ESDP), attempting to connect physical aspects of sustainability with other key political agendas, such as social cohesion and economic competition within Europe. Urban regional authorities have played a vital role in developing the ESDP, which now provides a framework for much interregional planning activity within the EU and between EU and neighbouring countries.

There are, moreover, international agreements for the protection of certain biodiversity sites (the Ramsar Convention), in addition to European legislation having the same objectives (Habitats Directive 92/43/EEC). In some countries local nature reserves are to be found, too.

Contaminated land is also subject to improvement targets. There are targets devised to direct new development to brownfield sites (e.g. 60% of new housing in the UK), while protecting green sites in most countries.

5. Unit of measurement

- a) artificial surface of the total municipal area: %
- b) extent of derelict land (m²) and contaminated land (m²)
- c) number of inhabitants per ha of urbanized land area
- d) newly built areas on virgin land and on derelict or contaminated land: % (the total must be 100%; only derelict land area - soil projection - must be considered, so that the restoration of 3 floors of a derelict building is equivalent to only one floor)

- e) renovation of urban land
 - renovation/conversion of derelict buildings (total number)
 - renovation, conversion of derelict buildings (floor surface in m²)
 - redevelopment of derelict land for new urban uses - including public green spaces (m²)
 - cleansing of contaminated land (m² and public expenditure)
- f) protected areas of total municipal area: %

6. Frequency

- a) the same as the updating frequency of Corine Land Use Database
- b) annual
- c) the same as the updating frequency of Corine Land Use Database
- d) annual
- e) annual
- f) annual

7. Data collection method and sources; Methods of calculation

The data on “Urbanised land” is obtained from CORINE EU sources (see box on Corine Land Cover): many municipalities, however, already use it for spatial planning.

The data on areas built entirely anew and the fraction concerning virgin land and derelict or contaminated land and the protected areas may be obtained from the plans and programmes of local authorities.

The calculation of the indicators is easy once the respective sizes of the different categories of land use and of the areas affected by restoration and decontamination schemes are known.

The geographical level to be considered is the whole area for which the local authority is responsible.

8. Form of reporting/presentation

- a) Bar graph for each period for which data is available.
- b) Bar graphs for each year
- c) Bar graph for each period for which data is available.
- d) Pie graphs for each year
- e) Bar graphs for each year
- f) Bar graphs for each year

9. Examples of similar applications

New housing development on brownfield sites as % of new housing is published each year in the *Bristol Quality of Life Report*, as is the total number of local nature reserves.

Norwich City Council publishes the amount of land developed from year to year, the proportion of this land that is on brownfield sites and the increase or reduction in greenfield sites compared to the previous year.

10. Questions to address/Future developments

As regards efficiency of land use, it is possible to consider a larger number of indicators intended to verify various aspects in greater detail. The city of Oslo, the JRC and the EEA have suggested a number of indicators allowing a more complete examination of the questions at issue; today these appear to be problematic because of difficulties in data collection; however, they could be taken into consideration for the future. The city of Oslo's proposal is outlined below.

- efficiency of land use: intensity of use by use types:
 - employment (employees per ha industrial/business development)
 - transport (estimated passenger kilometres per ha transport infrastructure)
- availability of habitat
 - unbuilt area for habitat type or land cover

11. Keywords

development, restoration, regeneration, protection, derelict, contaminated, greenfield, brownfield, biodiversity, land use.