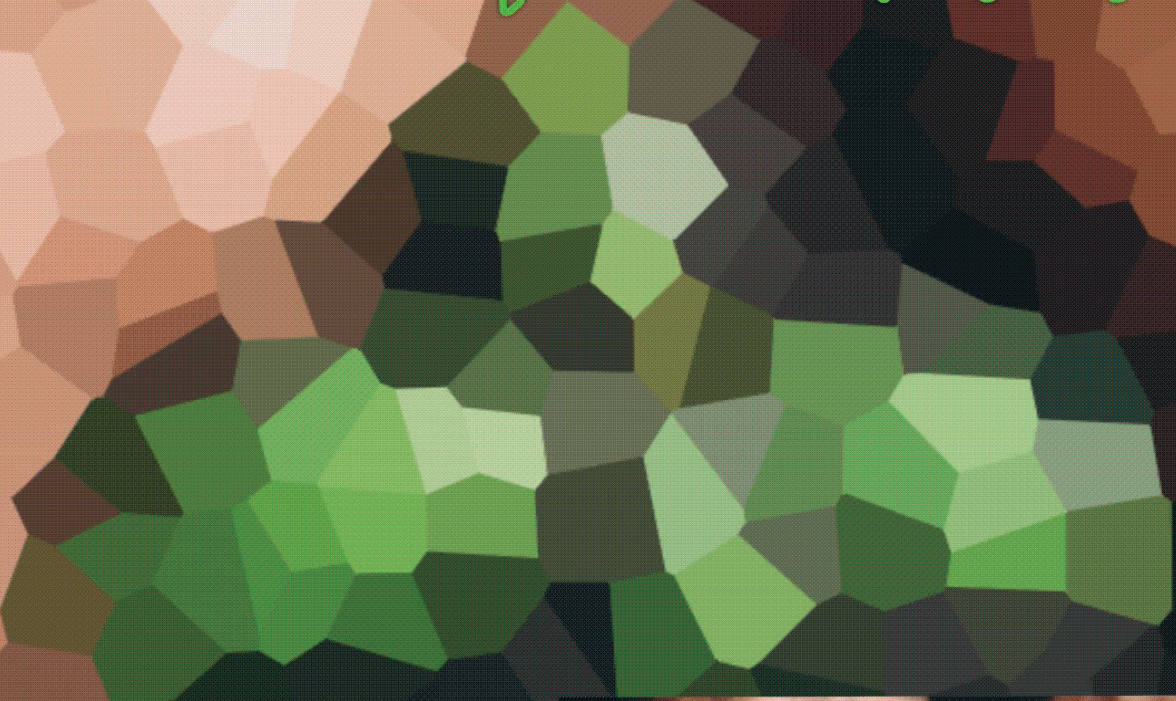


SOIL



ПОУБА





MK – NI 014

LAND TAKE

Period of indicator assessment

- September 2007 – April 2008

Explanation

- Justification for indicator selection

Land take by urban and related infrastructure results in major environmental impacts due to the soil take, as well as disruptions caused by transport, noise, resource exploitation, waste disposal and fragmentation and degradation of natural landscapes. Intensity and models of urbanization derive from three main factors: economic development, demand for housing and expansion of transport networks. Despite the fact that, under the legislation, most of the land and urban planning responsibilities have been delegated to local level (Municipalities), national policies have direct or indirect effects on urban development.

Definition

Changes in and current status of agriculture, forest and other semi-natural land taken by urban and other artificial land development. It includes areas sealed by construction and urban infrastructure as well as urban green areas and sport and leisure facilities. The main drivers of land take are grouped in processes resulting in the extension of:

- housing, services and recreation,,
- industrial and commercial sites,
- transport networks & infrastructures,
- mines, quarries and waste dumpsites.

Units

Units of measurement for changes and current status recording and mapping are hectares. For data presentation, the unit in km² can be used as well.

Results are presented as:

- current status of land cover based on the nomenclature adopted at European level, at five-year intervals;
- changes in land cover, at five-year intervals, presented in % of the total area of the country and % of the various land cover types.

Note: Particular attention is payed to areas changing as a result of urban systems extension leading to negative impact on the environment.





Policy relevance of the indicator

Legal grounds

Under the Law on Environment, every citizen is entitled to have an access to environmental state information. This indicator provides not only data on the state of the environment (land cover), but it also facilitates uniform access thereto, both at national and European levels.

Based on the Law on Land Survey and Registration, by means of regular land survey information is provided on the types of land cover. Although these parameters do not correspond with the CORINE land cover nomenclature, there is a possibility for unique integration of land cover elements.

Law on Urban and Spatial Planning.

Targets

Tracking the changes in land cover and mapping of current status. Changes are monitored over five-year intervals. Methodology and nomenclature have been additionally harmonized at European level, thus enabling integrated monitoring of changes at regional and European levels.

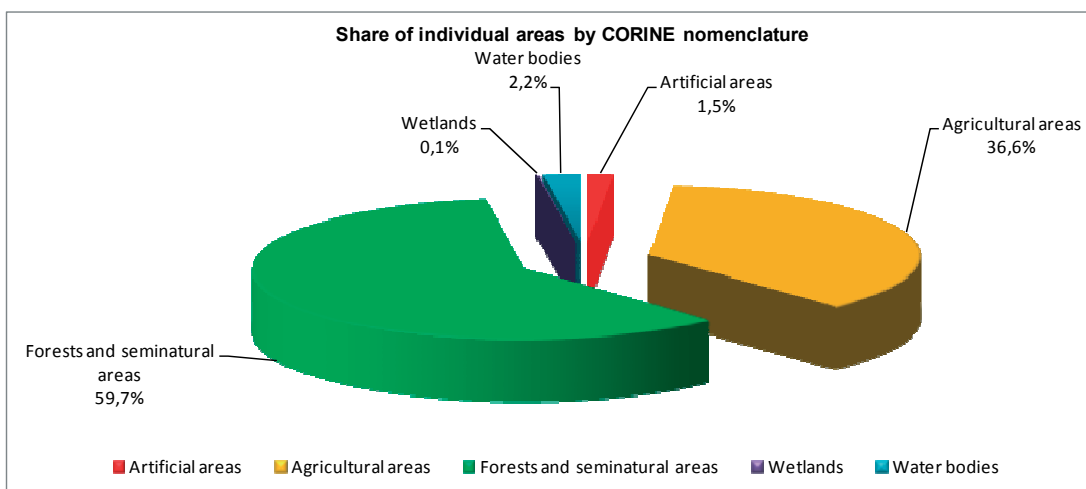
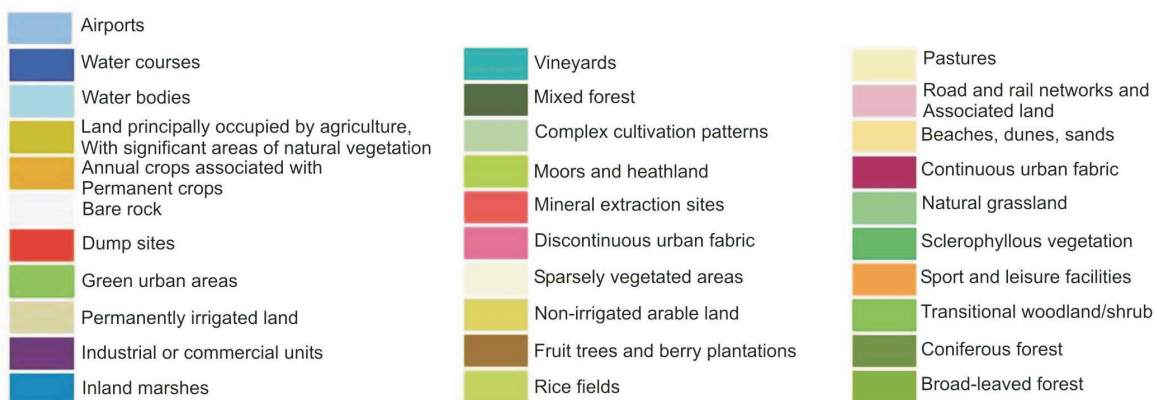
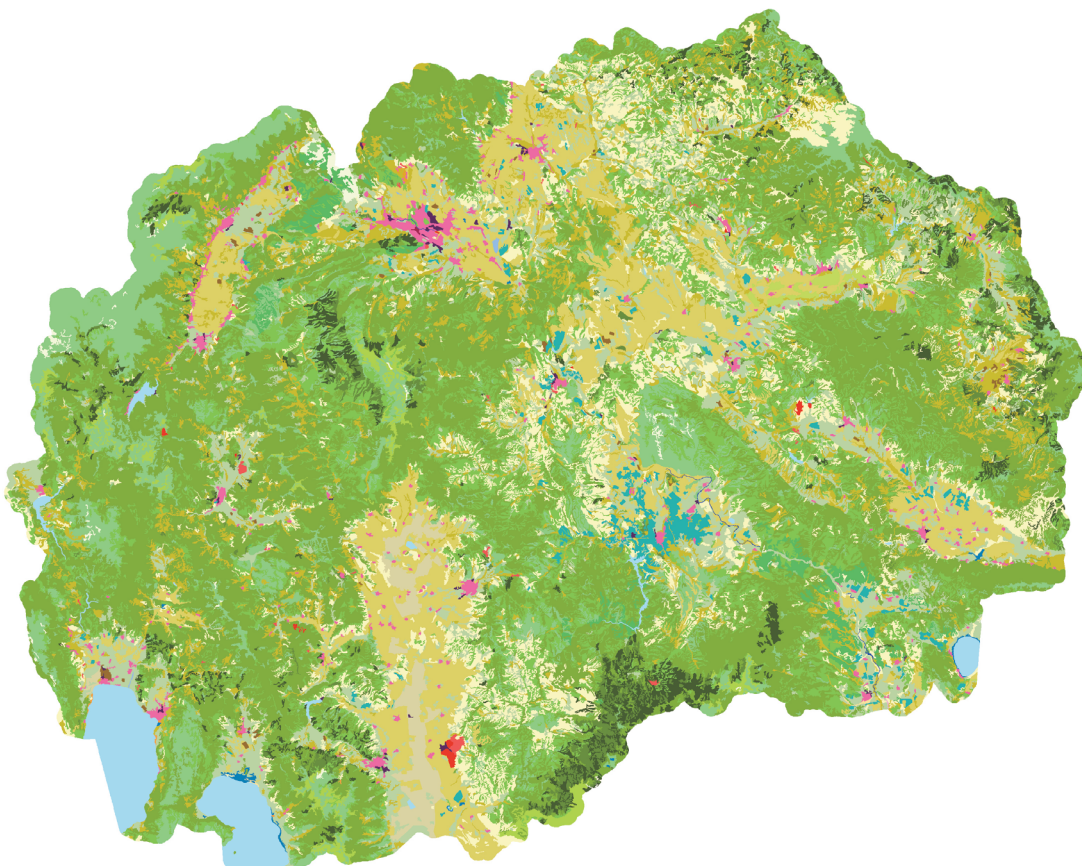
Key message

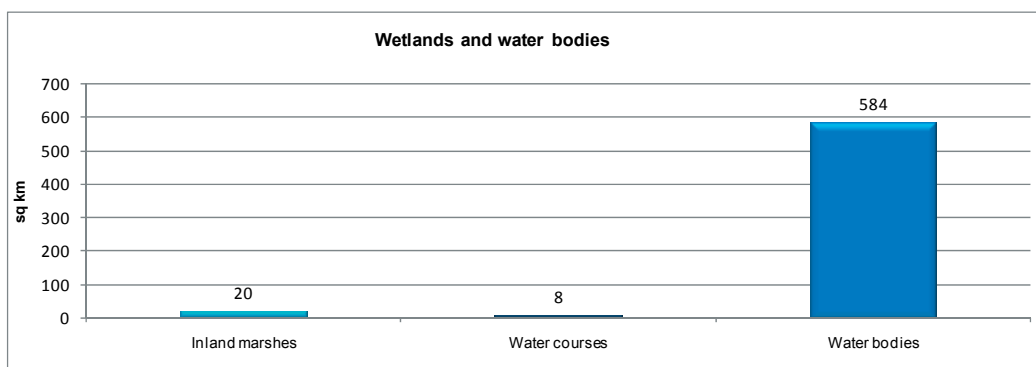
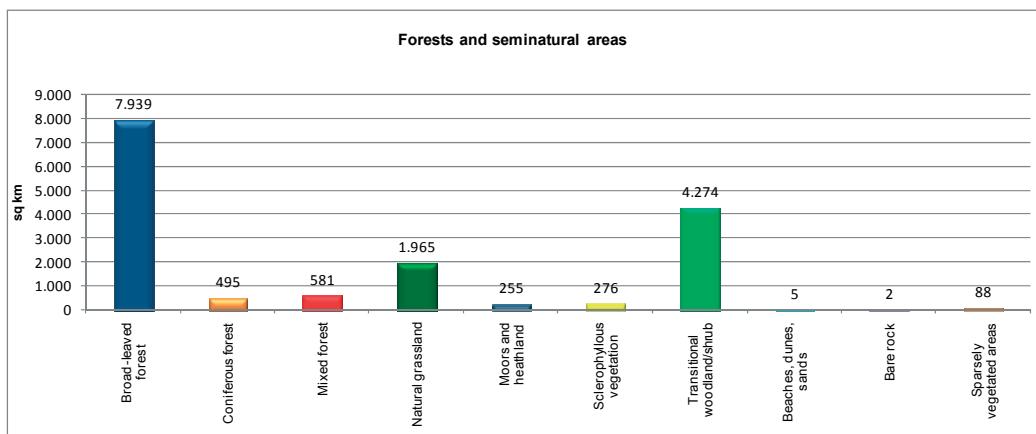
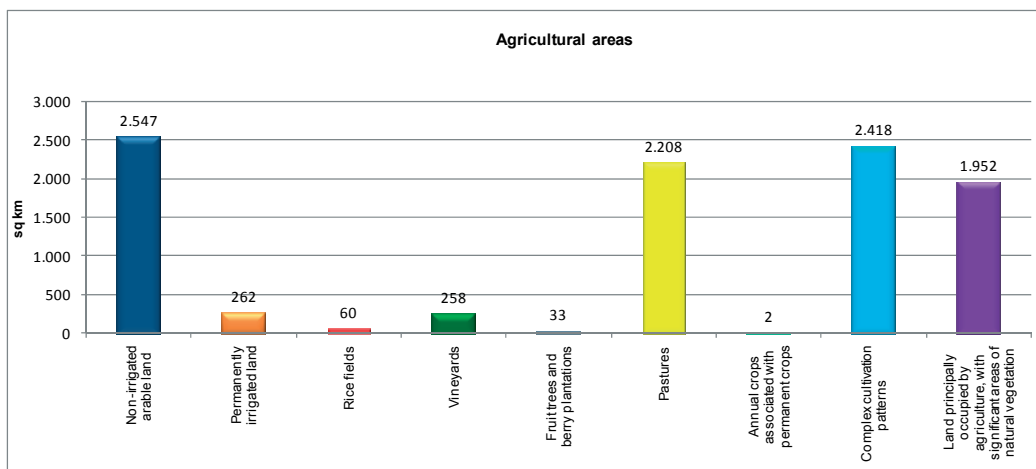
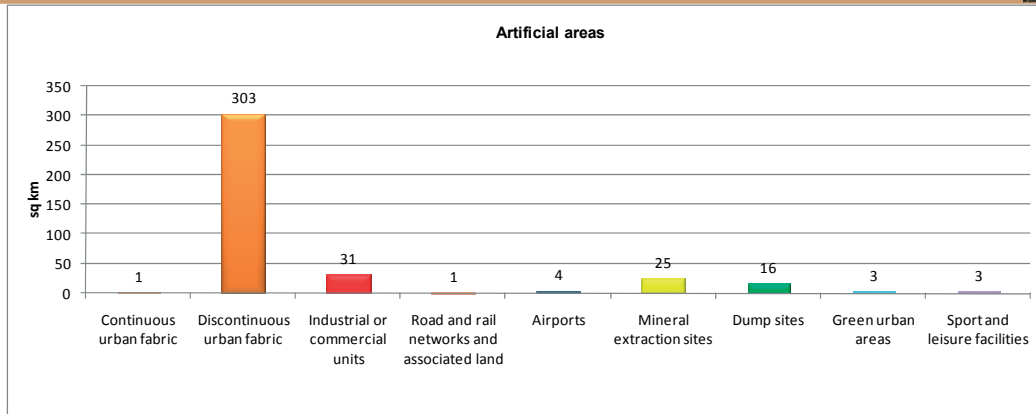
Based on the CORINE Land COVER methodology applied in the first phase of the project, it has been established that the surface area belonging to the category of forest and semi-natural areas is the largest one in the Republic of Macedonia, covering 15 879 km² or 61.8 % of the total area. Agricultural area is still significant by size (around 38 % of the total area).





CORINE Land COVER 2000 (data of 1996)







Assessment

Data under CORINE Land Cover was published in 2000 година, and the source of information (satellite Landsat images) was from 1996.

Republic of Macedonia was not actively involved in the Project "Image2000 and CLC2000" as a joint project of the European Environmental Agency (EEA) and Joint Research Centre (JRC) for the purposes of updating the CORINE Land COVER database.

Preparatory activities for implementation of the Project CORINE Land COVER 2006 (satellite images from 2006) are underway, while mapping of changes and current state is expected by the end of 2008.

In order to enable efficient use of this database at national level, i.e. within the Republic of Macedonia, additional data on Land COVER is needed, concerning area units and additional elements of the basic nomenclature, i.e. addition of the 4th level in the nomenclature.

According to CORINE Land COVER, the highest proportion of the land is covered by forests and semi-natural areas covering 15 879 km² which corresponds to 61.8 % of the total area. The category of agricultural land takes 9 739 km² or 37,9 % of the total area, the category of artificial areas covers 389 km² or 1.5 % of the total area, etc.

Methodology

■ Methodology for the indicator calculation

The assessment of CORINE Land Cover in 2000 was based on data from satellite images.

Owing to characteristics of the land cover of the Republic of Macedonia, out of the possible 44 classifications, 31 were identified. In addition to this and for the same reason, the minimum spatial unit treated within the project was reduced at 20 hectares instead of 25 hectares.

The substance of the process is photo-interpretation of satellite images consisting of:

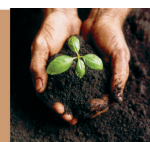
- Delineation of boundaries of areas representing unique land area units at images with "false" colours;
- Application of interpretation keys, supporting documentation and satellite/aeroplane images for marking with identification number - class in nomenclature;
- Extrapolation of this marking and identification of all segments of the image exhibiting similar characteristics: colour, structure and composition.

Technical Guideline for CORINE Land Cover development was prepared by the European Environmental Agency.

Data specification

Title of the indicator	Source	Reporting obligation
Land take	CORINE Land Cover	





Data coverage (by years):

Table 1: Percentage of individual areas by CORINE Nomenclature

	Area in km ²	% of total area
Artificial areas	389	1,5
Agricultural areas	9739	37,9
Forests and semi-natural areas	15879	61,8
Wetlands	20	0,1
Water bodies	591	2,3

Table 2: Artificial areas

	CORINE LandCOVER code	CORINE Nomenclature	km ²
Artificial areas	111	<i>Continuous urban fabric</i>	1
	112	<i>Discontinuous urban fabric</i>	303
	121	<i>Industrial or commercial units</i>	31
	122	<i>Road and rail networks and associated land</i>	1
	124	<i>Airports</i>	4
	131	<i>Mineral extraction sites</i>	25
	132	<i>Dump sites</i>	16
	141	<i>Green urban areas</i>	3
	142	<i>Sport and leisure facilities</i>	3

Table 3: Agricultural areas

	CORINE Land COVER code	CORINE Nomenclature	km ²
Agricultural areas	211	<i>Non-irrigated arable land</i>	2.547
	212	<i>Permanently irrigated land</i>	262
	213	<i>Rice fields</i>	60
	221	<i>Vineyards</i>	258
	222	<i>Fruit trees and berry plantations</i>	33
	231	<i>Pastures</i>	2.208
	241	<i>Annual crops associated with permanent crops</i>	2
	242	<i>Complex cultivation patterns</i>	2.418
	243	<i>Land principally occupied by agriculture, with significant areas of natural vegetation</i>	1.952





Table 4: Forests and seminatural areas

	CORINE LandCOVER code	CORINE Nomenclature	km ²
Forests and seminatural areas	311	<i>Broad-leaved forest</i>	7.939
	312	<i>Coniferous forest</i>	495
	313	<i>Mixed forest</i>	581
	321	<i>Natural grassland</i>	1.965
	322	<i>Moors and heathland</i>	255
	323	<i>Sclerophyllous vegetation</i>	276
	324	<i>Transitional woodland/shrub</i>	4.274
	331	<i>Beaches, dunes, sands</i>	5
	332	<i>Bare rock</i>	2
	333	<i>Sparsely vegetated areas</i>	88

Table 5: Wetlands and water bodies

	CORINE LandCOVER code	CORINE Nomenclature	km ²
Wetlands	411	<i>Inland marshes</i>	20
Water bodies	511	<i>Water courses</i>	8
	512	<i>Water bodies</i>	584

General metadata

Code	Title of the indicator	Compliance with CSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 014	Land take	CSI 014	Land take	P	A	<ul style="list-style-type: none"> - management - nature - other - population - soil - tourism - transport - urbanization 	10 - annually

Geographical coverage: Republic of Macedonia

Temporal coverage: Data set on land cover was finalized in 2000, based on satellite images taken in 1996.

Uncertainty

- **Methodological uncertainty**

No systematic methodological uncertainty or data uncertainty have been found. Certain digression in the identification of changes and actual state can occur for small size spatial elements that can not be identified uniformly, but have no significant impact on the quality of the indicator.





Future activities

■ Short-term activities

Active participation of the Republic of Macedonia in CORINE Land Cover 2006. Preparatory activities towards implementation of the Project CORINE Land COVER 2006 (satellite images from 2006) are underway, while mapping of changes and actual state is expected by the end of 2008.

a. Description of the activity

- All activities are in accordance with the technical specification of the European Environmental Agency, ETC "Land Use and Spatial Information" and under their direct supervision.

b. Required resources

- In accordance with the recommendations of the European Environmental Agency, the implementation of the Project will rely on the persons that have worked in the previous phase of the Project who will make the core team, and new persons will be included to establish the basis for the next phases.

c. Status

- Commencement of the activities for project implementation.

Deadline: End of 2008.

■ Long-term activities

- Participation in all follow-up phases of the Project, as well as data processing to generate the fourth level of the nomenclature.





MK - NI 015

PROGRESS IN MANAGEMENT OF CONTAMINATED SITES

Period of indicator assessment

- September 2007 – April 2008

Explanation

- Justification for indicator selection

Emission of hazardous substances from industry, as well as from municipal and industrial waste, may have impacts on the quality of soil and water, and especially groundwater. Management of contaminated sites assumes assessment of harmful effects that cause contamination and undertaking measures to comply with environmental standards required by the relevant legislation. Unfortunately, no standards for the soil quality or defined targets for remediation of the sites with exceeded standards have been put in place in our country. On the other side, numerous activities causing soil contamination have been identified. This concerns especially industrial activities and waste disposal by municipalities and industrial facilities.

The implementation of the existing legislation, especially the Law on Environment which incorporates the Integrated Pollution Prevention and Control Directive, the Law on Nature Protection, the Law on Agricultural Land, the Law on Waste Management with transposed Landfill Directive, as well as legislation pending adoption, such as Law on Waters with transposed Water Framework Directive would result in specific activities that shall be undertaken to reduce soil contamination. However, major efforts are needed to settle the issue of historical contaminations.

This indicator tracks the progress in the management of contaminated sites, as well as the level of financial resources (public and private) that should be allocated for remediation.

Definition

The term 'contaminated site' refers to a well-delimited area where the presence of soil contamination has been confirmed and the severity of possible impacts to ecosystems and human health are such that remediation is needed, specifically in relation to the current or planned use of the site. The remediation or clean-up of contaminated sites can result in a full elimination or in a reduction of these impacts.

The term 'potentially contaminated site' includes any site where soil contamination is suspected but not verified and investigations need to be carried out to verify whether relevant impacts exist.

The progress in the management of contaminated sites has been designed to mitigate possible negative effects in case of suspected or confirmed environment degradation and there is a need to reduce potential threats to human health, biological diversity, water bodies, soil, habitats, foodstuffs, etc.

The management of contaminated sites starts with investigation that can further lead to





rehabilitation or treatment of contaminated site, measures for its conservation and maintenance and revitalization of contaminated sites.

1. The indicator shows progress in five main steps:
2. site identification/ preliminary study;
3. preliminary investigation;
4. main site investigation;
5. implementation of remediation measures;
6. measure completed.

In future, this indicator would also show the costs to the society for contaminated sites remediation, the main activities contributing to soil contamination and achievements in the management of contaminated sites.

Units

- Share of economic activities in soil contamination as percentage of sites where the activity is present compared to the total number of processed sites.
- Number of sites managed to a certain step out of the five main steps of the indicator.
- Number of sites for which each of the five steps within contaminated sites management has been completed as a percentage of the total number of sites to be processed.
- Expenditures for remediation expressed in EUR per capita per year.

Policy relevance of the indicator

Our country lacks legally prescribed standards on soil. Generally, the existing legislation is intended to prevent new contaminations. Implementation of the actual legislation and the adoption of the Law on Waters would result in reduced soil contamination and improved control of contamination caused by natural and other developments.

Legal grounds

Soil protection is regulated by several laws, including the Law on Environment, the Law on Nature Protection, the Law on Agricultural Land, etc., but there is no soil specific law, with clearly defined institutional responsibilities.

According to Article 2 of the Law on Environment, improvement of the state and quality of the environment includes the protection of soil. The same Law, in its Article 9, prescribes the polluter pays principle, while Article 13 introduces the principle of precaution which should assist in avoiding the local soil contamination in future. Article 36 envisages internal monitoring for legal and natural persons possessing emissions and making impacts by their activities on one or more environmental media.

The Law on Nature Protection, in its Article 11 concerning restriction in land use change and in correlation with Article 12 prohibition of nature use in a manner causing degradation of soil and its fertility loss.

The Law on agricultural land, Article 31, prescribes protection of agricultural land against





pollution and contamination for the purpose of production of health safe food, protection of human health, flora and fauna and uninterrupted use and protection of the environment.

The same Article specifies that the Ministry of Agriculture, Forestry and Water Economy determines the matters which are harmful for agricultural land, their maximum permissible concentrations in soils and measures that have to be undertaken with regard to agricultural land with concentrations of harmful matters above permissible ones.

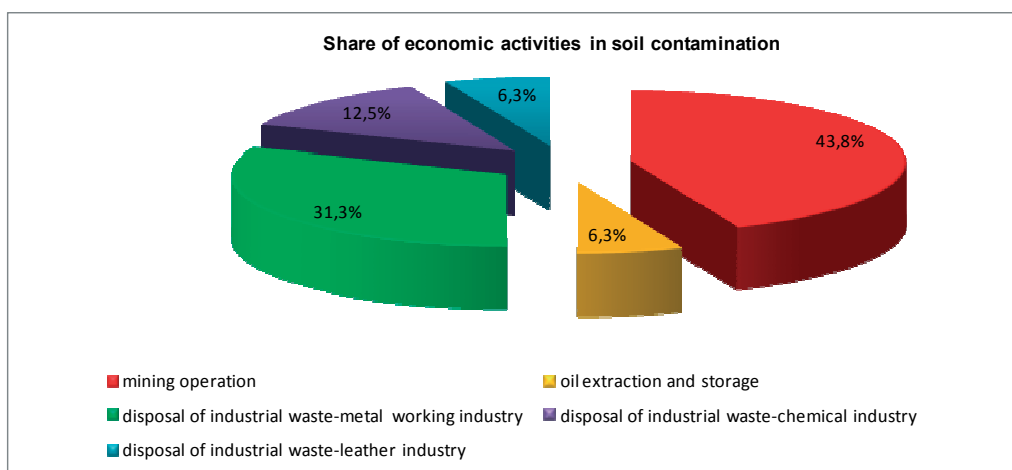
Targets

Implementation of the Operational Programme for pre-accession assistance of the European Union. Implementation of infrastructure projects (wastewater treatment, waste management and industrial hot-spots). Implementation of the National Waste Management Plan, development of local programmes and plans for solid municipal and other waste types management, closure and revitalization of illegal landfills.

Remediation of tailings, stabilization and recultivation of industrial landfills.

Key policy issue

What is the share of economic activities contributing to soil contamination in the Republic of Macedonia?



The main contaminants contributing to soil and groundwater contamination should be identified. In order to answer the above question, it is necessary to carry out additional investigations of contaminated sites, as well as inspection of the activities of industrial companies producing contaminants as by-products.

Key message

In the Republic of Macedonia, 16 sites have been identified as areas of potential soil contamination, characterized as hot-spots. Preliminary investigations have been carried out with 16 sites, while with two sites main investigations have been carried out and certain remediation measures implemented. Completion of measures has not been recorded with none of the identified hot-spots. With regard to economic activities contributing to soil contamination expressed in percentage, the highest share belongs to mining with 43.75%, followed by metallurgy with 31.25%, organic chemical industry with 12.5% and refinery and leather manufacturing industry with 6.25%.





Specific policy issue

What progress has been made in local soil contamination management and control?

Five main steps in the progress in contaminated sites management	Identified sites
Site identification/preliminary study	16
Preliminary investigation	16
Main site investigation	2
Implementation of remediation measures	1
Measure completed	0

What are the costs for soil contamination remediation and what is the contribution from the public budget and contribution from private budget?

According to the National Waste Management Plan of the Republic of Macedonia, calculations have led to the conclusion that around 77 million EUR or 38 EUR per capita will be needed.

Methodology

- Methodology for the indicator calculation

Data for the indicator calculation was taken from the National Waste Management Plan of the Republic of Macedonia or Special Study E.

The shares of economic activities contributing to soil contamination are calculated e.g. [number of mines contributing to soil contamination]/[total number of sites or sites where soil contamination has been confirmed] x 100.

- Source of applied methodology

According to European Environmental Agency, European Topic Centre for soils

Data specification

Title of the indicator	Source	Reporting obligation
Progress in the management of contaminated sites	– Ministry of Environment and Physical Planning	– Soil contamination (TE-2)

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 015	Progress in the management of contaminated sites	CSI 015	Progress in management of contaminated sites	P	A	chemicals industry management nature soil transport urbanization waste water	annually





Geographical coverage: Republic of Macedonia

Temporal coverage: 2005

Frequency of data collection: at annual basis

Uncertainty

- **Methodological uncertainty**

Although there is a definition of contaminated site, because of the lack of limit values for the concentration of certain toxic chemicals in the soil, it is difficult to determine the exact number of sites where soil contamination has been confirmed.

The assessment of contaminated site depends to a great extent on the individual expert assessment.

- **Uncertainty of data set**

All sites where certain industrial/economic activity is performed have not been accounted as sites with determined contamination, although such activities generate chemical substances. Lack of data on chemical substances from various industrial facilities causing soil contamination. Estimates of the costs related to remediation processes are approximative and based on expert judgments.

Future activities

- **Short-term activities**

Establishment of work groups for the purpose of elaboration, final definition and full development of the indicator.

- a. **Description of the activity**

Elaboration, final definition and full development of the indicator.

- b. **Required resources**

Experts in the area of environment, economy, organic and chemical industry, metallurgy, etc.

- c. **Status**

In progress.

Deadline: June 2008

- **Long-term activities**

Long-term activities will be defined by the Work Group.





MK - NI 038

FOREST FIRES

Period of indicator assessment

- September 2007 – April 2008

Explanation

- Justification for indicator selection

Forests are valuable resource and play significant role in the process of air, water, land and biodiversity protection. Forests are global store of carbon and biodiversity. Forests in the Republic of Macedonia cover 950.594 ha representing 37% of the national territory. High trunk forests constitute 30% of the overall forest cover, while low trunk forests makes up the remained 70%. Around 89% of the forests in the Republic of Macedonia are state owned and only around 11% are privately owned. Macedonian dendroflora consists of 319 tree species and shrubs are represented by more than 80 subspecies and varieties. They assemble 81 forest associations. There are 49 endemic and subendemic species. Deciduous trees take 56.10%, conifers 8.46%, mixed deciduous forests 28.70%, mixed conifers 0.79% and mixed deciduous and coniferous trees take 5.95%. Major causes of unfavorable conditions in forestry are forest fires, plant pests and diseases, inadequate individual wood felling, specific natural conditions and insufficient public awareness on the importance of forests. All mentioned pressures result in degradation of forests and land erosion. The statement can be illustrated by the fact that there is a semi-desert area in the central part of the Republic of Macedonia, on the eastern side of Vardar River, as a consequence of wood fellings around Vardar and Crna rivers in the period between 16 and 19 century. In addition to this, in the course of the last 10 years, around 100.000 ha have suffered forest fires, while annual amount of fuel wood acquired by illegal wood cutting has been estimated at 30% of the amount of fuel wood cut in a legal manner. Reduction of the rate of forests degradation and destruction is one of the greatest challenges in forestry.

Definition

The indicator provides information on the number of forest fires on the territory of the Republic of Macedonia. It also provides information on the magnitude of forest fires presenting the area subjected to fire and the type of wood mass seized by fire, as well as the total damage caused by fire.

Units

The area seized by fire is expressed in ha (hectares), while wood mass seized by fire is expressed in m³. The total damage from forest fires is expressed in denars, as well as number of forest fires.





Policy relevance of the indicator

List of relevant policy documents:

The Second National Environmental Action Plan (NEAP 2) defines measures for improved protection against forest fires through establishment of indicators as:

- Number of forest fires per year, and
- Area destructed by forest fires each year.

Under the NEAP 2 measures and activities, the following is specified:

- Development of National Strategy for Sustainable Development of Forests,
- Strengthening of capacity for sustainable forests management, and
- Development of Strategy for Forest Fire Prevention.

Legal grounds

- Law on Forests (Official Gazette of the Republic of Macedonia No. 47/97 and amendments no. 7/00) which regulates forests and forest resources management and protection. Protection of forests is integrated and indivisible part of the overall forest management. In the context of forests protection against fires and regulation of measures in this area, we should also mention the 2001 Rulebook on specific measures for forest protection against fires.
- Law on Natural Rarities Protection (Official Gazette of the Republic of Macedonia No. 41/73 and amendments no. 42/76, 10/90, 62/93)
- Around 7.34% of the territory of the Republic of Macedonia is under protection. Protection regimes cover national parks, strict natural reserves, three areas with specific natural characteristics, 14 special plant and animal reserves and 50 monuments of nature.
- Law on national parks Protection (Official Gazette of the Republic of Macedonia No. 33/80 and amendments no. 10/90 and 62/93)
- Law on Designation of Forest Area of Pelister Mountain as National Park (Official Gazette of the Republic of Macedonia No. 38/48 and 16/65)
- Law on Designation of Forest Area around Mavrovo lakes National Park (Official Gazette of the Republic of Macedonia No. 10/49, 23/52 and 16/65)
- Law on Designation of Forest Area of Galicica Mountain as National Park (Official Gazette of the Republic of Macedonia No. 31/58 and 16/65)
- Law on Fire Prevention (Official Gazette of the Republic of Macedonia No. 43/86 and amendments in no. 37/87, 51/88, 36/90, 12/93)

Targets

Compliance with the legislation concerning forests and forest resources protection. Reduction of forest fires number, reduction of wood mass and forest area affected by forest fires. Reduction of costs and damages resulting from forest fires. Increase of the public awareness in relation to fire prevention and undertaking all possible measures to reduce human factor as forest fires cause.





Key policy issue

What is the number of forest fires, what is the area and wood mass affected by fire?

Diagram 1: Number of forest fires in the Republic of Macedonia

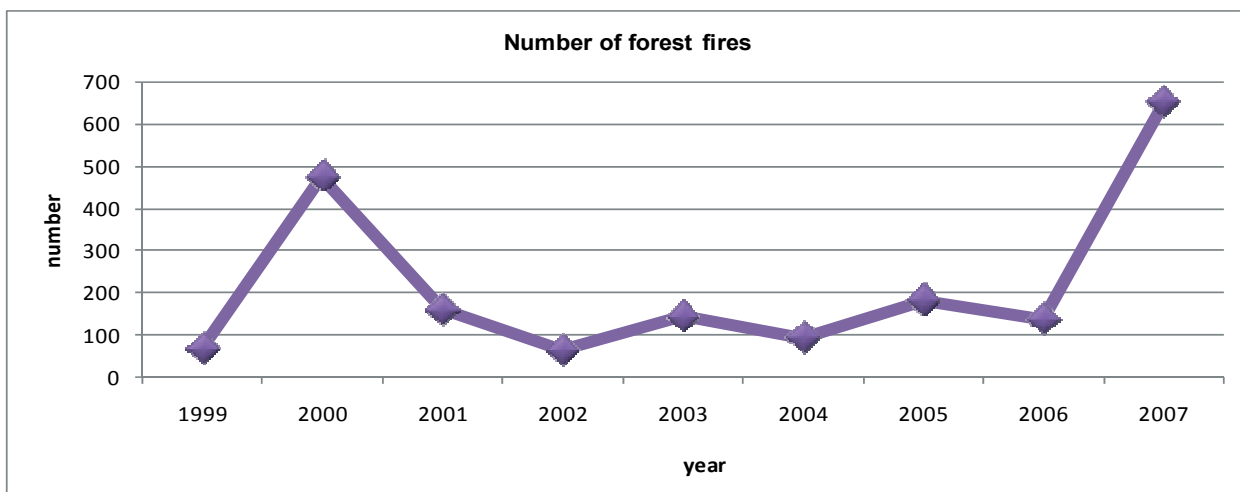


Diagram 2: Area affected by forest fires in the Republic of Macedonia

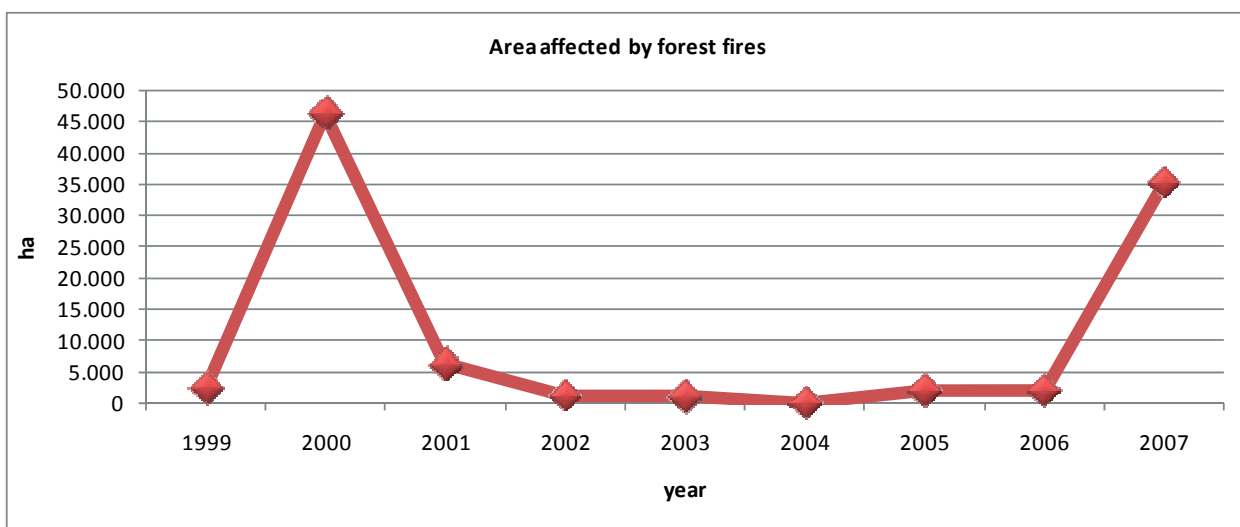
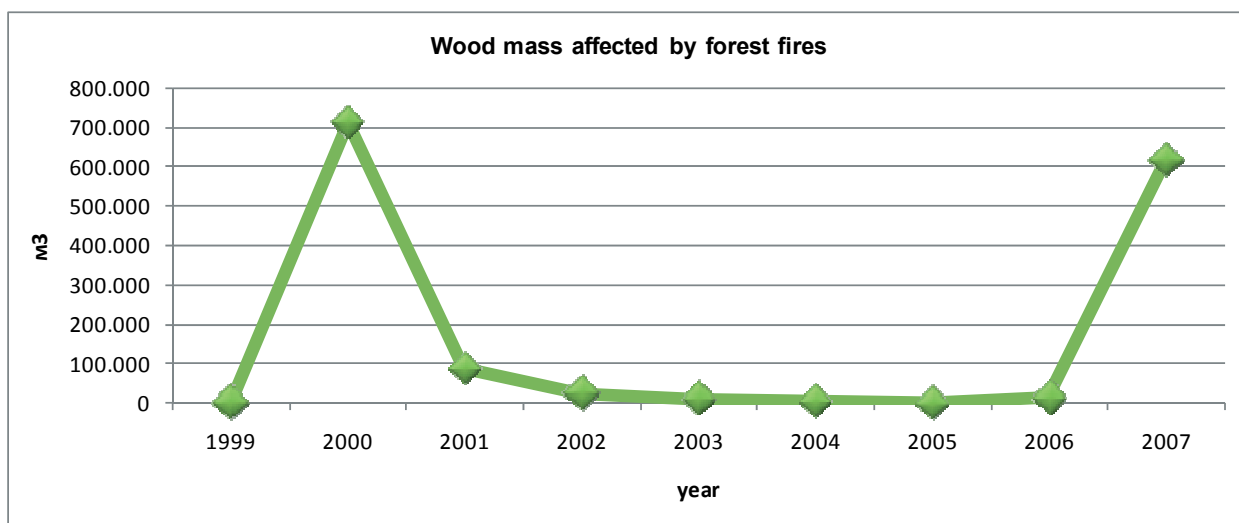




Diagram 3: Wood mass affected by forest fires in the Republic of Macedonia



Key message

In the period between 1999 and 2007, rapid increase in the number of fires, area and mass affected by fire in the Republic of Macedonia was tracked in 2000. Then, there was fall in 2001 and 2002, retaining relatively stable level up to 2006.

In 2007, there was rapid rise in the above mentioned measured parameters, where the number of fires reached the maximum, while area and wood mass affected by fire is slightly lower compared to the peak reached in 2000.

Specific policy issue

What is the status of forest fires in the Republic of Macedonia?

Forest fires constitute one of the biggest problems in forestry, as well as in the environment of the Republic of Macedonia as a whole. Huge amounts of wood mass are destroyed by forest fires and this is thus an economic problem. Forest fires cause air, soil and water pollution. Burn trunks are source of pathogens and pests. There is also an increase in erosion processes in burnt areas, water regime disbalancing, loss of vegetation and desertification. Almost 95% of forest fires is caused by man. Forest fires destroy as much as 2 200 ha forest each year. The mean number of fires is 120 per year. In 2000, due to extreme draughts and human factor, there were 476 fires and around 46 000 ha affected, while in 2007, an area of around 35 000 ha was affected by 652 fires.





Table 1: Number of fires, area affected by fires in ha, wood mass affected by fires in m³ in the Republic of Macedonia

Year	Number of fires	Area affected by fire in ha	Wood mass affected by fire in m ³
1999	69	2.414,80	1.905,00
2000	476	46.235,73	711.782,00
2001	161	6.263,30	88.260,00
2002	65	1.186,30	24.661,28
2003	144	1.068,88	10.987,00
2004	94	892,05	4.322,30
2005	182	2.084,10	1.063,00
2006	138	2.085,95	12.978,00
2007	652	35.248,06	617.678,67

What is the total damage resulting from forest fires in the Republic of Macedonia?

Table 2: Total damage resulting from forest fires in 2007 presented in denars in the Republic of Macedonia

Year	Total damage from fires in denars
1999	105.837.151,00
2000	969.852.057,00
2001	610.814.677,00
2002	18.531.939,00
2003	15.594.691,00
2004	91.083.591,00
2005	25.287.638,00
2006	148.712.782,00
2007	1.311.167.721,95

Methodology

- Methodology for the indicator calculation

Data and the indicator calculation was processed by the Public Enterprise for Forests Management of the Republic of Macedonia - "Macedonian Forests".





Data specification

Title of the indicator	Source	Reporting obligation
Forest fires	– Public Enterprise for Forests Management - "Macedonian Forests"	

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 038	Forest fires	TE065	Forest fires	P		Soil Forestry Agriculture Nature Urbanization	annually

Geographical coverage: Republic of Macedonia

Temporal coverage: 1999 to 2007

Frequency of data collection: At annual basis

Uncertainty

- Methodological uncertainty and data uncertainty

There is certain extent of uncertainty in determining the amount of wood mass in m³, as well as in the determining of area affected by fires in ha, deriving from some methodological uncertainty in parameters calculation.

Future activities

- Short-term activities
 - Establishment of work groups to elaborate, finalize definition and develop the indicator.
 - a. **Description of the activity**
 - Elaboration, finalization of definition and development of the indicator.
 - b. **Required resources**
 - Experts in the area of forestry, environment, agriculture, economy, etc.
 - c. **Status**
 - In progress
- Deadline:** June 2008
- Long-term activities
 - Long-term activities will be defined by the Work Group.

