

RESULTS FACTSHEET

ENV06: FRAGMENTATION OF NATURAL AREAS

DEFINITION - OBJECTIVE

This indicator defines potential fragmentation problems of forest areas, areas of natural beauty or other important ecosystems. The fragmentation of ecosystems may have an impact on their function and biodiversity, either because of loss of living space for the species (areas for nesting, reproduction and hunting) or because of communication problems between certain species. The fragmentation of areas bearing the characteristics of single ecosystems has been one of the most important issues related to the alignment of the axis. This indicator reveals the impact of the Egnatia Motorway on the unity of natural areas, protected sites etc, which is a parameter indirectly related to the preservation of biodiversity.

RESULTS - ASSESSMENT

The fragmentation of natural ecosystems has been studied using a fragmentation index for all natural areas, i.e. all areas except for cultivations and urban areas, irrespective of whether they are protected or not.

This factsheet only concerns the fragmentation of natural ecosystems by the vertical axes of the Egnatia Motorway. The corresponding fragmentation phenomena caused by the Egnatia Motorway Axis are analysed and presented in previous result factsheets.

INDICATOR RANGE	
Value	Characterisation
< 0,01	Minimal
0,01 - 0,1	Little
0,1 - 1	Average
1 - 10	Rather
10 - 100	Strong
> 100	Extreme

Model source: DG AGRI, EUROSTAT, ISPRA, EEA, From Land Cover to Landscape Diversity in the European Union, 2000

Degree of natural areas fragmentation						
NUTS 2	NUTS 3	Prefecture	Indicator values without EGNATIA MOTORWAY and VA*		Indicator values with EGNATIA MOTORWAY and VA*	
GR11	GR111	EVROS	4.50	2.99	4.51	3.08
	GR112	XANHTI	3.20		3.51	
	GR113	RODOPI	3.18		3.28	
	GR114	DRAMA	1.45		1.45	
	GR115	KAVALA	3.30		3.51	
GR12	GR121	IMATHIA	4.77	4.60	4.94	4.66
	GR122	THESSALONIKI	5.60		5.93	
	GR123	KILKIS	5.83		5.83	
	GR124	PELLA	3.25		3.25	
	GR125	PIERIA	4.58		4.58	
	GR126	SERRES	3.34		3.35	
	GR127	HALKIDIKI	5.36		5.36	
GR13	GR131	GREVENA	3.87	3.08	4.01	3.15
	GR132	KASTORIA	2.39		2.50	
	GR133	KOZANI	3.60		3.63	
	GR134	FLORINA	1.90		1.90	
GR14	GR141	KARDITSA	6.57	4.39	6.57	4.40
	GR142	LARISA	3.84		3.84	
	GR143	MAGNESIA	6.82		6.82	
	GR144	TRIKALA	2.45		2.50	
GR21	GR211	ARTA	6.06	3.78	6.06	3.85
	GR212	THESPROTIA	4.44		4.57	
	GR213	IOANNINA	2.60		2.68	
	GR214	PREVEZA	6.78		6.78	
IMPACT ZONE IV			3.81		3.88	

In Impact Zone IV (all 5 Regions crossed by the Egnatia Motorway), the natural areas fragmentation indicator after the completion of the Egnatia Motorway and its Vertical Axes is increased from 3.81 to 3.88. In particular, for each one of the Regions, the indicator is slightly increased as follows:

* Vertical Axes

- from 2.99 to 3.08 in the Region of Eastern Macedonia & Thrace,
- from 4.60 to 4.66 in the Region of Central Macedonia,
- from 3.08 to 3.15 in the Region of Western Macedonia,
- from 4.39 to 4.40 in the Region of Thessaly.

These indicators fall into the same impact range as prior to the construction of the Egnatia Motorway and its vertical axes.

Results of the Study Conducted for the Egnatia Motorway section “Panagia - Grevena”

There follows a presentation of an alternative assessment of the natural areas fragmentation degree, as conducted in the context of the study «Habitat monitoring in the Egnatia motorway project». The study, which was conducted by the aerospace technology company Luxspace with funds granted by the European Space Agency (ESA) and the European Investment Bank (EIB) within the context of the program “Earth Observation Market Development” (www.eomd.esa.int), was completed in November 2008. The aim of this study was to enhance the adequacy of the Earth Observation method in monitoring the progress of infrastructure construction and assessing the corresponding impacts on the natural environment. The design scope was a 40,7km-long Egnatia Motorway section located along the route Panagia - Grevena. The assessment of the natural areas fragmentation degree in this specific area was performed through the measurement of a series of indicators related to the polygons of land uses in the region. More specifically, these indicators were the following:

NP, which corresponds to the number of distinct groups of connected elements present in the natural environment (these are referred to as *patches* and can be a forest, a settlement, etc).

AREA_MN, which is the mean area of all patches constituting the natural environment of the area under study.

PARA_MN, which is the mean value of the perimeter/area ratio for all patches constituting the natural environment of the area under study. This indicator expresses the complexity of the patches' figures.

SHDI or Shannon Diversity Index, which is an indicator increasing when the number of different types of patches increases.

MESH, which corresponds to the mean area of non-fragmented patches.

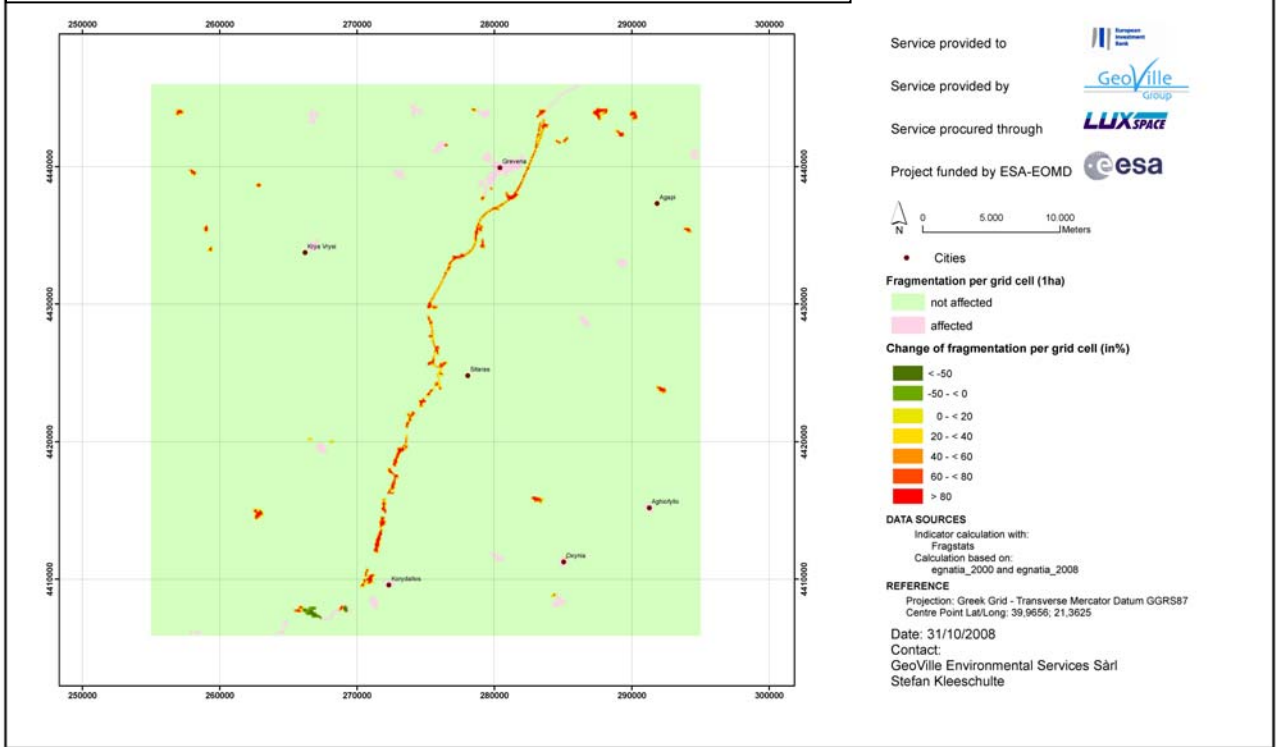
Fragmentation of Natural Areas along the Egnatia Motorway section Panagia - Grevena			
Indicator	Status 2000	Status 2008	Upon completion of the Egnatia Motorway and landscaping works
NP	566	692	652
AREA_MN (ha)	282	231	245
PARA_MN	116.5	147.6	137.3
SHDI	2.09	2.11	2.10
MESH (ha)	2,766	2,892	2,925
<i>Source:</i> Habitat monitoring in the Egnatia motorway project, November 2008			

These indicators show an increase of the fragmentation degree with the exception of the MESH indicator, which shows that the mean area of the fragmented areas was increased. It is obvious that almost all indicators (except for the MESH) show that the fragmentation of natural areas is increased in 2008 as compared to 2000, but then decreased immediately after the completion of the motorway construction and landscaping works.

The fragmentation maps presented are based on the ratio of the areas covered by the road network and construction works (worksites, temporary roads, etc) to all other areas in one-hectare grid-area. Each grid segment is considered to be “fragmented” when the area of roads and construction-related uses exceeds 30% of the total area of the grid segment. On the maps, the “fragmented” grid elements appear in pink and the “non-fragmented” ones in light green. Any change in the fragmentation degree relates to the increase or decrease of the surface of the elements causing fragmentation, i.e. roads and construction-related areas, in relation to the rest of the areas in the corresponding grid segment.

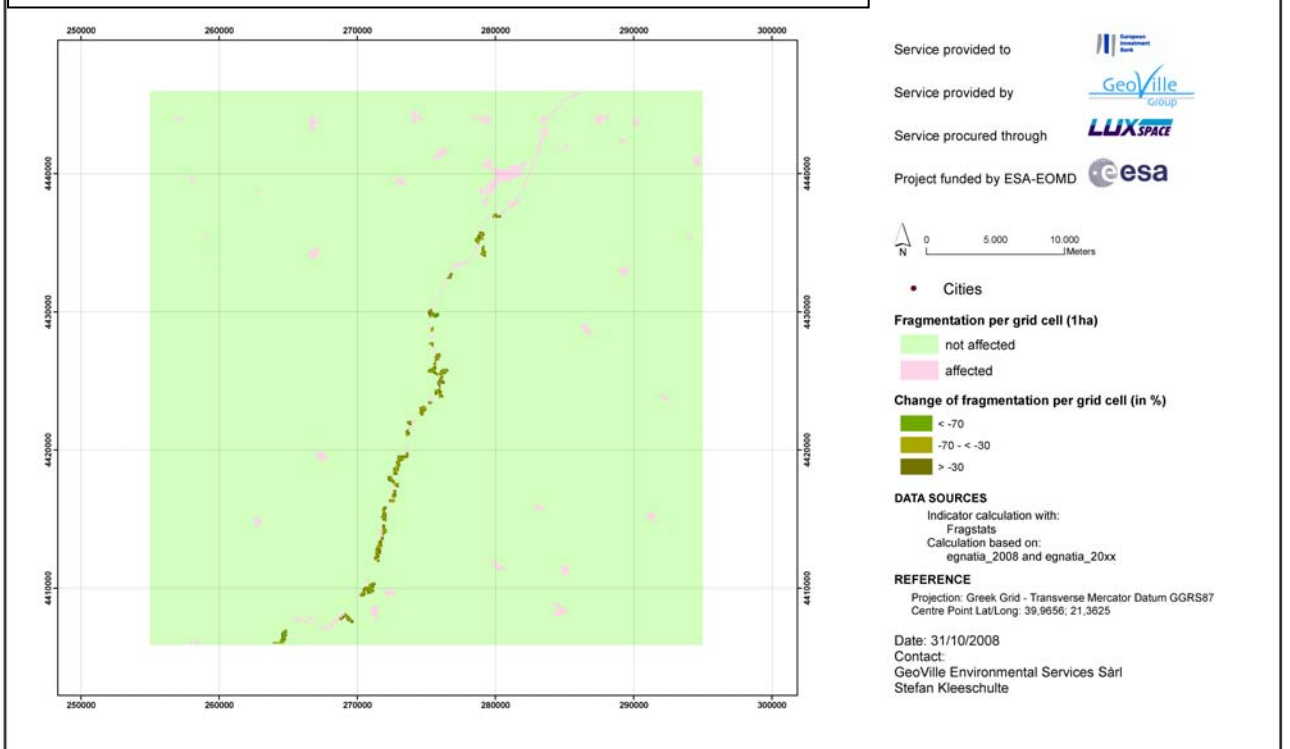
Map 1. Habitats fragmentation map in the period extending from 2008 - termination of the construction and landscaping works - percentage of the fragmentation degree change

Source: «Habitat monitoring in the Egnatia motorway project», November 2008



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METADATA

Sources

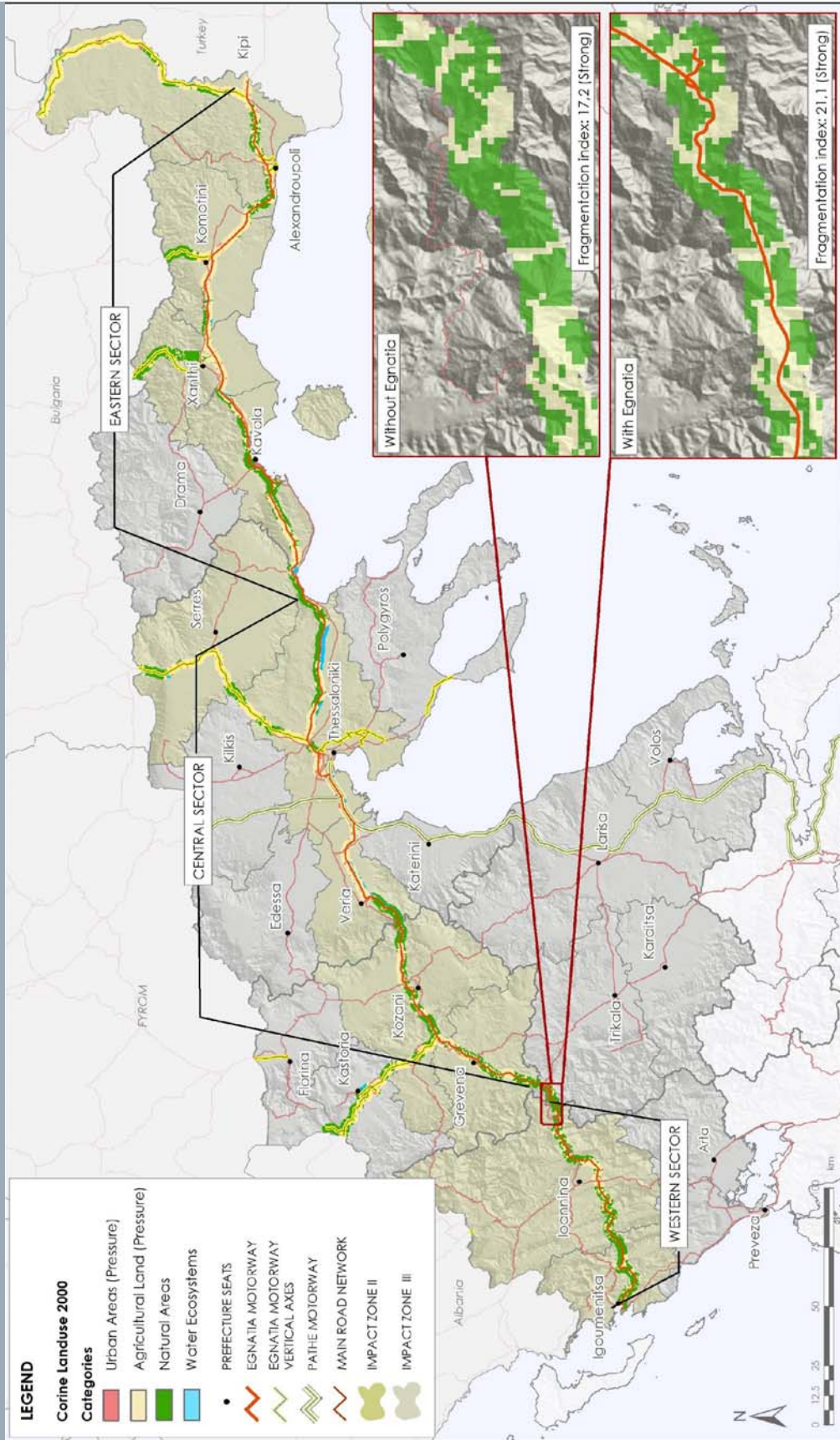
To assess the indicator, the vector levels of the Corine Land Cover 2000 and the road network with all categories of the geographical database developed and updated by the Observatory have been used.

The results presented in the study «Habitat monitoring in the Egnatia Motorway project» come from the program's final report (November 2008) drafted by GeoVille Environmental Services Sàrl. The assessment of the fragmentation indicators in this study was performed using Fragstat software (see <http://www.umass.edu/landeco/research/fragstats/fragstats.html>).

Methodology

For the initial processing, the land uses of Corine have been grouped and then changed from vector to raster level with an element size of 250x250m. The grouping resulted in “sensitive” and “non sensitive” areas. Then the road network (without Egnatia Motorway) has been installed with coverage in order to indicate more “non-sensitive” areas. Finally, the fragmentation index of “sensitive” areas was measured both in Zone I of 1 km on either side of the axis and the overall surface of each prefecture crossed by the road axes. The procedure was repeated after considering the Egnatia Motorway and its Vertical axes as well, in order to record the fragmentation before and after the Egnatia Motorway construction.

Map 3: Fragmentation of natural areas



DATE: 05/05/2008
DATA SOURCE: CORINE LC 2000
FILE: M:\GIS\Indicators\ENV\ENV06\2008\maps\mxd\EN\ENV06_apr08_EN.mxd