European Environment Agency

Interim Report

POLAND

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Warsaw, November 2008

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1. Background

- **Context of CLC2006 in the country** (national authority, previous CLC, contracted organisation, etc)

The CLC2006 update was undertaken together with the production of high resolution (HR) land cover data as part of the implementation plan of the GMES fast track service on land monitoring (GMES FTS-LM). The The Polish project comprises the production of CLC-change 2000-2006, CLC2006, and the verification of HR maps of built-up areas.

The national project is carried out by the Institute of Geodesy and Cartography contracted by Chief Inspectorate of Environmental Protection (GIOS) as the national authority, with financial support of the National Fund for Environment Protection and Water Management, and the EEA.

The national project plan was based on the 'Terms of reference and the template for CLC2006 national project plans' and the 'CLC2006 Technical Guidelines' provided by the European Environmental Agency (EEA). The CLC90 and CLC2000 inventories were carried out by Institute of Geodesy and Cartography under supervision of the Chief Inspectorate of Environmental Protection.

Due to economical and social transformation in Poland the significant land use/land cover changes occurred. These changes were not documented in the form of geographical database therefore a new CLC database for the reference year 2006 (CLC2006) is highly expected by continuously increasing number of the potential users. Scientists, spatial planners and practitioners in the field of environment protection constitute the biggest group among the eager potential users of the updated CLC database.

Poland has participated in elaboration of CLC90, CLC2000 and land cover changes databases. All mentioned above databases exist in the country and have been widely used. There is also the Baltic Cost Line Land Use Changes database elaborated as a spin-off product of CLC90 and CLC2000. All CLC databases were elaborated at the Institute of Geodesy and Cartography.

Satellite images taken in 2006 by SPOT 4 and IRS satellites (called IMAGE2006) were used as a basic source material for the CLC2006 project. Air photographs and ortophotomaps as well as topographic maps were applied as a supporting source of information. Some high resolution satellite data and ortophptomaps available via internet services, like GoogleMaps, Zumi or the Polish National Geoportal prototype were used as a reference material.

Employees of the Institute of Geodesy and Cartography have gained a great experience with interpretation of satellite images and construction of databases while doing all previous CORINE databases. Therefore no external training was needed.

2. Databases used in the project

- **IMAGE2000**

The complete coverage of Poland by Landsat satellite images consists of 28 scenes. For CLC2000 inventory most of the scenes were acquired within the vegetation period from May to September, mostly in 2000, only 4 images were taken in 1999 and 5 in 2001. This is summarized in table 1.

Table 1. Acquisition dates of IMAGE2000 (Landsat 7 TM) for Poland

Landsat ETM+	1999	2000	2001	Total
April		1		1
May		8	4	12
June		2		2
July	1			2
August		2	1	3
September	3	3		6
October		3		3
Total	4	19	5	28

- **IMAGE2006**

Image2006 comprises images delivered by satellites SPOT4 and IRS in the reference year 2006 +/- 1 year. For each area two images were acquired, in order to provide an opportunity for improved interpretation. Multitemporal images are considered especially useful in separating some land cover classes, e.g. non-irrigated arable land and pasture land, etc.

The The Polish team specified the narrow window for acquiring SPOT satellite images from August to September 2006, and the extended window – from May to September 2006. For AWIS data the narrow window was determined from September till October 2006 and 2005.

The reason for defining acquisition windows was caused by the fact that it is expected that a considerable part of land cover changes in Poland concerns conversion from arable land into pastures or fallow land and vice versa, then the best period for distinction pasture from arable land or from fallow land is September and alternatively the first decade of October or the last decade of June. Early Autumn (end of September and October) is also the best period for deciduous and coniferous forests delimitation.
Finally Image2006 for Poland comprises 141 images (91 SPOT, 50 IRS).

Tables 2 and 3 summarize some details of acquisition dates.

Table 2. IRS images

Acquisition data	Coverage 1			Coverage 2		
	2005	2006	2007	2005	2006	2007
March						2
April				3	7	6
May		4		1	4	
June					1	
July		6			5	
August	7					
September	1	11				
October					2	
Total	8	21		4	19	8

Table 3. SPOT images

Acquisition data	Coverage 1			Coverage 2		
	2005	2006	2007	2005	2006	2007
March						4
April						1
May		1				4
June		2				
July		13			4	
August						
September		46				
October				3		
November				1		
December					2	
Total		62		4	6	9

- **CLC2000**

The border-matched version of the CORINE Land Cover 2000 database, delivered by EEA, was used as basic input material.

- **Topographic maps**

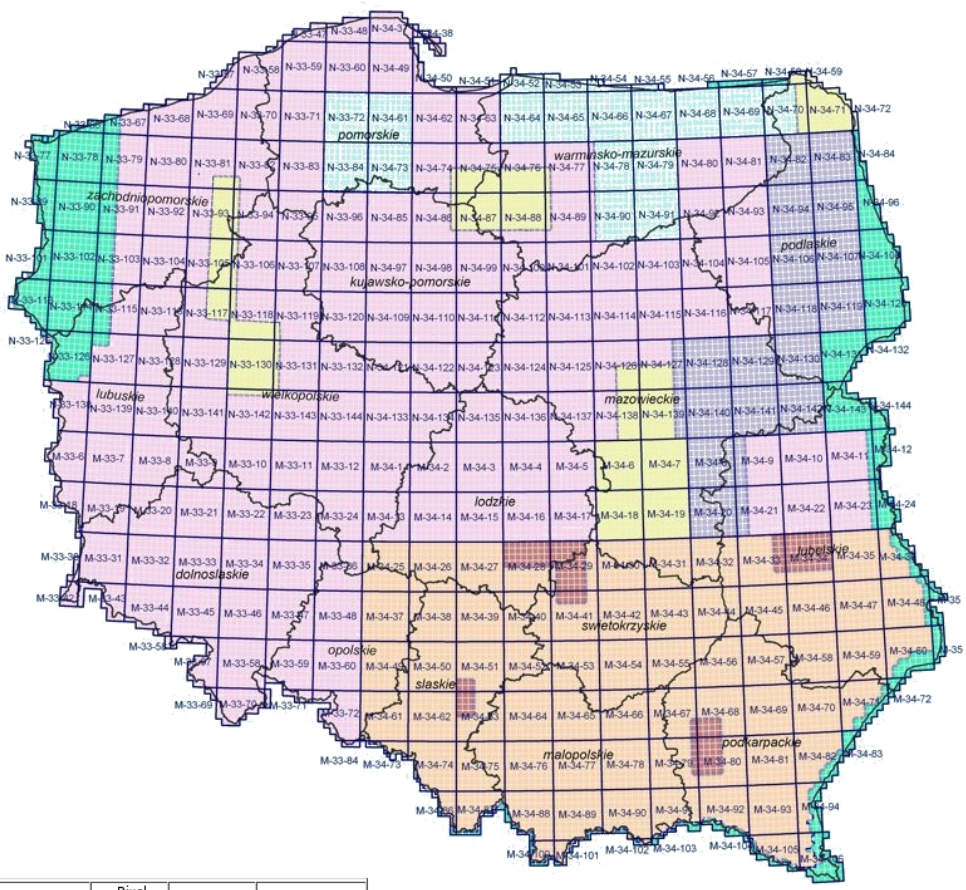
Scanned and calibrated paper topographic maps were used only for some parts of Poland area, especially for CLC2000 revision.

- **LUCAS 2001 data**

LUCAS 2001 data were used to support interpretation in some cases, mainly for improvement interpretation of 231, 243, 324 land cover classes.

- **Orthophotos, etc**

Orthophotomaps coverage, that was used as an interpretation support in Poland has been shown in figure 1. These orthophotos were viewed using the Polish national geoportal (www.geoportal.gov.pl) and they were the main source of interpretation support. Other Internet map services were helpful as well. That were: Google Maps and Zumi (the Polish address finder with map support). A common ancillary data were also city maps. They were used to facilitate interpretation images of big towns and cities.



	Ortophoto scale	Photo scale	Pixel size	Date	Colour
	1:5000	1:26000	0.5 m	2005/2006	black & white
	1:5000	1:26000	0.5 m	2005/2006	colour
	1:5000	1:26000	0.5 m	2004 - 2005	black & white
	1:2000 / 1:5000	1:13000	0.25 m	2003 - 2004	black & white
	1:2000 / 1:10000	1:13000	0.25 m *	2002 - 2003	black & white
	1:5000	1:26000 Digital Photos	0.5 m	2007 - 2002	colour
	1:5000	made from sattelite scenes	1 m	2002	colour

* some part of the maps in 1:10000 scale has 0,5m pixel size

Fig. 1. Orthophotomaps coverage, Poland

3. Organisation of the work at national level

- **Milestones**

Table 4. Milestones for the CLC2006 project in Poland

	1. Milestone	Between Milestone 1 and 2	2. Milestone – March 2008	Between Milestone 2 and 3	3. Milestone – May 2008	Between Milestone 3 and 4	4. Milestone November 2008	5. Milestone – verification of HR data soil sealing	6. Milestone-February 2009
Start of the project	X								
Signing of a contract	X								
Start working for contractor	X								
Satellite images control	X								
Interpretation 50% of territory of Poland		X	X						
WU metadata creation		X	X						
1st Verification Mission (ETC LUSI)			X						
Interpretation 100% of territory of Poland				X					
WU metadata creation				X					
2nd Verification Mission (ETC LUSI)					X				
Creation of the metadata of CLC 2000-2006						X			
Creation of CLC2000 revised database						X			
Creation of the CLC 2006 database						X			
Creation of the metadata of CLC 2006						X			
Final technical verification of CLC 2006 and CLC 2000-2006 (ETC LUSI)							X		
QA/QC		X	X	X	X	X	X		
Creation of the interim report							X		
Creation of the final report									x
End of the project									X

1st milestone – Start of the project, November 2007

2nd milestone - Interpretation of 50% territory of Poland has been finished, 1st verification mission of ETC-LUSI, March 2008
3rd milestone - Interpretation of 100% territory of Poland has been finished, 2nd verification mission of ETC-LUSI, May 2008
4th milestone - Final technical verification of CLC 2006 and CLC 2000-2006 databases and metadata (ETC LUSI), November 2008
5th milestone – verification of HR data "soil sealing", September 2008
6th milestone - End of the project, February 2009

- **CLC2006 training (if organised)**

The Polish interpretation Team was nearly the same as in the CLC1990 and CLC2000 projects, so there was no need to involve European Technical Team in training activities in Poland. New interpreters were trained by the project leader, at the end of December 2007.

- **Participating experts**

Participating experts and their role in the project are listed in the table 5.

Table 5. Participating experts

No.	TASK STAFF	Satellite image processing	Interpretation of land cover changes	CLC2006	Quality assurance / Quality control	Project management
1.	Elzbieta Bielecka				X	X
2.	Maria Andrzejewska		X			
3	Maciej Baginski		X			
4	Marek Baranowski				X	
5	Zbigniew Bochenek		X			
6	Andrzej Ciolkosz				X	
7	Agata Ciolkosz-Styk		X			
8	Dariusz Dukaczewski		X			
9	Jedrzej Gasiorowski		X	X		
10	Ryszard Gronet		X			
11	Elzbieta Kozubek		X			
12	Wanda Kowalik		X			
13	Ewa Laczynska	X	X	X		
14	Jan Musial		X			
15	Zenon Polawski		X			
16	Wojciech Prochnicki		X			
17	Maciej Rutkowski		X			
18	Katarzyna Raczka					
19	Konrad Turlej					

- **Processing methodology, software**

Interpretation of CLC changes 2000-2006 was made using special software based on ArcView (ESRI), named InterChange, dedicated for the CORINE project. It consisted of two connected windows, showing the same area: the first window for Image 2000 with the database of CLC 2000 and the second one for Image 2006 with the database CLC 2000-2006 changes. Interpretation consisted on visual comparing these two windows and identifying changes in land cover, which were larger than 5 ha. As a support some ancillary data were used like orthophotos, topographic maps, Internet services, city maps (either digital or paper) etc. The recommended colour rendition for interpretation is shown in table 6.

Table 6. Recommended colour rendition for interpretation

Sensor / Colour	Landsat TM/ETM	SPOT-4	IRS P6 LISS III	Spectral range
Red (R)	band 4	band 3	band 3	Near-infrared (NIR)
Green (G)	band 5	band 4	band 4	Middle-infrared (SWIR)
Blue (B)	band 3	band 2	band 2	Red (VIS)

All identified changes were drawn and attributed by interpretators as polygons and automatically written by the InterChange in the CLC 2000-2006 changes database (separately for each sheet).

After all controls, all working units were joined into one seamless database, and the new database - CLC2000-2006 - was created using ArcInfo (ESRI) software.

The CLC2006 database of Poland was generated accordingly to the following equation:

$$CLC2006 = CLC2000 + CLC\text{-}change_{2000\text{-}2006}$$

Generation of CLC2006 and change database was performed according to the instructions of ETC-LUSI Technical Team (*gener_manual_en_final.doc*) and with help of given macros. Data matching between adjacent working units was checked. All working units' datasets were matched together. As a result revised CLC2000 and the 2000-2006 land cover changes databases were generated. After that the quality of CLC2000 and CLC changes 2000-2006 land was checked using standard tools of software *ArcInfo 8.2* (attribute queries, spatial queries, *Repair Geometry*, *Topology toolbox*):

- correctness of attributes;
- quality of topology and geometry.

After quality control the CLC2006 database was generated in *ArcInfo workstation* environment using given functions and macros.

- **Internal quality control, results**

The person responsible for quality control of the CLC2006 project was the project manager. The project manager supervised all the production process of CLC2006 and checked the quality before data was submitted to the national authority for national-level approval (GIOS) and to the ETC-LUSI for verifications and final technical control.

The project manager and the expert, who was not involved with the production of the CLC2000 updating, checked correctness of the interpretation of changes in land cover.

Quality control assuring conformity with the technical specification of the CLC2006 database was done automatically using aml macros.

- **External quality control (Technical Team), results**

The external verification consisted of two verification missions held in March 2008 and May 2008. The main goal of the external verifications was to guarantee a harmonised European CLC 2006 and CLC change databases. For each of the 295 working units, well-distributed verification units of 10×10 km squares were selected on basis of pre-defined selection criteria.

The external control was made by European Technical Team. ETC controlled interpretation of land cover changes using dedicated software — InterCheck, based on ArcView (ESRI). During each mission, at first formal control was made automatically to identify some technical errors, like neighbouring polygons with the same codes, polygons with invalid size or code, etc. The next step was thematic, visual control of CLC2000 and CLC change 2000-2006 databases. As a result of thematic control of the first external control, some systematic errors were identified. These errors were marked as points with descriptive attributes and saved in two remark shapefiles for each working unit — one for the CLC2000 database and the other for the CLC2000-2006 changes database.

ETC-LUSI stated that both in the CLC2000 and CLC change databases errors are minor and accidental. The most typical errors in interpretation were as follows:

- Not consistent separation of 112 and 242 resulting in omission of several one-street villages from the artificial surfaces class.
- Not consistent separation of 141 and 31x inside urban areas. Urban forests in cities should be attributed as 141.
- Not sufficient separation of inland marshes (411) and peatbogs (412) in the Western part of the country.
- Occasional omission of forest growth, and clear-cuts.
- Paying attention on real changes process. Revision of all 2xx-324 changes, as well as 211-243 and 231-243 changes was strongly advised.

All errors were corrected as well as the no verified working units were checked and corrected paying attention on the remarks made by ETC.

- **Main difficulties and solutions**

The interpretation of the CORINE land cover classes as well as land cover changes detection requires a big experience in satellite images interpretation and knowledge of the region under consideration. Some difficulties were caused by heterogeneity of acquisition dates of satellite data (different vegetation seasons), temporal dynamics of land cover classes and their reflection in satellite images and fuzziness in land cover boundaries both on the ground and in the satellite image. All these reasons created a big challenge to unify the results of interpretation of land cover classes to obtain inherent land cover database for entire country.

At the beginning of interpretation identification of real change process made some difficulties. Especially new forest plantations (2xx-324) and changes within agriculture, like 211-243 and 231-243 were revised according to ETC-LUSI remarks.

4. Results

- **CLC-changes (with some analysis, examples, maps, statistics)**

Between 2000 and 2006 some 0.59% of Poland area had changed its land cover. The spatial distribution of areas that had changed their land cover is shown in Figure 2. It was envisaged that due to the followed method acreage of changes is slightly underestimated. A number of changes smaller than 5 ha were easily visible in satellite images but, as they do not meet the defined criteria, they couldn't be mapped. Such small changes in land cover category concerned mainly forest clear-cuts, built-up areas, industrial and commercial lands and afforested agriculture plots.

Fig. 2. Spatial distribution of land cover changes in 2000-2006.

It is evident from table (Table 7) and chart (presented in the Figure 3) that most of changes are associated with forests and agricultural areas. These reflect changes in

The Polish economy since 1990 when lower activity in agriculture sector and abandoning the arable lands were observed. The total decrease of agriculture areas is about 342 km^2.

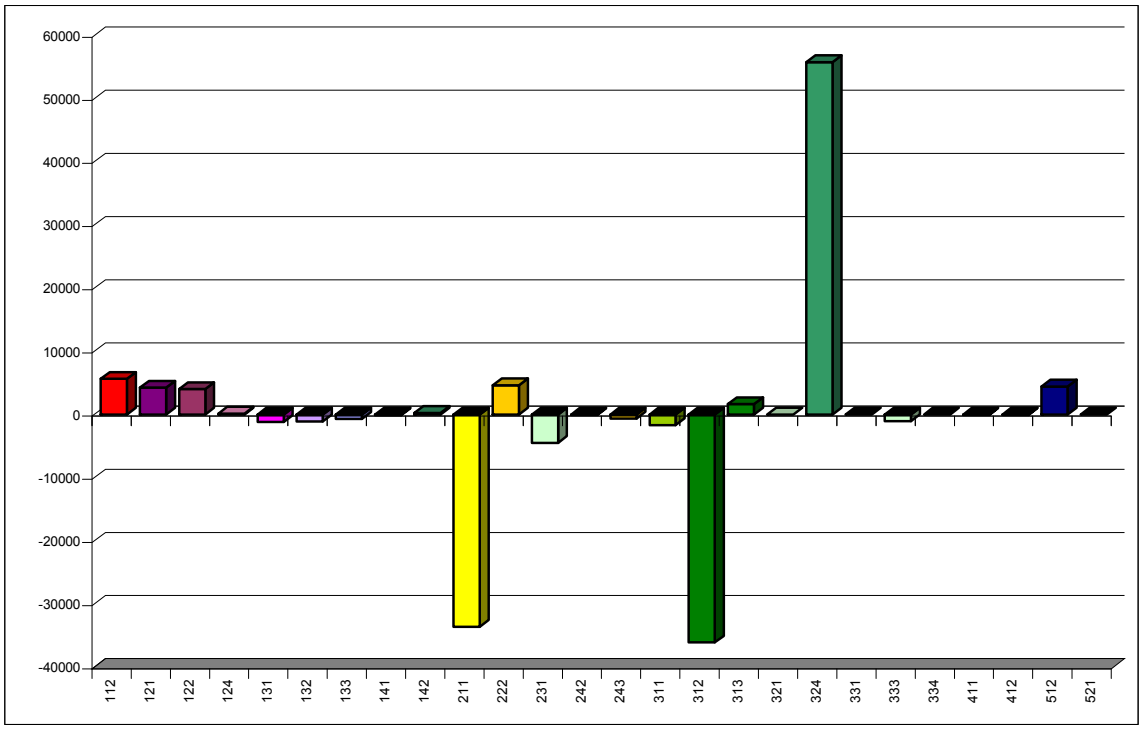


Fig. 3. Area of land cover changes in 2000-2006. Poland

Forests

Changes inside forest is dominating land cover change process in Poland. It comprises nearly 82% of changed area (134 978 ha).

It evidently reflects three types of changes:

1) forest damaged due to windstorm (Fig. 4) found mainly in the southwest part of Poland,
2) the increase of forest cutting for internal needs and export;
3) the growth of forest - clear cuts in the year 2000 now became a forest.

Increasing Poland's forested area is one of the priorities of the National Policy on Forests. An analysis of the spatial distribution of newly planted forests indicated that most of the afforestation activity took place in the north and south parts of the country. On the other hand the agriculture area is mostly afforested in eastern Poland.

Table 7. Real changes in land cover from the year 2000 to 2006 (in hectares)

AREA_HA	2006																						
2000	**112**	**121**	**122**	**124**	**131**	**132**	**133**	**141**	**142**	**211**	**212**	**222**	**231**	**242**	**243**	**311**	**312**	**313**	**321**	**324**	**333**	**512**	**Total**
112			48		16		20																**84**
121	7						20	13					68						10	60			**180**
124																				17			**17**
131			9							418			1863							3077		1639	**7005**
132		8	8										560		14					654		10	**1253**
133	2381	1651	826					33		173			291		10				5			151	**5521**
141	62	42					59																**163**
142	34	13	37				43																**127**
211	2651	1977	2144	55	3454	40	3032		192			5494	2912	510	2377					13738		740	**39316**
222	9	6					21			820													**856**
231	328	337	269		450	73	639		155	4228		8		83	186		8			2249		1288	**10302**
242	60	149	65	10	223		116			6										64		6	**698**
243	161	51	122	6	403	5	133			58				18		60	35	116		1743		320	**3232**
311		19	53		32	27	12		29											3729		30	**3929**
312		139	270		765		585		10	5										59109		30	**60913**
313	15	6	122	48	202		85						9	6			6			9268		12	**9780**
321		12					15											7		482			**516**
324	19	36	36	27	240	12	48				15					2202	24770	11301			41	88	**38835**
331																				5			**5**
333													82						503	360		125	**1070**
334																				29			**29**
411			2		25		2															24	**54**
412																						51	**51**
512					10								35							42			**87**
521							8																**8**
Total	**5727**	**4447**	**4012**	**146**	**5821**	**156**	**4838**	**46**	**385**	**5709**	**15**	**5502**	**5820**	**618**	**2587**	**2263**	**24819**	**11424**	**519**	**94626**	**41**	**4513**	**184033**

Agricultural areas

Furthermore, a considerable part of land cover changes concern conversion from arable land into artificial areas (urban, industrial, infrastructure), and the conversion of arable land into forests.

In comparing current (in 2006) acreage of arable land with that in 2000, it is apparent that the decrease in acreage was accompanied by an increase in acreage of artificial areas, forests. Afforestation of agricultural areas according to national plans of protection of the environment was one of the most important changes in Poland (see Fig.5).

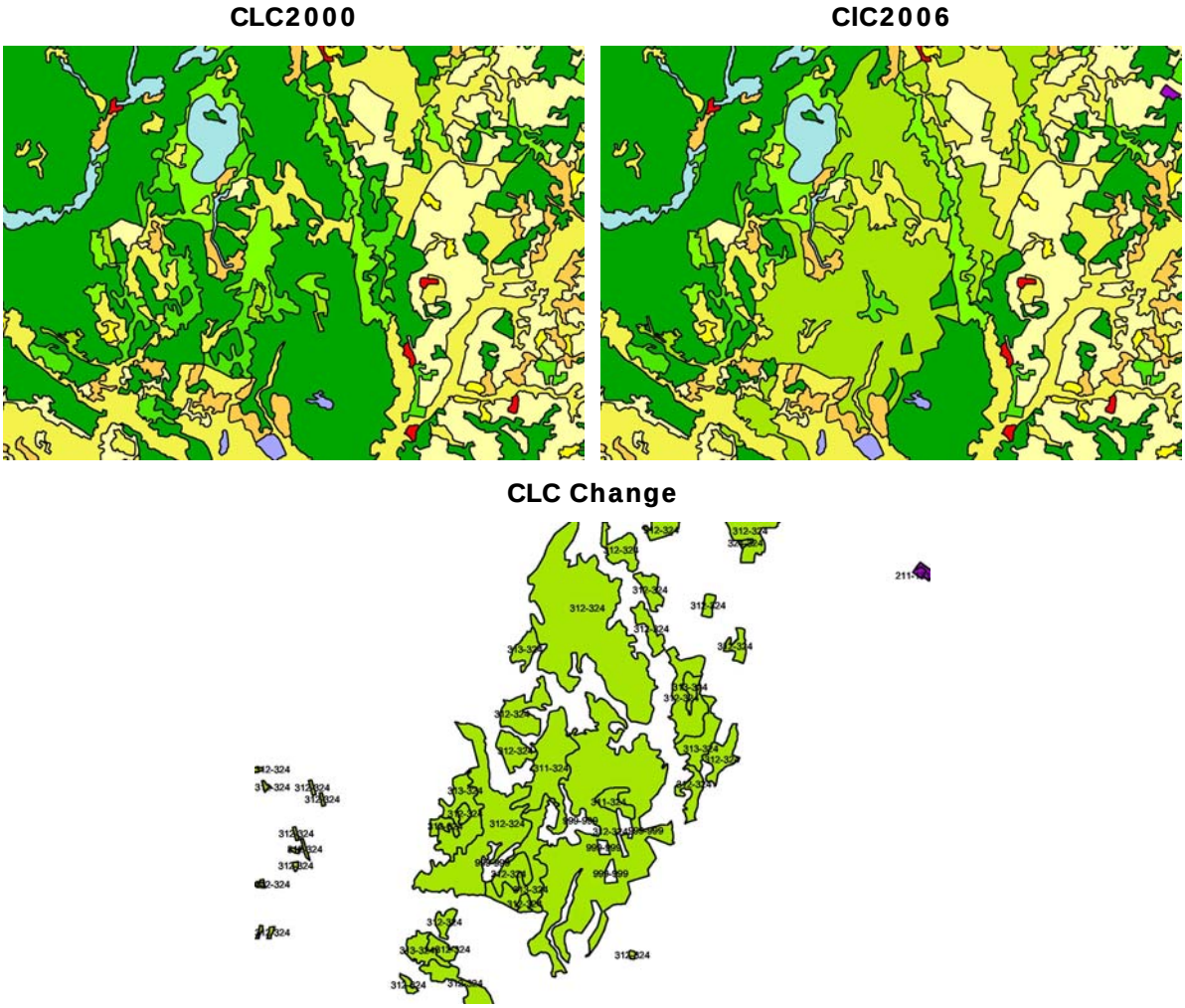


Fig.4. Forest damaged due to windstorm in Piska Forest

Artificial surface

The prevalence of discontinuous urban fabric in the The Polish settlements shows the permanent growth. Urbanisation was blooming in the vicinity of big cities (e.g.: Warsaw, Krakow, Lodz, Poznan, Gdansk agglomeration and Katowice agglomeration). The acreage occupied by the industrial classes is also growth. A big construction sites of new highways in some parts of Poland were also easily recognized on satellite images. Example showing these types of changes is presented in Fig. 6.

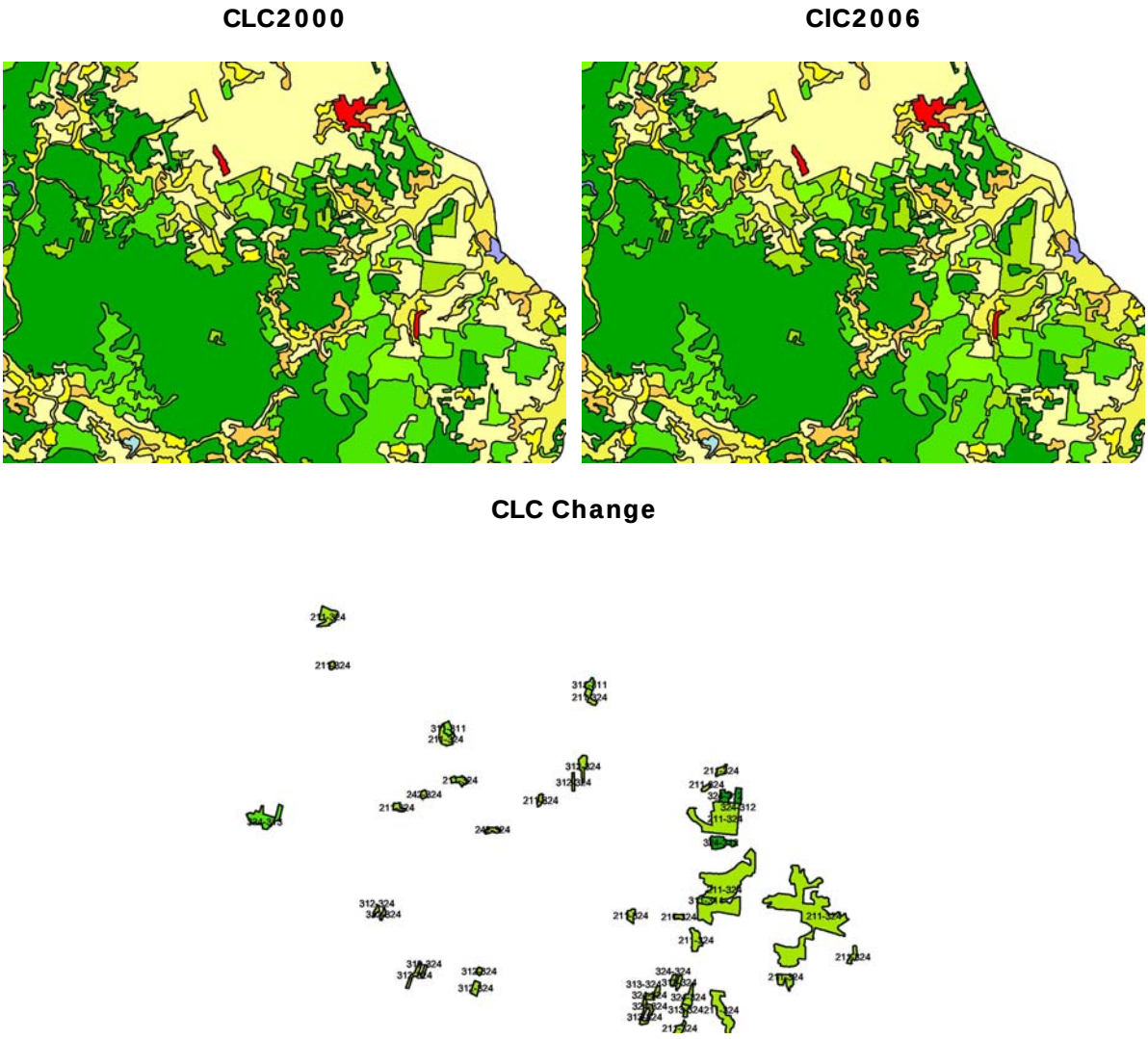


Fig.5. Aforestation of arable land in north-west part of Poland

Wetlands and water

A loss of wetlands is not considerable. Increase of water bodies is due to new water reservoirs.

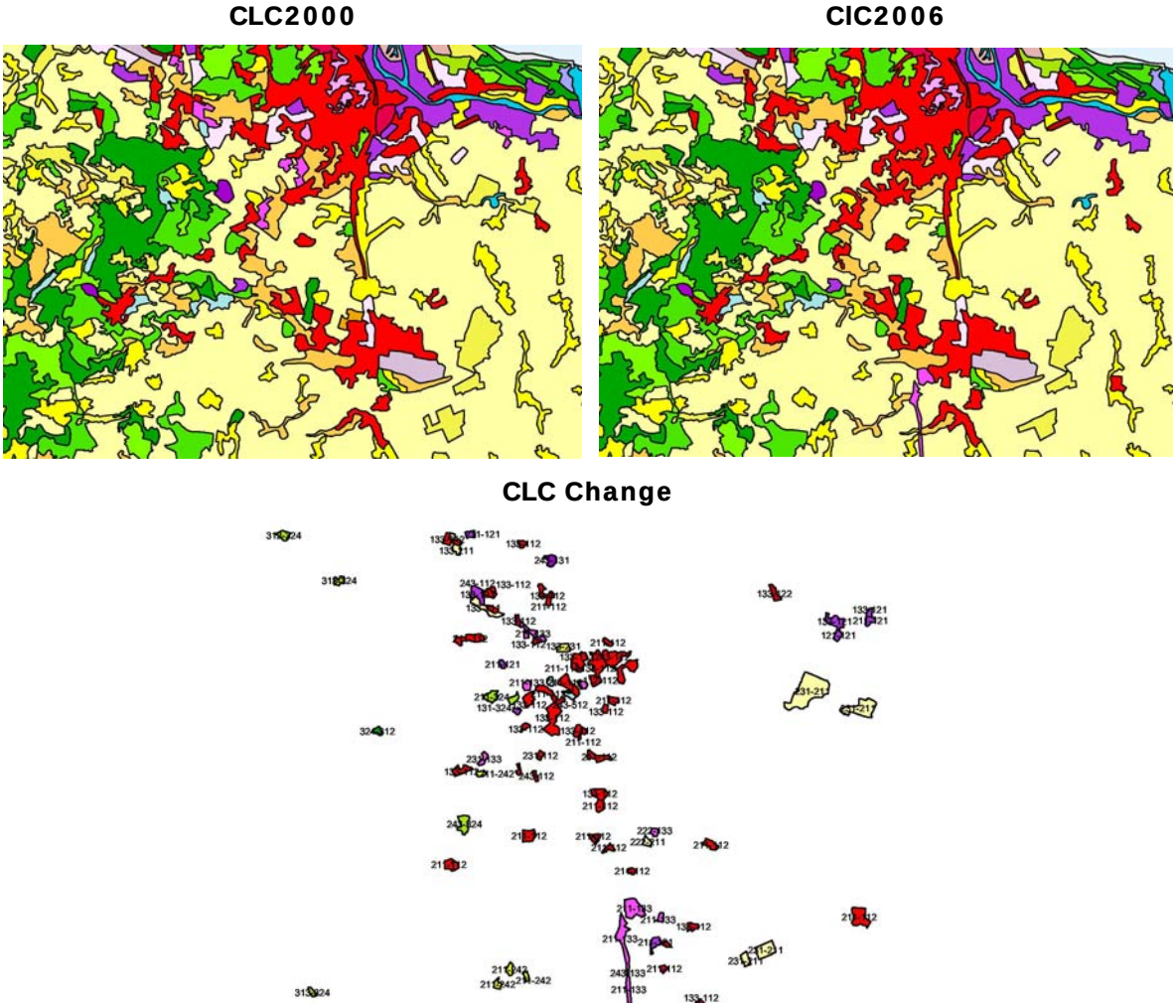


Fig. 6. Conversion to artificial areas

- **CLC2006 (some maps, charts, statistics)**

Land cover in Poland (Fig. 7) is characterised by 32 out of 44 classes of the CORINE Land Cover nomenclature. In both CLC 2000 and CLC 2006 databases similar land cover classes are represented. The analysis of land cover database revealed that arable land dominates in Poland. Some 45% of the total area of the country is occupied by this land cover class. Coniferous forest occupies 18%, meadows and pastures – 9% and complex cultivation patterns – 11% of the area of the country (Fig. 8). Almost 63% of Poland is classified as agricultural land. Land classified as artificial areas, according to the CORINE Land Cover nomenclature, occupied nearly 4%, and semi-natural and forest areas cover about 31% of national territory. The remaining 2% of Poland territory was classified as wetlands or water (Figures 7-9).

The small share of artificial surface (nearly 4%) shows that a big part of 38,1 million of the Polish population lives outside urban fabric areas. About 38% of population

lives in villages, which have been included to complex agricultural classes (242 and 243) due to dispersed pattern of rural settlements. Continuous urban fabric occurred only in 77 areas in centres of the cities of above 100 000 inhabitants. Industrial areas occupies almost 10% of artificial surface which is merely 0,3% of total territory of Poland. The biggest industrial areas and their higher concentration are characteristic for southern and western Poland (e.g. Upper and Lower Silesia, Great Poland).

Fig. 7. CORINE Land Cover in 2006. Poland

Transportation units seldom exceed the mapping threshold and are often included into other classes. Only big railway stations located in cities or near industrial areas are mapped.

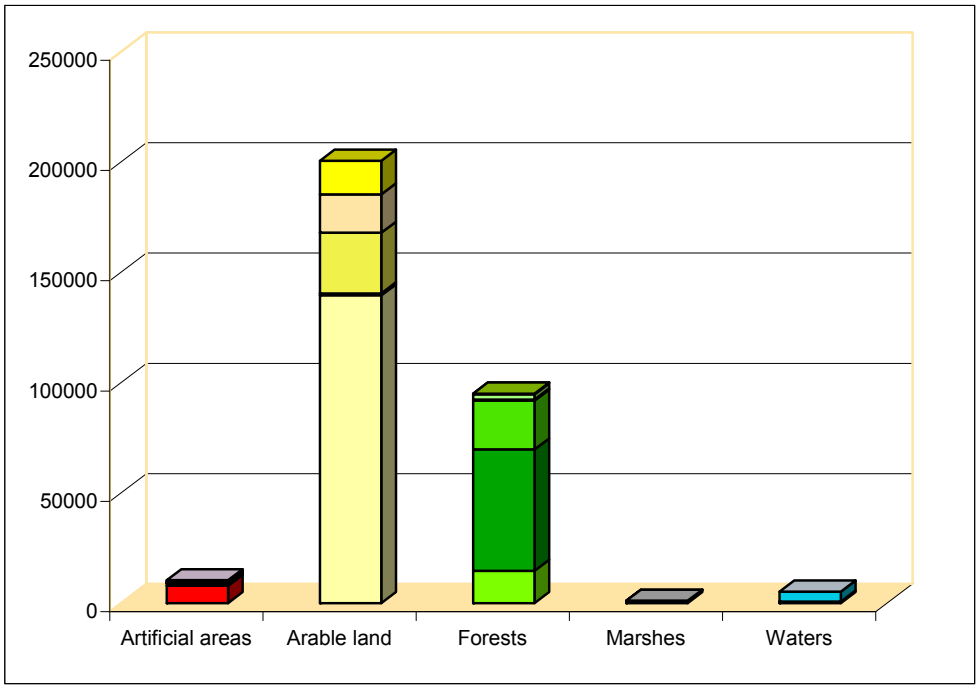


Fig 8. Sharing of land cover classes inside 1st level class.

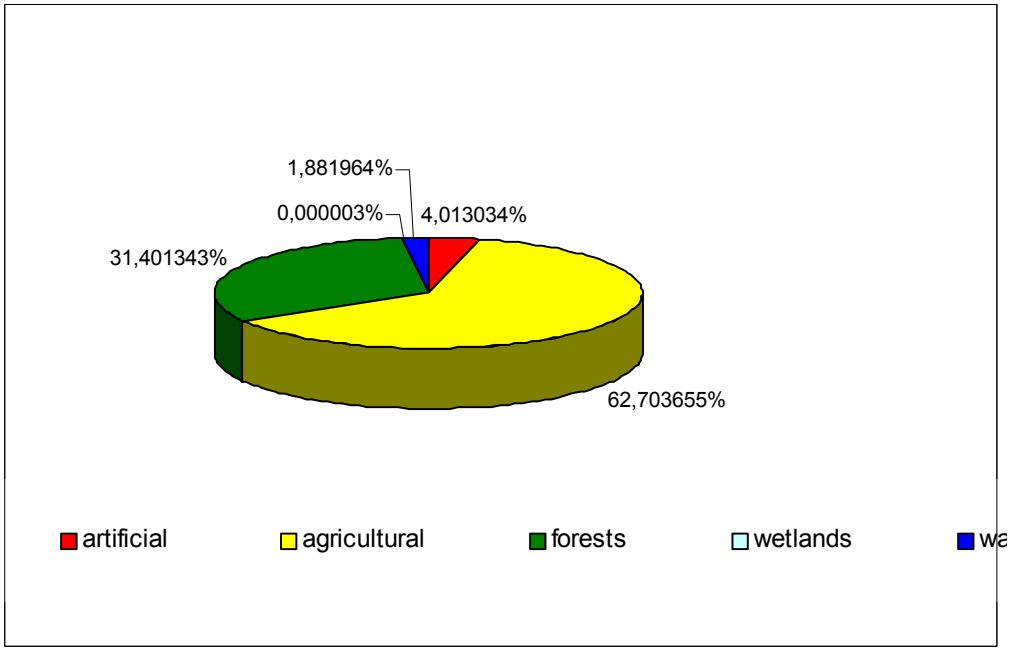


Fig. 9. Structure of land cover in Poland.

According to the CLC nomenclature the agricultural areas are divided into 11 classes. Only 5 of them occurred in Poland. Most of agricultural lands are shared between arable land, pastures and two complex classes (242 and 243). Arable land is uniformly spread throughout the whole country. The share of fruit berry plantations in agriculture area is small, however some big tree plantations in central and

southern Poland are clearly visible in the map. Areas classified as pastures do not form large polygons and have the same distribution pattern as arable lands. Meadows and pastures occupy less than 9% of the whole country area. Comparing to statistical data there is a slight underestimation of this land cover class, due to the fact that a big number of the Polish permanent meadows and pastures are smaller than 25 ha in size. Complex cultivated pattern (242) represents small parcels of diverse annual crops, pasture and permanent crops each of them smaller than 25 ha in size. This land cover class occupies approximately 5,5% of total area of Poland. It is logical that this class is located in the vicinity of arable lands. The mostly evenly distributed class is 243, which spreads everywhere in the provinces and in extensively cultivated areas. This class demonstrates the mosaic nature of the Polish landscapes. These two complex classes reflect also the spread of settlement pattern, which is very typical for the Polish rural landscape.

The forests occupy 29% of the total area of Poland. Forests are not distributed evenly; most forest areas are situated in north-eastern, north-western and south-eastern regions of Poland (see Fig. 7).

Natural grasslands (321) embrace less than 0,2% of Poland territory. This class forms the high mountain meadows. It is distributed mainly in the south of Poland. Heathland communities in Poland (322) include only *Pinus mugo* species located above the upper tree limit in the alpine zone or in the bottom of large depressions with temperature inversion. They can be found in the Tatra and Sudety Mountains with poor and rough soils. This type of vegetation occupies less than 0.1% of total class territory. LC classes with little vegetation all together occupy less than 1% of territory.

The CLC nomenclature considers wetlands as a non-forested areas of low lying land flooded by fresh water, covered by specific low ligneous, or herbaceous vegetation. The biggest wetlands of Poland are located in the northeast part of country.

Lakes are mainly located in the northern Poland, in areas covered by ice sheet during the last glaciation e.g. Pomeranian, Great Poland, Mazurian Lake District. Outside northern Poland, a fairly large cluster of lakes is located in the south-eastern part of the country (Polesie Podlaskie). Rivers seldom exceed the mapping threshold and are often included into neighbouring classes. Only few big rivers are mapped and included in the CORINE database.

5. Deliverables

Delivered to EEA via CDR

- CLC2000 revised
- CLC2006
- CLC2000-2006 change
- Metadata for working unit
- Metadata for CLC2006 country level
- Interim report

6. Conclusions

The two new CLC databases were created (CLC Change and CLC2006) and one was revised (CLC2000) during the project. The scope and properties of the created data sets are stated out in the CLC methodological basis.

The consistent land cover data sets allow comparison between different regions of Poland and between neighbouring countries. Methodological continuity as well as the databases themselves provides a tool for researching processes, which spread over national borders.

The regular updating of land cover data following the same methodology is of utmost importance in environmental dynamics monitoring and allows evaluating the range and extent of processes behind land cover changes.

Implementation of CLC2006 project in Poland went according to National Project Plan for implementing CLC2006 project in Poland.

7. References

- EEA documents

[1] Feranec, J., Büttner, G., Jaffrain, G., 2006. CORINE Land Cover nomenclature – Illustrated guide (to replace Addendum 2000)
[2] I&CLC2000 methodological guide vol. I and II
[3] CORINE Land Cover Technical Guide – Addendum 2000
[4] Büttner G., Kosztra B., 2007. CLC2006 Technical Guidelines. Final Draft. Copenhagen (EEA)
[5] Soukup, T. 2007: Guidelines for CLC2006 delivery

- National documents

[1] Büttner G., Kosztra B., 2007. Część III SIZW, Załącznik nr 3: Wtyczne techniczne dla programu CLC2006. (the Polish translation of [3])
[2] Ciołkosz A., Bielecka E., 2005. Pokrycie terenu w Polsce. Bazy danych CORINE Land Cover. Warszawa: Biblioteka Monitoringu Środowiska.

Annex 1: CLC-Changes metadata sheet for the country
Annex 2: CLC2006 metadata sheet for the country

Annex 1: CLC-Changes metadata sheet for the country

EEA Field name			**ISO Number**	**EEA Description**	**Please fill in**	**Max**
Level 1	**Level 2**	**Level 3**				
Metadata on metadata				Defines the metadata on the dataset		1
	Point of contact			Responsible organisation and individual for the metadata		1
		Organisation name	8.376	Responsible organisation name	Institute of Geodesy and Cartography (IGiK)	1
		Individual name	8.375	Responsible individual name	Mrs. Elzbieta Bielecka	1
		Position name	8.377	The responsible individual role or position in the organisation	Project manager	1
		Role	8.379	Function performed by the responsible organisation		1
		Address: Delivery point	8.378.381	Address line for the location	Modzelewskiego 27.	1
		Address: City	8.378.382	City of the location	Warsaw	1
		Address: State, Province	8.378.383	State, province of the location		1
		Address: Postal code	8.378.384	Postal code of the location	02-679	1
		Address: Country	8.378.385	Country of the location	Poland	1
		Address: E-mail	8.378.386	The electronic mail address of the responsible organisation or individual	elzbieta.bielecka@igik.edu.pl	1
	Last modified		9	Date of the last modification of the metadata (YYYYMMDD)	20081021	1
	Name of standard		10	Name of metadata standard	EEA-MSGI/ISO19115 (First Edition)	1
	Version of standard		11	Version of the metadata standard	EEA-MSGI 1.1	1
Dataset identi-fication				Basic information required to identify the dataset		1
	Title		15.24.360	Title of the dataset	CHA06_PL	1
	Alternative title		15.24.361	Alternative titles of the dataset	CORINE Land Cover change (2000-2006) database of Poland; CLC change (2000-2006) - Poland	N
	Brief Abstract		15.EEABrief Abstract	Brief abstract explaining in short the content of the dataset	CORINE Land Cover change (2000-2006) database of Poland	1

	Abstract	15.25	An abstract explaining the content of the dataset	In 2006 the European Environment Agency (EEA) put forward a proposal to collaborate with the European Space Agency (ESA) and the European Commission (EC) on the implementation of a fast track service on land monitoring. CLC2006 project is one of the components of GMES FTS Land Monitoring, launched in order to provide timely and relevant information on land cover to policy makers in Europe. 38 countries participate in the GMES FTS Land Monitoring - 32 EEA member states and 6 collaborating countries. In Poland the project is supervised by the Chief Inspectorate of Environmental Protection, and co-financed by the National Fund for Environmental Protection and Water Management. The European Environment Agency (EEA). Contract numbers: 3601/RO/CLC/B2008.EEA.53300.	1
	Keywords	15.33.53	Keywords helping to classify the dataset	CLC change, CLC2006, CORINE, geographic, landcover change, environment, vector data, Poland	N
	Topic category	15.41	A predefined ISO category, see **code list 2** underneath	010 (imageryBaseMapsEarthCover)	1
	Dataset version	15.24.363	Version of the dataset	Version 1.	1
	Reference date	15.24.362.394	Date of last modification to the dataset (YYYYMMDD)	20081021	1
Reference system			Definition of the reference system used for the dataset		1
	Name	13.196.207	Name of reference system	PL_EUREF89 / 1992	1
	Datum		Identity of the datum		1
	Name	13.192.207	Name of datum	PL_EUREF89 (EUREF-POL)	1
	Ellipsoid		Identity of the ellipsoid		1
	Name	13.191.207	Name of ellipsoid	GRS 80	1
	Semi-major axis	13.193.202	Radius of the equatorial axis of the ellipsoid	6378137	1
	Axis units	13.193.203	Units of the semi-major axis	Meter	1

		Flattening ratio	13.193.204	Ratio of the difference between the equatorial and polar radii of the ellipsoid to the equatorial radius when the numerator is set to 1	298.257222101	1
	Projection			Identity of the projection		1
		Name	13.190.207	Name of projection	Transverse Mercator (Gauss-Kruger)	1
		Zone	13.194.216	Unique identifier for grid zone		1
		Standard parallel	13.194.217	Line of constant latitude at which the surface of Earth and the plane or developable surface intersect		1
		Longitude Of Central Meridian	13.194.218	Line of longitude at the centre of a map projection generally used as the basis for constructing the projection	19,00000000	1
		Latitude of projection origin	13.194.219	Latitude chosen as the origin of rectangular coordinates for a map projection	0,00000000	1
		False easting	13.194.220	Value added to all “x” values in the rectangular coordinates for a map projection. This value frequently is assigned to eliminate negative numbers. Expressed in the unit of measure identified in planar coordinate units	500 000	1
		False northing	13.194.221	Value added to all “y” values in the rectangular coordinates for a map projection. This value frequently is assigned to eliminate negative numbers. Expressed in the unit of measure identified in planar coordinate units	- 5 300 000	1
		False easting northing units	13.194.222	Units of false northing and false easting	Meter	1
		Scale factor at equator	13.194.223	Ratio between physical distance and corresponding map distance, along the equator	0,9993	1
		Longitude of projection centre	13.194.224	Longitude of the point of projection for azimuthal projections		1

		Latitude of projection centre	13.194.225	Latitude of the point of projection for azimuthal projections		1
Distribution information				Information about the distributors of the dataset		1
	Owner 1			Information about the owner organisation		N
		Organisation name	15.29.376	Name of the owner organisation	European Environment Agency	1
		Individual name	15.29.375	Name contact person in the owner organisation	Ana Sousa	1
		Position name	15.29.377	Position of the contact person in the owner organisation	Project Manager Spatial Data, Information and Data Services (IDS/GIS)	1
		Role	15.29.379	Always “Owner” role	owner	1
		Address: Delivery point	15.29.378.389.381	Address line for the location	Kongens Nytorv 6	1
		Address: City	15.29.378.389.382	City of the location	Copenhagen	1
		Address: State, Province	15.29.378.389.383	State, province of the location	K	1
		Address: Postal code	15.29.378.389.384	Postal code of the location	1050	1
		Address: Country	15.29.378.389.385	Country of the location	Denmark	1
		Address: E-mail	15.29.378.389.386	The electronic mail address of the owner organisation or individual	eea@eea.europa.eu	1
	Owner 2			Information about the owner organisation		N
		Organisation name	15.29.376	Name of the owner organisation	Chief Inspectorate of Environmental Protection, (Poland)	1
		Individual name	15.29.375	Name contact person in the owner organisation	Lucyna Dygas-Ciolkowska	1

		Position name	15.2 9.37 7	Position of the contact person in the owner organisation	Deputy Director of Department	1
		Role	15.2 9.37 9	Always “Owner” role	owner	1
		Address: Delivery point	15.2 9.37 8.38 9.38 1	Address line for the location	ul. Wawelska 52/54	1
		Address: City	15.2 9.37 8.38 9.38 2	City of the location	Warsaw	1
		Address: State, Province	15.2 9.37 8.38 9.38 3	State, province of the location		1
		Address: Postal code	15.2 9.37 8.38 9.38 4	Postal code of the location	00-922	1
		Address: Country	15.2 9.37 8.38 9.38 5	Country of the location	Poland	1
		Address: E-mail	15.2 9.37 8.38 9.38 6	The electronic mail address of the owner organisation or individual	l.ciolkowska@gios.gov.pl	1
	Originator			Information about intellectual creator (person and/or organisation with intellectual rights) of the dataset		N
		Organisation name	15.2 9.37 6	Name of the creating organisation	Institute of Geodesy and Cartography (IGiK)	1
		Individual name	15.2 9.37 5	Name contact person in the creating organisation	Elzbieta Bielecka	1
		Position name	15.2 9.37 7	Position of the contact person in the creating organisation	project manager	1
		Role	15.2 9.37 9	Always “Originator” role	originator	1
		Address: Delivery point	15.2 9.37 8.38 9.38 1	Address line for the location	Modzelewskiego 27	1

		Address: City	15.2 9.37 8.38 9.38 2	City of the location	Warsaw	1
		Address: State, Province	15.2 9.37 8.38 9.38 3	State, province of the location		1
		Address: Postal code	15.2 9.37 8.38 9.38 4	Postal code of the location	02-679	1
		Address: Country	15.2 9.37 8.38 9.38 5	Country of the location	Poland	1
		Address: E-mail	15.2 9.37 8.38 9.38 6	The electronic mail address of the originator/creator organisation or individual	elzbieta.bielecka@igik.edu.pl	1
	Processor			The technical producer or processor of the data		N
		Organisation name	15.2 9.37 6	Name of the processor organisation	Institute of Geodesy and Cartography (IGiK)	1
		Individual name	15.2 9.37 5	Name contact person in the processor organisation	Elzbieta Bielecka	1
		Position name	15.2 9.37 7	Position of the contact person in the processor organisation	project manager	1
		Role	15.2 9.37 9	Always “Processor” role	processor	1
		Address: Delivery point	15.2 9.37 8.38 9.38 1	Address line for the location	Modzelewskiego 27.	1
		Address: City	15.2 9.37 8.38 9.38 2	City of the location	Warsaw	1
		Address: State, Province	15.2 9.37 8.38 9.38 3	State, province of the location		1
		Address: Postal code	15.2 9.37 8.38 9.38 4	Postal code of the location	02-679	1

		Address: Country	15.29.378.385	Country of the location	Poland	1
		Address: E-mail	15.29.378.389.386	The electronic mail address of the processor organisation or individual	elzbieta.bielecka@igik.edu.pl	1
	Distributor 1			The organisation distributing the data		N
		Organisation name	15.29.376	Name of the distributor organisation	European Environment Agency	1
		Individual name	15.29.375	Name contact person in the distribution organisation	Ana Sousa	1
		Position name	15.29.377	Position of the contact person in the distributor organisation	Project Manager Spatial Data, Information and Data Services (IDS/GIS)	1
		Role	15.29.379	Always “Distributor” role	distributor	1
		Address: Delivery point	15.29.378.389.382	Address line for the location	http://dataservice.eea.europa.eu/dataservice	1
		Address: City	15.29.378.389.383	City of the location	Copenhagen	1
		Address: State, Province	15.29.378.389.384	State, province of the location	K	1
		Address: Postal code	15.29.378.385	Postal code of the location	1050	1
		Address: Country	15.29.378.389.386	Country of the location	Denmark	1
		Address: E-mail	15.29.378.389.382	The electronic mail address of the distributor organisation or individual	eea@eea.europa.eu	1
	Distributor 2			The organisation distributing the data		N
		Organisation name	15.29.376	Name of the distributor organisation	Chief Inspectorate of Environmental Protection, (Poland)	1
		Individual name	15.29.375	Name contact person in the distribution organisation	Lucyna Dygas-Ciolkowska	1

		Position name	15.2 9.37 7	Position of the contact person in the distributor organisation	Deputy Director of Department	1
		Role	15.2 9.37 9	Always “Distributor” role	distributor	1
		Address: Delivery point	15.2 9.37 8.38 9.38 1	Address line for the location	ul. Wawelska 52/54	1
		Address: City	15.2 9.37 8.38 9.38 2	City of the location	Warsaw	1
		Address: State, Province	15.2 9.37 8.38 9.38 3	State, province of the location		1
		Address: Postal code	15.2 9.37 8.38 9.38 4	Postal code of the location	00-922	1
		Address: Country	15.2 9.37 8.38 9.38 5	Country of the location	Poland	1
		Address: E-mail	15.2 9.37 8.38 9.38 6	The electronic mail address of the distributor organisation or individual	l.ciolkowska@gios.gov.pl	1
	Access rights			Defines access rights for the dataset		N
		Type of constraint	20.7 0	The type of access right applied to assure the protection of privacy or intellectual property, and any special restriction or limitations on obtaining the resource. See **code list 1**.	005 (licence)	1
		Restriction	20.7 2	Description of the restriction of the access right.		1
Other data set information				Other aspects explaining the dataset		1
	Language		15.3 9	Language used within the dataset	EN	1
	Format name		15.3 2.28 5	Name of the used exchange format for the dataset	ArcInfo coverage	1
	Format version		15.3 2.28 6	Version of the used exchange format for the dataset		1

	Methodology description		18.8 1.83	General explanation of the data producer's knowledge about how the geometry was constructed/derived and how the attribute information being part of the dataset was generated.	In CLC2006 project CLC Changes (CHA06_PL) database has been interpreted directly, using comparison of IMAGE2000 and IMAGE2006 data in a dual-window environment. All changes fulfilling the mapping criteria (> 5 ha, > 100 m boundary displacement) have been delineated. Büttner, G., Kosztra B., CLC2006. Technical Guidelines, FINAL DRAFT, 31 January 2007.	1
	Changes		18.E EAC hang es	Description of the changes since last version of the dataset		1
	Proces s steps			Information about the event in the creation process of the dataset		N
		Description	18.8 1.84. 87	Description of the process step including related parameters or tolerance	Step1: Visual comparison of IMAGE2000 and IMAGE2006 with CLC2000 database displayed, direct delineation of changes. Software used: InterChange package under ArcView 3.2	1
		Source data reference title	18.8 1.84. 91.3 60	Name of the resource used in process step	IMAGE2000 data: Ortho-corrected Landsat ETM imagery, pan sharpened. Pixel size: 25 m	N
		Source data reference date	18.8 1.84. 91.3 62	Date of the resource used in process step	19990731-20011005	N
		Source data reference title	18.8 1.84. 91.3 60	Name of the resource used in process step	IMAGE2006 data: Ortho-corrected SPOT-4 HRVIR (pixel size 20) and IRS P6 LISS III (pixel size 23)– multispectral) multitemporal imagery.	N
		Source data reference date	18.8 1.84. 91.3 62	Date of the resource used in process step	20050402-20070521	N
		Source data reference title	18.8 1.84. 91.3 60	Name of the resource used in process step	Topographic paper maps, scale 1:50.000.	N
		Source data reference date	18.8 1.84. 91.3 62	Date of the resource used in process step	1980-1995	N
		Source data reference title	18.8 1.84. 91.3 60	Name of the resource used in process step	LUCAS2001 project data.	N
		Source data reference date	18.8 1.84. 91.3 62	Date of the resource used in process step	2006	N
		Source data reference title	18.8 1.84. 91.3 60	Name of the resource used in process step	Ortophotomaps (www.geoportal.gov.pl).	N

		Source data reference date	18.81.84.91.362	Date of the resource used in process step	1998-2005	N
		Source data reference title	18.81.84.91.360	Name of the resource used in process step	Satellite images (Google Earth).	N
		Source data reference date	18.81.84.91.362	Date of the resource used in process step		N
		Source data reference title	18.81.84.91.360	Name of the resource used in process step	Tourist maps and city plans.	N
		Source data reference date	18.81.84.91.362	Date of the resource used in process step	2000-2007	N
		Description	18.81.84.87	Description of the process step including related parameters or tolerance	Step2: Internal verification (Technical&thematic)	1
		Description	18.81.84.87	Description of the process step including related parameters or tolerance	Step3: External verification by the CLC2000 Technical Team	1
		Description	18.81.84.87	Description of the process step including related parameters or tolerance	Step4: Merging of adjacent mapsheets. Building topology.	1
	Scale		15.38.60.57	Gives a rough value of accuracy of the dataset; e.g. 2500000 means dataset has an accuracy suitable for use at scale 1:2.5 million at best	100.000	1
	Geographic accuracy		15.38.61	Geographic accuracy of location, ground distance as an value in meters	100	1
	Geographic box			Geographic position bounding box of the dataset		1
		West bound longitude	15.42.33.6.344	Western-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	14.125	1
		East bound longitude	15.42.33.6.345	Eastern-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	24.147	1
		South bound latitude	15.42.33.6.346	Southern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)	49.002	1
		North bound latitude	15.42.33.6.347	Northern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)	54.836	1

Annex 2: CLC2006 metadata sheet for the country

CLC2006 METADATA

Title of working unit:	m-33-35

A: GENERAL INFORMATION

Sponsor:	Chief Inspectorate of Environmental Protection, National Fund for Environmental Protection and Water Management	**Contractor:**	Institute of Geodesy and Cartography
Address:	ul. Wawelska 52/54 00-922 Warszawa	**Address:**	ul. Modzelewskiego 27 02-679 Warszawa
Phone:	22 825 48 59	**Phone:**	22 32 91 984
Fax:	22 825 41 29	**Fax:**	22 32 91 950
Responsible:	Lucyna Dygas-Ciolkowska	**Project leader:**	Elzbieta Bielecka
E-mail:	l.ciolkowska@gios.gov.pl	**E-mail:**	elzbieta.bielecka@igik.edu.pl

1. IMAGE2006 data used

SPOT-4 XI and / or IRS P/ LISS III scene(s)				
Satellite & Sensor	**Path-**	**Row**	**Date (yy-mm-dd)**	**Remark (e.g. clouds)**
IR06_LI3_ORT_1O_20060717T100524_20060717T100546_DLR_14269_0000			06-07-17	99%, many clouds
IR06_LI3_ORT_1O_20060506T100432_20060506T100454_DLR_13246_0000			06-05-06	100%
SP04_HRV2_X__1O_20060923T100227_20060923T100236_DLR_170_0000			06-23-09-	80%
SP04_HRV2_X__1O_20060923T100235_20060923T100244_DLR_170_0000			06-23-09-	20%

2. IMAGE2000 data used

Landsat-7 ETM and / or other scene(s)				
Satellite & Sensor	**Path-**	**Row**	**Date (yy-mm-dd)**	**Remark (e.g. clouds)**
Landsat-7 ETM+	190	24	00-05-05	

3. Topographic maps used *(indicate in remark if digital)*

Scale	Sheet id	Title/Name	Year of production	Year of last revision	Remark
1:50 000	M-33-35-A	Trzebnica	2000		useful to improve CLC2000 interpretation data
1:50 000	M-33-35-B	Olesnica	2000		useful to improve CLC2000 interpretation data
1:50 000	M-33-35-C	Wroclaw Wschod	2000		useful to improve CLC2000 interpretation data
1:50 000	M-33-35-D	Jelcz-Laskowice	2000		useful to improve CLC2000 interpretation data

4. Other ancillary data used (thematic data, satellite images, aerial photos, city maps, vegetation maps, LUCAS data)

Id.	Data source/type	Title (if relevant)	Date of production (yy-mm-dd)	Scale (spatial detail)	Remark
	satellite images	Google Earth			verification of CLC codes
	ortophotomaps	www.geoportal.gov.pl			useful source for interpretation of changes
	city plan	Wroclaw + 8	05-06-29	1: 20 000	useful source for interpretation of changes
	tourist map	Okolice Wroclawia. Częsc Polnocna	05-06-28	1: 100 000	verification of CLC codes
	tourist map	Okolice Wroclawia. Częsc Poludniowa	05-06-28	1: 100 000	verification of CLC codes

5. Photointerpreter(s)

Name	Affiliation	Phone	E-mail	interpretation		
				start (yy-mm-dd)	end (yy-mm-dd)	no. of days
Dariusz Dukaczewski	Institute of Geodesy and Cartography		dariusz.dukaczewski@igik.edu.pl	08-04-25	08-04-29	2

B: INTERPRETATION OF CHANGES

1. Photo-interpretation of changes and internal quality control

Date of submission (yy-mm-dd)	Control made by	Date of control (yy-mm-dd)	Remark (errors, corrections, etc.)
08-04-29	Elzbieta Bielecka, Dariusz Dukaczewski	08-05-02	

2. Field checking (*if carried out*)

Date (yy-mm-dd)	**Itinerary** (main settlements crossed on the working unit)	Problems checked and main conclusions
08-05-08	Wrocław Airport	antropogenic classes (airport) checked

3. Border matching of CLC-changes with neighbour working units

working unit	Controlled and corrected by	Date (yy-mm-dd)	Remark
m33036, m33047	Elzbieta Bielecka, Dariusz Dukaczewski	08-05-29	m33036 CLC Changes m33047 CLC2000

C: FINAL TECHNICAL QUALITY CONTROL

1. Control of topology, unnecessary boundaries, 25 ha limit, invalid codes and invalid changes (internal control)

	Date (yy-mm-dd)	Controlled by	Remark
CLC2006*	08-05-02	Elzbieta Bielecka	
CLC Changes	08-05-02	Elzbieta Bielecka	211 - 324 deleted
Revised CLC2000	08-05-02	Elzbieta Bielecka	242, 112 corrected

*If produced by the country

2. Verification and acceptance (CLC-changes and revised CLC2000)

	Date (yy-mm-dd)	Name	Signature	Remark
National level	08-05-12	Elzbieta Bielecka		verification of accordance with general remarks
CLC technical team	08-05-06	Barbara Kosztra		accepted

D: SOFTWARE / HARDWARE

Work phase	Software used	Hardware used
Interpretation of changes	InterChange 2.0 software running under ArcView 3.x	PC Windows platform
Technical quality control	InterCheck 2.1 software running under ArcView 3.x ArcInfo workstation 8.2	PC Windows platform