



European Topic Center
Terrestrial Environment

Under contract with the

European Environment Agency



CLC2000 Training in Serbia and Montenegro Mission Report

Belgrade, Serbia

(University of Belgrade)

2nd – 6th July 2005

Ref.: Training Mission Report 1/2005

19th July 2005

Submitted by: **G. Büttner and J. Feranec**

ETC-TE / Universitat Autònoma de Barcelona

Torre C5-S, 4a planta

Edifici C - Facultat de Ciències

Universitat Autònoma de Barcelona

08193 Bellaterra (Barcelona)

Spain

Tel. Secretariat: + 34 93 581 3518

Direct Tel.: + 34 93 581 3519

Fax.: +34 93 581 3545

<http://terrestrial.eionet.eu.int>

1. Activities linked to the preparation of the training

The mission in Serbia-and Montenegro (SCG) was the 27th training mission undertaken by the ETC-TE CLC2000 Technical Team (TT). It was the 1st training conducted following the CLC2000 closing workshop in Athens, held in January 2005. It can be considered as the start of continuation of CLC2000 in further 5 countries in Europe. Two TT experts participated to the meeting: George Büttner (GB) and Jan Fera-nec (JF).

Stefan Kleeschulte ETC-TE manager and GB have visited EvroGeomatika, the Serbian company responsible for the realisation of the project, two weeks before the training. Details of the contract and especially the training agenda have been discussed and agreed.

2. Context of the CLC2000 project in Serbia and Montenegro

CLC2000 in Serbia and Montenegro is implemented under the CARDS programme. The project is fully funded by EEA (i.e. without financial contribution from SCG). The country has been previously asked to contribute to the project by providing easy access to the necessary support materials, like topographic maps, Digital Terrain Model (DTM) and aerial photographs. National team includes a part in Serbia (Beograd, EvroGeomatika) and a part in Montenegro (Geological Survey of Montenegro, Podgorica). A previous preparatory mission (September 2004) revealed, that there is no significant satellite photointerpretation expertise exist in the country, therefore a longer, non-standard training session was to be organised. Another specialty of the project is, that IMAGE2000 will be produced internally (not like in other CLC2000 countries, where this task has been centralised), because topographic maps cannot be taken abroad, and the necessary expertise exists in the country.

The ETC-TE and the CLC Technical Team will lead and ensure the project implementation. This includes all tasks from general project coordination, training, supervision of the national implementation to the final acceptance of the database. EvroGeomatika will be responsible for the formation of a national team and the correct execution of the national activities. EvroGeomatika will establish a subcontract with the Geological Survey of Montenegro for the realisation of the work in Montenegro.

Due to different natural conditions in the two parts of the country, a separate training course will be organised in Montenegro.

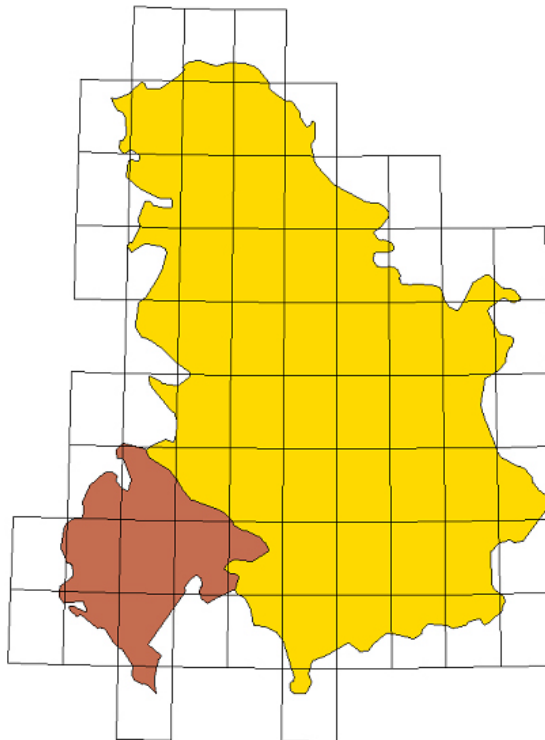


Fig. 1. Working units at scale 1:100.000 in Serbia (yellow) and Montenegro (brown)

3. Training Agenda

Place of the meeting:

Laboratory of Cartography, Department of Geodesy, University of Belgrade, Bulevar Kralja Aleksandra 73, Beograd, Serbia

2nd July, 9.00 – 18.00

- Welcome and presentation of participants (D. Protic)
- Basics of Remote Sensing (GB)
- Basics of CORINE Land Cover (GB)
- CLC2000 nomenclature – Part I. (JF)
- Examples from European validation (GB)

3rd July, 9.00 – 18.00

- CLC2000 nomenclature – Part II. (JF) Examples from European validation (GB) Project organisation (GB) Field work (JF) Quality control (GB) Practical exercise: interpretation of satellite image hardcopy with traditional method (JF, GB)

4th July, 9.00 – 18.00

- Practical exercise (continue the work started on previous day)

5th July, 9.00 – 18.00

- Field trip (near Beograd) to compare photointerpretation results with real land cover classes

6th July, 9.00 – 12.00

- Short exam of the photointerpreter participants
- Demonstration of capabilities of InterView photointerpretation software (G. Büttner)
- Practical work on the area of the traditional exercise

Kick-off meeting: 12:00 – 14:00

- CLC2000 in Europe (GB)
- Implementation of CLC2000 in SCG (EvroGeomatika)

14:30 End of meeting

4. Participants

The following experts participated in the meeting:

Serbia:

- Staša Majstorović (Governmental Geodetic Authority, Belgrade City Cadastre)
- Jasna Kolašinac (Laboratory for cartography, Department of Geodesy, University of Belgrade)
- Nebojša Martinović (Laboratory for cartography, Department of Geodesy, University of Belgrade)
- Mladen Simić (Laboratory for cartography, Department of Geodesy, University of Belgrade)
- Jovana Vučković (Laboratory for cartography, Department of Geodesy, University of Belgrade)
- Marina Urošević (Geokarta)
- Jelena Nikolić (Geokarta)
- Nenad Marković (Institute of Forestry, Belgrade)
- Nenad Petrović (Faculty of forestry, Belgrade University)
- Slobodanka Delić (Governmental Geodetic Authority)
- Aleksandar Milovanović (Highway Institute a.d.)
- Zoran Gavrilović (Institute for the Development of Water Resources “Jaroslav Cerni”)
- Aleksandar Marić (Evrogeomatika)
- Ivana Janković (Evrogeomatika)
- Slaven Tomić (Evrogeomatika)
- Vesna Simjanović (Military Geographic Institute)
- Dragitiv Protić (Laboratory for cartography, Department of Geodesy, University of Belgrade)

Montenegro:

- Dragan Radojević (Geological Survey of Montenegro)

Kick-off meeting only:

- Natasa Veljković (European Integration Office)
- Jelena Macković (European Integration Office)
- Ivan Nestorov (EvroGeomatika)

Participants on CLC2000 Technical Team side:

- Jan Feranec (IG SAS / IGN FI)
- George Büttner (FÖMI)

5. Practical exercises

5.1 Photointerpretation

As participants had no previous experience with photointerpretation it was considered important to get acquainted with the traditional way of producing the CORINE land cover database. An area near Belgrade has been selected (Fig.2) and printed on hard copy for each participant at scale 1:100.000. They had to interpret the area by using topographic maps (1:25.000, see Fig. 3) and the assistance of the Technical Team. Some aerial photographs were also available to support the work.

5.2 Field trip

A day-long field trip has been organised to the area of photointerpretation exercise in order to see, explain and discuss typical and questionable land cover classes near to Belgrade which were unclear the photointerpretation. The itinerary was as follows: Belgrade – Avala – highway (Donje livade) – Dragusica – Grocka – Zaklopaca – Lozovik – Kremenje – Belgrade. The following CLC classes were shown and characterised on the route:

- Top of Avala – general characteristic of the Avala region; CLC classes: 112, 211, 242, 243, 311 and 313.
- SE of Avala – explanation of separation of the CLC classes 311, 312 and 313.
- Along the highway (Donje livade) – example of the CLC class 231 with bushy vegetation.
- Week-end village (direction to Dragusica) – explanation of separation the CLC classes 112, 142, 242 and 243.
- Dragusica – example of the CLC classes 211 with small parcels of arable land (annual crops).
- S from Grocka – explanation of separation the CLC classes 222 and 243.
- N from Zaklopaca – example of the CLC class 222.
- Lozovik – example of contemporary abandoned land (231). It was arable land (ploughed land = CLC class 211) in 2000, as previous fruit trees (as indicated by topographic maps) have been cut.
- Kremenje – example of contemporary young orchard (222). It was arable land (ploughed land = CLC class 211 in 2000, previous vineyards (shown by topographic maps) have been cut (Figure 4).

5.3 Performance evaluation

As there were more participants as would be needed for the efficient realisation of the project in Serbia, participants have been evaluated with the following way:

- Capabilities shown during the photointerpretation exercise (based on the work done in one day).
- Replies for 10 basic questions related to remote sensing and CLC nomenclature.

The results have shown significant differences among participants. The two parts of the evaluation were usually correlated. Results were submitted to EvroGeomatika in order to consider them in the final composition of the team. The result of the evaluation is included in Annex 1.



Fig. 2: Landsat-7 ETM image of the training area (28 July 2000)

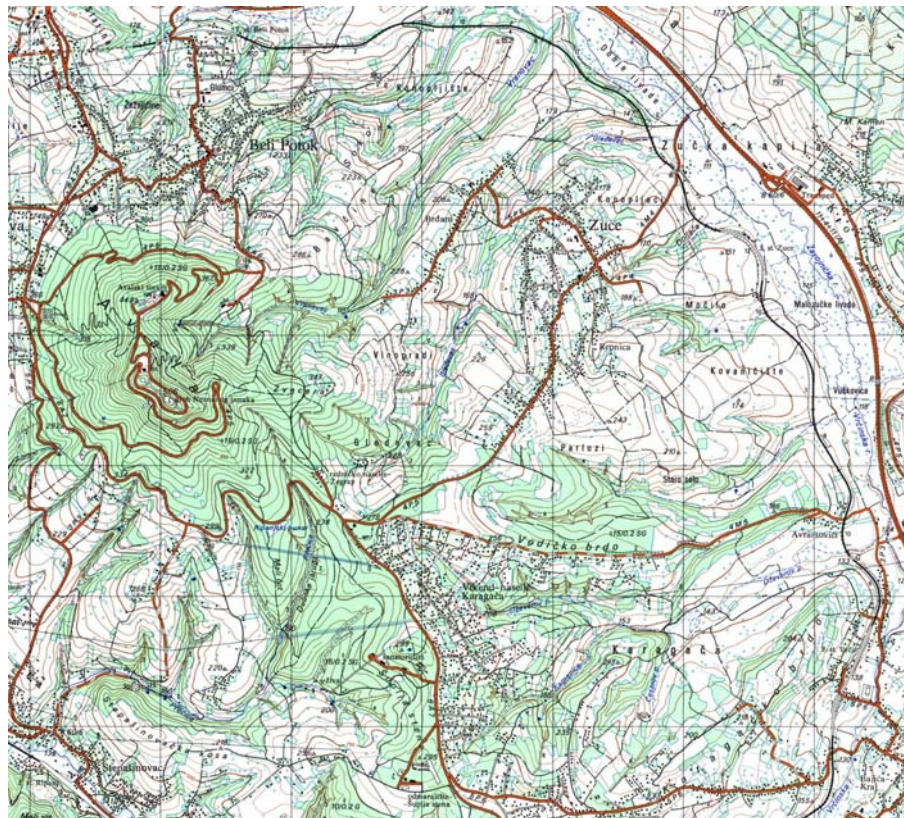


Figure 3: Fragment of a topographic map at scale 1:25.000 (Mt. Avala region, not printed at proper scale)



Fig.4. Photos from the field trip

5.4 Photointerpretation software

The SCG team agreed in the use of the InterView100 photointerpretation software developed by FÖMI, running under ArcView 3.x. At the end of the training course the capabilities of the software have been demonstrated. Especially the following functions were shown: delineation of a CLC polygon, splitting a polygon, merging two polygons, giving a code, correcting a code, adding a comment to the polygon, searching for different features in the database, error checking and correction. Finally participants were requested to solve simple tasks with the software.

5.5 Kick-off meeting

The meeting marked the official start of CLC2000 in SCG. The importance of the government support to the project is highlighted. This means the provision of the following data for the project as national contribution:

- topographic maps (scale 1:25.000),
- Digital Terrain Model (in suitable details to support orthorectification of Landsat imagery), and
- aerial photographs (as close to year 2000 as possible to support photointerpretation and reduce field checking).

Without this support the project can be implemented only with reduced accuracy and the technical requirements will probably not be fulfilled.

6. Recommendations from CLC2000 Technical Team

- The recommended size of the photointerpretation team is no more than 6 members in order to avoid heterogeneity in data processing..
- Rural settlements (villages) where the density of houses is not too high (but with distance between houses shorter than 300 m) is difficult to identify only by satellite images. Therefore topographic maps (or the database of settlements) have to be used also.
- Infrastructure of weekend villages checked during the field trip was similar to that of rural settlements, therefore they must be classified under the CLC class 112.
- Villages where the distance between houses is more than 300 m should be included into the CLC class 242 (juxtaposition of small parcels of annual and permanent crops) or 243 (this class includes land occupied by agriculture with areas of natural or semi natural origin, e.g. forests, water bodies, wetlands smaller than 25 ha).
- Alternation of annual and permanent crop parcels with natural or semi natural areas is typical for class 243. They are parts of this class and all constituents are smaller than 25 ha.
- Small and large areas (parcels) of vineyards are classified as the CLC class 221.
- Parcels of small and large orchards and berry plantations are classified as CLC class 222.
- Grassland areas agriculturally exploited, although of natural origin, should be classified into the CLC class 231.
- All detailed characteristics of CLC classes are available in the CORINE Land Cover Technical Guide – Addendum 2000.
- Serbian topographic maps proved to be of high quality. But the survey date always has to be considered by the interpreter. E.g. a weekend village in 1985 (the surveying date) could have developed to a permanent settlement in 2000 or orchards / vineyards could have changed, etc.

7. Difficulties encountered during the mission

No special difficulties were encountered.

8. Materials collected

--

9. Summary of actions to be undertaken

- Setting up the photointerpretation team (responsible: EvroGeomatika)
- Progress in orthorectification of existing IMAGE2000 scenes (EvroGeomatika)
- Purchase of IMAGE2000 and IMAGE90 raw imagery (EvroGeomatika)
- Support to orthorectification and image selection / purchase (ETC-TE - T. Soukup)
- Familiarisation with InterView100 programme (EvroGeomatika)
- Preparing the training programme for Montenegro (ETC-TE – G.Büttner and the project manager in Montenegro).

10. Next foreseen mission in the country

- Serbia: the external expert (B. Kosztra) will spent 5 working days with the Serbian team. Exact time have to agreed (latest: end September)
- Montenegro: training scheduled for the 2nd half of September.

11. Annexes

Annex 1: Performance evaluation

Name / affiliation	interpretation	exam	sum
Mladen Simić (Laboratory for cartography, Department of Geodesy, University of Belgrade)	8	8.5	16.5
Jovana Vučković (Laboratory for cartography, Department of Geodesy, University of Belgrade)	8	8.0	16
Aleksandar Milovanović (Highway Institute a.d.)	7	7.5	14.5
Aleksandar Marić (Evrogeomatika)	6	7.5	13.5
Jasna Kolašinac (Laboratory for cartography, Department of Geodesy, University of Belgrade)	6	7.0	13
Nebojša Martinović (Laboratory for cartography, Department of Geodesy, University of Belgrade)	8	4.5	12.5
Staša Majstorović (Governmental Geodetic Authority, Belgrade City Cadastre)	6	6.5	12.5
Jelena Nikolić (Geokarta)	5	7.0	12
Vesna Simjanović (Military Geographic Instityte)	7	4.5	11.5
Marina Urošević (Geokarta)	4	7.0	11
Ivana Janković (Evrogeomatika)	4	6.0	10
Slaven Tomić (Evrogeomatika)	4	4.5	8.5
Slobodanka Delić (Governmental Geodetic Authority)	6	1.5	7.5
Zoran Gavrilović (Institute for the Development of Water Resources “Jaroslav Cerni”)	1	4.5	5.5
Nenad Marković (Institute of Forestry, Belgrade)	3		3
Nenad Petrović (Faculty of forestry, Belgrade University)	2		2