



European Topic Centre
Land Use and Spatial Information



CLC2006 1st verification report, Macedonia

CARDS Project 2007-2008

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Implementation of CLC2006 in the West Balkan Countries

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TABLE OF CONTENTS

1	Activities linked to the preparation of the verification	2
1.1	Verification procedure.....	2
2	Agenda and participants	3
3	Summary conclusions	4
3.1	Method of verification	4
3.2	General conclusions concerning the results	4
3.3	Metadata	7
4	Recommendations concerning continuation of CLC2006 in the country	8
4.1	Revised CLC2000	8
4.2	CLC-Changes dataset	8
5	Others	9
5.1	Difficulties encountered during the work and solutions applied.....	9
5.2	Summary of actions to be undertaken.....	9
5.3	Next foreseen mission in the country	9
5.4	Materials collected	9
5.5	Annexes	9

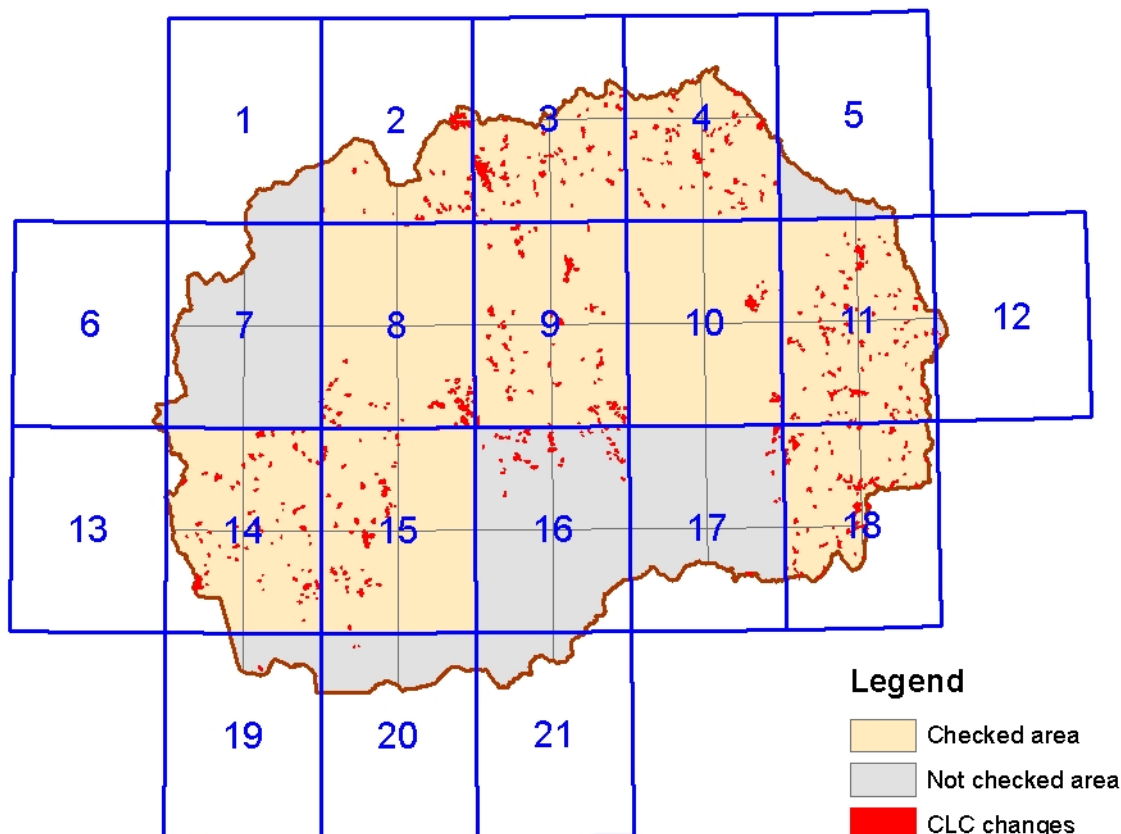
1 ACTIVITIES LINKED TO THE PREPARATION OF THE VERIFICATION

The CLC2006 project is implemented in Macedonia in the frames of the CARDS programme. Some of the experts in the national team also took part in the 1st CLC inventory in the country between 1999 and 2000. A training on CLC2006 (change mapping) was requested and conducted in February 2008. Following a preliminary remote verification, the first verification was held also remotely in FÖMI. About 71% of total country area (Map 1) has been prepared for the verification and sent to TT via FTP.

1.1 VERIFICATION PROCEDURE

The objectives of the verification missions are manifold:

- To assist the national team in producing the CLC2006 databases and to assure a homogenous implementation across Europe.
- Corrective goal: reveal and discuss specific problems occurred during the production in order to correct databases if necessary, and hereby assure a harmonised European CLC database.
- Provide the EEA with information about the overall quality of the work performed by the country.



Map 1 1:100.000 scale map units of Macedonia showing submitted (red), checked (yellow) and non-checked (grey) areas. Working units 2, 9, 18 had already been checked during preliminary verification. However, these were re-checked this time, too.

2 AGENDA AND PARTICIPANTS

Place of the verification: FÖMI, Budapest, Bosnyák tér 5. H-1149 Budapest, Hungary

12 August 2008

8.00 – 16.00

Verification of CLC2006 databases produced by the Macedonian Team

13 August 2008

8.00 – 16.00

Verification of CLC2006 databases produced by the Macedonian Team

22 August 2008

8.00 – 16.00

Verification of CLC2006 databases produced by the Macedonian Team

The following experts participated:

- Nobody was present from the Macedonian team (remote verification).

From the ETC-LUSI Technical Team:

- Barbara Kosztra (thematic verification)
- Gergely Maucha (data preparation)
- George Büttner (discussion)

3 SUMMARY CONCLUSIONS

3.1 METHOD OF VERIFICATION

The InterCheck2.1 software running under ArcView 3.x was used as a support tool for verification. IMAGE2000 and IMAGE2006 data were available for each working unit. Working units were the same as during previous verification. 12 working units were prepared for verification (2 of them very small fragments). Thus 10 working units have been checked, 3 of which already verified during first remote verification. 3 of the verified working units were not fully completed. In these the completed parts have been verified (remarks on the not completed parts can serve however as guidance for future work). See Map 1.

The checking process was as follows:

- a) Checking validity of codes and neighbouring polygons with the same code (merge errors) in CLC2000.
- b) Checking size errors in CLC2000.
- c) Checking CLC2000 statistics (to reveal non-relevant codes)
- d) Checking validity of codes and neighbouring polygons with the same code (merge errors) in CLC-changes.
- e) Checking size errors in CLC-changes.
- f) Checking CLC-changes statistics (to reveal non-relevant codes).
- g) Visual checking of CLC2000 for two 10x10 km verification units, additionally for artificial and rare classes.
- h) Visual checking of all changes.
- i) For previously checked areas former remarks by TT were also checked, new remarks added where necessary.

Additionally the whole wu area was examined visually to find missing changes, if any.

Results of the verification (remarks by the Technical team experts with coordinates) are included in ArcView point coverages for each wu, which are provided to the national team in order to load them into their GIS, used for photointerpretation. (InterChange2 software is capable of integrating the remarks very easily.) Naming convention: Remark_r means: remarks for the revised CLC2000; Remark_c means: remarks for the CLC-Changes database.

3.2 GENERAL CONCLUSIONS CONCERNING THE RESULTS

Generally it can be stated that the quality of work has improved, but some problems are still present.

3.2.1 Technical quality

Technical mistakes are much less numerous than during first verification:

- Some merge errors in both databases;
- Code errors (0 code) in CLC-Changes still exist;
- CLC-Change polygon outlines do not always match CLC2000 boundaries (this might be results of CLC2000 corrections done after change mapping). However the problem almost disappeared compared to last verification.

The results of the verification are summarised in Table 1.

Table 1 Summary of verification in Macedonia

Working unit (wu) no.	Result	Remark
Wu02	Accepted	Re-check
Wu03	Conditionally accepted	-
Wu04	Conditionally accepted	-
Wu08	Conditionally accepted	Non completed
Wu09	Accepted	Re-check
Wu10	Conditionally accepted	Non-completed
Wu11	Rejected	-
Wu14	Accepted	-
Wu15	Conditionally accepted	Non completed
Wu18	Conditionally accepted	Re-check
Total: 10	Accepted: 3 Conditionally accepted: 6 Rejected: 1	

'Accepted' means: after correction of the few mistakes found, the database is accepted.

'Conditionally accepted' means: the database includes more mistakes, which are relatively easy to correct. Following corrections the database will be accepted.

'Rejected' means: the database contains considerable amount of mistakes, which should be corrected and the wu is to be re-checked during next verification.

3.2.2 Revised CLC2000

- Missing corrections in CLC2000, in view of 2006 images (e.g. missing 112, 312/313).
- A few typical typing mistakes in CLC2000 have been found (121 vs. 211; 211 vs. 311) – residual mistakes.

3.2.3 CLC-Changes dataset

- Not always the latest image used in change mapping resulting missing and not correctly delineated changes. This is especially problematic in mapping new artificial surfaces and in forestry.
- Many unreal changes found in all change types, but especially in agriculture..
- Not always the right change code pair applied.
- Only a few technical changes found – this type of change generally not applied, although would be necessary.

Specific remarks on working units are found in 3.2.4.

3.2.4 Working unit-specific conclusions and recommendations

Wu02 (Re-check) – A

- Merge errors (neighbouring polygons with same code pair) in change database.
- Most of remarks corrected, some not. Check new remarks.

Wu03 – CA

- Merge and size errors in CLC2000.
- Merge errors in CLC-Changes.
- Missing changes of mine reclamation – where mineral extraction sites are abandoned or planted after cultivation finished (131-231 or 131-324).
- Unreal 242-211 and 211-242 changes – correction should be done in CLC2000.
- 242-243 changes still exist. All are non-real changes, area is similar in both dates. Correction in CLC2000, no change.
- 311-231 change is hardly possible (forest is almost never turned into agriculture) – use 311-324.

Wu04 – CA

- Code errors in change database.
- 57 out of 80 changes drawn were not real or partly not real.
- Some missing changes also found.
- Changes from grassland to forest (231-31x, 321-31x) and back (31x-321) are not possible in 6 years. The right process is either/first grassland (231 or 321) to transitional woodland (324), or/then from 324 to forest. Similarly, if a forest is cut, the „result“ is 324.

Wu08 – CA

- Only part of wu finished.
- Missing corrections in CLC2000: 311 -> 312, 313.
- New 131 only partly delineated.
- 231-311 change not possible (forest cannot develop into full grown-up stage in 6 years from nothing). Use 231-324 or 324-31x.
- 311-324 changes are not always real / correctly delineated. Check all available images when drawing these changes. May images might sometimes mislead interpreter as some tree species are not in full canopy, showing colour similar to 324. Always check a June-August image before drawing a change.
- Missing changes.

Wu09 (Re-check) –A

- Only former remarks have been re-checked. Most of them are corrected properly. Some non-corrections accepted.
- 12 out of 63 earlier remarks should be still corrected in change database. 4 remarks to be corrected in CLC2000.

Wu10 – CA

- Rice fields (213) to be revised/checked both in 2000 and 2006.
- Missing corrections in CLC2000: 311 -> 312, 313.
- 311-231 change is hardly possible (forest almost never turned into agriculture) – use 311-324.
- Missing forest growth (324-311) polygons in change database.

Wu11 – R

- Code errors in change database.
- Rice fields normally do not exist in sloping/hilly areas in Europe – revise all 213 in CLC2000.
- Revise lake shore outlines using all available images. CLC2000 images were taken in very dry period. Checking all (2000 and 2006) images more realistic lake shore outlines can be drawn.
- Many non-real changes – both dates (2000 and 2006) must be checked in order to avoid CLC2000 corrections drawn as a change.
- Always the latest 2006 image (here: July 2006) should be interpreted (re-check all forestry changes).
- Missing new dump site (2xx-132).
- All changes connected to class 243 are non-real changes, but corrections.
- Forest cuts with a chess table pattern should be considered 324 (change) only if the cut part dominates.
- 31x -231 still exists – if forest is cut, the right change code pair is 31x – 324.
- Missing forest growth (324-31x).

Wu14 –A

- Some 0 code polygons.
- Very nice work. Technical change also used, correctly.
- Typing mistakes in CLC2000 (131 and 311 mixed).

- Check 112 polygons in CLC2000 looking for missing CLC2000 corrections and missing changes.
- Not always the latest image used in mapping 311-324. Revise these changes using June or October 2006 images.

Wu15 – CA

- 0 codes in change data.
- Non-changed parts should be cut from change polygons, otherwise change area is unrealistic.
- Not all images used in change mapping.
- Check forestry changes using October 2006 image.
- Many unreal and missing changes.

Wu18 (Re-check) – CA

- Missing correction in CLC2000.
- Still many meaningless / unreal changes that should be deleted and some cases corrections drawn in CLC2000.
- Missing application of technical team remarks. E.g. 231-311 not corrected.
- Concerning river changes, some recommendation were given – discussion will follow during on-site verification as requested by national team.
- Revise the area based on new remarks.

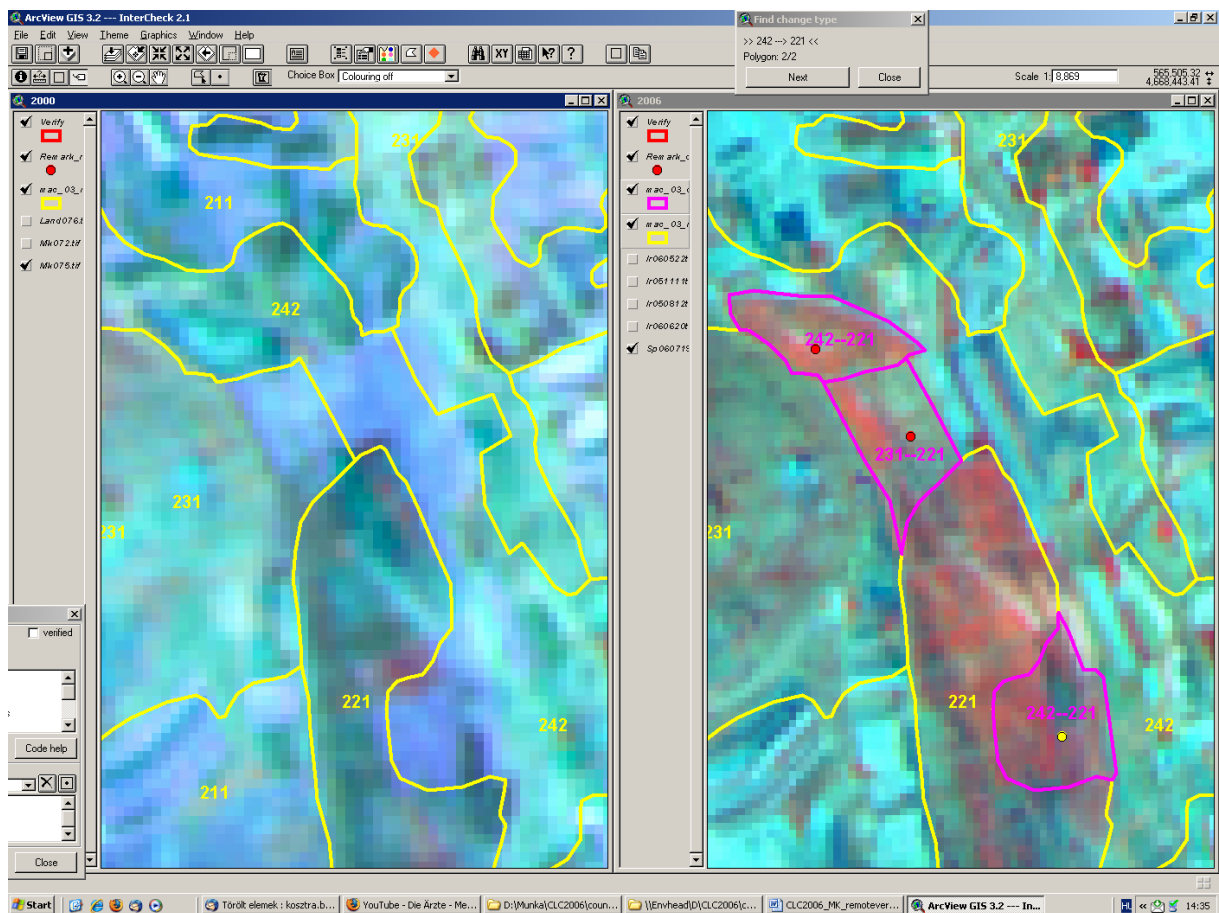


Figure 1 Use real change code pairs. Here 211-221 is the real change process.

3.3 METADATA

Metadata were not checked.

4 RECOMMENDATIONS CONCERNING CONTINUATION OF CLC2006 IN THE COUNTRY

Study the remarks of the Technical Team using the remark_r.shp and remark_c.shp files (attached), and this report. Corrections should be applied not only for the polygons with remarks, but all the completed working units (the re-checked ones, too) have to be revised, especially in order to reveal still missing changes. Internal quality control is very important.

4.1 REVISED CLC2000

- Correction of polygons shapes is necessary if the deviation from the true position (shown by IMAGE2006) exceeds 100 m.
- IMAGE2006 often helps us to find false outlines or codes in CLC2000. This is always correction in CLC2000 and not a change.
- Remove coding mistakes in CLC2000 (residual errors) such as 121 vs. 211; 211 vs. 311). This can be done by examining all polygons (about 10% of all polygons were checked during this verification).
- Check class 213 to find areas of real rice fields and to correct the non real ones already abandoned; being on slopes).

4.2 CLC-CHANGES DATASET

- Always the latest satellite image has to be interpreted, to avoid mistakes emerging from seasonal changes in forests, as well as omitting fast growing constructions on former agricultural land or forest. One deviation from this rule: if the latest image was taken in spring or autumn it should be used in forestry with care.
- Always see both dates when drawing a change – if the feature existed in 2000 it should not be a change polygon but a correction in CLC2000.
- Internal changes in agriculture (211-242, 242-211, 231-243, 243-231, 243-242, 242-243) are frequently questionable. Apply them carefully if you clearly understand what has happened.
- Non-real changes are still abundant: always see both dates when drawing a change – if the feature existed in 2000 it should not be a change polygon but a correction in CLC2000.
- Forest decline or forest clear-cut (loss of forest) is usually mapped as 312-324 and not as 312-231, 312-321.
- Check all available images when drawing these changes. May images might sometimes mislead interpreter as some tree species are not in full canopy that time of the year, showing colour similar to 324. Always check a June-August image before drawing a change. If an area looks obviously 324 on 2006 aerial photos it is not necessarily a change – often the place was already 324 in 2000 – this case a correction should be done in CLC2000 instead of drawing a change.
- Changes in forest composition (e.g. 311-313) not frequently happen in short time. Apply these kinds of changes only if you have additional information.
- Non-changed parts > 5 ha in change polygons have to be cut and deleted from change to keep the real area of changes only.
- Apply technical changes where relevant.
- Change code pairs should reflect processes that occurred in reality (e.g. if inside a 242 an patch of arable land is turned into vineyard the right code pair is 211-221 instead of 242-221 (Figure 1). First code might differ from inherited CLC2000 code.

5 OTHERS

5.1 DIFFICULTIES ENCOUNTERED DURING THE WORK AND SOLUTIONS APPLIED

No difficulties were encountered.

5.2 SUMMARY OF ACTIONS TO BE UNDERTAKEN

None.

5.3 NEXT FORESEEN MISSION IN THE COUNTRY

A standard verification will be organised in Skopje in October 2008. By that time 100% of the country should be interpreted.

5.4 MATERIALS COLLECTED

A few screen shots.

5.5 ANNEXES

Detailed remarks (shape files).