The European initiative CLC2000 and its implementation in Austria using mobile technologies

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Keywords:
CLC2000, IMAGE2000, CORINE, Land Use, Land Cover, Environmental Indicators, Mobile Devices, Handhelds

Introduction

Up-to-date information on land cover and land use plays a key role for monitoring the environmental status. The localisation of human activities or the detection of close-to-nature areas are examples for the information needed when dealing with regional development planning and integrated environmental assessment. To provide this information on European scale the European Environment Agency (EEA) launched the update of the European CORINE Land Cover database (called CLC2000) resulting in a European wide consistent data base on land cover and land cover changes since the 90s. To implement this project in Austria various constraints have to be met. To respond to the users need, the accuracy of this data has to be kept very high. Thus the use of new communication technologies in combination with mobile mapping devices offer new opportunities for the provision of high-quality databases and their verification in the field.

Land cover database

In 1985 the demand of a harmonised European environmental data led to the adoption of the CORINE-Program ("Co-ordination of Information on the Environment") within the European Union. The aim of the project was to assess the status of the environment by launching several projects, e.g. CORINE biotopes, CORINE air and CORINE landcover. For the spatial explicit analysis within integrated environmental assessment the CORINE land cover database is of major importance. This database was necessary, because in all countries the information on land cover available at national level was heterogeneous, fragmented and difficult to obtain.
At Community level information on land cover and changing land cover patterns is directly useful for determining and implementing environmental policy. Following a common methodology and nomenclature the CORINE land cover project provided the first European wide consistent database on land cover in the scale of 1:100.000. The methodology was set up on a computer-assisted photointerpretation of Landsat-TM satellite data using local expert knowledge for the identification of the 44 land cover classes and integrating ancillary data like topographic and thematic maps.
The resulting database encompass all EU15 countries plus 12 central and eastern European countries as well as the coastal zone of Morocco and Tunisia. The geographic key features of this database are a minimum mapping unit of 25 hectares, minimum width of objects with 100m and a nomenclature on three hierarchical levels with 44 classes contained in the third level.

Monitoring changes

The original CORINE database goes back to very inhomogenous creation dates. Due to the national selection of satellite images acquisition years range from 1985 until 1993. To overcome this problem and to provide the detection of changes in landscape patterns the update of CORINE has been initiated. Data will be collected from satellite images (IMAGE2000) with the year 2000 as reference year (+/- 1 year). CLC2000 is a joint project between the EEA, the Joint Research Centre (JRC) and the participation of the official National Reference Centres on Land Cover (NRC/LC), which are in charge for the updating process itself.

The update is based on a revised methodology and will result an updated European land cover database, fully compatible with the first CORINE land cover database and the detection of changes larger than 5 ha using the standard European CORINE land cover nomenclature. Within the member state countries the local project teams are encouraged to improve the quality not only of the new database, but also to correct errors in the old database. Thus modern image processing techniques and GIS environments are combined in a complete revised updating methodology leading to a fully digital processing of the data. To guarantee the quality of the database in countries like Austria with a high topographic relief the valiadation of the data using ground truth verification requires the usage of innovative methods for geopositioning and mobile mapping.

Use of Innovative Methods and Mobile Technologies

By using new telecommunication technologies (e.g. GSM, GPRS) in combination with mobile devices (Personal Digital Assistant, Handheld), user of environmental data and information will be supported in their daily work. According to prognosis by the European Union (Information Society: In the lead in the wireless world. In: RTD Info Nr. 26), the amount of mobile telecommunication user will increase over more than 65 % of the total population. More of 85 % of them (about 200 Mill. People) will use mobile devices and have access to different mobile information. The combination of mobility and positioning technologies like GPS will provide users with information related to their immediate environment.

The mentioned technology will support CLC2000 and its production process. In this framework the CLC2000 methodology benefits from the mobility, compactness and possibilities of mobile devices. Especially in the phase “Verification and Validation” of the mapped land cover / land use information mobile technologies will be of high importance. On the basis of a geographic component, solutions in the area of GIS were developed, which stands out for speedness and mobility.

During the verification and validation process in the field it is necessary to have all CORINE data sets available. Using mobile devices ensures displaying and editing all CLC relevant data. The hybrid system allows to work with both raster and vector data. An open interface allows to include different kinds of data bases.

This efficient, innovative approach allows to increase the quality of the CLC data set, supports the metadata information and is adapted to the CLC requirements.

Results

The main outputs of CLC2000 shall be available for the public by end of 2003. The main outputs will consist of a European wide mosaic of Landsat TM data at 25m ground resolution, an updated European land cover database for the year 2000 and a database on land cover changes 1990-2000.

According to EEA, which examined the European user needs prior to CLC2000 implementation, a variety of applications will make use of this European wide consistent information on landcover. The impact of new agricultural policies on the environment, the

ecological assessment of nature sites such as Natura2000, as well as studies and management of watersheds to support the Water framework directives.
Especially the last two applications are examples, where in addition to the European level information is also needed on a more detailed national level. Thus the preparation of an land cover inventory in the scale of 1:50.000 and extended CORINE nomenclature on level 4 and 5 are an ongoing process in many countries. In Austria the preparational work for such a detailed level can not omit the technology described above.
Beyond the applications like Natura2000 and the water framework directive the land cover inventory database will play an important role in the efforts to develop European wide environmental indicators to report on the state of the environment.