Regional Conference on the outcome of the CLC-Pilot project, potential benefits and way forward in ENI-East countries

Georgia

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European Environment Agency

1. Steps of implementing the CLC-pilot (1/2)

- **Area of interest:** Tbilisi city and it's suburban area as one of the most diverse land cover/Land use area in Georgia (2500 km2).

- **Satellite imagery:** Sentinel-2 images to map recent (2018) status layer; Landsat TM/ETM imagery (2001) to map CLC-changes and derive backdated status layer.

- **In-situ data:** Large scale topographic maps, forest maps, aerial ortho-photos, and ground survey data were used as ancillary information.


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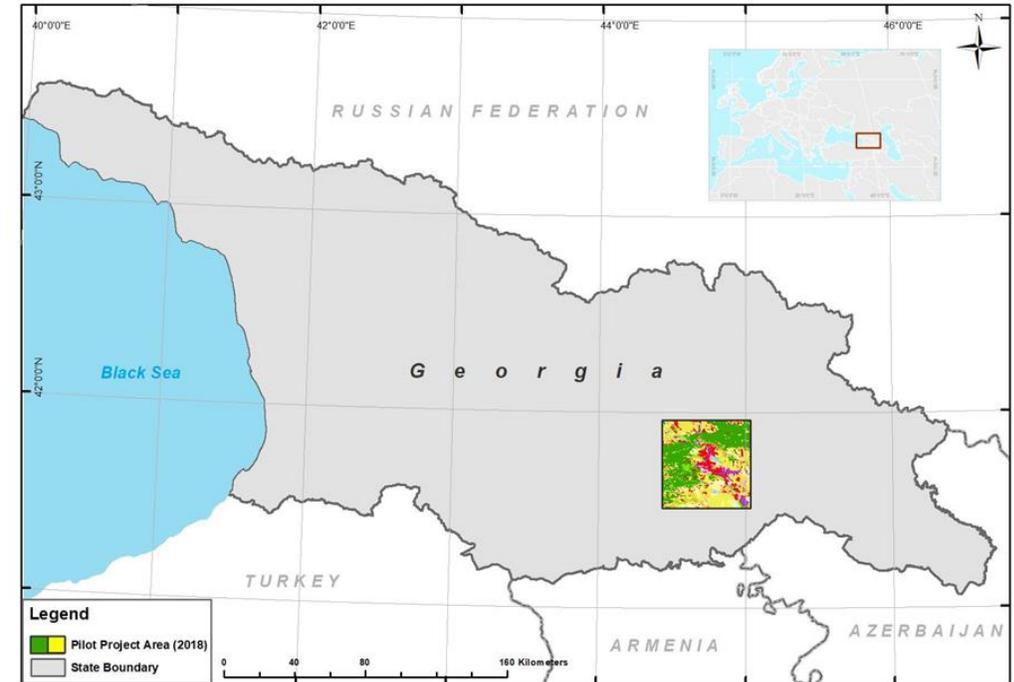
1. Steps of implementing the CLC-pilot (2/2)

- **Training:**

  ✓ **The training led by experts from the European Topic Centre on Urban, Land and Soil systems (ETC/ULS) in partnership with the Copernicus Programme (Apr 23, 2018; Nov 13, 2018)**

  ✓ **The Georgian CLC National Team managed by an expert representing the Ministry of Environmental Protection and Agriculture (MEPA) and includes a photo interpreter from the company GIS-Lab and GIS experts from GeoStat and MEPA.**

- **Methodology:** **During the CLC pilot project computer assisted photointerpretation based on the standard European CLC nomenclature (3-digit code) has been used. Extended CLC classes at a higher level to reflect national needs in the pilot area were not used.**

- **Quality control:** **During the phase of interpretation and change mapping, quality control was carried out on two levels: 1. by the GIS-Lab technical staff according to CLC methodology (Internal) and 2. by experts from (ETC/ULS) after CLC pilot project was finished (external).**
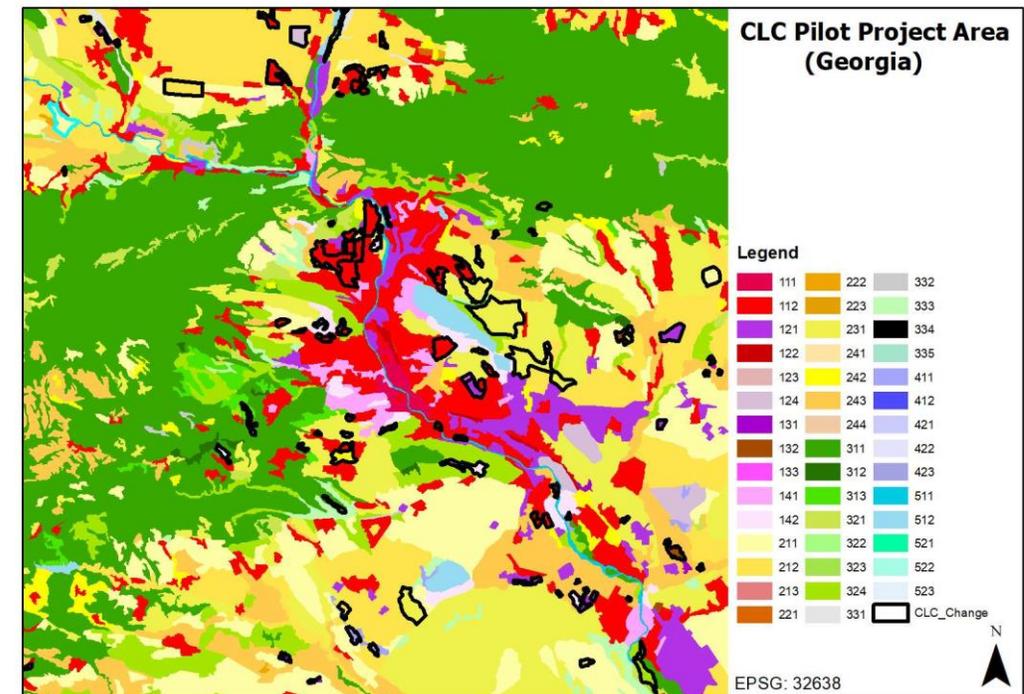
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2. Main results of the CLC-pilot (1/5)

- **Statistics:** **The pilot total area occupied 250,000 hectares of a very diverse and dynamic areas. The CLC2018 database include 715 polygons. Change database 101 polygons. Changed area is 6 137 ha or 2.45% of the total area.**
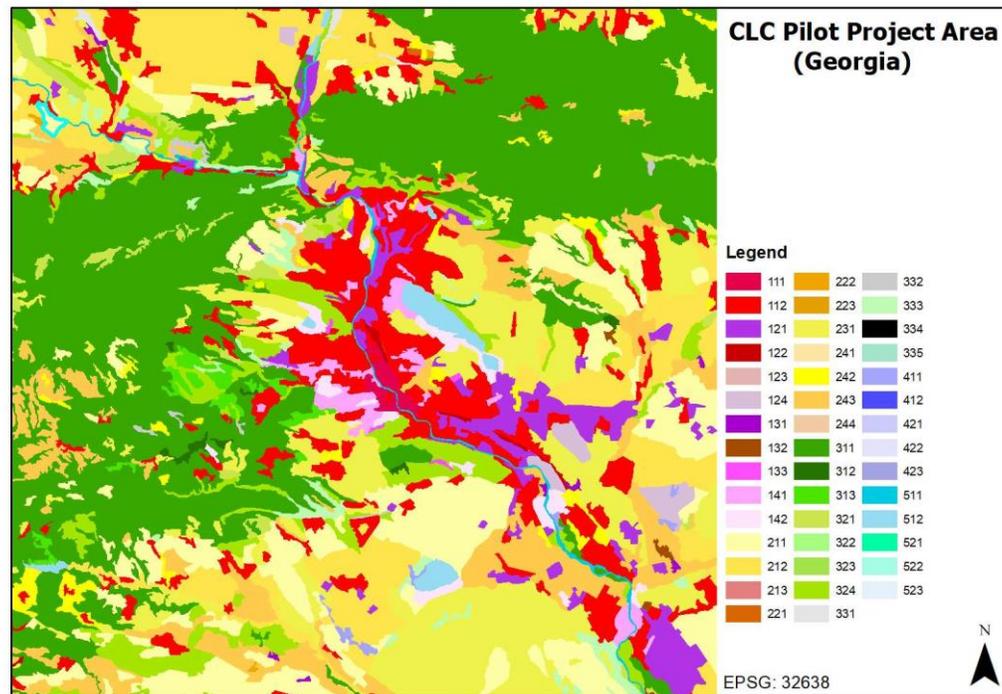
Status Layer 2018
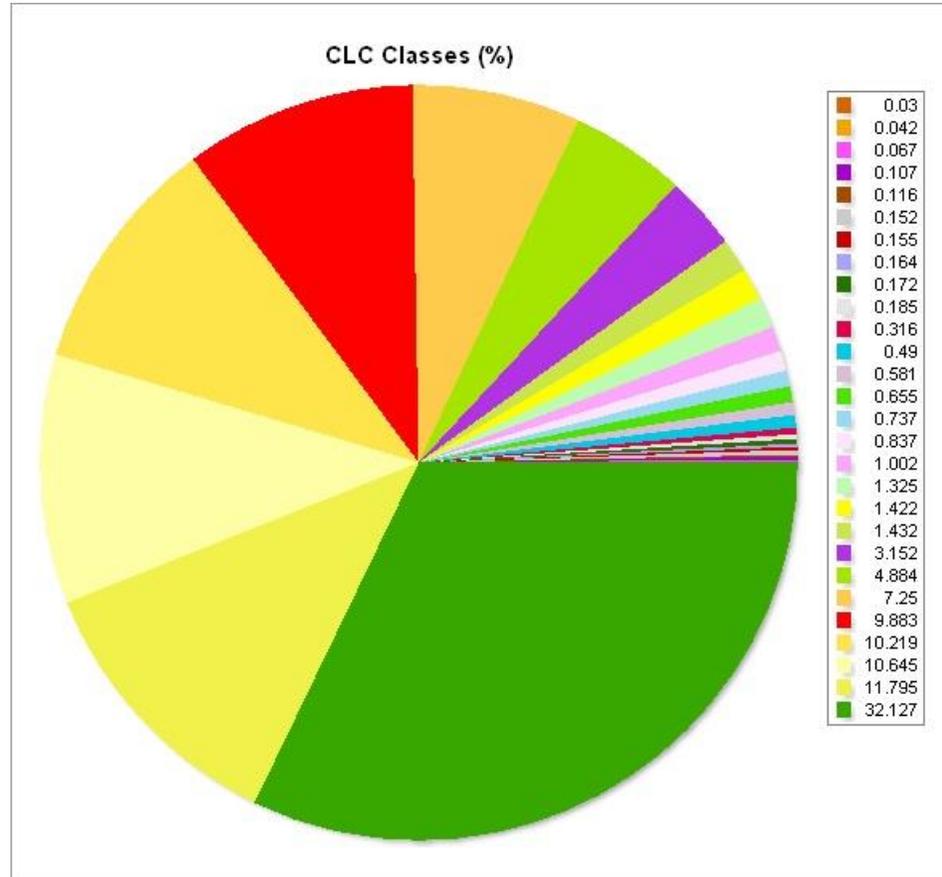

Status Layer with changes

CLC Classes, Area and Percentage

CLC Classes (%)

| 0.03 |
| 0.042 |
| 0.067 |
| 0.107 |
| 0.116 |
| 0.152 |
| 0.155 |
| 0.164 |
| 0.172 |
| 0.185 |
| 0.316 |
| 0.49 |
| 0.581 |
| 0.655 |
| 0.737 |
| 0.837 |
| 1.002 |
| 1.325 |
| 1.422 |
| 1.432 |
| 3.152 |
| 4.884 |
| 7.25 |
| 9.883 |
| 10.219 |
| 10.645 |
| 11.795 |
| 32.127 |

CLC Code	Class Name	Area (Ha)	Percentage
112	Discontinuous urban fabric	24728	9.88
212	Permanently irrigated land	25566	10.22
211	Non-irrigated arable land	26634	10.65
231	Pastures	29511	11.8
311	Broad-leaved forest	80380	32.13

* The largest classes are shown in the table

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CLC Changes 2001 -2018

LAND CLASS 2001	CODE 2001	LAND CLASS 2018	CODE 2018	AREA (Ha)
Pastures	231	Industrial or commercial units	121	208
Permanently irrigated land	212	Discontinuous urban fabric	112	225
Non-irrigated arable land	211	Permanently irrigated land	212	250
Permanently irrigated land	212	Pastures	231	447
Complex cultivation patterns	242	Discontinuous urban fabric	112	468
Pastures	231	Discontinuous urban fabric	112	573
Non-irrigated arable land	**211**	**Pastures**	**231**	**1173**

* The largest change types are shown in the table

Main processes (land type conversion) in the pilot area: Internal change in agriculture: decrease of crop production area

Non-irrigated arable land ⟶ Pastures   1173 ha

Permanently irrigated land ⟶ Pastures 447 ha

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Urban expansion: "Agriculture land" converted to "residential and industrial area"

Landsat TM (2001)

Sentinel-2 (2018)

3. Difficulties encountered in realising the CLC-pilot (1)

Compatibility with standard European CLC nomenclature has been maintained, but some classes may need to be revised as it better reflects national needs. For example:

- *Industry, abandoned / ruined, non-productive*

- *Pasture, hayfield used for agriculture purposes*

- *Grass covered areas around settlements without any use*

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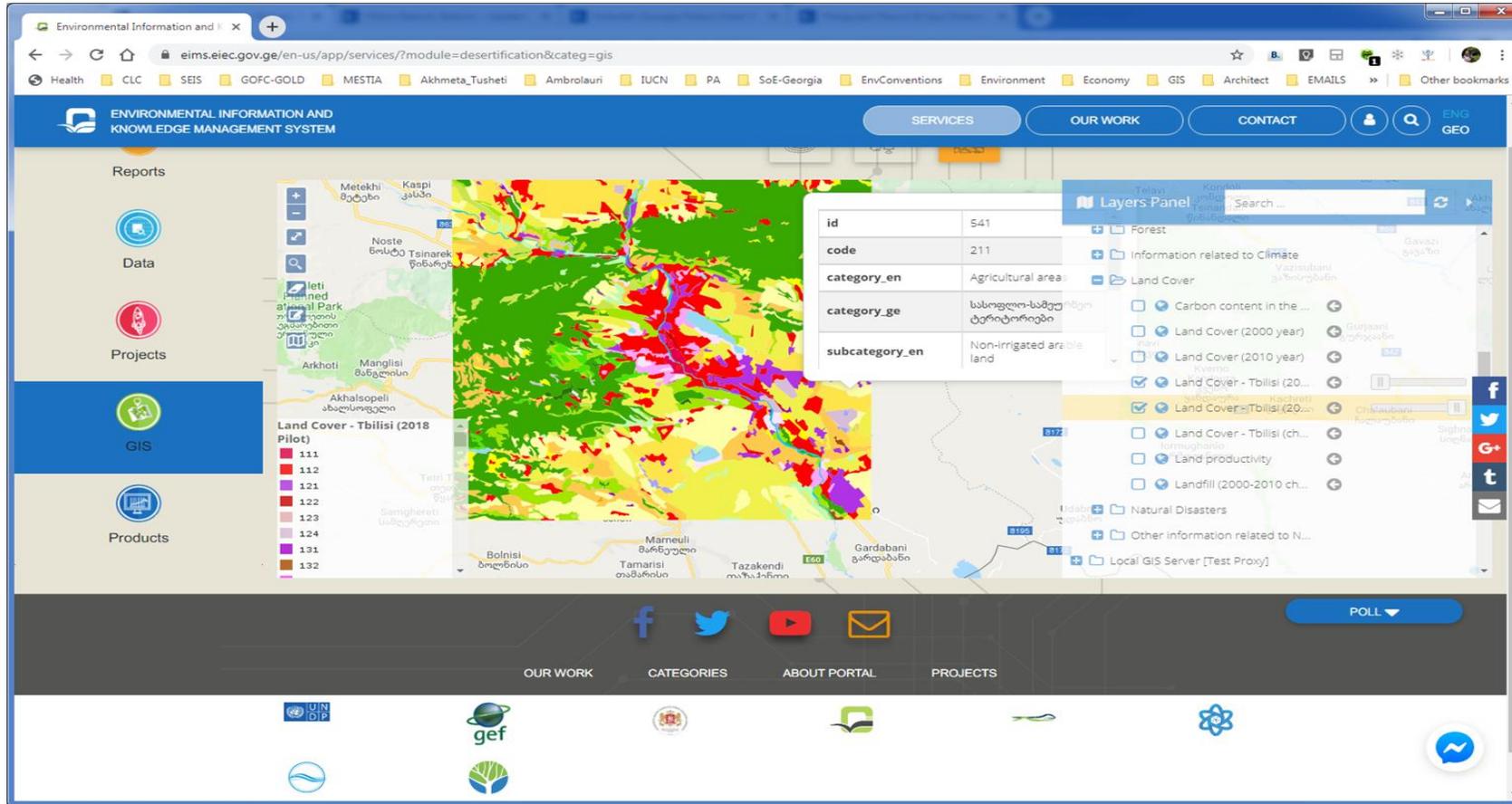
4. Visibility and communication (1/5)

Main achievements:

- *Important data on Land Cover of Tbilisi area have been produced.*

- *The standard European CORINE Land Cover methodology has been implemented for the pilot area in Georgia;*

- *Inter-institutional working group established at national level – National Team on CLC: MEPA, Environmental Information and Education Center (EIEC), GIS-Lab - having appropriate skills to implement the CLC project*

- *Pilot Project implemented - Tbilisi Urban Area and Surroundings (area 50km x 50km)*

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4. Visibility and communication (2/5)

Public Access to Pilot CLC Information by EIS and Online Availability

*CORINE Land Cover legend
was translated to Georgian
Language and adjusted to the
national terminology meanings*

*Contributed:
National Team on CLC
Experts in different fields*

European Corine Land Cover types- კორინის ევროპული მიწათსაფრის ტიპები

1. **Artificial Surfaces**– ხელოვნური ტერიტორიები
   1.1. Urban fabric
       1.1.1. *Continuous urban fabric - უწყვეტი ურბანული ქსოვილი*
       1.1.2. *Discontinuous urban fabric - ფრაგმენტირებული ურბანული ქსოვილი*
   1.2. Industrial, commercial and transport units *–ინდუსტრიული, კომერციული და
       სატრანსპორტო ერთეულები*
       1.2.1. *Industrial or commercial units - ინდუსტრიული ან კომერციული ერთეულები*
       1.2.2. *Road and rail networks and associated land - გზები, ლიანდაგები და მათთან
           ასოცირებული ინფრასტრუქტურა*
       1.2.3. *Port areas –საპორტო ტერიტორია*
       1.2.4. *Airports- აეროპორტები*
   1.3. Mine, dump and construction sites – *მაღაროები, ნაგავსაყრელები და მშენებარე
       ტერიტორიები*
       1.3.1. *Mineral extraction sites – წიაღისეულის მოპოვების ტერიტორიები*
       1.3.2. *Dump sites – ნაგავსაყრელები*
       1.3.3. *Construction sites - მშენებარე ტერიტორიები*
   1.4. Artificial, non-agricultural vegetated areas– *ხელოვნურად გამწვანებული,
       არასასოფლო-სამეურნეო ტერიტორიები.*
       1.4.1. *Green urban areas - ურბანული გამწვანება*
       1.4.2. *Sport and leisure facilities – სპორტული და სარეკრეაციო ტერიტორიები*
2. **Agricultural areas**– **სასოფლო-სამეურნეო ტერიტორიები**
   2.1. Arable land - *სახნავ-სათესი მიწები*
       2.1.1.*Non-irrigated arable land - ურწყავი მიწები*
       2.1.2.*Permanently irrigated land - რეგულარულად სარწყავი მიწები*
       2.1.3.*Rice fields - ბრინჯის მინდვრები*
   2.2. Permanent crops – *მუდმივი წათესები*
       2.2.1.*Vineyards - ვენახები*
       2.2.2.*Fruit trees and berry plantations - ხალები და საკენკრე პლანტაციები*
       2.2.3.*Olive groves - ზეთისხილის ხალები*
   2.3. Pastures - *სამოჲრები*
       2.3.1.*Pastures - სამოჲრები*
   2.4. Heterogeneous agricultural areas – *ერთგვაროვანი სასოფლო-სამეურნეო ტერიტორიები*
       2.4.1.*Annual crops associated with permanent crops - მრავალწლიანი წათესები
           ასოცირებული რეგულარულ სახნავ მიწებთან*

Articles published to the different websides:

SEIS II East project, MEPA, EIEC

30 July 2019 | Launch the result layers of Pilot CORINE Land Cover Project in Georgia

Countries: Georgia

The Ministry of Environmental Protection and Agriculture of Georgia (MEPA) has launched into their "Environmental Information and Knowledge Management System" the results of the Pilot Tbilisi CORINE Landcover-Change Mapping Project activities implemented under the ENI SEIS II East Project. Pilots on extending CORINE Land Cover (CLC) methodology to areas of the partner countries is a step to facilitate the access to, and use of, some spatial data required for SEIS implementation at national level.

This activity also allows direct links to related initiatives and programmes at the European level; namely the on-going work to produce the 2018 update of the CLC layers in the EEA39 countries, and services provided through the Copernicus Programme, a joint European Union and European Space Agency initiative for a long term sustainable capacity building in Earth Observation from space.

'Environmental Information and Knowledge Management System' portal is operated and managed under the Environmental Information and Education Center (EIEC) is the Legal entity of Pubic Law (LEPL) of the MEPA. Now the Pilot project's final results 3 CLC layers are available for viewing and downloading.

The largest city in Georgia, Tbilisi and its surrounding areas were selected for the CLC pilot project covering 2500 km^2 for mapping of land cover and land cover change an almost two decades. The pilot area includes dynamically developing urban areas, forested mountains, semi-arid rangelands, water bodies, etc. The pilot project successfully produced three CLC layers: CLC2018 status, CLC2001 status, and CLC-Changes 2001-2018. The derived GIS layers verification and evaluation were done by ETC/ULC Technical Team. The Team helped the pilot project implementation group to clearly understand the CORINE methodology for future work.

The main image for creating a land cover for the base year 2018 was the ortho-rectified image of the Sentinel-2, which was downloaded from the Copernicus data p... change detection, Sentinel-2 data from 2018 had to be compared with Landsat 7 2001 (7 spectral bands of 30m ground resolution) and Aster Terra 2001 (14 spectral ... 30, 90 m ground resolution) data. The main ancillary data were digital topographic maps of 1: 10,000 with an updated status from 1985 to 1989, IKONOS with high resolution, Quickbird images from 2005-2010 and a cadaster geodata of 1: 2000 scale from the National Registry. Vector data of irrigation schemes were also used.

The next steps for future work to upscale the pilot project results and cover the whole Georgia is discussed and is developed a proper proposal for CLC to the entire Georgian territory. Land cover change is an important indicator under UNCCD and Georgia is obliged reporting the Land Cover changes to the UNCCD Secretariat.

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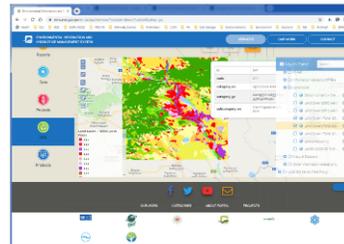
RIVER BASIN MANAGEMENT

- *Risk assessment of surface water bodies*

- *Diffuse source pollution risk assessment*

- *Point source pollution risk assessment*

- *Delineation of surface water bodies*

Maps source: River basin analysis in the Chorokhi-Adjaristskali pilot basin

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BIODIVERSITY

- **National Forest inventory and forest zoning**
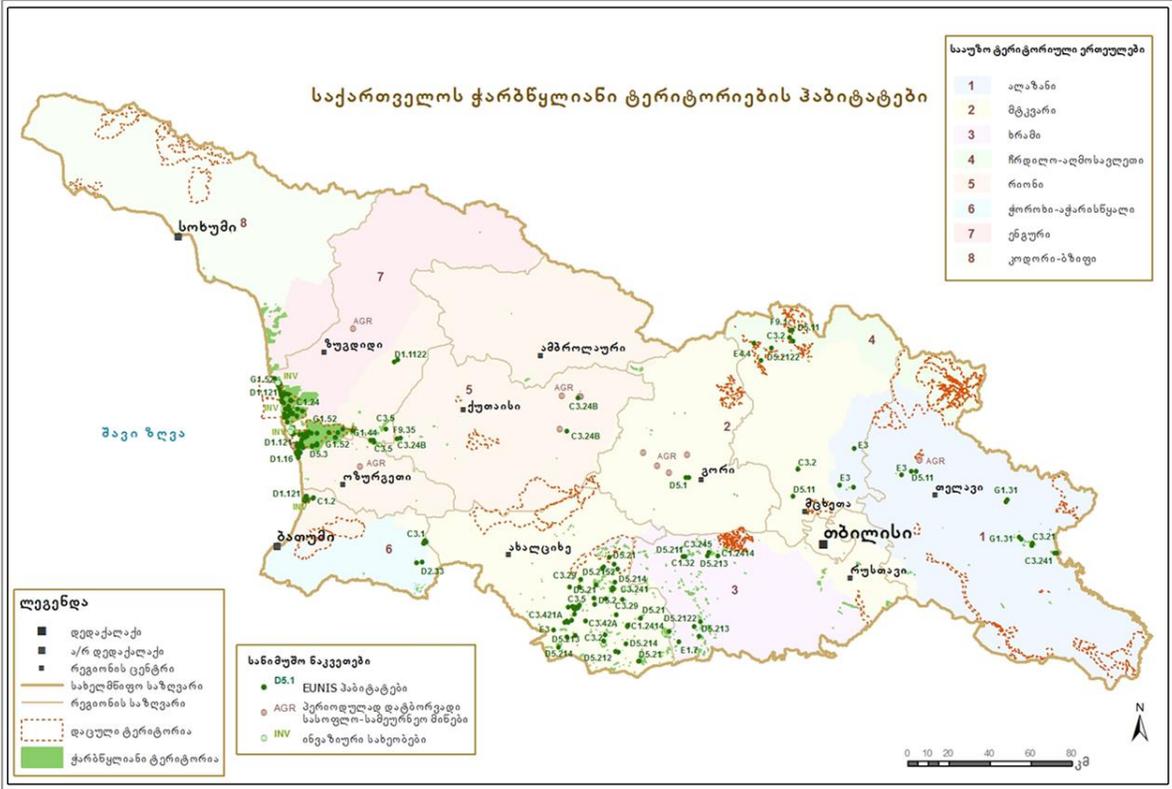- **EUNIS Habitat classification**
- **Protected area management**
- **etc.**

Fig. 1 Wetland classification by EUNIS methodology

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Land Management and Land Degradation Neutrality

- *Land management on multi-variable assessments, considering land potential and land condition*
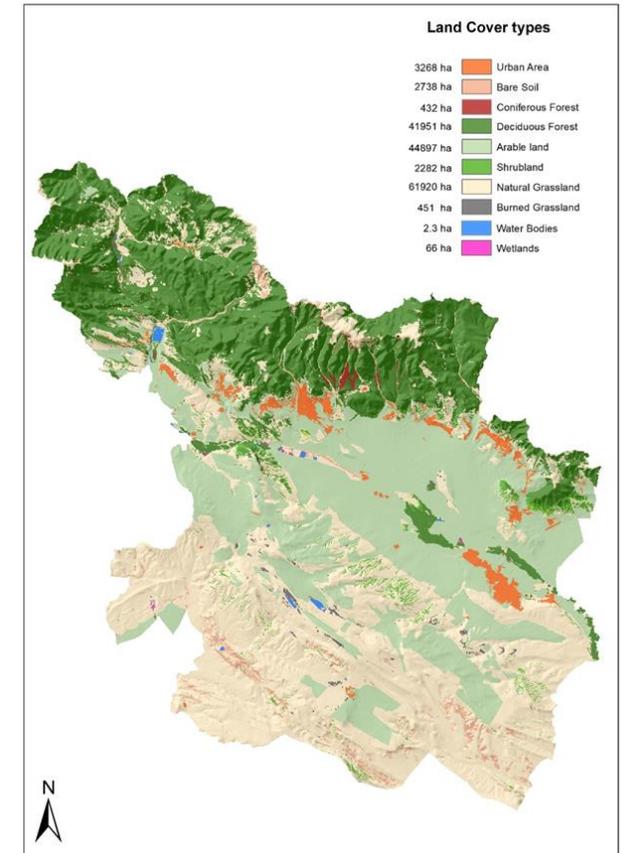
- *Land Balance and accounting*

Fig. 2 Simple landcover map for pasture assessment in Sagarejo Municipality

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6. Plans for continuation of CLC mapping (1/2)

Land cover change is an important indicator under United Nations Convention to Combat Desertification (UNCCD); Georgia is obliged reporting the Land Cover changes to the UNCCD Secretariat (for the last (2nd) reporting, the UNCCD Secretariat reported on behalf of Georgia using global data).

Proposed next <u>steps</u> are:

- *Stimulate the consultation process among the potential users of different domains such an agriculture, amelioration and spatial planning etc.*
- *Develop and formulate a draft proposal <u>for</u> the national CLC wide land cover according the country needs.*
- *Find the necessary funds for project implementation.*

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Institutional set-up of implementing National CLC

- *Responsible: MEPA, Department of Hydrology and Land Management*

- *To implement by National Team on CLC having appropriate skills*

- *Technical Implementation: GIS-Lab*

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