Report
Environmental accounting and hands on data for indicator production on integrated approach

Vocational training CIRAD

02-06 September 2019

Montpellier, France

This project is funded by the European Union and is implemented by the European Environment Agency

ENI SEIS II East

Contents

CIRAD

CIRAD, the French Agricultural Research Centre for International Development, is an organization working for the sustainable development.

Status

CIRAD is a public establishment (EPIC) under the joint authority of the Ministry of Higher Education, Research and Innovation and the Ministry for Europe and Foreign Affairs.

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Activities

Its activities concern the life sciences, social sciences and engineering sciences, applied to agriculture, food, the environment and territorial management. Its work centres on several main topics: food security, climate change, natural resource management, reduction of inequalities and poverty alleviation.

Training and knowledge sharing

CIRAD belongs to numerous European and international networks, and facilitates access for its partners to EU programmes and their involvement in international scientific cooperation networks.

Training, dissemination of information and knowledge and innovation sharing naturally complement CIRAD's research mandate by giving its partners and development players the means to make the choices incumbent upon them.

CIRAD offers up-to-date knowledge, modern facilities and pedagogic skills in application of international frameworks such as the UN SEEA, the United Nations Frameworks for the Development of Environment Statistics (FDES) and the Sustainable Development Goals indicators. Covering these methodologies with consideration of the capacities in connecting scientific expertise and policies to contribute in addressing concerns about environmental indicators, data comparability and a regular reporting across the pan-European region.

CIRAD is an Eionet partner, duly declared by the French Ministry of Ecology. It has the capacity to organise the preparation of the data, provide excellent infrastructure and carry out the training session itself. In addition, as part of a consortium with the Quebec University in Montreal (UQAM), CIRAD organises educational and vocational programmes and trainings on ecosystem natural capital accounting and, in 2016, it ran a summer school under the UN CBD patronage.

Objective of the vocational training

Vocational training on environmental accounting of land and hands on data for integrated indicator production for the experts from six Eastern countries (Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine).
The 2019 vocational training covered respectively the SEEA CF land module. Theory and practice were reinforced through hands-on exercises with national data. The 2019 training aimed at exercising the participants with real hands on data on their respective countries with the purpose of providing the sense of the tasks carried out as well as better understanding of the policy usefulness of the project's outcomes, maps, accounts and indicators.

A **combination of learning methods** was used – from lectures to case-studies analysis and practical exercises. Participants were called upon to make use of their **creative potential**, in a critical and **reflexive attitude** towards their own personal and organisational experience. Diverse groups of participants were attending this training. The learning path approach enabled the course to link to participants' specific contexts and background. Particular attention was devoted to **knowledge transferability** into working realities.

It was built on CIRAD's capacity in this area, taking into consideration the accumulated expertise and a result of its cooperation with the EEA, UN CBD, UNECE and UNEP, including its regional network of national policymakers and experts. (Service Contract No. EEA/PROC/2019/008 (3437/B2019/ENIE/EEA.57631) in force from 01.04. 2019)).

ENI SEIS II East project

The EEA is implementing the EU-funded ENI SEIS II East project to support the environmental reporting process (conventions, treaties, national obligations…) with contribution to the pan-European reporting. The **European Neighbourhood Instrument (ENI)** came into force in 2014. It is the financial arm of the European Neighbourhood Policy, the EU's foreign policy towards its neighbours to the East and to the South.

The ENI SIES II East project aims to strengthen the regular production of environmental indicators and assessments in line with the principles of the Shared Environmental Information System (SEIS) as a contribution towards knowledge-based policymaking and good environmental governance in the six Eastern Partnership countries.

The 1st Regional Project Steering Committee of the ENI SEIS East II meeting held in November 2016 stressed the priority need for Environmental Accounting (SEEA) capacity building. This need for the action has been taken into account and been added to the Regional work plan of the project 2017-2020.

The activities support the strengthening environmental statistics and accounting, in particular through the application of the UN System of Environmental-Economic Accounting and the revised UN Framework for the Development of Environment Statistics standards through the development of capacities of the six Eastern Partnership countries' experts. Thus will assist to modernise **a regular reporting on environment knowledge based and relevant.**

State of play of the SEEA implementation in Eastern Partnership countries

The first activity of the ENI SEIS II East project on the implementation of environmental accounting focused on analysing the state of play and structuring capacity building in respective activities.

In 2017, this is done using the Self-Assessment Diagnostic tool of SEEA implementation in order to measure the readiness of countries (data availability, institutional and human capacity,) and identify area of work to start. Key findings indicated that the SEEA is an emerging component, which is included in national statistical programmes led by NSOs. Priority areas for the SEEA include land accounts, air emission accounts, water accounts and environmental protection expenditure accounts.

2017 EEA study of efficiency and effectiveness of recent environmental assessment reports in the eastern partnership countries consider to sustain and use of modern tools and techniques for environmental assessment, including environmental economic accounting and GIS applications.

In 2019, an assessment of SEEA implementation has shown progress in six eastern countries. On regular basis produced and published accounts in Armenia (water emissions, supply and use table for water in physical and monetary units), Azerbaijan (energy assets and physical supply and use tables for energy), Georgia (material flow) and Ukraine (air emission accounts).

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Sep-19	Armenia	Azerbaijan	Belarus	Georgia	Moldova	Ukraine
SEEA Central framework						
Natural resource accounts						
2.1.Land cover accounts	F	F	F	F	F	F
2.1.1.Physical asset accounts for land (land cover and/or land use)		P	P	P	P	P
2.1.2.Monetary asset accounts for land (land cover and/or land use)				F		
2.2.Forest accounts	F	F	P	F	F	
2.2.1.Physical asset accounts for timber resources		F	P	F		
2.2.2.Monetary asset accounts for timber resources		F	P	F		
2.3.Water stock accounts	F			F		
2.3.1.Physical Asset accounts for water resources		F	P		P	
2.4.Mineral and energy asset accounts				F		
2.4.1.Physical asset accounts for mineral and energy resources*		R				
2.4.2.Monetary asset accounts for mineral and energy resources*		F				
Physical and hybrid flow accounts						
2.7.Air emission accounts	F	F	F	F	P	R
2.8.Water emission accounts	R	F				
2.9.Water flow accounts	R	F		F		
2.9.1.Physical supply and use tables for water	R	F	P	P	P	
2.9.2.Monetary supply and use tables for water	R	F				
2.10.Energy and material flow accounts				F		
2.10.1.Physical supply and use tables for energy		R	P			
2.10.2.Monetary supply and use tables for energy		F				
2.10.3.Full set of supply and use tables for materials		F				
2.10.4.Economy-wide material flow accounts (MFA)		F		R		
2.11.Waste accounts	F					
Environmental activity accounts						
2.12.Environmental protection expenditure accounts (EPEA)	F	F	F			R
2.13.Resource use and management accounts (RUMEA)						
2.14.Environmental subsidies account	F	F	P	P	P	
2.15.Environmental taxes account	F	F	F	F		
2.16.Environmental goods and services sector accounts (EGSS)	F	F				
SEEA Experimental Ecosystem Accounts	F	F	F	F	F	F

R-regular
P-pilot or project
F-future plan

Notably, stakeholders' interest in ecosystem-based approaches to environmental accounting is also taken into consideration, with; for example, focus on land, carbon, water, biodiversity, and their contribution to the national economy.

Background of the vocational training

ENI SEIS East II partner countries (Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine) have identified environmental accounting as highly relevant and requested capacity building in this domain during the first Regional Project Steering Committee Meeting of November 2016.

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The EEA introduced therefore a subcomponent on environmental accounting into the Assessment component of and developed activities to support it. According to the regional work plan, the first cycle of training on environmental accounting started in 2017, to build capacities in facilitating the implementation of the SEEA in the region from 2018. This vocational training covered induction to environmental accounting and was based on the SEEA-CF, the SEEA-EEA, and its development at the European Environment Agency (EEA). The focus was on land cover accounts as the first step in environmental accounting implementation following the EEA methodology and relied in particular on the EEA's 10 years' practical experience in producing and disseminating these accounts.

In 2017, the training identify a lack of environmental information systems/platform/land data platform in six countries and their weakness in use and knowledge of GIS in environmental and statistical authorities. This is a main obstacle to the development of environmental accounts, which are based on spatial approach.

In 2019, an objective of the training was focusing on institutional capacity development and production of new generation of indicators in order to implement land accounts and set up environmental information systems. It was built on CIRAD's capacity in this area, taking into consideration the accumulated expertise and a result of its cooperation with the EEA, UN CBD, UNECE and UNEP, including its regional network of national policymakers and experts. (Service Contract No. EEA/PROC/2019/008 (3437/B2019/ENIE/EEA.57631) in force from 01.04. 2019)).

Venue of the vocational training

The 2019 Vocational training on environmental accounting held from **02 to 6 September 2019** (5 full days) at the **CIRAD** premises in **Montpellier, France**: Maison de la Télédétection- 500, rue Jean-François Breton.

Participants of the vocational training

The regional vocational training (five days) 2-6 September 2019 attended 18 experts from the six Eastern partnership countries: Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova and Ukraine. National team of experts included 1 expert from environmental authorities with policy and data/ indicators compilation experience, 1 expert from statistical authorities with data handling experience, 1 experts from Land/ Cadastral /Spatial authorities with GIS background.

Name	Organisation	Country
Naira Mandalyan	Statistical Committee	Armenia
Gevorg Azgaldyan	Forest Monitoring Center SNCO	Armenia
Garik Grigoryan	Ministry of Environment	Armenia
Ilkin Shahvaladov	State Statistical Committee	Azerbaijan
Ilgar Valiyev	State Statistical Committee	Azerbaijan
Khanlar Mustafayev	Ministry of Ecology and Natural Resources	Azerbaijan
Ekaterina Istomina	Belhydromet	Belarus
Yuliya Sai	National Statistical Committee	Belarus
Halina Shyla	National Statistical Committee	Belarus
Vasil Tsakadze	National Statistics Office	Georgia
Daviti Kobakhidze	Ministry of Environment Protection and Agriculture	Georgia
Maka Manjavidze	Ministry of Environmental Protection and Agriculture	Georgia
Ovdii Maria	Agency for Land Relations and Cadastre	Moldova
Ludmila Lungu	National Bureau of Statistics	Moldova
Silvia Nicolaescu	Environmental Agency	Moldova
Olena Legka	Ministry of Ecology and Natural Resources	Ukraine
Pavel Sokolov	The State Service for Geodesy, Cartography & Cadastre	Ukraine
Olga Martyniuk	State Statistics Service	Ukraine

Key contents of the vocational training

The programme of the 2019 Vocational training was designed to address the following key questions:

- What are the perspectives of environmental accounting to measure the land policy sustainability?
- What are the fundamentals of environmental accounting for land sustainability?
- What is changing in environmental accounting use to assess land use sustainability?
- What new challenges in the environmental accounting arena call for a new type of knowledge and new indicators?
- How can environmental accounting with integrative approach respond to such knowledge requirements?
- How can we effectively combine and apply different methodologies and tools in specific working contexts on land of environmental accounting?

The five-day programme

The overall programme covered the why, what and how of environmental accounting go to an Integrated Sustainability Assessment.

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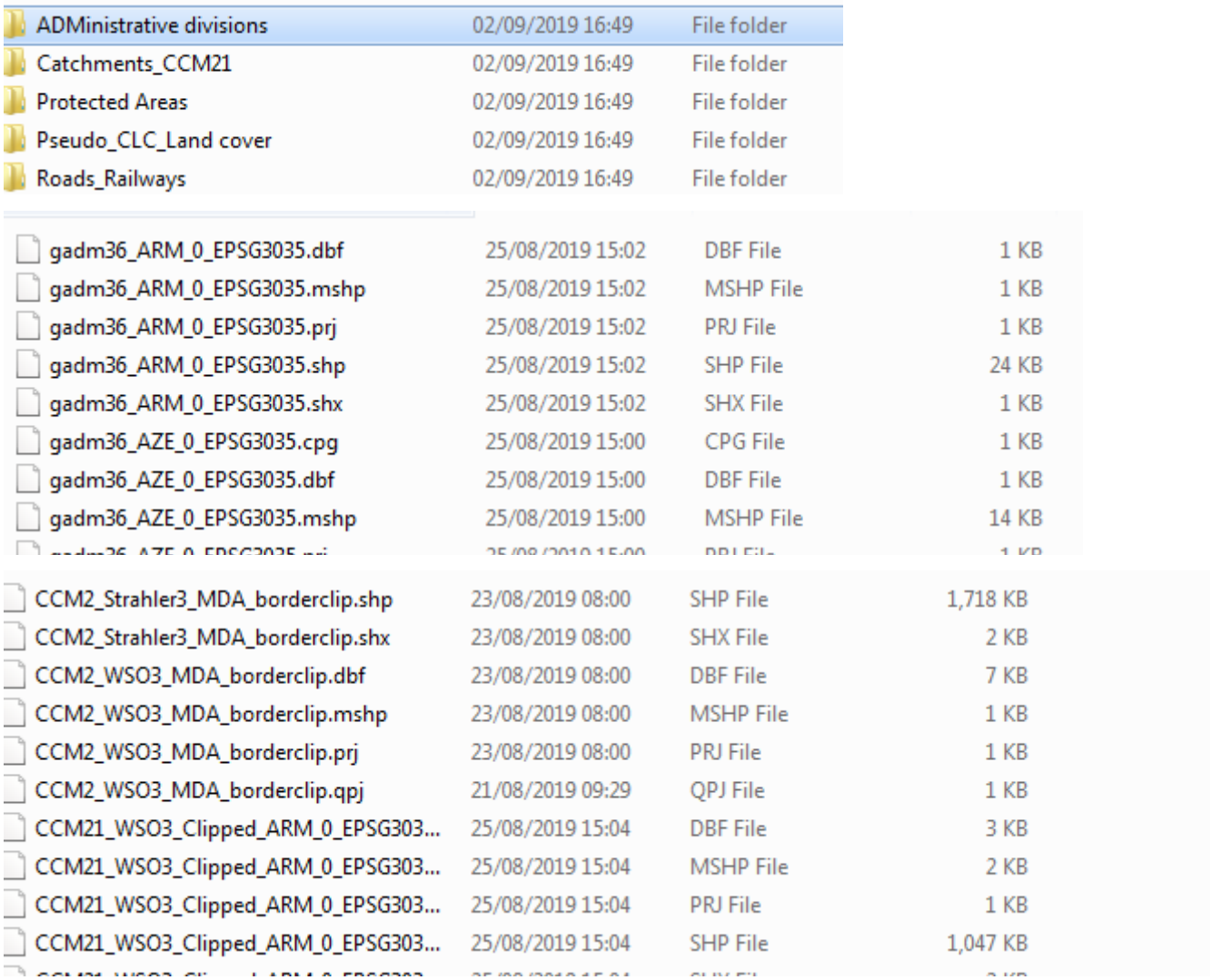
The 2019 vocational training covered respectively land module of the SEEA CF and with perspectives of SEEA-EEA. The first purpose of this training was, by doing, to raise awareness on environmental accounts feasibility with current information, technology and following the EEA methodology called LEAC (Land and Ecosystem Accounts). The second objective was providing participants the opportunity of understanding the practical usefulness of land accounts in their national context, including for producing land based indicators.

National data sets for vocational training

Theory and practice were reinforced through hands-on exercises with national data prepared by the CIRAD experts. To address above-mentioned needs land cover datasets had been prepared in advance, making full use of the new Copernicus Global Land Cover, which allowed a fully fledged implementation.



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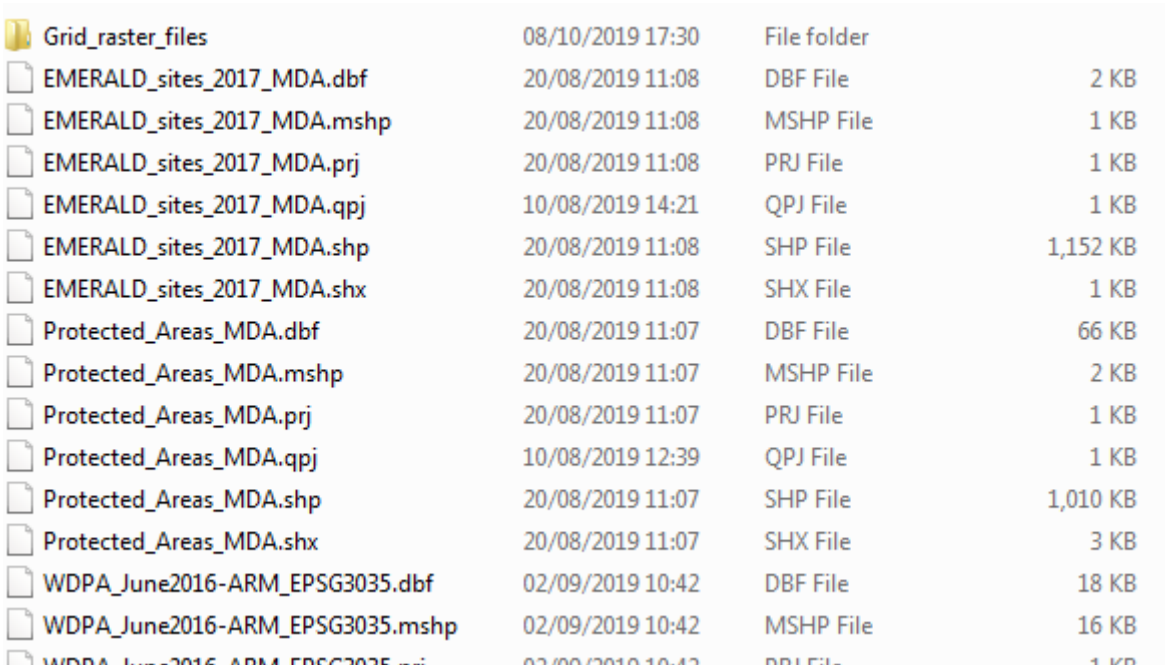

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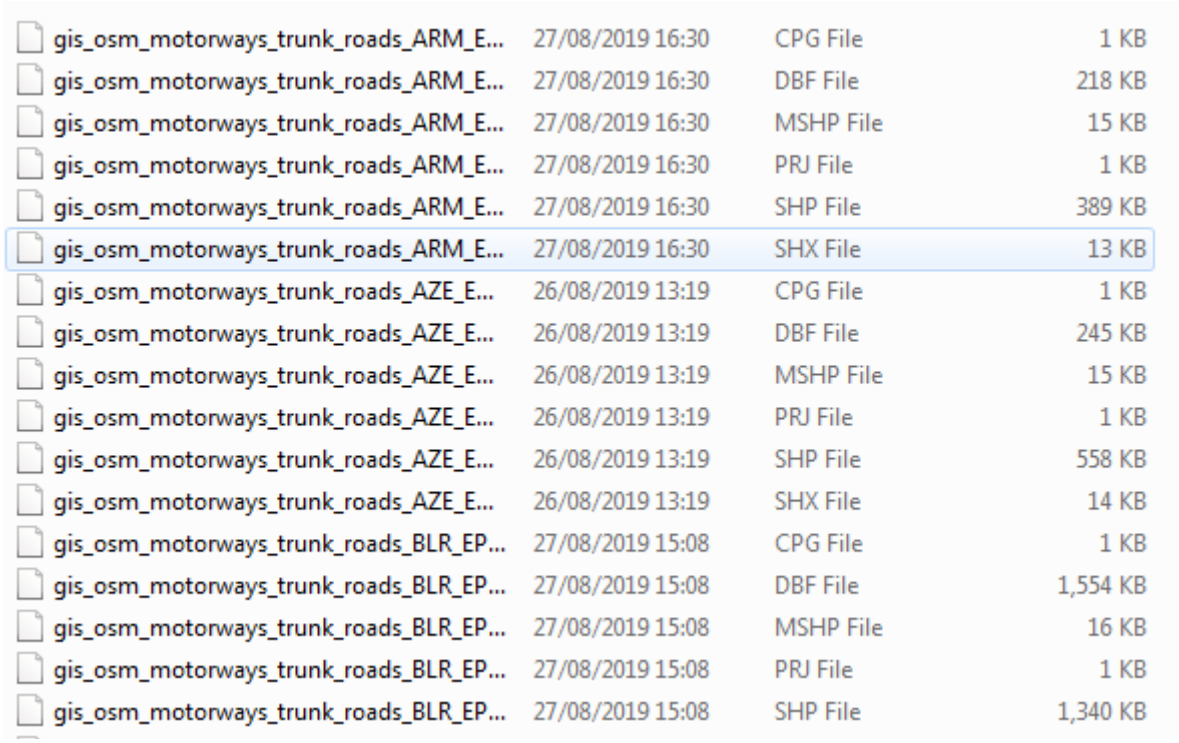

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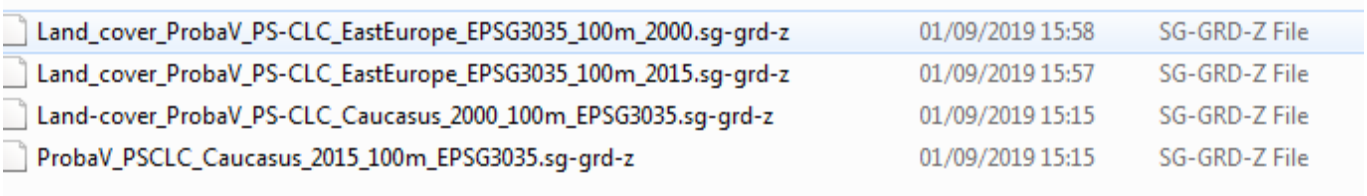

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17 PARTNERSHIPS FOR THE GOALS

To give a sense of expected outcomes in a pan-European perspective, a land cover map compatible with Corine Land Cover has been produced for the pan-European Eastern region using the new Copernicus Global Land Cover fraction layers 2015 and back-casted to 2000 with international datasets. It illustrates the kind of nation-wide products that the countries will get from national pilot of CORINE Land Cover implemented in parallel. The pseudo-Corine 2015 map is compatible with the UN SEEA land cover.

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Experts' level was of good and at the same time equal. They were coming in time, participated in the practical exercises actively.

The six Eastern Partnership countries participants using SAGA Gis, a geo-scientific software package developed by the University of Hamburg, have produced EEA LEAC type accounts.

It included:

- Production land cover and land cover change accounts following the EEA LEAC/ SEEA approach to monitor the land degradation in a natural capital approach (SDG indicator 15.3.1) in six eastern countries.

- Analysis of stress factors that caused of urban sprawl (SDG Indicator 11.3.1), agriculture extension (SDG Indicator 2.4.1.), deforestation (SDG Indicator 15.1.1., SDG Indicator 15.1.2.) and land uptake.

- Production of various thematic maps derived from land cover accounts.

The above-mentioned products in form of indicators, accounting tables and maps are in the chapter Outcome of vocational training.

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Self-assessment of the SEEA implementation

A self-assessment of progress in the SEEA implementation of by interviewing the national experts who were attended this training was conducted. The assessment included questions on production, major constraints in compiling, dissemination and use of environmental accounts.

What have been the major constraints in developing the Environmental-Economic Accounting Programme?	Armenia	Azerbaijan	Belarus	Georgia	Moldova	Ukraine
Lack of institutional set-up/coordination	*			*		*
Lack of financial resources			*	*	*	*
Lack of human resources	*	*	*	*	*	
Lack of interest by the users						
Lack of access to training materials				*		
Lack of expertise		*				
Avialability of data	*			*	*	
Quality of data	*			*	*	*
Lack of national legislation					*	

How are the Environmental-Economic Accounts disseminated?	Armenia	Azerbaijan	Belarus	Georgia	Moldova	Ukraine
13.1. Statistical publications	*		*			*
13.2 Environmental publications			*			
13.3 Internet	*	*	*	*		*
13.4 Others						

In your country, are the Environmental-Economic Accounts used for:	Armenia	Azerbaijan	Belarus	Georgia	Moldova	Ukraine
16.1 Deriving indicators	*			*	*	*
16.2 Modeling, economic analysis		*	*	*		*
16.3 Environmental assessments		*	*	*		*
16.4. Other						

Road maps for SEEA implementation

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The conclusions of the training were summarised in a national road map for land accounts and SEEA and discussed with countries. See in the chapter National road maps for SEEA implementation of land module.

The experts from the six Eastern countries have shown strong interest for continuation. Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine are interested in implementation of environmental accounting and start from land accounts. In order to facilitate the SEEA land methodology implementation there was an explicit request for CLC for these countries.

Objective	*Data sets/accounts*	*Tasks to the accountant*
Step 1: Create the data infrastructure needed for accounting		
Collect reference geographical data sets and create the database needed for environmental accounting	Geographical features/zonings • Physical boundaries (coastline, river basins and sub-basin limits, climate zoning, elevation classes) • Administrative boundaries (municipalities, districts, regions) • Transport network • Hydrological network, rivers, aquifers • Sea/fisheries zoning(s) Regular grid(s) for accounting (1 ha and 1 km2)	*Collect the basic geographical layers that will structure the physical accounts from relevant organisations. Check their consistency (geometry, projection). Produce a set of regular grids (based on official geographical standards).* *Create the database needed for environmental accounting: for terrestrial ecosystems, rivers, marine coastal units and other sea accounting units* *(NB: requires land cover map for the baseline year)*
Step 2: Collect the basic data sets		
Collect the basic data sets for environmental accounting: monitoring data and statistics	• Land cover and land use • Land cover change (including marine coastal areas) • Meteorological data • Hydrological data • Soil data • Data on forest stocks and growth • Population data • Regular agriculture, forestry and fishery statistics • Data/statistics on water use • Indicators on species and systems biodiversity • Energy balances • Environment protection expenditures statistics	*Produce a consistent multi-annual (10- to 20-year period) land cover map/database using satellite images and other sources available (forest maps, cadastre, buildings and roads, etc.).* *Collect and organise the various sets of data and statistics needed for accounting. Population and housing census, Agriculture survey and census, business survey, other type of survey and census data, and other governmental organizations information on land* *Official data sources are given priority: official statistics, meteorological data, hydrological data, etc., where available, accounts produced for IPCC reporting, REDD+, SEEA-water, etc., are important inputs.* *Satellite data sometimes as second best.* *Administrative sources – cadastre maintained by a land registry office, tax authorities, or land information centre*
Step 3: Produce the core accounts		
Produce the core environmental accounts-land	• Land cover account • Land cover change account • Land use account	*Compile the accounts with basic data collected at step 2, additional data for specific items and physical data modelling.* *Geo-process data sets.* *Estimate of missing data.* *Integrate the accounts and assess terrestrial ecosystem degradation and other sustainability issues.*
Step 4: Land accounts in physical units		
Land accounts in physical units	• Accounts integration, assessment of terrestrial ecosystem degradation, depreciation and enhancement of land • Social demand for land resource (by accounting units, municipalities, regions, etc.)	*Targeted, detailed mapping and analysis to be carried out with statistical offices, planning agencies, environment agencies, research sector, etc., of land use of particular importance and their social use.* *Assessment of land use sustainability.*
Step 5: Land accounts in monetary units		
Valuation of depreciation, benefits and restoration costs in monetary units	• Valuation of land use • Assessment of restoration costs • Accountability of economic sectors to capital degradation/enhancement • Degradation embedded in trade	*Economic analysis of land use in monetary value.* *Economic analysis of remediation costs (restoration works, alleviation, opportunity costs of reducing pressure on the environment, etc.).* *Assessment of terrestrial ecosystem degradation embedded in international trade*

The right institutional arrangement in how to use the Copernicus services inline with further expectations of countries in the context of finding to build a new project under EU ENI cooperation.

Evaluation of the vocational training on environmental accounting

Participants evaluated the training with excellent to good scoring.

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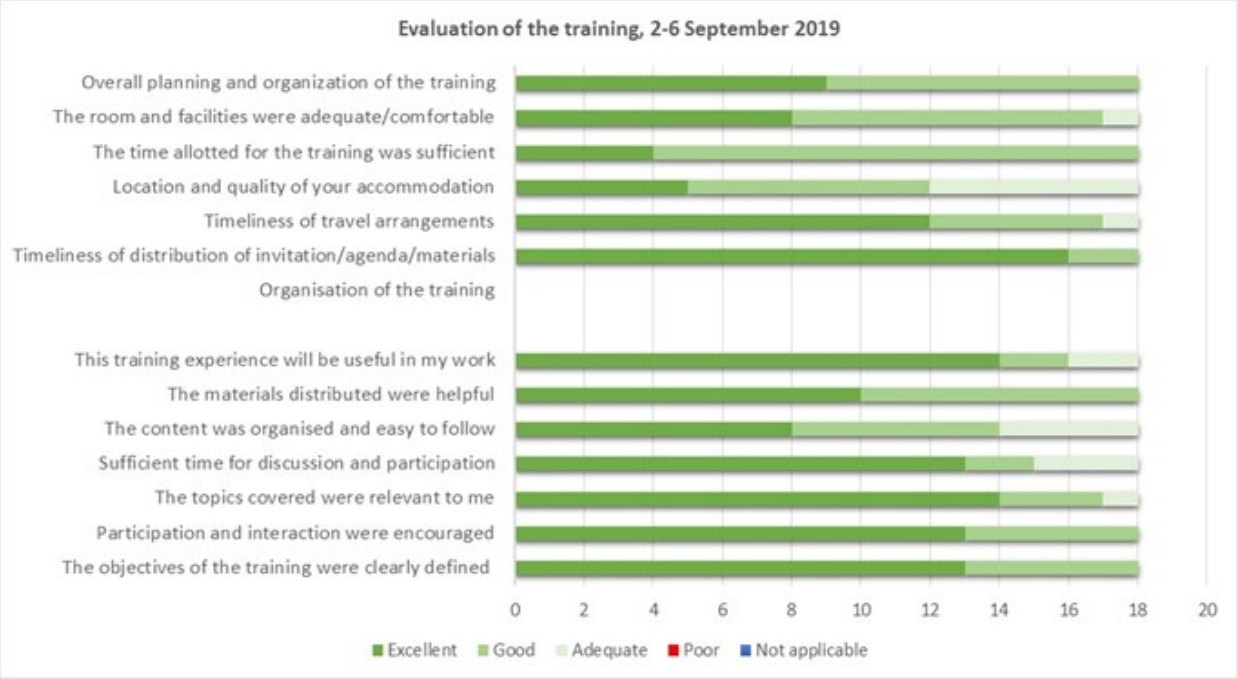

Agenda of the vocational training on environmental accounting

Day 1 – 02 September 2019	
8:45 – 9:00	**Registration**
9:00 – 9:30	**Introductive "tour de table »**
Session I: Purpose of environmental accounting	
9:30 – 13:00 **11:00 – 11:30/coffee break**	**1. Introduction to the training course** • ENI SEIS project II East: building capacities in environmental accounting • Environmental Accounting: an overall framework and specific developments and experimentations: SEEA CF, SEEA EEA, WB WAVES, UNCBD ENCA QSP, the European INCA programme and its components • Environmental accounting with integrative approach respond to new knowledge requirements (Rio Conventions, MEAs and SDGs monitoring, reporting and accountability). **2. Land and Ecosystem Accounts at the EEA:** • An accounting methodology based on Corine land cover • Introduction to the LEAC methodology • LEAC 1990-2000-2006-2012-2018 • Online access to LEAC on the EEA website: demo **3. New challenges in the environmental accounting arena call for a new type of knowledge and new indicators:**

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	• An indicator derived from land cover accounts: Net Landscape Ecosystem Potential (NLEP) • Land cover, land use and carbon accounts: links of LEAC to LULUCF • Land cover and ecosystem service mapping and assessment: the MAES experience • Land accounts as the foundation of integrated ecosystem accounting
13:00 – 14:30	**Lunch break**
14:30-17:00 **15:30-16:00/coffee break**	4. **Perspectives of environmental accounting to assess the sustainability** of land policies (CORINE Land Cover in EU and the EEA: process and results) **5. Remote sensing as a tool to produce information on landscape/land cover and land use** • Introduction to remote sensing • National experience in use of Earth observation data for environmental assessments (presentations by delegates for each country, 15 mn, 10 slides max) • Copernicus : role and land observation programme to measure natural capital degradation **6. Site visits (optional)** • Visit of satellite antenna site • Visit to the CIRAD laboratory GEOSUD (data processing, analysis and dissemination)
Day 2 – 03 September 2019	
Session II: Test case on land cover accounting : the making of LEAC	
09:00 – 13:00 **11:00 – 11:30/coffee break**	**7. Introduction to the LEAC exercise** • Presentation of the LEAC methodology for land cover change accounting • Land cover data for accounting: minimum classification detail, the SEEA requirements • land cover change and land cover flows • the land cover change matrix and the LEAC flatmatrix • presentation of results: tables, indicators and maps. 8. **Presentation of and gripping in the hand on the tools and datasets** which will be used for the exercise: • Opening the QGIS/SAGA Gis software package • Upload of the land cover tiles 2000 and 2015 (pseudo-CORINE layers supplied by VITO and IGNFI) • Upload of the Administrative boundaries shapefiles (GDAM files) and National parks boundaries (WCMC-WDPA/JRC-DOPA) 9. **Extraction of national land cover from the files: practical exercise**
13:00 – 14:30	**Lunch break**
14:30-17:00	**10. Production of the matrix of land cover change 2000-2015: practical exercise**

15:30-16:00/coffee break	11. **Discovery of the Flatmatrix for converting land cover changes to land cover flows of consumption and formation**; use of the LEAC Flatmatrix for producing the accounts 12. **Extraction of results by countries, regions, districts, national parks…** 13. **Presentation of the results: tables and maps**
Day 3 – 04 September 2019	
Session III: Test case on land cover accounting : analysis and developments	
09:00 – 13:00 **11:00 – 11:30/coffee break**	14. **Stock-taking of outcomes of Session II** **15. First analysis, comparisons and comments** • Land cover stocks and flows by administrative divisions • Land cover stocks and flows in protected areas **16. Indicators derived from LEAC :** • Typical indicator: Urban land uptake (EEA Core Set, UNECE…) • Other indicators: 1. Urban ○ Urban temperature: the urban influence on the neighbourhood (e.g. on protected areas): exercise for year 2015 ○ Urban density change: ▪ Combination with the urban density fraction layer of VITO/Dynamic Land Cover ▪ Combination with high resolution layers: Corine urban high resolution layer, Global Urban Footprint: presentation ○ Forests: ▪ Forest extent change: what is deforestation, what is normal forest exploitation? Discussion ▪ Forest density change: • Combination with the urban density fraction layer of VITO/Dynamic Land Cover • Combination with high resolution layers: Corine high resolution forest layer, Global Forest Change (U Maryland): presentation ○ Agriculture: ▪ Large scale agriculture vs. mixed agriculture landscapes: identification and meaning ▪ Loss of agriculture land vs. farmland abandonment
13:00 – 14:30	**Lunch break**
14:30-17:00 **15:30-16:00/coffee break**	**17. A first step from LEAC to Ecosystem accounts: Net Landscape Ecosystem Potential** • Presentation, format of the composite indicator • Green background Landscape index (GBLI): presentation and calculation 2000-2015

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	• High Nature value of landcover (NATURILIS): presentation and calculation (from WDPA) • Fragmentation index (MEFF): presentation – results given • Calculation of NLEP 2000 and 2015 • Assessments and comparisons with NLEP: by administrative divisions and for protected areas
Day 4 – 05 September 2019	
Session IV: Implementation of LEAC (and ecosystem natural capital accounts)	
09:00 – 13:00 **11:00 – 11:30/coffee break**	**18. The land cover data for accounting** • EU: Corine land cover • The pseudo-Corine maps used for the LEAC training : based on dynamic land cover classification by fractions **19. The dynamic land cover classification by fractions** • Presentation of the methodology based on ProbaV and outcomes • Annual updates available • Perspectives with the Sentinel 2 and 3 **20. Implementing LEAC based ecosystem natural capital accounts** • The basic modules: o Ecosystem infrastructure accounts (land cover and rivers accounts, NLEP and biodiversity) o Ecosystem carbon account o Water account o Integrated assessment of ecological value and measurement of ecosystem degradation or enhancement • The data model 21. **Making it possible: an IT platform for producing natural capital accounts: the SYS4NCA project** **22. Examples of ecosystem accounting case studies in and out of Europe (based on LEAC)** o The Rhône River Basin integrated ecosystem accounts o PapBIO: ENCA accounts for the governance of the Niokolo-Koba National Park in Senegal o ECOSEO: Accounts for the coastal entities of the Guyana Shield
13:00 – 14:30	**Lunch break**
14:30-17:00 **15:30-16:00/coffee break**	23. **Uses of LEAC for reporting on environment and sustainable development** • Back on the SDGs: Analysis of stress factors that caused of urban sprawl (SDG Indicator 11.3.1), agriculture extension (SDG Indicator 2.4.1.), deforestation (SDG Indicator 15.1.1., SDG Indicator 15.1.2.) • Reporting to UNECE and Environment for Europe • Policy interest in the national context, requirements for implementing land accounts in countries: data, capacities
Day 5 – 06 September 2017	
Session V: Perspectives for integrated environmental accounting	

9:30 – 13:00 **11:00 – 11:30/coffee break**	**24. What have we learn about monitoring and assessing land use sustainability with land cover accounts?** • General findings • Country findings **25. How can we effectively combine and apply different methodologies and tools in specific working contexts on land of environmental accounting?**
13:00 – 14:30	**Lunch break**
14:30-17:00 **15:30-16:00/coffee break**	**26. Countries Self-Assessment of the readiness of countries (data availability, institutional/human capacity...) to implement the SEEA land module** **27. National roadmaps to implement land accounts within the ENI SEIS II East project.** **28. Evaluation of the vocational training**
	End of the training

Outcome of the vocational training

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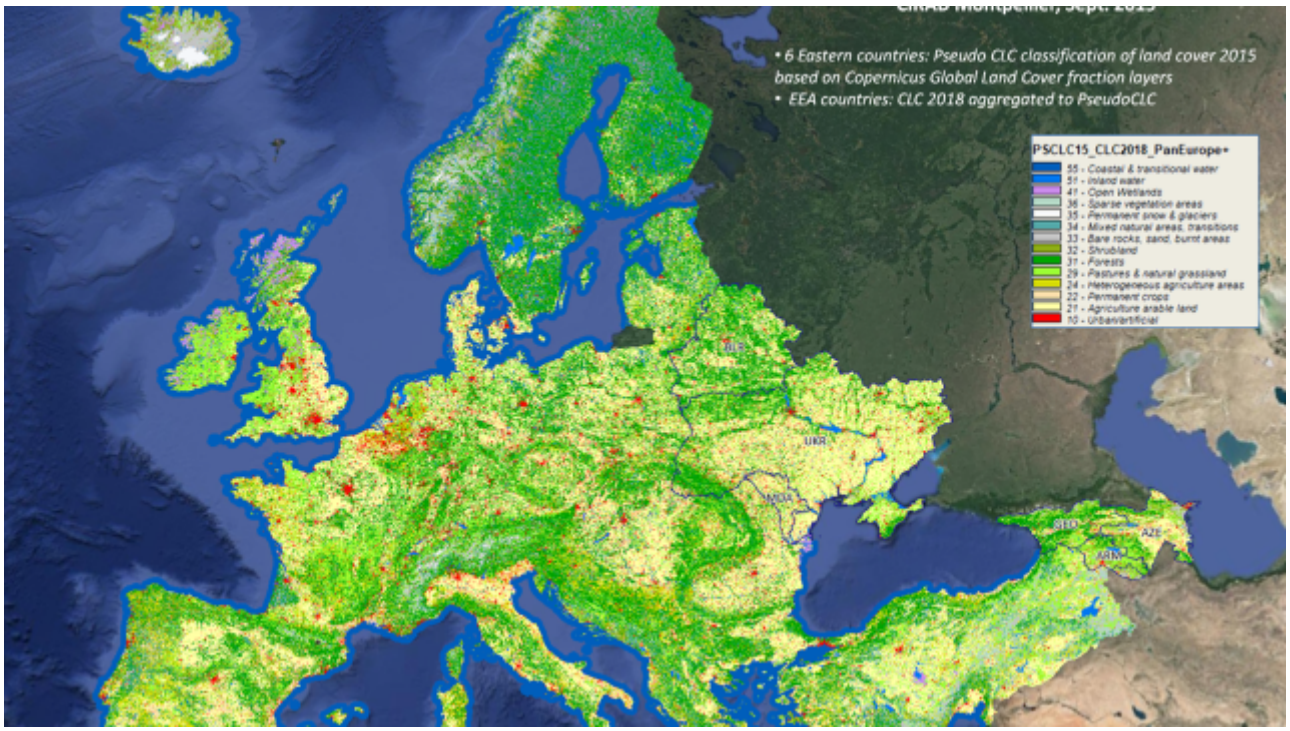
Land cover accounts and land cover change accounts in the Eastern Partnership countries

Outcome of the CIRAD vocational training, 2-6 September 2019, Montpellier, France



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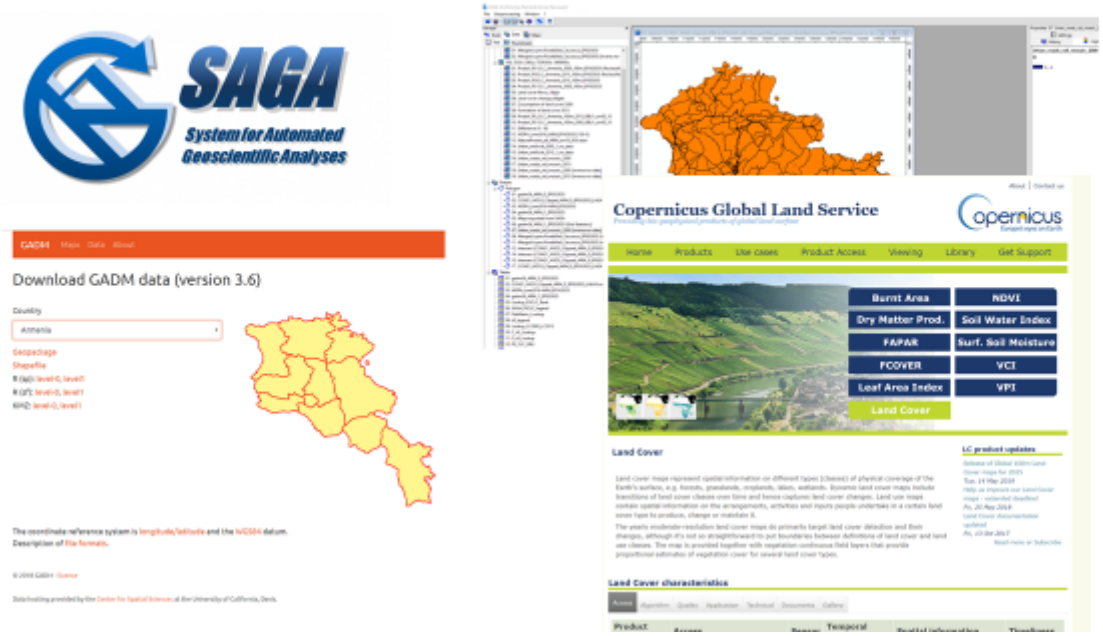
Sources



Software used; SAGAGis/ SAGA Graphical User Interface and SAGA version 7.3.0. and LibreOffice/Calc

Data sets sources:

1. Land cover data raster tiles for Eastern Europe and Caucasus areas 2015 and 2000 (100 m resolution, derived from Copernicus Proba-V Global Land Cover produced by VITO, classification harmonised to CLC level 2 and is in line with the SEEA land classifications (stocks, flows)

2. Administrative boundaries (downloaded from GADM, the Global ADMinistrative data base provided by the University of California in Davis

3. Protected areas database

4. OpenStreetMap data base

5. OSM data open road and railways layers

6. WSO3 catchments layers in CCM2 tiles

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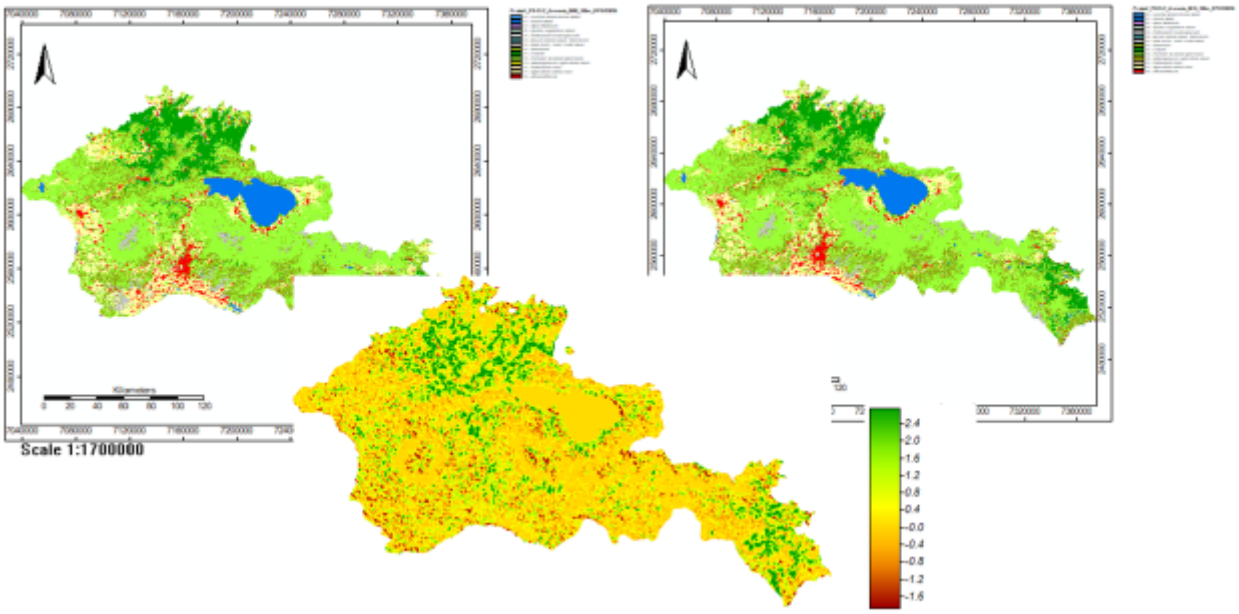
Armenia

Land cover and Land changes for 2000-2015



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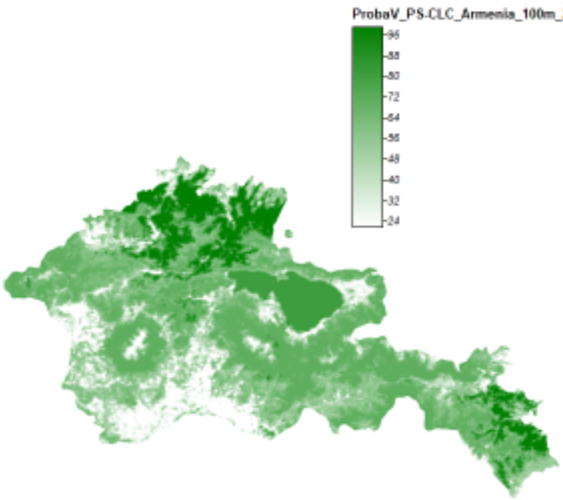
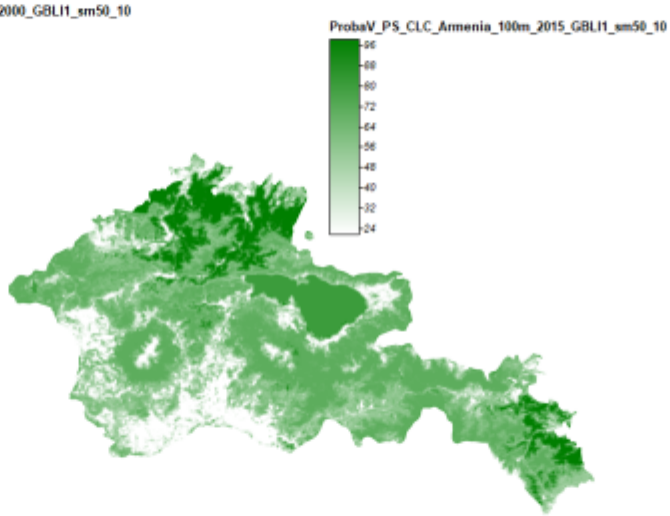
Land Accounts for Armenia 2000-2015

		11	21	22	24	26	31	32	33	34	35	36	41	51	
		Urban/artificial	Agriculture arable land	Permanent crops	Heterogeneous agriculture areas	Pastures & natural grassland	Forests	Shrubland	Bare rocks, sand, burnt areas	Mixed natural areas, transitions	Permanent snow & glaciers	Sparse vegetation areas	Open wetlands	Inland water	Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Total LC stock 2000		187292	369629	27108	71181	1296672	228536	683489	76891	22134	76	1466	294	128411	2963027
1	lcf1	Urban sprawl/Artificial development	1	1234	472	2682	873	133	2023	731	272	0	18	17	22	11628
2	lcf2	Agriculture extention	24	0	1	8787	34500	2582	5575	1486	1555	0	341	32	530	53391
3	lcf3	Internal conversions	1	3225	3118	0	0	0	1	0	0	0	1	0	0	6346
4	lcf4	Management and alteration of forested land	0	0	0	0	0	5355	888	0	3663	0	0	0	0	10237
5	lcf5	Restoration and development of habitats	0	31355	3874	2268	5295	0	1	4833	0	0	67	0	0	48677
6	lcf6	Change due to natural and multiple causes	-131	3827	-1591	-10133	80266	32734	79345	7461	2971	75	335	-167	954	222884
7	lcf7	Other change N.D.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total LC consumption 2000	374	42971	9155	24158	120244	41442	87754	14587	8255	76	756	216	1456	351394
8	lcf8	No observed change	186879	326656	18024	46923	1236428	287214	395735	61844	13880	0	698	828	127923	2611643
			1	2	3	4	5	6	7	8	9	10	11	12	13	Total
1	lcf1	Urban sprawl/Artificial development	11148	0	0	0	0	0	0	0	0	0	0	0	480	11628
2	lcf2	Agriculture extention	0	35956	5743	11185	0	0	0	0	0	0	0	0	0	53391
3	lcf3	Internal conversions	0	3118	3227	0	0	0	0	0	0	0	0	0	0	6346
4	lcf4	Management and alteration of forested land	0	0	0	0	0	4471	-1534	53	4179	0	0	0	0	10237
5	lcf5	Restoration and development of habitats	0	0	0	8187	28138	7362	4888	0	1236	0	0	0	0	48677
6	lcf6	Change due to natural and multiple causes	0	0	0	0	124471	133	80814	-13954	2264	0	228	222	0	222884
7	lcf7	Other change N.D.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total LC formation 2015	11142	39084	8870	18328	150807	12167	87237	14007	7586	0	229	222	652	351394
8	lcf8	No observed change	186879	326656	18024	46923	1236428	287214	395735	61844	13880	0	698	828	127923	2611643
		Total LC stock 2015	198121	365822	27984	65350	1327003	268061	607672	76001	21634	0	928	300	128606	2 963 027.0

	Urban/artificial	Agriculture arable land	Permanent crops	Heterogeneous agriculture areas	Pastures & natural grassland	Forests	Shrubland	Bare rocks, sand, burnt areas	Mixed natural areas, transitions	Permanent snow & glaciers	Sparse vegetation areas	Open wetlands	Inland water	Total
Losses of ecosystem extent (SEEA)	374	42971	9155	24158	120244	41442	87754	14587	8255	76	756	216	1456	351394
Gains of ecosystem extent (SEEA)	11142	39084	8870	18328	150807	12167	87237	14007	7586	0	229	222	652	351394
Net change	10768	-3887	-185	-5830	30563	-29275	-517	-580	-669	-76	-527	6	-803	0
Net change % 2000	16,03	-1,05	-0,68	-6,76	2,24	-9,24	-0,11	-0,66	-2,52	-100,00	-36,22	0,70	-0,58	0,00
Urban landtake (UNECE EEA) Gross	+11628													
Urban landtake Net	10768	-3887	-185	-5830	30563	-29275	-517	-580	-669	-76	-527	6	-803	0
Land cover turn over	10,73	22,20	66,66	61,18	19,96	16,21	27,33	37,49	71,87	100,00	87,70	91,29	1,86	23,67

GBLI, 2000-2015





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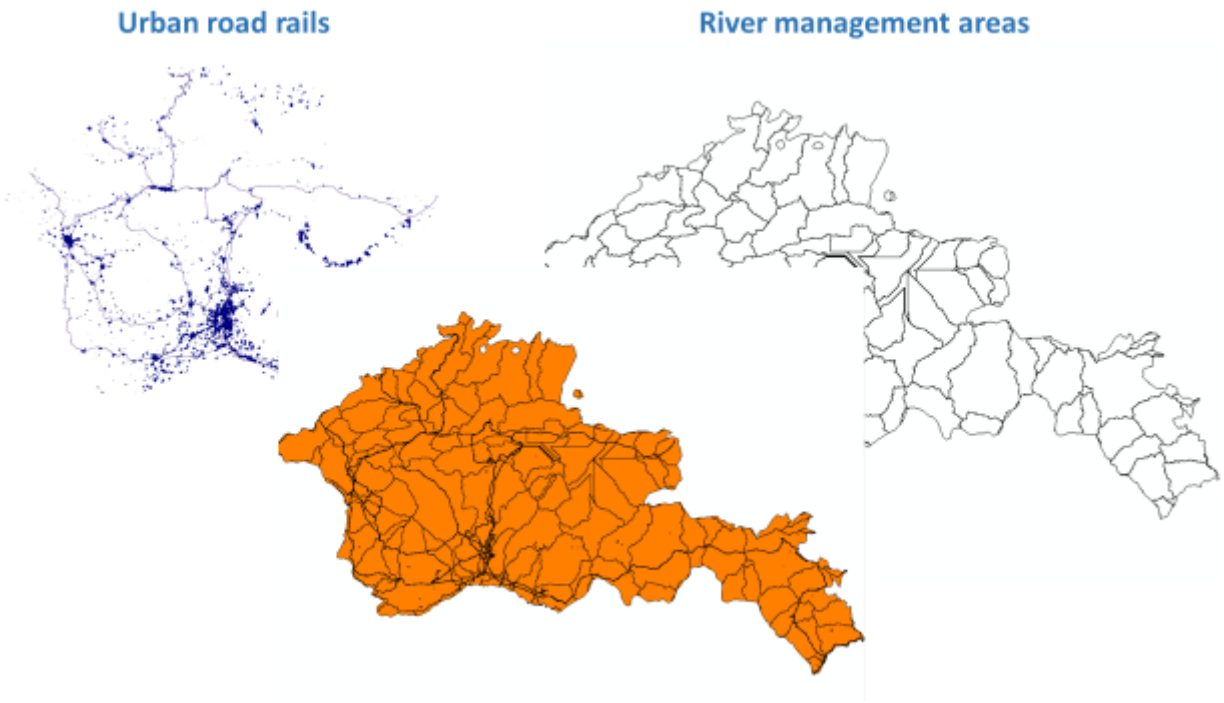

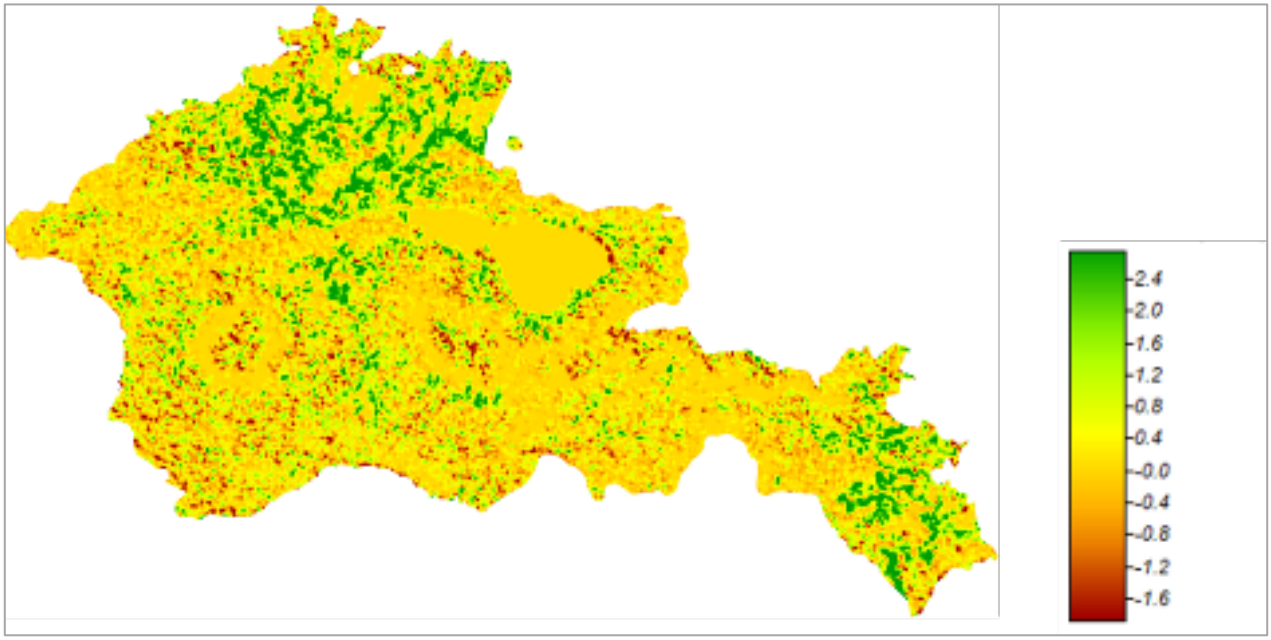

Green Background Landscape Index (GBLI) 2015 Armenia,

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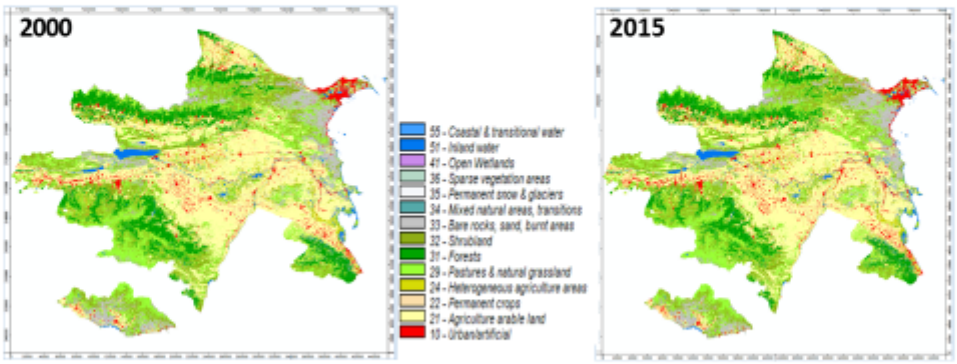
Azerbaijan

Land cover, 2000-2015



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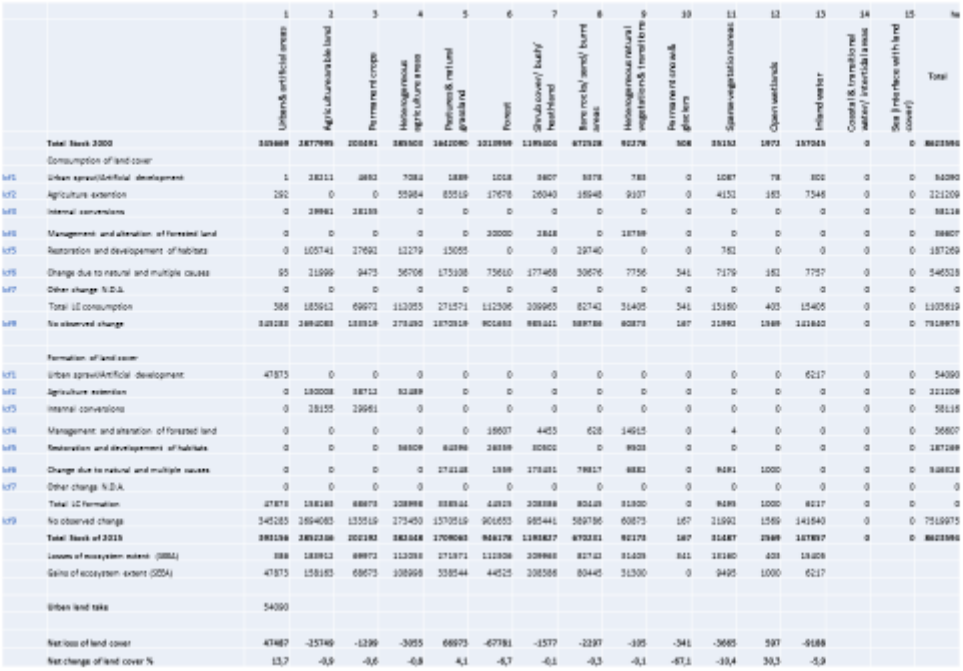
Land accounts of Azerbaijan 2000-2015



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	ha
		Urban & artificial areas	Agriculture arable land	Permanent crops	Heterogeneous agriculture areas	Pastures & natural grassland	Forest	Shrub cover/ bushy/ heathland	Bare rocks/ sand/ burnt areas	Heterogeneous natural vegetation & transitions	Permanent snow & glaciers	Sparse vegetation areas	Open wetlands	Inland water	Coastal & transitional water/ intertidal areas	Sea (interface with land cover)	Total
	Total Stock 2000	**345669**	**2877995**	**203491**	**385503**	**1642090**	**1013959**	**1195600**	**672528**	**92378**	**508**	**35153**	**1973**	**157245**	**0**	**0**	**8623594**
	Consumption of land cover																
lcf1	Urban sprawl/Artificial development	1	28211	1883	7084	1889	1018	8407	9378	783	0	1087	78	831	0	0	60250
lcf2	Agriculture extention	292	0	0	55984	65519	17678	26040	16946	9107	0	4152	183	7546	0	0	121209
lcf3	Internal conversions	0	28961	28155	0	0	0	0	0	0	0	0	0	0	0	0	58116
lcf4	Management and alteration of forested land	0	0	0	0	0	20000	2818	0	18789	0	0	0	0	0	0	39607
lcf5	Restoration and developement of habitats	0	105741	27691	12279	15055	0	0	29740	0	0	782	0	0	0	0	187269
lcf6	Change due to natural and multiple causes	93	21999	9473	36706	175108	75610	177468	30676	7756	541	7179	181	7757	0	0	546518
lcf7	Other change N.E.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total LC consumption	386	183912	69971	112053	271571	112306	209965	82741	36435	541	13180	403	15405	0	0	1103619
lcf8	No observed change	345283	2694083	133519	273450	1370519	901653	985441	589786	60873	167	21992	1569	141840	0	0	7519975
	Formation of land cover																
lcf1	Urban sprawl/Artificial development	47873	0	0	0	0	0	0	0	0	0	0	0	6217	0	0	54090
lcf2	Agriculture extention	0	130008	38712	51189	0	0	0	0	0	0	0	0	0	0	0	221109
lcf3	Internal conversions	0	28155	29961	0	0	0	0	0	0	0	0	0	0	0	0	58116
lcf4	Management and alteration of forested land	0	0	0	0	0	19607	4455	628	14915	0	4	0	0	0	0	39607
lcf5	Restoration and developement of habitats	0	0	0	36809	62396	26339	30802	0	9903	0	0	0	0	0	0	187269
lcf6	Change due to natural and multiple causes	0	0	0	0	271108	1999	179101	79817	6883	0	9181	1000	0	0	0	546518
lcf7	Other change N.E.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total LC formation	47873	158163	68673	108998	338544	44525	214358	80445	31500	0	9185	1000	6217	0	0	0
lcf9	No observed change	345283	2694083	133519	273450	1370519	901653	985441	589786	60873	167	21992	1569	141840	0	0	7519975
	Total Stock of 2015	**393156**	**2852246**	**202192**	**382448**	**1709063**	**946178**	**1198827**	**670231**	**92373**	**167**	**31487**	**2569**	**147957**	**0**	**0**	**8623594**
	Losses of ecosystem extent (SEEA)	386	183913	69973	112053	271571	112306	209965	82741	36435	541	13180	403	15405			
	Gains of ecosystem extent (SEEA)	47873	158163	68673	108998	338544	44525	214358	80445	31500	0	9185	1000	6217			
	Urban land take	54090															
	Net loss of land cover	47487	-25749	-1299	-3055	66973	-67781	-1577	-2297	-936	-541	-3665	597	-9188			
	Net change of land cover %	13,7	-0,9	-0,6	-0,8	4,1	-6,7	-0,1	-0,3	-0,1	-97,1	-10,4	30,3	-5,9			

Land accounts of Azerbaijan 2000-2015

	1	2	3	4	5	6	ha
	Urban & artificial areas	Agriculture arable land	Permanent crops	Heterogeneous agriculture areas	Pastures & natural grassland	Forest	Total
Total Stock 2000	**345669**	**2877995**	**203491**	**385503**	**1642090**	**1013959**	**8623594**
Total LC consumption	**386**	**183912**	**69972**	**112053**	**271571**	**112306**	**1103619**
Total LC formation	**47873**	**158163**	**68673**	**108998**	**338544**	**44525**	**0**
Total Stock of 2015	**393156**	**2852246**	**202192**	**382448**	**1709063**	**946178**	**8623594**
Losses of ecosystem extent (SEEA)	**386**	**183912**	**69972**	**112053**	**271571**	**112306**	
Gains of ecosystem extent (SEEA)	**47873**	**158163**	**68673**	**108998**	**338544**	**44525**	
Urban land take	**54090**						
Net loss of land cover	**47487**	**-25749**	**-1299**	**-3055**	**66973**	**-67781**	
Net change of land cover %	**13,7**	**-0,9**	**-0,6**	**-0,8**	**4,1**	**-6,7**	

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Belarus

Land-cover accounts 2000-2015 in BELARUS

			Urban & artificial areas	Agriculture arable land	Permanent crops	Heterogeneous agriculture areas	Pastures & natural grassland	Forest	Shrub cover/ bush/ heathland	Bare rocks/ sand/burnt areas	Heterogeneous natural vegetation & transitions	Permanent snow & glaciers	Sparse vegetation areas	Open wetlands	Inland water	Coastal & transitional waters/ intertidal areas	Sea (interface with land cover)	Total
	1 lcf1	Urban sprawl/Artificial development	0	72087	1001	18944	9102	5799	6094	130	2559	0	7	167	1018	0	0	107579
	2 lcf2	Agriculture extention	0	0	0	0	0	166832	0	0	0	0	0	0	0	0	0	166832
	3 lcf3	Internal conversions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4 lcf4	Management and alteration of forested land	0	0	0	0	0	27930	7589	0	106987	0	0	0	0	0	0	142926
	5 lcf5	Restoration and development of habitats	0	86809	668	63458	119968	0	0	0	0	0	0	0	0	0	0	270863
	6 lcf6	Change due to natural and multiple causes	830	0	0	0	0	4081	0	46	0	0	7	557	5551	0	0	10611
	7 lcf7	Other change N.D.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		Total consumption	830	158896	1669	73402	129070	204252	14083	176	109546	0	14	684	6569	0	0	696832
	9 lcf9	No-observed change	547825	6546252	30890	718425	2586301	8498259	521147	6197	264859	0	50	46245	262150	0	0	20098574
		Total	548655	6705148	32560	791867	2715371	8702548	535230	6373	374405	0	64	46929	268719	0	0	20795006
	1 lcf1	Urban sprawl/Artificial development	103751	0	0	0	0	0	0	0	0	0	0	0	1828	0	0	105579
	2 lcf2	Agriculture extention	0	115810	0	50192	0	0	0	0	0	0	0	0	0	0	0	166032
	3 lcf3	Internal conversions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4 lcf4	Management and alteration of forested land	0	0	0	0	0	118976	0	2	27809	0	9	0	0	0	0	142826
	5 lcf5	Restoration and development of habitats	0	0	0	0	0	270863	0	0	0	0	0	0	0	0	0	270863
	6 lcf6	Change due to natural and multiple causes	0	0	0	0	3986	6618	0	0	0	0	0	0	95	0	0	10611
	7 lcf7	Other change N.D.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		Total formation	103751	115810	0	50192	3986	396457	0	2	27809	0	9	0	95	1828	0	698932
	9 lcf9	No-observed change	547825	6546252	30890	718425	2586301	8498259	521147	6197	264859	0	50	46245	262150	0	0	20098574
		Total Stock	651576	6662062	30890	768617	2590287	8894716	521147	6199	292668	0	59	46245	262245	0	0	20797506
Total	2000	Total LEVER	830	158896	1669	73462	129070	208252	14083	176	109546	0	14	684	6569	0	0	696832
Total	2015	Total GAINS	103751	115810	0	50142	3986	392595	0	2	27809	0	9	95	1828	0	0	696452
		net change	102921	-43086	-1669	-23320	-125084	188118	-14083	-174	-81737	0	-5	-589	-4741	0	0	0
		net change %2000	15.1	-8.6	-5.1	-2.8	-4.6	1.1	-1.7	-2.7	-21.7	0.0	-7.8	-1.4	-1.6	#ДЕЛ/0!	#ДЕЛ/0!	

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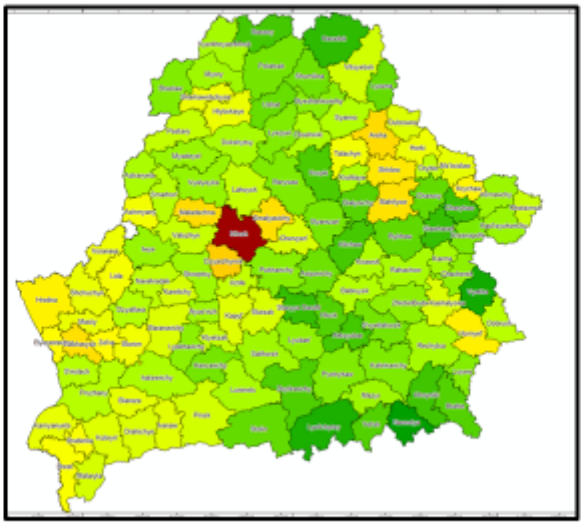
Land cover change matrix

2000 \ 2015	1 Urban & artificial areas	2 Agriculture arable land	3 Permanent crops	4 Heterogeneous agriculture areas	5 Pastures & natural grassland	6 Forest	7 Shrub covert/ bush/ heathland	8 Bare rocks/ sand/ burnt areas	9 Heterogeneous natural vegetation & transitions	10 Permanent snow & glaciers	11 Sparse vegetation areas	12 Open wetlands	13 Inland water	14 Coastal & transitional water/ intertidal areas	15 Sea (interface with land cover)	Opening stock
1 Urban & artificial areas	547835	0	0	0	0	800	0	0	0	0	0	0	0	0	0	548635
Reduction 2 Agriculture arable land	72887	6546252	0	0	0	86909	0	0	0	0	0	0	0	0	0	6705148
3 Permanent crops	1802	0	30890	0	0	668	0	0	0	0	0	0	0	0	0	32560
4 Heterogeneous agriculture areas	30044	0	0	713425	0	63418	0	0	0	0	0	0	0	0	0	783887
5 Pastures & natural grassland	9102	0	0	0	2586266	119968	0	0	0	0	0	0	0	0	0	2715336
6 Forest	3941	115410	0	51542	3966	8498293	0	3	27889	0	9	95	1828	0	0	8702545
7 Shrub covert/ bush/ heathland	6094	0	0	0	0	7989	525147	0	0	0	0	0	0	0	0	539230
8 Bare rocks/ sand/ burnt areas	130	0	0	0	0	46	0	6187	0	0	0	0	0	0	0	6373
9 Heterogeneous natural vegetation & transitions	2599	0	0	0	0	136967	0	0	264899	0	0	0	0	0	0	379965
10 Permanent snow & glaciers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 Sparse vegetation areas	7	0	0	0	0	3	0	0	0	0	58	0	0	0	0	64
12 Open wetlands	567	0	0	0	0	517	0	0	0	0	0	40245	0	0	0	40329
13 Inland water	1838	0	0	0	0	5151	0	0	0	0	0	0	262350	0	0	269339
14 Coastal & transitional water/ intertidal areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 Sea (interface with land cover)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closing stock	651576	6661662	30890	765567	2590247	8898663	525147	6190	292678	0	58	40340	264178	0	0	0
												778 983 ha	Remain			20707806 h
												19 times		Country DATA		20708000 h

Green Background Landscape Index (GBLI), 2015



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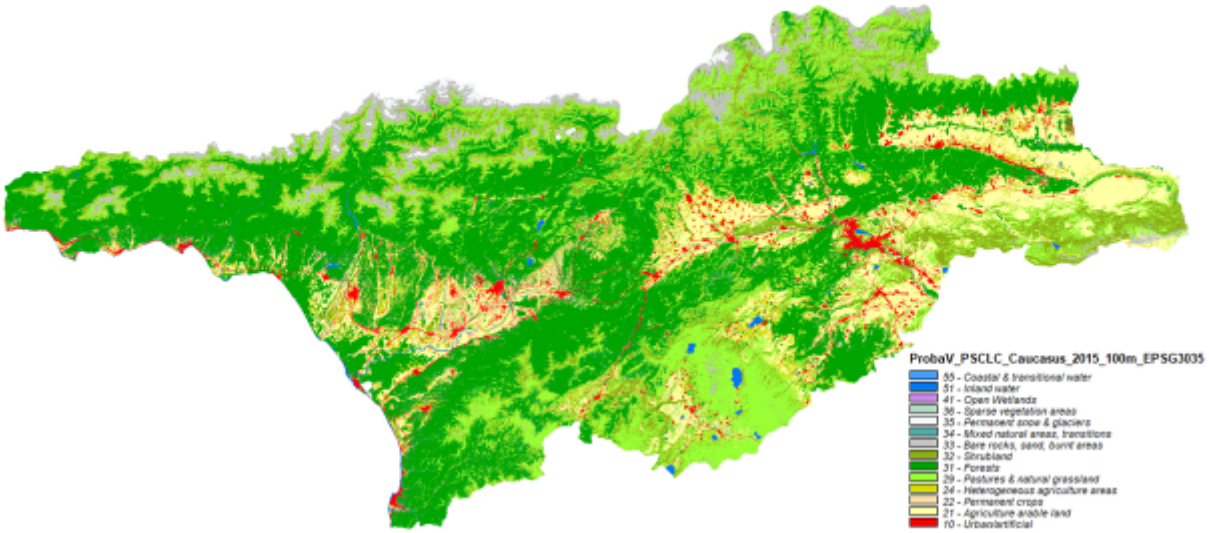
AGRICULTURAL RESEARCH FOR DEVELOPMENT

25 1994-2019 European Environment Agency

Georgia

Land Cover Map 2015



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17 PARTNERSHIPS FOR THE GOALS

Land Cover Change Matrix 2000 - 2015

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
			10	21	22	24	29	31	32	33	34	35	36	41	51	55	99	
			Urban & artificial areas	Agriculture arable land	Permanent crops	Heterogeneous agriculture areas	Pastures & natural grassland	Forest	Shrub cover/ bush/ heathland	Bare rocks/ sand/ burnt areas	Heterogeneous natural vegetation & transitions	Permanent snow & glaciers	Sparse vegetation areas	Open wetlands	Inland water	Coastal & transitional water/ intertidal areas	Sea (interface with land cover)	Total
1	10	Urban & artificial areas	170657	180	202	173	80	44	129	7	59	0	0	0	69	0	0	171600
2	21	Agriculture arable land	9716	719655	17418	27605	18352	8154	4336	1075	3734	0	40	102	402	0	0	810587
3	22	Permanent crops	4630	16845	102507	11580	6672	1601	4042	384	1287	0	5	136	152	0	0	149841
4	24	Heterogeneous agriculture areas	7068	27668	12038	219958	14662	14887	4442	514	5680	0	14	60	552	0	0	307543
5	29	Pastures & natural grassland	934	17567	6588	12894	1077982	24506	108284	15204	4681	2	43	1282	310	0	0	1265277
6	31	Forest	2373	9109	2124	18770	183563	2763329	9674	1072	37618	0	8	35	674	0	0	3028349
7	32	Shrub cover/ bush/ heathland	2597	4021	4020	4137	106221	6155	583516	11104	2420	0	122	321	186	0	0	724820
8	33	Bare rocks/ sand/ burnt areas	245	1056	387	415	16133	867	11152	225422	258	18	652	590	283	0	0	257458
9	34	Heterogeneous natural vegetation & transitions	1961	3631	1366	6195	7008	33452	2770	305	101579	0	1	8	150	0	0	158222
10	35	Permanent snow & glaciers	0	63	0	4	818	300	1406	20409	187	34438	349	9	3	0	0	57986
11	36	Sparse vegetation areas	0	39	5	9	43	4	70	681	1	1	2007	0	0	0	0	2860
12	41	Open wetlands	25	60	84	36	1029	7	336	529	6	0	1	6970	13	0	0	9096
13	51	Inland water	116	679	243	801	466	803	279	433	134	0	3	57	36818	0	0	40832
14	55	Coastal & transitional water/ intertidal areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	99	Sea (interface with land cover)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total	200322	800573	146982	302575	1433029	2854109	725416	277135	157444	34459	3245	9570	39612	0	0	0

Land Cover Accounts 2000 -2015 (Copernicus PS-CLC reclassified)

LAND COVER ACCOUNTS 2000_2015 Data source : Copernicus PS-CLC reclassified Country : Georgia	Urban & artificial areas	Agriculture arable land	Permanent crops	Heterogeneous agriculture areas	Pastures & natural grassland	Forest	Shrub cover/ bush/ heathland	Bare rocks/ sand/ burnt areas	Heterogeneous natural vegetation & transitions	Permanent snow & glaciers	Sparse vegetation areas	Open wetlands	Inland water	Coastal & transitional water/ intertidal areas	Sea (interface with land cover)	Total
Urban sprawl/Artificial development	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0	[illegible]	[illegible]	0	0	[illegible]
Agriculture extension	[illegible]	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	0	0	[illegible]
Internal conversions	0	17418	16845	0	0	0	0	0	0	0	0	0	0	0	0	34263
Management and alteration of forested land	0	0	0	0	0	48371	6155	0	33451	0	0	0	0	0	0	87979
Restoration and development of habitats	0	[illegible]	[illegible]	[illegible]	[illegible]	0	0	[illegible]	0	0	70	0	0	0	0	[illegible]
Change due to natural and multiple causes	319	5551	4567	19691	124496	183598	120188	18518	10090	23481	730	1908	2175	0	0	515315
Other change N.D.A.	0	0	0	0	0	0	0	0	0	67	0	0	0	0	0	67
No observed change	170657	719655	102507	219958	1077982	2763329	583516	225422	101579	34438	2007	6970	36818	0	0	[illegible]
STOCK LAND COVER 2000	171600	810587	149841	307543	1265277	3028349	724820	257458	158222	57986	2860	9096	40832	0	0	6984471
Urban sprawl/Artificial development	[illegible]	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0	0	[illegible]
Agriculture extension	0	[illegible]	[illegible]	[illegible]	0	0	0	0	0	0	0	0	0	0	0	[illegible]
Internal conversions	0	16845	17418	0	0	0	0	0	0	0	0	0	0	0	0	34263
Management and alteration of forested land	0	0	0	0	0	39607	9674	1071	37618	0	8	0	0	0	0	87979
Restoration and development of habitats	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	0	0	0	0	0	0	[illegible]
Change due to natural and multiple causes	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21	[illegible]	[illegible]	[illegible]	0	0	[illegible]
Other change N.D.A.	0	65	0	4	0	0	0	0	0	0	0	0	0	0	0	67
No observed change	170657	719655	102507	219958	1077982	2763329	583516	225422	101579	34438	2007	6970	36818	0	0	[illegible]
STOCK LAND COVER 2015	200322	800573	146982	302575	1433029	2854109	725416	277135	157444	34459	3245	9570	39612	0	0	6984471
Total losses	943	90932	47334	87585	187295	265020	141304	32036	56843	23548	853	2126	4014	0	0	
Total gains	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21	[illegible]	[illegible]	[illegible]	0	0	
Net change	28722	-10014	-2859	-4968	167752	-174240	596	19677	-778	-23527	385	474	-1220	0	0	
Net change % 2000	17%	-1%	-2%	-2%	13%	-6%	0%	8%	0%	-41%	13%	5%	-3%	#DIV/0!	#DIV/0!	
Total turnover	30608	171850	91809	170201	542342	355800	283204	83749	112908	23569	2091	4726	6808	0	0	

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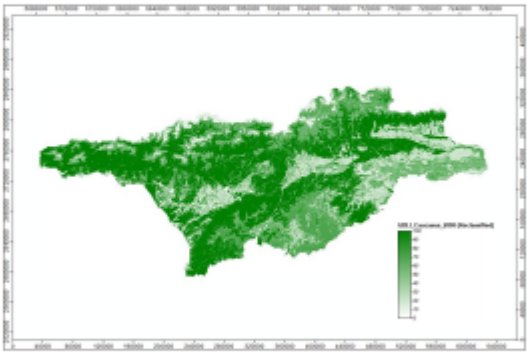
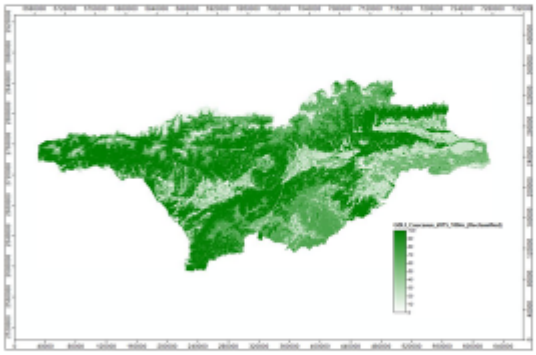
Green Background Landscape Indicator (GBLI)

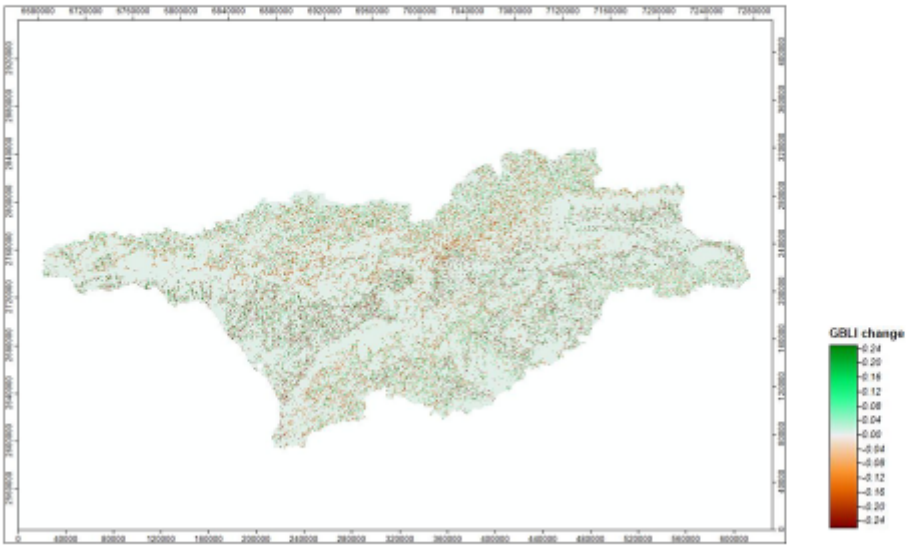
Green Background Landscape Indicator 2000 y.



Green Background Landscape Indicator 2015 y.



Green Background Landscape Indicator Change, 2000-2015



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Moldova

Moldova: Land cover accounts

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
			Urban & artificial areas	Agriculture arable land	Permanent crops	Heterogeneous agriculture areas	Pastures & natural grassland	Forest	Shrub cover/ bushy/ heathland	Bare rocks/ sand/ burnt areas	Heterogeneous natural vegetation & transitions	Permanent snow & glaciers	Sparse vegetation areas	Open wetlands	Inland water	Coastal & transitional water/ intertidal areas	Sea [interface with land cover]	Total
		total stock land cover 2000	216529	2117629	53196	252390	393587	348696	34181	2529	13093	0	17	3520	52096	0	0	3464864
1	b11	Urban sprawl/Artificial development	0	19358	3427	4844	1323	349	388	24	512	0	0	1	389	0	0	27625
2	b12	Agriculture extention	0	0	0	0	0	17435	0	0	0	0	0	0	0	0	0	17435
3	b13	Internal conversions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	b14	Management and alteration of forested land	0	0	0	0	0	610	261	0	4122	0	0	0	0	0	0	4993
5	b15	Restoration and development of habitats	0	10680	108	5864	5658	0	0	0	0	0	0	0	0	0	0	21310
6	b16	Change due to natural and multiple causes	29	0	0	0	0	298	0	0	0	0	0	4	396	0	0	726
		total LC consumption 2000	29	29946	3627	9939	6981	18691	859	24	4234	0	0	5	785	0	0	72569
9	b19	No observed change	216492	2088283	52179	242451	385706	330005	33323	5496	13059	0	17	3515	50311	0	0	3392180
1	b11	Urban sprawl/Artificial development	27518	0	0	0	0	0	0	0	0	0	0	0	87	0	0	27626
2	b12	Agriculture extention	0	15721	0	1713	0	0	0	0	0	0	0	0	0	0	0	17434
4	b14	Management and alteration of forested land	0	0	0	0	0	4305	0	0	610	0	0	0	0	0	0	4993
5	b15	Restoration and development of habitats	0	0	0	0	0	21310	0	0	0	0	0	0	0	0	0	21310
6	b16	Change due to natural and multiple causes	0	0	0	0	288	438	0	0	0	0	0	20	0	0	0	726
		total LC formation 2015	27518	15721	0	1713	288	26041	0	0	610	0	0	20	87	0	0	72098
9	b19	No observed change	216492	2088283	52179	242451	385706	330005	33323	5496	13059	0	17	3515	50311	0	0	3392180
		total stock land cover 2015	244010	2104004	52179	244164	385994	356446	33323	5496	13669	0	17	3535	50398	0	0	
		losses of ecosystem extent(b61&)	29	29946	3627	9939	6981	18691	859	24	4234	0	0	5	785	0	0	
		Gains of ecosystem extent(b62&)	27518	15721	0	1713	288	26041	0	0	610	0	0	20	87	0	0	
		urban land take (UNECE 11&)	27625															
		Net loss of land cover	27518	-15721	-3627	-8215	-6693	7950	-859	-24	-3624	0	0	5	-698	0	0	
		Net change of land cover% 2000	12,71%	-0,65%	-3,06%	-3,26%	-1,79%	3,30%	-2,51%	-1,58%	-16,89%	0,00%	0,00%	0,14%	-1,37%	0,00%	0,00%	
		Land cover turn-over	12,71%	2,13%	3,06%	4,61%	1,85%	18,23%	2,51%	1,58%	34,98%	0,00%	0,00%	0,43%	1,71%	0,00%	0,00%	

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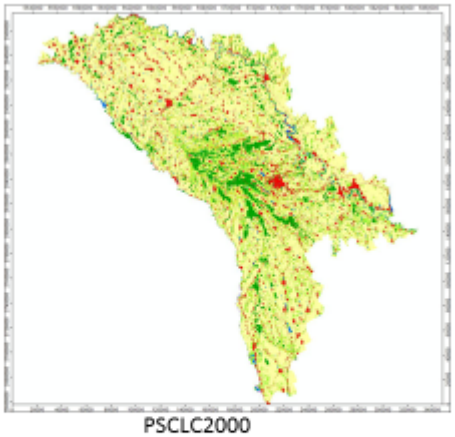
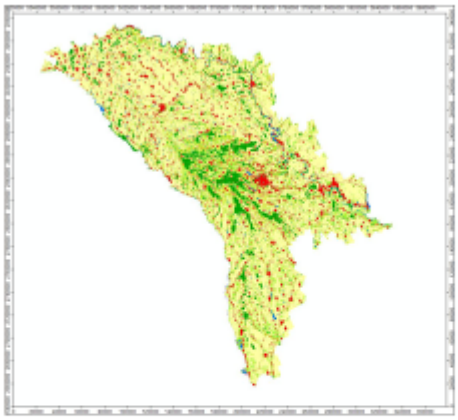
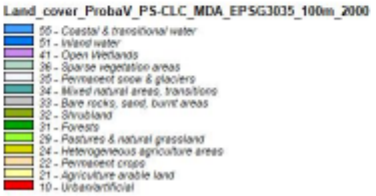
Moldova: CLC 2000 and CLC 2015



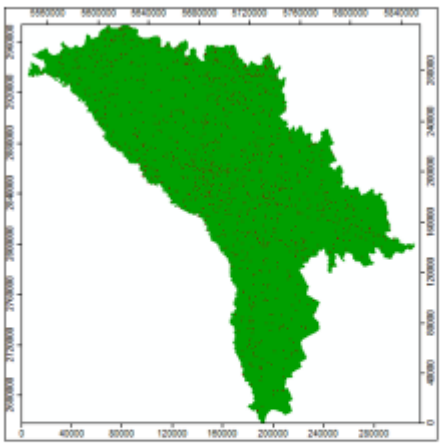
PSCLC2000



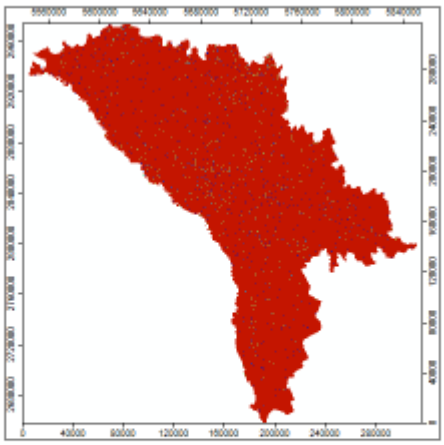
PSCLC2015



Land account: CLC Consumption 2000 and CLC Formation 2015



CLC Consumption 2000



CLC Formation 2015

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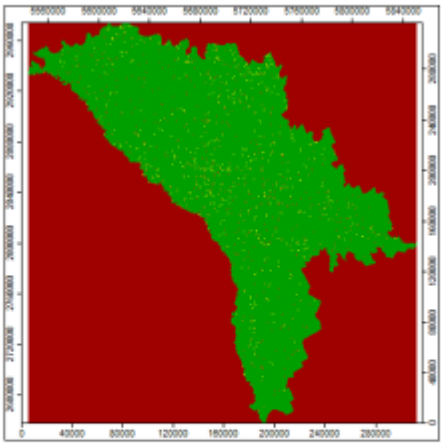
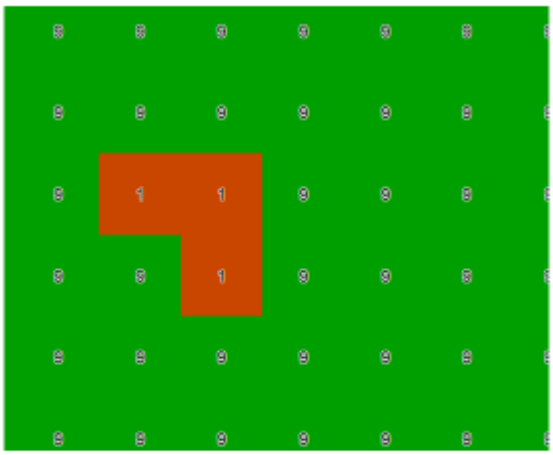
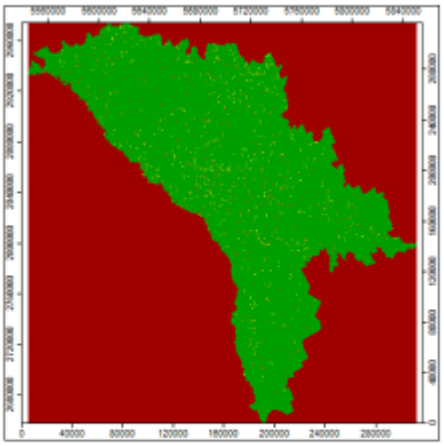
CLC Flows 2000:2015

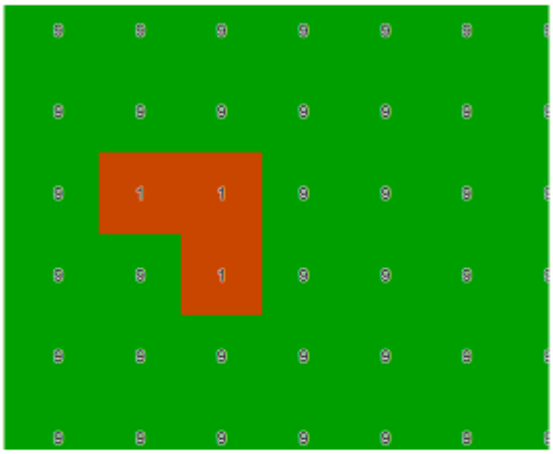




	Icf_ID	Icf_Code	Icf_Name
1	1	Icf1	Urban sprawl/Artificial development
2	2	Icf2	Agriculture extention
3	3	Icf3	Internal conversions
4	4	Icf4	Management and alteration of forested land
5	5	Icf5	Restoration and developement of habitats
6	6	Icf6	Change due to natural and multiple causes
7	7	Icf7	Other change N.D.A.
8	9	Icf9	No observed change

CLC Flows 2000:2015





	Icf_ID	Icf_Code	Icf_Name
1	1	Icf1	Urban sprawl/Artificial development
2	2	Icf2	Agriculture extention
3	3	Icf3	Internal conversions
4	4	Icf4	Management and alteration of forested land
5	5	Icf5	Restoration and developement of habitats
6	6	Icf6	Change due to natural and multiple causes
7	7	Icf7	Other change N.D.A.
8	9	Icf9	No observed change

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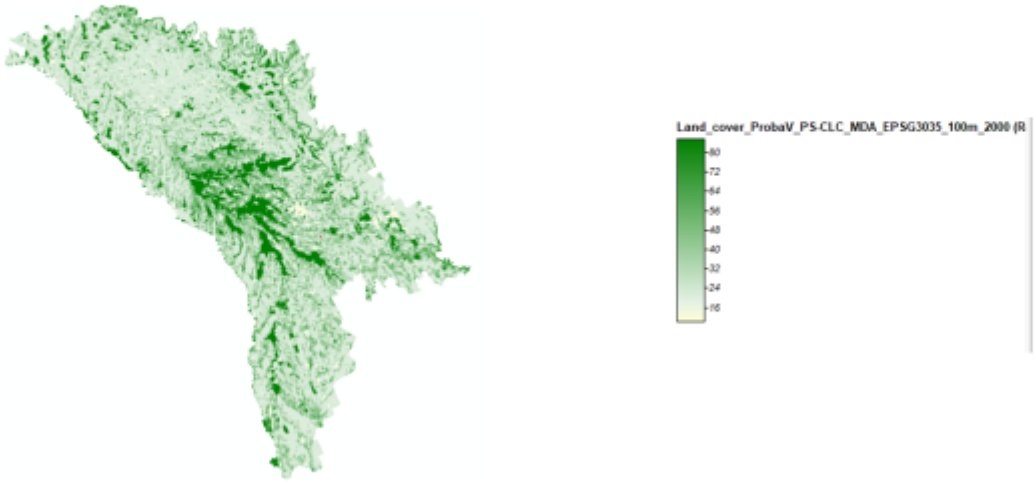
Green Background Landscape Index, 2000



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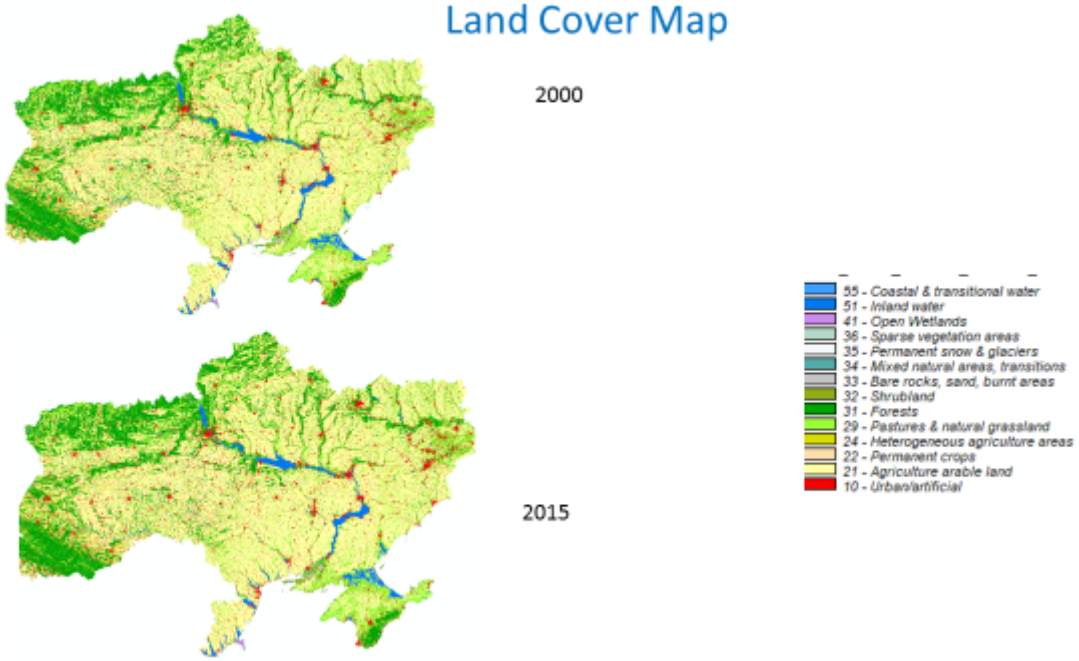
Ukraine

Land Cover Map



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Land cover accounts

Land cover	Urban & artificial areas	Agriculture arable land	Permanent crops	Heterogeneous agriculture areas	Pastures & natural grassland	Forest	Shrub cover/ bush/ heathland	Bare rocks/ sand/ burnt areas	Heterogeneous natural vegetation & transitions	Permanent snow & glaciers	Sparse vegetation areas	Open wetlands	Inland water	Coastal & transitional water/ intertidal areas	Sea (interface with land cover)	Total
Total_Cross_2000	2632855	31845890	309799	2574680	9502989	8865070	2223878	124985	652602	0	1250	48154	1564472	0	0	60071802
Urban sprawl/Artificial development	0	248869	8512	58081	57029	13098	51818	818	7304	0	73	100	8369	0	0	453768
Agriculture extention	0	0	0	0	0	328911	0	0	0	0	0	0	0	0	0	328911
Internal conversions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Management and alteration of forested land	0	0	0	0	0	33303	22591	0	170018	0	0	0	0	0	0	225912
Restoration and developement of habitats	0	199749	1215	86178	182290	0	0	0	0	0	0	0	0	0	0	469432
Change due to natural and multiple causes	1944	0	0	0	0	12958	0	287	0	0	18	39	5550	0	0	22771
Other change N.D.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total_Consumption_2000	2634799	32292506	319526	2518959	9742308	9285157	2298082	126065	829925	0	1320	48295	1578591	0	0	61575591
No observed change	2630911	31399471	300072	2230421	9263870	8500903	2149674	123905	475279	0	1160	48015	1550353	0	0	58569810

Land cover	Urban & artificial areas	Agriculture arable land	Permanent crops	Heterogeneous agriculture areas	Pastures & natural grassland	Forest	Shrub cover/ bush/ heathland	Bare rocks/ sand/ burnt areas	Heterogeneous natural vegetation & transitions	Permanent snow & glaciers	Sparse vegetation areas	Open wetlands	Inland water	Coastal & transitional water/ intertidal areas	Sea (interface with land cover)	Total
Total_Cross_2015	3084847	31664421	300089	2290366	9278602	9170860	2149674	123922	508416	0	1186	48039	1552195	0	0	60072617
Urban sprawl/Artificial development	453932	0	0	0	0	0	0	0	0	0	0	0	1842	0	0	455774
Agriculture extention	1	268949	17	59945	0	0	0	0	0	0	0	0	0	0	0	328912
Internal conversions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Management and alteration of forested land	0	0	0	0	0	192710	0	19	33137	0	46	0	0	0	0	225912
Restoration and developement of habitats	0	0	0	0	0	469432	0	0	0	0	0	0	0	0	0	469432
Change due to natural and multiple causes	2	0	0	0	14932	7818	0	0	0	0	0	24	0	0	0	22776
Other change N.D.A.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total_Formation_2015	3538783	31933370	300106	2350311	9293534	9840817	2149674	123941	541553	0	1232	48063	1554037	0	0	61575421
No observed change	2630911	31399471	300072	2230421	9263870	8500903	2149674	123905	475279	0	1160	48015	1550353	0	0	58569810
Total losses	1944	448418	9727	144259	239319	392167	74204	1080	177323	0	90	139	14119	0	0	1502789
Total gains	453936	268949	17	59945	14932	669957	0	19	33137	0	46	24	1842	0	0	1502804
Net change	451992	-179469	-9710	-84314	-224387	277790	-74204	-1061	-144186	0	-44	-115	-12277	0	0	15

Total losses	1944	448418	9727	144259	239319	392167	74204	1080	177323	0	90	139	14119	0	0	1502789
Total gains	453936	268949	17	59945	14932	669957	0	19	33137	0	46	24	1842	0	0	1502804
Net change	451992	-179469	-9710	-84314	-224387	277790	-74204	-1061	-144186	0	-44	-115	-12277	0	0	15
Net change %2000	17,2	-0,6	-4,6	-3,6	-2,4	3,1	-3,3	-0,8	-22,1		-3,6	-0,2	-0,8			0,0

Land Cover Classes' Changes for 2000 -2015

- ❖Urban area expansion - 17% (452 thsd, ha)
- ❖Loss of agriculture arable land area - 0,6% (179 thsd, ha)
- ❖Loss of permanent crops - 5% (9,7 thsd, ha)
- ❖Loss of Pastures & natural grassland area -2,4 % (224 thsd, ha)

Transformation to Urban & artificial areas:

- ❖**Agriculture arable land - 249 thsd, ha**
- ❖**Permanent crops - 8,5 thsd,ha**
- ❖**Heterogeneous agriculture areas - 58 thsd,ha**
- ❖**Pastures & natural grassland - 57 thsd,ha**
- ❖**Forest -13,3 thsd,ha**
- ❖**Shrub cover/ bush/ heathland - 52 thsd,ha**
- ❖**Heterogeneous natural vegetation & transitions - 7,3 thsd,ha**

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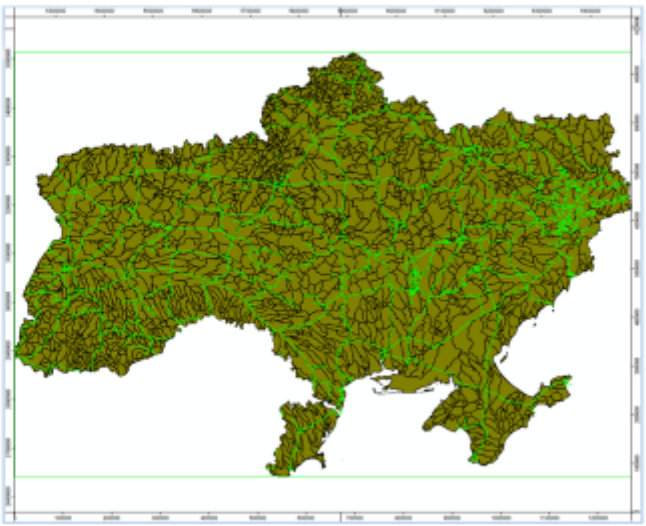
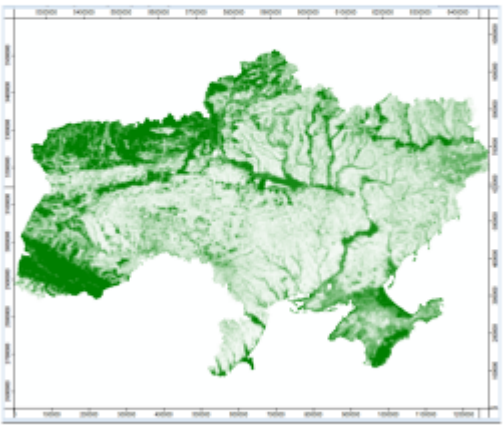
River basins and road nets Map



Green Background Land scape Index

2000



2015

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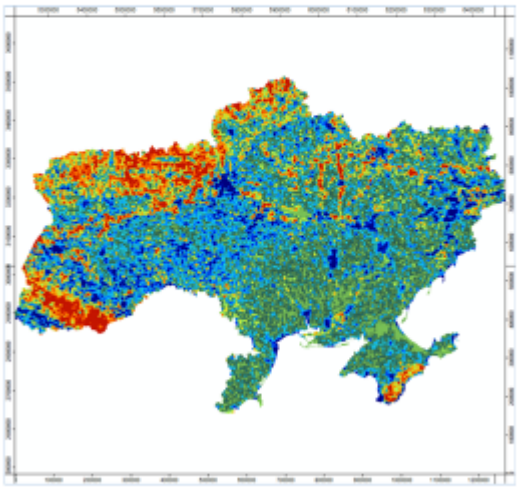
17 PARTNERSHIPS FOR THE GOALS

Green Background Land scape Index 2000 -2015



On the North and West of Ukraine, on the Eastern part of Autonomous Republic of Crimea - high biomass productivity

On the South of Ukraine – stable biomass productivity

In Central Part of Ukraine – low biomass productivity

Protected Areas Map

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National road maps for SEEA implementation for land module

The overall programme included the development of national road maps for the SEEA implementation of land cover accounts and land cover change accounts as first module.

The experts from the six Eastern countries have shown strong interest for continuation:

- Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine are interested in implementation of environmental accounting and starting from land accounts.
- In order to facilitate the SEEA land accounts methodology implementation there was an explicit request for CLC for these countries.
- Finding the right institutional arrangement and funding to use the Copernicus services via sharing EU knowledge in the context of building a new project under EU ENI cooperation is on the agenda.

Compilation of land cover accounts with land data is a basis for building environmental information system at the country level. The overall improvement of the first provisional land accounts will streamline development of the basic accounting infrastructure to facilitate further implementation of modules in the SEEA framework. Their operationalisation require further developments in terms of data improvement, capacity building and institutional cooperation necessary for annual updates. The future activities need to follow a tiered approach, which allows the progressive implementation of environmental accounts with intermediate milestones and products of interest for policymaking.

The vocational training has supported the strengthening environmental accounting and statistics, in particular through the application of the UN System of Environmental-Economic Accounting and the revised UN Framework for the Development of Environment Statistics standards and the development of institutional capacities on environmental assessments and reporting of the six Eastern Partnership countries' representatives under ENI cooperation.

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Azerbaijan ***Objective***	***Data sets/accounts***	***Tasks to the accountant***
Step 1: Create the data infrastructure needed for accounting		
Collect reference geographical data sets and create the database needed for environmental accounting	Geographical features/zonings • Physical boundaries (coastline, river basins and sub-basin limits, climate zoning, elevation classes) • Administrative boundaries (municipalities, districts, regions) • Transport network • Hydrological network, rivers, aquifers • Sea/fisheries zoning(s) Regular grid(s) for accounting (1 ha and 1 km2)	*Collect the basic geographical layers that will structure the physical accounts from relevant organisations. Check their consistency (geometry, projection). Produce a set of regular grids (based on official geographical standards).* *Create the database needed for environmental accounting: terrestrial ecosystems, rivers, marine coastal units and other sea accounting units* *(NB: requires land cover map for the baseline year)*
Step 2: Collect the basic data sets		
Collect the basic data sets for environmental accounting: **monitoring data and statistics**	• Land cover and land use • Land cover change (including marine coastal areas) • Meteorological data • Hydrological data • Soil data • Data on forest stocks and growth • Population data • Regular agriculture, forestry and fishery statistics • Data/statistics on water use • Indicators on species and systems biodiversity • Energy balances • Environment protection expenditures statistics	*Produce a consistent multi-annual (10- to 20-year period) land cover map/database using satellite images and other sources available (forest maps, cadastre, buildings and roads, etc.).* *Collect and organise the various sets of data and statistics needed for accounting. Population and housing census, Agriculture survey and census, business survey, other type survey and census data, and other governmental organizations information on land* *Official data sources are given priority: official statistics, meteorological data, hydrological data, etc., where available accounts produced for IPCC reporting, REDD+, SEEA-water, etc., are important inputs.* *Satellite data sometimes as second best.* *Administrative sources – cadastre maintained by a land registry office, tax authorities, or land information centre*
Step 3: Produce the core accounts		
Produce the core environmental accounts-land	• Land cover account • Land cover change account • Land use account	*Compile the accounts with basic data collected at step 2, additional data for specific items and physical data modelling* *Geo-process data sets.* *Estimate of missing data.* *Integrate the accounts and assess terrestrial ecosystem degradation and other sustainability issues.*
Step 4: Land accounts in physical units		
Land accounts in physical units	• Accounts integration, assessment of terrestrial ecosystem degradation, depreciation and enhancement of land • Social demand for land resource (by accounting units, municipalities, regions, etc.)	*Targeted, detailed mapping and analysis to be carried out with statistical offices, planning agencies, environment agencies, research sector, etc., of land use of particular importance and their social use.* *Assessment of land use sustainability.*
Step 5: Land accounts in monetary units		
Valuation of depreciation, benefits and restoration costs in monetary units	• Valuation of land use • Assessment of restoration costs • Accountability of economic sectors to capital degradation/enhancement • Degradation embedded in trade	*Economic analysis of land use in monetary value.* *Economic analysis of remediation costs (restoration works, alleviation, opportunity costs of reducing pressure on the environment, etc.).* *Assessment of terrestrial ecosystem degradation embedded in international trade*

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Armenia *Objective*	*Data sets/accounts*	*Tasks to the accountant*
Step 1: Create the data infrastructure needed for accounting		
Collect reference geographical data sets and create the database needed for environmental accounting	Geographical features/zonings • Physical boundaries (coastline, river basins and sub-basin limits, climate zoning, elevation classes) • Administrative boundaries (municipalities, districts, regions) • Transport network • Hydrological network, rivers, aquifers • Water basin management Regular grid(s) for accounting (1 ha and 1 km2)	*Collect the basic geographical layers that will structure the physical accounts from relevant organisations. Check their consistency (geometry, projection). Produce a set of regular grids (based on official geographical standards).* *Create the database needed for environmental accounting: f terrestrial ecosystems, rivers, marine coastal units and othe sea accounting units* *(NB: requires land cover map for the baseline year)*
Step 2: Collect the basic data sets		
Collect the basic data sets for environmental accounting: **monitoring data and statistics**	• Land cover and land use • Land cover change (including marine coastal areas) • Meteorological data • Hydrological data • Soil data • Data on forest stocks and growth • Population data • Regular agriculture, forestry and fishery statistics • Data/statistics on water use • Indicators on species and systems biodiversity • Energy balances • Environment protection expenditures statistics • Waste statistics • Air emissions	*Produce a consistent multi-annual (10- to 20-year period) la cover map/database using satellite images and other source available (forest maps, cadastre, buildings and roads, etc.).* *Collect and organise the various sets of data and statistics needed for accounting. Population and housing census, Agriculture survey and census, business survey, other type survey and census data, and other governmental organizatic information on land* *Official data sources are given priority: official statistics, meteorological data, hydrological data, etc., where available accounts produced for IPCC reporting, REDD+, SEEA-water, etc., are important inputs.* *Satellite data sometimes as second best.* *Administrative sources – cadastre maintained by a land registry office, tax authorities, or land information centre*
Step 3: Produce the core accounts		
Produce the core environmental accounts-land	• Land cover account • Land cover change account • Land use account	*Compile the accounts with basic data collected at step 2, additional data for specific items and physical data modelling* *Geo-process data sets.* *Estimate of missing data.* *Integrate the accounts and assess terrestrial ecosystem degradation and other sustainability issues.*
Step 4: Land accounts in physical units		
Land accounts in physical units	• Accounts integration, assessment of terrestrial ecosystem degradation, depreciation and enhancement of land • Social demand for land resource (by accounting units, municipalities, regions, etc.)	*Targeted, detailed mapping and analysis to be carried out w statistical offices, planning agencies, environment agencies, research sector, etc., of land use of particular importance ar their social use.* *Assessment of land use sustainability.*
Step 5: Land accounts in monetary units		
Valuation of depreciation, benefits and restoration costs in monetary units	• Valuation of land use • Assessment of restoration costs • Accountability of economic sectors to capital degradation/enhancement • Degradation embedded in trade	*Economic analysis of land use in monetary value.* *Economic analysis of remediation costs (restoration works, alleviation, opportunity costs of reducing pressure on the environment, etc.).* *Assessment of terrestrial ecosystem degradation embedded international trade*

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Belarus Objective	Data sets/accounts	Tasks to the accountant
Step 1: Assessment of national needs for SEEA implementation		
Analysis of administrative needs and resources for environmental accounting	• Stakeholders interest and needs • Legislative basis • Methodological basis • Institutional resources • Institutional partnership • International experience and expertise	*Assessment and analysis of national interest and need and availability of administrative resources to implement*
Step 2: Create the data infrastructure needed for accounting		
Collect reference geographical data sets and create the database needed for environmental accounting	Geographical features/zonings • Physical boundaries (coastline, river basins and sub-basin limits, climate zoning, elevation classes) • Administrative boundaries (municipalities, districts, regions) • Transport network • Hydrological network, rivers, aquifers • Sea/fisheries zoning(s) Regular grid(s) for accounting (1 ha and 1 km2)	*Collect the basic geographical layers that will structure the physical accounts from relevant organisations. Check their consistency (geometry, projection). Produce a set of regular grids (based on official geographical standards).* *Create the database needed for environmental accounting: t terrestrial ecosystems, rivers, marine coastal units and othe sea accounting units* *(NB: requires land cover map for the baseline year)*
Step 3: Collect the basic data sets		
Collect the basic data sets for environmental accounting: **monitoring data and statistics**	• Land cover and land use • Land cover change (including marine coastal areas) • Meteorological data • Hydrological data • Soil data • Data on forest stocks and growth • Population data • Regular agriculture, forestry and fishery statistics • Data/statistics on water use • Indicators on species and systems biodiversity • Energy balances • Environment protection expenditures statistics	*Produce a consistent multi-annual (10- to 20-year period) la cover map/database using satellite images and other source available (forest maps, cadastre, buildings and roads, etc.).* *Collect and organise the various sets of data and statistics needed for accounting. Population and housing census, Agriculture survey and census, business survey, other type survey and census data, and other governmental organizatio information on land* *Official data sources are given priority: official statistics, meteorological data, hydrological data, etc., where available accounts produced for IPCC reporting, REDD+, SEEA-water, etc., are important inputs.* *Satellite data sometimes as second best.* *Administrative sources – cadastre maintained by a land registry office, tax authorities, or land information centre*
Step 4: Produce the core accounts		
Produce the core environmental accounts- land	• Land cover account • Land cover change account • Land use account	*Compile the accounts with basic data collected at step 2, additional data for specific items and physical data modelling* *Geo-process data sets.* *Estimate of missing data.* *Integrate the accounts and assess terrestrial ecosystem degradation and other sustainability issues.*
Step 5: Land accounts in physical units		
Land accounts in physical units	• Accounts integration, assessment of terrestrial ecosystem degradation, depreciation and enhancement of land • Social demand for land resource (by accounting units, municipalities, regions, etc.)	*Targeted, detailed mapping and analysis to be carried out w statistical offices, planning agencies, environment agencies, research sector, etc., of land use of particular importance ar their social use.* *Assessment of land use sustainability.*
Step 6: Land accounts in monetary units		

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Valuation of depreciation, benefits and restoration costs in monetary units	• Valuation of land use • Assessment of restoration costs • Accountability of economic sectors to capital degradation/enhancement • Degradation embedded in trade	*Economic analysis of land use in monetary value.* *Economic analysis of remediation costs (restoration works, alleviation, opportunity costs of reducing pressure on the environment, etc.).* *Assessment of terrestrial ecosystem degradation embedded international trade*
Step 7: Results analysis and publication of Land accounts		
Analysis and publication of results	• Provisional first results • Template and tables for compilation • Methodology for land accounts • Publication of results	Analysis of provisional results. Construction of templates based on SEEA CF. Use tables for compilation from SEEA CF Implementation of SEEA methodology for land module. Test and approval methodological documents for SEEA implementation of land module. Publication of first results w update on annual basis.

Georgia Objective	*Data sets/accounts*	*Tasks to the accountant*
Step 1: Create the data infrastructure needed for accounting		
Collect reference geographical data sets and create the database needed for environmental accounting	Geographical features/zonings • Physical boundaries (coastline, river basins and sub-basin limits, climate zoning, elevation classes) • Administrative boundaries (municipalities, districts, regions) • Transport network • Hydrological network, rivers, aquifers • Sea/fisheries zoning(s) Regular grid(s) for accounting (1 ha and 1 km2)	*Collect the basic geographical layers that will structure the physical accounts from relevant organisations. Check their consistency (geometry, projection). Produce a set of regular grids (based on official geographical standards).* *Create the database needed for environmental accounting: t terrestrial ecosystems, rivers, marine coastal units and othe sea accounting units* *(NB: requires land cover/land use map for the baseline year*
Step 2: Collect the basic data sets		
Collect the basic data sets for environmental accounting: **monitoring data and statistics**	• Land cover and land use • Land cover change (including marine coastal areas) • Meteorological data • Hydrological data • Soil data • Data on forest stocks and growth • Population data • Poverty data • Regular agriculture, forestry and fishery statistics • Data/statistics on water use • Indicators on species and systems biodiversity • Energy balances • Environment protection expenditures statistics	*Produce a consistent multi-annual (10- to 20-year period) la cover map/database using satellite images and other source available (forest maps, cadastre, buildings and roads, etc.).* *Collect and organise the various sets of data and statistics needed for accounting. Population and housing census, pove survey. Agriculture survey and census, business survey, oth type of survey and census data, and other governmental organizations information on land* *Official data sources are given priority: official statistics, meteorological data, hydrological data, etc., where available accounts produced for IPCC reporting, REDD+, SEEA-water, etc., are important inputs.* *Satellite data sometimes as second best.* *Administrative sources – cadastre maintained by a land registry office, tax authorities, or land information centre*
Step 3: Produce the core accounts		
Produce the core environmental accounts- land	• Land cover account • Land cover change account • Land use account	*Compile the accounts with basic data collected at step 2, additional data for specific items and physical data modelling* *Geo-process data sets.* *Estimate of missing data.* *Integrate the accounts and assess terrestrial ecosystem degradation and other sustainability issues.*
Step 4: Land accounts in physical units		
Land accounts in physical units	• Accounts integration, assessment of terrestrial ecosystem degradation, depreciation and enhancement of land • Social demand for land resource (by accounting units, municipalities, regions, etc.)	*Targeted, detailed mapping and analysis to be carried out w statistical offices, planning agencies, environment agencies, research sector, etc., of land use of particular importance ar their social use.* *Assessment of land use sustainability.*
Step 5: Land accounts in monetary units		
Valuation of depreciation, benefits and restoration costs in monetary units	• Valuation of land use • Assessment of restoration costs • Accountability of economic sectors to capital degradation/enhancement • Degradation embedded in trade	*Economic analysis of land use in monetary value.* *Economic analysis of remediation costs (restoration works, alleviation, opportunity costs of reducing pressure on the environment, etc.).* *Assessment of terrestrial ecosystem degradation embedded international trade*

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Moldova Objective	*Data sets/accounts*	*Tasks to the accountant*
Step 1: Create the data infrastructure and national legislation needed for accounting		
Collect reference geographical data sets and create the database needed for environmental accounting with development and endorsement of national strategy for SEEA	Geographical features/zonings • Physical boundaries (coastline, river basins and sub-basin limits, climate zoning, elevation classes) • Administrative boundaries (municipalities, districts, regions) • Transport network • Hydrological network, rivers, aquifers • Fisheries zoning(s) Regular grid(s) for accounting (1 ha and 1 km2) • National legislation and normative/administrative mechanisms	*Collect the basic geographical layers that will structure the physical accounts from relevant organisations. Check their consistency (geometry, projection). Produce a set of regular grids (based on official geographical standards).* *Create the database needed for environmental accounting: t terrestrial ecosystems, rivers and other sea accounting units* *(NB: requires land cover map for the baseline year)* Endorse national legislation and normative mechanisms to support SEEA implementation, example of the EU Strategy f SEEA implementation, February 2019
Step 2: Collect the basic data sets		
Collect the basic data sets for environmental accounting: **monitoring data and statistics**	• Land cover and land use • Land cover change (including marine coastal areas) • Meteorological data • Hydrological data • Soil data • Data on forest stocks and growth • Population data • Regular agriculture, forestry and fishery statistics • Data/statistics on water use • Indicators on species and systems biodiversity • Energy balances • Environment protection expenditures statistics	*Produce a consistent multi-annual (10- to 20-year period) la cover map/database using satellite images and other source available (forest maps, cadastre, buildings and roads, etc.).* *Collect and organise the various sets of data and statistics needed for accounting. Population and housing census, Agriculture survey and census, business survey, other type survey and census data, and other governmental organizatio information on land* *Official data sources are given priority: official statistics, meteorological data, hydrological data, etc., where available accounts produced for IPCC reporting, REDD+, SEEA-water, etc., are important inputs.* *Satellite data sometimes as second best.* *Administrative sources – cadastre maintained by a land registry office, tax authorities, or land information centre*
Step 3: Produce the core accounts		
Produce the core environmental accounts- land	• Land cover account • Land cover change account • Land use account	*Compile the accounts with basic data collected at step 2, additional data for specific items and physical data modelling* *Geo-process data sets.* *Estimate of missing data.* *Integrate the accounts and assess terrestrial ecosystem degradation and other sustainability issues.*
Step 4: Land accounts in physical units		
Land accounts in physical units	• Accounts integration, assessment of terrestrial ecosystem degradation, depreciation and enhancement of land • Social demand for land resource (by accounting units, municipalities, regions, etc.)	*Targeted, detailed mapping and analysis to be carried out w statistical offices, planning agencies, environment agencies, research sector, etc., of land use of particular importance ar their social use.* *Assessment of land use sustainability.*
Step 5: Land accounts in monetary units		
Valuation of depreciation, benefits and restoration costs in monetary units	• Valuation of land use • Assessment of restoration costs • Accountability of economic sectors to capital degradation/enhancement • Degradation embedded in trade	*Economic analysis of land use in monetary value.* *Economic analysis of remediation costs (restoration works, alleviation, opportunity costs of reducing pressure on the environment, etc.).*

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Ukraine Objective	*Data sets/accounts*	*Tasks to the accountant*
Step 1: Create the data infrastructure needed for accounting		
Collect reference geographical data sets and create the database needed for environmental accounting	Geographical features/zonings • Physical boundaries (coastline, river basins and sub-basin limits, climate zoning, elevation classes) • Administrative boundaries (municipalities, districts, regions) • Transport network • Hydrological network, rivers, aquifers • Sea/fisheries zoning(s) Regular grid(s) for accounting (1 ha and 1 km2)	*Collect the basic geographical layers that will structure the physical accounts from relevant organisations. Check their consistency (geometry, projection). Produce a set of regular grids (based on official geographical standards).* *Create the database needed for environmental accounting: t terrestrial ecosystems, rivers, marine coastal units and othe sea accounting units* *(NB: requires land cover map for the baseline year)*
Step 2: Collect the basic data sets		
Collect the basic data sets for environmental accounting: **monitoring data and statistics**	• Land cover and land use • Land cover change (including marine coastal areas) • Meteorological data • Hydrological data • Soil data • Data on forest stocks and growth • Population data • Regular agriculture, forestry and fishery statistics • Data/statistics on water use • Indicators on species and systems biodiversity • Energy balances • Environment protection expenditures statistics	*Produce a consistent multi-annual (10- to 20-year period) la cover map/database using satellite images and other source available (forest maps, cadastre, buildings and roads, etc.).* *Collect and organise the various sets of data and statistics needed for accounting. Population and housing census, Agriculture survey and census, business survey, other type survey and census data, and other governmental organizatio information on land* *Official data sources are given priority: official statistics, meteorological data, hydrological data, etc., where available accounts produced for IPCC reporting, REDD+, SEEA-water, etc., are important inputs.* *Satellite data sometimes as second best.* *Administrative sources – cadastre maintained by a land registry office, tax authorities, or land information centre*
Step 3: Produce the core accounts		
Produce the core environmental accounts- land	• Land cover account • Land cover change account	*Compile the accounts with basic data collected at step 2, additional data for specific items and physical data modelling* *Geo-process data sets.* *Estimate of missing data.* *Integrate the accounts and assess terrestrial ecosystem degradation and other sustainability issues.*
Step 4: Land accounts in physical units		
Land accounts in physical units	• Accounts integration, assessment of terrestrial ecosystem degradation, depreciation and enhancement of land • Social demand for land resource (by accounting units, municipalities, regions, etc.)	*Targeted, detailed mapping and analysis to be carried out w statistical offices, planning agencies, environment agencies, research sector, etc., of land use of particular importance ar their social use.* *Assessment of land use sustainability.*
Step 5: Land accounts in monetary units		
Valuation of depreciation, benefits and restoration costs in monetary units	• Valuation of land use • Assessment of restoration costs • Degradation	*Economic analysis of land use in monetary value.* *Economic analysis of remediation costs (restoration works, alleviation, opportunity costs of reducing pressure on the environment, etc.).* *Assessment of terrestrial ecosystem degradation*

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If you have any questions regarding the 2019 Vocational training, please feel free to contact Dr. D.Babin didier.babin@cirad.fr.

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