EU4Environment in Eastern Partner Countries:
Water Resources and Environmental Data (ENI/2021/425-550)

EU4ENVIRONMENT WATER RESOURCES AND ENVIRONMENTAL DATA

CLC implementation in Moldova (Full coverage)

Funded by
the European Union

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ABOUT THIS REPORT

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IMPRINT

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June 2024

ABOUT EU4ENVIRONMENT – WATER RESOURCES AND ENVIRONMENTAL DATA

This Programme aims at improving people's wellbeing in EU's Eastern Partner Countries and enabling their green transformation in line with the European Green Deal and the Sustainable Development Goals (SDGs). The programme's activities are clustered around two specific objectives: 1) support a more sustainable use of water resources and 2) improve the use of sound environmental data and their availability for policy-makers and citizens. It ensures continuity of the Shared Environmental Information System Phase II and the EU Water Initiative Plus for Eastern Partnership programmes.

The Programme is implemented by five Partner organisations: Environment Agency Austria (UBA), Austrian Development Agency (ADA), International Office for Water (OiEau) (France), Organisation for Economic Co-operation and Development (OECD), United Nations Economic Commission for Europe (UNECE). The action is co-funded by the European Union, the Austrian Development Cooperation and the French Artois-Picardie Water Agency based on a budget of EUR 12,75 million (EUR 12 million EU contribution). The implementation period is 2021-2024.

https://eu4waterdata.eu

CONTENTS

List of abbreviations

ADA	Austrian Development Agency
BQE	Biological Quality Elements
DoA	Description of Action
DG NEAR	Directorate-General for Neighbourhood and Enlargement Negotiations of the European Commission
EaP	Eastern Partners
EC	European Commission
EECCA	Eastern Europe, the Caucasus and Central Asia
EMBLAS	Environmental Monitoring in the Black Sea
EPIRB	Environmental Protection of International River Basins
ESCS	Ecological Status Classification Systems
EU	European Union
EUWI+	European Union Water Initiative Plus
GEF	Global Environmental Fund
ICPDR	International Commission for the Protection of the Danube River
INBO	International Network of Basin Organisations
IOW/OIEau	International Office for Water, France
IWRM	Integrated Water Resources Management
NESB	National Executive Steering Board
NFP	National Focal Point
NGOs	Non-Governmental Organisations
NPD	National Policy Dialogue
OECD	Organisation for Economic Cooperation and Development
RBD	River Basin District
RBMP	River Basin Management Plan
Reps	Representatives (the local project staff in each country)
ROM	Result Oriented Monitoring
ToR	Terms of References
UBA	Umweltbundesamt GmbH, Environment Agency Austria
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
WFD	Water Framework Directive

Country Specific Abbreviations Armenia

EMIC ..... Environmental Monitoring and Information Centre (until January 2020)

HMC ..... Hydrogeological Monitoring Centre (since February 2020)

MNP ..... Ministry of Nature Protection

SCWS ..... State Committee on Water Systems

SWCIS ..... State Water Cadastre Information System of Armenia

WRMA ..... Water Resources Management Agency

Country Specific Abbreviations Azerbaijan

Azersu JSC ..... JSC Water Supply and Sanitation of Azerbaijan

MENR ..... Ministry of Ecology and Natural Resources

WRSA ..... Water Resources State Agency of Ministry of Emergency Situations

Country Specific Abbreviations Georgia

MENRP ..... Ministry of Environment and Natural Resources Protection

NEA ..... National Environment Agency

NWP ..... National Water Partnership

Country Specific Abbreviations Moldova

AAM ..... Agency “Apele Moldovei”

AGMR ..... Agency for Geology and Mineral Resources

AMAC ..... Association of Apacanals

ANRE ..... National Agency for Economic Regulation of the Energy Sector (also regulates WSS)

EAM ..... Environment Agency Moldova

MoAgri ..... Ministry of Agriculture (of the Republic of Moldova)

MoENV ..... Ministry of Environment (of the Republic of Moldova)

Moldova ..... Republic of Moldova

SHS ..... State Hydrometeorological Service

Country Specific Abbreviations Ukraine

MENR ..... Ministry of Ecology and Natural Resources

NAAU ..... National Accreditation Agency of Ukraine

SAWR ..... State Agency of Water Resources

SEMS ..... State Environment Monitoring System

UkrHMC ..... Ukrainian Hydrometeorological Center

Key messages

The realization of the CLC project provide spatial information on different types (classes) of physical land surface coverage in the Republic of Moldova, such as forests, grasslands, arable land, lakes, wetlands, built-up areas. The ability to accurately estimate, for example, forest area, forest losses and gains, as well as to identify clear-cutting sites.

Possibility to assess the gain and loss of water resources, changes in the agro-industrial complex, etc.

Multi-temporal analysis can be useful in dynamic countries as the Republic of Moldova. However, the images must be of different seasons in one year to make optimal use of the possibilities of multi-temporal analysis.

Executive Summary

The Project - ID 20940-C2/MD-Ingeocad-2022/1 “Land and agriculture monitoring CLC implementation in Moldova (Full coverage)” has created CLC maps for Moldova, characterized by 23 out of 44 CORINE Land Cover classes. The main land cover in CLC project in Moldova is agricultural land (pastures, arable land and complex cultivation patterns (66.94%)).

The total area that has changed its land cover between 2018 and 2023 is 1.1% within the entire territory.

CLC-Changes$_{2018\text{-}2023}$ database was derived by visual comparison of IMAGE2018 and IMAGE2023. All changes fulfilling the mapping criteria (> 5 ha, > 100 m boundary displacement) were delineated.

The CLC2018 database was produced by combining the CLC2023 revised and CLC-Changes$_{2018\text{-}2023}$ databases in ArcGIS, followed by a semi-automated process to eliminate polygons smaller than 25 ha.

CLC 2018 and CLC2023 take into account national initiatives to avoid duplications and to increase the use of the database.

Overall, the post-project outputs - land use/land cover and change maps - provide fundamental baseline information for a wide range of spatial planning and monitoring tasks.

No special difficulties were encountered during the project execution. The work was carried out taking into account the knowledge gained during the training and the pilot project.

Moldova is an agrarian country and not all land parcels with small areas are consolidated. When creating CLC they were generalized and aggregated. It would be a good solution to increase spatial resolution of the layers and create new ones with objects with an area of e.g. 5 or 10 hectares.

Updating the data and expanding the layers will create opportunities for more accurate planning, long-term forecasts of development and monitoring of land use in the country, allow to assess risks, develop measures for environmental protection and conservation of forest and water resources.

1. Part I

1.1. Background

CORINE Land Cover (CLC) was specified to standardize data collection on land in Europe to support environmental policy development. The reference year of first CLC inventory was 1990 (CLC1990), and the first update created in 2000. Later, the update cycle become 6 years. The number of participating countries has increased over time – currently includes 33 European Environment Agency (EEA) member countries and six cooperating countries with a total area of over 5.8 Mkm2. Orthocorrected medium / high spatial resolution satellite images provide the geometrical and thematic basis for mapping. In-situ data (topographic maps, ortho-photos and ground survey data) are essential ancillary information. The project is implemented by national teams under the management and quality control (QC) of EEA. The basic technical parameters of CLC have not been changed since the beginning, therefore the results of the different inventories are comparable.

In the early 1980's, the European Commission recognized the need for a comprehensive, detailed, and harmonized dataset on the land cover and land use of the European continent. At that time, national land cover maps were often inconsistent and incomparable across borders, making the prospect of monitoring the European environment at a continental scale all but impossible. In response, the European Commission launched the CORINE (Coordination of Information on the Environment) program in an effort to develop a standardized methodology for producing continent-scale land cover, biotope, and air quality maps. In 1990, the first CORINE Land Cover dataset was produced. Since then, it has become a flagship component of the European Environment Agency's Copernicus Land Monitoring Service, where it has provided essential information on European land cover/land use for over three decades.

In its current form, the CORINE Land Cover (CLC) product offers a pan-European land cover and land use inventory with 44 thematic classes, ranging from broad forested areas to individual vineyards. The product is updated with new status and change layers every six years—with the most recent update made in 2018. CLC serves a multitude of users and has nearly limitless potential and actual applications, including environmental monitoring, land use planning, climate change assessments, and emergency management.

Same as in the other EEA member states, the steps for full implementation of the CLC pilot project in the Republic of Moldova were defined in the Technical Specifications for the CORINE Land Cover (CLC) pilot projects implemented in each of the Eastern Partnership countries (2017-2019):

- Mapping the CLC status layer over the pilot area; due to the special situation in the

Republic of Moldova that the CLC2000 status layer exists Revision of the existing CLC2000 status layer covering the pilot area using verification remarks of ETC/ULS

- Mapping the CLC-Change layer over the pilot area; correction of the layers by following verification remarks of ETC/ULS.
- Generating the updated CLC 2018 status layer for the pilot area;
- A report about the work.

The transfer of knowledge and skills was also carried out through a CLC training course on mapping CLC and CLC changes, conducted by the European Topic Centre on Urban, Land and Soil Systems (ETC/ULS).

Participants of the training course gained practical experience in working with different functions of the dedicated software named 'CLC2018 Support Package': CLC polygon contouring, polygon boundary correction, quick estimation of area and width, error checking and correction, calculation of statistics, image enhancement (optimizing the scale of the displayed image for photo-interpretation), etc.

In the Republic of Moldova the CLC pilot project has been financed by the Environment Agency Austria under the contract BE-003715.

The Project "Land and agriculture monitoring CLC implementation in Moldova (Full coverage)" gives solution to realization of the mains components of the land monitoring.

The three main components of the Land Monitoring Service are:

Global Component: Biophysical parameters to give a picture of the state of vegetation, the energy budget, water cycle, etc.

Pan-European Component: Data sets of land cover – land use and land cover characteristics such as: artificial surfaces, forest areas, agricultural areas, wetlands and water bodies.

Local Component: Focus on so called "hotspot areas". These are areas requiring a specific focus, such as: urban areas (Urban Atlas), river networks (Riparian Zones) or Natura sites etc.

The Pan-European and the Local Components of Copernicus are managed by the EEA. The CLC (2012 version and future updates) is now embedded in the Copernicus program. All of the land monitoring products can be consulted (viewing), used (services) and downloaded (FTP) via: http://land.copernicus.eu.

1.2. General information

1.2.1. Basic technical parameters of CORINE Land Cover

Minimum mapping unit (MMU) for mapping status layer= 25 hectares and minimum width of linear elements (MMW) is 100 meters); smaller objects should be generalized to "most similar" neighbor.

Minimum mapping unit for change mapping: 5 hectares; smaller changes should be generalized. Minimum mapping width (MMW) 100 meters; narrower objects should be generalized.

Geometric (localization) accuracy: better than 100 m.

Thematic accuracy: better than 85% (checked by independent validation)

The standard CLC nomenclature includes 44 land cover classes. These are grouped in a three-level hierarchy.

The five main categories are:

Artificial surfaces

Agriculture areas

Forests and semi-natural areas

Wetlands

Water bodies

Mapping methodology: computer assisted photointerpretation of satellite imagery (CAPI) by using reference data - topographic maps, orthophoto, field checking.

Result: vector database with polygon topology.

1.2.2. Hierarchical CLC Class Definitions

Class 1.1 Urban fabric

Areas mainly occupied by dwellings and buildings used by administrative/public utilities, including their connected areas (associated lands, approach road network, parking lots).

Class 1.2 Industrial, commercial and transport units

Areas mainly occupied by industrial activities of manufacturing, trade, financial activities and services, transport infrastructures for road traffic and rail networks, airport installations, river and sea port installations, including their associated lands and access infrastructures. Includes industrial livestock rearing facilities.

Class 1.3 Mine, dump and construction sites

Artificial areas mainly occupied by extractive activities, construction sites, manmade waste dump sites and their associated lands.

Class 1.4 Artificial non-agricultural vegetated areas

Areas voluntarily created for recreational use. Includes green or recreational and leisure urban parks, sport and leisure facilities.

Class 2.1 Arable land

Lands under a rotation system used for annually harvested plants and fallow lands, which are rain-fed or irrigated. Includes flooded crops such as rice fields and other inundated croplands.

Class 2.2 Permanent crops

All surfaces occupied by permanent crops, not under a rotation system. Includes ligneous crops of standards cultures for fruit production such as extensive fruit orchards, olive groves, chestnut groves, walnut groves shrub orchards such as vineyards and some specific low-system orchard plantation, espaliers and climbers.

Class 2.3 Pastures

Lands that are permanently used (at least 5 years) for fodder production. Includes natural or sown herbaceous species, unimproved or lightly improved meadows and grazed or mechanically harvested meadows. Regular agriculture impact influences the natural development of natural herbaceous species composition.

Class 2.4 Heterogeneous agricultural areas

Areas of annual crops associated with permanent crops on the same parcel, annual crops cultivated under forest trees, areas of annual crops, meadows and/or permanent crops which are juxtaposed, landscapes in which crops and pastures are intimately mixed with natural vegetation or natural areas.

Class 3.1 Forests

Areas occupied by forests and woodlands with a vegetation pattern composed of native or exotic coniferous and/or broad-leaved trees and which can be used for the production of timber or other forest products. The forest trees are under normal climatic conditions higher than 5 m with a canopy closure of 30 % at least. In case of young plantation, the minimum cut-off-point is 500 subjects by ha.

Class 3.2 Shrubs and/or herbaceous vegetation associations

Temperate shrubby areas with Atlantic and Alpine heaths, sub -Alpine bush and tall herb com-munities, deciduous forest recolonization, hedgerows, dwarf conifers.

Class 3.3 Open spaces with little or no vegetation

Natural areas covered with little or no vegetation, including open thermophile formations of sandy or rocky grounds distributed on calcareous or siliceous soils frequently disturbed by erosion, steppic grasslands, perennial steppe-like grasslands, meso- and thermo-Mediterranean xerophile, mostly open, short-grass perennial grasslands, alpha steppes, vegetated or sparsely vegetated areas of stones on steep slopes, screes, cliffs, rock fares, limestone pavements with plant communities colonizing their tracks, perpetual snow and ice, inland sand-dune, coastal sand-dunes and burnt natural woody vegetation areas.

Class 4.1 Inland wetlands

Areas flooded or liable to flooding during the great part of the year by fresh, brackish or standing water with specific vegetation coverage made of low shrub, semi-ligneous or herbaceous species. Includes water-fringe vegetation of lakes, rivers, and brooks and of fens and eutrophic marshes, vegetation of transition mires and quaking bogs and springs, highly oligotrophic and strongly acidic communities composed mainly of sphagnum growing on peat and deriving moistures of raised bogs and blanket bogs.

Class 4.2 Coastal wetland

Areas, which are submerged by high tides at some stage of the annual tidal cycle. Includes salt meadows, surfaces of saltmarsh grass meadows, transitional or not to other communities, vegetation occupying zones of varying salinity and humidity, sands and muds submerged for part of every tide devoid of vascular plants, active or recently abandoned salt-extraction evaporation basins.

Class 5.1 Inland waters

Lakes, ponds and pools of natural origin containing fresh (i.e. non-saline) water and running waters made of all rivers and streams. Man-made fresh water bodies including reservoirs and canals.

Class 5.2 Marine waters

Oceanic and continental shelf waters, bays and narrow channels including sea lochs or loughs, fiords, straits and estuaries. Saline or brackish coastal waters often formed from sea inlets by sitting and cut-off from the sea by sand or mud banks.

1.2.3. CORINE Land Cover nomenclature

LEVEL 1	LEVEL 2	LEVEL 3
1. ARTIFICIAL SURFACES	1.1. Urban fabric	1.1.1. Continuous urban fabric 1.1.2. Discontinuous urban fabric
	1.2. Industrial, commercial and transport units	1.2.1. Industrial or commercial units 1.2.2. Road and rail networks and associated land 1.2.3. Port areas 1.2.4. Airports
	1.3. Mine, dump and construction sites	1.3.1. Mineral extraction sites 1.3.2. Dump sites 1.3.3. Construction sites
	1.4. Artificial, non-agricultural vegetated areas	1.4.1. Green urban areas 1.4.2. Sport and leisure facilities
2. AGRICULTURAL AREAS	2.1. Arable land	2.1.1. Non-irrigated arable land 2.1.2. Permanently irrigated land 2.1.3. Rice fields
	2.2. Permanent crops	2.2.1. Vineyards 2.2.2. Fruit trees and berry plantations 2.2.3. Olive groves
	2.3. Pastures	2.3.1. Pastures
	2.4. Heterogeneous agricultural areas	2.4.1. Annual crops associated with permanent crops 2.4.2. Complex cultivation patterns 2.4.3. Land principally occupied by agriculture, with significant areas of natural vegetation 2.4.4. Agro-forestry areas

3. FOREST AND SEMI-NATURAL AREAS	3.1. Forests	3.1.1. Broad-leaved forest 3.1.2. Coniferous forest 3.1.3. Mixed forest
	3.2. Scrub and/or herbaceous associations	3.2.1. Natural grassland 3.2.2. Moors and heathland 3.2.3. Sclerophyllous vegetation 3.2.4. Transitional woodland-scrub
	3.3. Open spaces with little or no vegetation	3.3.1. Beaches, dunes, sands 3.3.2. Bare rocks 3.3.3. Sparsely vegetated areas 3.3.4. Burnt areas 3.3.5. Glaciers and perpetual snow
4. WETLANDS	4.1. Inland wetlands	4.1.1. Inland marshes 4.1.2. Peat bogs
	4.2. Marine wetlands	4.2.1. Salt marshes 4.2.2. Salines 4.2.3. Intertidal flats
5. WATER BODIES	5.1. Inland waters	5.1.1. Water courses 5.1.2. Water bodies
	5.2. Marine waters	5.2.1. Coastal lagoons 5.2.2. Estuaries 5.2.3. Sea and ocean

Detailed descriptions and illustrations of the nomenclature can be found in the following documents: Updated CLC illustrated nomenclature guidelines , CLC2018 Technical Guidelines, Manual of CORINE Land Cover Changes by link https://land.copernicus.eu/en/products/corine-land-cover (folder 'Product documentation').

1.2.4. Databases used in the project

The total area of "Land and agriculture monitoring CLC implementation in Moldova (Full coverage)" project in the Republic of Moldova is 33970 sq. km, inclusive the Pilot Project - 3158 sq. km.

High-resolution satellite images taken by the ESA Sentinel-2 L1C satellite in 2023 and 2018, selected and prepared by ETC-DI partner Lechner were available for the project to cover the area of the Republic of Moldova. The multi-seasonal imagery provides an excellent basis for the change mapping exercise over a 4-year long period.

The CLC project in the Republic of Moldova is based primarily on the high resolution (HR) satellite image coverage IMAGE2022. The IMAGE2018 HR satellite image coverage, digital topographic maps, orthophoto images and other reference geospatial data were used to map land cover changes between 2023 and 2018.

Reference years: 2023 and 2018

Coverage 2023: an image from summer 2022 and one from spring 2023 or from autumn 2022

Coverage 2018: an image from summer 2018 and one from autumn/spring 2018

Summer (first coverage) = 06.01. – 09.15.

Autumn = 10.01. - 10.31.

Spring = 04.01. – 05.01

The aim of the project is to provide satellite data coverage of the entire area to be mapped to support high-quality photointerpretation.

An overview of the databases used in the project is shown in Table 1.

Table 1 Overview of databases used in the project

Name	Data type	Resolution	Reference year	Data source
IMAGE2023	Sentinel-2	10m	15April2022, 26 July 2022, 28 August 2022 17 October 2022,	EEA (CLMS*)
IMAGE2018	Sentinel-2	10m	31August2017, 11May2018, 14August2018, 20September2018	EEA (CLMS*)

Topo maps	Topographic maps scale 1:50.000	vector	2012	AGCC**
Orthophoto 2007	True colour aerial ortho-photos	0.4m	2007	AGCC**
Orthophoto 2016	True colour aerial ortho-photos	0.2m	2016	AGCC**
Orthophoto 2020	True colour aerial ortho-photos	0.2m	2020	AGCC**
Orthophoto 2021	True colour aerial ortho-photos	0.2m	2021	AGCC**

* CLMS – Copernicus Land Monitoring Service

** AGCC – Agency for Geodesy, Mapping and Cadastre of the Republic of Moldova

1.2.5. Satellite Images

Images are reprojected onto a given national projection and resampled using cubic conversion (CC). Compared to other methods (nearest neighbours, bilinear interpolation) CC reduces aliasing and blurring. EPSG 4026 MOLDREF99 / Moldova TM is used for Moldova projection.

The radiometric resolution of the MSI instrument on board the satellite is 12-bit. The bit depth of the L1C product is 16-bit. Despite that the derived colour composite specified in this document is going to be used for visual interpretation purposes, there is no intention to rescale the data to 8-bit and potentially lose any valuable information.

Considering the purpose of the product (visual photo-interpretation) atmospheric correction was not applied.

The spatial resolution of the Sentinel-2 channels is dependent on the spectral band. Band-8 and Band-4 have 10 m spatial resolution, while Band-11 has 20 m pixel size. The different scale of these bands introduce a compositing problem. The Visual Product would need 10 m pixel size in order to make maximum use of the better resolution provided by Sentinel-2.

The Sentinel-2 L1C data product is processed with the maximum comparability to the IMAGE2012 and composited the closest to the IRS/SPOT-4/5 colour composite 3-4-2 (NIR, SWIR, Red). Accordingly, the Sentinel-2 false-colour image would contain the following bands: Band-8

(NIR), Band-11 (SWIR) and Band-4 (RED). The composite has been successfully tested during CLC2012 and CLC2018.

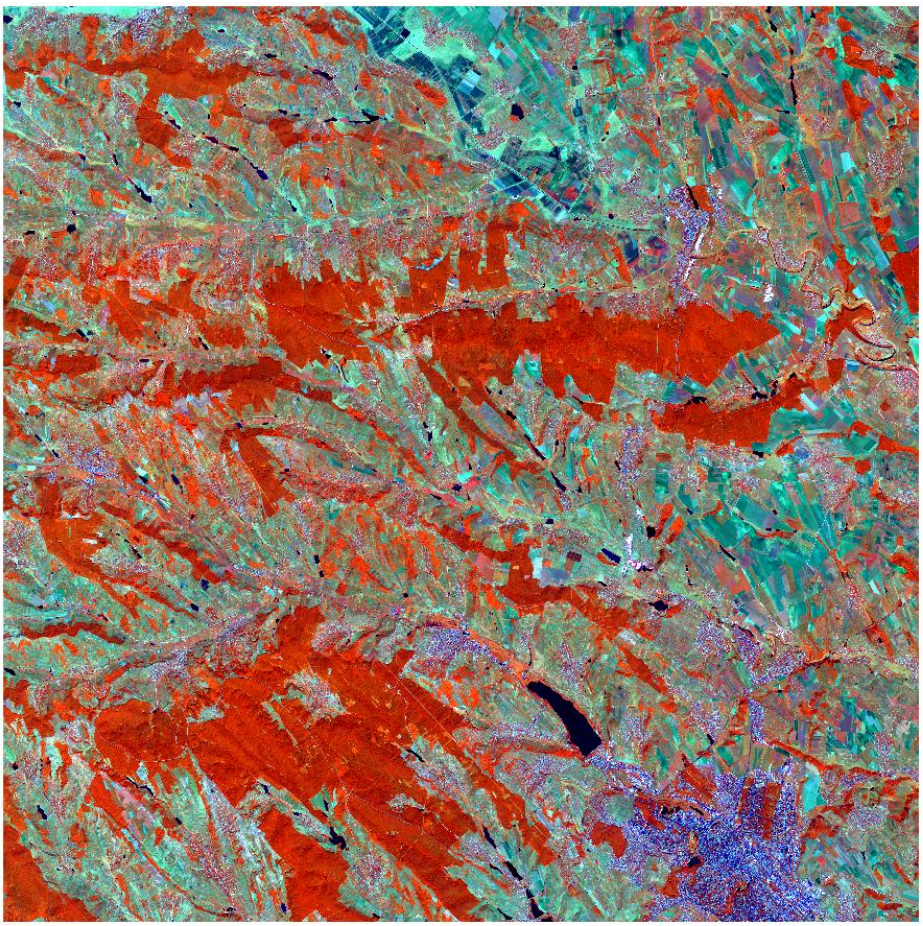


Figure 1 Sample satellite image covering the CLC project in the Republic of Moldova

1.2.6. Topographic maps

1:50.000-scale vector topographic maps database, reference year 2012, have been provided by the Agency for Land Relations and Cadastre of Moldova. Grid of the vector topographic maps is shown in Figure 2.

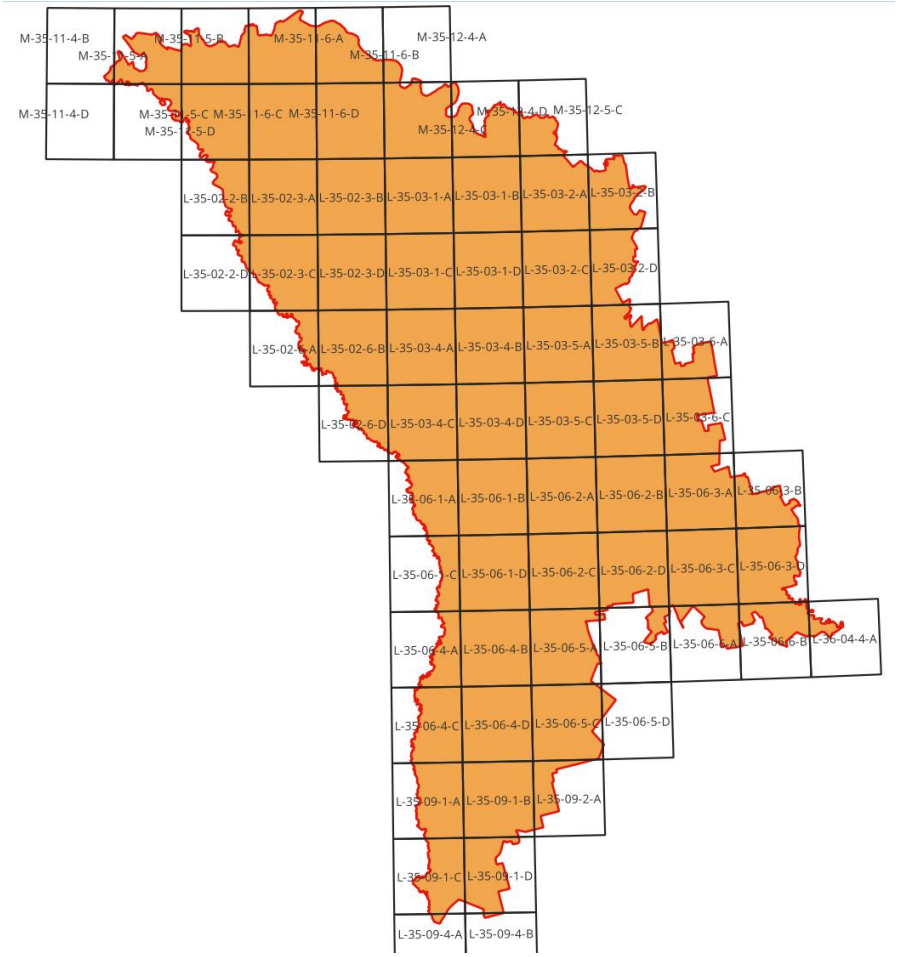


Figure 2 1:50.000-scale topographic maps

1.2.7. Ortho-photos

Ortho-photos taken in years 2007 and 2016/2020/2021 – at 0.4 m and 0.2 m resolution, respectively, have been used as ancillary data for change mapping and as the base reference imagery for the accuracy assessment of the HR soil sealing database. The ortho-photos have been provided by the Agency for Land Relations and Cadastre of Moldova. Reference year of the ortho-imagery is shown in Figure 3.

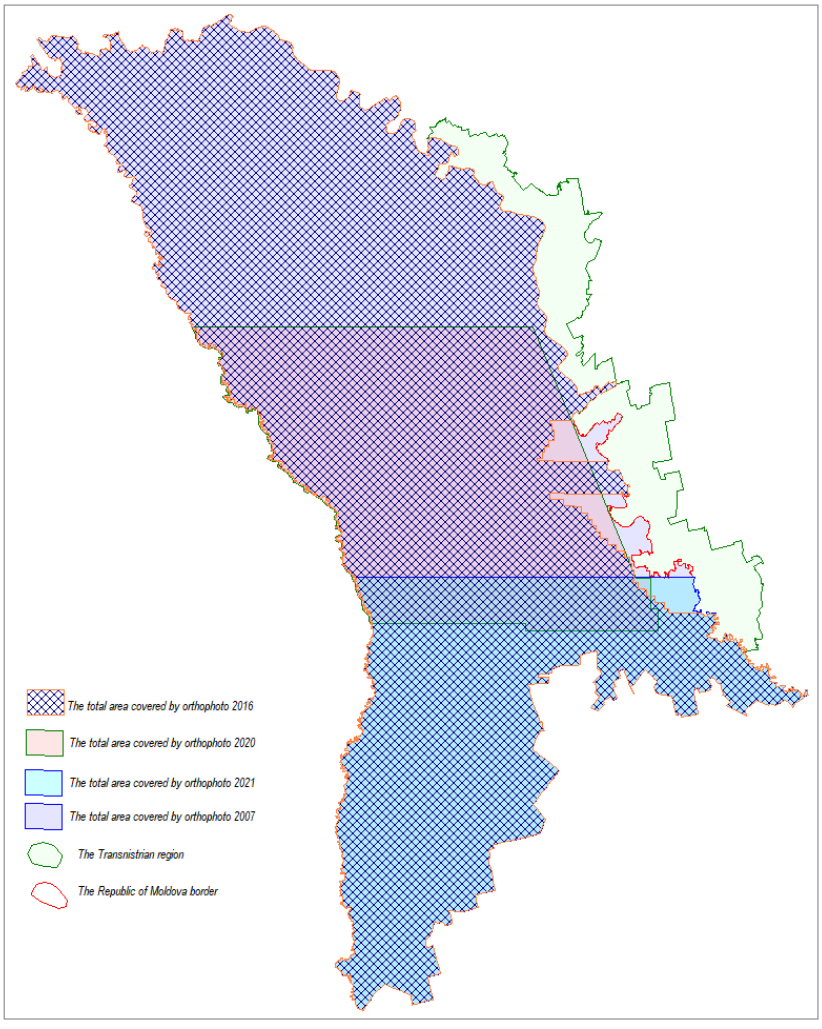


Figure 3 Reference year of the ortho-imagery

2. Part II

2.1. Organization of the work at national level

2.1.1. Milestones

Milestones of the project are presented in Table 2.

Table 2 Milestones of the CLC project in the Republic of Moldova

No	Date (m/d/y)	Description
1	14/11/2022	A contract between S.E. INGEOCAD and Umweltbundesamt has been signed to implement the CLC project in Moldova.
2	31/08/2023	1st verification by the **ETC-DI**
3	22/02/2024	2nd verification by the **ETC-DI**
4	31/05/2024	Delivery of final results to project management

2.1.2. CLC2023 training

The Republic of Moldova through the Agency for Geodesy, Mapping and Cadastre of the Republic of Moldova/State Enterprise Institute of Geodesy, Engineering Research and Cadastre "INGEOCAD" has taken the first steps towards implementing the CORINE Land Cover project in 2019 by participating in a pilot project.

In additional to the 4-day CLC training course on mapping CLC and CLC changes in the period 09-12 July 2019, conducted by ETC-ULS (Mr. György BÜTTNER, and Mr. Christopher PHILIPSEN), the new course for Moldova also was provided 01-02 February 2023. The course was provided by Barbara Kosztra, ETC/DI.

Venue: Agency for Geodesy, Mapping and Cadastre of the Republic of Moldova, 48 Serghei Lazo str, office 318, Chisinau, MD 2004.

Topics of Training Agenda is presented in **Table 3.**

Table 3. Milestones of Training Agenda of CLC project in the Republic of Moldova

Expert group on CLC
1. Introduction to CLC, main objectives, practice in Europe Barbara Kosztra Lechnerkozpont

2. CLC-change mapping: concept and examples Barbara Kosztra Lechnerkozpont
3. Practicalities of CLC project in Moldova: history, guidelines, and tools Barbara Kosztra Lechnerkozpont
Coffee break
4. CLC project implementation in Moldova: available expertise and data, national specifics IngeoCad + Barbara Kosztra Lechnerkozpont
Fingerfood and coffee
5. Discussion of CLC project implementation in Moldova 6. CLC concept preparation IngeoCad + Barbara Kosztra Lechnerkozpont
Coffee break
7. Discussion of CLC project implementation in Moldova 8. CLC concept preparation (continued) IngeoCad + Barbara Kosztra Lechnerkozpont

The latest version of InterChange (modified version of CLC2018 Support Package) software has been designed to support the EU4ENV project, meaning revision of CLC2018 and mapping CLC-Changes between 2023 and 2018. The software has been provided by the EU4ENV project to support mapping changes between any two years (2023 and 2018) and provide possibility to change mapping backward in time, i.e. starting with creating a recent status layer and mapping changes back in time (applied by the other EU4ENV countries where CLC2000 is not available). InterChange is offered free of charge to the EU4ENV participants, but users are requested to register (registration document was provided). Using InterChange in revision of the CLC2023 status layer and mapping CLC-Changes over the pilot area was recommended, but not obligatory.

Google Earth (GE) time series was the only available ancillary (in-situ) data, which is linked to the displayed extent of satellite images. GE coverage is excellent for the recent (2023) land

cover status. When using GE imagery, photointerpreter must not forget about checking the image acquisition date. Also, the image dates indicated in GE might be incorrect, therefore in case of contradiction between IMAGE2023 or IMAGE2018 and GE, one has to consider the satellite image as valid information.

3. Part III

3.1. Processing methodology, software

3.1.1. Methodology of mapping

The methodology of mapping is in conformity with the technical specifications for the CORINE Land Cover (CLC) projects implemented in the Eastern Partnership countries (2017-2019), prepared by the EEA and the European Topic Centre on Urban, Land and Soil Systems (ETC/ULS) as part of the ENI SEIS II East Project, October 2017.

The methodology consists of the following main steps:

- Mapping the CLC status layer for the entire area;
- Mapping the CLC –Change layer for the entire area
- Thematic quality control of datasets;
- Application of corrections based on QC results;
- Generating the backdated status layer for the project area;
- Final quality control of deliverables: CLC2023, CLC-Changes and CLC2018.
- Writing the report about the work performed.

3.1.1. Photointerpretation

Like in many other participating countries, InterChange 4.1 tool was used for creating of CLC2023 and mapping of changes.

According to the European methodology, all changes larger than 5 ha have been delineated, not depending on their location. Efforts were taken to map “real” changes concerning attributes and area. The technical change attribute was also frequently used to support creation of realistic CLC2023 database.

CLC2023 - CLC project in the Republic of Moldova, when photointerpreters performed it on digital satellite images. Photointerpretation was done according to the technical guidelines and following recommendations of ETC/DI experts.

The area was separated to 12 working units and several photointerpreters worked on it. External verification by ETC/DI was also done on working units. Working units were combined and border-matched to entire project area for the Republic of Moldova. The working unit boundaries are shown in Figure 4.

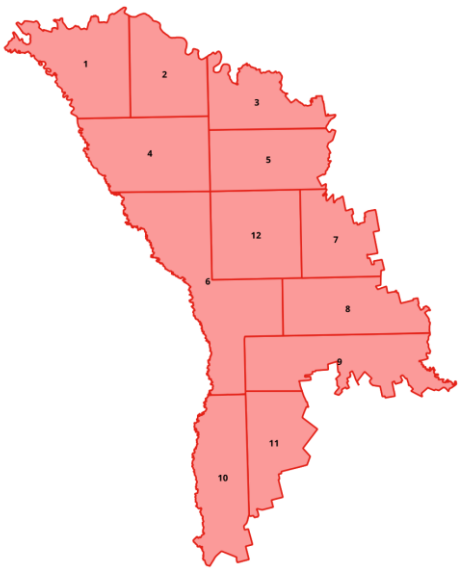


Figure 4. Working units

3.1.1. Generating the CLC2018 database

Having the CLC-Change database completed, CLC2018 was generated in a semi-automated process:

CLC2018 = CLC2023revised (+) CLC-Change2023-2018

Where CLC2018 means the CLC database for 2018 (MMU=25 ha, width of linear elements=100 m);

CLC2023 revised means the controlled / revised CLC2023 database (MMU=25 ha, width of linear elements=100 m);

CLC-Change2023-2018 means the CLC changes between 2023 and 2018, delineated by the mapping process (MMU=5 ha, width of linear elements=100 m);

(+) means an operation having GIS components and photointerpretation components.

The automated component has implemented as an ArcGIS tool. It integrates the $CLC2023_{revised}$ and $CLC\text{-}Change_{2018\text{-}2023}$ databases, then the small (<25 ha) polygons were generalised according to a priority table. As an option, polygons "almost" reaching the 25 ha limit (e.g. larger than 23.5 ha) was generalised by a photointerpreter, as method for Moldova.

3.1.2. Internal quality control, results

The revised CLC2023 and $CLC\text{-}Change_{2018\text{-}2023}$ databases were 100% quality controlled by the leading photo-interpreters. Where mistakes had been discovered, the interpretation with written comments on polygon level was sent back to the interpreter for correction.

3.1.3. External quality control, results

The CLC Technical Team of the ETC/DI verified the results of the photo-interpretation, the revised CLC2023 and CLC-Change$_{2018\text{-}2023}$ databases. The project area was checked as seen on Figure 5.

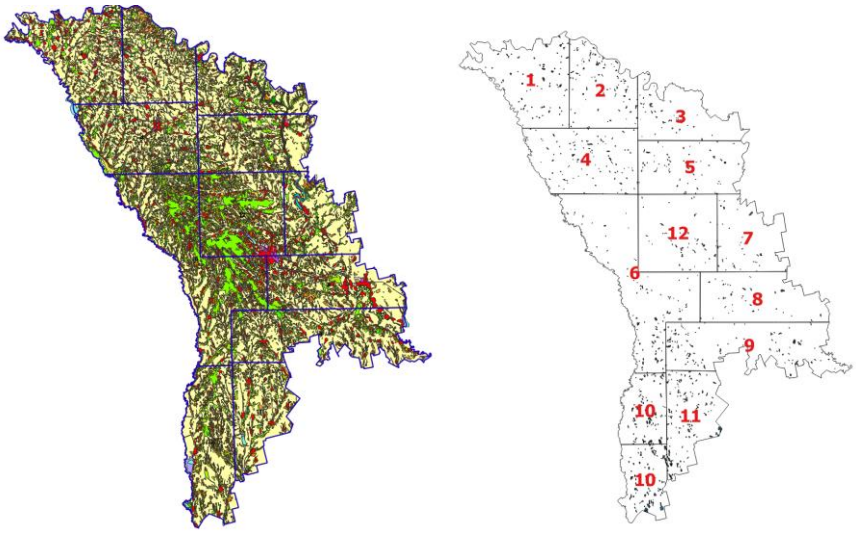


Figure 5. Working units for quality control

In 1st verification WU05, in 2nd verification WUs 02, 03 were checked (all create by different photointerpreters). Verification results were provided in verification reports as well as location-specific remarks (in shapefiles).

Some remarks were given on technical quality during the verification missions, and some other remarks were given concerning specific and systematic thematic mistakes (misinterpretation). Both specific and systematic mistakes were corrected.

3.1.4. Main difficulties and their solutions

No special difficulties were encountered during the contract execution. The work was carried out taking into account the knowledge gained during the training and the pilot project. The descriptions and instructions for CORINE at https://land.copernicus.eu/user-corner/technical-library were also used.

3.1.5. Internal validation

No internal validation has been performed yet.

4. Part IV

4.1. Results

4.1.1. CLC-Changes

The map of CLC-Changes (2018-2023) is shown on Figure 6.

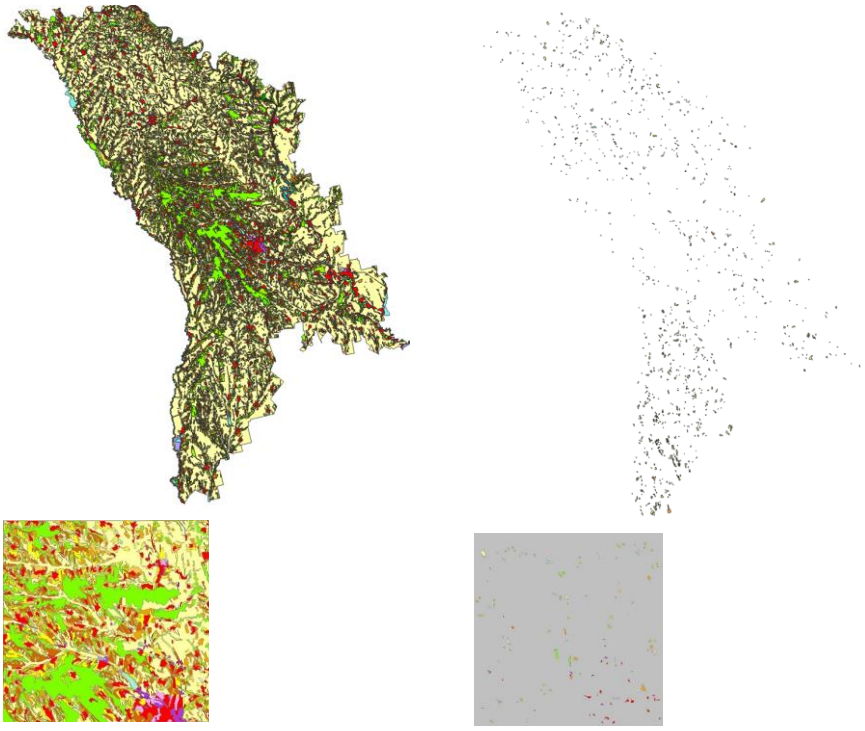


Figure 6 CLC-Changes (2018-2023) map of project area

Dominant land cover changes (level-3) providing 50% of all changes are listed in Table 4.

Table 4 Dominant CLC changes between 2018 and 2023

Change 2018-2023	**Explanation of the evolution process**	**Area, ha**	**Area, percent of total changes**	**Area, cumulative percent**
324-211	Transitional woodland-scrub converted to arable land	434.574	22.07%	22.07%
411-512	The water level has risen, converted water bodies	166.0333	8.43%	30.50%
221-211	Vineyards converted to arable land	123.544	6.27%	36.77%
324-311	Forest growth	115.545	5.87%	42.64%
512-411	The water has gone, converted to inland marshes	102.9115	5.23%	47.87%
222-243	Fruit trees and berry plantations converted to land principally occupied by agriculture, with significant areas of natural vegetation	101.2343	5.14%	53.01%
243-211	Land principally occupied by agriculture, with significant areas of natural vegetation converted to arable land	93.2994	4.74%	57.74%
211-221	Arable land converted to vineyards	68.3708	3.47%	61.22%
231-211	Clear-cutting of broad-leaved forest and converted to arable land	66.0474	3.35%	64.57%
211-133	Arable land converted to construction sites	59.7536	3.03%	67.60%
211-311	Afforestation of arable land. Arable land converted to broad-leaved forest	57.743	2.93%	70.54%
231-411	Pastures converted to inland marshes	41.8122	2.12%	72.66%
242-112	Discontinuous urban fabric has increased. Complex cultivation patterns converted to discontinuous urban fabric	35.7722	1.82%	74.48%
231-324	Pastures converted to transitional woodland-scrub	35.6524	1.81%	76.29%
231-222	Agricultural land expansion: pastures converted to fruit trees and berry plantations	31.3777	1.59%	77.88%

222-242	Fruit trees and berry plantations converted to Complex cultivation patterns	27.4499	1.39%	79.27%
242-211	Complex cultivation patterns converted to arable land	25.6014	1.30%	80.57%
231-242	Pastures converted to complex cultivation patterns	24.3294	1.24%	81.81%
242-222	Complex cultivation patterns converted to orchards, fruit-tree plantations	21.1338	1.07%	82.88%
512-231	The water has gone, water bodies converted to pastures	21.0949	1.07%	83.95%
131-231	Mineral extraction sites converted to pastures	20.9449	1.06%	85.02%
411-231	The water has gone, Inland marshes converted to pastures	19.7083	1.00%	86.02%
221-221	Vineyards of both periods next to the changes	18.1002	0.92%	86.94%
231-231	Pastures of both periods next to the changes	17.9076	0.91%	87.85%
324-324	Transitional woodland-scrub of both periods next to the changes	16.8643	0.86%	88.70%
512-512	Water bodies of both periods next to the changes	13.9628	0.71%	89.41%
211-242	Arable land converted to complex cultivation patterns	13.0171	0.66%	90.07%
222-324	Afforestation of orchards, fruit-tree plantations. Orchards, fruit-tree plantations converted to transitional woodland-scrub	12.7715	0.65%	90.72%
242-221	Complex cultivation patterns converted to vineyards	12.0065	0.61%	91.33%
222-211	Clear-cutting of the vineyards. Vineyards converted to arable land	11.6623	0.59%	91.92%
324-221	Clear-cutting of the transitional woodland-scrub. Transitional woodland-scrub converted to vineyards	11.657	0.59%	92.52%
211-231	Arable land converted to pastures	11.0426	0.56%	93.08%
211-112	Discontinuous urban fabric has increased. Arable land converted to discontinuous urban fabric	10.9687	0.56%	93.63%

311-231	Clear-cutting of the broad-leaved forest. Broad-leaved forest converted to pastures	10.7039	0.54%	94.18%
211-222	Arable land converted to orchards, fruit-tree plantations	10.6941	0.54%	94.72%
222-231	Clear-cutting of the orchards, fruit-tree plantations. Orchards, fruit-tree plantations converted to pastures	10.6845	0.54%	95.26%
221-231	Clear-cutting of the vineyards. Vineyards converted to pastures	9.275	0.47%	95.73%
231-512	New water bodies have been created on the pastures	9.1139	0.46%	96.20%
231-221	Intensification in agriculture: pasture / fallow land converted to vineyards	8.7649	0.45%	96.64%
324-112	Discontinuous urban fabric has increased. Transitional woodland-scrub converted to discontinuous urban fabric	8.1645	0.41%	97.06%
324-231	Transitional woodland-scrub converted to pastures	7.6541	0.39%	97.44%
221-324	Afforestation of vineyards. Vineyards converted to transitional woodland-scrub	7.5412	0.38%	97.83%
242-231	Complex cultivation patterns converted to pastures	6.5612	0.33%	98.16%
311-311	Broad-leaved forest of both periods next to the changes	6.2847	0.32%	98.48%
211-131	Extension of the mineral extraction sites on arable land	6.1706	0.31%	98.79%
222-222	Orchards, fruit-tree plantations of both periods next to the changes	5.8102	0.30%	99.09%
231-131	Extension of the mineral extraction sites on pastures	5.6195	0.29%	99.37%
221-121	The area of industrial or commercial units has been increased. Vineyards converted to Industrial or commercial units	5.437	0.28%	99.65%
311-211	Clear-cutting of the broad-leaved forest. Broad-leaved forest converted to arable land	5.3624	0.27%	99.92%
211-211	Arable land of both periods next to the changes	1.5371	0.08%	100.00%

Based on detailed CLC-Change statistics, Table 6, entries and their balance, and dynamics for each class have been produced. This summarizes the evolution of land cover in pilot area between 2018 and 2023.

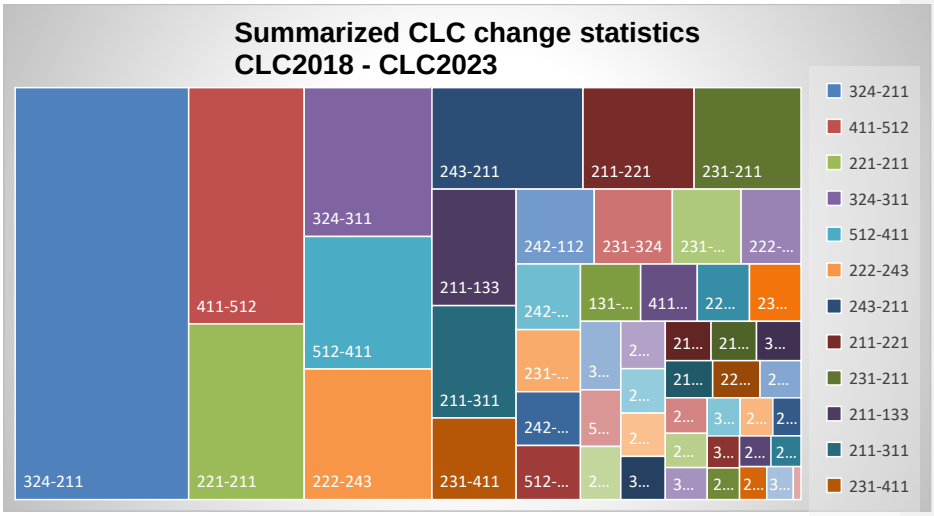


Figure 7 CLC-Change statistics for 2018-2023

Comparing net changes of class areas, the largest change is observed in transitional woodland-scrub, vineyards converted into arable land and from arable land to vineyards, gardens, pastures.

The largest net area increase was observed in the arable land (211), followed by the forest and semi-natural areas (324, 311), vineyards (221) and orchards, fruit-tree plantations (222). The water level has changed, inland marshes (411) converted into water bodies (512) and from water bodies into inland marshes.

4.1.2. CLC2018, CLC2023

The associated statistics for CLC2018 are shown in Table 5. Arable land (211) is the largest category - 53.13% of total area, followed by pastures (231) - 10.05% transitional woodland-scrub (324) - 7.64 %. %. Transitional woodland-scrub include the largest number of polygons (2854), followed by pastures (2704) and arable land (1836).

The associated statistics for CLC2023 are shown in Table 6. Arable land (211) is the largest category - 53.74% of total area, followed by pastures (231) - 9.90% and broad-leaved forest - 7.49 %. Transitional woodland-scrub include the largest number of polygons (2835), followed by pastures (2692) and arable land (1797).

The CLC2023 maps of the country is presented on Figure 8.

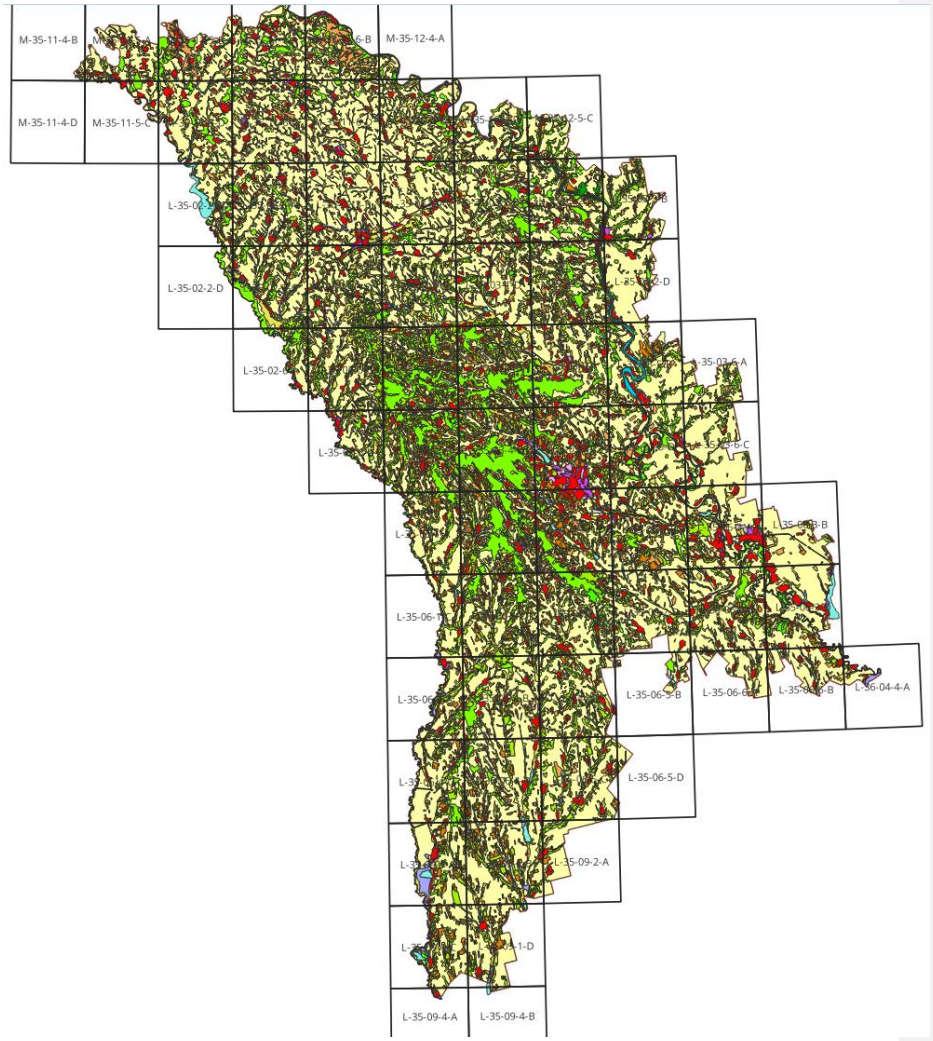
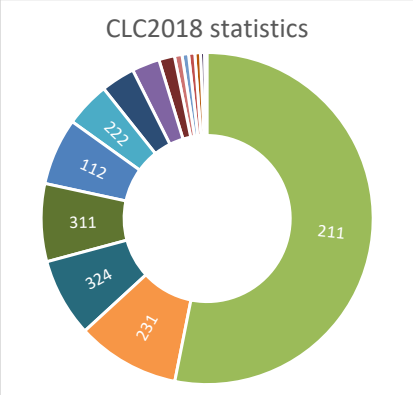


Figure 8 CLC 2023 map of project area

Table 5 CLC2018 statistics

Code	Description	No of polygons	Area ha	Percent of total
112	Discontinuous urban fabric	1273	221491.01	6.521%
121	Industrial or commercial units	353	20605.29	0.607%
122	Road and rail networks and associated land	10	469.74	0.014%
124	Airports	5	1464.03	0.043%
131	Mineral extraction sites	40	1572.32	0.046%
132	Dump sites	2	53.17	0.002%
133	Construction sites	1	29.3	0.001%
141	Green urban areas	31	3303.38	0.097%
142	Sport and leisure facilities	5	254.11	0.007%
211	Non-irrigated arable land	1836	1804568.16	53.125%
221	Vineyards	985	91847.84	2.704%
222	Fruit trees and berry plantations	1890	148876.74	4.383%
231	Pastures	2704	341220.58	10.045%

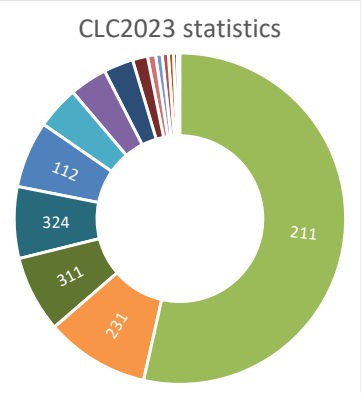


242	Complex cultivation patterns	1623	112314.8	3.306%
243	Land principally occupied by agriculture, with significant areas of natural vegetation	690	51778.21	1.524%
311	Broad-leaved forest	952	257469.49	7.580%
312	Coniferous forest	31	1503.74	0.044%
313	Mixed forest	118	13300.79	0.392%
324	Transitional woodland-scrub	2854	259519.85	7.640%
333	Sparsely vegetated areas	1	31.72	0.001%
411	Inland marshes	246	18521.4	0.545%
511	Water courses	4	21586.29	0.635%
512	Water bodies	308	25053.01	0.738%
Sum		**15962**	**3396835**	**100.000%**

Table 6 CLC2023 statistics

Code	Description	No of polygons	Area ha	Percent of total
112	Discontinuous urban fabric	1273	221546.4	6.52%

121	Industrial or commercial units	353	20611.11	0.61%
122	Road and rail networks and associated land	10	469.74	0.01%
124	Airports	5	1464.03	0.04%
131	Mineral extraction sites	43	1666.39	0.05%
132	Dump sites	2	53.17	0.00%
133	Construction sites	2	89.06	0.00%
141	Green urban areas	31	3295.22	0.10%
142	Sport and leisure facilities	5	254.11	0.01%
211	Non-irrigated arable land	1797	1825311.5	53.74%
221	Vineyards	976	86744.86	2.55%
222	Fruit trees and berry plantations	1864	143746.27	4.23%
231	Pastures	2692	336449.64	9.90%
242	Complex cultivation patterns	1626	112023.68	3.30%
243	Land principally occupied by agriculture, with significant areas of natural vegetation	690	51708.51	1.52%
311	Broad-leaved forest	953	257573.57	7.58%
312	Coniferous forest	31	1503.74	0.04%



313	Mixed forest	117	13264.17	0.39%
324	Transitional woodland-scrub	2835	253858.22	7.47%
333	Sparsely vegetated areas	1	31.72	0.00%
411	Inland marshes	248	18554.72	0.55%
511	Water courses	4	21586.29	0.64%
512	Water bodies	308	25028.83	0.74%
Sum		**15866**	**3396835**	**100.000%**

4.1.3. Deliverables

In accordance of the contract for work and services Reference number: 20940-C2/MD-Ingeocad-2022/1 the following deliverables covered by the project area:

- CLC 2023 status layer.
- CLC-Change$_{2018\text{-}2023}$ layer
- CLC 2018 status layer
- Final Report

All spatial data presented in ESRI shape format with polygon topology.

4.1.4. Metadata

Metadata - information that describes spatial data sets and services and allows them to be searched, inventoried and used.

The metadata for CLC 2023 status layer, CLC-Change$_{2018\text{-}2023}$ layer, CLC 2018 status layer is performed in annexes 5

5. Annexes

NSDI Republic of Moldova Geoportal INDS

5.1. Acoperire terestră, anul 2023

CLC este o bază de date digitală privind starea și modificările acoperirii suprafeței terestre a Republicii Moldova, elaborată, în conformitate cu nomenclatura și metodologia standardizată CORINE, care asigură coerența și omogenitatea datelor la nivelul întregii Uniuni Europene.

Nomenclatura standard CLC include 44 de clase de acoperire a terenului. Acestea sunt grupate într-o ierarhie pe trei niveluri. În Republica Moldova acoperirea terestră este caracterizată de 23 din 44 de clase CORINE LAND COVER nomenclator. Principala acoperire a solului în proiectul CLC în Republica Moldova reprezintă terenurile agricole (pășuni, teren arabil și modele complexe de cultivare).

Unitatea minimă de cartografiere este 25 ha; lățimea minimă a elemetelor liniare este 100m.

Unitate de cartografiere minimă pentru cartografierea modificării: 5 hectare; modificările mai mici sunt generalizate.

Baza de date CLC conține date privind ocuparea terenurilor pentru anii de referință 2023, precum și date privind modificările de acoperire a terenurilor între anii de referință menționați.

Profil moldovenesc

Identificare

Titlul alternativ al resursei	Corine Land Cover
Tip de resursă	Set de date
Cod	https://geodata.gov.md/#/

Resursă cuplată

Format de date

Tip de reprezentare spațială	Vector
Limbajul resurselor	rum
Codificarea caracterelor	Utf8

Clasificarea datelor spațiale

Categorie de subiect

Cuvânt cheie

Valoarea cuvintelor cheie	Acoperire terestră
GEMET - INSPIRE themes, version 1.0	•Acoperire terestră
Spatial scope	•European
	•

Referință temporală

Întindere temporală

Întindere temporală

Data (Creare)	2024-05-31
Data (Publicare)	
Frecvența de actualizare	După cum este necesar

Calitate și validitate

Descendență	Abordarea standard pentru crearea bazei de date CLC s-a bazat pe interpretarea vizuală a imaginilor satelitare: Image2000, Image2018, Image2022, hărți topografice la scara 1:50000, ortoimagini 2007, 2016, 2020, 2021, în conformitate cu metodologia CLC acceptată, oferind date vectoriale pe o scară de 1: 100.000, lățimea minimă a poligonului 100m, suprafața minimă de cartografiere de 25 ha pentru baza acoperirii terenului și 5 ha pentru baza modificărilor. Nomenclatura CLC definită include 23 de clase, fiecare descriind o acoperire diferită a terenului.
Scară echivalentă	100000

Conformitate

Specificație

Consistență conceptuală

Constrângeri legate de acces și utilizare

Limitarea accesului public

Alte constrângeri	no limitations to public access

Condiții aplicabile pentru acces și utilizare

Alte constrângeri	conditions to access and use unknown

Condiții aplicabile pentru acces și utilizare

Petrecere responsabilă

Contact pentru resursă

Numele organizației (parte responsabilă)	Întreprinderea de Stat Institutul de Geodezie, Prospecţiuni Tehnice şi Cadastru „INGEOCAD"
Nume individual	ÎS "INGEOCAD"
Numele poziției	Instituție
Telefon	022881200
Abordare	str. Serghei Lazo, 48
Oraș	mun. Chișinău
Cod poștal	MD-2004
Țară	R. Moldova
E-mail	info@ingeocad.md

Numele organizației (parte responsabilă)	Ministerul Mediului al Republicii Moldova
Nume individual	Ministerul Mediului
Numele poziției	Instituție
Telefon	022204587
Abordare	Bd. Ștefan Cel Mare Și Sfânt 162
Oraș	mun. Chișinău

Cod poștal	MD-2004
Țară	Moldova
E-mail	cancelaria@mediu.gov cancelaria@mediu.gov.md

Contact pentru resursă

Metadate

Contact pentru metadate

Nume organizatie	Întreprinderea de Stat Institutul de Geodezie, Prospecţiuni Tehnice şi Cadastru „INGEOCAD"
Nume individual	Igor Paharikov
Numele poziției	Șef secț. GIS
Telefon	022881200
Abordare	str. Serghei Lazo, 48
Oraș	mun. Chișinău
Cod poștal	MD-2004
Țară	Moldova
E-mail	info@ingeocad.md

Data metadatelor	2024-05-29T11:07:45.391Z
Limba metadatelor	rum
Identificator de fișiere	c0ec1053-bd48-4e3e-99bb-0c09867d95d2 XML

Prezentare generală

Furnizat de

NSDI Republic of Moldova Geoportal INDS

5.2. Acoperire terestră, anul 2018

CLC este o bază de date digitală privind starea și modificările acoperirii suprafeței terestre a Republicii Moldova, elaborată, în conformitate cu nomenclatura și metodologia standardizată CORINE, care asigură coerența și omogenitatea datelor la nivelul întregii Uniuni Europene.

Nomenclatura standard CLC include 44 de clase de acoperire a terenului. Acestea sunt grupate într-o ierarhie pe trei niveluri. În Republica Moldova acoperirea terestră este caracterizată de 23 din 44 de clase CORINE LAND COVER nomenclator. Principala acoperire a solului în proiectul CLC în Republica Moldova reprezintă terenurile agricole (pășuni, teren arabil și modele complexe de cultivare).

Unitatea minimă de cartografiere este 25 ha; lățimea minimă a elemetelor liniare este 100m.

Unitate de cartografiere minimă pentru cartografierea modificării: 5 hectare; modificările mai mici sunt generalizate.

Baza de date CLC conține date privind ocuparea terenurilor pentru anii de referință 2018, precum și date privind modificările de acoperire a terenurilor între anii de referință menționați.

Profil moldovenesc

Identificare

Titlul alternativ al resursei	Corine Land Cover
Tip de resursă	Set de date
Cod	https://geodata.gov.md/#/

Resursă cuplată

-	

Format de date

Tip de reprezentare spațială	Vector
Limbajul resurselor	rum

Codificarea caracterelor	Utf8

Clasificarea datelor spațiale

Categorie de subiect

Cuvânt cheie

Valoarea cuvintelor cheie	Acoperire terestră
GEMET - INSPIRE themes, version 1.0	•Acoperire terestră
Spatial scope	•European
	•

Locatie geografica

Referință temporală

Întindere temporală

Întindere temporală

Data (Creare)	2024-05-31
Data (Publicare)	
Frecvența de actualizare	După cum este necesar

Calitate și validitate

Descendență	Abordarea standard pentru crearea bazei de date CLC s-a bazat pe interpretarea vizuală a imaginilor satelitare: Image2000, Image2018, hărți topografice la scara 1:50000, ortoimagini 2007, 2016, 2020, 2021, în conformitate cu metodologia CLC acceptată, oferind date vectoriale pe o scară de 1: 100.000, lățimea minimă a poligonului 100m, suprafața minimă de cartografiere de 25 ha pentru baza acoperirii terenului și 5 ha pentru baza modificărilor. Nomenclatura CLC definită include 23 de clase, fiecare descriind o acoperire diferită a terenului.
Scară echivalentă	100000

Conformitate

Specificație

Consistență conceptuală

Constrângeri legate de acces și utilizare

Limitarea accesului public

Alte constrângeri	no limitations to public access

Condiții aplicabile pentru acces și utilizare

Alte constrângeri	conditions to access and use unknown

Condiții aplicabile pentru acces și utilizare

Petrecere responsabilă

Contact pentru resursă

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Cod poștal	MD-2004
Țară	R. Moldova
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Numele poziției	Instituție
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Oraș	mun. Chișinău
Cod poștal	MD-2004

Țară	Moldova
E-mail	cancelaria@mediu.gov cancelaria@mediu.gov.md

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Nume individual	Igor Paharikov
Numele poziției	Șef secț. GIS
Telefon	022881200
Abordare	str. Serghei Lazo, 48
Oraș	mun. Chișinău
Cod poștal	MD-2004
Țară	Moldova
E-mail	info@ingeocad.md

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Limba metadatelor	rum
Identificator de fișiere	1d669b7d-14fc-4bae-9f22-1ea59fe5a784 XML

Prezentare generală

Furnizat de

5.3. Modoficările acoperirii terestre, anul 2023-2018

Setul de date conține modificările CLC care caracterizează acele modificări ale acoperirii terenurilor cu o periodicitate mai mare decât cea anuală/stațională. Extinderea urbană, plantarea de copaci pentru a înlocui terenurile arabile, crearea unui nou rezervor, ect. - astfel de modificări pe termen lung ale acoperirii terenurilor sunt cartografiate ca modificări CLC. Pe de altă parte, modificările tranzitorii și modificările periodice pe termen scurt sunt fenomene care nu trebuie cartografiate ca modificări CLC.

Profil moldovenesc

Identificare

Titlul alternativ al resursei	Corine Land Cover
Tip de resursă	Set de date
Cod	https://geodata.gov.md/#/

Resursă cuplată

Cod	EPSG:4026

Format de date

Tip de reprezentare spațială	Vector
Limbajul resurselor	rum
Codificarea caracterelor	Utf8

Clasificarea datelor spațiale

Categorie de subiect

Cuvânt cheie

Valoarea cuvintelor cheie	Acoperire terestră
GEMET - INSPIRE themes, version 1.0	• Acoperire terestră
Spatial scope	• European
INSPIRE priority data set	• Nationally designated areas - CDDA

Locatie geografica

	N		E
	S		W

Referință temporală

Întindere temporală

Întindere temporală

Data (Creare)	2024-05-31

Data (Publicare)	
Frecvența de actualizare	După cum este necesar

Calitate și validitate

Descendență	Abordarea standard pentru crearea bazei de date CLC s-a bazat pe interpretarea vizuală a imaginilor satelitare: Image2000, Image2018, hărți topografice la scara 1:50000, ortoimagini 2007, 2016, 2020, 2021, în conformitate cu metodologia CLC acceptată, oferind date vectoriale pe o scară de 1: 100.000, lățimea minimă a poligonului 100m, suprafața minimă de cartografiere de 25 ha pentru baza acoperirii terenului și 5 ha pentru baza modificărilor. Nomenclatura CLC definită include 23 de clase, fiecare descriind o acoperire diferită a terenului.
Scară echivalentă	100000

Conformitate

Specificație

Consistență conceptuală

Constrângeri legate de acces și utilizare

Limitarea accesului public

Alte constrângeri	no limitations to public access

Condiții aplicabile pentru acces și utilizare

Alte constrângeri	conditions to access and use unknown

Condiții aplicabile pentru acces și utilizare

Petrecere responsabilă

Contact pentru resursă

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Nume individual	Ministerul Mediului
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Contact pentru resursă

Metadate

Contact pentru metadate

Nume organizatie	Întreprinderea de Stat Institutul de Geodezie, Prospecţiuni Tehnice şi Cadastru „INGEOCAD"
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Data metadatelor	2024-05-29T11:09:35.182Z
Limba metadatelor	rum
Identificator de fișiere	355292b6-b243-4cf5-8834-e09ef9e4685f XML

Prezentare generală

Furnizat de

NSDI
Republic of Moldova

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Updated CLC illustrated nomenclature guidelines, 2017.

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HTML version: https://land.copernicus.eu/content/corine-land-cover-nomenclature-guidelines/html/

Kommentiert [KB1]: Better to refer to latest vesion