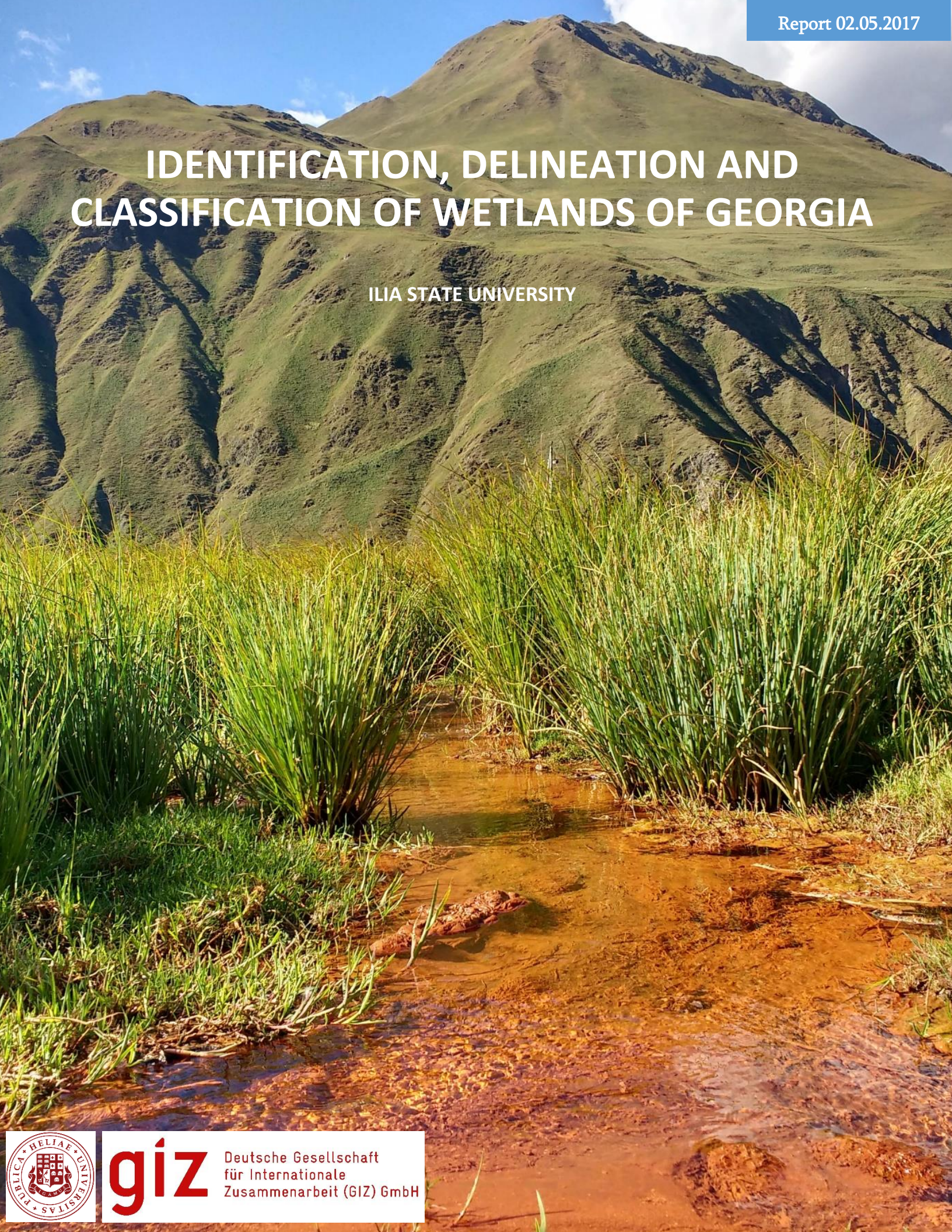
Report 02.05.2017

IDENTIFICATION, DELINEATION AND CLASSIFICATION OF WETLANDS OF GEORGIA

ILIA STATE UNIVERSITY



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Project Manager: Giorgi Mikeladze

Botanists: Giorgi Tedoradze, Niko Lachashvili, Ilia Akobia, Vasil Metreveli

GIS and RS specialists: Nutsa Meghvinetukhutsesi, Zurab Janiashvili

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1. General Characteristics of Wetlands of Georgia

Given to specific landscape and climatic conditions the wetlands in Georgia are mainly located in Colchis and Javakheti, however it should be mentioned, that irrespective of intensive anthropogenic impact, the fragments and habitats of wetlands are still maintained in East Georgia. Overall, the wetlands cover 51500 ha in Georgia, where the average number of free-standing-water bodies (hydrologically isolated units) amounts to 1040.

Mire vegetation (fig. 8) is a typical component of South-Georgia volcanic upland mainly associated with subalpine belt, but rarely extending as far as to the subnival zone. Meso-and eutrophic mires are quite common in South Georgia, while oligotrophic peatlands occupy limited area. Typical sphagnum peat bogs are missing due to harsh environmental conditions of subalpine and alpine zone, but can be found at lower elevations embedded in Picea-Abies forest and mesic beechwoods outside Javakheti Uplands [Nakhutsrishvili, 1999].

The character of mire vegetation is similar to that of northern Eurasia and the Alps, though one cannot find many characteristic for northern mires species on the territory of Georgia. The most characteristic plant species of the alpine belt is a medium-sized sedge - *Carex transcaucasica* - taxonomically related to *Carex nigra* complex. Along water bodies at lower altitudes tall-sedges like Tussock-sedge {*Carex elata*), Bottle-sedge (*Carex vesicaria*) are of significance. Woollyfruit-sedge (*Carex lasiocarpa*) is characteristic for advanced phases of terrestrialisation at mid altitudes (Dzelkva Ltd., 2008).

Various types of aquatic communities have been recorded in lakes and mire pools, of which pond-weeds (*Potamogeton* spp.), bladder-worth (*Utricularia vulgaris*) and duckweeds (*Lemna trisulca*) are of foremost importance. Spike-rush (*Eleocharis palustris*), stands of tall-sedges (*Carex vesicaria, Carex elata*) and cattail (*Typha angustifolia*) are often found intermingled with aquatic vegetation.

Degree of endemism is rather low compared to adjacent mountain steppe and alpine turfs. Species richness is also quite low in most parts due to prevailing acidic conditions (Dzelkva Ltd., 2008).

Unlike South Georgia the abundance of precipitations on Colchis Lowlands, plain and often lowered surface, heavy composition of forming rocks, floods and other factors provide for existence of permanently waterlogged soil of the lowlands, what results in the creation of wetlands with different composition as a whole massive. This territory occupies a large area in the coastal part of the Lowlands, in the watersheds of the rivers Enguri, Khobi, Rioni and Supsa.

Typical Colchic vegetation is found on the coastal zone and protected areas, where the following plant communities are distinguishable: 1) forests, 2) wet-meadow communities 3) aquatic

vegetation. Woods of *Alnus barbata* are prevalent here, a rather small area is occupied by *Pterocarya pterocarpa*forest as well as one of *Fraxinus Excelsior*. Their associates are *Quercus hartwissiana, Fagus orientalis, Diospyros lotus, Acer campestre, Alnus incana, Staphylea eolchica, S. pinnata, Sorbus tomninalis*. One can distinguish the following forest types of Colchis: 1)*Alnetum oplismenosum*, which occurs on slimmy-glay swampy soils. The arboreal components are *Carpinus caucasica*, *Acer campestre* undergrowth is represented by *Crataegus microphylla, Rosa canina, Lonicera caprifolium*. The ground layer consists of *monodominant Oplismenus Undalatifolius*. Lianas are also characteristic of this community, 2)*Alnetum polygonosum* on partly swampy soils, with *Polygonum hydropiper* as monodominant ground layer, 3) *Alnetum struthiopterosum* alongside the canal, connecting the Pichora and Rioni rivers, 4) Woods of *Pterocarya Pterocarpa* with forbs – *Iris pseudacorus, Juncus effuses, Ranunculus repens, Mentha aquatica, Carex ramota* etc (Ketskhoveli, 1965).

The vegetation of Colchis Nature Resort includes number of hydrophytic communities. One can find here both submerged water plants and (*Lemna minor, Nuphar lutea, Nympaea alba*) and those rooted in water (*Potamogeton natans, P. crispus*), as well as free floating, very intricately branching plants such as *Ceratophyllum demersum, Myriophyllum spicatum* etc. River banks are covered mostly with *Alisma plantagoaquatica, Sagittaria trifolia* etc.

In lowlands and on piedmonts the dominant forest formations are *Alnetum barbatae, Quercetum iberici, Quercetum hartwissianae, Querceto-Zelcovetum (Quercus iberica – Zelcova caprinifolia), Carpinetum caucasici, Castanetum sativae, Fagetum orientalis, Pinetum Kolchianaea*. In separate gorges broad-leaved forest occur. It should be mentioned, that according to Dolukhanov (1980) the plants mentioned above are the derivatives of ancient floristic complex which is already on the territory of Western Eurasia.

Aquatic and bog vegetation of Colchis is very diverse. These plant communities mostly occur in lowlands. Of special interest are the peat bogs of Colchis (especially those of Kobuleti). They are regarded to be an Atlantic type. They existed even before glaciation. After the glacial period they were enriched by the components of boreal flora, namely *Drosera rotundrifolia, Rhynchospora alba* etc. The typical representatives of these communities are the following species, which are very unusual in Northern Eurasia: *Rododendron Ponticum, Rh. Luteum, Osmunda regalis* etc. [Kotliakov et al., 2012].

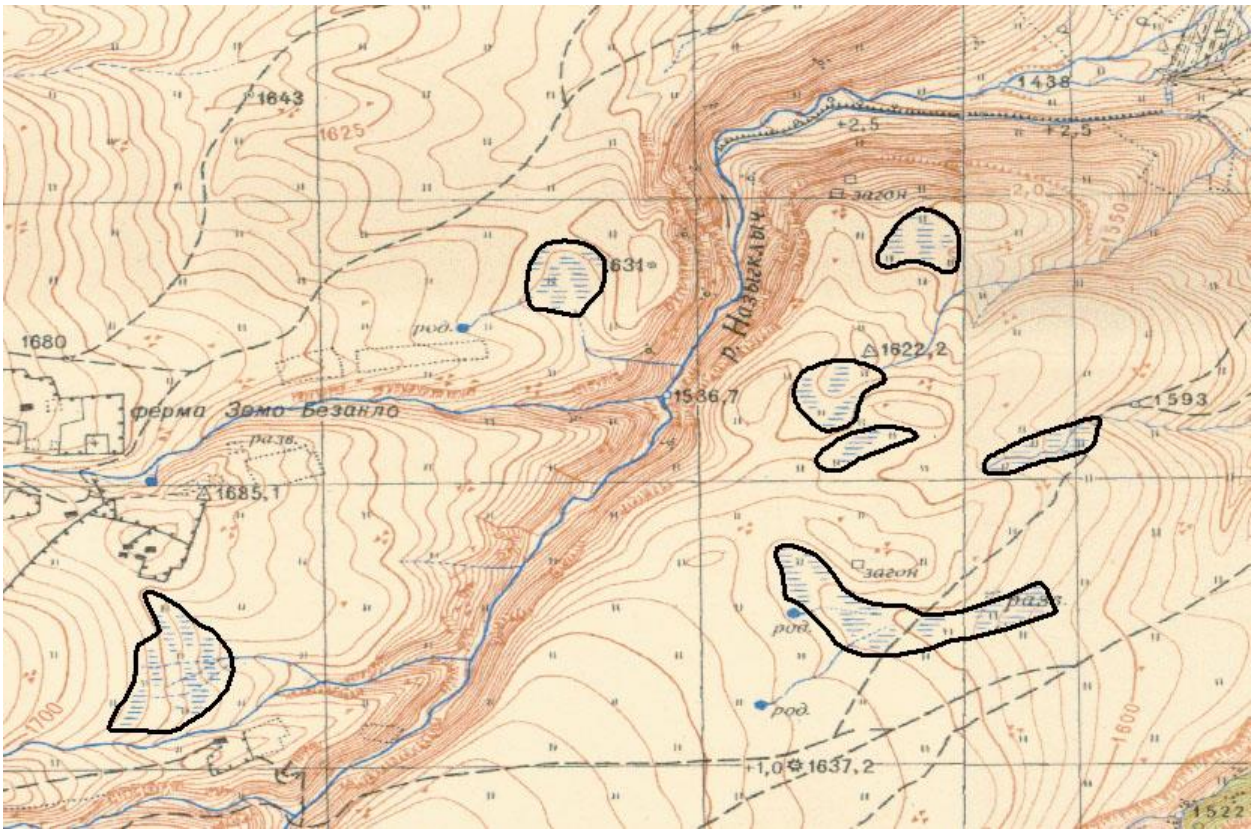
2. Identification of Wetlands

2.1. Identification of wetlands according to historical maps

As of to date available are the topographic maps of the Soviet period - 1950-60s, depicting mires, swamps and other wetlands in a rather detailed manner, with average 10-15m accuracy. The problem is the age of these maps and respectively, taking account of spatially changing in time bodies existing thereon for contemporary geographic evaluation. For the past 56 years most of the

wetlands have greatly changed or are already dried due to anthropogenic, climatic or other factors. Furthermore, during the identification of wetlands it became necessary to take account of thematic implication of topographic map as well. It is a common understanding, that military maps depicted only those wetlands, that might have endangered the movement of military machinery, while small and dry for the most period of a year territories were neglected. Respectively, for the determinations of the location of wetland bodies, the Project also used 5m accuracy RapidEye satellite multispectral images in combination with 1:25,000 scale maps along with topographic maps.

During the inception phase of the Project the bodies denoting wetland units according to map legends were vectorized from 1:25,000 scale topographic maps. Some 1709 bodies were outlined, which were checked later using contemporary satellite images (see Chapter 2.3 and Pic.1).



Pic.1 1:25,000 scale topographic map (1955) and vectored outlines

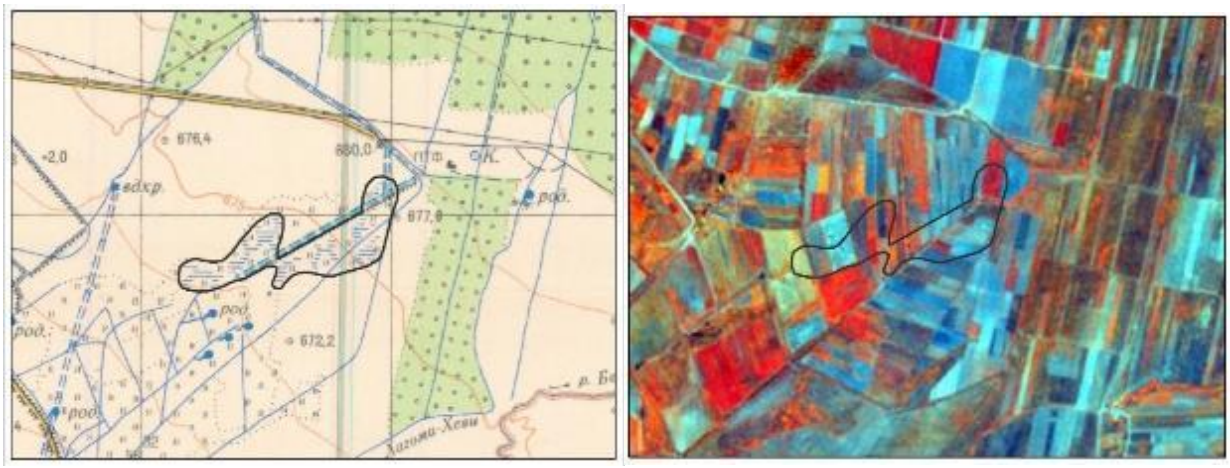
2.2. Identification of wetlands using multispectral satellite images

The data vectorized from topographic maps were checked by specialists visually, according to binary principles - the existing wetlands were granted code "1", while dried and heavily degraded (used as

croplands) - "0". Human errors in this case is practically excluded as agricultural lands have very specific geometrical pattern.

The wetlands, not found on topographic maps, were mapped out on satellite images using spectral analogues (ENVI 5.3) method. Spectral analogues method is a powerful instrument, with the help of which the relevant bodies (wetlands) were mapped out on images. Spectral analogues method uses spectral coincidence algorithms, when spectral characteristics of image pixels are compared with average properties of predetermined pixels*. Using this method, we have found areas, wetland fragments and bodies which were not depicted by topographic map for some reason.

** The location was mapped out according to coordinates, taken from topographic maps*



Pic.2 A wetland - topographic map (1955) on the left and satellite image (RapidEye 2014) on the right

2.3. Identification of wetlands according to available literature

The information maintained from the past century until now about the location of Georgian wetlands is rather scarce. On the one part this can be accounted for the fact that most of spatial data was classified in Soviet Georgia and on the other hand - the majority of historical academic works are somewhat forgotten and as of to date are no more available for the academic society at large. As for modern authors - just a few of them are known, mainly from academic publications. The mention should be made of the Report, prepared by Dzellkva.Ltd - Botanical Survey of South Georgian Wetlands, on the basis of which Report the following territories were identified and delineated: Agrikari-Emliki, Verana-Chobareti, Bezhano-Baraleti, Godorebi-Didi Abuli and Didi Samsari. Also worth mentioning is Andreas Kaffke's publication - Vegetation and Site Conditions of a Sphagnum Percolation Bog in the Colchis Lowlands (Georgia, Transcaucasia), with the help of which publication the unique percolation mires were identified and the new code was added to the classification. The project also relied on the works of K.Kimeridze (1981, 1985) and I.Machutadze (2009, 2015) according to which works the ecology and coverage of various plant species were established.

Naturally, the Project took account of Vegetation Cover of Georgia by N.Ketskhoveli and The Vegetation of Georgia (South Caucasus) by G.Nakhutsrishvili, which proved to be particularly helpful during Project planning phase.

2.4. Identification of wetlands according to vegetation cover, soils and hydrological regimes

The most accurate method of wetland identification is field evaluation, hence, before onsite visits, our group developed special questionnaire for the identification of wetlands, which questionnaire was based on the following characteristics:

Diagnostic-ecological characteristics:

Wetlands have the following general diagnostic environmental characteristics:

(1) **Vegetation.** The prevalent vegetation consists of macrophytes that are typically adapted to areas having hydrologic and soil conditions described above. Hydrophytic species, owing to morphological, physiological, and/or reproductive adaptation, are able to grow, effectively compete for survival, reproduce, and/or persist in anaerobic conditions. The species (e.g., *Alnus glutinosa* subsp. barbata) with broad ecological tolerance are characteristic both for wetlands and non-wetlands.

Many plant species have morphological adaptations for occurrence in wetlands. These structural modifications most often provide the plant with increased buoyancy or support. In some cases (e.g., adventitious roots), the adaptation may facilitate the uptake of nutrients and/or gases (particularly oxygen). The wetlands were identified during field works also according to adaptation indicators when water or characteristic humidity was not notable. Of morphological-adaptation indicators used during field works the mentioned should be made of the following:

- Buttressed tree trunks
- Adventitious roots
- Shallow root systems
- Inflated leaves, stems or roots
- Polymorphic leaves
- Floating leaves
- Floating stems
- Hypertrophied lenticels
- Multitrunks or stooling

(2) **Hydric soil** may be either drained or undrained, and a drained hydric soil may not continue to support hydrophytic vegetation. Therefore, not all areas having hydric soils qualify as wetlands. Only when hydric soil supports hydrophytic vegetation and the area has indicators of wetland hydrology may the soil be referred to as a "wetland" soil.

It is important to record such evidence of drainage of an area; a hydric soil that has been drained or partially drained still allows for meeting soil parameters. However, the area will not qualify as a wetland if drainage degree had been sufficient to preclude the presence of either hydrophytic vegetation or a hydrologic regime that occurs in wetlands.

(3) **Wetland hydrology** encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated up to the surface at some time during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on characteristics of vegetation and soils due to anaerobic and reducing conditions, respectively. Such characteristics are usually present in areas that are inundated or have soils that are saturated to the surface for sufficient duration to develop hydric soils and support vegetation typically adapted for life in periodically anaerobic soil conditions. Hydrology is often the least exact of the parameters, and indicators of wetland hydrology are sometimes difficult to find in the field. However, it is essential to establish that a wetland area is periodically inundated or has saturated soils during the growing season.

3. Delineation of Wetlands

3.1. Preprocessing of satellite images

Along with topographic maps the Project used 5m/pixel accuracy RapidEye satellite multispectral images for wetland mapping. The image was the first level procession product meaning that atmospheric correction should have been conducted prior to its use for analytical purposes, meaning the correction of pixel values distorted under the influence of the atmosphere. Atmospheric correction was done using ENVI 5.3 FLAASH instrument. Spatial orientation, shooting time and other physical parameters of the sensor were taken from annexed metadata of Rapideye. The number of processed scenes amounted to 37.

It should be mentioned that geometric correction (orthorectification) had already been done. Despite the foregoing, the geometric and spatial accuracy of images still had some imprecisions (5-40m).

3.2. Segmentation of satellite images

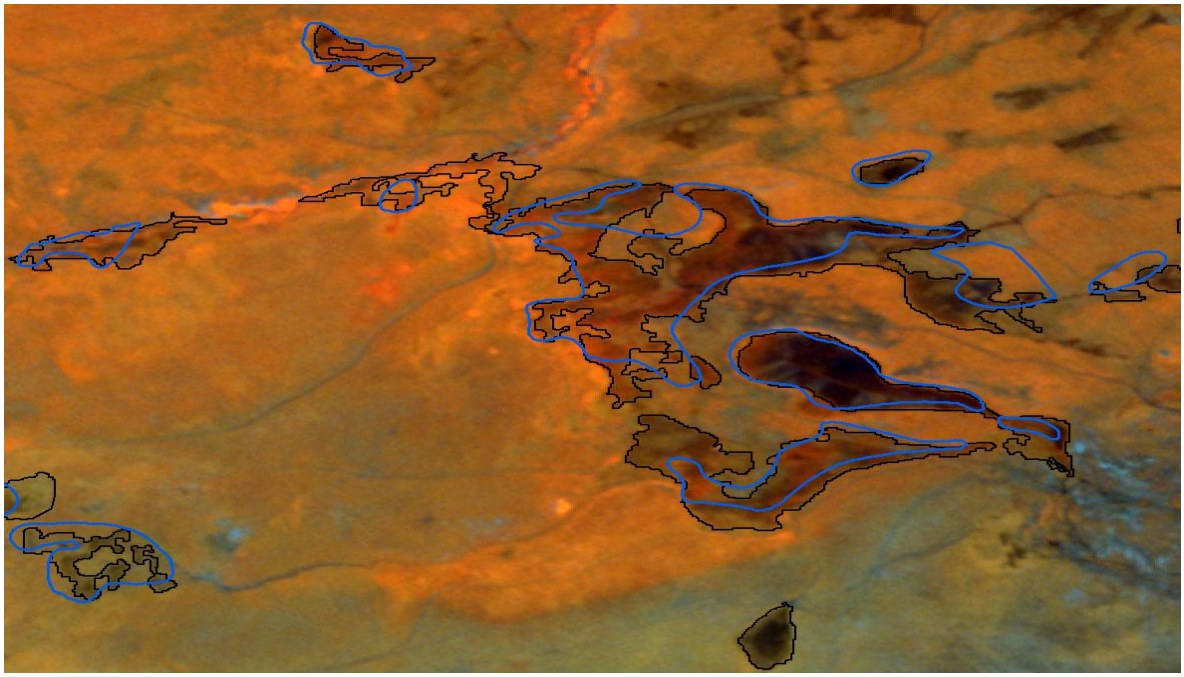
Owing to wetland specificities we decided to use "object based classification", i.e. unlike unsupervised and supervised classification, in the case of object/segment based classification a segment is identified not only according to spectral characteristics, but also the morphological elements are taken into consideration, like texture or shape of a body. Segmentation was done on the basis of the following parameters:

1.Spectral mean	9.Area
2.Spectral sdt	10.Length
3.Spectral min	11.Compactness
4.Spectral max	12.Convexity
5.Texture range	13.Roundness
6.Texture mean	14.Elongation
7.Texture entropy	15.Form factor
8.Main direction	16.Number of holes

In normal conditions typical wetlands are characterized by distinct, different from other surrounding territories pattern and coloring, what is conditions by specific features of the terrain and different vegetation cover; hence segmentation of an image proved to be particularly efficient. As a result of multiparameter segmentation a delineation line became clearly visible between wetlands and dry areas, what would have created certain problems as neighboring pixels with transient values would have creates similar spectral noise in certain cases. *Segmentation was done using ENVI 5.3 software.*

After the accomplishment of segmentation of a satellite image we obtained homogenous segments covering the image both on wetland territories and other areas. Our next task was the categorization and classification of segments according to their ecotype. For example wetlands and non-wetlands, while wetlands were subdivided into subgroups: with and without sphagnum, with and without reeds, etc. Theoretically this approach is called "Classification Tree", which is very efficient for this type of classification. However, after a number of testing efforts, we abandoned this method, as satellite images were taken during different vegetation periods and years, what caused much seasonal ambiguity in spectral characteristics. Furthermore, spatial deviation of images (see Chapter 3.1) did not allow for adequate spatial coincidence with GPS coordinates taken during field works.

Based on the foregoing the identification of wetland segments was done through overlapping analysis of wetland areas taken out of 1:25,000 scale topographic maps and segments of vector layers prepared using Spectral analogues (ENVI 5.3) method (see Pic.3).



Pic.3 Segments identified from satellite images (black) and comparison of unites, outlined from topographic maps (blue) (RapidEye 2012).

Ultimately, we identified segments, poligonic vectors, which depict only wetlands, their areas and contours and shape-lines. The classification of wetlands was done according to EUNIS system (see Chapter 7.2).

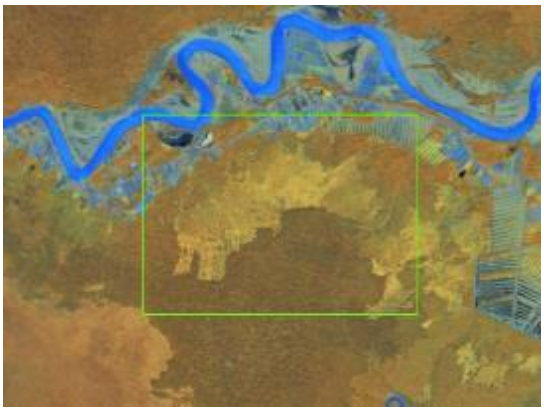
3.3. Data accuracy and scale

Geometrical patterns of most wetlands are changing seasonally (depending on hydrological regime and precipitations), hence its morphology may not be typical for the moment when the image is taken. Respectively, it is difficult to establish the geometric accuracy of obtained spatial data, and the results may tend to be conditional to a certain extent in some places.

The mention should as well be made of spatial distortion of RapidEye satellite images used by Project, which in average amounted to 5-40 meters. The orthogonal distortion of bodies should not exceed 5 meters due to relatively small areas of identified bodies and their dislocation mainly on the plains, hence in future vector polygons may be moved to correct coordinates.

RapidEye satellite images were taken in 2011-12, hence we were not able to double check the identified bodies against more recent satellite images, specifically against high resolution Quick Bird

images existing in Google Earth pro space. It should be mentioned, that in certain cases the patterns of wetlands turned out to be significantly changed. Hence in places, where this process was large-scale, their outline were corrected according to outlines taken out from Google Earth pro.



Pic.4 RapidEye 2011, deforested forest stand is

Pic.5. Quickbird (Google Earth) 2016, forest stand rehabilitated

The scale of final spatial was set to be 1:25,000 with due consideration of satellite resolution and other factors.

4. Field-work, Planning of Expeditions and Security Measures

4.1. Expedition Guide

As already mentioned starting from the past century until now Georgian wetlands have been studied only by small groups and individual scholars. Consequently, the methodology for the survey of this type of ecosystem either not existed or was obsolete. Hence we decided to draft a methodological guide, including detailed description of field visits, field work in general and inventory-taking process. This guideline enabled the working group to better understand the specificity of survey of wetlands and correctly accomplish their tasks. We do hope, that this Guide will be useful for future generations as well as a guideline for wetland surveys.

Guidelines for Identification and General Characterization of Wetland and Deepwater Territories* was drafted during Project inception period and included the methodology of identification and field description of wetland and deepwater habitats according to specially developed criteria.

**See Guidelines Identification and General Characterization of Wetland and Deepwater Territories*

4.2. Work-sheets and record cards

Special work-sheets and record cards were developed for data-recording, which ensured the standardization of information collected by various groups and experts.

Form 1. Determination and general characterization of a wetland

Responsible officer: *Giorgi Tedoradze*	**Application number:** R-85-14-81	**Nearest settlement:** Grigoleti
Region/Municipality *Guria and Samegrelo*	**Description of the place:** *Central Colchis Wetlands*	**Area, boundaries, size** *33 710 hectares.* *Waster level in mires - 0.2-0.7 m; in lakes - 0.5-3.0 m; in rivers - 1-1.2 m* *(location dimensions: length/width, sketch, area, boundaries, area of the territory covered/saturated with water (seasonal max./min), depth (seasonal max./min, whenever important)*
Location: *41.7419 42.0398 decimal degrees* *(DD coordinates)*	**Geomorphic showings:** *Is located on both banks of the Rioni outfall, in the central part of the Black Sea East Coast.* *0.2-5.5 m above sea level; average - 1.2 m above sea level* *(terrain characteristics, drainage basin, river basin, altitude, indices, elevation upper and lower zones, distance to the bank if the bank is near, etc.)*	**Climate:** *The climate is humid subtropical. Full year precipitation average index is 1500-1700 mm/y. Average temperature for the most period of time is +14°C, minimal temperature -13°C, and maximal - +41°C.* *(General overview of climate type, zone and key characteristics (precipitation rate, temperature, wind))*
Land management and factors affecting research territory: ***Land management and activities:*** *Research territory: nature protection, small-scale cattle breeding, mowing,*	**Land ownership and administrative self-governance** *Research territory: state owned* *Adjacent territories: state, private and*	**Wetland conservation and management status:** *Colchis Preserve (500 ha) was founded in 1947*

logging, small-scale fish-breeding. *Adjacent territories: cultivation of crops and legume, citruses, cattle breeding, mowing, gardening, road-metal and sand quarry, commercial gardening.* ***Factors affecting research territories:*** *Research territory: peat milling, forest felling, illegal hunting and fishing.* *Adjacent territories: mire draining, peat milling, forest felling, illegal hunting and fishing.* *(Land management and activities)*	*cooperative owned.* *(concerns a wetland and adjacent river basin/bank)*	*Necessary measures for offered conservation: Guidelines for the Management of Colchis Protected Areas (Tbilisi 1995)* *Managing agency: Ministry of Environmental Protection* *(Covers legal aspects and social or cultural traditions, which affect the management of the wetland; also the category of protected area according to IUCN and/or other national system)*

Date: *12.06.2016*	**Prot number:** *3.4*	**Transect:** 2	**Sampling station along the transect:** *3.4.2.1*

Vegetation cover *List three dominant plants in each layer (5 species if there are only 2 layers). Mark with a star the specie, having morphological characteristics, indicative of wetlands.*

Indicator		**Indicator**	
Species	**Status**	**Species**	**Status**
Trees:		Grass:	
1 *Pterocarya pterocarpa*	*OBL*	1 *Habiscus ponticus*	*OBL*
2 *Alnus glutinosa*	*OBL*	2 *Trapa colchica*	*OBL*
3		3	
Bushes:		Twining plans:	
4	*OBL*	4	
5		5	
6		6	

Percentage of OBL, FACW and FAC species:	Other indicators:
Hydrophytic vegetation: ☑ Yes ❑ No	Dominant vegetation: *50% of dominant vegetation is "mandatory" uliginous plant (OBL).*

Soils

Series and phase: *Frequently inundated*	Of known soil type?: ☑ Yes ❑ No	Mottled?: ☑ Yes ❑ No	Mottle color according to Munsell book: *5YR4/6*	Matrix color according to Munsell book: *10 YR4/1*
Gleyed: ❑ Yes ☑ No	Other indicators:	Wetland soil?: ☑ Yes ❑ No	Basic soil: *The territory is characterized with high level of peat content*	

Hydrology

Covered with water: ☑ Yes ❑ No	Ditch-water depth: *1.5 ∂*	Water saturated soil: ☑ Yes ❑ No	Depth of water saturated soil: *30 ьд*	Other indicators: *Characteristic for mire sediment layer and water drift line of trees is notable*
Water hydrology: ☑ Yes ❑ No	Hydrological regime: *Permanently covered with water*	Basic: *Water saturated soils*	Atypical situation: ❑ Yes ☑ No	Normal Environment?: ☑ Yes ❑ No

Pressure and trend:

Criterion	**Level**		
Naturalness	High ❑ (Natural or semi-natural, moderately modified habitats)	Average ☑ (Habitat, which still supports complex of characteristic species)	Low ❑ (Severely modified habitat)
Anthropogenic impact	High ❑ (Insignificant or almost none)	Average ☑ (Low level of human impact)	Low ❑ (Heavy of anthropogenic pressure (cattle-breeding, logging, etc.))

Establishment of a wetland: A wetland ☑ Not a wetland ❑

Comments:_____ *No rain for the past two weeks* _____

4.3. Field work, implementation methodology and taxonomic study of plants

Before commencement of field work the number of sample stations was planned, their coordinates and access roads were identified. Only one central station was identified within each wetland body/unit, from which point all the locations of the territory were studied and described. Exempted were only Colchis wetlands, where research area exceeded 200 ha, hence the stations were planned on the basis of segments taken from satellite images. In Colchis the sample stations were selected at random for high statistic reliability, however, later during the field work, this approach was slightly corrected as sample areas were often located in inaccessible places, and sometimes it was beyond physical abilities of experts and security rules to reach these stations.

The experts worked in two groups, consisting of at least three persons. Often these groups worked in different regions of Georgia, where university students would assist them.

Each and every member of the group was equipped with special implements: high boots, mosquito nets, anti-insect preparations, first-aid kits, shovels, axes and other equipment.

Pic.5 Working process on Colchis Lowland

For the conduct of mentioned field work the vegetation cover of research wetlands was studied, plant taxons were accounted, herbarium material was collected, the species were identified, obtained data were entered into electronic databases /processed, etc.

As a result of field expeditions the plants were described in a traditional manner (collection, classification and identification of herbarium material). Predetermined sample stations were visited using the navigation instruments - GPS and satellite images.

The following method was developed for the determination of species diversity and coverage: dominant plant species were accounted within direct vicinity of the observation stations. Subjectively, the dominant species were determined according to their amount/density. Each specie accounted on research stations were granted the indicative status (OBL, FAC, FACU, FACW, etc.).

Along with phyto-sociological inventory the dominant plants were accounted for/identified on sampling plots. Diverse species of ligneous plants, forbs, ferns, lianas, sphagnum and other mosses, as well as their coverage, composition and other ecological characteristics were described.

Both standard variables and additional physical parameters were measured: types of aquatic plants, water depth, habitat area, condition (dry and humid), naturalness (modified and natural), anthropogenic impact (grazing, mowing, burning, etc.), peat exposure (with or without peat), soil wetness (water saturated, dry), etc. It should be mentioned, that photos were taken on each and every sample station, photo materials depicted both plants and the landscape, terrain and hydrological characteristics.

The first part of stationary works (for Colchis Lowland) covered the placement-drying of collected plants in herbarium nets, their classification and taxonomic identification on Grigoleti marine base of Ilia State University. Taxonomic identification was conducted according to Glossary of Georgia's Plants (1964, 1969) and Georgia's Flora (1971-2011). The plants, specie determination-identification of which deemed impossible on the site were identified under stationary conditions, at the Institute of Botany of the Ilia State University.

The second part of stationary works, which were conducted in October-November, 2016 together with the personnel of the Institute of Botany and foresters-botanists, covered the identification of collected herbarium material and their comparison with the samples maintained in the Institute herbarium.

The third part of stationary works, which covered the entry into/procession of obtained data and structuring of existing information in electronic databases, was conducted in December-January 2016, using Microsoft Excel program. The indicative statuses granted to each species were checked and compared (FAC, OBL, FACU, etc.), which statuses are compatible with the current academic research methodology and international standards.

Pic.6 Classification of plants and the process of taxonomic identification

Vascular plants (*Tracheophyta*) and mosses were identified to the lowest taxonomic level. During the identification of plants mainly the floras of Georgia and former Soviet Union were used (Georgia's Flora, 1971-2007; Komarov, 1986-2006). For verification and comparison of certain material the data accumulated in floras of neighboring countries - Turkey, Iran, Armenia and Europe. Rare and endemic species were identified on the basis of Solomon et al. (2013). Botanical nomenclature used in the report follows the Nomenclature List of Synopsis of Georgia's Flora (Gagnidze, 2005), which in its turn was verified and updated according to Internet portal The Plant List 2017.

Total 258 species were accounted. Of them 186 species are forbs, 11 species - mosses, 10 species are floating plants, 5 species - lianas and 4 species - ferns. There are six leading families according to number of species: *Cyperaceae* (40 species), *Poaceae* (29 species), *Rosaceae* (20 species), *Asteraceae* (16 species), *Fabaceae* (10 species), *Juncaceae* (10 species). The number of genera in six leading families is as follows: *Cyperaceae* (10 genera), *Poaceae* (24 genera), *Rosaceae* (14 genera), *Asteraceae* (15 genera), *Fabaceae* (7 genera), *Juncaceae* (2 genera). Amongst these general particularly diverse in species are: genus *Carex* -25 species, *Juncus* – 8 species, *Sphagnum* – 6 species, *Rubus* – 4 species, *Trifolium* - 4 species. The number of endemic species amounts to 14, of them 4

species are endemic to Georgia (*Hibiscus ponticus, Rhynchospora caucasica, Rubus caucasigenus, Trapa colchica*) and 10 species to the Caucasus (*Alnus glutinosa subsp. barbata, Carex transcaucasica, Swertia iberica, Thymus collinus, Ranunculus caucasicus, Alchemilla sericata, Rubus caucasicus, Ruscus colchicus, Euphrasia caucasica, Valeriana tiliifolia*).

Of total number of species the indicative status of 114 species belong to FAC, of 75 species - to OBW, of 55 species - to FACW, and of 16 species - to FACU.*

* Categories of Indicative Plant Statuses		
Indicator category	**Indicator symbol**	**Definition**
Obligate Wetland Plants	OBW	Plants, that are always found in natural wetlands (with >99% probability), however in very rare cases (<1 %), they may be found in non-bogged areas as well.
Facultative Wetland Plants	FACW	Plants, that are mainly found in wetlands (probability - from >67 up to 99 %), however may be found in non-bogged areas as well (probability - 1 to 33 %).
Facultative Plants	FAC	Plants than can be found both on bogged and non-bogged territories with equal rate of probability (probability from 33 up to 67%).
Facultative Upland Plants	FACU	Plants, that are rarely found in wetlands (1-33%) and more often on non-bogged territories (67-99%).

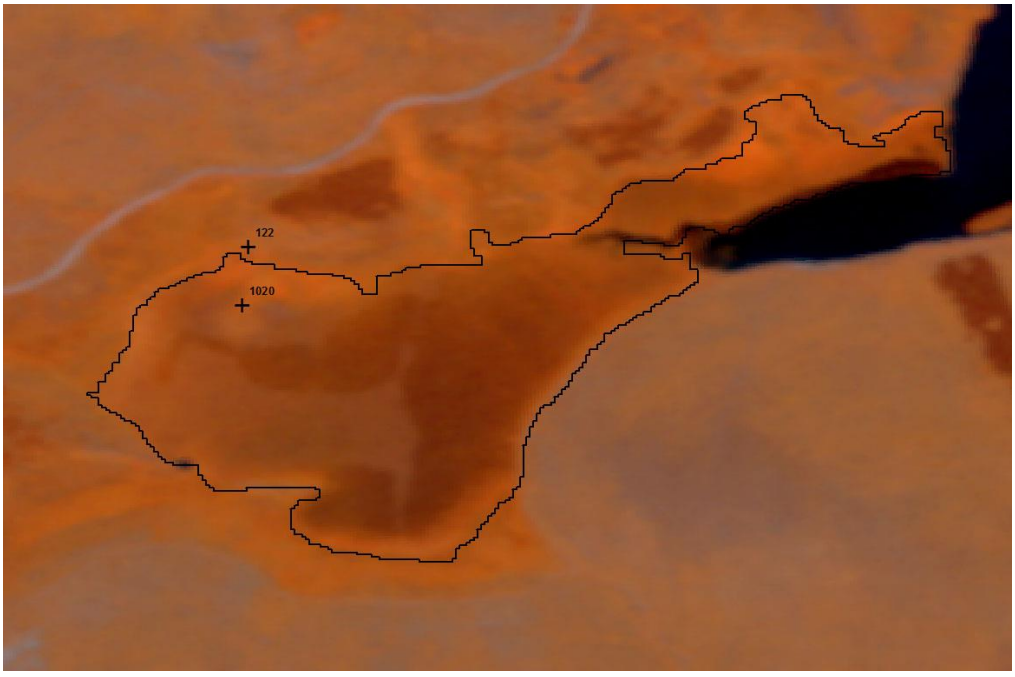
Source: Corps of Engineers Wetlands Delineation Manual by Environmental Laboratory 1987

5. Soils

5.1. Hydrophilic soils and criteria for their determination

For the identification and accurate delineation of wetlands it became crucial to determine and further classify hydrophilic soils first in the field and then in the laboratory. Quite often wetlands had transient stripes, buffer areas, encircling wetland bodies as contours. In most cases they are easily identifiable through the procession of a multispectral image, however, there were cases, when wetland territories greatly depended on the vegetation period, and the boundary between wetlands and dry places was rather imprecise and indistinct. When no contrast was notable between soils, the samples were taken and then identified. The soils were identified using two methods, according to Munsell book, when the soil code was determined on the basis of colors and chemical analysis, when reducing conditions of the soil were described. In soils saturated for long and very long period iron ions transform from three valency iron (Fe^{3+}) into two valency iron (Fe^{2+}). This situation was

established chemically, through iron test. High concentration of iron spoke for hydrophilic soils. This method was necessary for the identification of those sections, where field methods proved to be useless.



Pic.7 High concentration of reduced iron (Fe II mg/kg) mean wetlands subjected to prolonged inundation, what could not have been established visually in the field due to seasonal hydrological cycle and partially mowed territory (RapidEye 2014).

5.2. Soil pH

Establishment of soil pH is a crucial point as according to EUNIS classification determination of pH level is one of the key criteria. Acidic soils in Georgia mainly occur on the lowlands of West Georgia, however slightly acidic soils can be found in the East as well, specifically on Colchis volcanic plateau. The test samples of soil pH were taken within the framework of the Project, with the help of which the existing data were verified (Sabashvili, 1965).

It should be mentioned that in certain cases the soil pH level turned out to be anomalous - in places where the pH of wetland soils were supposed to be low according to already existing data, proved to be extremely high. This was the situation in places, where were surrounded by agricultural lands.

Presumably, these were the places of administration of carbonaceous fertilizers or lime, where the farmers try to improve land crop capacity through raising soil pH level, what had a major impact on the ecosystems of wetlands.

6. Classification of Georgian Wetland Habitats According to **EUNIS** Hierarchical System

6.1. EUNIS Classification of habitats and the difficulties with its application in Georgia

EUNIS (European Nature Information System) habitat classification system includes all types of natural and artificial habitats, also the electronic database about them and explanatory documents. Unlike old classification systems, which traditionally accounted only for phyto-sociological aspects, EUNIS classification system takes account of physical factors of the environment as well and divides habitats into three groups: land, fresh water and marine habitats. These habitats are categorized hierarchically and geographically cover the whole Europe, from Atlantics to the Urals and the Caucasus. Furthermore, the EUNIS classification system allows for adding new, amongst them indicative of the Caucasus and Georgia specific habitats (e.g. Imnati and Ispani percolating mires).

Wetland habitats were categorized on the basis of data collected in the field and phyto-sociological analysis. It should be mentioned, that wetlands were studied throughout whole Georgia; hence, to save time, targeted were dominant plant communities. Despite the foregoing, technically, the identification of habitats was not a problem, problematic proved to be only heavily degraded and unique for the region wetland habitats.

It is worth mentioned that EUNIS habitat classification was developed mainly for the European flora. Respectively, it became rather problematic to award respective code within EUNIS habitat system to the Caucasus, which is located on the verge of the continent and is characterized with specific flora and paleofloristics. Such an exemption is the flora of Colchis lowland and mountain wetlands, which constituted the regional refuge for the last ice-age. Owing to the foregoing the relict plants and endemics are still maintained in these places. Apart from floristic specificities Colchis Ispani and Imnati mires are unique from hydrological point of view as well, what is manifested in their percolation characteristics.

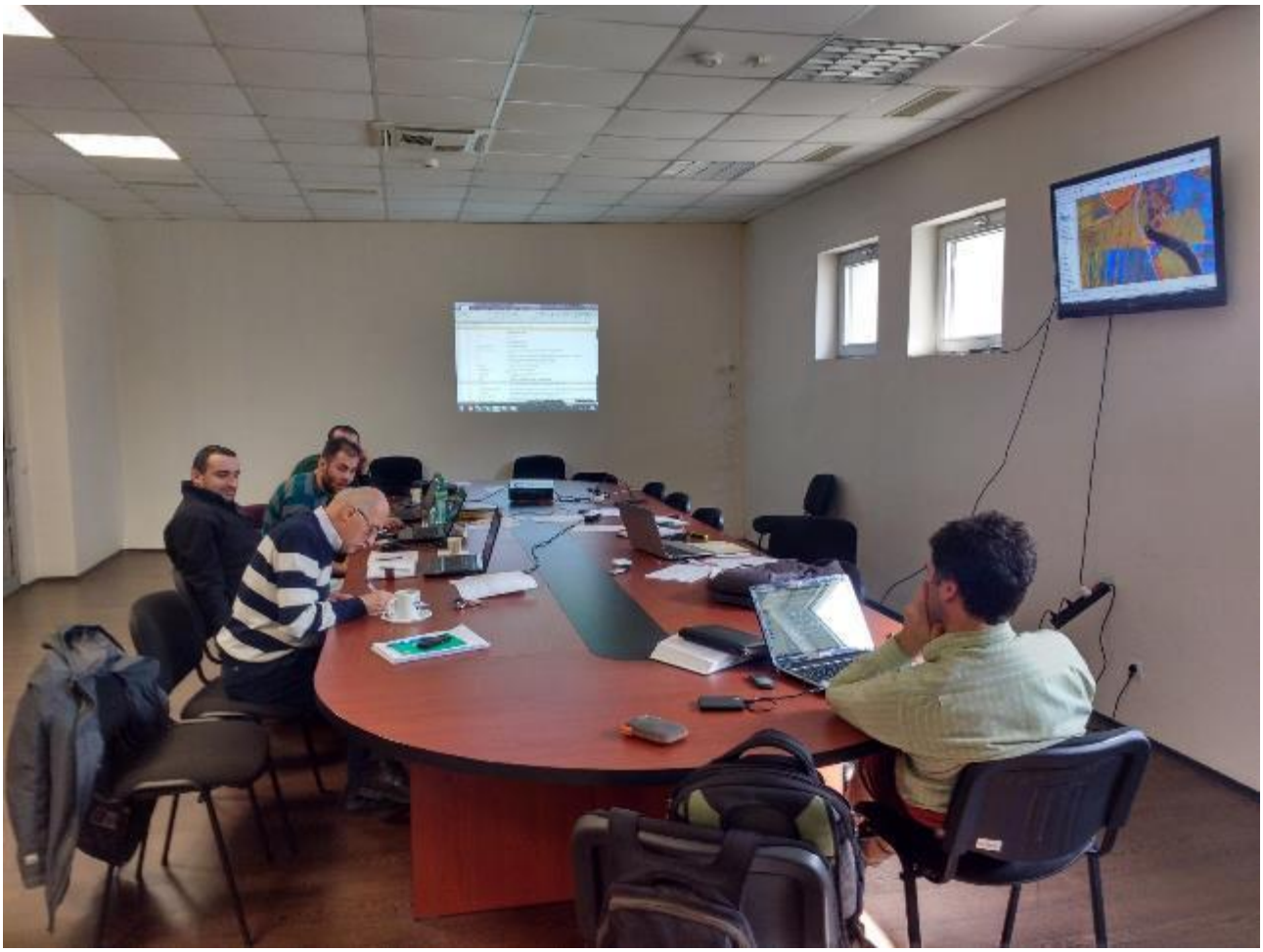
Presumably, Colchis wetlands with indicative of West Georgia subtropical climate is the perfect environment for the development of percolation mires. Hence, due to this very reason this type of mires were actively studied on this territory. It turned out, that sphagnum peat of Ispani 2, located near Kobuleti, corresponded to and met all the criteria; respectively is was declared as the first and unique percolating mire in the world (Kaffke et al. 2000; Matchutadze & Joosten 2003; Matchutadze & Krebs 2003; Haberl et al. 2006). And the second percolation mire is Imnati peatland, which is located to the North of Ispani-2, near Poti (Haberl et al. 2006).

During the classification we tried not to add any additional classes and to find relevant places for all the habitats in the European hierarchy system, however, due to the above factors, we made a decision to create/add the new class with regard to Colchis percolation mires. The latter will presumably be officially added to existing EUNIS habitat classification.

Georgian wetlands covered four I level habitats: B - Coastal habitats, C - Inland surface waters, D - Mires, bogs and fens and E - grasslands.

6.2. Description and coding of EUNIS Habitats

EUNIS and RAMSAR coding of habitats was accomplished according to botanical, physical and geographic data. All the personnel of the Project was involved in the classification process, on the basis of their mutual agreement the habitat classes and relevant codes were identified.



Pic.8. Classification and coding process in the Institute of Botany

The unique code was created for each wetland unit - this was the combination of hydrological basin identification codes (ERICA)* and wetland body. E.g. a wetland code 5.131 consists of two values: 5 and 131, where 5 is the code of Rioni hydrological basin and 131 - code of wetland body within this basin.

* European Rivers and Catchment (ERICA) coding system

7- Enguri Basin

Identification code: 7.7
INV - Habitat dominated by invasive species

Location - Colchis, Anaklia surroundings;
Photo: See the database;
Founding-dominant species - *Solidago canadensis*;
Obligate species - *Molinia caerulea*;
Facultative species - *Polygonum perfoliatum*, *Alnus glutinosa* subsp. *barbata*;
Relief -Flat plain;
Surface - Permanently partially covered with water;
Soil - Wetland, saturated with water;
Usage - Unknown

Comment 1.: Former peat quarry - the habitat was created as a result of peat extraction and developed in situ of the peat quarry. This is the territory with degraded structure, with domination of invasive plants.
Comment 2.: Heavy anthropogenic impact, high level of degradation.

Identification code: 7.8
Code - D5.24 – Fen beds of great fen sedge (Cladium)

Location - Colchis, Churia;
Photo: See the database;
Founding-dominant species - *Cladium mariscus*;
Obligate species - *Carex rostrata;*
Facultative species - *Iris pseudacurus*, *Stachys palustris*, *Solidago canadensis*, *Convolvulus arvensis*;
Relief - Flat plain;
Surface - Permanently partially covered with water;
Soil - Hydric, peaty, glayed, saturated with water;
Usage - Pasture.

Comment: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 7.9
C1.24 – Rooted floating vegetation of mesotrophic waterbodies

Location - Colchis, nearby Khulevi terminal, nameless small lake;
Photo: See the database;
Founding-dominant species - *Nuphar lutea*;
Founding-dominant species - N/A;
Obligate species - N/A;
Facultative species - N/A;
Relief - Lake;
Surface - Permanently fully covered with water;
Soil - -;

Comment 1.: Habitat created as a result of eutrophication, mesotrophic phase.
Comment 2.: Obligate and facultative species were not recorded.

<u>Identification code: 7.10</u>
C1.2412 – Water chestnut carpets

Location - Colchis, nearby Khulevi terminal, Martotba lake;
Photo: See the database;
Founding-dominant species - *Trapa colchica*
Obligate species - N/A;
Facultative species - N/A;
Relief - Lake;
Surface - Permanently fully covered with water;
Soil - -

Comment 1.: Habitat created as a result of eutrophication, mesotrophic phase.

<u>Identification code: 7.11</u>
C1.23 – Rooted submerged vegetation of mesotrophic waterbodies

Location - Colchis, Anaklia surroundings;
Photo: See the database;
Founding-dominant species - *Potamogeton crispus*;
Obligate species - *Typha latifolia*;
Facultative species - *Phragmites australis*, *Schoenoplectiella mucronata*, *Amorpha fruticosa*;
Relief - Pool created as a result of quarry works;
Surface - Permanently fully covered with water;
Soil - -;

Comment: This is the depression in situ of a peat quarry, which was filled up with water and currently is a pond. First the quarry territory was filled up with water and the pond was developed, and then the eutrophication process started. *Potamogeton crispus* populated the pool, occupying the major part of the pond. This is the habitat of eutrophication mesotrophic phase. Vegetation cover is that of a pond. At the same time the other plants (*Phragmites australis*, *Schoenoplectiella mucronata*, *Amorpha fruticosa*) grow on its banks and in it as well.

Identification code: 7.12
INV - Habitat dominated by invasive species

Location - Colchis, Kulevi surroundings, near terminal railway;
Photo: See the database;
Founding-dominant species - *Solidago canadensis*;
Obligate species - *Pteridium tauricum*;
Facultative species - *Asparagus officinalis*, *Asparagus officinalis, Paliurus spina-christi*, *Rosa canina*, *Citrus trifoliata*;
Relief - Flat plain;
Surface - Not covered with water, periodically inundated;
Soil - Sandy, not mire, is not saturated with water;
Usage - Grazing, cutting.

Comment 1. The environment is not suitable for wetland habitats. There was a wetland habitat on this territory in the past, but it was drained because of the construction of the railway;
Comment 2.: Heavy anthropogenic impact, high level of degradation.

Identification code: 7.30
G3.71 – Maritime pine ([Pinus pinaster) forests and plantations

Location - Colchis, between Poti and Kulevi;
Photo: See the database;
Founding-dominant species - *Pinus pinaster*;
Obligate species - -;
Facultative species - *Malus orientalis*, *Pyrus communis*, *Alnus glutinosa* subsp. *barbata*, *Mespilus germanica*, *Elaeagnus multiflora*, *Ruscus aculeatus*, *Solidago canadensis*, *Ambrosia artemisiifolia*, *Typha laxmannii*;
Relief - Flat plain;
Surface - Not covered with water;
Soil - Alluvial sandy light soil, not saturated with water;
Usage - Grazing, cutting.

Identification code: 7.31
A2.52 – Upper saltmires

Location - Colchis, Poti surroundings;
Photo: See the database;
Founding-dominant species - *Juncus effusus*;
Obligate species - *Juncus maritimus*;
Facultative species - *Typha latifolia*, *Solidago canadensis*, *Acorus calamus*, *Hydrocotyle ramiflora*, *Lycopus europaeus*, *Mentha aquatica*, *Lythrum salicaria*, *Juncus acutus*, *Carex vesicaria*, *Typha laxmannii*, *Phragmites australis*;
Relief - Flat plain;
Surface - Permanently fully covered with water;
Soil - Sandy light soil, saturated with water;

Comment: Weak anthropogenic impact, low level of degradation.

Identification code: 7.32
G1.C3 – False acacia ([Robinia]) plantations

Location - Colchis, between Poti and Kulevi;
Photo: See the database;
Founding-dominant species - *Robinia pseudoacacia*;
Obligate species - *Rubus candicans*;
Facultative species - *Asplenium trichomanes*, *Pteridium tauricum*, *Solidago canadensis*, *Carex divulsa*, *Violas sp.*;
Relief - Flat plain;
Surface - Not covered with water, periodically inundated;
Soil - Alluvial sandy light soil, not saturated with water;
Usage - Grazing, cutting.

Comment 1.: The environment is not suitable for wetland habitats.
Comment 2.: Heavy anthropogenic impact, high level of degradation.

Identification code: 7.35
D1.121 – Damaged, inactive bogs, dominated by dense purple miregrass (Molinia)

Location - Colchis

Photo: See the database;
Founding-dominant species - *Molinia caerulea*;
Obligate species - *Lythrum salicaria*;
Facultative species - *Carex lasiocarpa*, *Centaurea oxylepis*, *Mentha aquatica*, *Convolvulus arvensis*, *Alnus glutinosa* subsp. *barbata*, *Centaurea oxylepis*, *Calamagrostis epigejos*, *Athyrium filix-femina*,
Relief - Flat plain;
Surface - Not covered with water;
Soil - saturated with water;
Usage - Pasture.

Comment 1.: Former forest territory, habitat created as a result of deforestation and crazing, is being burnt; heavy anthropogenic impact, high level of degradation.
Comment 2.: Molinia mires drying as a result of burning; formation of the habitat is associated with burning of the vegetation cover - after burning the vegetation cover is changed (succession), as a result of the foregoing molinia (*Molinia caerulea*) has "gained dominion" and is still dominating.
Comment 3.: This habitat is one of the versions of rise bog.

<u>Identification code: 7.36</u>
G1.52 – Alder swamp woods on acid peat

Location - Colchis, Poti municipality;
Photo: See the database;
Founding-dominant species - *Alnus glutinosa* subsp. *barbata*;
Obligate species - *Iris pseudacorus*;
Facultative species - *Amorpha fruticosa*, *Viburnum opulus*, *Rubus candicans*, *Smilax excelsa*, *Carex vesicaria*, *Polygonum thunbergii*, *Alisma plantago-aquatica*;
Relief - Flat plain;
Surface - Permanently partially covered with water, periodically fully inundated;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - cutting, Grazing;

Comment: Heavy anthropogenic impact, high level of degradation.

<u>Identification code: 7.38</u>
G1.52 – Alder swamp woods on acid peat

Location - Colchis, Poti municipality;
Photo: See the database;

Founding-dominant species - *Alnus glutinosa* subsp. *barbata*;
Obligate species - *Polygonum thunbergii*;
Facultative species - *Frangula alnus*, *Rubus candicans*, *Periploca graeca*, *Smilax excelsa*, *Alisma plantago-aquatica*, *Mentha aquatica*, *Persicaria maculosa*, *Lythrum salicaria*, *Iris pseudacorus*, *Solidago canadensis*;
Relief - Flat plain;
Surface - Permanently partially covered with water, presumably is fully inundated seasonally (during precipitations);
Soil - Peaty, acid, gleyed, saturated with water;
Usage - cutting, Grazing;

Comment: Heavy anthropogenic impact, high level of degradation.

Identification code: 7.42
G1.52 – Alder swamp woods on acid peat

Location - Colchis, Khobistskali river gorge;
Photo: See the database;
Founding-dominant species - *Alnus glutinosa* subsp. *barbata*;
Obligate species - *Polygonum thunbergii*;
Facultative species - *Rubus sanguineus*, *Frangula alnus*, *Smilax excelsa*, *Hedera helix*; *Perioloca graeca*, *Ulmus minor*, *Amorpha fruticosa*, *Carpinus betulus*, *Crataegus microphylla*, *Rubus candicans*, *Equisetum palustre*;*Iris pseudacorus*, *Alisma plantago-aquatica*, *Carex divulsa*, *Carex vesicaria*, *Sparganium erectum*;
Relief - Flat plain;
Surface - Permanently partially covered with water, presumably is fully inundated seasonally;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - Cutting, grazing;

Comment 1.: Humidification degree differs from a section to section;
Comment 2.: Stand density differs from section to a section, what is mainly conditioned by the intensity of anthropogenic factors.
Comment 3.: Floristic composition is different on different sections;
Comment 4.: Moderate, and weak on some sections anthropogenic impact, moderate level of degradation.

Identification code: 7.75
G1.52 – Alder swamp woods on acid peat

Location - Colchis,Churia;
Photo: See the database;
Founding-dominant species - *Alnus glutinosa* subsp. *barbata*;
Obligate species - *Frangula alnus*,
Facultative species - *Hedera helix*, *Smilax excelsa*, *Rubus candicans*, *Hedera colchica*, *Viburnum opulus*, *Crataegus microphylla*, *Clematis vitalba*, *Juncus effusus*; *Carex vesicaria*; *Carex divulsa*; *Juncus effusus*, *Solanum persicum*, *Osmunda regalis*, *Polygonum thunbergii*, *Persicaria maculosa*, *Iris pseudacorus*; *Sparganium erectum* subsp. *neglectum*,
Relief - Flat plain;
Surface - Permanently partially covered with water, presumably is fully inundated seasonally;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - Cutting and grazing.

Comment 1.: Humidification degree differs from a section to section;
Comment 2.: Stand density differs from section to a section, what is mainly conditioned by the intensity of anthropogenic factors.
Comment 3.: Floristic composition is different on different sections;
Comment 4.: Ecological condition of stands is different on different sections - there are both slightly and moderately degraded, and drying stands.

Comment 4.: Ecological condition of sands is different on different sections - there are both slightly and moderately degraded, as well as drying stands;

Identification code: 7.82
AGR - Agricultural

Location - Colchis, Tsalenjikha;
Photo: See the database;
Relief - Flat plain;
Surface - Not covered with water;
Soil - Not gleyed, not saturated with water;
Usage - Cultivated plant (hazelnut plantation).

Comment 1.: Drainage canals are cut and the territory is being drained; the environment is not suitable for wetland habitats;
Comment 2.: Heavy anthropogenic impact, high level of degradation.

Identification code: 7.116

D1.121 – Damaged, inactive bogs, dominated by dense purple miregrass (Molinia)

Location - Colchis, surroundings of Martotba and Patara (small) lake;
Photo: See the database;
Founding-dominant species - *Molinia caerulea*;
Obligate species - *Cladium mariscus*;
Facultative species - *Carex cespitosa*, *Lythrum salicaria*, *Spagnum palustre*, *Potentilla erecta*, *Rhynchospora caucasica*, *Osmunda regalis*, *Alnus glutinosa* subsp. *barbata*; *Typha angustifolia*, *Iris pseudacorus*, *Nymphaea lutea*, *Potamogeton crispus*, *Rubus sanguineus*, *Phragmites australis*, *Eupatorium cannabinum*, *Solidago canadensis*, *Lysimachia vulgaris*, *Lycopus europaeus*;
Relief - Flat plain;
Surface - Permanently partially covered with water;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - Unknown

Comment 1.: Low anthropogenic impact, low level of degradation, is being burnt.
Comment 2.: Molinia mires drying as a result of burning; formation of the habitat is associated with burning of the vegetation cover - after burning the vegetation cover is changed (succession), as a result of the foregoing molinia (*Molinia caerulea*) has "gained dominion" and is still dominating.

Comment 3.: This habitat is one of the versions of rise bog.

<u>Identification code: 7.117</u>
D1.121 – Damaged, inactive bogs, dominated by dense purple miregrass (Molinia)

Location - Colchis
Photo: See the database;
Founding-dominant species - *Molinia caerulea*;
Obligate species - *Osmunda regalis*;
Facultative species - *Lysimachia vulgaris*, *Potentilla erecta*, *Carex lasiocarpa*; *Solidago canadensis*, *Alnus glutinosa* subsp. *barbata*, *Cladium mariscus*, *Juncus effusus*, *Eupatorium cannabinum*,; *Lycopus europaeus*, *Euopatorium cannabinum*, *Sphagnun palustre*;
Relief - Flat plain;
Surface - Not covered with water;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - Some sections are used for grazing.

Comment 1.: Intensity of anthropogenic impact on different sections is different; respectively, there are both heavily and moderately degraded sections.

Comment 2.: Molinia mires drying as a result of burning; formation of the habitat is associated with burning of the vegetation cover - after burning the vegetation cover is changed (succession), as a result of the foregoing moninia (*Molinia caerulea*) has "gained dominion" and is still dominating. Sphagnum is exterminated due to burning.
Comment 3.: Rehabilitation of alder forest is notable on various sections.
Comment 4.: This habitat is one of the versions of rise bog.

Identification code: 7.118
D1.121 – Damaged, inactive bogs, dominated by dense purple miregrass (Molinia)

Location - Colchis, Khobistskali;
Photo: See the database;
Founding-dominant species - *Molinia caerulea*;
Obligate species - *Alnus glutinosa* subsp. *barbata*;
Facultative species - *Cladium mariscus*, *Carex vesicaria*, *Lythrum salicaria*, *Potentilla erecta*, *Phragmites australis*, *Osmunda regalis*, *Hydrocotyle vulgaris*, *Eupatorium cannabinum*, *Vicia cracca*, *Convolvulus arvensis*, *Senecio sp.*, *Solidago canadensis*,
Relief - Flat plain;
Surface - Permanently partially covered with water, sometimes is seasonally inundated;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - Some parts are used for pasturing and logging purposes.

Comment 1.: Moderate anthropogenic impact, moderate level of degradation; some sections are heavily degraded;
Comment 2.: Quite frequently Alder (*Alnus glutinosa* subsp. *barbata*) forest is presented as shrubbery.

Identification code: 7.119
G1.52 – Alder swamp woods on acid peat

Location - Colchis, Anaklia surroundings;
Photo: See the database;
Founding-dominant species - *Alnus glutinosa* subsp. *barbata*;
Obligate species - *Polygonum thunbergii*;
Facultative species - *Carpinus betulus*, *Pterocarya pterocarpa*, *Rubus caesius*, *Crataegus monogyna*, *Smilax excelsa*, *Periploca graeca*, *Ilex colchica*, *Ruscus aculeatus Typha latifolia*, *Iris pseodacorus*, *Sparganium erectum* subsp. *neglectum*, *Carex vesicaria*, *Juncus effusus*; *Lythrum salicaria*, *Persicaria hydropiper*; *Typha angustifolia*, *Solidago canadensis*, *Pycreus flavescens*, *Cyperus serotinus*, *Sagittaria sagittifolia*, *Salvinia natans*, *Hydrocharis morsus-tanae*;
Relief - Flat plain;

Surface - Permanently partially covered with water, are further inundated seasonally;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - Cutting and some sections - hayfield-pasture.

Comment: On certain sections anthropogenic impact is different, mostly the pressure is moderate and respectively the level of degradation is moderate;, however, on some sections the level of degradation is high.

Identification code: 7.84
D1.121 – Damaged, inactive bogs, dominated by dense purple miregrass (Molinia)

Location - Colchis, Kulevi terminal surroundings and Churia;
Photo: See the database;
Founding-dominant species - *Molinia caerulea*;
Obligate species - *Carex vesicaria*;
Facultative species - *Cladium mariscus*, *Carex lasiocarpa*, *Sphagnum palustre*, *Lythrum salicaria*, *Solidago canadensis*, *Lysimachia vulgaris*, *Brachythecium mildeanum*, *Calamagrostis epigejos*, *Lycopus europaeus*, *Alnus glutinosa* subsp. *barbata*, *Iris pseodacorus*, *Rhynchospora alba*, *Phragmites australis*, *Hydrocotyle vulgaris*, *Stachys palustris*, *Juncus maritimus*;
Relief - Flat plain;
Surface - Permanently partially covered with water;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - Certain sections are used for grazing.

Comment 1.: Moderate and heavy anthropogenic impact (on some sections the anthropogenic impact is weak); Respectively the level of degradation also differs.
Comment 2.: Molinia mires drying as a result of burning; formation of the habitat is associated with burning of the vegetation cover - after burning the vegetation cover is changed (succession), as a result of the foregoing molinia (*Molinia caerulea*) has "gained dominion" and is still dominating.

Comment 4.: Some sections (locations 89, 90, 91, 92, 93) are not concurrent with typical structure of the habitat. Specifically:

- The locations are dominated by *Carex* species,
- *Molinia caerulea* is presented in small amounts.
- Relief is mostly hillocky,
- The bogs are mostly "quacking" ones,
- Surface and soil are mostly wet,
- Structural difference is conditioned by the relief - in these places the relief is more depressed and coverage of the surface and soil saturation is higher. This obstructs burning, what reduces the potential of development of *Molinia caerulea* habitat.

Amalgamation of these locations under the above code is conventional. Their inclusion in this code is conditioned by the smallness of area. They are the constituents of this large mire and constitute the part of its "body".

2- Mtkvari Basin

Identification code: 2.2
D5.1 – Reedbeds normally without free-standing water

Location - Shida Kartli Shida Kartli, Gori Municipality, surroundings of Skra village;
Photo: See the database;
Founding-dominant species - *Phragmites australis*;
Obligate species - *Typha latifolia*;
Facultative species - *Juncus effesus*, *Calamagrostis arundinacea*, *Equisetum palustre*, *Carex vesicaria*, *Lythrum salicaria*, *Elaeagnus rhamnoides*, *Rosa canina*, *Rubus sp.*, *Elaeagnus angustifolia*;
Relief - Depressed;
Surface - Fully covered with water;
Soil - Peaty, water saturated;
Usage - Grazing.

Comment 1.: There is a fishery and a small lake near the habitat, a canal crosses the habitat in the middle.
Comment 2.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 2.49
AGR- Agriculture

Location - Shida Kartli, Gori Municipality, surroundings of Variani village
Photo: See the database;
Usage - agricultural land - apple garden.

Identification code: 2.60
D5.11 – Common reed (Phragmites) beds normally without free-standing water

Location - Shida Kartli, Mtskheta Municipality, surroundings of Tsilkani village;
Photo: See the database;
Founding-dominant species - *Phragmites australis*;
Obligate species - *Sparganium erectum* subsp. *neglectum*;
Facultative species - *Daucus carota*, *Convolvulus arvensis*, *Lythrum salicaria*;
Relief - Slightly depressed, with flat surface;
Surface - Not covered with water; presumably is inundated in spring, the drainage canals are cut;
Soil - Hydric, gleyed, not saturated with water;

Usage - Pasture-grassland (mowed).

Comment 1.: Was drained in 1960s.
Comment 2.: Heavy anthropogenic impact, high level of degradation.

<u>Identification code: 2.61</u>
C3.2 – Water-fringing redbeds and tall helophytes other than canes –

Location - Mtkheta-Mtianeti, Dusheti Municipality, Bazaleti Lake;
Photo: See the database;
Founding-dominant species - *Phragmites australis*;
Obligate species - *Sparganium erectum* subsp. *neglectum*;
Facultative species - *Bolboschoenus maritimus*, *Alisma plantago-aquatica*, *Lythrum salicaria*, *Calamagrostis epigejos*, *Ranunculus ophioglossifolius*, *Equisetum palustre*, *Bidens tripartita*;
Relief - Topogenic Lake;
Surface - Permanently covered with water;
Soil - Hydric**,** gleyed, saturated with water;
Usage - Unknown

Comment 1.: Presumably private property, grazing
Comment 2.: Heavy anthropogenic impact, high level of degradation.

<u>Identification code: 2.346</u>
C1.2414 - Broad-leaved pondweed carpets

Location - Javakheti, Ninotsminda Municipality, Madatapa, Avchalagiuli Lake;
Photo: See the database;
Founding-dominant species - *Potamogeton natans*;
Obligate species - N/A;
Facultative species - N/A;
Relief - Habitat is located directly in the lake;
Surface - Standing water:
Soil - -;
Usage - Unknown
Comment 1.: Habitat formed as a result of eutrophication - habitat of mesotrophic phase.

<u>Identification code: 2.173</u>
D5.212 – Slender tufted sedge beds and related communities

Location - Javakheti, Madatapa, Avchalagiuli Lake;
Photo: See the database;
Founding-dominant species - *Carex acuta*;
Obligate species - *Alisma plantago-aquatica*;
Facultative species - *Potamogeton natans*, *Sparganium emersum*, *Eleocharis palustris*, *Taraxacum officinale*, *Artemisia absinthium*,*Plantago media*, *Cirsium vulgare*, *Molinia caerulea*, *Beckmannia eruciformis*;
Surface - Permanently covered with water;
Soil - Hydric, saturated with water;
Usage - Hayfield-Pasture;
Surrounding habitats - Hayfield-pasture.

Comment 1.: Habitat formed as a result of eutrophication.
Comment 3.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 2.270
D5.21 – Beds of large [Carex] species

Location - Javakheti, Paravani river banks, Ninotsminda Municipality, surroundings of Poka village;
Photo: See the database;
Founding-dominant species - *Carex cespitosa*;
Obligate species - *Lemna minor*;
Facultative species - *Phleum phleoides*;
Relief - River adjoining plain;
Surface - Seasonally partially covered with water;
Soil - Hydric**,** gleyed, saturated with water;
Usage - Grassland.

Comment 1.*:* Formed on the first terrace of the river, which constitutes the geomorphological bed of the river. Presumably, the habitat territory is more or less covered with water seasonally. Inundation period is not long. Soil is not saturated with water. Origin of this habitat is not associated with eutrophication process. It was created under the influence of river flow and no process of formation or structural change is notable - i.e. the habitat is hydrologically stable. The description was made on the river bank and we do not have detailed information about floristic composition and other structural characteristics of the habitat. Due to the foregoing, further detailing of coding deemed impossible and this habitat was conditionally allocated to D5.21 habitats.
Comment 2.: Heavy anthropogenic impact, high level of degradation.

Identification code: 2.317
D5.21 – Beds of large [Carex] species

Location - Javakheti, Chaplagichi;
Photo: See the database;
Founding-dominant species - *Carex acuta*;
Obligate species - *Carex rostrata*;
Facultative species - *Persicaria maculosa*, *Phleum phleoides*, *Agrostis capillaris*, *Taraxacum officinale*, *Trifolium canescens*, *Cirsium vulgare*;
Relief - Almost flat, the surface is hummocky;
Surface - Not covered with water, periodically inundated;
Soil - There is a peat layer, saturated with water;
Usage - Grazing, presumably mowing as well;

Comment 1.: Habitat created long time ago as a result of eutrophication. The process of turning of the territory into meadowland is underway, what is evidenced by floristic composition, specifically, by facultative species.
Comment 2.: Heavy anthropogenic impact, high level of degradation.

Identification code: 2.243
C3.2 - Water-fringing reedbeds and tall helophytes other than canes -

Location - Javakheti, Ninotsminda Municipality, near Khanchala Lake;
Photo: See the database;
Founding-dominant species - *Equisetum palustre*;
Obligate species - *Eleocharis uniglumis*;
Facultative species - *Alisma plantago-aquatica*, *Sagittaria sagittifolia*, *Persicaria maculosa*, *Calamagrostis epigejos*, *Potamogeton natans*;
General Relief - Depressed;
Location Relief - Flat slope, slightly inclined towards the lake;
Relief - Littoral flat plain around the lake;
Surface - Permanently covered with water;
Soil - Hydric**,** saturated with water;
Usage - Grazing.

Comment: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 2.50
C1.2414 - Broad-leaved pondweed carpets

Location - Javakheti, Ninotsminda Municipality, Madatapa Lake;
Photo: See the database;
Founding-dominant species - *Potamogeton natans*;
Obligate species - N/A;
Facultative species - N/A;
Relief - Lake "seated" between slopes, the habitat is located directly in the lake.
Surface - Standing-water body;
Soil - -;
Usage - Unknown;

Comment: Habitat formed as a result eutrophication - habitat of mesotrophic phase.

Identification code: 2.51
D5.21 – Beds of large [Carex] species

Location - Javakheti, Madatapa Lake;
Photo: See the database;
Founding-dominant species - *Carex vesicaria*;
Obligate species - *Eleocharis palustris*;
Facultative species - *Sagittaria sagittifolia*, *Alisma plantago-aquatica*, *Potamogeton natans*, *Taraxacum officnale*.
Relief - Lakeside slightly inclined flat, but hummocky plain;
Surface - Permanently fully covered with water;
Soil - Hydric**,** saturated with water;
Usage - Mowing.

Comment 2.: The habitat is almost fully encircling the lake (i.e. C1.2414 habitat). Despite the foregoing it is not a littoral habitat. It was formed as a result of eutrophication.
Comment 3.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 2.245
D5.212 – Slender tufted sedge beds and related communities

Location - Javakheti, Ninotsminda Municipality, between Khanchala and Orlovka villages;
Photo: See the database;
Founding-dominant species - *Carex acuta*;
Obligate species - *Agrostis capillaris*;
Facultative species - *Calamagrostis arundinacea*, *Cirsium vulgare*, *Alisma plantago-aquatica*, *Beckmannia eruciformis*, *Eleocharis palustris*, *Juncus atratus*;

Relief - Depressed;
Surface - Permanently partially covered with water;
Soil - Gleyed, saturated with water;
Usage - Grazing.

Comment 1.: Habitat formed long time ago as a result of eutrophication.
Comment 2.: The territory around the location is mowed.
Comment 3: Heavy anthropogenic impact; high level of degradation.

<u>Identification code: 2.170</u>
C3.24A - Common spikerush beds - Common spikerush (*Eleocharis palustris*) Communities

Location - Javakheti, Tabatskuri, surroundings of Vachiani village, near Vachiani Lake;
Photo: See the database;
Founding-dominant species - *Eleocharis palustris*;
Obligate species - *Alisma plantago-aquatica*;
Facultative species - *Equisetum palustre*, *Typha latifolia*, *Potamogeton crispus*, *Utricularia vulgaris*, *Beckmannia eruciformis*, *Batrachium divaricatum*, *Polygonum sp.*;
General relief - Depressed;
Location relief - Flat slope slightly inclined towards the lake;
Surface - Permanently, fragmentarily covered with water - water stands fragmentarily;
Soil - Hydric, gleyed, saturated with water;
Usage - Grazing.

Comment 1.: Actually this is the territory of former lake adjoining the existing lake to the west, today it constitutes a littoral habitat; i.e. the lake has changed in this part as a result of eutrophication, eutrophication process should be associated with non-stable level of water on this slightly alleviated section, i.e. water is "moving" seasonally.
Comment 2.: The drainage system can be seen directly in the lake and on its shores.
Comment 3.: We cannot establish the habitat of the lake itself as we do not have any information about the plants of this lake.
Comment 4.: Awarded code is the code of a specific location - the code of littoral habitat formed in situ of the lake to the west of the existing lake.
Comment 5.: Heavy anthropogenic impact, high level of degradation;

Identification code: 2.181
D5.213 – Greater pond sedge beds

Location - Javakheti, Akhalkalaki Municipality, surroundings of Sulda village;
Photo: See the database;
Founding-dominant species - *Carex riparia*;
Obligate species - *Carex vesicaria*;
Facultative species - *Juncus articulatus*, *Scolochloa festucacea*, *Potamogeton natans*, *Beckmannia eruciformis*, *Ranunculus caucasicus*;
Relief - Depressed;
Surface - Permanently fully covered with water;
Soil - Hydric, gleyed, saturated with water;
Usage - Unknown

Comment 1.: Territory around the location is used as hayfields and pastures.
Comment 2.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 2.182
D5.213 – Greater pond sedge beds

Location - Javakheti, Akhalkalaki Municipality, surroundings of Sulda village, Sulda Preserve;
Photo: See the database;
Founding-dominant species - *Carex riparia*;
Obligate species - *Carex lasiocarpa*;
Facultative species - *Alisma plantago-aquatica*, *Potamogeton natans*, *Beckmannia eruciformis*, *Luzula multiflora*, *Ranunculus caucasicus*;
Relief - Flat, slightly sloping plain;
Surface - Permanently, partially covered with water;
Soil - Hydric**,** gleyed, saturated with water;
Usage - Hayfield.
Comment: Heavy anthropogenic impact, high level of degradation.

Identification code: 2.188
D5.214 – Bottle, bladder and slender sedge beds

Location - Javakheti, Ninotsminda Municipality, surroundings of Spasovka village;
Photo: See the database;
Founding-dominant species - *Carex rostrata*;

Obligate species - *Eleocharis palustris*;
Facultative species - *Alisma plantago-aquatica*, *Beckmania eruciformis*, *Cirsium vulgare*, *Phleum phleoides*;
Relief - Depressed, with hummocks; the habitat is located between low hillocks;
Surface - Permanently partially covered with water, is fully inundated in spring;
Soil - Hydric, saturated with water, presumably acid; presumably there is a peat layer;
Usage - Grazing.

Comment 1: Habitat formed long time ago as a result of eutrophication.
Comment 2.: Heavy anthropogenic impact, high level of degradation.

<u>Identification code: 2.187</u>

D5.214 – Bottle, bladder and slender sedge beds

Location - Javakheti, Akhalkalaki Municipality, Kartsakhi (protected area);
Photo: See the database;
Founding-dominant species - *Carex vesicaria*;
Obligate species - *Carex lasiocarpa*;
Facultative species - *Lysimachia vulgaris*, *Ranunculus ophioglossifolius*, *Carex disticha*;
Relief - Heavily depressed, situated between low slopes like a volcano crater;
Surface - Not covered with water;
Soil - Hydric, gleyed, saturated with water, high pH; presumably there is a peat layer;
Usage - Unknown

Comment 1.: Indicative is the large amount of sedges and abundance of species.
Comment 2.: Territory around the location is mowed.
Comment 2.: Moderate level of degradation.

<u>Identification code: 2.244</u>

D5.212 – Slender tufted sedge beds and related communities

Location - Javakheti, Ninotsminda Municipality, Orlovka village, surroundings of Akhmazi Lake;
Photo: See the database;
Founding-dominant species - *Carex acuta*;
Obligate species - *Carex vesicaria*;
Facultative species - *Potamogeton natans*, *Phleum phleoides*, *Taraxacum officinale*, *Cirsium vulgare*;
Relief - Almost flat plain, hummocky;
Surface - Permanently covered with water;
Soil - Hydric**,** gleyed, saturated with water;

Usage - Grazing.

Comment 1.: Habitat formed as a result of eutrophication.
Comment 2.: There is a farm near the location and the territory around the location is being grazed.
Comment 3.: Heavy anthropogenic impact, high level of degradation.

<u>Identification code: 2.224</u>

E3 – Seasonally wet and wet grasslands

Location - Javakheti, Akhalkalaki Municipality, surroundings of Okami and Kumurdo villages;
Photo: See the database;
Founding-dominant species - *Eleocharis palustris*;
Obligate species - *Beckmannia eruciformis*;
Facultative species - *Lolium rigidum*, *Phleum phleoides*, *Dactylis glomerata*, *Inula britanica*;
Relief - Weakly depressed;
Surface - Not covered with water; presumably the territory is inundated during the rainy season and the soil maintains wet during the remaining period of year;
Soil - Not saturated with water, rammed, dried;
Usage - Pasture (cattle footprints are visible).

Comment 1.: Secondary wet grassland;
Comment 2.: Territory around the location is used as a pasture.
Comment 3.: Heavy anthropogenic impact, high level of degradation.

<u>Identification code: 2.223</u>
E3 – Seasonally wet and wet grasslands

Location - Javakheti, Akhalkalaki Municipality, surroundings of Okami and Kumurdo villages;
Photo: See the database;
Founding-dominant species - *Eleocharis palustris*;
Obligate species - *Beckmannia eruciformis*;
Facultative species - Not recorded;
Relief - Weakly depressed;
Surface - Not covered with water; the territory is inundated during the rainy season and the soil maintains wet during the remaining period of year;
Soil - Not saturated with water, rammed, dried;
Usage - Pasture.

Comment 1.: Secondary wet grassland;
Comment 2.: Territory around the location is used as a pasture.
Comment 3.: Floristically poor.
Comment 4.: Heavy anthropogenic impact, high level of degradation.

Identification code: 2.171
C3.421A - Mediterranean [Eleocharis] swards

Location - Javakheti, between Okami and Kumurdo villages;
Photo: See the database;
Founding-dominant species - *Eleocharis palustris*;
Obligate species - *Beckmannia eruciformis*;
Facultative species - *Blysmus compressus*, *Sparganium emersum*, *Capsella bursa-pastoris*, *Ranunculus ophioglossifolius*;
Relief - Depressed, former lake;
Surface - Periodically covered with water, however, presumably is covered with water and snow for the most part of a year;
Soil - Hydric**,** gleyed, saturated with water.
Usage - Hayfield.

Comment 1.: Habitat developed in situ of a former lake.
Comment 2.: Wetland obligate species: *Eleocharis palustris*, *Blysmus compressus*, *Sparganium emersum*, *Ranunculus ophioglossifolius*.
Comment 3.: Heavy anthropogenic impact, high level of degradation;

Identification code: 2.175
E3 – Seasonally wet and wet grasslands

Location - Javakheti, surroundings of Kumurdo village;
Photo: See the database;
Founding-dominant species - *Juncus atratus*;
Obligate species-*Carex disticha*;
Facultative species - *Agrostis vinealis*, *Phleum phleoides*, *Stipa pulcherrima*, *Beckmannia eruciformis*, *Lolium rigidum*, *Cirsium vulgare*;
Relief - Very weakly depressed, located on a plateau;
Surface - Not covered with water; the territory is inundated during the rainy season and the soil maintains wet during the remaining period of year;
Soil - Not saturated with water, rammed, dried;

Usage - Grassland.

Comment 1.: Secondary wet grassland; grassland elements are growing here and the process of transformation into a grassland has already gone far.
Comment 2.: Heavy anthropogenic impact, high level of degradation.

<u>Identification code: 2.169</u>
D5.211 – Brown sedge beds

Location - Javakheti, Akhalkalaki Municipality, surroundings of Okami and Kumurdo villages;
Photo: See the database;
Founding-dominant species - *Carex disticha*;
Obligate species - *Eleocharis uniglumis*;
Facultative species - *Potamogeton natans*, *Alisma plantago-aquatica*, *Beckmannia eruciformis*, *Typha angustifolia*, *Utricularia vulgaris*, *Capsela bursa-pastoris*, *Sparganium emersum*, *Ceratophyllum demersum*;
Relief - Depressed;
Surface - Permanently partially covered with water;
Soil - Wetland, peat layer is notable, saturated with water;
Usage - Pasture.

Comment 1.: Depression mire formed as a result of eutrophication.
Comment 2: Heavy anthropogenic impact; high level of degradation.

<u>Identification code: 2.227</u>
D5.2 – Beds of large sedges normally without free-standing water

Location - Javakheti, Akhalkalaki Municipality, surroundings of Okami and Kumurdo villages;
Photo: See the database;
Founding-dominant species - *Carex disticha*;
Obligate species - *Beckmannia eruciformis*;
Facultative species - *Eleocharis palustris*, *Capsella bursa-pastorisa*;
Relief - Weakly Depressed;
Surface - Not covered with water; Presumably is inundated seasonally; water stands seasonally (presumably the trenches are cut for water drainage);
Soil - Hydric**,** gleyed, not saturated with water;
Usage - Grassland.

Comment 1: Due to drainage and mowing the mire structure is degraded and the process of transformation into a grassland is under way. Actually this is a transition habitat between mire and wet grassland.
Comment 2.: Heavy anthropogenic impact, high level of degradation;

<u>Identification code: 2.194</u>
C1.2414 - Broad-leaved pondweed carpets

Location - Javakheti, surroundings of Okami and Kumurdo villages;
Photo: See the database;
Founding-dominant species - *Potamogeton natans*;
Obligate species - *Eleocharis palustris*;
Facultative species - *Iris pseudacorus*, *Typha latifolia*, *Beckmannia eruciformis*, *Alisma plantago-aquatica*, *Butomus umbellatus*, *Bidens tripartita*;
Relief - Depressed, lake; habitat is located directly in the lake.
Surface - Standing water body;
Soil - -;
Usage - Unknown;
Surrounding habitats - Pasture.

Comment 1.: Eutrophication process is well-defined;
Comment 2.: Heavy anthropogenic impact, high level of degradation;

<u>Identification code: 2.236</u>
E3 – Seasonally wet and wet grasslands

Location - Javakheti, Akhalkalaki Municipality, surroundings of Kumurdo village;
Photo: See the database;
Founding-dominant species - -;
Obligate species - -;
Facultative species - -;
Relief - Weakly depressed;
Surface - Not covered with water;
Soil - Not saturated with water;
Usage - Grassland (Mowed for the moment of observation).

Comment 1.: This is a wet grassland of secondary origin (*Nardetum stricta*).
Comment 2.: Floristic composition was not accounted as the habitat was mowed.

Identification code: 2.235
E3 – Seasonally wet and wet grasslands

Location - Javakheti, surroundings of Tmogvi and Kumurdo villages;
Photo: See the database;
Founding-dominant species-*Phleum phleoides*;
Obligate species - *Lolium rigidum*;
Facultative species - *Agrostis capillaris*, *Achillea millefolium*, *Cirsium vulgare*, *Capsella bursa-pastoris*, *Arctium lappa*, *Dactylis glomerata*, *Senecio vernalis*, *Artemisia absinthium*;
Relief - Weakly depressed;
Surface - Not covered with water;
Soil - Not saturated with water;
Usage - Hayfield-pasture.

Comment 1.: Vegetation is that of wet grassland of secondary origin with grains.
Comment 2.: Heavy anthropogenic impact; high level of degradation.

Identification code: 2.230
D5.2 – Beds of large sedges normally without free-standing water

Location - Javakheti, Akhalkalaki Municipality, surroundings of Kumurdo and Tmogvi villages;
Photo: See the database;
Founding-dominant species - *Carex disticha*;
Obligate species - *Phleum phleoides*;
Facultative species - *Lolium rigidum*, *Trifolium canescens*, *Agrostis capillaris*, *Cichorium intybus*, *Cirsium vulgare*, *Senecio leucanthemifolius* subsp. *vernalis*, *Agrimonia eupatoria*;
Relief - Weakly depressed;
Surface - Not covered with water; presumably is inundated seasonally and water is in free-stand seasonally (presumably there are trenches for water drainage);
Soil - Saturated with water;
Usage - Hayfield-Pasture.

Comment 1.: There are agricultural lands around the territory (arable lands and potato plantations).
Comment 3.: There are typical elements of a grassland in floristic composition;
Comment 4.: Heavy anthropogenic impact, high level of degradation.

Identification code: 2.222
C3.21 - Common reed (Phragmites) beds

Location - Javakhetiს Municipality, surroundings of Nakalakevi and Tmogvi villages;
Photo: See the database;
Founding-dominant species - *Phragmites australis*;
Obligate species - *Carex vesicaria*;
Facultative species - *Typha latifolia*, *Lythrum salicaria*, *Equisetum palustre*, *Lemna minor*, *Alisma plantago-aquatica*, *Carex diluta*, *Carex elata*, *Schoenoplectus lacustris*, *Euonymus europaeus*;
Relief - Depression at the bottom of slopes;
Surface - Permanently covered with water; feeds on ground waters;
Soil - Saturated with water;
Usage - Mowing.

Comment 1.: Habitat formed as a result of eutrophication - Eureophic phase habitat. This is a mosaic-type habitat, where the area is occupied by common reed beds(*Phragmitetum australis*), with fragmentary inclusions of lemna (*Lemnetum minor*) beds.
Comment 2.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 2.231
E3 – Seasonally wet and wet grasslands

Location - Javakheti, surroundings of Tmogvi and Kumurdo villages;
Photo: See the database;
Founding-dominant species - *Beckmannia eruciformis*;
Obligate species - *Carex disticha*;
Facultative species - *Phleum phleoides*, *Eleocharis palustris*,*Taraxacum officinale*, *Trifolium canescens*;
Relief - Weakly depressed;
Surface - Not covered with water;
Soil - Not saturated with water;
Usage - Grassland (Mowed for the moment of observation).

Comment 1.: Wet grassland of secondary origin with grains;
Comment 2.: *Carex disticha* and *Eleocharis palustris* are still maintained, what speaks for the wetness of the soil.
Comment 3.: Survey was conducted on 50^2 m non-mown area.
Comment 4.: Heavy anthropogenic impact; high level of degradation.

Identification code: 2.232

C3.5 - Periodically inundated shores with pioneer and ephemeral vegetation

Location - Javakheti, between Tmogbi and Kumurdo villages:
Photo: See the database;
Founding-dominant species - Calamagrostis pseudophragmites;
Obligate species - *Carex disticha*;
Facultative species - *Beckmannia eruciformis*, Persicaria maculosa, *Butomus umbellatus*, *Scolochloa festucacea*;
Relief - Depressed;
Surface - Permanently partially covered with water;
Soil - Hydric**,** gleyed, saturated with water;
Usage - Grassland (As far as machinery can access).

Comment 1.: The territory around the location is used as arable lands.
Comment 2: Allocation to littoral habitat is conditional.
Comment 3.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 2.275

D5.215 – Tufted sedge and sward sedge tussocks

Location - Javakheti, Samsari, Akhalkalaki Municipality, surroundings of Bughasheni village;
Photo: See the database;
Founding-dominant species - *Carex elata;*
Obligate species - *Sclorochloa festucacea*;
Facultative species - *Carex disticha*, *Carex vesicaria*, *Agrostis vinealis*, *Juncus articulatus*, *Phleum phleoides*, *Beckmannia eruciformis*;
Relief - Almost flat, habitat is surrounded by low and medium-height hillocks;
Surface - Not covered with water; presumably the surface is seasonally inundated for a short period.
Soil - Not saturated with water, dry;
Usage - Is mowed.

Comment 1.: Habitat was formed long time ago as a result of eutrophication.
Comment 2.: Presumably feeds on water running down the slopes and rainwater;
Comment 3.: Thin dead mass is developed;
Comment 3.: Presumably, the habitat was developed on alkali soils, what is proved by participation of *Phleum phleoides* and low content of ferrous iron in soil.
Comment 4.: Moderate anthropogenic impact; moderate level of degradation.

Identification code: 2.221
D5.21 – Beds of large [Carex] species

Location - Javakheti, Samsari, Akhalkalaki Municipality, surroundings of Bughasheni village;
Photo: See the database;
Founding-dominant species - *Carex vesicaria*;
Obligate species - *Eleocharis uniglumis*;
Facultative species - *Cladium mariscus*, *Beckmannia eruciformis*, *Arctium lappa*, *Typha latifolia*, *Sparganium emersum*, *Alisma plantago-aquatica*, *Alopecurus aequalis*, *Epilobium palustre*, *Cirsium sp.*, *Rumex sp.*;
Relief - Depressed;
Surface - Not covered with water, it is possible that seasonally is covered with water;
Soil - Not saturated with water;
Usage - Hayfield-Pasture.

Comment 1.: Vegetation cover of the location is of mosaic type - different species are concentrated on different sections. Floristic composition includes ruderal plants (*Arctium lappa*, *Cirsium sp.*, *Rumex sp.* etc.) as well.
Comment 2.: The territory around the location is mowed.
Comment 3.: Heavy anthropogenic impact, high level of degradation.

Identification code: 2.277
C3.241- Arrowhead communities

Location - Javakheti, Samsari, Akhalkalaki Municipality, surroundings of Bughasheni village;
Photo: See the database;
Founding-dominant species - *Sparganium emersum*;
Obligate species - *Carex elata*;
Facultative species - *Alisma plantago-aquatica*, *Scolochloa festucacea*, *Hypericum mutilum*, *Juncus articulatus*;
Relief - Depressed;
Surface - Permanently fully covered with water;
Soil - Saturated with water;
Usage - Grazing, mowing.

Comment 1.: Habitat formed as a results of eutrophication - mesotrophiv phase habitat.
Comment 2.: The territory around the location is mowed.
Comment 3.: Heavy anthropogenic impact, high level of degradation;
Comment 4.: Small - 200 m² area habitat.

Identification code: 2.337
D5.214 – Bottle, bladder and slender sedge beds

Location - Javakheti, Samsari Akhalkalaki Municipality, surroundings of Bughasheni village;
Prhoto - 6705-6738;
Founding-dominant species - *Carex rostrata*;
Obligate species - *Carex hirta*;
Facultative species - *Comarum palustre*, *Calamagrostis epigejos*;
Relief - Depressed, the habitat is situated between the slopes of various height, the surface is wavy;
Surface - Permanently partially covered with water; Presumably feeds on water running off the slopes and rainwater;
Soil - Saturated with water; thick layer is developed, the surface is soft and foot sinks;
Usage - Unknown, is burnt annually.

Comment 1.: Habitat formed long time ago as a result of eutrophication.
Comment 2.: In our opinion, the habitat is developed on acid soils, what is proved by the participation of *Carex hirta*. This species is indicative of acid soils. Furthermore, the founding species itself - *Carex rostrata* is found on different types of soils, amongst them on acid soils.
Comment 3.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 2.271
D5.21 – Beds of large [Carex] species

Location - Javakheti, Samsari, Akhalkalaki Municipality, surroundings of Bughasheni village;
Photo: See the database;
Founding-dominant species - *Carex vesicaria*;
Obligate species - *Carex elata*;
Facultative species - *Calamagrostis epigejos*;
Relief - Depressed;
Surface - Not covered with water, is seasonally covered with water;
Soil - Not saturated with water;
Usage - Pasture.

Comment 1.: Part of the territory around the location is used for grazing; there are some agricultural plots as well.
Comment 2.: Vegetation cover of the location is of mosaic type - different species are concentrated on different sections. Floristic composition includes ruderal plants (*Arctium lappa*, *Cirsium sp.*, *Rumex sp.* etc.) as well.
Comment 3.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 2.159

D5.212 – Slender tufted sedge beds and related communities

Location - Javakheti, Samsari Akhalkalaki Municipality, surroundings of Bughasheni village;
Photo: See the database;
Founding-dominant species - *Carex acuta*;
Obligate species - *Typha latifolia*;
Facultative species -
Relief - Depressed;
Surface - Permanently partially covered with water, seasonal coverage with water may be higher;
Soil - Saturated with water;
Usage - Unknown
Comment 1.: Founding specie is not *Typha latifolia*. It is forming a stripe. However the population burns it
Comment 2.: Territory around the location is mowed.
Comment 3.: Moderate anthropogenic impact; moderate level of degradation.

Identification code: 2.345
D5.2 – Beds of large sedges normally without free-standing water

Location - Javakheti, Samsari Akhalkalaki Municipality, surroundings of Bughasheni village;
Photo: See the database;
Founding-dominant species - *Carex disticha*;
Obligate species - *Carex lachenalii*;
Facultative species - *Carex vesicaria*, *Juncus effusus*, *Beckmannia eruciformis*, *Alisma plantago-aquatica*, *Butomus umbellatus*, *Juncus atratus*;
Relief - Weakly depressed;
Surface - Not covered with water;
Soil – Not gleyed, not saturated with water;
Usage - Hayfield-Pasture.

Comment: Heavy anthropogenic impact, high level of degradation.

Identification code: 2.134
D5.2152 – Sward sedge tussocks

Location - Javakheti, Tabatskuri, Akhalkalaki Municipality, surroundings of Khando village;
Photo: See the database;

Founding-dominant species - *Carex cespitosa*;
Obligate species - *Carex vesicaria*;
Facultative species - *Galium verum*, *Menyanthes trifoliata*, *Alisma plantago-aquatica*, *Potamogeton natans*, *Sparganium emersum*, *Batrachium divaricatum*, *Lemna trisulca*;
Relief - Depressed, is encircled by low hillocks and hills, hummocky;
Surface - Permanently partially covered with water, presumably is fully covered with water seasonally;
Soil - Hydric, gleyed, saturated with water;
Usage - Partially mowed.

Comment 1.: Abundance of water related obligate species is well-defined (*Potamogeton natans*, *Batrachium divaricatum*, *Sparganium emersum*, *Alisma plantago-aquatica*, *Menyanthes trifoliata*, *Lemna trisulca*), meaning that the surface of this location is fragmentarily permanently covered with water.
Comment 2.: The territory around the location and partially the mire are mowed.
Comment 3.: Moderate anthropogenic impact; moderate level of degradation.

<u>Identification code: 2.327</u>
C1.2414 - Broad-leaved pondweed carpets

Location - Javakheti, Tabatskuri, Akhalkalaki Municipality, surroundings of Khando village;
Photo: See the database;
Founding-dominant species - *Potamogeton natans*;
Obligate species - *Beckmannia eruciformis*;
Facultative species - *Typha latifolia*, *Alisma plantago-aquatica*, *Juncus filiformis*, *Persicaria maculosa*, *Eleocharis palustris*;
Relief - Depressed, Lake; the habitat is located directly in the lake.
Surface - - Free-standing water body;
Soil - -;
Usage - The population uses the lake as a water reservoir and for irrigation purposes.
Surrounding habitats - Pasture.

Comment 1.: Eutrophication process is weakly defined.
Comment 2.: Moderate anthropogenic impact, moderate level of degradation;

<u>Identification code: 2.129</u>
D5.21 – Beds of large [Carex] species

Location - Javakheti, Tabatskuri, surroundings of Moliti village;

Photo: See the database;
Founding-dominant species - *Carex lasiocarpa*;
Obligate species - *Carex elata*;
Facultative species - *Juncus effusus*, *Equisetum palustre*, *Juncus articulatus*, *Calamagrostis epigejos*, *Comarum palustre*, *Petasites albus*, *Salix caprea*;
Relief - Valley - depressed valley between low slopes, which "opens" towards the lake and constitutes the topographic continuation of the lake; however, the valley relief situated between gorges is relatively weakly defined.
Surface - Not covered with water; the surface may be covered with water seasonally, what is proved by floristic composition;
Soil - Hydric, large content of peat, saturated with water;
Usage - Mowing.

Comment 1: This habitat is not formed either as a result of eutrophication or retreat of the lake. Saturation of soil with water, peat content and shape of the relief demonstrate that this, presumably, is the habitat with stable water regime. The water regime is presumably conditioned by two factors: (1) atmosphere precipitations and water running off low slopes and (2) leakage of filtration wet from the lake. Such a stable water regime provides for the existence of mire s and large amount of peat in soil.
Comment 2: Is not concurrent with typical D5.21 habitats.
Comment 3.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 2.136
D5.2152 – Sward sedge tussocks

Location - Javakheti, Tabatskuri, Akhalkalaki Municipality, surroundings of Khando village;
Photo: See the database;
Founding-dominant species - *Carex cespitosa*;
Obligate species - *Carex vesicaria*;
Facultative species - *Carex rostrata*; *Persicaria maculosa*, *Alopecurus arundinaceus*, *Phleum phleoides*, *Dactylis glomerata*;
Relief - Depressed, hummocky;
Surface - Not covered with water; presumably the surface is inundated seasonally for a short period;
Soil - Not gleyed, not saturated with water;
Usage - Pasture.

Comment 1.: No water related obligate species other than sedges were found. Facultative species demonstrate that the process of transformation into grassland has started. Respectively, is a relatively dry version.
Comment 2.: Moderate anthropogenic impact; moderate level of degradation.

Identification code: 2.348

D5.21 – Beds of large [Carex] species

Location - Javakheti, Tabatskuri, Akhalkalaki Municipality, surroundings of Khando village;
Photo: See the database;
Founding-dominant species - *Carex vesicaria*;
Obligate species - *Carex pallescens*;
Facultative species - *Eleocharis palustris*, *Calamagrostis epigejos*, *Juncus atratus*, *Alisma plantago-aquatica*, *Potamogeton natans*, *Beckmannia eruciformis*, *Blysmus compressus*, *Batrachium divaricatum*;
Relief - Depressed, there are hillocks and slopes of various height around it;
Surface - Not covered with water, seasonally covered with water;
Soil - Not saturated with water;
Usage - Pasture.

Comment 1.: Presumably the surface is heavily covered with water seasonally, what is proved by the existence of "residue" degraded samples of *Potamogeton*, *Batrachium* and *Alisma plantago-aquatica.*
Comment 2.: The territory around the location is mowed.
Comment 3.: Heavy anthropogenic impact, high level of degradation.

Identification code: 2.333
D5.21 – Beds of large [Carex] species

Location - Javakheti, Tabatskuri, Akhalkalaki Municipality, surroundings of Khando village;
Photo: See the database;
Founding-dominant species - *Carex vesicaria*;
Obligate species - *Carx disticha*;
Facultative species - *Eleocharis palustris*, *Alisma plantago-aquatica*, *Potamogeton natans*, *Utricularia vulgaris*, *Batrachium divaricatum*, *Ranunculus ophioglossifolius*;
Relief - Depressed;
Surface - partially covered with water;
Soil - Thin pear layer is developed, saturated with water;.
Usage - Hayfield (except for hydrous micro-sections)

Comment 1.: Water fragment is present only on the most depressed micro section, which we have included into general habitat.
Comment 2.: The territory around the location is mowed.
Comment 3.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 2.49
AGR - Agricultural

Location - Shida Kartli, Gori Municipality, surroundings of Variani village.
Photo: See the database;
Usage - Agricultural land, apple garden.

Identification code: 2.226
AGR- Agricultural

Location - Shida Kartli, adjacent to autobahn;
Photo: See the database;
Usage - Pasture.

Comment: Former ex-wetland, currently the territory is not abounding in water.

Identification code: 2.225
AGR- Agricultural

Location - Shida Kartli, Kareli Municipality, surroundings of Kveda Khvedureti village, between Khvedureti village and Kareli;
Photo: See the database;
Usage - Agricultural land - Hayfield-Pasture.

Comment: Former ex-wetland, currently the territory is not a wetland.

Identification code: 2.46
D5.1 – Reedbeds normally without free-standing water

Location - Shida Kartli, Gori Municipality, surroundings of Skra village;
Photo: See the database;
Founding-dominant species - *Phragmites australis*;
Obligate species - *Molinia caerulea*;
Facultative species - *Juncus effusus*, *Glycyrrhiza glabra*, *Bolboschoenus maritimus*, *Calamagrostis arundinacea*, *Iris pseudacorus*, *Lythrum salicaria*, *Elaeagnus rhamnoides*, *Crataegus microphylla*, *Rosa canina*;
Relief - Depressed;
Surface - partially covered with water;
Soil - Wetland**,** gleyed, saturated with water;
Usage - Pasture.

Comment 1.: Plant community is of mosaic type - *Phragmites australis* and *Molinia caerulea* communities are interchanging; dominating are the communities where the founding specie is the reed (*Phragmites australis*).
Comment 2.: Vegetation cover is degraded due to grazing. Heavy anthropogenic impact, high level of degradation.
Comment 3.: There is a trench around the territory.

<u>Identification code: 2.302</u>
AGR-Agricultural land plot

Location - Shida Kartli, Kareli Municipality, surroundings of Abisi village;
Photo: See the database;
Founding-dominant species - *Cladium mariscus*;
Obligate species - Iris pseudacorus;
Facultative species - *Molinia caerulea*, *Juncus effesus*, *Mentha aquatica*;
Relief - Flat, weakly depressed;
Surface - Partially covered with water;
Soil - Hydric, saturated with water;
Usage - Grassland

Comment 1.: Suitable for a wetland environment.
Comment 2.: Vegetation cover is more or less degraded owing to grazing.
Comment 3.: The territory around the location was drained and now it is used as an arable land.

<u>Identification code: 2.120</u>

D5.2122- Lesser pond sedge beds

Location - Javakheti, Akhalkalaki Municipality, Akrikari-Emlikli;
Photo: See the database;
Founding-dominant species - *Carex acuta*;
Obligate species - *Carex vesicaria*;
Facultative species - *Carex mucronata*, *Carex rostrata*, *Eleocharis palustris*, *Carex transcaucasica*, *Luzula stenophylla*;
Relief - Slightly sloping flat plain;
Surface - Permanently partially covered with water;
Soil - Peaty, gleyed, saturated with water;
Usage - Grazing;

Comment 1.: Drained
Comment 2.: Moderate anthropogenic impact, moderate level of degradation;
Comment 3.: Description of the location is given according to Dzelkva Ltd. Report 2008

<u>Identification code: 2.165</u>
C3.29 - Water-fringing large sedge communities

Location - Javakheti, Akhalkalaki Municipality, Abuli Lake (Abulgioli);
Photo: See the database;
Founding-dominant species - *Casrex rostrata*;
Obligate species - *Carex elata*;
Facultative species - *Carex lasiocarpa*;
Relief - Depressed;
Surface - Permanently, partially covered with water;
Soil - Peaty, saturated with water;
Usage - Unknown;

შენიშვნა1.: Territory around the location is mowed;
Comment 2.: Moderate anthropogenic impact; moderate level of degradation.
Comment 3.: Description of the location is given according to Dzelkva Ltd. Report 2008.

<u>Identification code: 2.330</u>
C3.29 - Water-fringing large sedge communities

Location - Javakheti, Akhalkalaki Municipality, Verana-Chobareti;
Photo: See the database;
Founding-dominant species - *Carex elata*;
Obligate species - *Calamagrostis pseudophragmites*;
Facultative species - *Eleocharis palustris*;
Relief - Riverine river-bed, valley relief;
Surface - Permanently, partially covered with water;
Soil - Hydric, degraded peat fen, saturated with water;
Usage - Pasture.

Comment 1.: There is an osier-bed (Salicetum sp.) agricultural lands near the location.
Comment 2.: Drained**.**

Comment 3.: Description of the location is given according to Dzelkva Ltd. Report 2008.

<u>Identification code: 2.135</u>
D5.21 – Beds of large [Carex] species

Location - Javakheti, Akhalkalaki Municipality, between Bezhano and Baraleti villages, near Agandirchali Lake;
Photo: See the database;
Founding-dominant species - *Carex vesicaria*;
Obligate species - *Eleocharis uniglumis*;
Facultative species - *Eleocharis palustris*, *Sparganium emersum*, *Lemna trisulca*, *Typha angustifolia*;
Relief - Depressed;
Surface - Permanently partially covered with water;
Soil - Hydric, degraded peaty, gleyed, saturated with water;
Usage - Mowing and Grazing.

Comment 1.: Presumably, there is a hydrous fragment in the middle of the location under the participation of Potamogeton.
Comment 2.: Moderate anthropogenic impact, moderate level of degradation.
Comment 3.: Description of the location is given according to Dzelkva Ltd. Report 2008.

<u>Identification code: 2.215</u>
C3.29 - Water-fringing large sedge communities

Location - Javakheti, Akhalkalaki Municipality, Godorebi - Didi Anuli;
Photo: See the database;
Founding-dominant species - *Casrex rostrata*;
Obligate species - *Juncus filiformis*;
Facultative species - *Sagittaria sagittifolia*, *Spatganium emersum*, *Carex transcaucasica*, *Luzula stenophylla*;
Relief - Lakeside slightly sloping flat plain;
Surface - Permanently, partially covered with water;
Soil - Hydric, peaty, saturated with water;
Usage - Hayfield-Pasture

Comment 1.: Heavy anthropogenic impact, high level of degradation;
Comment 3.: Description of the location is given according to Dzelkva Ltd. Report 2008.

<u>Identification code: 2.280</u>

D5.214 – Bottle, bladder and slender sedge beds

Location - Javakheti, Akhalkalaki Municipality, Didi Samsari;
Photo: See the database;
Founding-dominant species - *Casrex rostrata*;
Obligate species - *Carex cespitosa*;
Facultative species - No data available;
Relief - Slightly flat plain;
Surface - Permanently partially covered with water;;
Soil - Hydric, peaty, gleyed, saturated with water;
Usage - Hayfield-Pasture.
Comment 1.: Drained;
Comment 2.: Moderate anthropogenic impact, moderate level of degradation;
Comment 3.: Description of the location is given according to Dzelkva Ltd. Report 2008.

3 - Khrami Basin

Identification code: 3.38
C3.245 – Flowering rush communities

Location - Kvemo Kartli, Tsalka Municipality, surroundings of Santa village;
Photo: See the database;
Founding-dominant species - *Butomus umbellatus*;
Obligate species - *Eleocharis palustris*;
Facultative species - *Alisma plantago-aquatica*, *Polygonum carneum*, *Blysmus compressus*, *Calamagrostis epigejos*, *Phragmites australlis*, *Batrachium divaricatum*;
Relief - Depressed;
Surface - The water is drained in most parts of the territory, only small part is covered with water - water is maintained fragmentarily as sections;
Soil - Hydric**,** gleyed, saturated with water;
Usage - Grazing.

Comment 1.: Mash formed as a result of eutrophication - Mesotrophic phase habitat, moving to eutrophic phase.
Comment 2.: The territory around the location is mowed.
Comment 3.: Moderate anthropogenic impact, moderate level of degradation;

Identification code: 3.152
C1.32 - Free-floating vegetation of eutrophic waterbodies

Location - Kvemo Kartli, Tsalka Municipality, surroundings of Santa village;
Photo: See the database;
Founding-dominant species - *Lemna minor*;
Obligate species - N/A;
Facultative species - N/A;
Relief - Lake in saucer-like depression;
Surface - - Free-standing water body;
Soil - N/A;
Usage - Unknown

Comment: The last phase of eutrophication process - eutrophic phase;

Identification code: 3.37
D5.211 – Brown sedge beds

Location - Kvemo Kartli, Tsalka Municipality, of Santa village surroundings;
Photo: See the database;
Founding-dominant species - *Carex disticha*;
Obligate species - *Persicaria maculosa*;
Facultative species - *Calamagrostis arundinacea*, *Juncus articulatus*, *Alisma plantago-aquatica*;
Relief - Depressed;
Surface - Permanently partially covered with water;
Soil - Hydric**,** gleyed, saturated with water;
Usage - Unknown;
Surrounding habitats- Grassland.

Comment 1.: Depressed mire created as a result of eutrophication.
Comment 2: Heavy anthropogenic impact; high level of degradation.

Identification code: 3.39
C1.2414 - Broad-leaved pondweed carpets

Location - Kvemo Kartli, Tsalka Municipality, surroundings of Imera village;
Photo: See the database;
Founding-dominant species - *Potamogeton natans*;
Obligate species - *Phragmites australis*;
Facultative species - *Typha latifolia*, *Carex vesicaria*, *Calamagrostis arundinacea*, *Cephalaria gigantea*, *Arctium lappa*, *Nymphaea alba*, *Lycopus europaeus*;
Relief - Depressed, lake; the habitat is located directly in the lake;
Surface - - Free-standing water body;
Soil - -;
Usage - Collection of water-lilies.

Comment 1.: Eutrophication process is well-defined;
Comment 2.: The habitat has mosaic structure - other plants are wedged in potamogeton sections (*Phragmites austarlis*, *Typha latifolia*, *Carex vesicaria* etc.
Comment 3.: Heavy anthropogenic impact, high level of degradation.

Identification code: 3.142
D5.213 – Greater pond sedge beds

Location - Kvemo Kartli, Tsalka Municipality, surroundings of Beshtasheni village;
Photo: See the database;
Founding-dominant species - *Carex riparia*;
Obligate species - *Typha angustifloia*;
Facultative species - *Filipendula vulgaris*, *Potamogeton natans*, *Lycopus europaeus*, *Lemna minor;*
Relief - Weakly depressed;
Surface - Permanently partially covered with water;
Soil - Hydric, gleyed, saturated with water;
Usage - Unknown (private property).

Comment 1.: There is a small water area, maintained in the middle of the habitat. Eutrophication process has started relatively recently.
Comment 2.: Heavy anthropogenic impact, high level of degradation.

Identification code: 3.34
D5.2142 – Bladder sedge beds

Location - Kvemo Kartli, Tsalka Municipality, surroundings of Bareti village;
Photo: See the database;
Founding-dominant species - *Carex vesicaria*;
Obligate species - *Juncus effusus*;
Facultative species - *Juncus articulatus*, *Alisma plantago-aquatica*, *Calamagrostis arundinacea*, *Lycopus europaeus*, *Persicaria maculosa*;
Relief - Weakly depressed;
Surface - Permanently fully covered with water;
Soil - Hydric**,** gleyed, saturated with water;
Usage - Mowing-Grazing.

Comment 1.: The territory around the location is used as arable land and hayfield.
Comment 2.: Heavy anthropogenic impact, high level of degradation.

Identification code: 3.164
D5.213 – Greater pond sedge beds

Location - Surroundings of Emlikli village and Dmanisi;
Photo: See the database;
Founding-dominant species - *Carex riparia*;
Obligate species - *Calamagrostis epigejos*;
Facultative species - *Carex disticha*, *Juncus effusus*, *Petasites albus*;
Relief - Flat plain;
Surface - Permanently partially covered with water;
Soil - Not gleyed, saturated with water;
Usage - Grassland.

Comment: Heavy anthropogenic impact, high level of degradation.

Identification code: 3.178
D5.213 – Greater pond sedge beds

Location - Surroundings of Emlikli village and Dmanisi;
Photo: See the database;
Founding-dominant species - *Carex disticha*;
Obligate species - *Carex riparia*;
Facultative species - *Carex pendula*, *Scolochloa festucacea*, *Agrostis vinealis*, *Juncus conglomeratus*, *Lythrum salicaria*, *Achillea millefolium*, *Comarum palustre*, *Anthoxanthum odoratum*;
Relief - Flat plain;
Surface - Not covered with water;
Soil - Hydric, gleyed, saturated with water;
Usage - Mowing, Grazing.

Comment 1.: Drained, with a trench in the middle;
Comment 2.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 3.195
D5.21 – Beds of large [Carex] species

Location - Dmanisi, Emlikli surroundings;
Photo: See the database;
Founding-dominant species - *Carex cespitosa*;
Obligate species - *Lysimachia vulgaris*;

Facultative species - *Lythrum salicaria*, *Potamogeton natans*, *Utricularia vulgaris*, *Ranunculus ophioglossifolius*;
Relief - Depressed;
Surface - Permanently partially covered with water;
Soil - Saturated with water;
Usage - Unknown

Comment 1.: Habitat has developed around a standing pool, which was not identified as an independent habitat owing to its small area. Under the influence of this pool the surface of the habitat is partially covered with water and the soil is saturated with water.
Comment 2.: *Potamogeton natans* and*Utricularia vulgaris* grow in the pool.
Comment 3.: The territory around the location is mowed.
Comment 4.: Moderate anthropogenic impact, moderate level of degradation.

<u>Identification code: 3.194</u>
E1.7 - Closed non-Mediterranean dry acid and neutral grassland

Location - Dmanisi, Emlikli;
Photo: See the database;
Founding-dominant species - *Nardus stricta*;
Obligate species - *Alchemilla sp.*;
Facultative species - *Carex canescens*, *Zannichellia palustris*, *Batrachium divaricatum*, *Lemna trisulca*;
Relief - Depressed, there is a very small pool in the most depressed part;
Surface - partially covered with water;
Soil - Hydric, saturated with water;
Usage - Grazing.

Comment 1.: Habitat vegetation cover is that of grassland, heavily degraded, what is conditioned by overgrazing. Habitat vegetation cover and soil are not concurrent.
Comment 2.: As of to date the habitat vegetation cover is that of grassland, specifically with nardus beds (*Nardetum strictum*). Transformation of wetland habitats into grassland vegetation presumably consisted of the following phases: (1) First D category mire has developed as a result eutrophication; (2) The structure of vegetation cover has deteriorated as a result of overgrazing; (3) *Nardus stricta* and *Alchemilla sp.* intruded and indicative of wetland plants were "evicted" from the habitat (only *Carex canescens* is still maintained). Presumably, this process took the past 50 years. It is known that the structure and composition of the soil is relatively stable and maintained for a relatively long period. Respectively, it has not changed for a short period of time (approximately 50 years) and wetland is still present in this habitat. Maintenance of wetland was also promoted by water regime and climatic conditions. As of to date, the habitat surface is again covered with water, what is a

designator of wetland ecosystems and is not concurrent with grassland ecosystem. Despite the foregoing the habitat vegetation cover is that of grassland, but degraded as a result of grazing.
Comment 3.: Heavy anthropogenic impact; high level of degradation.

4 - North-East Basin

Identification code: 4.3

E4.4 - Calcareous alpine and subalpine grassland

Location - Khevi, Khazbegi Municipality, surroundings of Truso village (near travertine)
Photo: See the database;
Founding-dominant species - *Carex tristis* (coverage 90%);
Obligate species - *Carex vesicaria*;
Facultative species - *Nasturtium officinale*, *Koeleria luerssenii*, *Agrostis capillaris*, *Phragmites australis*;
Relief - Flat, slightly uneven valley, situated between slopes;
Surface - Permanently partially covered with water;
Soil - Hydric, rusty, saturated with water;
Usage - Pasture;

Comment 1. : Subalpine grassland, the territory of which is humidified by mineral streams and mineral springs.
Comment 2.: The territory is covered with man-made trenches;
Comment 3.: Changed, moderately degraded habitat.

Identification code: 4.5

D5.2122- Lesser pond sedge beds

Location - Khevi, Khazbegi Municipality, surroundings of Kobi village;
Photo: See the database;
Founding-dominant species - *Carex vesicaria*;
Obligate species - *Epilobium montanum*;
Facultative species - *Carex leporina*, *Poa annua*, *Nasturtium officinale*, *Triglochin palustris*;
Relief - Weakly sloping towards the river valley, situated in river bed, between slopes;
Surface - Permanently partially covered with water; is inundated by waters of the river and its tributary streams and springs;
Soil - Alluvial, saturated with water;
Usage - Unknown
Comment: Weak anthropogenic impact, low level of degradation.

Identification code: 4.6

D5.11– Common reed ([Phragmites]) beds normally without free-standing water

Location - Khevi, Khazbegi borough;
Photo: See the database;
Founding-dominant species - *Phragmites australis*;
Obligate species - *Blysmus compressus*;
Facultative species - *Trifolium spadiceum*, *Rhinanthus minor*, *Gentiana septemfida*, *Equisetum palustre*, *Epilobium palustre*, *Parnassia palustris*, *Juncus articulatus*, *Triglochin palustris*, *Salix caprea*, *Elaeagnus rhamnoides*;
Relief - Weakly sloping flat plain;
Surface - Permanently partially covered with water; feeds on streams and springs;
Soil - Hydric, signs of peat are notable, saturated with water;
Usage -Hayfield.

Comment 1.: The vegetation cover is heavily degraded due to anthropogenic impact (mowing).

Identification code: 4.8

D5.11– Common reed ([Phragmites]) beds normally without free-standing water

Location - Khevi, Khazbegi Municipality, surroundings of Sno village;
Photo: See the database;
Founding-dominant species - *Phragmites australis*;
Obligate species - *Agrostis vinealis*;
Facultative species - *Trifolium pratense*, *Rhinanthus minor*, *Anthriscus sylvestris*, *Carex hirta*, *Juncus articulatus*, *Lythrum salicaria*, *Epilobium palustre*;
Relief - Flat plain (valley) situated between slopes;
Surface - Permanently partially covered with water;
Soil - Alluvial, not Hydric, not saturated with water;
Usage - Hayfield-Pasture, is mowed.
Comment 1.: The territory is drained and water presumably stands in drainage trenches and not on the basic territory. Drainage trenches are dominated by *Carex hirta*.
Comment 2.: Due to drainage, the vegetation cover is heavily changed. The elements of meadow are also present. Plants associated with water are mainly growing near the drainage trenches.

Identification code: 4.9

E4.4 - Calcareous alpine and subalpine grassland

Location - Khevi, Khazbegi Municipality, surroundings of Almasiani village;
Photo: See the database;
Founding-dominant species - *Carex tristis*;
Obligate species - *Blysmus compressus*;
Facultative species - *Carex riparia*, *Bromus variegatus*, *Alchemilla sericata*, *Cirsium obvallatum*, *Juncus inflexus*, *Nardus stricta*, *Swertia iberica*;
Relief - Weakly sloping plain (Valley) with uneven surface, situated between slopes;
Surface - Permanently is partially covered with water;
Soil - Hydric, saturated with water, with high content of iron;
Usage - Pasture;

Comment 1.: Alpine meadow, on the territory of which several streams gather. These streams form wetland sections, where this habitat is developed.
Comment 2.: The territory is covered with man-made trenches;
Comment 3.: The vegetation cover is heavily degraded due to anthropogenic factors (heavy grazing) (high level of degradation).

Identification code: 4.10

C3.2 - Water-fringing reedbeds and tall helophytes other than canes

Location - Khevi, Khazbegi Municipality, between Achkhoti and Sno villages;
Photo: See the database;
Founding-dominant species - *Carex elata*;
Obligate species - *Carex vesicaria*;
Facultative species - *Lycopodiella inundata, Alisma plantago-aquatica, Juncus articulatus, Phleum pratense, Typha angustifolia;*
Relief - Flat plain (valley) situated between slopes;
Surface - Permanently almost fully (80-85%) covered with water;
Soil - Saturated with water;
Usage - Hayfield.

Comment 1.: Floristic composition consists of species associated with water.
Comment 2.: Formation of the habitat is associated with the dam constructed after laying the road - the water is no more drained, does not leak and inundates the territory. This is the water from gorges. This is atypical wetland habitat, which is still developing.
Comment 3.: Moderate anthropogenic impact, moderate level of degradation.

<u>Identification code: 4.13</u>
F9.1 – Riverine scrub

Location - Khevi, Khazbegi Municipality, surroundings of Pansheti village;
Photo: See the database;
Founding-dominant species - *Elaeagnus rhamnoides*;
Obligate species - *Blysmus compressus*;
Facultative species - *Juncus articulatus*, *Carex diluta*, *Epilobium dodonaei*, *Euphrasia caucasica*, *Agrostis vinealis*;
Relief - The first terrace of the river, flat plain;
Surface - Permanently partially covered with water;
Soil - Wetland**,** gleyed, saturated with water;
Usage - Unknown

Comment 1.: Scarcity of Wetland obligate species; vegetation elements (grasses) of D4.2 are penetrated.
Comment 2.: Vegetation cover is degraded - moderate level of degradation;

5 - Rioni Basin

Identification code: 5.131
D1.122 – Drained raised bogs

Location - Colchis, Kobuleti surroundings, Ispani 1;
Photo: See the database;
Founding-dominant species - *Sphagnum papillosum*;
Obligate species - *Juncus effusus*;
Facultative species - *Sphagnum palustre*, *Rhynchospora caucasica*, *Rhynchospora alba*, *Pteridium tauricum*, *Carex lasiocarpa*, *Frangula alnus*, *Osmunda regalis*; *Typha latifolia*, *Phragmites australis*, *Iris pseudacorus*, *Molinia caerulea*, *Rubus hirtus*, *Alnus glutinosa subsp. barbata*; *Rhododendron luteum*, *Vaccinium arctostaphylos*, *Rubus hirtus*; *Rhododendron ponticum*, *Pinus pinaster*;
Relief - Flat plain;
Surface - Permanently partially covered with water;
Soil - Wetland, peaty, acid, gleyed, saturated with water;
Usage - Unknown

Comment: Weakly changed, anthropogenic impact is weak, is not degraded, sphagnum is reduced on a small section and dominating is *Juncus effusus*. Some sections are drained;

Identification code: 5.130
D1.16 – Colchis lowlands percolation bog

Location - Colchis, Kobuleti surroundings, Ispani 2;
Photo: See the database;
Founding-dominant species - *Sphagnum papillosum*;
Obligate species - *Drosera rotundifolia*;
Facultative species - *Sphagnum palustre*, *Molinia caerulea*, *Rhynchospora caucasica*, *Osmunda regalis*; *Pteridium tauricum*, *Frangula alnus*, *Rhododendron luteum*, *Vaccinium arctostaphylos*; *Rhododendron luteum*;
Relief - Flat plain;
Surface - Permanently partially covered with water, periodically fully inundated;
Soil - Hydric, peaty, acid, gleyed, saturated with water;
Usage - Unknown
Comment 1: Weak anthropogenic impact.
Comment 2. : Sphagnum thickness 30-40 sm.
Comment 3.: Unique bog, feeds only on rain water and water loss accounts only for evaporation.

Identification code: 5.133

G1.52 – Alder swamp woods on acid peat

Location - Colchis, Kobuleti surroundings;
Photo: See the database;
Founding-dominant species - *Alnus glutinosa* subsp. *barbata*;
Obligate species - *Frangula alnus*;
Facultative species - *Carpinus betulus Rubus hirtus*, *Ruscus colchicus*, *Rubus caucasigenus*, *Smilax excelsa*, *Osmunda regalis*, Juncus effuses, *Rhynchospora caucasica*, *Polygonum thunbergii*, *Carex divulsa*, *Rhynchospora alba*, *Sphagnum palustre*;
Relief - Flat plain;
Surface - Permanently partially covered with water, mainly seasonally;
Soil - Hydric, peaty, acid, gleyed, saturated with water;
Usage - Unknown;

Comment: Moderate anthropogenic impact.

Identification code: 5.132

C1.2 – Permanental mesotrophic lakes, ponds and pools

Location - Colchis, Kobuleti, adjacent to bypass;
Photo: See the database;
Founding-dominant species - *Potamogeton natans*;
Obligate species - *Carex sp.*;
Facultative species - *Rhynchospora alba*, *Juncus effusus*, *Typha latifolia*, *Lythrum salicaria*, *Utricularia minor*, *Sphagnum palustre*, *Frangula alnus*, *Osmunda regalis*, *Carpinus betulus*, *Alnus glutinosa* subsp. *barbata*;
Relief - Topogenic depression with flat surface;
Surface - Permanently fully covered with water;
Soil - Hydric, peaty, gleyed, saturated with water;

Comment: Habitat formed as a result of eutrophication, mesotrophic phase.

Identification code: 5.134

C1.2 – Permanental mesotrophic lakes, ponds and pools

Location - Colchis, Kobuleti, adjacent to sidetrack;
Photo: See the database;
Founding-dominant species - *Juncus effusus* (on the banks);
Obligate species - *Persicaria maculosa*;
Facultative species - *Utricularia minor*;
Relief - Depressed plain, located between highways and alleviated territory;
Surface - Permanently covered with water;
Soil - Saturated with water;
Usage - Unknown (is fenced).

Identification code: 5.128
INV - Habitat dominated by invasive species

Location - Colchis, Kobuleti surroundings;
Photo: See the database;
Founding-dominant species - *Polygonum thunbergii*;
Obligate species - *Juncus effusus*;
Facultative species - *Iris pseudacorus*, *Lythrum salicaria*, *Spagnum palustre*;
Relief -;
Surface - Permanently partially covered with water, periodically inundated;
Soil - Not saturated with water;
Usage - Unknown

Comment 1.: Moderate anthropogenic impact, moderate level of degradation.
Comment 2.: Habitat is located near thr canal.

Identification code: 5.52
D1.16 – Colchis lowlands percolation bog

Location - Colchis, Imnati;
Photo: See the database;
Founding-dominant species - *Sphagnum ssp.*;
Obligate species - *Molinia caerulea*, *Cladium mariscus*;
Facultative species - *Rhynchospora caucasica*, *Pteridium tauricum*, *Alnus glutinosa* subsp. *barbata*, *Frangula alnus*, *Rhododendron luteum*; *Eupatorium cannabinum*, *Potentilla erecta*, *Kosteletzkya pentacarpos*, *Juncus maritimus*, *Calamagrostis epigejos*; *Lysimachia vulgaris*, *Juncus* effusus, *Rhynchospora alba*, *Nymphaea alba*; *Sorghum halepensis*;
Relief - Flat plain;
Surface - Permanently partially covered with water, is fully inundated periodically;

Soil - Hydric, peaty, acid, gleyed, saturated with water;
Usage - Unknown

Comment 1. : Weak anthropogenic impact.
Comment 2.: Different sphagnum species dominate on different sections (*Sphagnum palustre*, *Sphagnum papillosum*).
Comment 3.: Unique bog, feeds only on rain water and water loss accounts only for evaporation;

<u>Identification code: 5.49</u>
D1.121 – Damaged, inactive bogs, dominated by dense purple miregrass (Molinia)

Location - Colchis, surroundings of Paliastomi and Pichora river;
Photo: See the database;
Founding-dominant species - *Molinia caerulea*;
Obligate species - *Cladium mariscus*;
Facultative species - *Phragmites australis*, *Polygonum thunbergii*, *Osmunda regalis*; *Stachys palustris*, *Calamagrostis epigejos*, *Alnus glutinosa* subsp. *barbata*;
Relief - Flat plain;
Surface - Permanently partially covered with water;
Soil - Hydric, peaty, acid, gleyed, saturated with water;
Usage - Hayfield-Pasture.

Comment 1.: Moderate anthropogenic impact, moderate level of degradation.
Comment 2.: Molinia (*Molinia caerulea*) mires drying as a result of burning and mowing; creation of the habitat is related to burning of vegetation cover - vegetation cover is being changed (succession) as a result of what molinia (*Molinia caerulea*) prevails in vegetation covers and becomes the dominant species.

Comment 3.: This habitat is one of the versions of rise bog.

<u>Identification code: 5.125</u>
D5.24 – Fen beds of great fen sedge (Cladium)

Location - Colchis, nearby Paliastomi lake;
Photo: See the database;
Founding-dominant species - *Cladium mariscus*;
Obligate species - *Phragmites australis*;

Facultative species - *Typha angustifolia*, *Calamagrostis epigejos*, *Hibiscus ponticus*, *Juncus articulatus*, *Juncus maritimus*; *Molinia caerulea*, *Solidago canadensis*, *Alnus glutinosa* subsp. *barbata*, *Crataegus microphylla*;
Relief - Flat plain;
Surface - Permanently partially covered with water, is not fully inundated;
Soil - Hydric, peaty, gleyed, saturated with water;
Usage - Unknown

Comment 1.: *Spagnum ssp.* was not recorded.
Comment 2.: Fens in pristine condition; no human impact is not traceable.

<u>Identification code: 5.50</u>
D5.3 – Swamps and mires dominated by soft rush or other large rushes

Location - Colchis, Paliastomi surroundings;
Photo: See the database;
Founding-dominant species - *Juncus effusus*;
Obligate species - *Phragmites australis*;
Facultative species - *Molinia caerulea*, *Cyperus serotinus*, *Cyperus pannonicus*, *Solidago canadensis*, *Calamagrostis epigejos*, *Kosteletzkya pentacarpos*, *Paspalum distichum*, *Amorpha fruticosa*;
Relief - Flat plain, hummocky;
Surface - Permanently partially covered with water, is fully inundated periodically;
Soil - Hydric, mottled, saturated with water;
Usage - Pasture.

Comment: No sphagnum.
Comment 2.: Moderate anthropogenic impact.

<u>Identification code: 5.72</u>
C3.21 - Common reed (Phragmites) beds

Location - Colchis, Poti surroundings, nearby Paliastomi Lake;
Photo: See the database;
Founding-dominant species - *Phragmites australis*;
Obligate species - *Calamagrostis epigejos*;
Facultative species - *Cladium mariscus*, *Kosteletzkya pentacarpos*, *Paspalum distichum*, *Hydrocharis morsus-ranae*;
Relief - Lake-side flat plain - littoral territory;
Surface - Permanently fully covered with water;

Soil - Hydric, peaty, gleyed, saturated with water;

Comment: Suitable environment for wetland habitats.

Identification code: 5.86
AGR-Agricultural

Location - Colchis, Poti surroundings, nearby Paliastomi Lake;
Photo: See the database;
Founding-dominant species - -;
Obligate species - -;
Facultative species - -;
Relief - Flat plain;
Surface - Not covered with water, periodically inundated;
Soil - Not saturated with water, not gleyed;
Usage - Pasture.

Comment: Vegetation cover is heavily degraded, abundance of weeds.

Identification code: 5.57
G1.52 – Alder swamp woods on acid peat

Location - Colchis
Photo: See the database;
Founding-dominant species - *Alnus glutinosa* subsp. *barbata*;
Obligate species - *Pterocarya pterocarpa*;
Facultative species - *Frangula alnus*, *Crataegus microphylla*, *Smilax excelsa*, *Hedera helix*, *Periploca graeca*, *Ulmus minor*, *Fraxinus excelsior*, *Cornus sanguinea* subsp. *australis*, *Viburnum opulus*, *Rubus candicans*, *Rubus caesius*, *Rubus caucasicus*, *Acer campestre*, *Euonymus europaeus*, *Polygonum thunbergii*, *Iris pseudacorus*, *Oplismenus undulatifolius*, *Persicaria maculosa*, *Mentha aquatica*; *Sparganium emersum*, *Rhynchospora alba*, *Carex divulsa, Carex riparia*, *Carex vesicaria*, *Persicaria maculosa*, *Geum urbanum*, *Prunella vulgaris*, *Commelina communis*; *Sparganium erectum* subsp. *neglectum*, *Lythrum hyssopifolia*;
Relief - Flat plain;
Surface - Permanently partially covered with water, is presumably fully inundated seasonally;
Soil - Wetland, peaty, acid, saturated with water;
Usage - Cutting and grazing.

Comment 1.: Humidification level is different on certain sections;
Comment 2.: Stand density on certain sections is different - alder woods consist of both trees and offshoot high bushes, what is mainly conditioned by intensity of anthropogenic factors.
Comment 3.: Floristic composition is different on different sections;
Comment 4.: Ecological status of the habitat is different on different sections - there are weakly, moderately and heavily degraded stands.

Identification code: 5.69
G1.52 – Alder swamp woods on acid peat

Location - Colchis, Guria, Lanchkhuti Municipality, Katsobura Preserve;
Photo: See the database;
Founding-dominant species - *Alnus glutinosa* subsp. *barbata*;
Obligate species - *Oplismenus undulatifolius*;
Facultative species - *Ficus carica*, *Gleditsia triacanthos*, *Diospyros lotus*, *Pyrus caucasica*, Sambucus nigra, *Cornus sanguinea* subsp. *australis*, *Geum urbanum*;
Relief - Flat plain, former meander of Rioni river;
Surface - Not covered with water, frequently inundated
Soil - Wetland, peaty, acid, gleyed, saturated with water;
Usage - Unknown;

Comment: The habitat is surrounded by a canal.

Identification code: 5.48
D1.16 – Colchis lowlands percolation bog

Location - Colchis, Grigoleti-Maltakva surroundings, nearby Paliastomi Lake;
Photo: See the database;
Founding-dominant species - *Sphagnum palustre*;
Obligate species - *Molinia caerulea*;
Facultative species - *Rhynchospora caucasica*, *Cladium mariscus*, *Juncus maritimus*, *Alnus glutinosa* subsp. *barbata*, *Pterocarya pterocarpa*; *Phragmites australis*, *Polygonum thunbergii*, *Persicaria maculosa*, *Hypericum mutilum*, *Potentilla erecta*, *Rubus sanguineus*;
Relief - Flat plain;
Surface - Permanently partially covered with water;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - Unknown

Comment 1.: Moderate anthropogenic impact; some sections are burnt; there is a highway near the habitat area, also there are houses.
Comment 2.: Unique bog, feeds only on rain water and water loss accounts only for evaporation;

<u>Identification code: 5.124</u>
D2.3D – Purple miregrass ([Molinia) Transition quaking bogs

Location - Colchis, nearby Paliastomi Lake:
Photo: See the database;
Founding-dominant species - *Molinia caerulea*;
Obligate species - *Rhynchospora caucasica*;
Facultative species - *Cladium mariscus*, *Potentilla erecta*, *Phragmites australis*, *Spagnum palustre*; *Stachys palustris*, *Alnus glutinosa* subsp. *barbata*;
Relief - Flat plain;
Surface - Permanently partially covered with water;
Soil - Peaty, gleyed, saturated with water;
Usage - Some sections are mowed.

Comment 1.: Sphagnum is present on some sections.
Comment 2.: Moderate anthropogenic impact,

<u>Identification code: 5.135</u>
Code - G1.44 – Wet-ground woodland of the Black and Caspian Seas

Location - Colchis, surroundings of Japana village, Patara Nationali;
Photo: See the database;
Founding-dominant species - *Alnus glutinosa* subsp. *barbata*;
Obligate species - *Morus nigra*;
Facultative species - *Malus orientalis*, *Cornus sanguinea* subsp. *australis*, *Polygala thunbergii*, *Oplismenus undulatifolium*;
Relief - Flat plain;
Surface - Not covered with water (drainage trenches are cut);
Soil - Not Hydric,
Usage - Grazing and cutting.

Comment: The Rioni river would flow here in the past - this is a former meander of the Rioni river where this habitat is still maintained.

Identification code: 5.111

Code - G1.44 – Wet-ground woodland of the Black and Caspian Seas

Location - Colchis, surroundings of Japana village, Patara Nationali;
Photo: See the database;
Founding-dominant species - *Alnus glutinosa* subsp. *barbata*;
Obligate species - *Pterocarya pterocarpa*;
Facultative species - *Ficus carica*, *Ulmus minor*, *Cornus sanguinea* subsp. *australis*, *Rubus caesius*, *Smilax excelsa*, *Periploca graeca*, *Sparganium emersum*, *Equisetum palustre*, *Oplismenus undulatifolium*;
Relief - Flat plain;
Surface: Not covered with water, periodically is inundated with low intensity;
Soil - Alluvial, not gleyed, not saturated with water;
Usage - cutting.

Comment 1.: Former meander, where the wood habitat is still maintained.
Comment 2.: Suitable environment for wetland habitats.
Comment 3.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 5.53

C3.5 - Periodically inundated shores with pioneer and ephemeral vegetation

Location - Colchis, surroundings of Japana village, Patara Nationali;
Photo: See the database;
Founding-dominant species - *Persicaria maculosa*;
Obligate species - *Paspalum distichum*;
Facultative species - *Lemna minor*;
Relief - Weakly inclined flat plain;
Surface - Permanently partially covered with water, is fully inundated seasonally;
Soil - Hydric**,** gleyed, saturated with water;
Usage - Pasture (is fenced).

Comment: The Rioni river would flow here in the past - this is a former meander of the Rioni river, the major part of which is a pond with standing water. Mapped out habitat is the continuation of this pond with standing water - littoral part.

Identification code: 5.58
G1.52 – Alder swamp woods on acid peat

Location - Colchis, 1,5 km away from Paliastomi Lake;
Photo: See the database;
Founding-dominant species - *Alnus glutinosa* subsp. *barbata*;
Obligate species - *Frangula alnus*;
Facultative species - *Corylus avellana*, *Rubus sanguineus*, *Rubus idaeus*, *Viburnum lantana*, *Equisetum palustre*, *Juncus effusus*, *Iris pseudacorus*, *Carex divulsa*, *Carex riparia*, *Osmunda regalis*, *Sphagnum palustre*;
Relief - Flat plain;
Surface - Permanently covered with water;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - Wood-cutting.

Comment: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 5.45
D1.121 – Damaged, inactive bogs, dominated by dense purple miregrass (Molinia)

Location - Colchis, surroundings of Pichora river;
Photo: See the database;
Founding-dominant species - *Molinia caerulea*;
Obligate species - *Cladium mariscus*;
Facultative species - *Iris pseudacorus*, *Sphagnum palustre*, *Stachys palustris*, *Hibiscus ponticus*, *Calamagrostis epigejos*, *Alnus glutinosa* subsp. *barbata*;
Relief - Flat plain;
Surface - Permanently partially covered with water;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - Grassland Pasture.

Comment 1.: Anthropogenic impact is different on different sections: respectively there are both heavily and moderately degraded sections.
Comment 2.: Molinia (*Molinia caerulea*) mires drying as a result of burning and mowing; creation of the habitat is related to burning of vegetation cover - after burning the vegetation cover is changed (succession), as a result of the foregoing molinia (*Molinia caerulea*) has "gained dominion" and is still dominating.
Comment 3.: This habitat is one of the versions of a rise bog.

Identification code: 5.56
G1.52 – Alder swamp woods on acid peat

Location - Colchis, surroundings of Grigoleti village;
Photo: See the database;
Founding-dominant species - *Alnus* glutinosa subsp. *barbata*;
Obligate species - *Frangula alnus*;
Facultative species - *Viburnum opulus*, *Rubus caesius*, *Crataegus miccrophylla*, *Smilax excelsa*, *Polygonum thunbergii*;
Relief - Flat plain;
Surface - Permanently partially covered with water, frequently fully inundated;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - Wood-cutting.

Comment 1.: There is a pond near the habitat;
Comment 2.: Moderate anthropogenic impact, moderate level of degradation.
Comment 3.: Drained.

Identification code: 5.136
G1.52 – Alder swamp woods on acid peat

Location - Colchis, Rioni river rainforest;
Photo: See the database;
Founding-dominant species - *Alnus glutinosa subsp. barbata;*
Obligate species - *Polygonum thunbergii*;
Facultative species - *Smilax excelsa*, *Periploca graeca*, *Iris pseudacorus*;
Relief - Flat plain;
Surface - Permanently fully covered with water;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - Unknown

Comment: Low level of degradation.

Identification code: 5.50
D5.3 – Swamps and mires dominated by soft rush or other large rushes

Location - Colchis, surroundings of Poti airport;
Photo: See the database;
Founding-dominant species - *Juncus effusus*;

Obligate species - *Molinia caerulea*;
Facultative species - *Polygonum thunbergii*, *Solidago canadensis*, *Hypericum perforatum*;
Relief - Flat plain, hummocky;
Surface - Permanently partially covered with water;
Soil - Hydric, gleyed, saturated with water;
Usage - Pasture.

Comment 1.: Is covered with trenches' network.
Comment 2.: Heavy anthropogenic impact, vegetation cover is heavily degraded due to grazing.

Identification code: 5.46
INV - Habitat dominated by invasive species

Location - Colchis, Poti surroundings;
Photo: See the database;
Founding-dominant species - *Polygonum thunbergii*;
Obligate species - *Molinia caerulea*;
Facultative species - *Solidago canadensis*, *Potentilla erecta*, *Juncus maritimus*, *Typha latifolia*, *Sparganium emersum*, *Lycopus europaeus*, *Equisetum palustre*, *Sagittaria sagittifolia*, *Paspalum distichum*;
Relief - Flat plain;
Surface - Permanently partially covered with water;
Soil - Hydric, gleyed, saturated with water;
Usage - Grazing, cutting.

Comment 1.: Habitat vegetation cover is heavily degraded;
Comment 2.: The trenches are cut.

Identification code: 5.138
INV - Habitat dominated by invasive species

Location - Colchis, Poti surroundings;
Photo: See the database;
Founding-dominant species - *Polygonum thunbergii*;
Obligate species - *Juncus effusus*;
Facultative species - *Molinia caerulea*, *Equisetum palustre*, *Paspalum distichum*;
Relief - Flat plain;
Surface - Permanently partially covered with water;
Soil - Hydric**,** saturated with water;

Usage - Grassland.

Comment: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 5.139
G1.52 – Alder swamp woods on acid peat

Location - Colchis, Cherpalka;
Photo: See the database;
Founding-dominant species - *Alnus glutinosa* subsp. *barbata*;
Obligate species - *Polygonum thunbergii*;
Facultative species - *Carpinus betulus*, *Pterocarya pterocarpa*, *Viburnum lantana*, *Smilax excelsa, Crataegus kyrtostyla*, *Rubus sanguineus*, *Iris pseudacorus*, *Carex riparia*;
Relief - Flat plain;
Surface - Permanently partially covered with water;
Soil - Peaty, acid, gleyed, saturated with water;
Usage - cutting.

Comment 1.: Tree height 10-12 m.
Comment 2.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 5.44
D5.3 – Swamps and mires dominated by soft rush or other large rushes

Location - Colchis, Imnati, Cherpalka;
Photo: See the database;
Founding-dominant species - *Juncus effusus*;
Obligate species - *Polygonum thunbergii*;
Facultative species - *Persicaria maculosa*;
Relief - Flat plain, hummocky;
Surface - Permanently partially covered with water; more inundated seasonally;
Soil - Hydric**,** saturated with water, rusty and brownish;
Usage - Pasture.

Comment: Heavy anthropogenic impact, vegetation cover is degraded dues to grazing.

Identification code: 5.51
C1.2412 – Water chestnut carpets

Location - Colchis, Imnati mire, Kukani Lake;
Photo: See the database;
Founding-dominant species - *Trapa colchica*;
Obligate species - *Iris pseudacorus*;
Facultative species - *Juncus effusus*, *Polygonum thunbergii*, *Phragmites australis*, *Cyperus serotinus*;
Relief - Lake of secondary origin in situ of the Kukani river;
Surface - Permanently fully covered with water;
Soil - -;

Comment 1.: Habitat formed as a result of eutrophication, mesotrophic phase.
Comment 2.: Obligate and facultative species grow on habitat edges.

Identification code: 5.140
D5.3 – Swamps and mires dominated by soft rush or other large rushes

Location - Colchis, Imnati, Cherpalka;
Photo: See the database;
Founding-dominant species - *Juncus effusus*;
Obligate species - *Polygonum thunbergii*;
Facultative species - *Persicaria maculosa*, *Stachys palustris*;
Relief - Flat plain, hummocky;
Surface - Permanently partially covered with water;
Soil - Gleyed, saturated with water;
Usage - Pasture.

Comment: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 5.14
INFR-Infrastructure

Location - Colchis, Samtredia surroundings
Photo: See the database;
Usage: Currently this is the road infrastructure.

Identification code: 5.15

F9.35 – Riparian stands of invasive shrubs

Location - Colchis, Samtredia surroundings;
Photo: See the database;
Founding-dominant species - *Amorpha fruticosa*;
Obligate species - *Cynodon dactylon*;
Facultative species - *Solidago canadensis*;
Relief - Flat plain;
Surface - Not covered with water;
Soil - Alluvial, not saturated with water, not gleyed, not Hydric soil;
Usage - Unknown

Comment: Heavy anthropogenic impact, high level of degradation.

Identification code: 5.55

AGR
Agricultural

Location - Colchis, Guria, Ozurgeti surroundings;
Photo: See the database;
Usage: Agricultural lands;

Comment: According to assertions of local population no wetland has ever been here, water would stand only when it rained, the environment is not indicative of (adequate for) wetland habitats, i.e. is not a wetland habitat.

Identification code: 5.54

C3.5 - Periodically inundated shores with pioneer and ephemeral vegetation

Location - Colchis, Abasha Municipality, surroundings of Bulvani village;
Photo: See the database;
Founding-dominant species - *Persicaria maculosa*;
Obligate species - *Paspalum distichum*;
Facultative species - *Echinochloa crus-galli*, *Eryngium caeruleum*, *Gleditsia triacanthos*, *Amorpha fruticosa*, *Hydrocotyle ramiflora*, *Trifolium repens*, *Capsella bursa-pastoris*;
Relief - Plain with uneven surface (former meander);
Surface - Permanently partially covered with water;
Soil - Hydric, not gleyed, saturated with water;

Usage - Pasture.

Comment 1.: The Rioni River would flow here in the past - this is place of former meander of the Rioni river.
Comment 2.: Vegetation cover is degraded due to grazing; Heavy anthropogenic impact, high level of degradation.

<u>Identification code: 5.85</u>
Code - D1.1122 – Mud-bottom schlenken

Location - Colchis, Samegrelo, Senaki Municipality, surroundings of Namikolaevo village;
Photo: See the database;
Founding-dominant species - *Rhynchospora alba*;
Obligate species - *Sphagnum palustre*, *Drosera rotundifolia*;
Facultative species - *Persicaria maculosa*, *Hydrocotyle ramiflora*, *Rhododendron luteum*, *Juncus sp.*;
Relief - Weakly slanting flat plain;
Surface - Permanently partially covered with water;
Soil - Hydric**,** peaty, gleyed, saturated with water;
Usage - Pasture.

Comment: Vegetation cover is heavily degraded due to grazing.

<u>Identification code: 5.84</u>
Code - D1.1122 – Mud-bottom schlenken

Location - Colchis, Samegrelo, Senaki Municipality, surroundings of Namikolaevo village;
Photo: See the database;
Founding-dominant species - *Rhynchospora alba*;
Obligate species - *Juncuss articulatus*;
Facultative species - *Rhododendron luteum*, *Rubus sanguineus*, *Alnus glutinosa* subsp. *barbata*, *Hypericum mutilum*, *Rhamphicarpa medwedewii*, *Persicaria maculosa*, *Hydrocotyle ramiflora*, *Juncus sp.*, *Sphagnum palustre*;
Relief - Weakly slanting flat plain;
Surface - Permanently partially covered with water;
Soil - Hydric, peaty, gleyed, saturated with water;
Usage - Pasture.

Comment: Heavy anthropogenic impact, high level of degradation.

Identification code: 5.41

F9.35 – Riparian stands of invasive shrubs

Location - Colchis, Samtredia surroundings
Photo: See the database;
Founding-dominant species - *Amorpha fruticosa*;
Obligate species - *Alnus glutinosa* subsp. *barbata*;
Facultative species - *Gleditsia triacanthos*, *Persicaria maculosa*, *Polygonum thunbergii*, Poaceae;
Relief - Flat plain;
Surface - Not covered with water;
Soil - Hydric, saturated with water, not gleyed;
Usage - Unknown
Surrounding habitats - Agricultural lands

Comment 1.: The habitat is degraded in the light of hydrological regime.
Comment 2.: Presumably, long time ago the Rioni river creek was flowing through here.
Comment 3.: Heavy anthropogenic impact, high level of degradation.

Identification code: 5.17
C3.24B - Iris beds

Location - Colchis, Samtredia surroundings (Identification code: opposite to 117, on the other side of the road);
Photo: See the database;
Founding-dominant species - *Iris pseudacorus*;
Obligate species - *Persicaria maculosa*;
Facultative species - *Phragmites australis*, *Molinia caerulea*, *Juncus effusus*, *Xanthium strumarium*, Poaceae;
Relief - Weakly depressed;
Surface - covered with water;
Soil - Hydric, not gleyed, saturated with water;
Usage - Unknown (is fenced).
Surrounding habitats - Agricultural lands.

Comment 1.: Vegetation cover is mosaic - Iris and graining communities are interchanging.
Comment 2.: The habitat is weakly degraded in the light of hydrological regime.
Comment 3: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 5.117
AGR-Agricultural

Identification code: 5.112
AGR-Agricultural

Identification code: 5.115
AGR-Agricultural

Identification code: 5.116
AGR-Agricultural

Location - Imereti, Sachkhere surroundings;
Photo: See the database;
Usage - Presumably private property.

Comment: Heavy anthropogenic impact, high level of degradation.

Identification code: 5.126
C3.24B - Iris beds

Location - Imereti, Sachkhere Municipality, surroundings of Tkemliani surroundings;
Photo: See the database;
Founding-dominant species - *Iris pseudacorus*;
Obligate species - *Persicaria maculosa*;
Facultative species - *Lemna minor*, *Paspalum distichum*, *Cladium mariscus*, *Typha angustifolia*, *Phragmites australis*;
Relief - Topographic depressed relief, lake;
Surface - Permanently partially covered with water;
Soil - Saturated with water;
Usage - Pasture.

Comment: Moderate anthropogenic impact, moderate level of degradation.

<u>Identification code: 5.114</u>
C3.24B - Iris beds

Location - Imereti, Sachkhere surroundings;
Photo: See the database;
Founding-dominant species - *Iris pseudacorus*;
Obligate species - *Alisma plantago-aquatica*;
Facultative species - *Molinia caerulea*, *Phragmites australis*, *Lemna minor*, *Paspalum distichum*, *Cladium mariscus*, *Typha angustifolia*;
Relief - Topographic depressed relief, pond;
Surface - Permanently fully covered with water;
Soil - Saturated with water;
Usage - Pasture.

Comment: Heavy anthropogenic impact, high level of degradation.

6 - Chorokhi - Acharistskali Basin

Identification code: 6.5
D2.33 – Bottle sedge (*Carex ro*strata) quaking mires

Location - Mountainous Adjara, Khulo Municipality, surroundings of Danisparauli village;
Photo: See the database;
Founding-dominant species - *Carex rostrata*;
Obligate species - *Carex medwedewii*;
Facultative species - *Cyperus longus* subsp. *badius*, *Phleum pratense*, *Juncus conglomeratus*, *Comarum palustre*, *Sphagnum v*Valley) with uneven surface, located between slopes;
Surface - Permanently partially covered with water; feeds on water of 2-3 springs, colleting on this valley;
Soil - Saturated with water;
Usage - Pasture.

Comment: Heavy anthropogenic impact, high level of degradation.

Identification code: 6.29
D2.33 – Bottle sedge (*Carex ro*strata) quaking mires

Location - Mountainous Adjara, Khulo Municipality, surroundings of Danisparauli village;
Photo: See the database;
Founding-dominant species - *Carex rostrata*;
Obligate species - *Carex medwedewii*,
Facultative species - *Drosera intermedia*, *Sphagnum palustre*, *Menyanthes trifoliata*, *Lemna minor*, *Juncus effusus*, *Plagiomnium ellipticum*, *Epilobium palustre*;
Relief - Flat plain situated between low hillocks, elevations, hills and knolls;
Surface - Permanently partially covered with water;
Soil - Peaty, gleyed, saturated with water;
Usage - Pasture;

Surrounding habitats - Beech woods with fir and Maple (*Acer trautvetter*).

Comment 1.: Suitable environment for wetland habitats;
Comment 2.: Peat mires with droseras.
Comment 3.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 6.18

C3.1 – Species-rich helophyte beds

Location - Mountainous Adjara, Khulo Municipality, surroundings of Danisparauli village;
Photo: See the database;
Founding-dominant species - *Carex rostrata*;
Obligate species - *Carex medwedewii*;
Facultative species - *Persicaria maculosa*, *Asisma plantago-aquatica*, *Eleocharis palustris*, *Equisetum palustre*, *Nardus stricta*, *Bidens tripartita*, *Sparganium emersum*;
Relief - Depressed, surrounded by low hillocks;
Surface - Permanently partially covered with water;
Soil - Wetland, gleyed, saturated with water; peat and sphagnum is not notable;
Usage - Pasture;
Surrounding habitats- Fir-tree woods;

Comment: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 6.35
D2.33 – Bottle sedge (*Carex ro*strata) quaking mires

Location - Mountainous Adjara, Goderdzi pass, between Khulo and Adigeni Municipalities;
Photo: See the database;
Founding-dominant species - *Carex disticha*;
Obligate species - *Carex medwedewii*;
Facultative species - Sphagnum capillifolium, Drosera intermedia, Menyanthes trifoliata, Potentilla erecta, Primula auriculata, Juncus bufonius, Blysmus compressus, Polytrichastrum longisetum, Climacium dendroides;
Relief - Weakly slanting flat plain situated between low slopes, and hillocks;
Surface - Permanently partially covered with water;
Soil - Peaty, gleyed, saturated with water;
Usage - Traces of grazing in peripheral part of the habitat;
Surrounding habitats - Beech woods and subalpine grassland.

Comment 1.: Sedge bed mires with sphagnum and drosera.
Comment 2.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 6.1
D2.33 – Bottle sedge (*Carex ro*strata) quaking mires

Location - Mountainous Adjara, Khulo Municipality, surroundings of Danisparauli village, near the Green Lake;
Photo: See the database;
Founding-dominant species - *Carex rostrata*;
Obligate species - *Carex medwedewii*;
Facultative species - *Cyperus longus* subsp. *badius*, *Nardus stricta*, *Primula auriculata*, *Juncus effusus*, *Carex echinata*, *Scirpus sylvaticus*, *Polytrichum strictum*, *Polytrichum juniperellum*;
Relief - Flat plain situated between low slopes and hillocks;
Surface - Permanently partially covered with water;
Soil - Gleyed, saturated with water;
Usage - Pasture;

Comment: Heavy anthropogenic impact, high level of degradation.

Identification code: 6.20
D2.33 – Bottle sedge (*Carex ro*strata) quaking mires

Location - Mountainous Adjara, Khulo Municipality, surroundings of Danisparauli village, near the Green Lake;
Photo: See the database;
Founding-dominant species - *Carex rostrata*;
Obligate species - *Carex medwedewii*;
Facultative species - *Menyanthes trifoliata*, *Comarum palustre*, *Lemna minor*, *Carex juncella*, *Sphagnum imbricatum*, *Sphagnum palustre*.
Relief - Flat plain situated between low slopes;
Surface - Permanently partially covered with water;
Soil - Gleyed, saturated with water;
Usage - Unknown;
Surrounding habitats - Beech wood.

Comment 1.: This is a quaking mire.
Comment 3.: Weak anthropogenic impact, low level of degradation.

Identification code: 6.32
D2.33 – Bottle sedge (*Carex ro*strata) quaking mires

Location - Mountainous Adjara, Khulo Municipality, surroundings of Danisparauli village, near the Green Lake;
Photo: See the database;
Founding-dominant species - *Carex vesicaria*;
Obligate species - *Carex medwedewii*;
Facultative species - *Sphagnum capillifolium*, *Menyanthes trifoliata*, *Potentilla erecta*, *Carex rostrata*, *Primula auriculata*, *Polytrichum strictum*;
Relief - Depressed;
Surface - Permanently partially covered with water;
Soil - Gleyed, saturated with water;
Usage - Grazing;
Surrounding habitats -Fir-tree woods;

Comment 1.: Very rich in sphagnum - sphagnum carpets.
Comment 2.: Moderate anthropogenic impact, moderate level of degradation.
Comment 3.: This is a quaking bog.

Identification code: 6.30
D2.33 – Bottle sedge (*Carex ro*strata) quaking mires

Location - Mountainous Adjara, river Skhalta gorge;
Photo: See the database;
Founding-dominant species - *Carex rostrata*;
Obligate species - *Nardus stricta*;
Facultative species - *Carum carvi*, *Persicaria hydropiper*, *Primula auriculata*, *Hydrocotyle ramiflora*, *Potentilla erecta*, *Carex disticha*, *Scirpus sylvaticus*, *Alnus glutinosa* subsp. *barbata*;
Relief - Depressed;
Surface - Permanently partially covered with water; may be covered with water seasonally;
Soil - Gleyed, saturated with water;
Usage - Pasture.

Comment: Moderate anthropogenic impact, moderate level of degradation, what is proved by the participation of *Nardus stricta*;

1 - Alazani Basin

Identification code: 1.43
E3 – Seasonally wet and wet grasslands

Location - Tianeti;
Photo: See the database;
Founding-dominant species - *Agrostis vinealis*;
Obligate species - *Inula helenium*;
Facultative species - *Vicia tenuifolia* subsp. *variabilis*, *Dipsacus laciniatus*, *Lythrum salicaria*, *Calamagrostis arundinacea*, *Centaurea sp.*;
Relief - Weakly depressed, with flat surface;
Surface - Not covered with water;
Soil - not saturated with water;
Usage - Hayfield (fenced land parcel under private ownership).

Comment 1.: Habitat formed in the course of terestrialization. This habitat is no more a wetland habitat. This is already a mesophilic grassland, which was created as a result of "drying" of a wetland habitat. A wetland habitat was hear approximately in 1960s. However, the whole territory is located within forest belt, and historically is a former forest. The reasons and conditioning factors of origin of a wetland habitat here are unknown and cannot be established today. Currently this habitat is located between forest derivatives.
Comment 2.: Intensive anthropogenic pressure, high level of degradation.

Identification code: 1.55
E3 – Seasonally wet and wet grasslands

Location - Tianeti Municipality, surroundings of Khevsuretsopeli village;
Photo: See the database;
Founding-dominant species - *Phragmites australis*;
Obligate species - *Lysimachia vulgaris*;
Facultative species - *Lythrum salicaria*, *Arctium lappa*, *Calamagrostis epigejos*, *Vicia tenuifolia* subsp. *variabilis*, *Dipsacus laciniatus*, *Geranium sp.*;
Relief - Weakly depressed;
Surface - Not covered with water;
Soil - Gleyed, not saturated with water; environment not suitable for wetland Haitat,
Usage - Grassland.

Comment 1.: Habitat formed in the course of terestrialization. This habitat is no more a wetland habitat. This is already a mesophilic grassland, which was created as a result of "drying" of a wetland habitat. A wetland habitat was hear approximately in 1960s and is not a wetland habitat since 1980s. There were drainage trenches, which are out of order and the territory is now used as a grassland and not an arable land
Comment 2.: Intensive anthropogenic pressure, high level of degradation.

Identification code: 1.56
AGR-Agricultural

Location - Akhmeta Municipality, surroundings of Babaneuri village;
Photo: See the database;
Usage: Plural melons and fragments of forest.

Identification code: 1.46
D5.11 – Common reed (Phragmites) beds normally without free-standing water

Location - Tianeti Municipality, surroundings of Zurabebi village;
Photo - 5109-5124;
Founding-dominant species - *Phragmites australis*;
Obligate species - *Inula helenium*;
Facultative species - *Lythrum salicaria*;
Relief - Flat plain;
Surface - Permanently partially covered with water; is fully inundated with water seasonally;
Soil - Gleyed, saturated with water;
Usage - Grassland (in places, where water is not standing).

Comment: Heavy anthropogenic impact, high level of degradation.

Identification code: 1.53
E3 – Seasonally wet and wet grasslands

Location - Kakheti, Akhmeta Municipality, Alazani valley, near Alaverdi Lake;
Photo: See the database;
Founding-dominant species - *Daucus carota*;
Obligate species - *Lythrum salicaria*;
Facultative species - *Inula helenium*, *Euonymus europaeus*, *Thymus collinus*, *Phragmites australis*, *Bolboschoenus naritimus*, *Scirpus sylvaticus*, *Rubus sp.*, *Ononis spinosa* subsp. *hircina*;

Relief - Weakly depressed;
Surface - Not covered with water;
Soil - Gleyed, not saturated with water; fed on artesian waters;
Usage - Unknown

Comment 1.: Habitat formed in the course of terestrialization;
Comment 2.: Vegetation - secondary graining - plural grass grassland.
Comment 2.: Moderate anthropogenic impact, moderate level of degradation.

<u>Identification code: 1.52</u>
E3 – Seasonally wet and wet grasslands

Location - Kakheti, Akhmeta Municipality, surroundings of Kistauri village, Alazani valley;
Photo: See the database;
Founding-dominant species - *Inula britanica*;
Obligate species - *Lythrum salicaria*;
Facultative species - *Bolboschoenus maritimus*, *Daucus carota*, *Phragmites austr*alis, Allium sp.;
Relief - Flat plain;
Surface - Not covered with water;
Soil - not gleyed, not saturated with water;
Usage - Unknown

Comment 1.: Habitat formed in the course of terestrialization;
Comment 2.: Vegetation - secondary grassland.
Comment 3.: There are irrigation canals around the territory.
Comment 4.: Moderate anthropogenic impact, moderate level of degradation.

<u>Identification code: 1.54</u>
D5.11 – Common reed (Phragmites) beds normally without free-standing water

Location - Kakheti, Akhmeta Municipality, Alazani valley, between Alaverdi village and Alaverdi Monastery;
Photo: See the database;
Founding-dominant species - *Phragmites australis*;
Obligate species - *Eupatorium cannabinum*;
Facultative species - *Typha angustifolia*, *Calamagrostis arundinacea*, *Daucus carota*, *Lythrum salicaria*;
Relief - Flat plain;
Surface - Not covered with water; may be periodically inundated; is fed on artesian waters;

Soil - Gleyed, saturated with water;
Usage - Unknown;

Comment 1.: Moderate anthropogenic impact, moderate level of degradation.
Comment 2.: Surrounding habitats- Cornfields.

Identification code: 1.22
C3.21- Common reed (Phragmites) beds

Location - Kakheti, Alazani valley, Chiauri, Heretiskari village, territory of hunting husbandry;
Photo: See the database;
Founding-dominant species - *Phragmites australis*;
Obligate species - *Bolboschoenus maritimus*;
Facultative species - *Lythrum salicaria*;
Relief - Flat plain;
Surface - Fully covered with water;
Soil - Gleyed, saturated with water;
Usage - Unknown.

Comment: Weak anthropogenic impact, low level of degradation.

Identification code: 1.41
G1.31 – Mediterranean riparian poplar forests

Location - Kakheti, Alazani valley, Chiauri, surroundings of Heretiskari village, territory of hunting husbandry;
Photo: See the database;
Founding-dominant species - *Salix alba*;
Obligate species - *Alnus glutinosa* subsp. *barbata*, *Rubus sp.*;
Facultative species - *Malus orientalis*, *Fraxinus excelsior*, *Ulmus minor*, *Periploca graeca*, *Crataegus microphylla*, *Phragmites australis*, *Lythrum salicaria*, *Plantago major*;
Relief - Flat plain;
Surface - Not covered with water;
Soil - Alluvial, not saturated with water;
Usage - Cutting.

Comment 1.: This is a forest derivative and not a typical forest. Tree density - 0,2-0,3. Trees are young, rebgenerated both from off-shoots and seeds.
Comment 2.: Intensive anthropogenic impact, high level of degradation.

Identification code: 1.19
G1.31 – Mediterranean riparian poplar forests

Location - Kakheti, Alazani valley, Kvareli Municipality, surroundings of Chikaani village;
Photo: See the database;
Founding-dominant species - *Pterocarya pterocarpa*;
Obligate species - *Populus canescens*, *Alnus glutinosa* subsp. *barbata*;
Facultative species - *Corylus avellana*, *Frangula alnus*, *Cornus sanguinea* subsp. *australis*, *Euonymus europaeus*, *Dryopteris filix-mas*, *Carex divulsa*, *Oplismenus undulatifolius*, *Geum urbanum*, *Polygonum thunbergii*, *Phytolacca americana*, *Festuca sp.*, *Equisetum palustre*, *Urtica dioica*, *Sambucus ebelus*, *Smilax excelsa*, *Periploca graeca*;
Relief - Flat plain;
Surface - Not covered with water;
Soil - Alluvial, not saturated with water;
Usage - cutting.

Comment: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 1.30
C3.241- Arrowhead communities

Location - Kakheti, Alazani valley, Beshten, Lagodekhi Muinicipality, surroundings of Tsitelgori village;
Photo: See the database;
Founding-dominant species - *Sparganium emersum*;
Obligate species - *Bolboschoenus maritimus*;
Facultative species - *Juncus effusus*, *Paspalum distichum*, *Cynodon dactylon*.
Relief - Weakly depressed flat plain;
Surface - Permanently partially covered with water; seasonally is more inundated;
Soil - Not gleyed, saturated with water;
Usage - Unknown

Comment 1.: Territory of former lake, which was drained - the canal was cut and the road was constructed. Despite the foregoing the water still leaks through the canal and inundates the habitat territory.
Comment 2.: Intensive anthropogenic impact, high level of degradation.

Identification code: 1.31
C3.21- Common reed (Phragmites) beds

Location - Kakheti, Alazani valley, Beshten, Lagodekhi Muinicipality, surroundings of Tsitelgori village;
Photo: See the database;
Founding-dominant species - *Phragmites australis*;
Obligate species - *Bolboschoenus maritimus*;
Facultative species - *Solidago virgaurea*;
Relief - Flat plain;
Surface - Permanently partially covered with water; fed on artesian waters;
Soil - Saturated with water;
Usage - Unknown

Comment 1.: Habitat is surrounded by a drainage canal with growing therein *Hydrocharis morsus-ranae*, *Salvinia natans*, *Lythrum salicaria*.
Comment 2.: Moderate anthropogenic impact, moderate level of degradation.

Identification code: 1.1
G1.31 – Mediterranean riparian poplar forests

Location - Kakheti, Alazani valley, Kvareli Municipality, surroundings of Chikaani village;
Photo: See the database;
Founding-dominant species - *Populus canescens*;
Obligate species - *Oplismenus undulatifolius*;
Facultative species - *Carpinus betulus*, *Pterocarya pterocarpa*, *Morus alba*, *Frangula alnus*, *Rubus sp.*, *Smilax excelsa*, *Periploca graeca*, *Equisetum palustre*, *Juncus effusus*, *Sambucus ebulus*, *Solidago virgaurea*, *Mentha aquatica*;
Relief - Flat plain;
Surface - Not covered with water, presumably is seasonally inundated;
Soil - Not gleyed, mottled, not saturated with water;
Usage - cutting;
Surrounding habitats- Arable land.

Comment 1.: Heavy anthropogenic impact, high level of degradation.
Comment 2.: Drained.

Identification code: 1.5
G1.31 – Mediterranean riparian poplar forests

Location - Kakheti, Gurjaani Municipality, Gurjaani Preserve

Photo: See the database;
Founding-dominant species - *Populus canescens*;
Obligate species - *Pterocarya pterocarpa*;
Facultative species-, *Salix alba*, *Acer campestre*, *Cornus sanguinea* subsp. *australis*, *Viburnum opulus*, *Euonymus europaeus*, *Rubus sp.*, *Smilax excelsa*, *Periploca graeca*, *Hedera helix*, *Festuca drymeja*, *Orobus sp.*;
Relief - Flat plain, territory of the river Alazani meander;
Surface - Not covered with water;
Soil - Alluvial, not saturated with water;
Usage - Unknown

Comment 1.: Drained.
Comment 2.: Moderate anthropogenic impact, moderate level of degradation.

<u>Identification code: 1.40</u>
G1.31 – Mediterranean riparian poplar forests

Location - Location - Kakheti, Gurjaani Municipality, Gurjaani Preserve
Photo: See the database;
Founding-dominant species - *Populus canescens*;
Obligate species - *Morus alba*;
Facultative species - *Salix alba*, *Cornus sanguinea* subsp. *australis*, *Viburnum opulus*, *Rubus sp.*, *Smilax excelsa*, *Periploca graeca*, *Hedera helix*, *Phragmites australis*, *Glycyrrhiza glabra*, *Carex vesicaria*;
Relief - Flat plain, territory of the river Alazani meander;
Surface - Not covered with water;
Soil - Alluvial, not saturated with water;
Usage - Unknown.

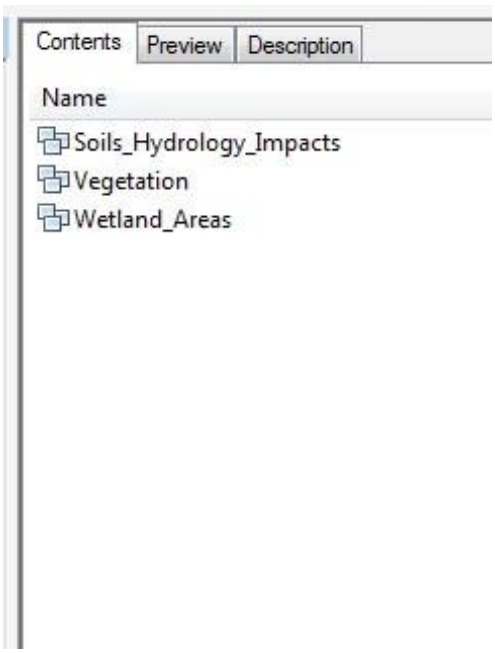
Comment: Moderate anthropogenic impact, moderate level of degradation.

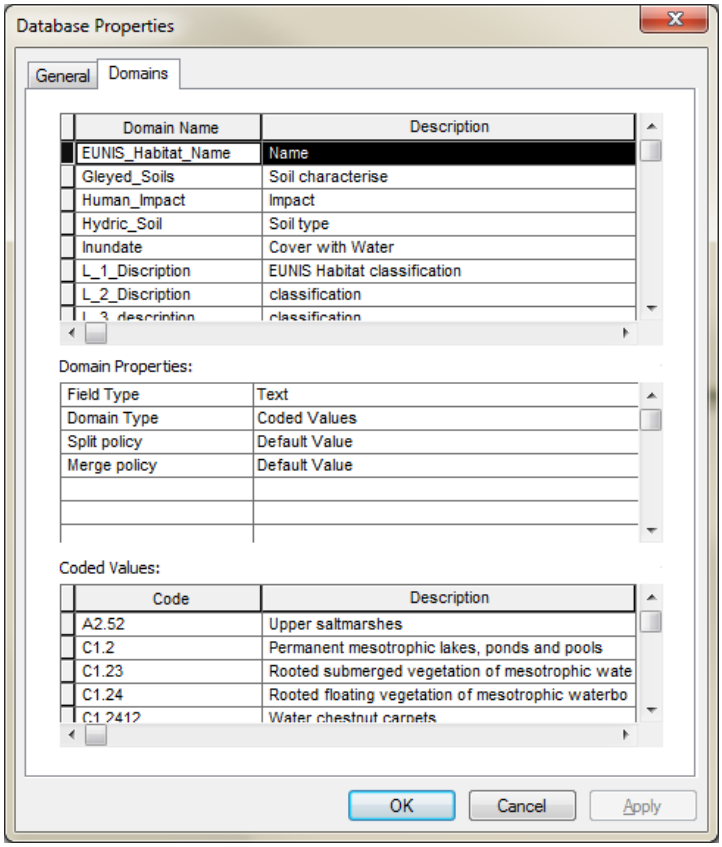
7. Database of Geo-data and Its Structure

The raster data prepared within the framework of the Project were vectored and then, these vectored data were entered into GeoData database. Wetland EUNIS and RAMSAR classification codes were indicated in GeoData attribute table. Apart from wetlands the administrative borders of Georgia, borders of protected areas and layers depicting settlements were also entered into the GeoData database. The codes are described using GeoData database domain, where the meanings of the codes are entered.

GeoData database is accompanied with metadata, which can be viewed via ESRI ArcCatalog or ESRI ArcGIS.

The database is structured according to the following fields:





8. Conclusion

No survey, identification and mapping of wetland habitats of Georgia has been done until now. This situation tuned out to be somewhat problematic for exhaustive presentation of the Project as the work started with almost a clean slate, with no relevant basic data available either. Particularly difficult was the taxonomic survey of wetland vegetation as in certain cases the directories of Georgian flora did not contain the relevant information. It should as well be mentioned that scarcity of reliable academic sources regarding this issue (as compared with phyto-sociological and geobotanical surveys of other ecosystems) is striking. Mentioned should be made of very poor condition of wetlands, as very few of their overall amount are still in pristine condition, most of them are drained, mowed and used as pastures. In East Georgia the wetlands are quite often used as agricultural lands, as private property, what means their cultivation using heavy machinery. Such territories, in fact, already lack their conservation value and water-regulatory functions.

Unfortunately the population sees wetlands as barren, less fertile lands, territories with negative connotation. Similar presumption prevails in the inhabitants of all the parts of Georgia and constitutes one of the main reasons of such poor condition of wetlands. It seems, that this approach is not a historical heritage as in the past the wetlands were often used as water-bearing bodies, a good example of the foregoing being the wetland on Meskhetian terraces, which was well protected and fenced with a stonewall by rural population for centuries.

Despite many complications the unified database of GeoData was created in Georgia, where the data of currently existing wetlands were entered, and the attribute table of this database contain the description of species composition of the territories, their physical condition, impact, etc.

We believe, that the outcomes of the Project will become the basis of the study of wetlands and in general, of conservation activities. The latter will simplify the assessment of problematic places, and cartographic material will enable interested persons to spatially plan the environmental activities. We also hope, that the electronic database and maps will promote the planning and implementation of future researches, as well as the monitoring system.

9. Recommendations

9.1. EUNIS classification

On May 21. 1992 the Council of the European Communities adopted the Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Directive #92/43/EEC). This Directive is called "Habitat Directive" and constitutes the milestone of the EU environmental policy as of to date. The Habitat Directive aims at the protection of biodiversity through conservation of natural habitats and wild species. Furthermore, is also regulates the question of classification of habitats (EUNIS Habitat Classification Revised 2004).

Georgia is not a EU Member state but has certain responsibilities as a signatory to the Association Agreement, amongst them, in the field of conservation and environmental protection. Hence the involvement in the process of EUNIS classification is of paramount importance both from political and environmental points of view.

EUNIS classification is based on the hierarchical system, which, as already mentioned in previous chapters, is streamlined for the European part, while the Caucuses, situated on the verge, is discussed in a less detailed manner. This is proved by Colchis vegetation, which has been developing in a refugial manner for the last ice age within the boundaries of palearchtic region. This factor conditioned the origin of different phyto-sociological units and respectively, their grading according to EUNIS hierarchy turned out to be rather complicated. Based on this and other issues, it would have been reasonable to create additional classes and in certain cases - to conduct additional, more thorough researches. We are of the opinion, that in the very first place the percolation mires of Colchis lowland should be added to hierarchical system. Also it would have been important to study sphagnum bed mires of Colchis highlands (Mountainous Adjara) and foot-hills (Samegrelo), which were not covered by the scope of the Project despite the fact that they are identified and their location* is established.

** Being inaccessible, the relatively pristine wetlands in Georgia are maintained on the territory of Mountainous Adjara.*

9.2. Ramsar Convention, Rare Wetlands

Convention on Wetlands, called Ramsar Convention, is an interstate agreement providing for the basis of national activities for the conservation and reasonable use of wetlands.

The system of wetland classification was developed within the framework of Ramsar Conventions, which we have extended to wetlands mapped out by us. The examples of Ramsar codification can be seen in the database.

During the study of Georgian wetlands particular attention was accorded to the identification of rare wetlands and those of conservation importance. In our opinion, of particular importance in this respect are the wetlands of Mountainous Adjara under intensive participation of sphagnum (Spha*gnum capillifolium, Sphagnum palustre*) and drosera (*Drosera intermedia*). Based on Ramsar criteria, we have mapped out 3 mires.

It should be mentioned, that sphagnum (Spagnum ssp.) and drosera (Drosera ssp.) mires are relic boreal habitats. Their range in the Caucasus is disjunctive and is very far away from basic boreal range. Such mires were recorded on three locations in the Mountainous Adjara (Identification codes: 202, 204, 207). The vegetation cover is dominated by sedge species (*Carex rostrata, Carex disticha, Carex vesicaria*). Participation of *Carex medwedewii* is indicative of all three habitats.

We believe, that the aforementioned mires of Mountainous Adjara meet the 2nd and 3rd criteria of Ramsar B Group.

- Wetland habitats supporting sphagnum and drosera are relic boreal habitats. They have disjunctive range in the Caucasus and are located very far from the basic boreal range. These mires are unique for the region and endangered habitat (ecological communities) and their protection is important for the preservation of the ecological diversity of not only the Mountainous Adjara and Georgia, but also the whole Caucasus as well; it should as well be mentioned, that such mires are mainly localized on Colchis lowland, there are very few of them in the mountainous regions of the Caucasus; the range of these mires in Mountainous Adjara is rather limited and covers only a small area; they are genetically connected with respective habitats of Colchis lowland;

- The mapped out habitats constitute shelters for sphagnum and drosera species, whose areal in the Caucasus is rather small and disjunctive, furthermore, these habitats are vulnerable in the Caucasus. In Mountainous Adjara the aforementioned habitats are separated from their basic range - Colchis lowland;

- It is also worth mentioning, that floristic composition of these habitats in the Mountainous Adjara includes Caucasian-South West Asian species of sedge - *Carex medwedewii.* In our opinion its presence means that sphagnum mires of Mountainous Adjara under drosera participation have characteristic for it structural implications;

- Mapped out mires cover small area; they are included in the range of subalpine woods (alder wood, fir woods) and subalpine grasslands;

- Mapped out mires are subjected to anthropogenic pressure - they are used as pastures; respectively there is a risk that they may disappear as a result of their degradation and succession processes.

A relic mire supporting drosera and sphagnum was recorded in Samegrelo as well, nearby Namikolaevo village, Senaki Municipality (Identification code 115). The vegetation cover is dominated by white beaksedge (*Rhynchospora alba*). Obligate species are *Sphagnum palustre* and *Drosera rotundifolia.* This mire is more or less distanced from the other mires of Colchis lowland, with whuch it is genetically linked in our opinion. We believe, that this mire also meets the 2nd and 3rd criteria of Ramsar B Group:

- Wetland habitats supporting sphagnum and drosera are relict boreal habitats. They have disjunctive range in the Caucasus and are located very far from the basic boreal range. These mires are unique for the region and endangered habitats (ecological communities) and their protection is important for the preservation of the ecological diversity of not only the Mountainous Adjara and Georgia, but also the whole Caucasus as well;

- The mapped out habitats constitute shelters for sphagnum and drosera species, whose range in the Caucasus is rather small and disjunctive, furthermore, they are vulnerable in the Caucasus. In

Mountainous Adjara the aforementioned habitats are rather distanced from their basic range - Colchis lowland;

- Mapped out mires cover small area; the habitat is located near a settlement and is subjected to heavy anthropogenic pressure - is used as a pasture; due to this reason its vegetation cover is degraded and respectively the risk of its disappearance is rather high.

It should as well mentioned, that the aforementioned considerations are of recommendatory nature. Resolution of this problem at the international level requires additional and detailed studies. We consider it necessary to conduct complex researches in the light of both ecology and biodiversity (flora, fauna).

9.3. Monitoring

Unfortunately, most of the wetlands are partially degraded and require protection and rehabilitation. The same goes true with protected area as well, which are subjected to seasonal mowing and sometimes man-inflicted fires. Solution of this problem requires coherent evaluative programs, which would have greatly promoted the management and protection of wetland resources.

Implementation of these programs would have ensured:

- Delineation of permanent boundaries, status (condition) and functions of wetlands;
- Determination of changes in time;
- Establishment of wetland operation trends.

Conventionally, the following 3 levels of wetland monitoring system can be identified:

1. Annual evaluation of wetlands through remote sensing* and GIS-analysis. The check information should be based on inventory-taking or academic data.

   ** Average resolution remote sensing data can be obtained from free servers.*

2. Evaluation of wetlands using relatively simple and quick methods**. "Quick evaluation" should be done according to simple field protocols.

   *** "Quick evaluation" can be delegated upon the rangers of protected areas or students, within the framework of educational programs.*

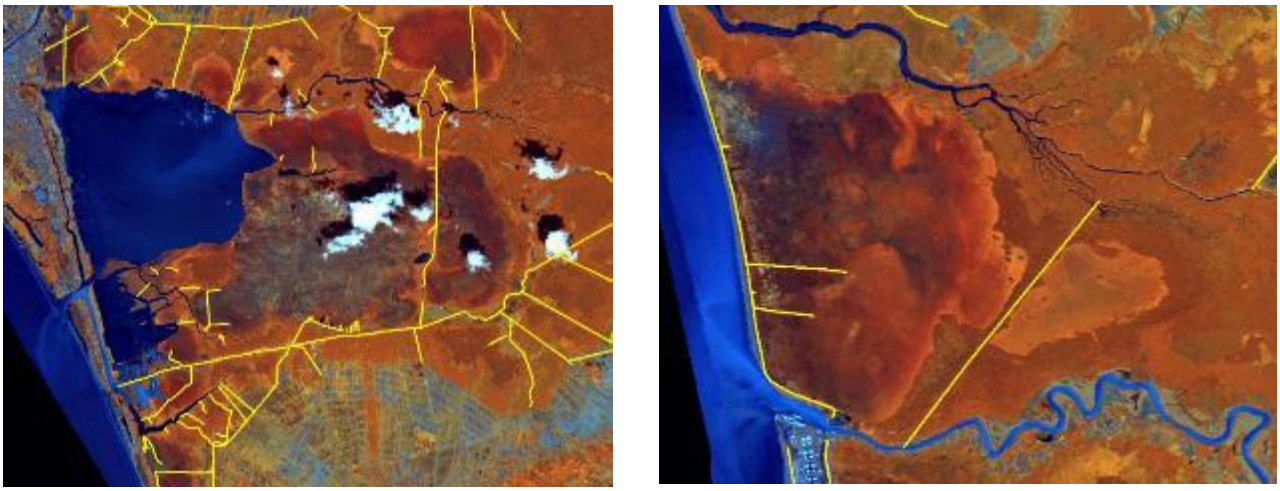
3. Intensive site evaluation method, which is based on multi-metric indices***, i.e. the evaluation should be done on the basis of hydrological, geomorphological, biological and meteorological factors and should describe the mechanism of operation of the research

territory. See: Wetland and Deepwater Habitat Delineation and Characterization Guideline

**** Multi-metric evaluations are based on multiparameter surveys and should be conducted only on important wetlands (Ramsar sites) and under the assistance of the universities or research organizations.*

9.4. Wetland Rehabilitation

In 1950-60s and later the state carried out wetland draining works, the freed lands were then allocated to agricultural land fund. However, very often the attainment of this goal deemed impossible due to bad engineering planning and fulfillment. Fortunately, these territories managed to maintain the indicative of wetlands hydrological regime, but their ecosystem was fully degraded, meaning the invasion of facultative for mire species into plant communities. In most locations the structure of plant communities has also changed, hydrophilic species were substituted by more competitive species, etc.



Pic.9 Drainage canals around Imnati and Churia mire (RapidEye 2014)

Structural changes of vegetation are still traceable in the mires of Colchis National Park, which changes were conditioned by water outflow through drainage canals, hence, in our opinion, it would have been reasonable to partition some canals off, what is a well-probed and cheap method of mire rehabilitation in the world. It should be mentioned that partitioning of certain drainage canals off will not result in the inundation of agricultural lands and will affect only specific mires. The following mires can be mentioned as an example:

1. Percolation bog near Grigoleti;
2. Churia bog;
3. Part of Imnati percolation bog.

Pic.10 Rehabilitation of the hydrological regime of a raised bog through partitioning off the drainage canals. Blowhorn reserve, Central Scotland

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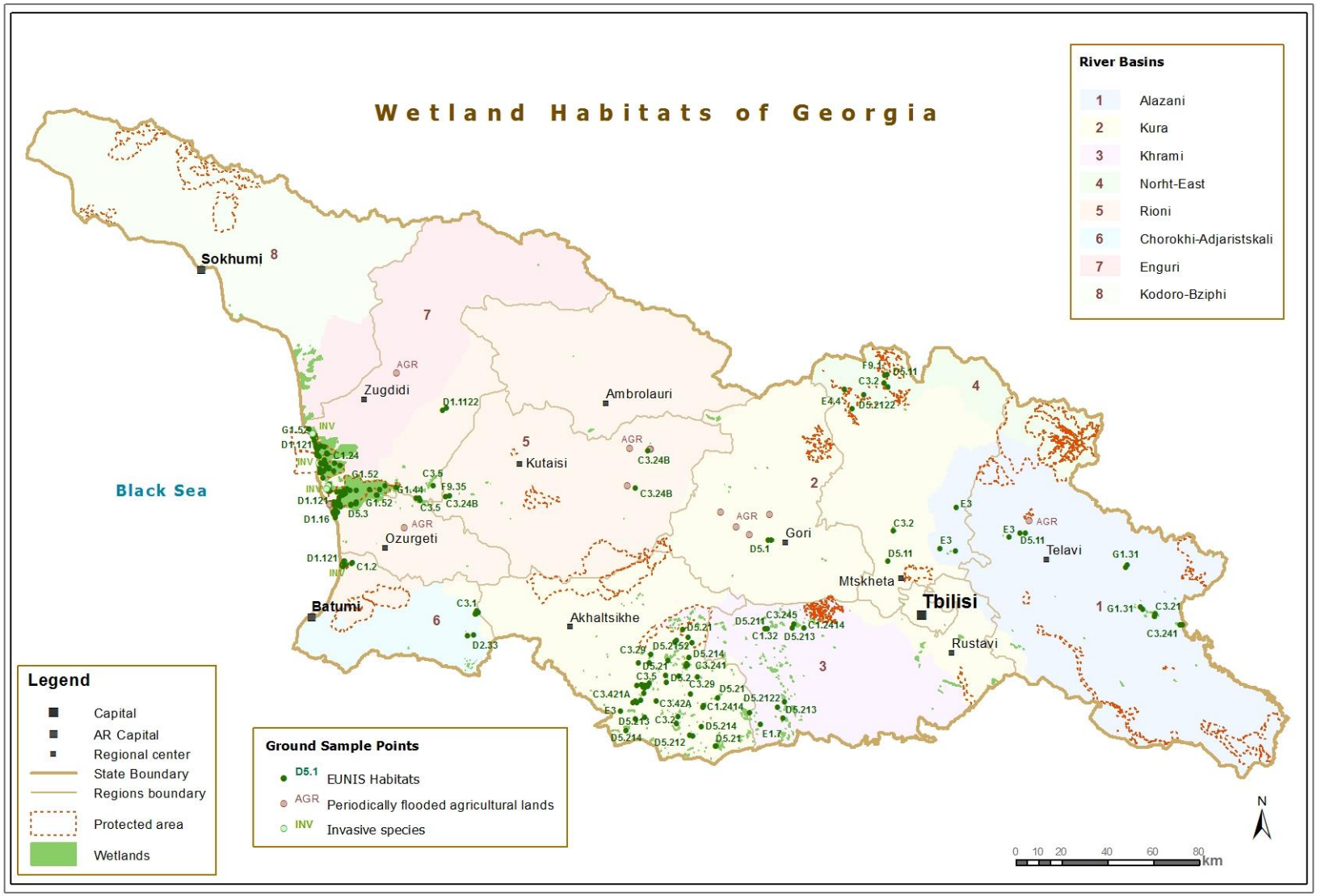
References

1. გაგნიძე, რ. (2000): საქართველოს ფლორის მრავალფეროვნება. - რედ: ნ. ბერუჩაშვილი, ა. კუშლინი, ნ. ზაზანაშვილი. კრებული: საქართველოს ბიოლოგიური და ლანდშაფტური მრავალფეროვნება. გვ.21-32. - ბუნების დაცვის მსოფლიო ფონდის საქართველოს ოფისის გამოცემა. თბილისი.
2. კეცხოველი, ნ. 1935. საქართველოს მცენარეულობის ტიპები. მეცნიერება. თბილისი.
3. კეცხოველი, ნ., ხარაძე, ა., გაგნიძე, რ. (რედ.). 1971-2007. საქართველოს ფლორა. ტ. I-XV. მეცნიერება. თბილისი.
4. კეცხოველი, ნ., ხარაძე, ა., ქუთათელაძე, შ. (რედ.). 1964-1969. საქართველოს მცენარეების სარკვევი. ტ. I- II. მეცნიერება. თბილისი.
5. მარგალიტაძე, ნ., გაგნიძე, რ., ქიმერიძე, კ., ამანი, ბ., პოკორნი., ჭელიძე, დ. 2015. ზემო სვანეთის ჰოლოცენური მცენარეულობის ისტორია.
6. მაჭუტაძე, ი., 2009. სამხრეთ *Colchisს (აჭარის) დაბლობის ეკოსისტემათა ბიომრავალფეროვნება.* აჭარის (სამხრეთ Colchisს) ბიოლოგიური მრავალფეროვნება. „შოთა რუსთაველის სახელმწიფო უნივერსიტეტი“. ბათუმი. გვ. 139-147.
7. სახოკია, მ. (1983): ხევის სათიბ-საძოვრების აგრობოტანიკური მიმოხილვა და გაუმჯობესების ღონისზიებანი.- მეცნიერება. თბილისი. გვ. 118.
8. სვანიძე, ე. 2016. ”Khazbegiრეგიონის ჰიდროფილური მცენარეულობა: მრავალფეროვნება და ეკოლოგიური ანალიზი“. სამაგისტრო ნაშრომი. ილიას სახელმწიფო უნივერსიტეტი. თბილისი.
9. ქიმერიძე, კ., 1981. საქართველოს ჭაობის მცენარეულობის ერთი ფორმაციის განსაზღვრისათვის. მეცნიერება. თბილისი. გვ. 88.
10. ქიმერიძე, კ., 1985. ალპური ისლიანი ჭაობების შესწავლისათვის კავკასიონზე. მეცნიერება. ბოტანიკის ინსტიტუტი. კრებული: ბიოეკოლოგია და ფიტოცენოლოგია. თბილისი. გვ. 48-76
11. ქიქოძე, დ., მემიაძე, ნ., ხარაზიშვილი, დ., მანველიძე, ზ., მიულერ-შერერი, ჰ. 2009. საქართველოს არაადგილობრივი ფლორა. გვ. 36.
12. შეთეკაური, შ., ჭელიძე, დ. 2016. მესხეთ-Javakhetiს მაღალი მთის ფლორა (მცირე კავკასიონი). გამომცემლობა „საარი“. თბილისი. გვ. 512.
13. ხარაზიშვილი, დ., 2009. *მავშეთის ქედის მაღალი მთის ფლორისა და მცენარეულობის ბიომრავალფეროვნება.* აჭარის (სამხრეთ Colchisს) ბიოლოგიური მრავალფეროვნება. „შოთა რუსთაველის სახელმწიფო უნივერსიტეტი“. ბათუმი. გვ. 162-165.

14. Botanical survey of south Georgian wetlands. 2008. BTC/SCP Pipeline Project, Georgia This report is prepared by Dzelkva Ltd.
15. De Klerk, P., Haberl, A., Kaffke, A. Krebs, M., Matchutadze, I., Minke, M., Schulz, J. & Joosten, H. (2009): Vegetation history and environmental development since ca 6000 cal yr BP in and around Ispani 2 (Colchis lowlands, Georgia). Quaternary Science Reviews 28: 890–910.
16. Gagnidze, R. (2005) : Vascular Plants of Georgia – A Nomenclatural Checklist. – Georgian Academy of Sciences, N. Ketskhoveli Institute of Botany, I. Javakhishvili Tbilisi State University, Department of Botany, Tbilisi. 248 pp.
17. Jäger, J., Müller, F., Ritz, M., Welk, E., Wesche, K, 2013. Exkursionsflora von Deutschland. Springer.
18. Joosten, H., Kaffke, A. & I. Matchutadze, 2003. The mires of the Colchis lowlands {Georgia). IMCG Newsletter 2003/3. pp. 19 - 23
19. Kahrmann, M. & A. Haberl, 2005. Lmnati ein Regendurchstromungsmire Mirekundliche Untersuchungen in der Kolchis {Georgian). MSc thesis. Greifswald University. 101 p.
20. Krebs, M., Klerk, P., Matchutadze, I., Joosten., H., 2009. A future for Ispani 2 (Colchis, Georgia) and adjacent lands. International Mire Conservation Group Newsletter 2009/2: 3-14.
21. Kaffke, Andreas, 2008. Vegetation and site conditions of a Sphagnum percolation bog in the Colchis Lowlands (Georgia, Transcaucasia)
22. Matchutadze1, I., Bakuradze, T., Tcheishvili, T., Bolkvadze, B. 2015. Vegetation of Colchis Mires. Earth Sciences. 4(5-1): 73-78.
23. Nakhutsrishvili, G. 2013. The Vegetation of Georgia (South Caucasus). Springer.
24. Sakhokia, M. & Khutsishvili, E. (1975): Conspectus florae plantarum vascularium Chewii. – Metsniereba, Tbilisi. 204 pp.
25. Solomon et al., 2013 Red List of the Endemic Plants of the Caucasus
26. The Plantlist, 2017. The Plantlist. URL: http://www.theplantlist.org/
27. Долуханов, А., 1980. Колхидский подлесок. " Мецниереба". Тбилиси. С. 260.
28. Долуханов, А., 2010. Лесная растительность Грузии. Издательство "Универсал". Тбилиси.
29. Яброва-Колаковская, В., Шенгелия, Е. 1978.Сорные растения Абхазии. " Мецниереба". Тбилиси. С. 99.
30. Тахтаджяна, А. (Ред.). 1954-2009. Флора Армении. Том I-XI. Ереван.

Maps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1 Alazani
2 Kura
3 Khrami
4 Norht-East
5 Rioni
6 Chorokhi-Adjaristskali
7 Enguri
8 Kodoro-Bziphi
Sokhumi
Zugdidi
Ambrolauri
Kutaisi
Ozurgeti
Batumi
Akhaltsikhe
Gori
Telavi
Mtskheta
Tbilisi
Rustavi
Black Sea
Legend
Capital
AR Capital
Regional center
State Boundary
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Protected area
Wetlands
Ground Sample Points
EUNIS Habitats
Periodically flooded agricultural lands
Invasive species
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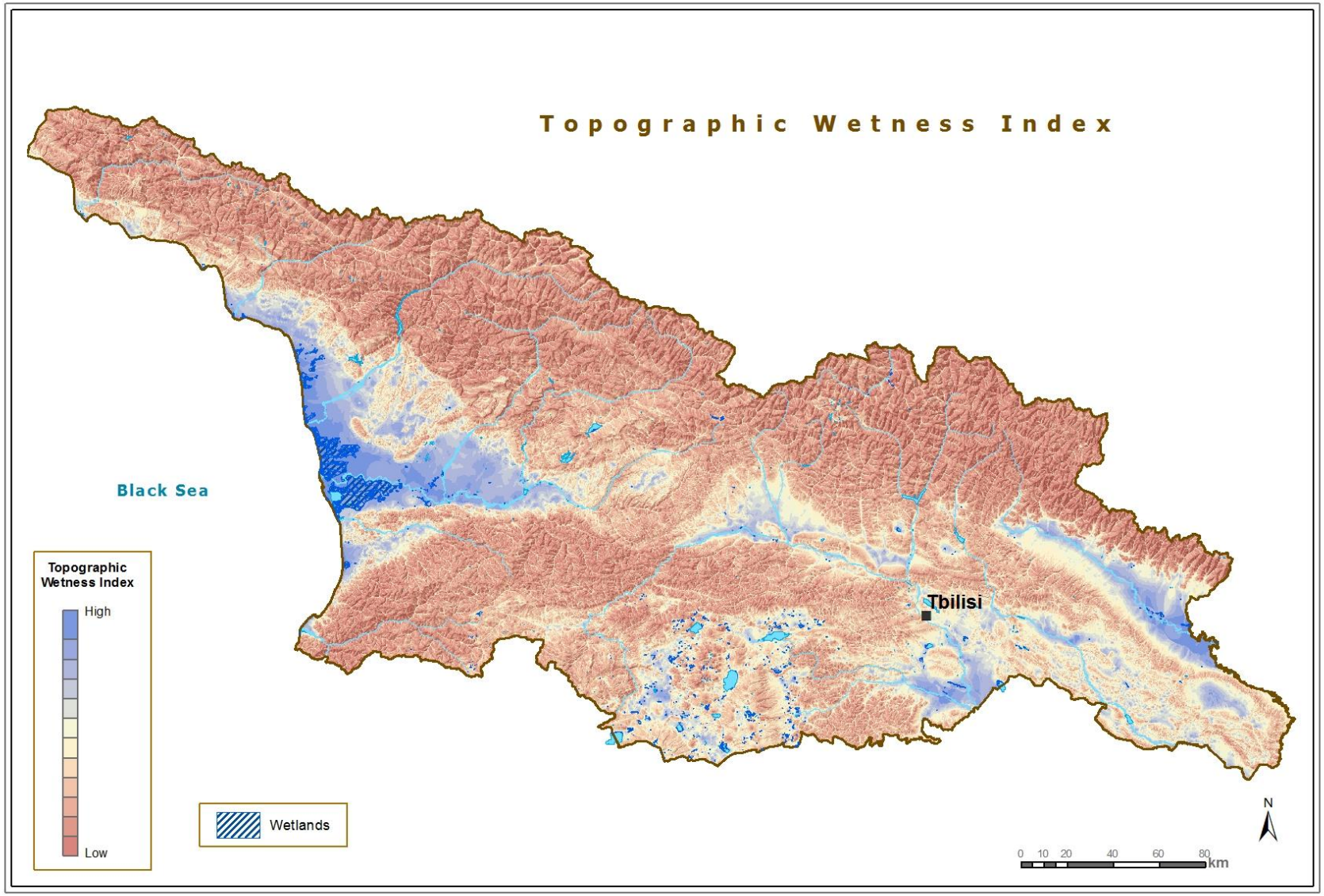
Topographic Wetness Index
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