Technical report No 38

The revised and supplemented Corine land cover nomenclature

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1 Introduction

During more than 10 years of inventory of the CORINE land cover (CLC) classes an enormous experience has been built up with regard to the visual interpretation of the Landsat and SPOT satellite images. It has been found out that for most classes the initial definition could be refined, in order to exclude potential confusions, however without changing the core content of the class definition.

In the sense of the Technical Guide (Heymann et al. 1994) the CLC classes are defined in such a way as to comprise land cover of Europe at scale 1:100 000 with all its particularities. Perfect knowledge of the CLC database requires inclusion of all particularities - features of land cover of individual countries generalised in the uniform European CLC nomenclature.

Particularities for our purposes mean specific physiognomic and morphostructural features of landscape objects which can change and do change in various geographic settings (conditions) and with use of characteristics of the CLC classes allow for inclusion of the objects in question into one of 44 classes of uniform European CLC nomenclature.

Therefore, in this addendum, the CLC classes are reviewed and whenever relevant following clarifications were added:

- refinement – extension of the definitions,
- characteristics of the class contents
- generalised patterns
- representative – typical of class photographs,
- characteristics of class particularities (occurring in the Phare countries)

2 Land cover

New techniques of data obtaining and processing contributed to objectivisation of the available knowledge of landscape. For instance, analysis of aerial images represents a distinct progress in general and comprehensive recognition of landscape, while it also makes possible to conceive the subject of landscape ecology as an integrated study of landscape. Perception of a part of Earth's surface, if possible from an ideal distance (time-spatial dimension), offers more efficient cognition in the light of spatial coherence and thus also objectivisation of its "record".

Remote sensing methods make possible to perceive the visible layer of the material contents of landscape, which we identify by means of physiognomic and morphostructural features as landscape cover. Simultaneously the physiognomic aspect of objects often indicates their material contents or function.

Identification of land cover, objects of physiognomic essence of contemporary landscape is then the primary salient point of its knowing. Land cover represents the materialised projection of natural spatial assets (morphopositional and bioenergetic assets) in combination with current use of recreated (cultivated objects) on the one side and of created (artificial objects) landscape on the other. Interpretation schemes and land cover maps became a suitable basis for further analyses of spatial cognition, decision-making and planning in landscape. Data on land cover are often linked to the ones on land use and vice versa. In regional dimension cognition of land cover is close to basic categories of land use. Morphostructural and physiognomic properties of land use usually correspond also to basic functional features and indicate also spatial organisation of cultural landscape. The difference between the quoted data is explained by Fig. 1. Study area is represented in land cover map, as well as in land use map. The map of land cover presents Earth surface objects by means of the physiognomic attributes, land use map does it by means of functional attributes.

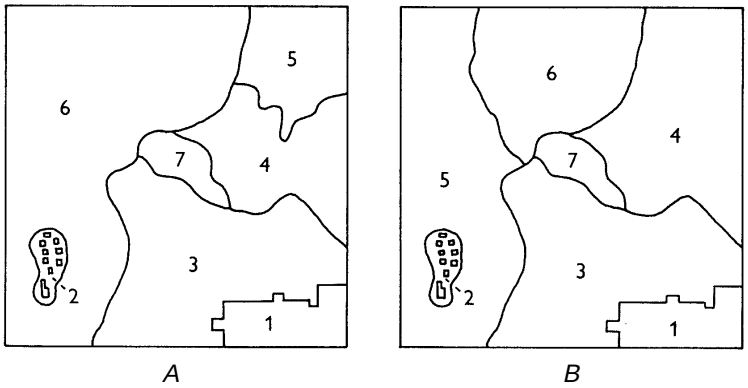


Fig. 1 Samples of land cover and land use mapping of identical territory (Feranec et al. 1996).
A- Land cover: 1 - built up compound, 2 - built up area of scattered buildings, 3 - soil without vegetation, 4 - grassland, 5 - grassland with scattered trees and shrubs, 6 - coniferous forest, 7 - water bodies,
B- Land use: 1 compound of agricultural buildings, 2 - leisure area, 3 - arable land without vegetation, 4 - pasture, 5- coniferous forest with protecting function relevant for water management 6 - nature reserve, 7 - pond.

3 Methodology used for compilation of addendum

Visual interpretation is a method of identification and assessment or characterisation of objects recorded in aerial or satellite images. This method was applied also while creating the CLC database. It is based on analysis of interpretation elements, of the recorded landscape objects.

Further itemisation or up dating of CLC database will mean emphasis on analysis of the relation **"landscape object - its manifestation in satellite image"**. Analysis of this relation assumes a perfect knowing of landscape objects, namely their characteristics, which decisively influence reflexivity and emission capability of electromagnetic radiation. However, stress must be laid also on analysis of interpretation elements, by means of which the objects are represented in images. As far as the descriptions of the land cover and its particularities are concerned, the following part of the addendum contains graphic and verbal presentation of a sum of objects and the characteristics which are part of the CLC classes at scale 1:100 000 from the viewpoint of characterised land cover. This crucial part of the addendum was compiled based on image documentation and commentaries prepared by experts dealing with the issue of land cover from the European Topic Centre on Land Cover (ETC/LC) and Phare Topic Link on Land Cover (PTL/LC). Every land cover class is characterised by its definition in the sense of Heymann et al. (1994) and its refinement – extension if it was necessary, a list of dominating objects comprised in a particular class, typical arrangement of the objects by means of a pattern (Fig. 3) containing the dominating textures (Fig. 2), a representative photograph, list of particularities (if they exist), and their samples in photographs. The set of the quoted characteristics of CLC nomenclature can facilitate comprehension of single classes and their national particularities, resulting in broader possibilities of application of the CLC database, and it will help the interpreters in image analysis, making use of interpretation elements texture and pattern. Simultaneously it will contribute to further knowing of the landscape types of Europe, above all their physiognomical and spatial features.

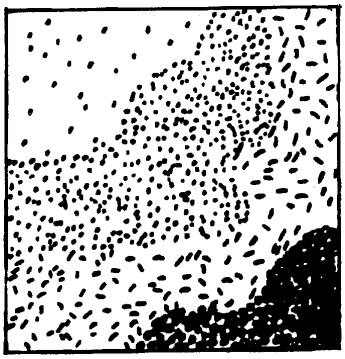


Fig. 2 Texture - is the area variability in the tone arrangement in the satellite images, representing objects or groups of Earth's surface objects that are too small to be discerned as individual features; the same objects are represented in satellite images of the same type and scale by the same pattern of tones, e.g. very small stripes, circles, points, etc. (Feranec et al. 1995).

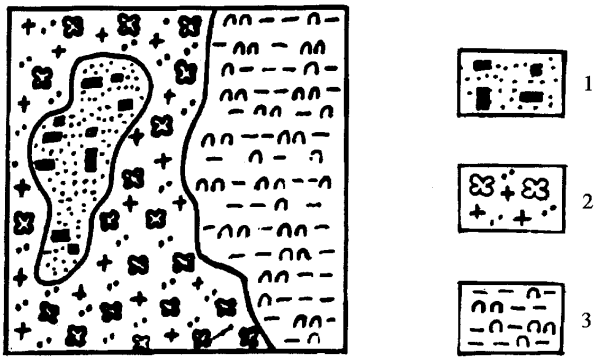


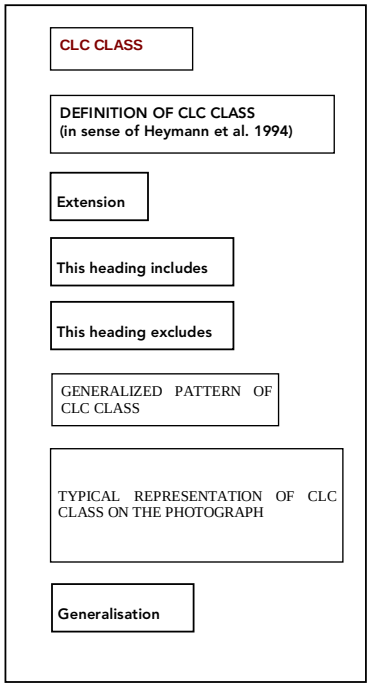
Fig. 3 Pattern - is spatial arrangement of objects represented in the satellite images by different textures (Feranec et al. 1995).

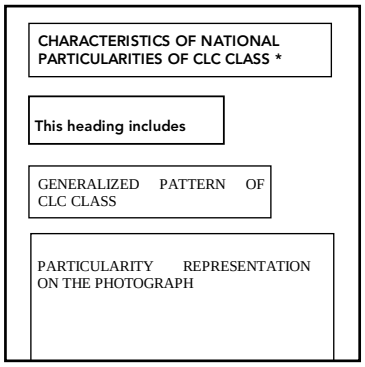
Fig. 4 Pattern types. Interpreted land cover - is determined by the significant appearance characteristics of landscape objects, manifesting themselves in the satellite images by means of the typical patterns (acceptably homogeneous) e.g. 1, 2, 3, which are formed at least by two textures (Feranec et al. 1995).

4 The supplemented characteristics of the CORINE Land Cover classes

Essential purpose of this part of the addendum is to provide detailed characteristics of the contents of CLC classes.

Each class and its particularity is characterised and illustrated as follows:





When definition, contents and delimitation of the CLC classes are evident, characteristics – *extension* , *this heading excludes* and *generalisation* are not quoted.

* These characteristics are representative mainly for the Phare countries.

4.1 Artificial areas

Class 1.1 Urban fabric
Areas mainly occupied by dwellings and buildings used by administrative/public utilities or collectivities, including their connected areas (associated lands, approach road network, parking-lots).

Class 1.2 Industrial, commercial and transport units
Areas mainly occupied by industrial activities of transformation and manufacturing, trade, financial activities and services, transport infrastructures for road traffic and rail networks, airport installations, river and sea port installations, including their associated lands and access infrastructures. Includes industrial livestock rearing facilities.

Class 1.3 Mine, dump and construction sites
Artificial areas mainly occupied by extractive activities, construction sites, man-made waste dump sites and their associated lands.

Class 1.4 Artificial non-agricultural vegetated areas
Areas voluntarily created for recreational use. Includes green or recreational and leisure urban parks, sport and leisure facilities.

Specifications
In case of cultivated areas inter-mixed with built-up areas within a patchwork system, the minimum threshold to be considered to classify in discontinuous urban fabric is 30 % (at least 30 % of the small parcels are urban fabric). Otherwise the area should be classified as complex cultivation patterns.

The figures below illustrate different urban fabric density, which can be used as a template for distinguishing:

- agricultural areas with scattered houses and discontinuous urban fabric,
- discontinuous and continuous urban fabric.

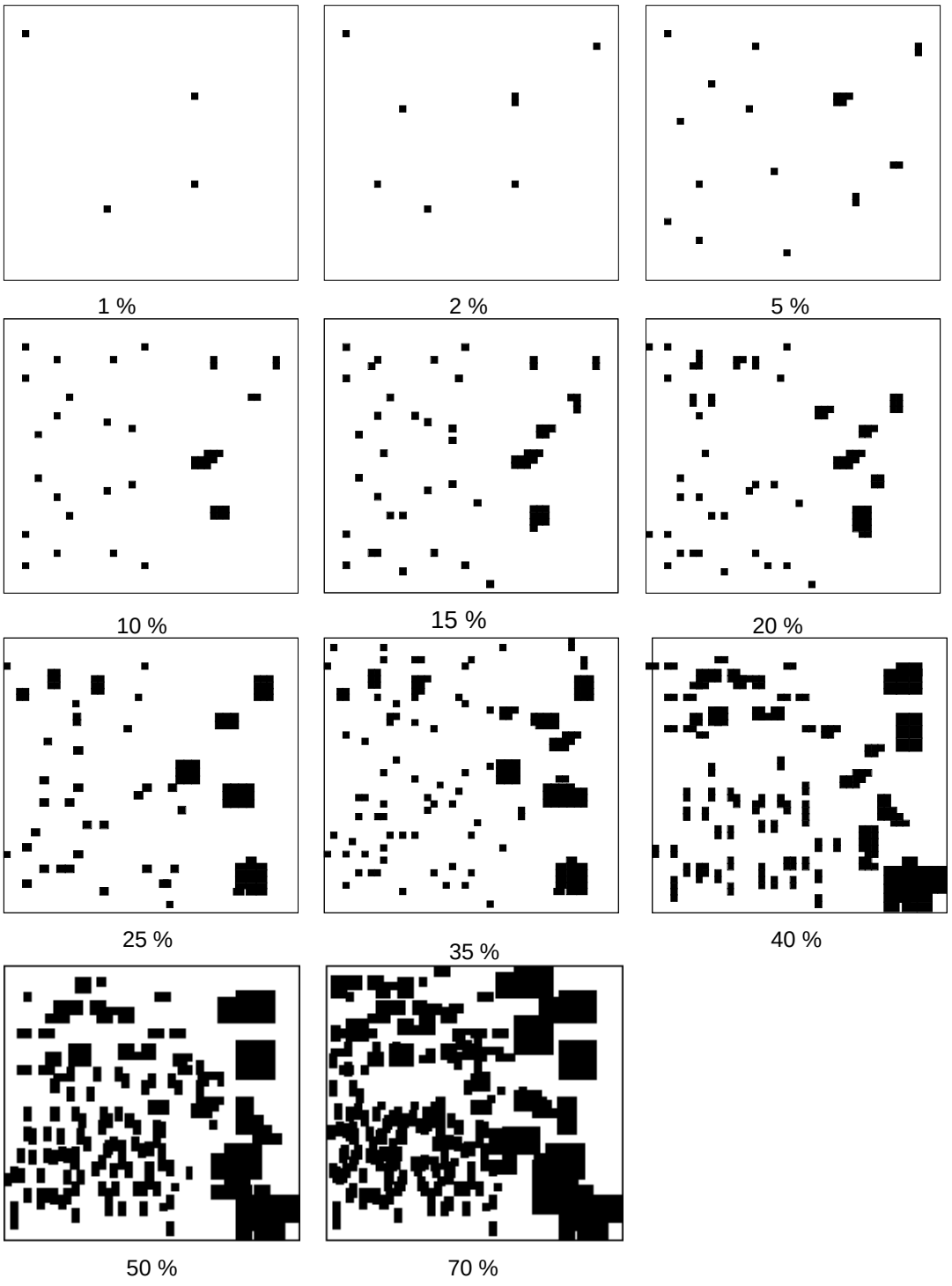


Fig. 5 Illustration of different urban fabric density

111 Continuous urban fabric

Most of the land is covered by structures and the transport network. Building, roads and artificially surfaced areas cover more than 80% of the total surface. Non-linear areas of vegetation and bare soil are exceptional.

Extension:
80 % of the total surface at least should be impermeable.

The continuous urban fabric class is assigned when the urban structures and transport network (i.e. impermeable surfaces) occupies more than 80 % of the surface area. This coverage percentage pertains to real ground surface. Therefore, localisation of this cut-off-point requires particular attention to avoid confusion with the apparent vegetation (i.e. visible tree crowns) and permeable surfaces under trees. For example, in the streets bordered with trees, the real ground surface under the trees is mostly covered with asphalt or concrete. So, the vegetation percentage has to be estimated taking into account the shape structure and context visible on the satellite image. In particular, vegetation impact has to be underestimated in case of linear structure of vegetation.

This heading includes:

- urban centre types and dense ancient suburbs where buildings form a continuous and homogeneous fabric,
- public services or local governments and commercial/industrial activities with their connected areas inside continuous urban fabric when their surface is less than 25 ha,
- interstices of mineral areas,
- parking lots, concrete or asphalt surfaces,
- transport network,
- small squares, pedestrian zones, yards,
- urban greenery (parks and grass areas) amounting to 20 % of the polygon area,
- unvegetated and vegetated cemeteries less than 25 ha located inside continuous urban fabric.

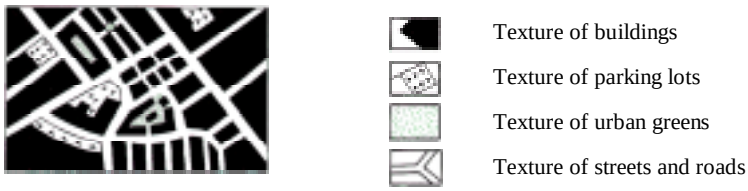
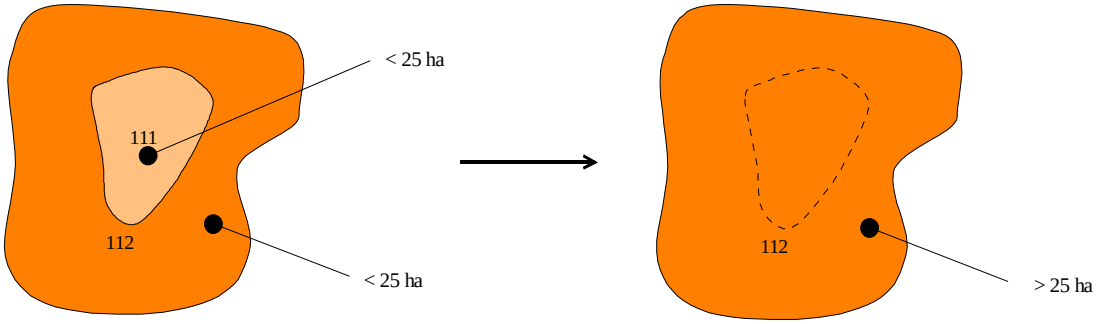


Fig. 6 A generalised pattern of the class 111

Fig. 7 Representative demonstration of the quoted class on examples of Bratislava (Slovakia) and Athens (Greece)

Generalisation:

- If two adjacent polygons of discontinuous and continuous urban fabric, each of them less than 25 ha, but in total > 25 ha, are connected to each other, they should be mapped as one polygon, and discontinuous urban fabric is privileged.



No particularity was identified in this class.

112 Discontinuous urban fabric

Most of the land is covered by structures. Building, roads and artificially surfaced areas associated with vegetated areas and bare soil, which occupy discontinuous but significant surfaces.

Extension:
Between 30 to 80 % of the total surface should be impermeable.

The discrimination between continuous and discontinuous urban fabric is set from the presence of vegetation visible in the satellite image illustrating either single houses with gardens or scattered apartment blocks with green areas between them.

The density of houses is the main criteria to attribute a land cover class to the built-up areas or to the agricultural area (242). In case of patchwork of small agricultural parcels and scattered houses, the cut-off-point to be applied for discontinuous urban fabric is 30 % at least of urban fabric within the patchwork area.

This heading includes:
- private housing estates, residential suburbs made of individual houses with private gardens and/or small squares,
- scattered blocks of residential flats, hamlets, small villages where numerous unmineralised interstitial spaces (gardens, lawns) can be distinguished,
- large blocks of flats where green spaces, parking areas and adventure playgrounds cover significant surface area,
- transport network,
- sport area smaller than 25 ha included within discontinuous urban fabric,
- buildings with educational, health care and production functions and market places smaller than 25 ha included within this class,
- unvegetated and vegetated cemeteries smaller than 25 ha included within discontinuous urban fabric,
- public utilities/communities surfaced areas less than 25 ha,
- holiday cottage houses are included in 112 if infrastructures like houses, road network are visible in the satellite image; they must also be connected to built-up areas,
- troglodyte villages along streets and subterranean housings visible from the satellite image.

This heading excludes:
- holiday cottage areas, which are only used for recreational purposes and defined as a specific unit in the satellite image should be classified as 142,
- installations structured with a view to summer settlement with bungalows and a specific organisation (road, facilities) which must be classified as 142,
- scattered main and secondary residences implanted in natural or agricultural areas when their coverage is less than 30 % of the total surface; they are classified as 242 or 243,
- greenhouses; they are classified as 211.

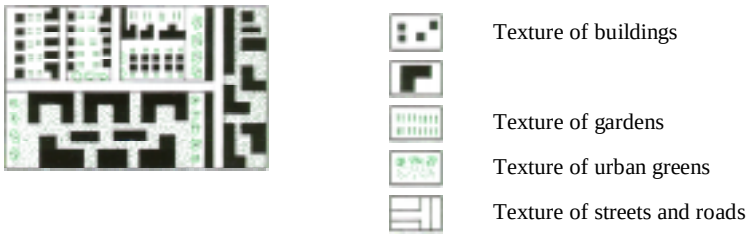
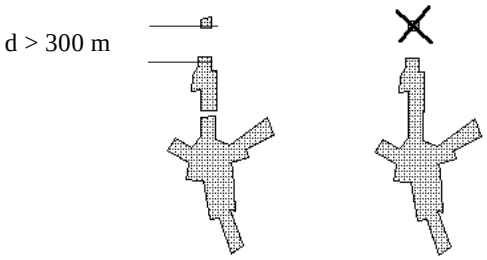


Fig. 8 A generalised pattern of the class 112

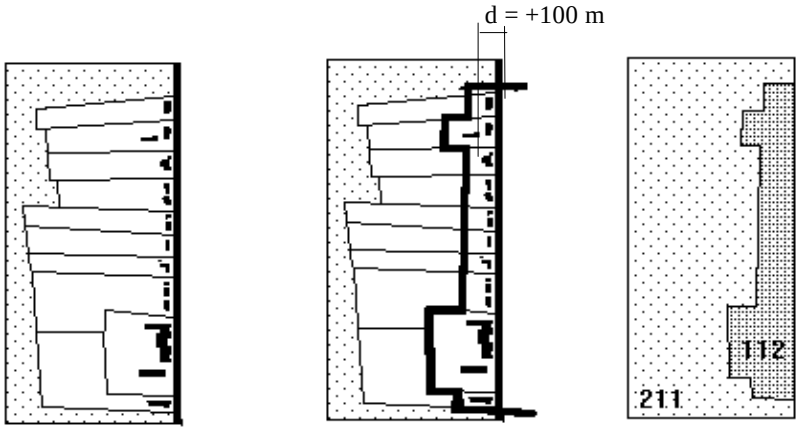
Fig. 9 Representative demonstration of the quoted class on example of village Liskova (Slovakia).

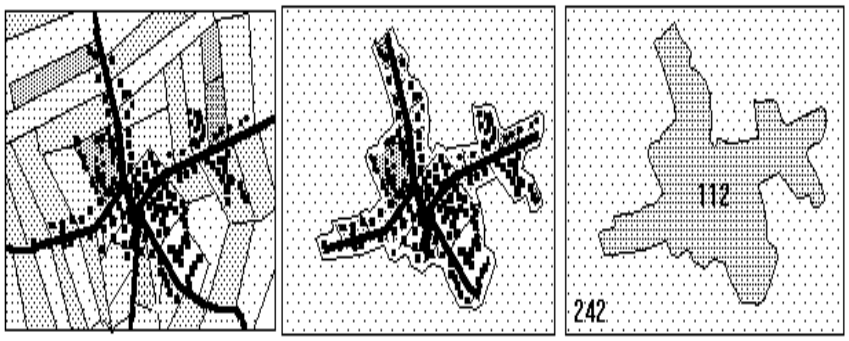
Generalisation:

- Generalisation of discontinuous built-up areas located along roads: until 300 m to maintain land cover feature of street villages.

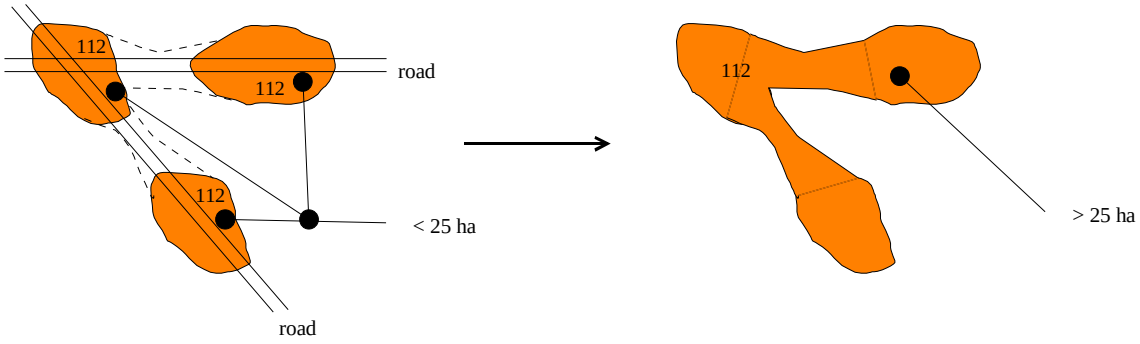


- For housing with large gardens, an arbitrary 100 m – buffer is added around the houses and infrastructure to delimit the artificialised surfaces from the surrounding area (often agricultural area).

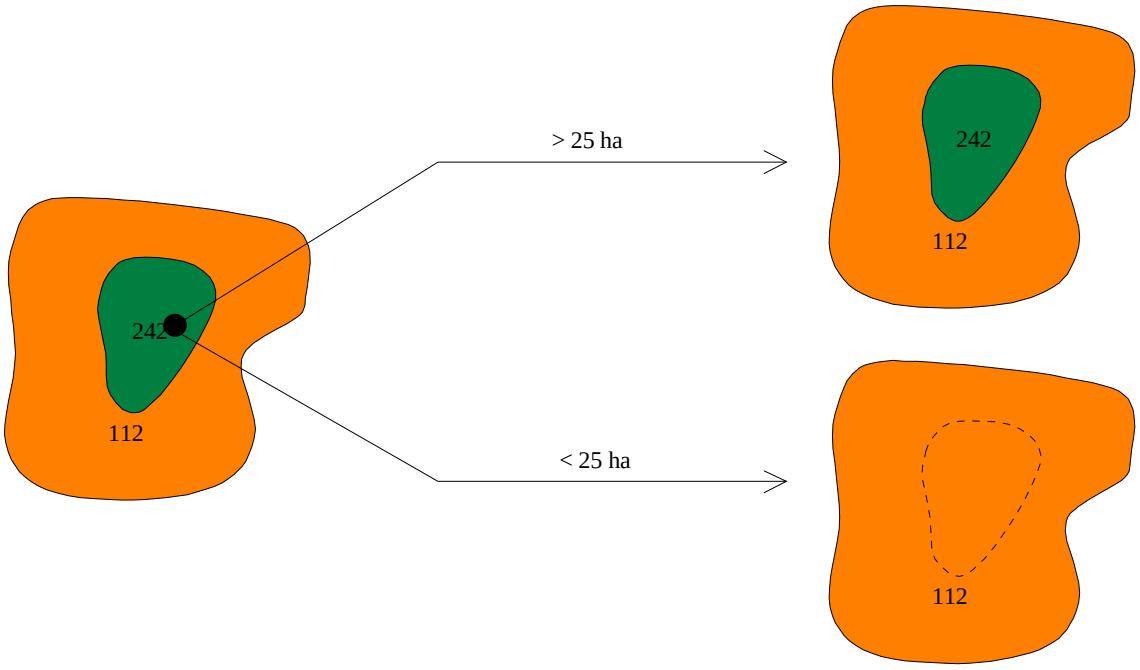




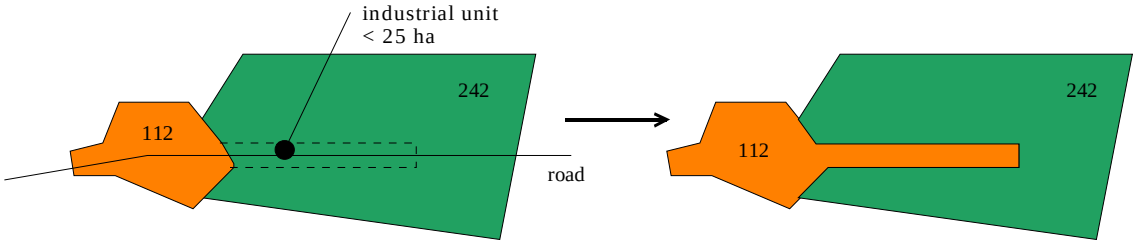
- Small discontinuous urban fabric areas less than 25 ha are grouped together if the distance between each of them is less than 300 m in order to reach 25 ha. The exterior contour line leans on road network.



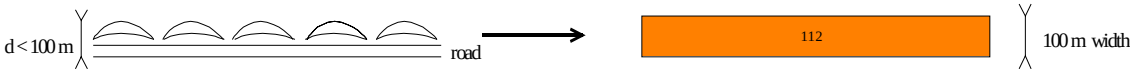
- In case of free space surrounded by discontinuous urban fabric, the free space zone is assigned 242 if its surface is more than 25 ha. On the contrary, it should be included in discontinuous urban fabric.



- Extension of villages (112) with mixed fabric of settlement/industrial and commercial activities along the roads need to be added in 112.



- Troglodyte villages along roads, with length over 2.500 m, are mapped as linear urban construction by artificially delimiting a 100 m – linear buffer zone including the road from the house frontage.



No particularity was identified in this class.

Particularity of class 112: Housing estates

Areas of multiflat or multistoreyed houses forming built-up areas particularly at the outskirts of urban settlements typical for their physiognomic uniformity. Observable in substantial part of the European towns and cities.

This heading includes:

- multiflat-multistoreyed houses,
- squares, streets,
- transport network,
- parking lots,
- vegetation within housing estates (lawns, flower beds, shrub and tree formations).

Fig. 10 A generalised pattern of the particularity of class 112

Fig. 11 Representative of the quoted class particularity on example of housing estates of Petrzalka - Bratislava (Slovakia)

121 Industrial or commercial units

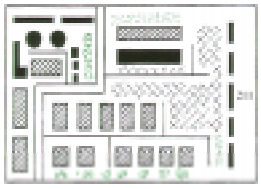
Artificially surfaced areas (with concrete, asphalt, tarmacadam, or stabilised, e.g. beaten earth) without vegetation occupy most of the area, which also contains buildings and/or vegetation.

This heading includes:

- research and development establishments,
- security and law and order services (fire stations, penal establishments),
- company benefit schemes (old people's home, convalescent homes, orphanages, etc.),
- stud farms, agricultural facilities (co-operatives, state farm centres, livestock farms, living and exploitation buildings),
- exposition sites, fair sites,
- nuclear power plants, military barracks, testing pistes, test fields, biological waste water treatment plants, water houses, transformers,
- large shopping and exposition centres,
- hospitals, spas,
- universities, schools,
- parking lots,
- abandoned industrial sites and by-products of industrial activities where buildings are still present,
- water retention dam and hydroelectric dam in total >25 ha,
- telecommunication networks (relay stations for T.V., telescopes, radar stations).

This heading excludes:

- extractive industry (class 131),
- oil terminals inside port activities (class 123),
- dumps, decanting basin structures (class 132),
- dockyards (class 123),
- merchant departments belonging to private or public services (class 11x),
- places of worship: convents, monasteries, etc. (class 142).



Textures of industrial and commercial buildings

Texture of storing area and parking lots

Texture of roads

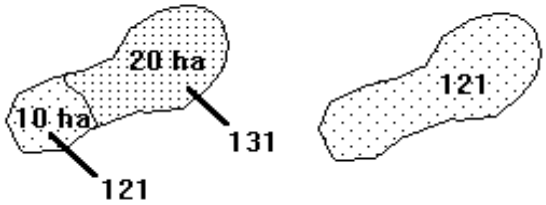
Texture of urban greens

Fig. 12 A generalised pattern of the class 121

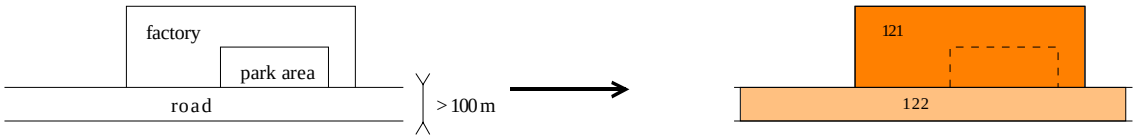
Fig. 13 Representative demonstration of the quoted class on examples of aluminium factory in Ziar nad Hronom (Slovakia) and electricity power plant in France

Generalisation:

- If an industrial area 121 needs to be aggregated to a mine dump or construction site 13x, priority is given to the industrial area, if the area 121 covers at least 25 % of the total area.



- Commercial/industrial units less than 25 ha which are connected to urban fabric larger than 25 ha should be assigned as urban fabric.
- Urban fabric units equal or larger than 25 ha inside commercial/industrial units should be mapped.
- Park areas and factory approaches are mapped as industrial units (class 121) even if a road network crosses them.



Particularity of class 121: Agricultural farms

Areas of other than housing buildings, in-door spaces, stables, garages, workshops, lay-by and storing areas, often also bad land with ruderal vegetation, part of farms. The farms are often located in outskirts or close to rural settlements with agricultural function. Concentration of agricultural buildings in areas of various sizes was associated with collectivisation of agriculture. The quoted areas smaller than 25 ha were included in class 112.

This heading includes:

- buildings, in-door spaces and yards for keeping farm animals,
- garages, workshops, production buildings, lay-by areas for agricultural machinery,
- paved and unpaved storing areas and warehouses,
- bad land with ruderal vegetation.

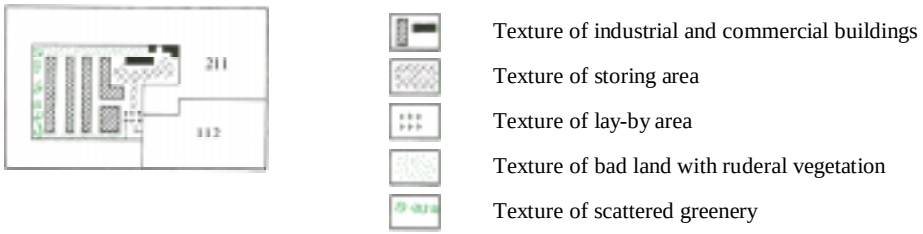


Fig. 14 A generalised pattern of the particularity of class 121

Fig. 15 Representative of the quoted class particularity on example of agricultural farm in Liskova (Slovakia)

122 Road and rail networks and associated land

Motorways and railways, including associated installations (stations, platforms, embankments). Minimum width for inclusion: 100 m.

This heading includes:

- transport networks – roads, railways, funiculars, minimum width 100 m,
- motorway rest areas, service stations, parking areas haulage depots connected on motorway networks, services and maintenance activities for roads, tollbooths,
- marshalling yards, perimeter of stations, services and maintenance activities for trains,
- compounds of large crossroads with minimum area 25 ha,
- tramways networks,
- cableway networks.

This heading excludes:

- motorways and high-speed train under construction (133),
- closed-down transport network (classified under the real appropriate land cover class).

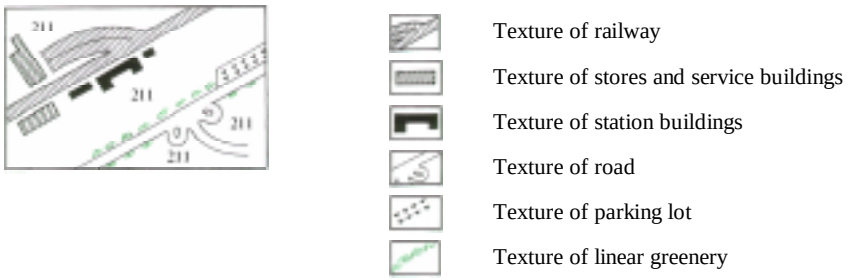
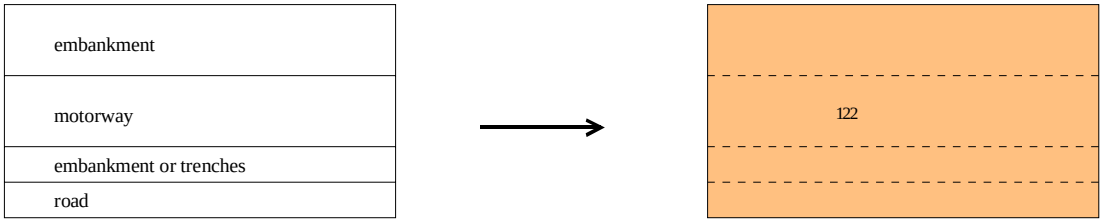


Fig. 16 A generalised pattern of the class 122

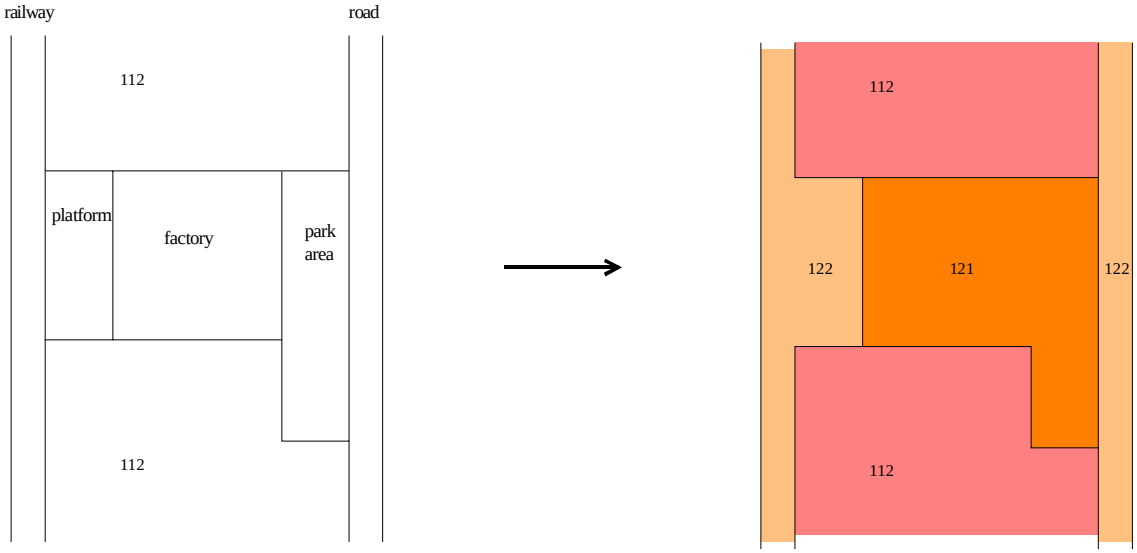
Fig. 17 Representative demonstration of the quoted class on examples of road and rail network in the Hron valley (Slovakia) and the crossroad in Vilnius (Lithuania)

Generalisation:

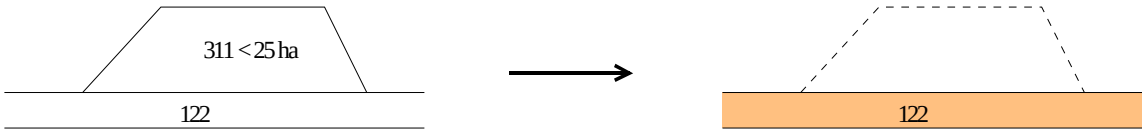
- The 100 m minimum width refers to the real linear coverage of the network including vegetated trenches and/or embankment slopes. The minimum real length should be 2.500 m.

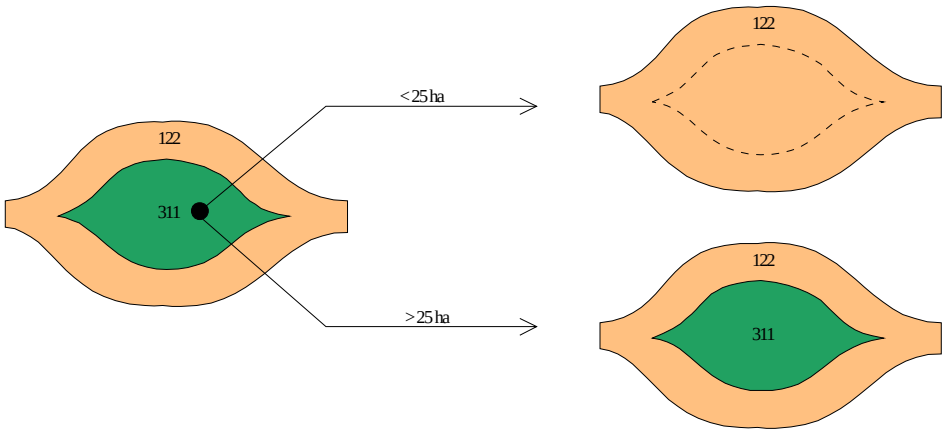


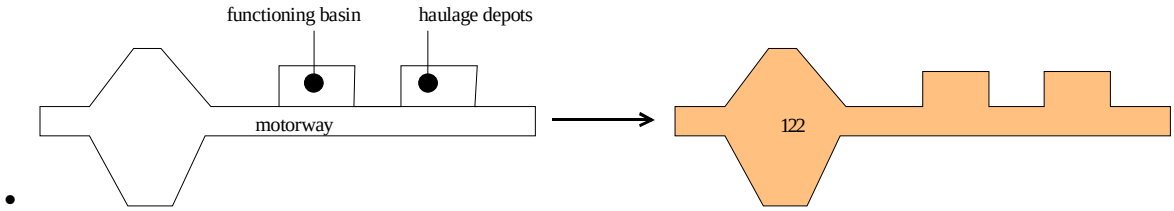
- Disused transport infrastructures (ancient stations, disused railway lines and associated land) are assigned according to their present land cover, which predominates in this case against land use.
- Railways have a higher priority than urban fabric does and roads have a lower priority than urban fabric does.



- In case of complex transport networks and associated lands, associated land should be restricted to those areas, which are clearly isolated by roads or railways.







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No particularity was identified in this class.

123 Port areas

Infrastructure of port areas, including quays, dockyards and marinas.

This heading includes:

- commercial and military ports,
- shipyards,
- fishing ports,
- yachts ports, sport and recreation ports,
- shipping and infrastructure port facilities,
- sea, river and lake ports,
- harbour stations, dock houses,
- oil terminals,
- roads, railways and parking lots within the port area,
- adjacent water areas shirted by quays if the area of infrastructure of the port (firm land part) is smaller than 25 ha

This heading excludes:

- industrial and commercial units larger than 25 ha associated with port activities (class 121)

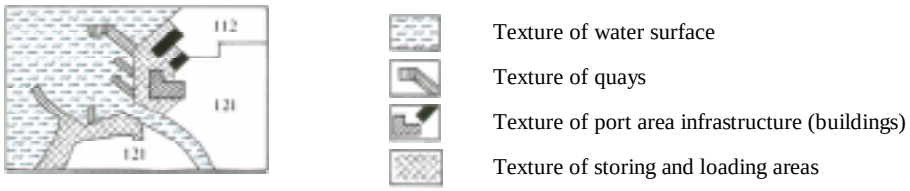
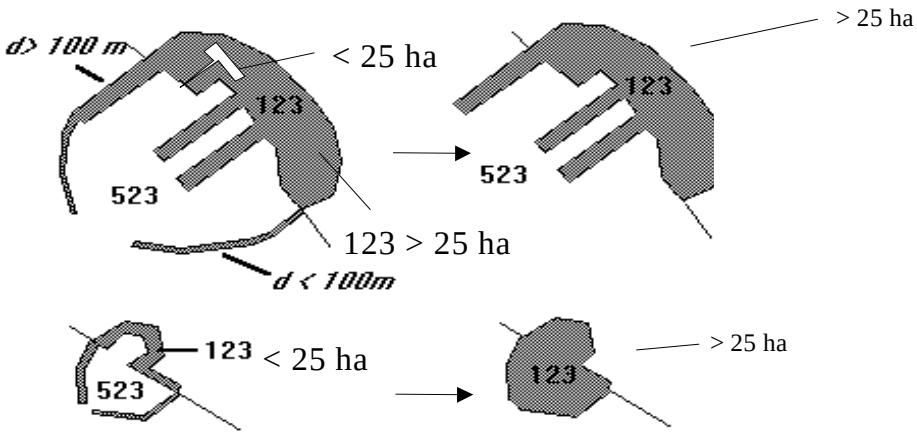


Fig. 18 A generalised pattern of the class 123

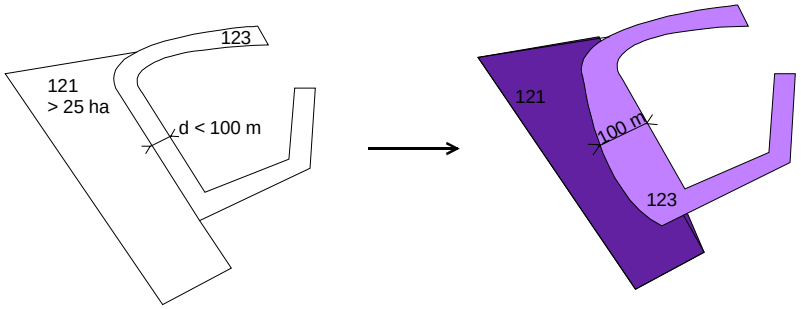
Fig. 19 Representative demonstration of the quoted class on examples of Bratislava Port (Slovakia) and Klajpeda Port (Lithuania)

Generalisation:

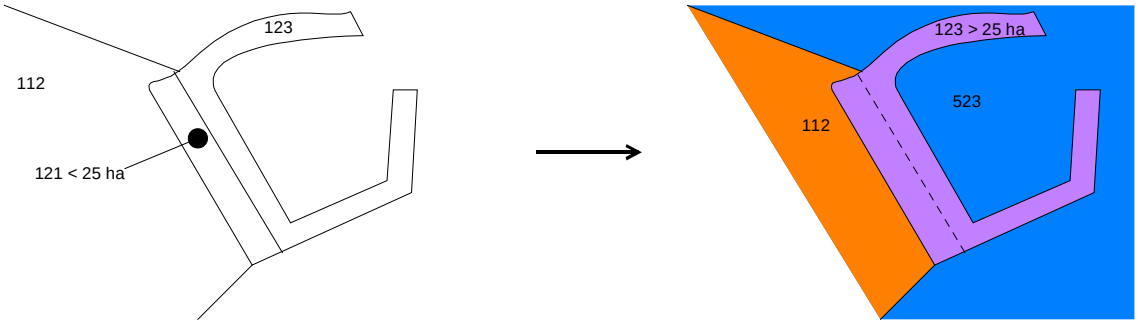
- Port areas for which the artificial surface is covering more than 25 ha do not include docks or water surfaces larger than 25 ha.
- Port areas for which the artificial surface is covering less than 25 ha and characterised by the construction of two protection arms surrounding a water area resulting in a total area larger than 25 ha, should be generalised as port areas.



- At least a buffer zone of 100 m should be delineated around the mooring of the harbour.



- Narrow strips of industrial units below the area threshold contiguous to the harbour are included in the harbour area.



No particularity was identified in this class.

124 Airports

Airports installations: runways, buildings and associated land.

Extension:
This class includes associated lands (mainly grassland).

This heading includes:
- take-off and landing runways (concrete, grass surfaced) of civil, military and sport airports with non concreted or asphalted runways and with installations,
- terminals, hangars, service and storing buildings and in-door spaces,
- flying schools used for pilot's training programme of civil aviation,
- parking lots and lay-by areas,
- adjacent grass areas, or dispersed trees and shrubs within the buffer zone of airport,
- small sport airports with non-concreted or asphalted runways used for agriculture and forestry (e.g. spreading of fertilizers and chemical materials),

This heading excludes:
- small sport airports with non-concreted or asphalted runways,
- disused airport or airfield should be classified as 321.

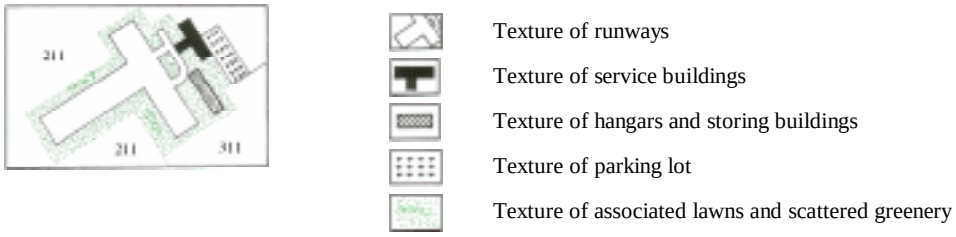
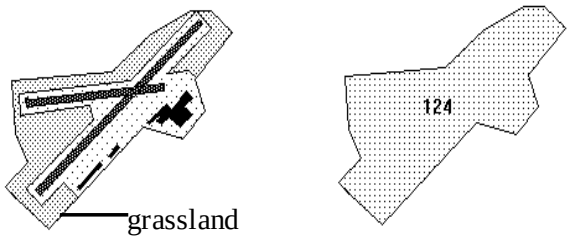


Fig. 20 A generalised pattern of the class 124

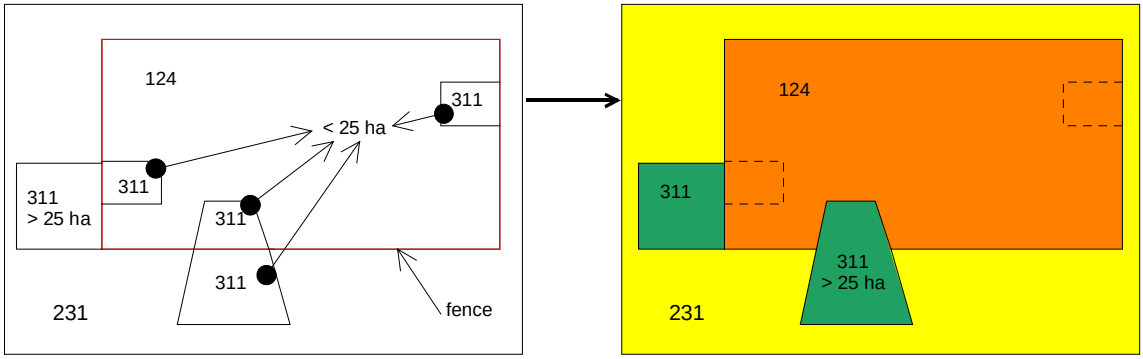
Fig. 21 Representative demonstration of the quoted class on example of airport in Vilnius (Lithuania)

Generalisation:

- All land cover features such as terminal buildings, runways, etc larger than 25 ha, located inside the airport territory, should be generalised as airport area 124.



- At least a buffer zone of 100 m should be delineated around the runways of an airport.
- When forest or semi-natural vegetation areas extend on both sides of the airport, fence delineation is done according to the threshold area of the total surface.



No particularity was identified in this class.

131 Mineral extraction sites

Areas with open-pit extraction of construction material (sandpits, quarries) or other minerals (open-cast mines). Includes flooded gravel pits, except for river-bed extraction.

Extension:
This class includes flooded gravel pits surface of which is less than 25 ha and temporary mining pools.

This heading includes:
- open-pit extraction often associated with heaps of extracted building material (gravel, sand, stone or clays) or ore and non-ore mineral material (iron, manganese ores, magnesite, lignite, brown coal, kaolin, etc.),
- infrastructure of buildings and installations providing for extraction, or primary processing of the quoted material and minerals,
- transport networks associated with areas of open-pit extraction,
- lay-by areas,
- water bodies (smaller than 25 ha), often associated with open pit extraction of gravel, sand, etc.
- rock salt pits,
- sand extraction site inside coastal dune areas,
- inland salinas,
- oil fields with wells,
- petroleum, gas and liquid petroleum gas, shale oil extraction site.

This heading excludes:
- exploited peat bogs (class 412),
- associated land of mines where barren materials are dumped (coal tips, slag dumps) (class 132),
- coastal saline (class 422),
- scree covered areas (class 332),
- extraction sites abandoned and reconverted to leisure areas (class 142).

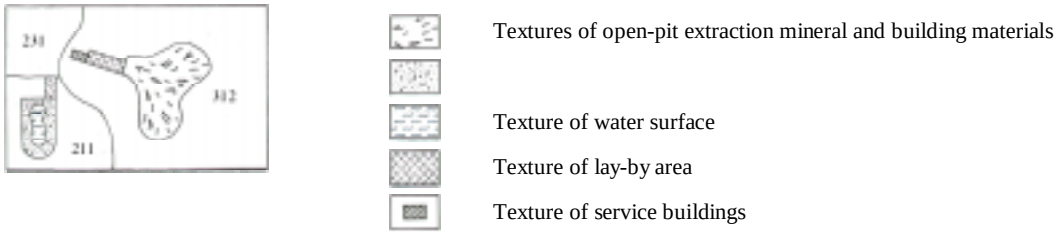
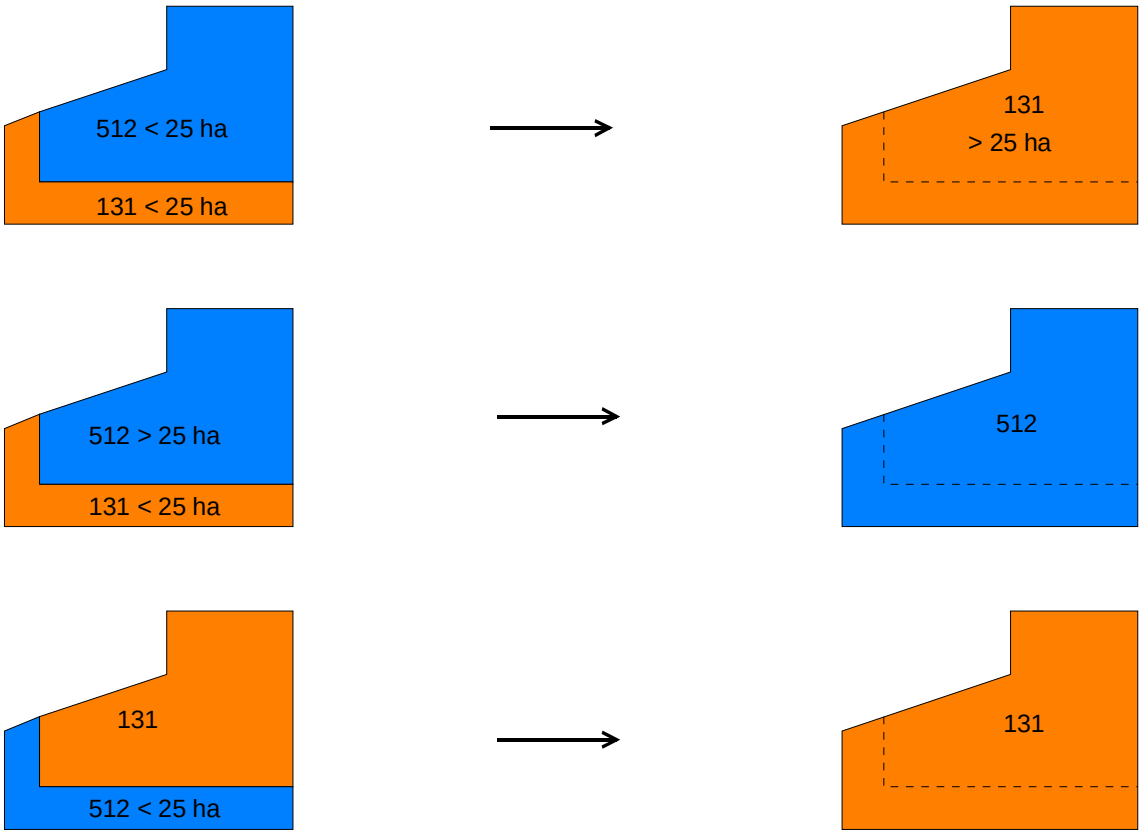


Fig. 22 A generalised pattern of the class 131

Fig. 23 Representative demonstration of the quoted class on example of brown coal extraction in Most (Czech Republic) and a quarry in Lithuania

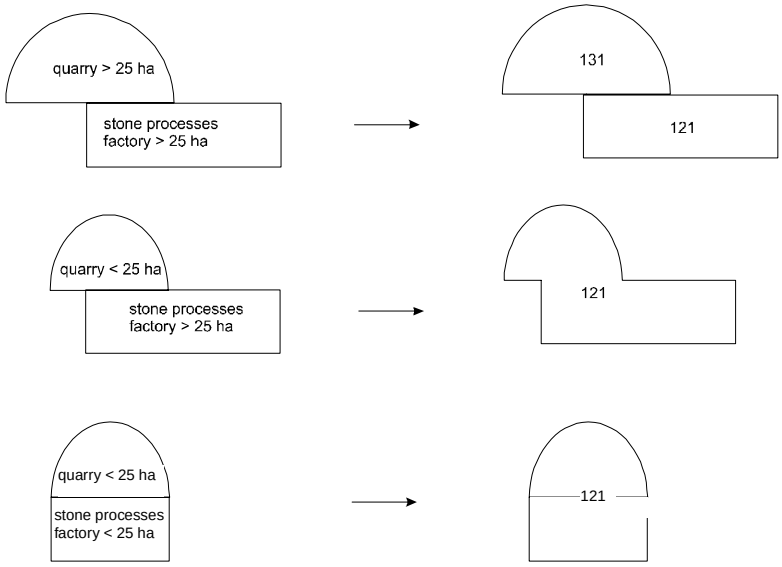
Generalisation:

- Flooded mineral extraction surfaces are included if < 25 ha. The flooded areas should be isolated and assigned as water bodies (class 512) if > 25 ha. The water surfaces and their visible extraction surrounds are connected together to create a single polygon 131 > 25 ha.

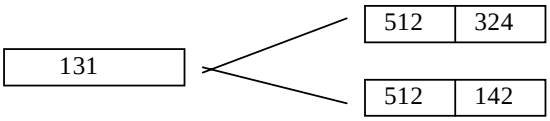


How to map mineral extraction sites associated to industrial areas if both polygons are less than 25 ha?

- In this case, the size of each polygon should be considered.
- In general, priority will be given to 121 industrial area if both polygons cover approximately the same area. Otherwise, the dominating area will be represented.



- Disused gravel pits filled with water should be classified according to their current actual land cover.



No particularity was identified in this class.

132 Dump sites

Public, industrial or mine dump sites.

Extension:
This class includes dump sites of raw materials or liquid wastes.

This heading includes:
- dump sites of public, communal waste (landfills),
- dump sites of industrial waste - waste rock after processing of various raw materials,
- dump sites of waste material from stations cleaning the communal waste water,
- pools of waste water/liquid waste, products of various chemical processes,
- protecting dikes,
- line vegetation belts, part of buffering/protective zones around the dump sites,
- buildings, transport networks with parking lot associated with dump site,
- slag heaps which are unvegetated.

This heading excludes:
- decanting basins of biological water treatment plants by means of lagoonage processing (class 121),
- dump sites abandoned and reconverted to leisure areas (class 142),
- vegetated slag heaps (class 3xx).

Fig. 24 A generalised pattern of the class 132

Fig. 25 Representative demonstration of the quoted class on examples of dump sites of public and industrial waste in Slovakia

No particularity was identified in this class.

133 Construction sites

Spaces under construction development, soil or bedrock excavations, earthworks.

This heading includes:

- public and industrial fabric structures, road and rail networks, water dams/reservoirs, etc. under construction.

This heading excludes:

- completed parts of transport networks under construction when they are larger than 25 ha.

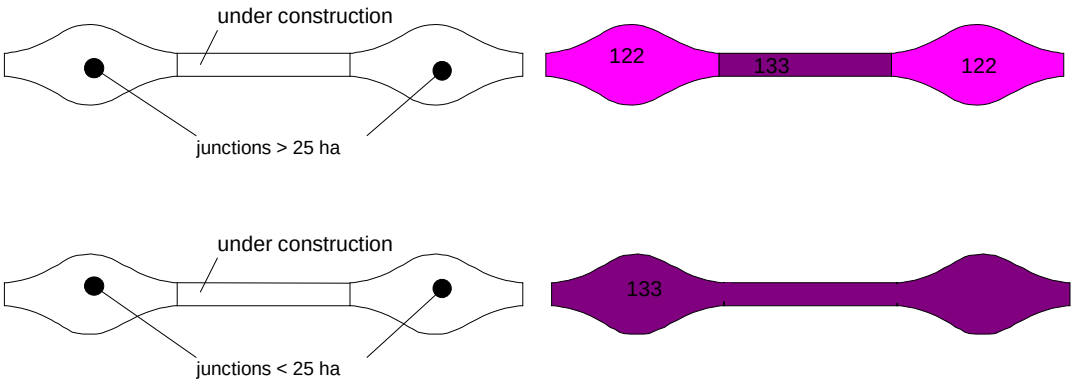
Texture of buildings under construction

Fig. 26 A generalised pattern of the class 133

Fig. 27 Representative demonstration of the quoted class on examples of houses and technical objects under construction in Slovakia and Lithuania

Generalisation:

If structures for crossing and/or junctions are already present and visible on the satellite image along traces of transport networks under construction, then the following scheme should be applied according to the size of structure elements.



No particularity was identified in this class.

141 Green urban areas

Areas with vegetation within urban fabric, includes parks and cemeteries with vegetation, and mansions and their grounds.

Extension:
This class includes cemeteries with important vegetation coverage.

Green urban areas concern all vegetated areas greater than 25 ha which are either situated within or in contact with urban fabrics. Greenery with strips of lanes and paths may be found within these areas created for recreational use.

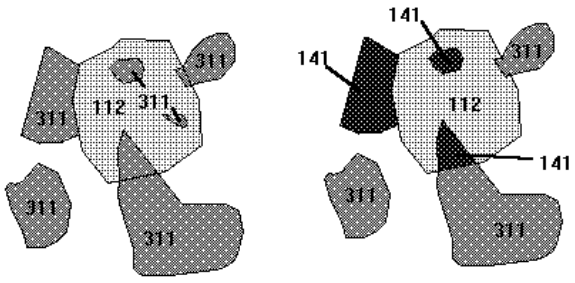
This heading includes:
- parks, park basins, lawns, flower beds in settlements,
- ornamental gardens,
- botanical and zoological gardens situated in settlement (urban fabric - 112) or in contact-peripheral zone of settlement,
- city squares,
- inner spaces of city blocks,
- cemeteries with vegetation in settlements,
- vegetated areas which can be used for recreational purpose even if it is not their main utilisation such as woods in urban fabric.

This heading excludes:
- city gardens (class 242),
- vegetated cemeteries outside urban fabric (class 142),
- unvegetated cemeteries inside urban fabric (class 11x).

Fig. 28 A generalised pattern of the class 141

Fig. 29 Representative demonstration of the quoted class on example of the Freedom Square in Bratislava (Slovakia)

Generalisation:



No particularity was identified in this class.

142 Sport and leisure facilities

Camping grounds, sports grounds, leisure parks, golf courses, racecourses, etc. Includes formal parks not surrounded by urban areas.

This heading includes:

- areas of sport compounds (football stadiums with the corresponding infrastructure, hockey halls, swimming pools and tennis courts, cycling stadiums, athletic halls and stadiums, etc.) within settlements and out of them,
- sport shooting-ranges,
- cemeteries with vegetation situated out of the settlements,
- camping sites,
- cottage (tourist) communities used for recreation and leisure activities outside the settlements only for temporary residence,
- zoological and botanical gardens out of settlements,
- compounds of disclosed/open archaeological sites,
- golf courses,
- racecourses,
- ski resorts (except ski pistes),
- motor – racing circuit,
- forest-parks in the periphery of settlements,
- small sport airports with non concreted or asphalted runways.

This heading excludes:

- motor-racing circuits inside industrial unit areas used for test purposes (class 121),
- caravaning parking used for commercial activities (class 121),
- beaches (class 331),
- camping areas within forests that are not specially prepared for the purpose (class 31x),
- stud farms (class 121).

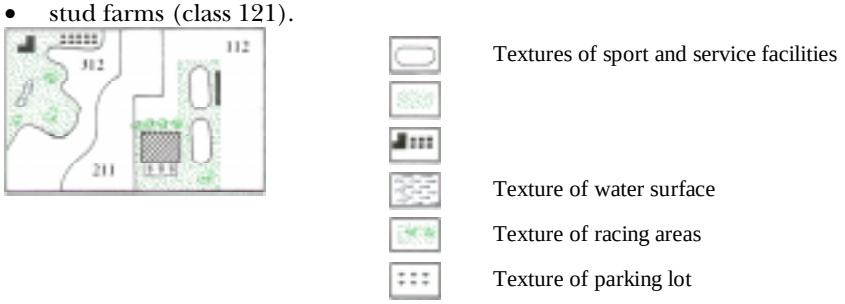
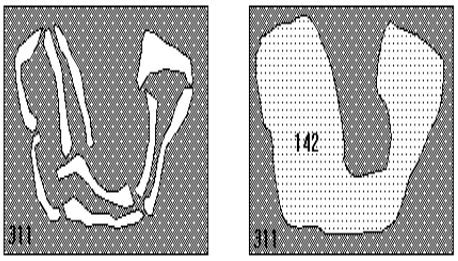


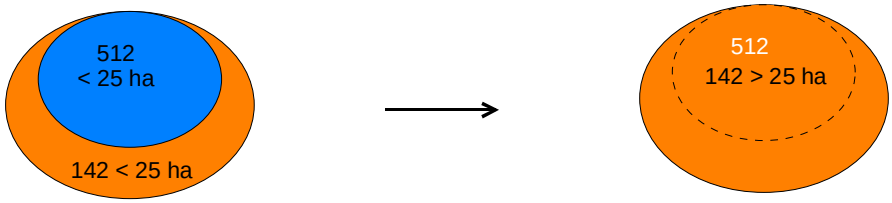
Fig. 30 A generalised pattern of the class 142

Fig. 31 Representative demonstration of the quoted class on example of sport area in Bratislava (Slovakia)

Generalisation:



- In case of recreational/leisure strip areas surrounding lakes are less than 25 ha, the water surface and leisure facility areas should be grouped together to reach a 142 polygon > 25 ha.



No particularity was identified in this class.

4.2 Agricultural areas

Class 2.1 Arable land
Lands under a rotation system used for annually harvested plants and fallow lands, which are permanently or not irrigated. Includes flooded crops such as rice fields and other inundated croplands.

Class 2.2 Permanent crops
All surfaces occupied by permanent crops, not under a rotation system. Includes ligneous crops of standards cultures for fruit production such as extensive fruit orchards, olive groves, chestnut groves, walnut groves shrub orchards such as vineyards and some specific low-system orchard plantation, espaliers and climbers.

Class 2.3 Pastures
Lands, which are permanently used (at least 5 years) for fodder production. Includes natural or sown herbaceous species, unimproved or lightly improved meadows and grazed or mechanically harvested meadows.

Class 2.4 Heterogeneous agricultural areas
Areas of annual crops associated with permanent crops on the same parcel, annual crops cultivated under forest trees, areas of annual crops, meadows and/or permanent crops which are juxtaposed, landscapes in which crops and pastures are intimately mixed with natural vegetation or natural areas.

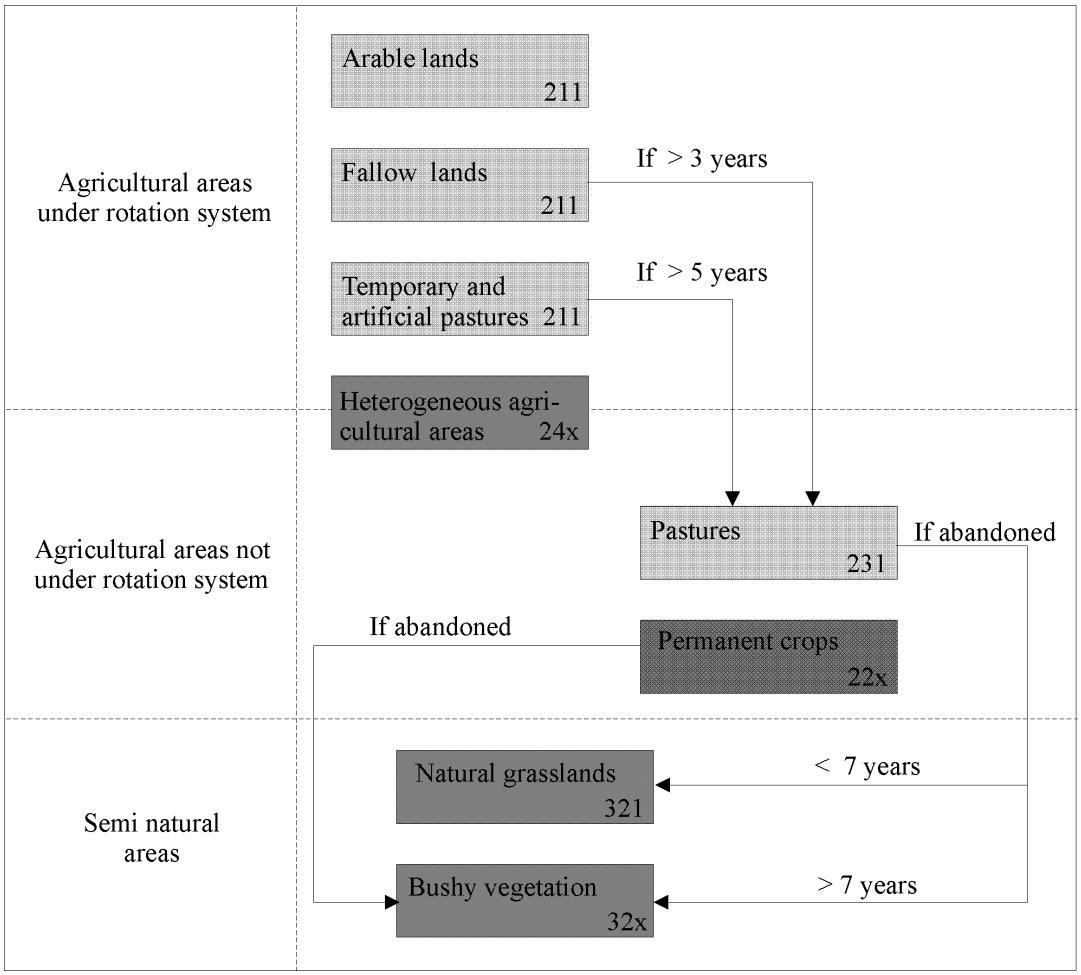


Fig. 32: Decision scheme for agricultural areas in relation to semi-natural areas

211 Non-irrigated arable land

Cereals, legumes, fodder crops, root crops and fallow land. Includes flowers and fruit trees (nurseries cultivation) and vegetables, whether open field, under plastic or glass (includes market gardening). Includes aromatic, medicinal and culinary plants. Does not include permanent pastures.

Extension:

This class includes flower, fruit trees (nurseries) and vegetable cultivation. Includes other annually harvested plants with more than 75 % of the area under a rotation system. Part of this class are the plots of arable land with area of several hectares reaching tens (hundreds) of ha.

This heading includes:

- multi–year plants as asparagus and chicory,
- flooded crops as water cross beds,
- semi-permanent crops as strawberries,
- temporary fallow lands (lands under three yearly rotation system),
- drained arable land should be mapped as 211 instead of 212,
- fragmented agricultural land use resulting in juxtaposition of different annual crops,
- weeded crops,
- non-permanent industrial crops as textile plants, oleaginous plants,
- tobacco,
- condiment plants,
- sugar cane,
- flowers under a rotation system,
- industrial flower crops as lavender species,
- nurseries-garden (seedlings of fruit trees and shrubs),
- dispersed, mostly line vegetation,
- abandoned irrigated arable land even the irrigation channel network is still visible in the satellite image.

This heading excludes:

- city gardens (class 242),
- lands which lie fallow for at least three years (class 231 or 32x),
- hop plantations (class 222),
- rice field (class 213),
- forest tree nurseries with non-commercial purposes located in forest areas (31),
- fruit trees and berry plantation under glass greenhouses (class 222),
- osier trees for wicker production (class 222),
- permanent plantations of roses (class 222),
- wine-growing nurseries (class 221).

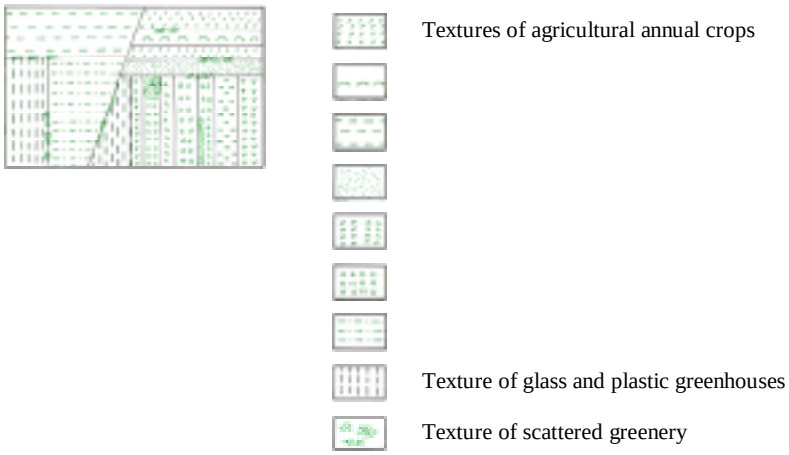


Fig. 33 A generalised pattern of the class 211

Fig. 34 Representative demonstration of the quoted class on example of arable land in Western part of Slovakia

Particularity of class 211: Abandoned (fallow) land

Areas of arable land not used for 1-3 years. Identification of these areas requires data obtained by field research as well as topical statistic data on area of arable land in particular part of the country.

This heading includes:

- abandoned agricultural land,
- arable land, where the above quoted agricultural crops are cultivated,
- scattered (especially line) greenery.

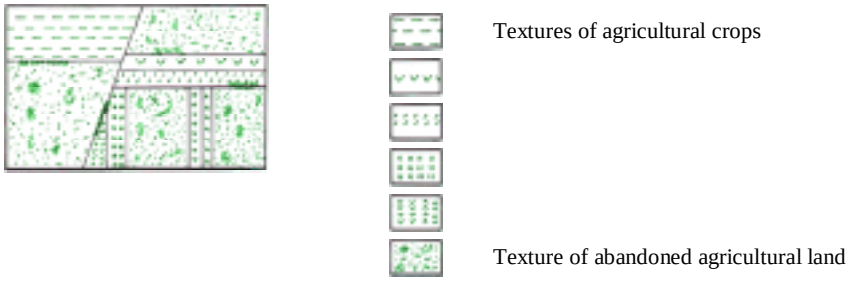


Fig. 35 A generalised pattern of the particularity of class 211

Fig. 36 Representative of the quoted class particularity on example of abandoned land in Latvia

212 Permanently irrigated land

Crops irrigated permanently or periodically, using a permanent infrastructure (irrigation channels, drainage network). Most of these crops cannot be cultivated without an artificial water supply. Does not include sporadically irrigated land.

Extension:
This class excludes drainage network areas, which are assigned to 211, 231 or 242, applied for pumping infrastructure and irrigation systems from superficial water supplies.

This heading includes:
- recently abandoned irrigation systems; decision must be taken based on the satellite image spectral reflectance showing if soils are still wet and the infrastructure!,
- sown grassland (as part of crop rotation) if the irrigation infrastructure is permanently present.

This heading excludes:
- drainage network intended to clean up wet soils (classes 211, 231 or 242),
- crops under greenhouses (classes 211 or 222),
- underground irrigation pipes and above ground pipes and furrows (other cultivation classes),
- spray sprinkler line (other cultivation classes),
- rotary sprinkler (other cultivation classes),
- rice fields (class 213).

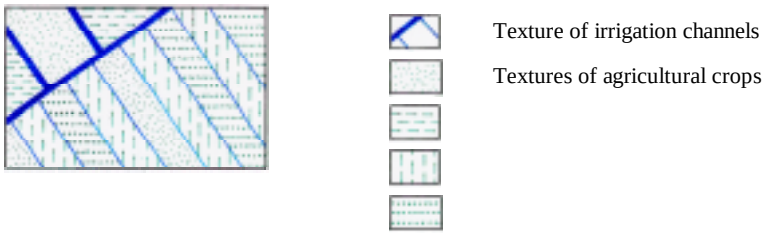


Fig. 37 A generalised pattern of the class 212

Fig. 38 Representative demonstration of the permanently irrigated land on example from Greece

No particularity was identified in this class.

213 Rice fields

Land prepared for rice cultivation. Flat surfaces with irrigation channels. Surfaces periodically flooded.

Extension:
Abandoned rice fields are not included. One or two yearly rotation is applied for rice fields, therefore the land cover is mapped according to the presence at the time of satellite data acquisition.

This heading includes:
- rice fields,
- irrigation channels.

This heading excludes:
- ancient rice fields with irrigation channels should be mapped according to their actual land cover (mainly classes 211 or 231),
- abandoned rice fields (class 2xx).

Fig. 39 A generalised pattern of the class 213

Fig. 40 Representative demonstration of the rice field on example from Portugal

No particularity was identified in this class.

221 Vineyards

Areas planted with vines.

Extension:
Vineyard areas are classified as 221 if the vineyard parcels exceed 50 % of the area and/or they determine the land use of the area.

This heading includes:
- vine-growing nurseries inside vineyard areas,
- vineyards for wine production,
- vineyards for consumer grapes and raisins,
- complex cultivation pattern areas where vineyards parcels cover at least 50 % of the area.

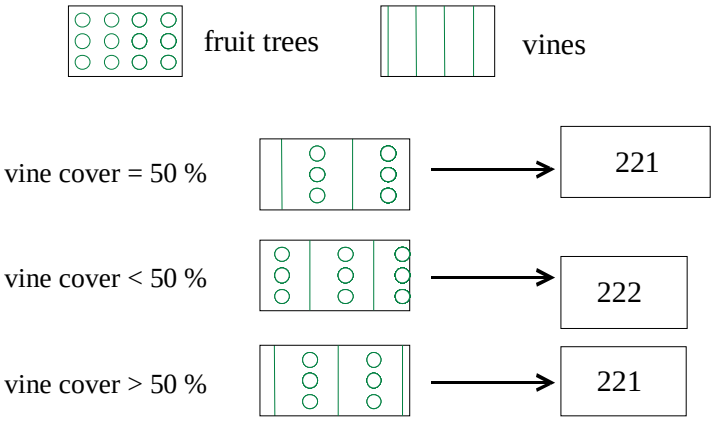
This heading excludes:
- vines mixed with arable land and/or meadows within a single parcel (class 241),
- vines (single parcels (25 ha)) mixed with arable land and/or meadows interspersed with significant natural vineyard parcels covering less than 40 % of the area (class 243).

Fig. 41 A generalised pattern of the class 221

Fig. 42 Representative demonstration of the quoted class on example of vineyards in surroundings of Modra (Slovakia)

Generalisation:
How to map vines associated with fruit trees within a single parcel?

- In this case, the dominance of each permanent crop should be considered. In general, priority will be given to vineyard if dominances are approximately the same. Otherwise the dominating permanent crop will be represented.



- In case of vines associated to olive trees within a single parcel, priority will be given to class 221.

No particularity was identified in this class.

222 Fruit trees and berry plantations

Parcels planted with fruit trees or shrubs: single or mixed fruit species, fruit trees associated with permanently grassed surfaces. Includes chestnut and walnut groves.

Extension:
This class includes ligneous crops and chestnut and walnut tree orchards intended for fruit production.

This heading includes:
- hop plantations,
- plantations of berry shrubs, black and/or red currants, raspberries, gooseberries, blackberry crops,
- willow plantation for wicker production,
- fruit trees under greenhouses,
- abandoned orchards which still preserve characteristic alignments,
- fruit, orchards of apples, pears, plums, apricots, peaches, cherries, figs, quinces and other rosaceae,
- ligneous crops : chestnut, walnut, almond, hazel, pistachio groves,
- permanent florist plantations of roses,
- plantation of vines associated to fruit trees within the same parcel where vines cover at least 40 % of the surface,
- tropical fruit trees : avocados, bananas, guavas, mango, kiwis, passion fruits, papayas, pineapples, pomegranates, brazil nuts, cashew nuts, coconuts, nutmegs,
- citrus fruit trees : oranges, lemons, mandarins, tangerines, grape fruits, pomelos,
- fruit tree greeneries inside fruit tree plantations,
- permanent industrial plants : coffee, cacao, mulberry, tea,
- recently abandoned orchards where characteristic plantation structures (espaliers and climbers) are still visible,
- scattered greenery.

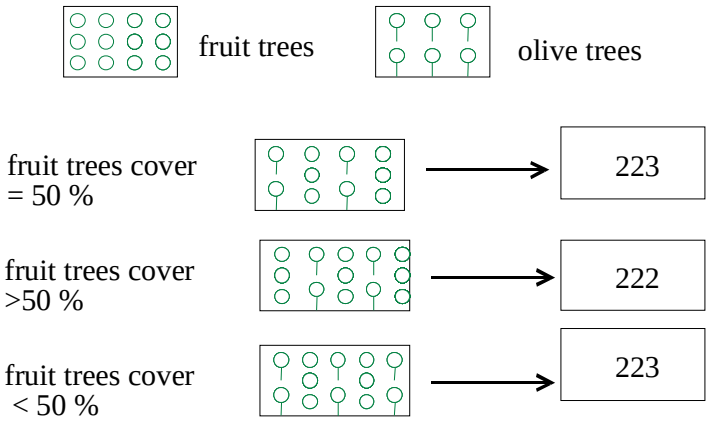
This heading excludes:
- strawberries (class 211),
- olive groves (class 223),
- vineyard (class 221),
- fruit trees nurseries (class 211),
- carob trees (class 311),
- chestnut and walnut grove forests intended for wood production (class 311),
- abandoned orchards where plantation structures have disappeared (class 324),
- orchards located in permanently irrigated lands (class 212),
- multi–year plants as asparagus (class 211).

Fig. 43 A generalised pattern of the class 222

Fig. 44 Representative demonstration of the quoted class on example of apple orchard in surroundings of Cachtice (Slovakia)

Generalisation:
When fruit trees are associated to vines on the same parcel, the dominance of each permanent crop should be considered.

- In case of equal density, priority will be given to vineyard (class 221). The generalisation scheme adopted for class 221 should be also applied for class 222.
- In case of fruit trees associated to olive trees on the same parcel, the dominance of each permanent crop should be evaluated and priority will be given to class 223 when no dominance is visible.



Particularity of class 222: Hop plantations

Areas of arable land where hop is cultivated requiring especially tall supporting construction.

This heading includes:

- hop-garden plots.

Fig. 45 A generalised pattern of the particularity of class 222.

Fig. 46 Representative of the quoted class particularity on example of hop plantations in the Western part of Slovakia

223 Olive groves

Areas planted with olive trees, including mixed occurrence of olive trees and vines on the same parcel.

Extension:
This class includes mediterranean plantations of Olea europaea ssp. europaea.

This heading includes:
- olive groves shading herbaceous layer.

This heading excludes:
- olive trees (Olea europaea ssp. sylvestris) as part of evergreen forest areas (class 311),
- wild olive trees (Oleaster spp.) as part of sclerophyllous vegetation areas (class 323),
- abandoned olive groves (class 323).

Fig. 47 A generalised pattern of the class 223

Fig. 48 Representative demonstration of the olive groves on example from Greece

No particularity was identified in this class.

231 Pastures

Dense grass cover, of floral composition, dominated by graminacea, not under a rotation system. Mainly for grazing, but the fodder may be harvested mechanically. Includes areas with hedges (bocage).

Extension:
Grazing used by cattle.

Pastures can be described as extensively used grasslands with presence of farm structure such as: fences, shelters, enclosures, watering places, drinking trough, or regular agricultural works: mowing, drainage, hay making, agricultural practices, manuring.

This heading includes:

- temporary and artificial pastures not under a rotation system which become permanent grasslands five years after ploughing. Significant number of natural vegetation species are present (as Taraxacum officinale, Ranunculus spp., Chrisanthemum leucantemum, Knautia arvensis, Achillea millefolium, Salvia spp., etc.),
- abandoned arable land not under a rotation system used as pastures (after 3 years),
- pastures may include patches of arable land which do not cover 25 % of the total surface,
- humid meadows with dominating grass cover. Sedges, rushes, thistles, nettles, cover less than 25 % of the parcel surface,
- scattered trees and shrubs (10–20% of surface).

This heading excludes:

- military exercising grass fields (without grazing) (class 321),
- salt meadow located in intertidal flat areas (class 423),
- lawns inside sport and leisure facility areas (class 142),
- high-productive natural alpine meadows far from houses and/or crops (class 321),
- fodder crops (class 211),
- derelict grassland where semi-ligneous/ligneous vegetation cover at least 25 % of the parcel (class 322/324),
- strong humid meadows where hygrophyle plant species cover at least 25 % of the parcel (class 411),
- herbaceous grass cover composed of non-palatable and undesirable species for cattle as Molinia spp. and Brachypodium spp. (class 321).

Texture of grassland

Texture of scattered trees and shrubs (10-20% of surface)

Fig. 49 A generalised pattern of the class 231

Fig. 50 Representative demonstration of the quoted class on example of grassland in Central part of Slovakia

Particularity of class 231: Pastures on abandoned land

Grassland developed by not using arable land for more than three years. Identification of the quoted grassland requires application of data obtained by field checking.

This heading includes:

- areas of grassland representing succession of natural overgrowing of arable land by prevailingly herbaceous vegetation,
- areas of sporadically occurring shrubs.

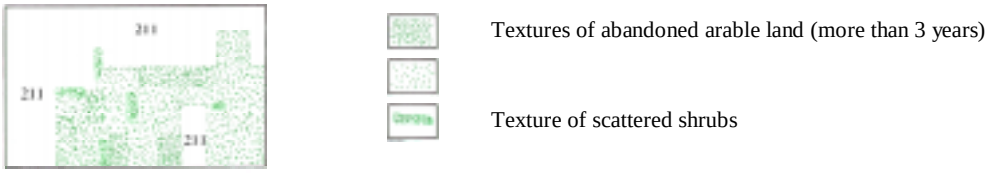


Fig. 51 A generalised pattern of the particularity of class 231

Fig. 52x Representative of the quoted class particularity on example of pasture on abandoned land in Latvia

Particularity of class 231: Wooded meadows

Meadows where dispersed trees and shrubs occupy up to 50% of surface of the area. These meadows are characterised by rich floristic composition.

This heading includes:

- areas of grassland, partially covered by tree crowns,
- areas of scattered trees and shrubs.

Texture of grassland

Texture of scattered trees and shrubs (40-50% of surface)

Fig. 53 A generalised pattern of the particularity of class 231

Fig. 54 Representative of the quoted class particularity on example of wooded meadow in Virtsu-Laelatu (Estonia)

241 Annual crops associated with permanent crops

Non-permanent crops (arable land or pasture) associated with permanent crops on the same parcel.

Extension:
Permanent crops are either in juxtaposition with arable land/pastures or located along the border of the parcels. The occupation rate of non-permanent crops is more than 50 %.

This heading includes:
- non-permanent crop areas in which they are shaded by a fairly closed canopy of fruit trees or olive trees or vines,
- non-permanent crop areas which are bordered by a reticulated structure of fruit tree lines, vine lines,
- some parcels of permanent crops more or less irregular with annual crops/pastures less than 25 ha and inserted into a dominating non-permanent crop whole where none of these crops represents more than 75 %.

This heading excludes:
- permanent crops associated with fruit trees (classes 22x),
- non-permanent crops associated with forest trees (class 244),
- natural grasslands shaded by permanent crops (class 324),
- pastures planted with trees (class 231).

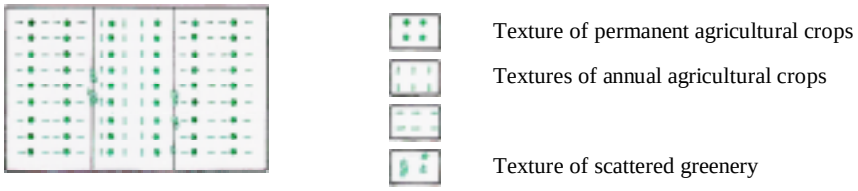
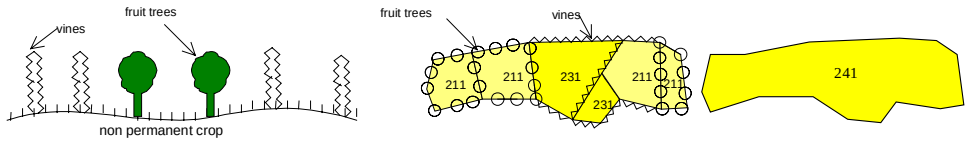


Fig. 55 A generalised pattern of the class 241

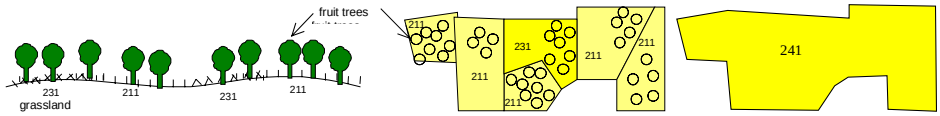
Fig. 56 Representative demonstration of the olive trees associated with arable lands on example from Tunisia

Generalisation:
According to the bio-climatic zone, the heading could be described under two illustrations:

- reticulated landscapes.



- small plot and orchard patterns.



No particularity was identified in this class.

242 Complex cultivation patterns

Juxtaposition of small parcels of diverse annual crops, pasture and/or permanent crops.

Extension:
This class includes juxtaposition of small parcels of annual crops, city garden pastures, fallow land and/or permanent crops eventually with scattered houses or gardens.

This heading includes:
- mixed parcels of permanent crops (fruit trees, berry plantations, vineyards and olive groves),
- interstices of non-mineralised free spaces in discontinuous urban fabric < 25 ha,
- complex cultivation pattern areas with scattered houses inserted within a patchwork structure when built-up parcels cover less than 30 % of the patchwork area,
- summer settlement areas if infrastructure/road network is not visible,
- hobby/city gardens,
- parcels of grassland.

This heading excludes:
- market gardening (class 211),
- nurseries cultivation (class 211),
- in spite of strong fragmentation, the areas with more than 75 % of area under rotation system (class 211),
- complex cultivation patterns areas with scattered houses when they occupy more than 30 % of the patchwork area (class 112).

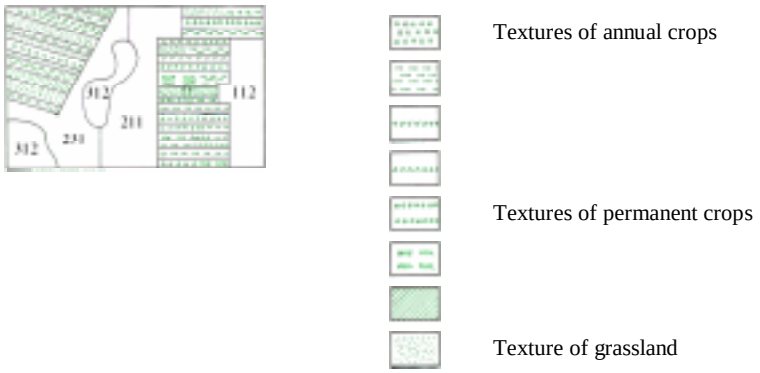
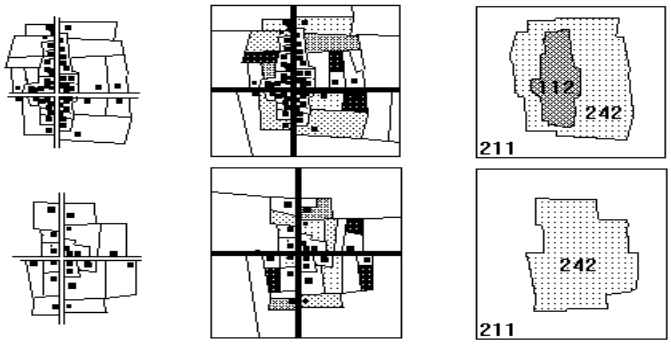


Fig. 57 A generalised pattern of the class 242

Fig. 58 Representative demonstration of the quoted class on example of complex cultivation patterns in Central part of Slovakia

Generalisation:



How to apply the appropriate generalisation rules for complex cultivation patterns mapping?

- In general, only details larger than 100 m are mapped within the scale 1:100.000 inventory. For the 242 heading, aggregation of different smaller units should only be considered within a distance of 300 m.

Particularity of class 242: Complex cultivation patterns with scattered houses

Alternation of small plots (smaller than 25 ha) of arable land with annual or permanent crops with scattered garden huts or scattered houses. They are usually situated in proximity of rural or urban settlements and are used for growing agricultural crops, fruit, and vegetable for the particular households.

This heading includes:

- parcels of arable land smaller than 25 ha with one-year agricultural crops and various kinds of vegetables,
- parcels of permanent crops (smaller than 25 ha), fruit trees, vineyards, berry plantations,
- parcels of grassland,
- garden huts and scattered, sporadically occurring houses.

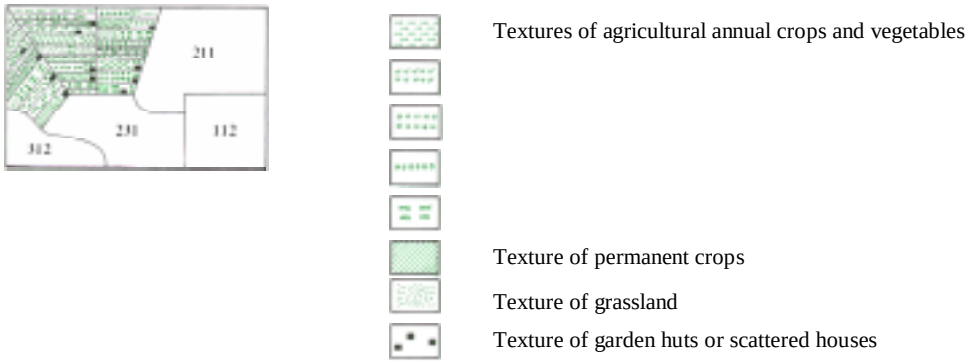


Fig. 59 A generalised pattern of the particularity of class 242

Fig. 60 Representative of the quoted class particularity on example of complex cultivation patterns with scattered garden huts in the Western part of Slovakia

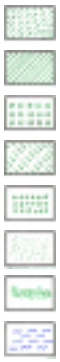
243 Land principally occupied by agriculture, with significant areas of natural vegetation

Areas principally occupied by agriculture, interspersed with significant natural areas.

Extension:
This class includes land occupied by agriculture with areas of natural or semi-natural origin (including wetlands and water bodies, out crops).

This heading includes:
- parcels of arable land (smaller than 25 ha),
- parcels of orchards, vineyards and berry plantations (smaller than 25 ha),
- parcels of the rests of natural forests, groups of trees and shrubs (smaller than 25 ha),
- small areas of water bodies,
- sporadically occurring houses of rural settlement, or farm buildings
- linear structures of trees organised for truffle production,
- hortillonage (vegetable crops and canals),
- agriculture and scattered heaps of stones.

This heading excludes:
- agricultural land associated with small plots of fruit trees/olive groves without natural vegetation (class 242),
- small islands of 243 made by mapping the forest units < 25 ha with a buffer of agricultural land to reach units > 25 ha,
- areas in which the share of agricultural areas is above 75 % (classes 21x, 22x or 23x),
- areas in which semi-natural areas predominate (more than 75 %) (classes 3xx).



Textures of annual agricultural crops

Texture of orchards

Texture of grassland

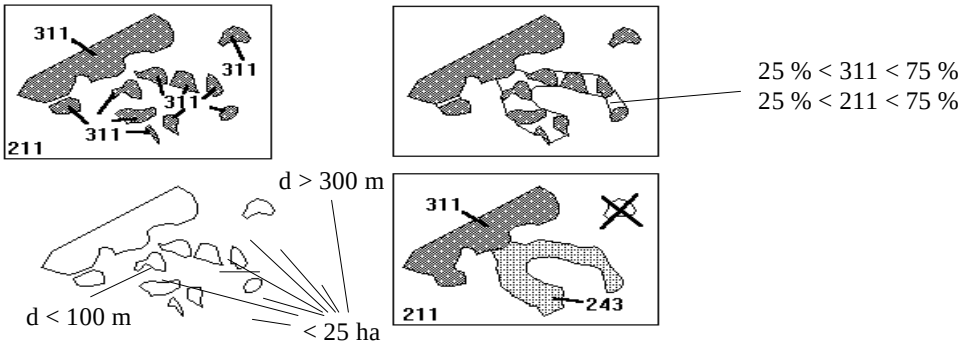
Texture of scattered greenery

Texture of water surfaces

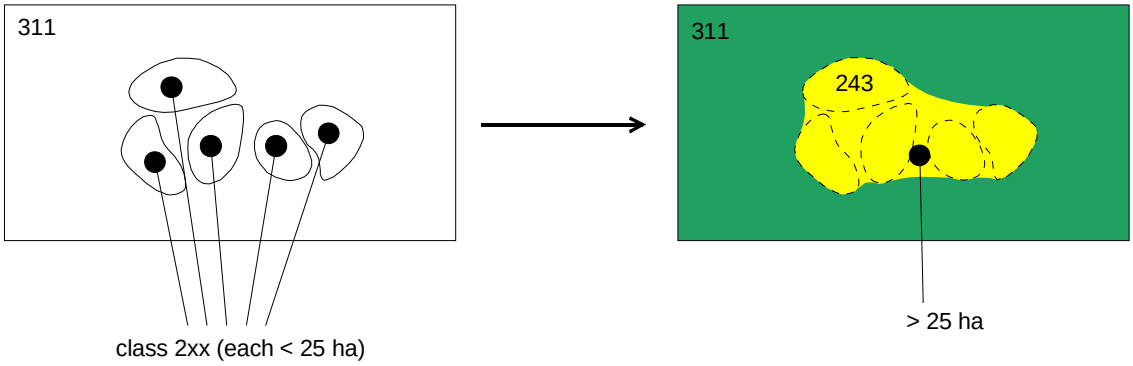
Fig. 61 A generalised pattern of the class 243

Fig. 62 Representative demonstration of the quoted class on example of arable land interspersed with natural vegetation in the Central part of Slovakia

Generalisation:



- Class 2.4.3 should be used for example in case of small agricultural units located within forest areas.



No particularity was identified in this class.

244 Agro-forestry areas

Annual crops or grazing land under the wooded cover of forestry species.

Extension:
This class includes annual crops or grazing land and fallow land covering less than 50 % of the surface.

This heading includes:
- areas of forest trees imbricated with fruit trees/olive trees while neither of the two kinds of trees dominates,
- carob trees shading agricultural lands,
- agricultural land shaded by palm trees in Mediterranean context.

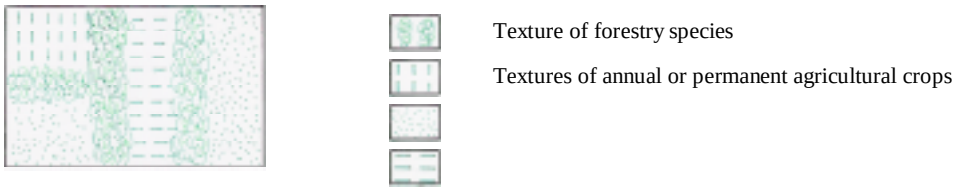


Fig. 63 A generalised pattern of the class 244

Fig. 64 Representative demonstration of the agro–forestry area on example from Portugal

No particularity was identified in this class.

4.3 Forest and semi-natural areas

Class 3.1 Forests
Areas occupied by forests and woodlands with a vegetation pattern composed of native or exotic coniferous and/or deciduous trees and which can be used for the production of timber or other forest products. The forest trees are under normal climatic conditions higher than 5 m with a canopy closure of 30 % at least. In case of young plantation, the minimum cut-off-point is 500 subjects by ha.

The 30 % minimum threshold to be considered can be illustrated by the three following figures.

Figs. 65 A and C correspond to random distribution of the coverage and Fig. B illustrates a regular distribution.

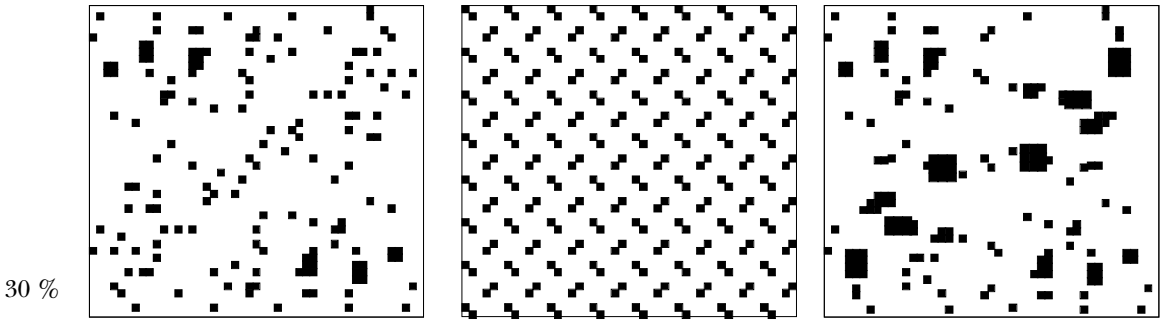


Fig. 65 Random distribution of the forest trees coverage (A, C) and regular distribution (B).

REMARKS

The LCTU applied two different rules, one for the 15 member countries and another one for Phare countries. Within European Union countries, forest management plans and forest related legislation is being applied. Thereby, clear-cut areas and young growths have been assigned under CLC class 31x. Due to the absence of forest related legal obligations and a special request coming from them, all Phare partner countries involved in the Phare CORINE Land Cover project, have not applied this rule. In such caseses, clear-cuts, plantations and forest nurseries inside forests have been classified under CLC class 324. For the up–dating of the CLC database it is recommended to include clear–cuts, young forest plantations, and forest nurseries to the class 324 if they are physiognomically discernable on the satellite images.

Class 3.2 Shrubs and/or herbaceous vegetation associations

- Temperate shrubby areas with Atlantic and alpine heaths, sub Alpine bush and tall herb communities, deciduous forest re-colonisation, hedgerows, dwarf conifers.
- Mediterranean and sub-Mediterranean evergreen sclerophyllous bush and scrub (maquis, garrigue, mattoral, phrygana sensu lato), re-colonisation and degradation stages of broad-leaved evergreen forests.
- Dry thermophilous grasslands of the lowlands, hills and mountain zone. Poor Atlantic a sub-Atlantic mat-grasslands of acid soils; grasslands of decalcified sands; Alpine and sub Alpine grasslands. Humid grasslands and tall herb communities; lowland and mountain mesophile pastures and hay meadows.

Class 3.3 Open spaces with little or no vegetation
Natural areas covered with little or no vegetation, including open thermophile formations of sandy or rocky grounds distributed on calcareous or siliceous soils frequently disturbed by erosion, steppic grasslands, perennial steppe-like grasslands, meso- and thermo-Mediterranean xerophile, mostly open, short-grass perennial grasslands, alpha steppes, vegetated or sparsely vegetated areas of stones on steep slopes, screes, cliffs, rock fares, limestone pavements with plant communities colonising their tracks, perpetual snow and ice, in land sand-dune, coastal sand-dunes and burnt areas.

311 Broad-leaved forest

Vegetation formation composed principally of trees, including shrub and bush understoreys, where broad-leaved species predominate.

Extension:
This class includes areas with a crown cover of more than 30 % or a 500 subjects/ha density for plantation structure, broad-leaved trees represent more than 75 % of the planting pattern. In case of young plants or seedlings the proportion of broad-leaved plants to be considered is at least 75 % of the total amount of plants.

This heading includes:
- plantations of eucalyptus,
- young plantations of deciduous trees,
- walnut trees and chestnut trees used for wood production included into forest area context,
- sparse broad-leaved forests with a 30 - 60 % bracket of crown cover,
- evergreen broad-leaved woodlands composed of sclerophyllous trees (mainly *Quercus Ilex*, *Quercus Suber*, *Quercus Rotondifolia*),
- arborescent mattoral with sclerophyllous species,
- olive-carob forests dominated by *Olea europaea sp. sylvestris*, *Ceratonia siliqua*,
- palm groves woodlands (one single case found in Greece),
- holly woods dominated by *Ilex aquifolium*,
- tamarix woodlands,
- broad-leaved wooded dunes,
- transitional woodland areas when the canopy closure of the trees cover more than 50 % of the area and if their average breast diameter is at least 10 cm,
- denuded spots and grassland,
- clear–cuts (applied for European Union countries)**.

This heading excludes:
- burnt areas inside forest areas (classes 32x or 334),
- non-evergreen coniferous trees dominated by larix species (class 312),
- woodland areas composed of broad-leaved trees smaller than 5 m high (class 322),
- vegetated areas where the crown cover of the broad-leaved trees is less than 25 % (class 324),
- forest nurseries specialised in reproduction situated inside broad-leaved wooded areas (class 324),**
- clear-cuts (class 324, applied for Phare countries)**,
- forest nurseries outside forests for commercial purpose (class 211),
- wooded parks (class 141).

** See the general remarks concerning heading 31x.

Fig. 66 A generalised pattern of the class 311

Fig. 67 Representative demonstration of the quoted class on example of broad-leaved forest in Rouge (Estonia)

No particularity was identified in this class.

312 Coniferous forest

Vegetation formation composed principaly of trees, including shrub and bush understoreys, where coniferous species predominate.

Extension:
Coniferous trees represent more than 75 % of the formation. In case of young plants or seedlings, the proportion of coniferous plants to be considered is at least 75 % of the total amount of plants and their texture is very similar to a surrounding coniferous forest texture.

This heading includes:
- non-evergreen coniferous trees woodland composed of larch trees (*Larix spp.*),
- young plantations of coniferous trees,
- coniferous wooded dunes,
- arborescent mattoral with dominating *Juniperus oxycedrus/phoenica*,
- coniferous wooded land,
- Christmas tree plantations,
- denuded spots and grassland,
- clear–cuts (applied for European Union countries)**.

This heading excludes:
- dwarf coniferous trees as *Pinus mugo* (class 322),
- sclerophyllous trees (class 311),
- vegetated areas where the crown cover of coniferous trees is less than 30 % (class 324, 231, 321).
- forest nurseries specialised in reproduction situated inside coniferous wooded areas (class 324)**
- clear-cuts (class 324, applied for Phare countries)**.

** See the general remarks concerning heading 31x.

Fig. 68 A generalised pattern of the class 312

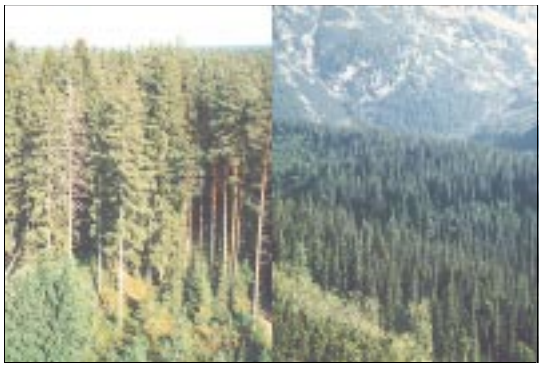


Fig. 69 Representative demonstration of the quoted class on examples of coniferous forest in Taheva (Estonia) and the High Tatras (Slovakia)

No particularity was identified in this class.

313 Mixed forest

Vegetation formation composed principally of trees, including shrub and bush understoreys, where neither broad-leaved nor coniferous species predominate.

Extension:
Mixed forests with a crown cover of more than 30 % or a 500 subjects/ha density for plantation structure. The share of coniferous or broad-leaved species does not exceed 25 % in the canopy closure.

This heading includes:
- mixed-forest wooded dunes,
- denuded spots and grassland,
- sporadically occurying shrub formations,
- clear–cuts (applied for European Union countries)**.

This heading excludes:
- young plantations (class 324)**,
- forest nurseries specialised in reproduction situated inside mixed-forest areas (class 324)**,
- clear-cuts (class 324, applied for Phare countries)**,
- burnt areas inside mixed-forest areas (class 3.3.4),
- woodlands with mixed species trees smaller than 5 m high (class 3.2.2),
- vegetated areas where the crown cover of mixed species trees is less than 30 % (class 3.2.4, 231, 321).

** See the general remarks concerning heading 31x.

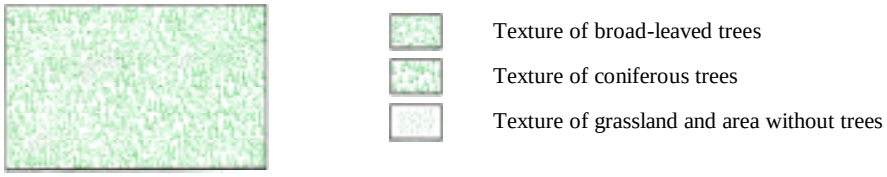
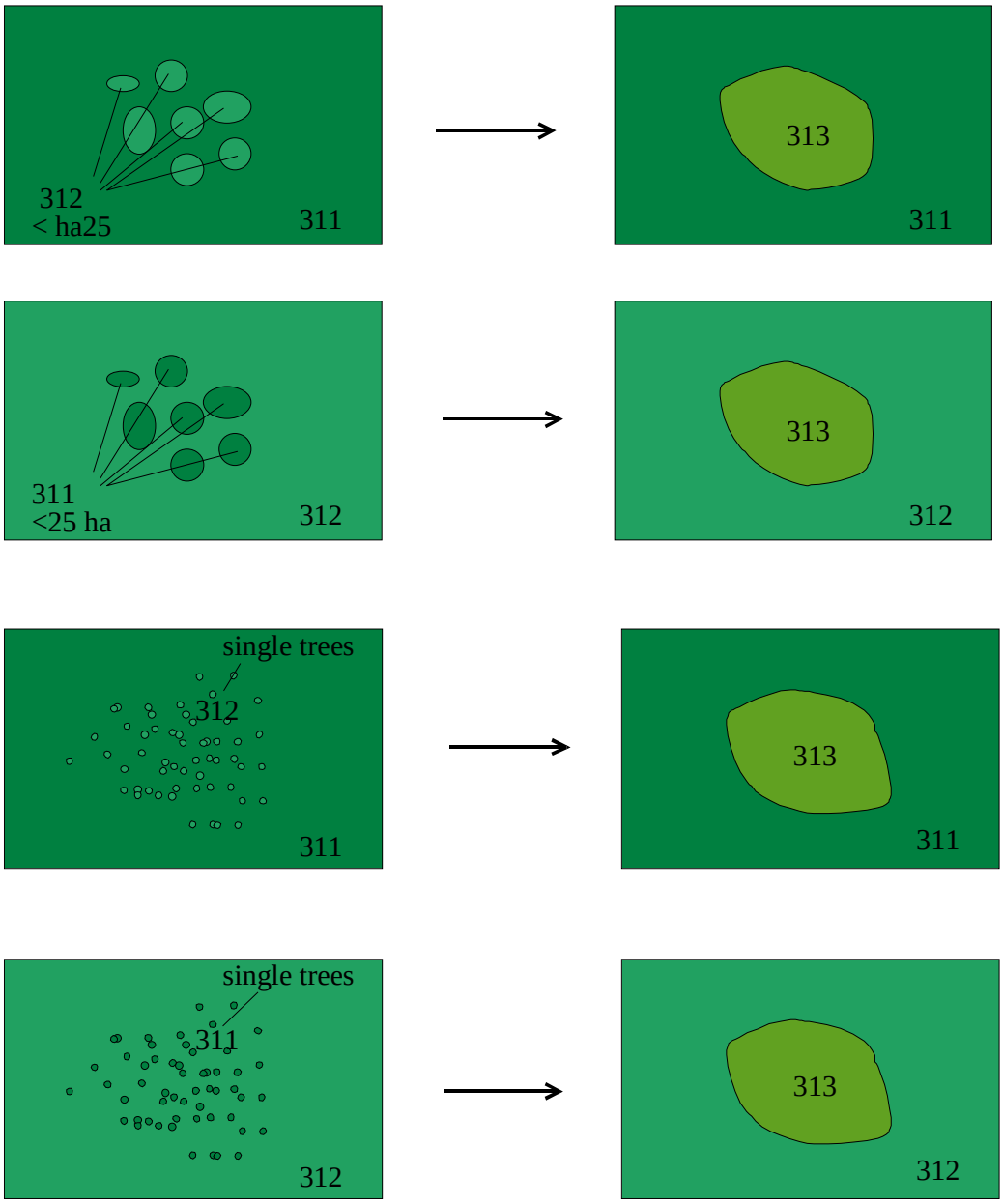


Fig. 70 A generalised pattern of the class 313

Fig. 71 Representative demonstration of the quoted class on examples of mixed forest (created by alternation of single trees and stands of trees) in Stiavnicke vrchy (Slovakia)

Generalisation:

- Mixed-forest area is formed by alternation of plots or single trees of broad-leaved and coniferous trees.



No particularity was identified in this class.

321 Natural grassland

Low productivity grassland. Often situated in areas of rough, uneven ground. Frequently includes rocky areas, briars and heathland.

Extension:
Natural grasslands are areas with herbaceous vegetation (maximum height is 150 cm and gramineous species are prevailing) which cover at least 75 % of the surface covered by vegetation which developed under a minimum human interference (not mowed, fertilized or stimulated by chemicals which might influence production of biomass); here belong for instance grass formations of protected areas, karstic areas, military training fields, etc. (even though the human interference cannot be altogether discarded in quoted areas, it does not suppress the natural development or species composition of the meadows), areas of shrub formations of scattered trees.

This heading includes:
- saline grasslands grown on temporary wet areas of saline soils,
- humid meadows where sedges, rushes, thistles, nettles cover more than 25 % of the parcel,
- natural grasslands with trees and shrubs if they do not cover more than 25 % of the surface to be considered,
- high-productive Alpine grasslands far from houses, crops and farming activities,
- herbaceous military training areas,
- grasslands which can be grazed, never sown and not otherwise managed by way of application of fertilizers, pesticides, drainage or reseeding except by burning,
- grasslands with a yearly productivity less than 1.500 units of fodder/ha,
- herbaceous grass covered composed of non-palatable gramineous species such as *Molinia spp.*and *Brachypodium spp.*,
- derelict natural grassland where ligneous vegetation cover less than 75 % of the area,
- grasslands found on calcareous soils with a high proportion of calcicole species of limestone, chalk Machair or Karst,
- grasslands dotted with bare rock areas which represent less than 25 % of the surface.

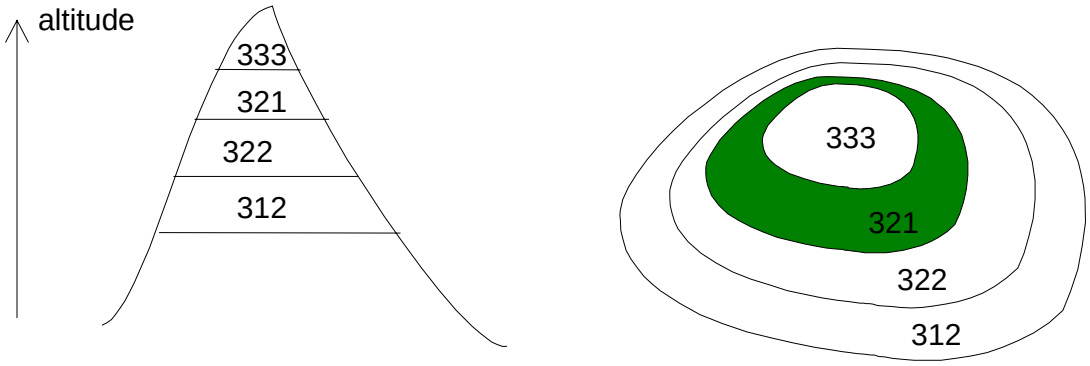
This heading excludes:
- grey dunes (class 331),
- swampy grassland (class 411),
- fallow land (class 211).

Fig. 72 A generalised pattern of the class 321

Fig. 73 Representative demonstration of the quoted class on example of natural grassland in the Morava floodplain (Slovakia)

Generalisation:

- At high altitude, class 321 might be present as altitude formation between heathlands (322) or class 31x and sparsely vegetated areas (333).

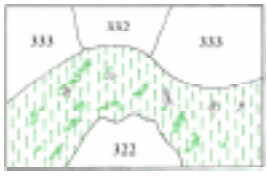


Particularity of class 321: Alpine meadows

Grass formations which occur in high mountains above the upper timberline. The most extensive areas of this particularity as far as the Phare countries are concerned, are in the mountains of the Alps, the Carpathian Arch, etc.

This heading includes:

- natural grassland,
- rocky formations,
- dwarf pines.



Texture of natural grassland

Texture of rocky formations

Texture of dwarf pines

Fig. 74 A generalised pattern of the particularity of class 321

Fig. 75 Representative of the quoted class particularity on example of alpine meadow in the High Tatras (Slovakia)

Particularity of class 321: Grass formations of innundated alluvial plains and coastal plains, lowlands

Human influence is very low with regard to natural conditions – of grass formations - extreme soil humidity and seasonal inundated.

This heading includes:

- natural grassland,
- water bodies,
- shrub formations and scattered trees.

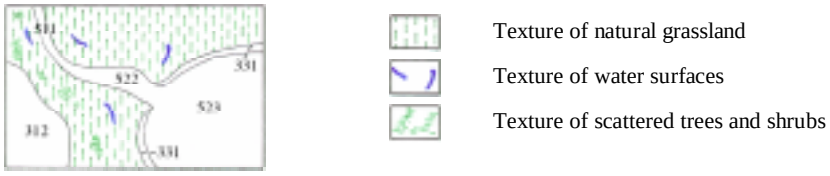


Fig. 76 A generalised pattern of the particularity of class 321

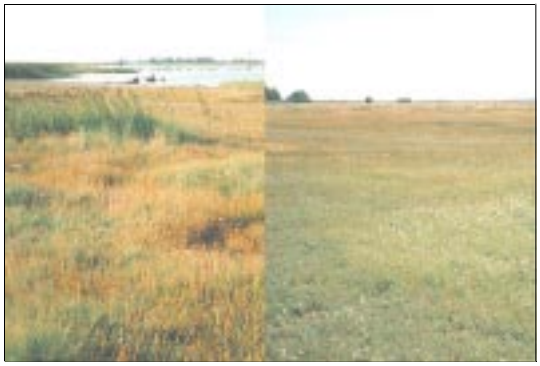


Fig. 77 Representative of the quoted class particularity on examples of lower coastal grassland and upper coastal grassland (Rumpo and Vaemla, Estonia)

322 Moors and heathland

Vegetation with low and closed cover, dominated by bushes, shrubs and herbaceous plants (heather, briars, broom, gorse, laburnum, etc.).

Extension:
This class includes temperate shrubby area vegetation (climax stage of development): includes dwarf forest trees with a 3 m maximum height in climax stage.

This heading includes:
- wet heath distributed on humid or semi-peaty soils (peat depth < 30 cm) with *Erica tetralix/ciliaris*, *Sphagnum spp.* and *Molinia spp.*,
- *Pinus mugo* coverage above the upper tree limit in the Alpine zone or in the bottom of large depressions with temperature inversion,
- maritime, prostrate, wind-swept and cushiony heaths with maritime ecotypes,
- heath and scrub formation in Atlantic, sub-Atlantic and sub-continental areas with gorse (*Ulex spp.*), vaccinium heaths (*Calluna vulgaris*, *Vaccinium spp.*), heather (*Erica spp.*), bracken or gorse (*Genista spp.*), bilberry heaths (*Vaccinium myrtillus*), briar patch (*Rubus spp.*),
- moors in supra-Mediterranean area with box trees and gorse, hedgehog-heaths (*Buxus spp.*, *Astragalus spp.*, *Bupleurum spp.*, etc.),
- sub Alpine tall herbs with dominating bushy facies (*Calluna spp.*, *Vaccinium spp.*, *Rubus spp.*, *Juniperus nana*, etc.),
- arctic moors areas with moss, lichen, gramineous coverage and small dwarf or prostrate shrub formations (*Betula nana*, *Salix lapponum*, *Salix glauca*, *Juniperus alpina*, *Dryas spp.*),
- thickets and brush woods in temperate climate areas (box, bramble thickets, broom fields, gorse thickets, braken fields, common juniper-scrubs),
- brush woods and bush-like forest in Alpine area with dwarf mountain pine scrub or green alder scrub (*Pinus mugo ssp. mughus* and *Alnus spp.*) Alpine willow brush, etc., accompanied by *Rhododendron spp.*,
- thickets and bush-like forest in arctic area with *Betula nana* and *Salix lapponum/glauca spp.*,
- abandoned crops where ligneous/semi-ligneous species cover more of 25 % of the surface,
- coastal dunes (so-called brown dunes) covered and fixed with shrubs (*Hippophae spp.*, *Empetrum spp.*, *Salix spp.*),
- herbaceous coverage formations mainly composed of non-palatable gramineous species such as *Molinia spp.*, *Brachypodium spp.*, etc.

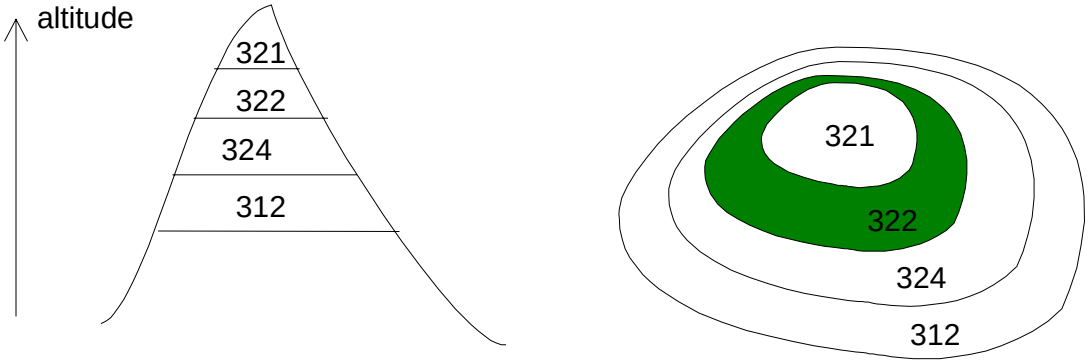
This heading excludes:
- low maquis/mattoral vegetation (class 323),
- heathland under recolonizing process where tree-like species cover more than 30 % of the surface (class 324).

Fig. 78 A generalised pattern of the class 322

Fig. 79 Representative demonstration of the quoted class on example of heather moor (Määvli, Estonia) and alvar with juniper (Rumpo, Estonia)

Generalisation:

- At high altitude class 322 should be used as altitude range formation according to the vegetation gradient between classes 321 and 324/31x.



Particularity of class class 322: Dwarf mountain pine scrub (climax stage of development)

These shrub formations are 2-2.5 m high and form a compact canopy. Dwarf mountain pine scrub is found on large areas in the mountains ranges of the Alps, the Carpathian Arch, etc. It is also often artificially planted, for instance in the coastal dunes as protection against deflation (for instance, in Lithuania). In case of shrub vegetation areas composed of sclerophyllous species such as *Juniperus oxycedrus* and heathland species such as *Buxus spp.* or *Ostrya carpinifolia* with no visible dominance (each species occupy about 50% of the area), priority will be given to sclerophyllous vegetation and the whole area will be assigned class 323.

This heading includes:

- dwarf mountain pine scrub (*Pinus mugo spp. mughus*),
- rocky formations,
- sporadic areas of grassland,
- sporadic tree enclaves.

Fig. 80 A generalised pattern of the particularity of class 322

Fig. 81 Representative of the quoted class particularity on example of dwarf mountain pine shrubs (High Tatras, Slovakia)

323 Sclerophylous vegetation

Bushy sclerophyllous vegetation, includes maquis and garrigue. In case of shrub vegetation areas composed of sclerophyllous species such as *Juniperus oxycedrus* and heathland species such as *Buxus spp.* or *Ostrya carpinifolia* with no visible dominance (each species occupy about 50% of the area), priority will be given to sclerophyllous vegetation and the whole area will be assigned class 323.

Extension:
This class includes evergreen sclerophyllous bushes and scrubs which compose maquis, garrigue, mattoral and phrygana.

This heading includes:

- mattoral of arid zone with pre-desert brushes and tall *Ziziphus lotus*,
- laurrel mattoral with *Laurus nobilis*,
- cypress mattoral with native or planted cypressus,
- tree-spurge formation with dense stands of *Euphorbia dendroides* in thermo-Mediterranean area,
- palmetto brush formations with dominating *Chamaerops humilis*,
- pre-desert scrub with halo-nitrophyllous scrubs and gypsum scrubs: jujube brush (*Ziziphus lotus*), shrubes of African affinities (spiny brush formation of accacia),
- abandoned olive groves.

This heading excludes:

- arborescent mattorals which are a pre- or post-broad-leaved evergreen forest formation with more or less dense arborescent cover with a usually thick high evergreen shrub stratum organised around evergreen oaks (*Quercus suber/ilex/rotundifolia*) olive trees or pines the crown cover of which is more than 30 % (class 3.1.1). If the crown cover is less than 30 %, it is assigned 3.2.4.

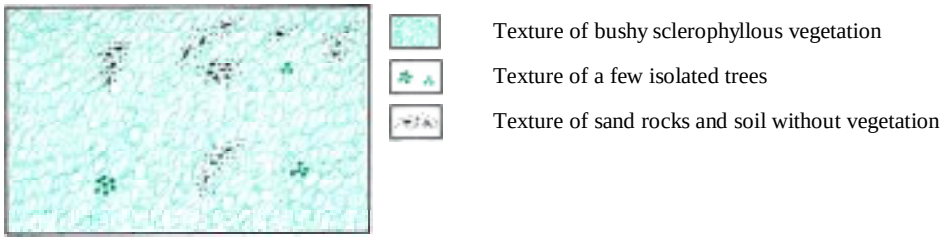


Fig. 82 A generalised pattern of the class 232

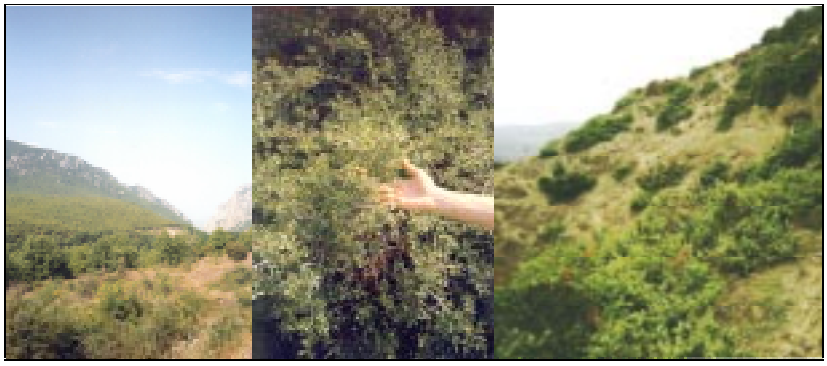


Fig. 83 Representative demonstration of the sclerophyllous vegetation (maquis composed of Quercus coccifera) on examples from FYROM. The 3rd photos illustrates a vegetation association of Juniperus oxycedrus mixed with Ostrya carpinifolia or Buxus spp. with no dominance to be assigned class 323

No particularity was identified in this class.

324 Transitional woodland/shrub

Bushy or herbaceous vegetation with scattered trees. Can represent either woodland degradation or forest regeneration/recolonisation.

Extension:
Areas of natural developmental forest formations (young broad–leaved and coniferous wood species with herbaceous vegetation and dispersed solitary trees) for instance; in abandoned meadows and pastures or after calamities of various origin, part of this class may be also various degenerative stages of forest caused by industrial pollution, etc.

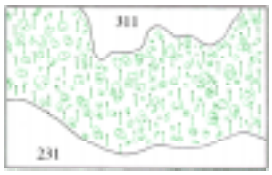
This heading includes:

- arborescent mattorals which are pre- or post-formation of broad-leaved evergreen forest with a usually thick evergreen shrub stratum composed of evergreen oaks (*Quercus suber/ilex/ rotundifolia*), olive trees, carob trees or pines the crown cover density of which is less than 30 % of the surface,
- agricultural lands (classes 2xx) under recolonizing process with occurrence of forest trees which cover more than 30 % of the surface (scattered trees or small plots of forests),
- abandoned fruit tree plantations and orchards,
- clear cuts in forest areas **,
- young plantations,**
- forest nurseries inside forests areas,**
- natural grassland areas with small forests < 25 ha and/or with trees intermixed which cover more than 30 % of the surface,
- open clear-felled or regeneration areas with regrowing during transition stage which last for maximum 5-8 years,
- forest burning areas which do not show black tones any more in the satellite image but are still visible,
- heavily damaged forests by wind, snow-brake or acid rains and other pollution with more than 50 % dead trees,
- marginal zones of bogs with a vegetation composed of shrubs and pine bogs which cover more than 50 % of the surface,
- bare rocks with scattered trees that cover more than 10 % of the surface.

This heading excludes:

- transitional woodland areas when the area has been overgrown with forest vegetation. The canopy closure which is at least 50 % and if the average breast diameter of trees is at least 10 cm (class 311),
- abandoned olive groves (class 323),
- agricultural lands (classes 2xx) with occurrence of forest vegetation with an overgrowing rate less than 50 % (class 243),
- stable/climax tree-like forest formations with a tree height less than 4 m and *Pinus mugo* forests (class 322),
- arborescent mattoral with trees of which the crown cover is more than 30 % (class 311).

** See general remark concerning heading 31x.



Texture of forest regeneration or degradation

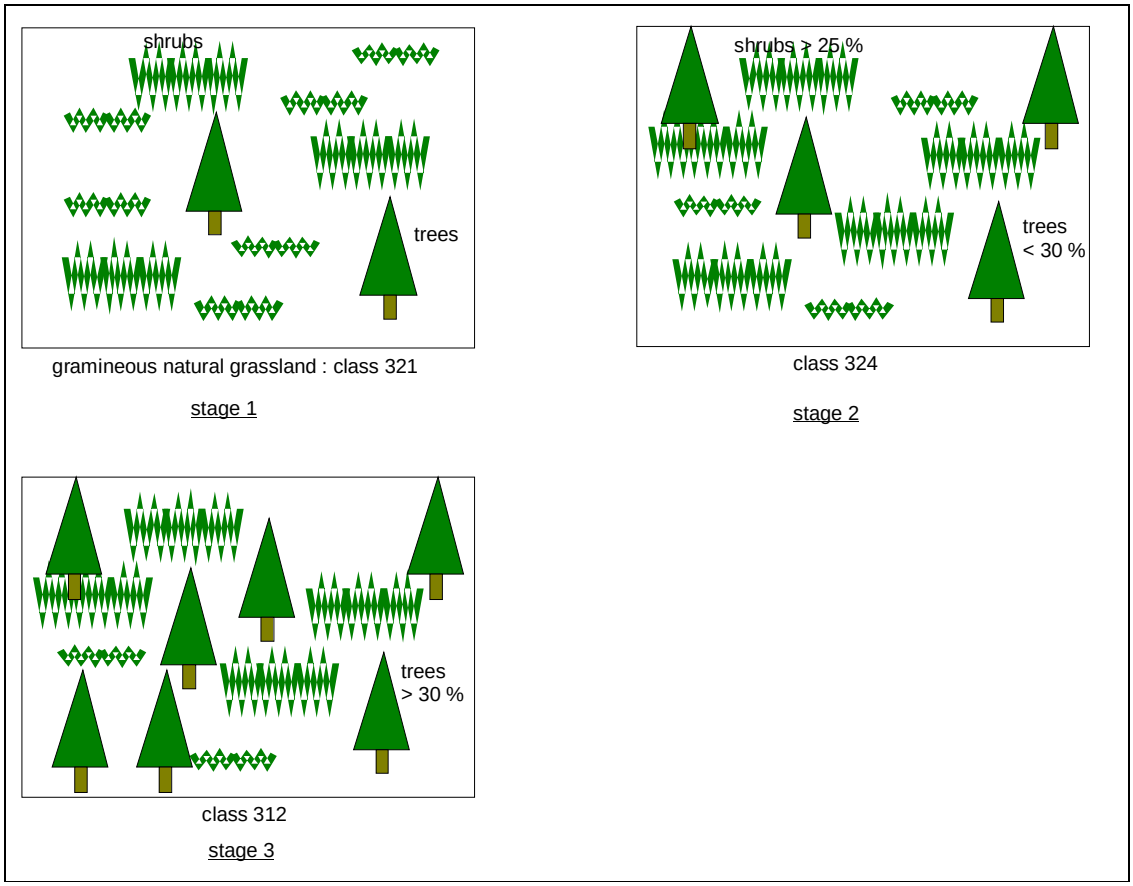
Texture of herbaceous plants

Fig. 84 A generalised pattern of the class 324

Fig. 85 Representative demonstration of the quoted class on examples of forest degradation stage (damaged forest) in the Jizerske Mts. (Czech Republic) and natural developmental forest formations (Kysucka vrchovina, Slovakia) and woodland degradation in Slovenia

Generalisation:

- Class 324 within an evolution stage of natural grasslands.

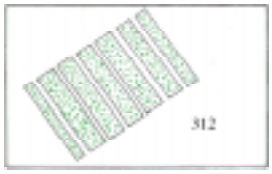


Particularity of class 324: Forest clear–cuts

These areas contain e.g. regular belts which originated by alternation of natural or planted young stand with rests of forest. Young stands were distinguished by their physiognomic appearance (height of the trees and the canopy of crowns) in time of taking the image.

This heading includes:

- planted or natural young stands after logging.



Texture of young stands natural or planted after cutting

Fig. 86 A generalised pattern of the particularity of class 324

Fig. 87 Representative of the quoted class particularity on example of forest clear–cut (Kysucka vrchovina, Slovakia)

Particularity of class 324: Wooded fen, bog and transitional bog

These shrubby-herbaceous formations with scattered tree forms marginal zones of peat bogs.

This heading includes:

- shrubs and herbaceous vegetation with scattered trees (*Betula pubescens, Alnus glutinosa, Picea abies, Pinus silvestris, Salix spp.*).

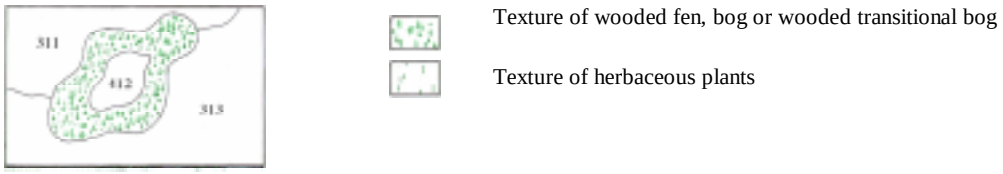


Fig. 88 A generalised pattern of the particularity of class 324

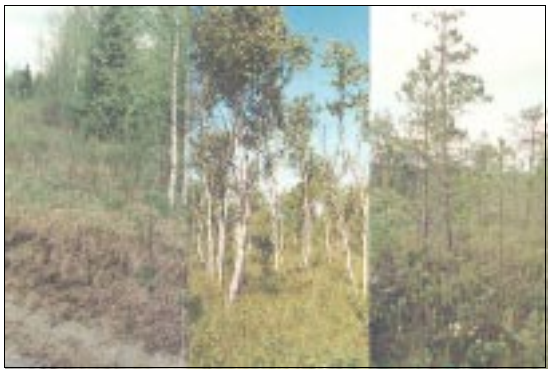


Fig. 89 Representative of the quoted class particularity on examples of wooded fen, wooded transitional bog and wooded bog (Palase, Avaste and Alam-pedja NR, Estonia)

331 Beaches, dunes, and sand plains

Beaches, dunes and expanses of sand or pebbles in coastal or continental locations, including beds of stream channels with torrential regime.

Extension:
This class includes supra-littoral beaches and dunes developed at the back of the beach from high water mark towards land.

This heading includes:
- river dune formation in the immediate vicinity of great rivers,
- inland and lacustrine dunes,
- shifting dunes with mobile, unvegetated or open grasslands (white dune),
- grey dunes fixed, stabilised or colonised by more or less closed perennial grasslands,
- machair formations (nature coastal sand-plain with more or less surface and grassland vegetation),
- ergs (continental dune field located in desert),
- accumulation of gravels along lower section of Alpine rivers.

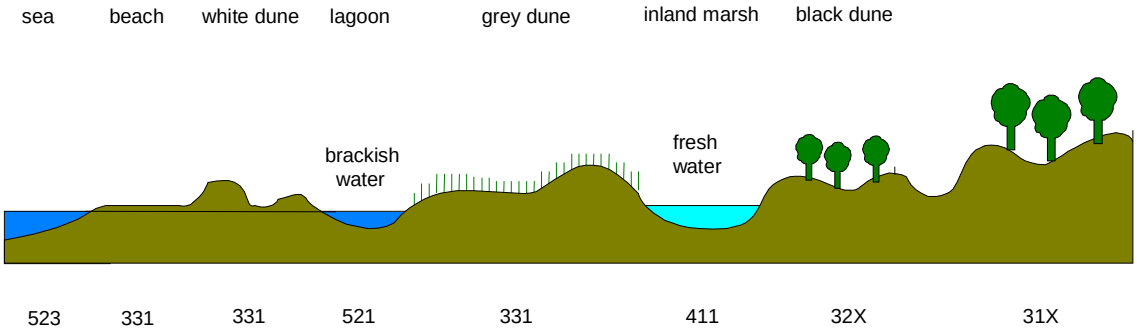
This heading excludes:
- inland dune heaths (crowberry and heather brown dunes) (class 322),
- inland dunes thickets occupied by dense formations of shrubs including sea-buckthorn, privet, elder, willow, gorse or broom often festooned with creepers (class 322),
- dune juniper thickets and woods (class 32x),
- dune sclerophyllous scrubs (class 323),
- wooded dune (class 31x),
- humid dune-slacks (class 411),
- unvegetated gravels on steep Alpine mountain side (class 332),
- vegetated islands inside stream beds (class 3xx).

Fig. 90 A generalised pattern of the class 331

Fig. 91 Representative demonstration of the quoted class on examples of sandy bed of Morava river (Slovakia) and coastal dunes in Lithuania.

Generalisation:

- Zoning of dune vegetation from the sea toward supra-littoral landscapes.



No particularity was identified in this class.

332 Bare rock

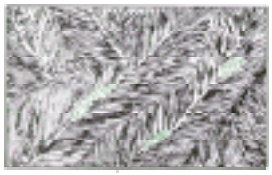
Scree, cliffs, rock outcrops, incuding active erosion, rocks and reef flats situated above the high-water mark.

This heading includes:

- unvegetated abandoned extraction sites,
- sparsely vegetated areas where 75 % of the land surface is covered by rocks,
- stable rocks with limestone pavements, block litter and mountain-top-debris,
- unvegetated lapiaz,
- sites and products of recent volcanic activities, volcanic ash and lapilli fields, barren lava fields,
- unvegetated supra-littoral rocky zones.

This heading excludes:

- white dunes (class 331),
- mediolittoral rocky sea beds (class 423),
- bare rocks with scattered trees that cover more than 10 % of the surface (class 324).



Texture of cliff relief forms and talus cones

Texture of grassland

Fig. 92 A generalised pattern of the class 332

Fig. 93 Representative demonstration of the quoted class on example of the cliff relief forms in the High Tatras (Slovakia)

No particularity was identified in this class.

333 Sparsely vegetated areas

Includes steppes, tundra and badlands. Scattered high-altitude vegetation.

Extension:
Scattered vegetation is composed of gramineous and/or ligneous and semi-ligneous species for determining the ground cover percentage, excluding cryptograms.

This heading includes:

- sparsely vegetated and unstable areas of stones, boulders, or rubble on steep slopes where the vegetation layer covers between 15 % and 50 % of the surface,
- sub-desertic steppes with gramineous species (*Artemisia spp.*) mixed with alfa (*Stipa spp.*) when they cover between 15 % and 50 % of the surface,
- vegetation of "lapie" areas or limestone paving,
- bare soils inside military training areas,
- karstic areas of gramineous, ligneous and semi-ligneous vegetation.

This heading excludes:

- windblown part of dune areas (class 331),
- areas where ground cover more than 85 % of the surface (class 332),
- areas where the vegetation layer covers more than 50 % of the surface (class 321),
- dense alfa (*Stipa ssp.*) coverage (class 321).

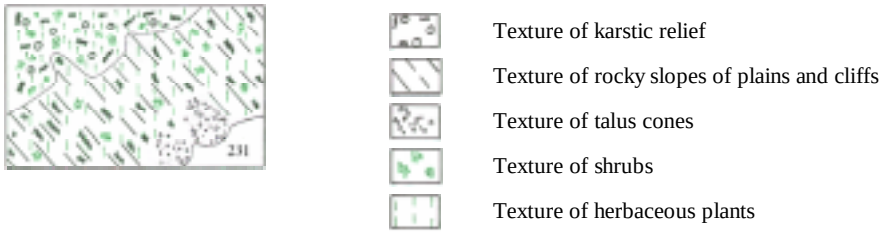


Fig. 94 A generalised pattern of the class 333

Fig. 95 Representative demonstration of the quoted class on example of talus cone in the High Tatras (Slovakia)

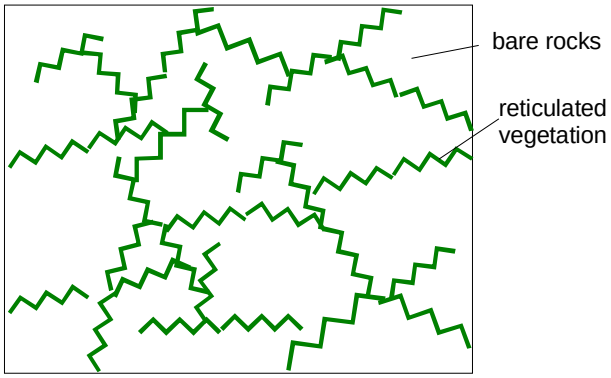
Generalisation:

- For class 333, a quantitative scheme should be applied:

Class 321	Class 333	Class 332
vegetation > 50 % and ground cover < 50 %	10 % < vegetation < 50 % and 50 % < ground cover < 90 %	ground cover > 90 % and vegetation < 10 %

- "Lapie" areas:

Sparsely vegetated areas should also be applied for reticulated landscapes as "lapie" or limestone paving where vegetation is characterised by line/reticular distribution on ground cracking substratum.



No particularity was identified in this class.

334 Burnt areas

Areas affected by recent fires, still mainly black.

Extension:
This class includes burnt forest areas, moors and heathlands, transitory forest-shrub formations, areas with sparse vegetation.

This heading includes:
- burns which are younger than three years and still visible in the satellite images,
- all natural and semi-natural vegetated areas.

This heading excludes:
- human farming management by burning arable lands (class 211).

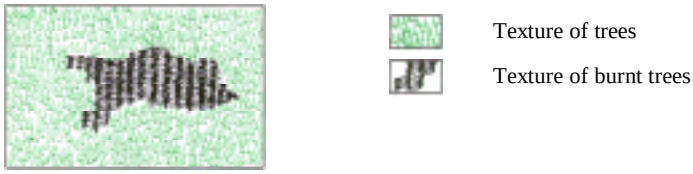


Fig. 96 A generalised pattern of the class 334

Fig. 97 Representative demonstration of the quoted class on examples of burnt forest areas in Slovakia, Lithuania and Portugal

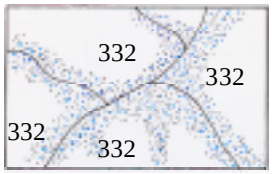
No particularity was identified in this class.

335 Glaciers and perpetual snow

Land covered by glaciers or permanent snowfields.

This heading includes:

- glaciers and perpetual snow,
- bare rocks.



Texture of glaciers and perpetual snow

Texture of bare rocks

Fig. 98 A generalised pattern of the class 335

Fig. 99 Representative demonstration of the glaciers on example from Slovenia

Generalisation:

- glaciers and perpetual snow =50 % > 335
- bare rocks =50 %
- glaciers and perpetual snow >50 % ⇨ 335
- glaciers and perpetual snow <50 % ⇨ 332

No particularity was identified in this class.

4.4 Wetlands

Class 4.1 Inland wetlands
Areas flooded or liable to flooding during the great part of the year by fresh, brackish or standing water with specific vegetation coverage made of low shrub, semi-ligneous or herbaceous species. Includes water-fringe vegetation of lakes, rivers, and brooks and of fens and eutrophic marshes, vegetation of transition mires and quaking bogs and springs, highly oligotrophic and strongly acidic communities composed mainly of sphagnum growing on peat and deriving moistures of raised bogs and blanket bogs.

Class 4.2 Coastal wetland
Areas which are submerged by high tides at some stage of the annual tidal cycle. Includes salt meadows, facies of saltmarsh grass meadows, transitional or not to other communities, vegetation occupying zones of varying salinity and humidity, sands and muds submerged for part of every tide devoid of vascular plants, active or recently abandoned salt-extraction evaporation basins.

411 Inland marshes

Low-lying land usually flooded in winter, and more or less saturated by water all year round.

Extension:
This class includes non-forested areas of low-lying land flooded or liable to flooding by fresh, stagnant or circulating water. Covered by specific low ligneous, semi-ligneous or herbaceous vegetation.

This heading includes:

- fens and transitional bogs without peat deposition or on peaty ground (peat layer is less than 30 cm thick) with specific vegetation composed of reeds, bulrushes, rushes, willows, sedges and tall herbs, sphagnum hummocks, often with alder or willows and other water plants,
- marsh vegetation located in margin zones of raised bogs,
- water-fringe vegetation of reed beds, sedge communities, fen-sedge beds, tall rush swamps, riparian cane formations,
- high floating vegetation,
- inland saline (alkali) marshes (prevailing arheic).

This heading excludes:

- humid meadows (water logging of between 10 and 30 cm depth) (class 231),
- rice fields (class 213),
- free water space in wetlands (class 512),
- salt marshes (class 421),
- salt meadows in intertidal zone (class 421),
- polders with reticulated channels bordered by hydrophilic vegetation (class 2xx),
- humid forests with a crown cover more than 30 % (class 31x),
- low floating aquatic vegetation (class 512).

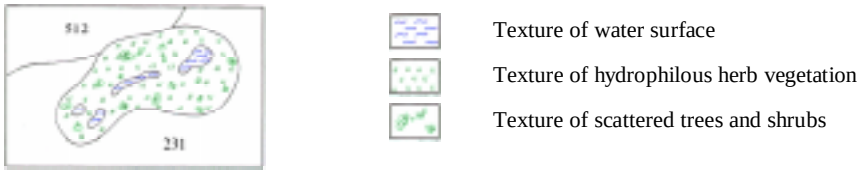
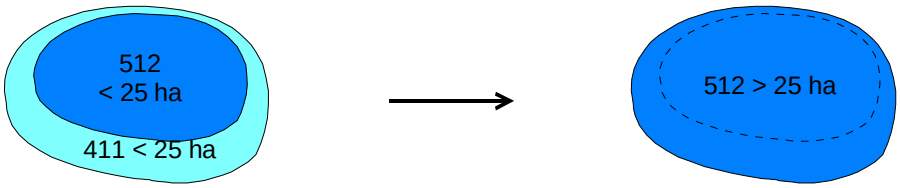


Fig.100 A generalised pattern of the class 411

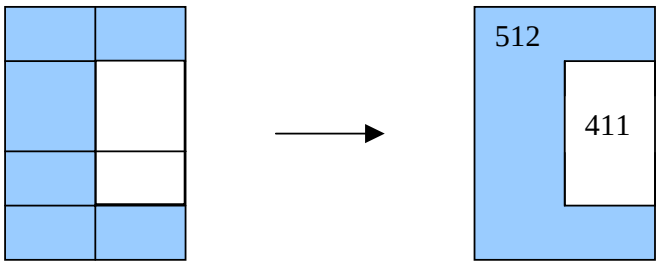
Fig. 101 Representative demonstration of the quoted class on examples of inland marsh in Morava floodplain (Slovakia) and high reed vegetation of Danube delta (Romania)

Generalisation:

- When a marsh surrounds a small lake < 25 ha, the marsh area should be connected to water bodies to make up to 25 ha polygon of 512.



- Water body areas which are fully or partially empty, during the acquisition of satellite data due to cleaning or dredging process must be classified class 411.



Particularity of class 411: Treeless fens and transitional bogs sometimes with more than a 30 cm–thick peat layer

These are located in inland throughflow basins, in river flood valleys, areas of springs, and margin zones of raised bogs. Surface of peatlands is plain or concave with small microforms - hummocks and tussocks.

This heading includes:

- areas of hydrophilous herb vegetation (*Cares spp., Comarum palustres, Menyanthes trifoliata, Phragmites australis, Trychophorum alpinum, Oxycoccus spp.).*

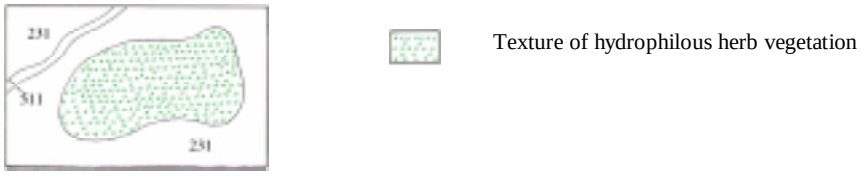


Fig. 102 A generalised pattern of the particularity of class 411

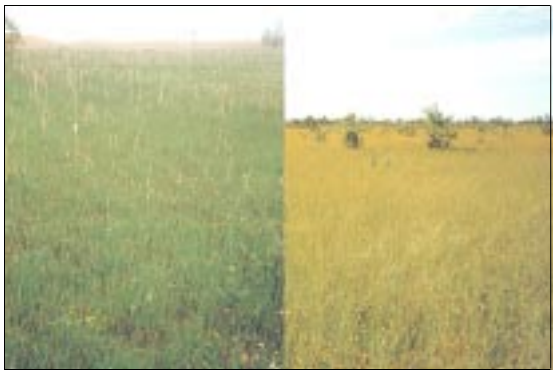


Fig. 103 Representative of the quoted class particularity on examples of treeless fen and treeless transitional bog (Lahemaa NP and Tuhu NR, Estonia)

412 Peatbogs

Peatland consisting mainly of decomposed moss and vegetable matter. May or may not be exploited.

This heading includes:

- minerotrophic peat bogs fed by ground water or streams with mosses (*Drepanocladus spp.*) and *Carex spp.* or schoenus in alcaline bogs with occurrence of *Calix spp.*, *Betula spp.* and *Alnus spp.*,
- ombrotrophic peat bogs fed only by direct precipitation with sphagnum species which are abundant and dominant with other acidophilous plants such as *Eriophorum vaginatum, Scirpus spp.*, *Carex spp.*, *Vaccinium oxicoccos, Andromeda spp.*, *Drosera spp.* and lichens,
- blanket bogs with sphagnum species and *Narthecium spp.*, *Molinia spp.*, *Scirpus spp.*, *Shoenus spp.*, *Erophiorum spp.*,
- boreal peat bogs with reticulated structure (aapa) with *Sphagnum spp.*, *Empetrum spp.*, *Vaccinium spp.*, *Betula nana, Salix nana, Carex spp.*, *Eriophorium spp.*, *Utriculara spp.*, *Drosera spp.*,
- peat extracting areas,
- fossil arctic peat bogs (palsa) with *Vaccinium spp.*, *Betula nana, Salix lapponum* and *Salix glauca*, lichens and *Carex spp.*

This heading excludes:

- bog eye > 25 ha : large pool or lake occurring near the centre of raised bogs (class 512),
- transitional bogs on peaty soils (< 30 cm thick peat) (class 324),
- wooded peat bogs (class 31x),
- drained peat bogs (class 411),
- abandoned peat milling areas (class 32x),
- upland areas of blanket peat bogs where peat does not accumulate dominated by nardus or other deciduous grasses (class 321).

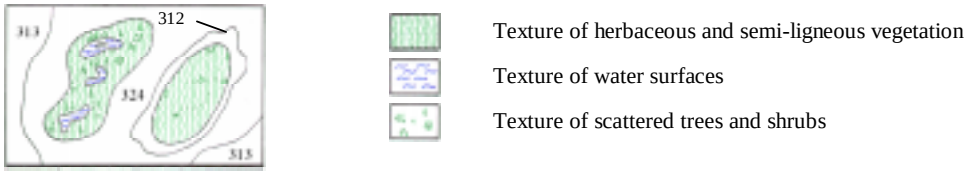


Fig. 104 A generalised pattern of the class 412

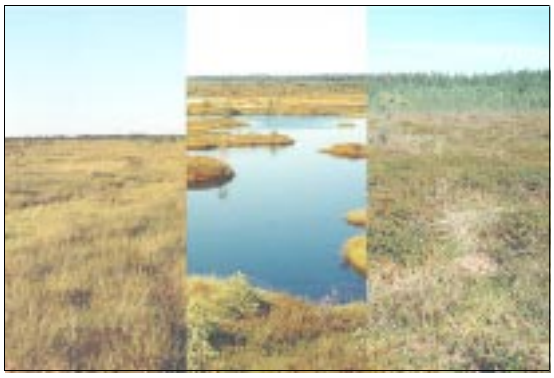
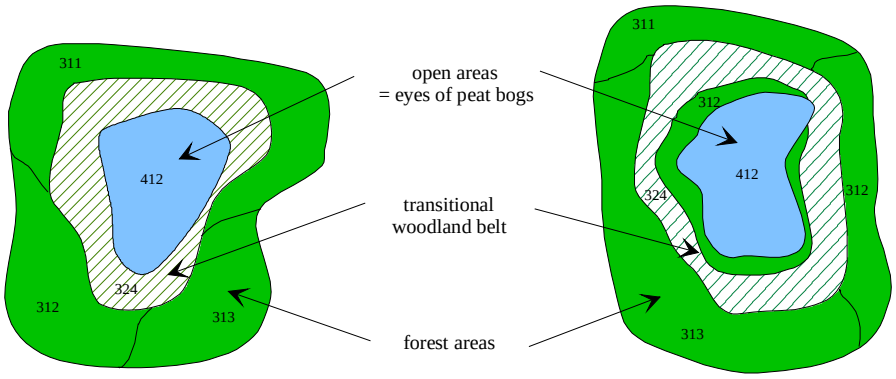


Fig. 105 Representative demonstration of the quoted class on examples of natural open bog, natural open bog with pools and natural dwarf shrub bog (Marimetsa, Nätsi-Võlla and Laukasoo, Estonia)

Generalisation:

- The figures below illustrate the two possible schemes to be applied for mapping peat bogs according to their geographic context.



Particularity of class 412: Explored peat bogs

Areas with extraction of peat.

This heading includes:

- uncovered peat bog,
- exploited peat bog.

Texture of uncovered peat-bog

Texture of exploited peat-bog

Fig. 106 A generalised pattern of the particularity of class 412

Fig. 107 Representative of the quoted class particularity on example of the explored peat bog in Lithuania

421 Salt marshes

Vegetated low-lying areas, above the high-tide line, susceptible to flooding by seawater. Often in the process of filling in, gradually being colonized by halophilic plants.

This heading includes:

- intertidal sand, silt or mud-based habitats colonized by halophytic grasses such as: *Puccinelia spp.*, *Spartina spp.*, rushes such as *Juncus spp.* and *Blismus rufus* and herbs such as *Limonium spp.*, *Aster tripolium*, *Slicornia spp.* Includes all flowering plant communities which are submerged by high tides at some stage of the annual cycle,
- salt meadow shep areas.

This heading excludes:

- inland salt marshes with halophile and gypsophile communities (classes 333 or 411),
- humid meadows of low vegetation dominated by *Juncus gerardis*, *Carex divisa*, *Hordeum marinum* or *Trifolium spp.* and *Lotus spp.* of the edge of brackish lagoons (class 411).

Fig. 108 A generalised pattern of the class 421

Fig. 109 Representative demonstration of the quoted class on example of salt marshes Rumpo (Estonia) and in France

No particularity was identified in this class.

422 Salines

Salt-pans, active or in process of abandonment. Sections of salt marsh exploited for the production of salt by evaporation. They are clearly distinguishable from the rest of the marsh by their parcellation and embankment systems.

This heading includes:

- salinas organised for breeding shellfish, fishes,
- salt pans,
- sea water.

This heading excludes:

- inland salinas (class 131).

Fig. 110 A generalised pattern of the class 422

Fig. 111 Representative demonstration of the saline on example from France

No particularity was identified in this class.

423 Intertidal flats

Generally unvegetated expanses of mud, sand or rock lying between high and low water marks. 0 m contour on maps.

Extension:
0 m marine contour on maps.

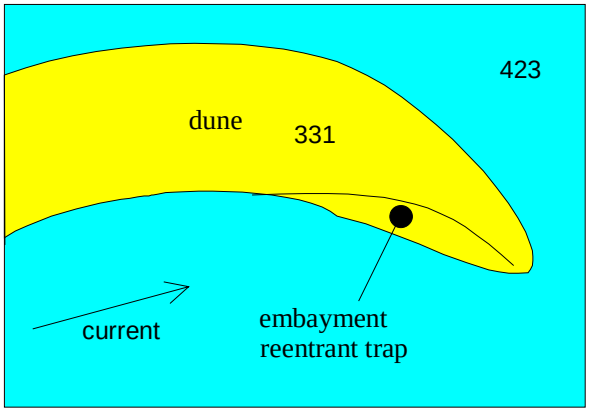
This heading includes:
- intertidal seaweed-covered boulders, unvegetated shores, covered by shattered rocks or boulders, cliffs and outcropping base-rocks.

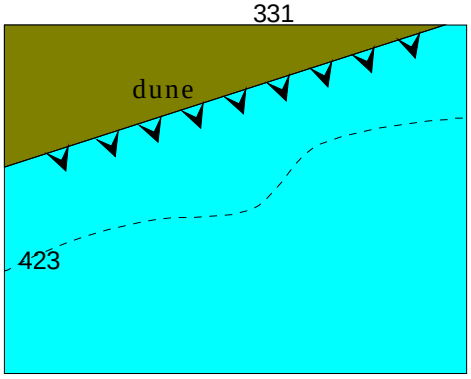
This heading excludes:
- salt marshes (class 421),
- broadening of rivers entering the sea (class 522),
- part of lagoon area directly connected to the sea which is artificially separated (class 521).

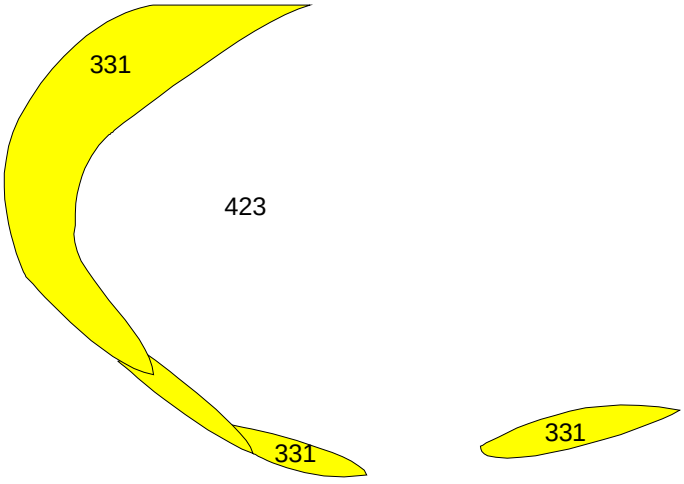
Fig. 112 A generalised pattern of the class 423

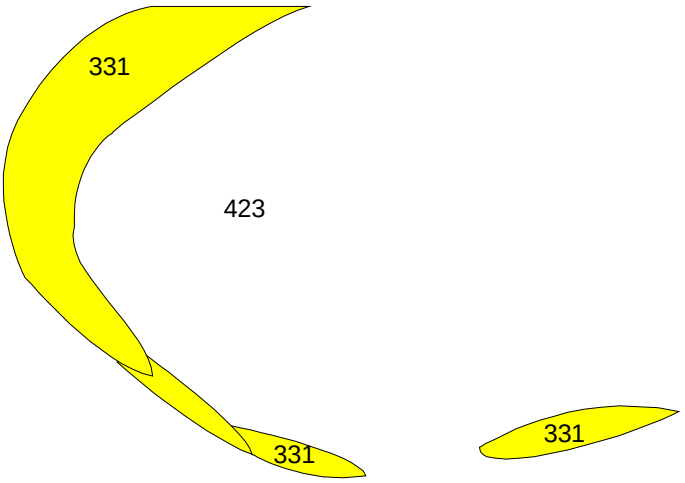
Fig. 113 Representative demonstration of the intertidal flat on example from Belgium

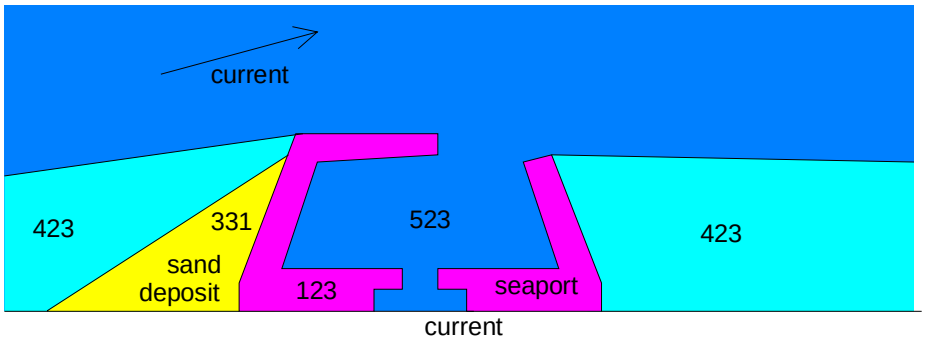
Generalisation:
- morphological contexts of main erosion/deposit material processing where high water mark from topographic maps might be modified.

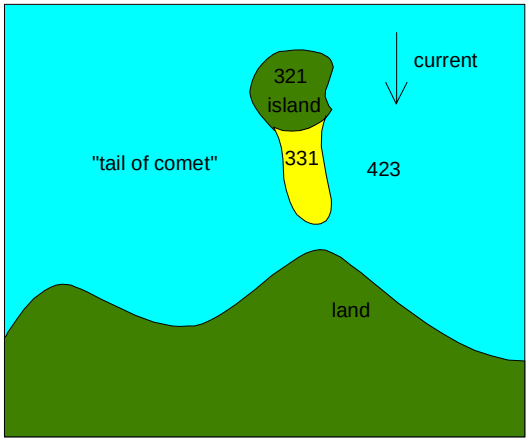

423
dune
331
current
embayment
reentrant trap

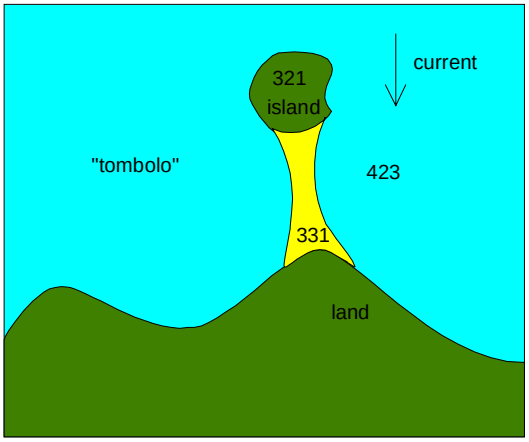

331
dune
423


331
423
331
331









No particularity was identified in this class.

4.5 Water bodies

Class 5.1 Inland waters
Lakes, ponds and pools of natural origin containing fresh (i.e non-saline) water and running waters made of all rivers and streams. Man-made fresh water bodies including reservoirs and canals.

Class 5.2 Marine waters
Oceanic and continental shelf waters, bays and narrow channels including sea lochs or loughs, fiords or fjords, rya straits and estuaries. Saline or brackish coastal waters often formed from sea inlets by sitting and cut-off from the sea by sand or mud banks.

511 Water courses

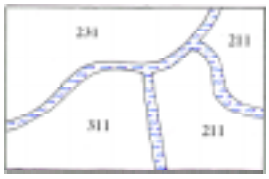
Natural or artificial water-courses serving as water drainage channels. Includes canals. Minimum width for inclusion: 100 m.

This heading includes:

- sand or gravel accumulations along streams < 25 ha,
- rivers which have been canalised.

This heading excludes:

- water bodies areas connected to watercourses (class 512),
- hydroelectric plant located on watercourses > 25 ha (class 121).



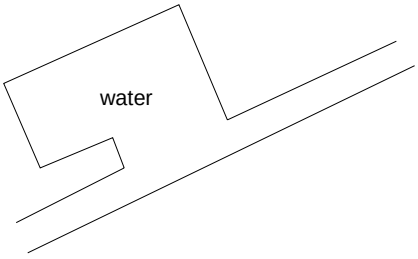
Texture of water courses and channels

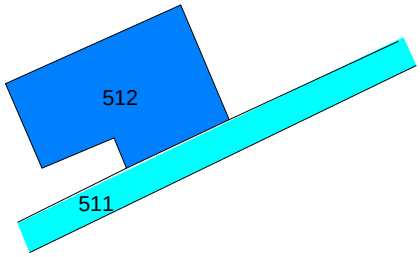
Fig. 114 A generalised pattern of the class 511

Fig. 115 Representative demonstration of the quoted class on example of Danube river (Slovakia)

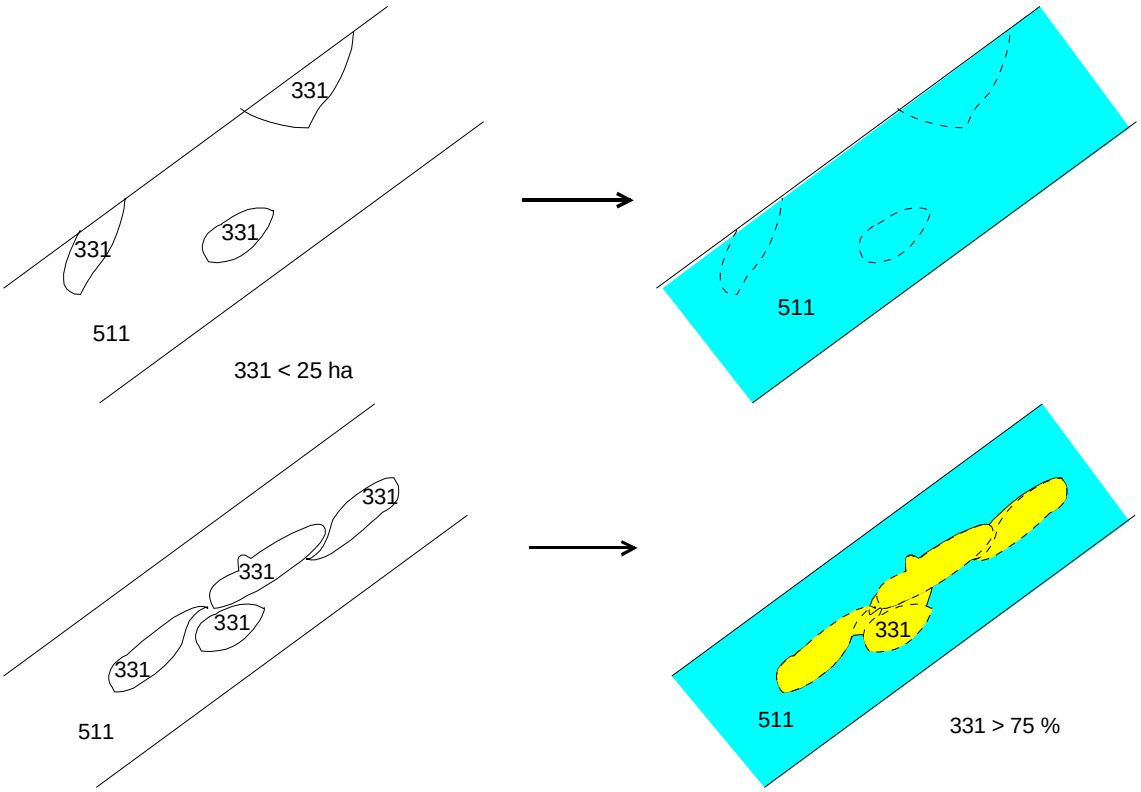
Generalisation:

- Water body areas along streams are artificially separated from class 511 and assigned class 512 even if they are connected to them.



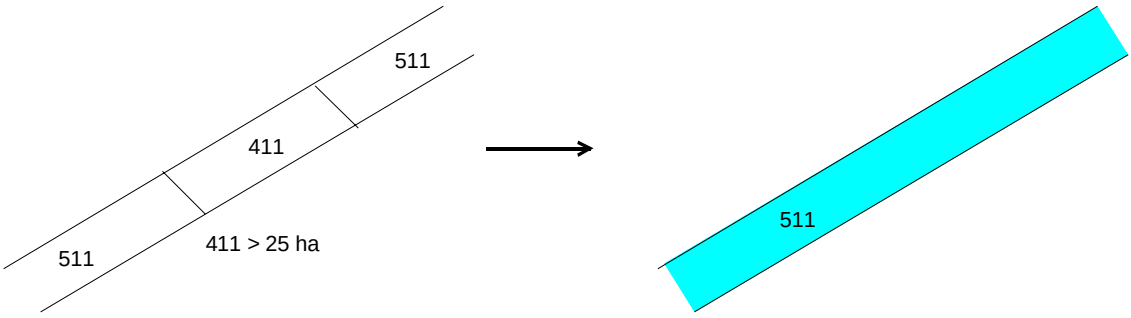


- Sand and gravel accumulations inside a stream bed area are connected to the stream.

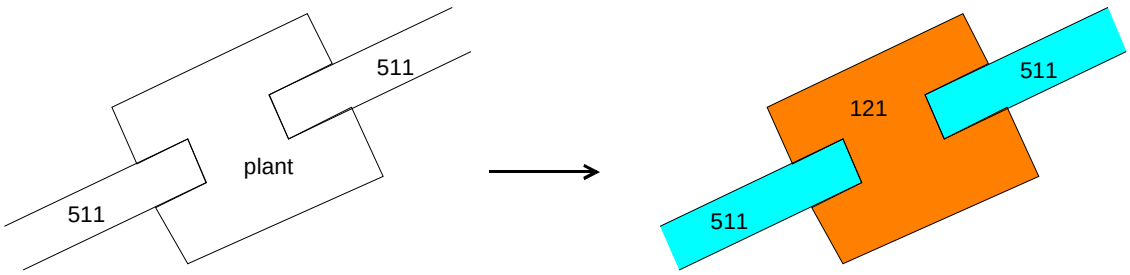


How to map watercourses with significant presence of *Arundo donax* or *Phragmites ssp.* (class 411) located within the watercourse bed?

- In this case, it is more important to preserve the continuity of watercourses without interruption of 411 areas.



- Hydroelectric plant located on water-course is an exception of the continuity rule normally applied for class 511.



No particularity was identified in this class.

512 Water bodies

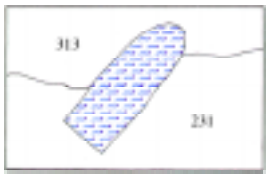
Natural or artificial stretches of water.

This heading includes:

- low floating aquatic vegetation with species such as *Nuphar spp.*, *Nymphaea spp.*, *Potamageton spp.* and *Lemna spp.*,
- archipelago of lakes inside land areas,
- water surfaces used for fresh-water fish-breeding activities.

This heading excludes:

- surface plant species characteristic for standing water (e.g. *Typha latifolia*, *Carex riparia*, *Glyceria maxima*, *Sparganium erectum* and *Phragmites communis* (class 411),
- liquid waste (class 132).

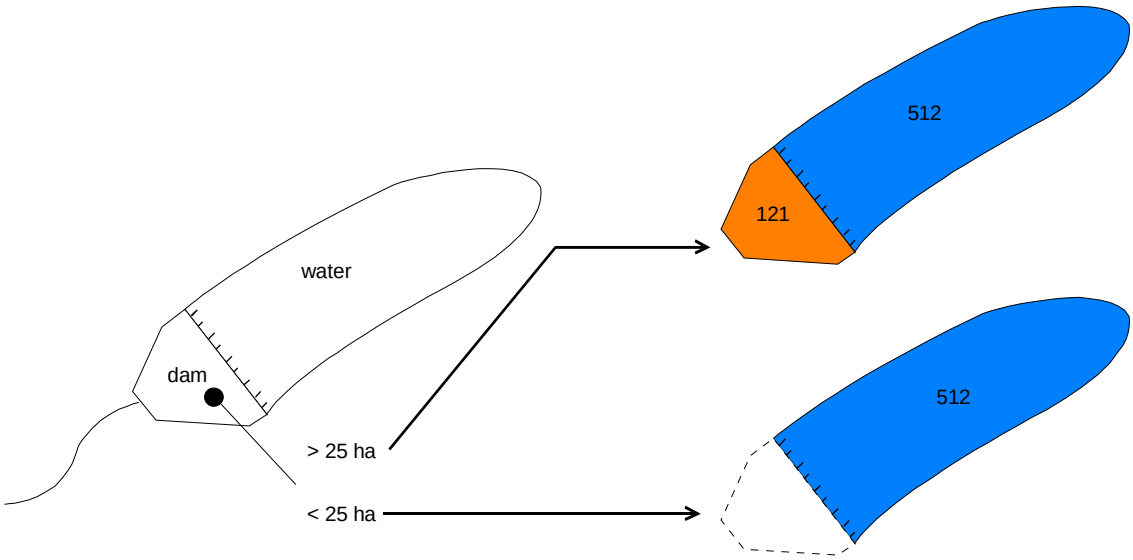


Texture of water surface

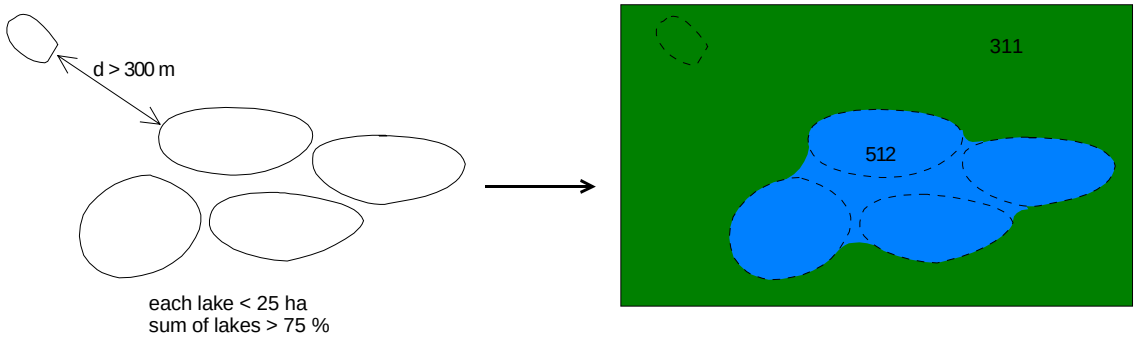
Fig. 116 A generalised pattern of the class 512

Fig. 117 Representative demonstration of the dam infrastructure on example from Auvergne (France)

Generalisation:
Dam infrastructure should be isolated and assigned class 121 if its surface area is more than 25 ha.



- In case of a group of small lakes (each water surface < 25 ha), linking principle may be applied if :
  1) the resulting water polygon is > 25 ha,
  2) the new zone created is composed of 75 % of free water.



No particularity was identified in this class.

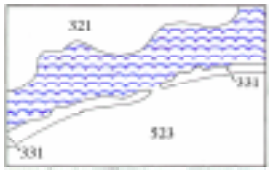
521 Coastal lagoons

Stretches of salt or brackish water in coastal areas which are separated from the sea by a tongue of land or other similar topography. These water bodies can be connected to the sea at limited points, either permanently or for parts of the year only.

Extension:
This class includes

This heading includes:
- only water surface, vegetation fringe should be separated,
- estuarine lagoon,
- salt or brackish water surface remaining at low tide,
- lagoons organised for breeding shellfish.

This heading excludes:
- salt marshes (class 421),
- water courses (class 511),
- beaches (class 331),
- fresh water bodies along shoreline (class 512).

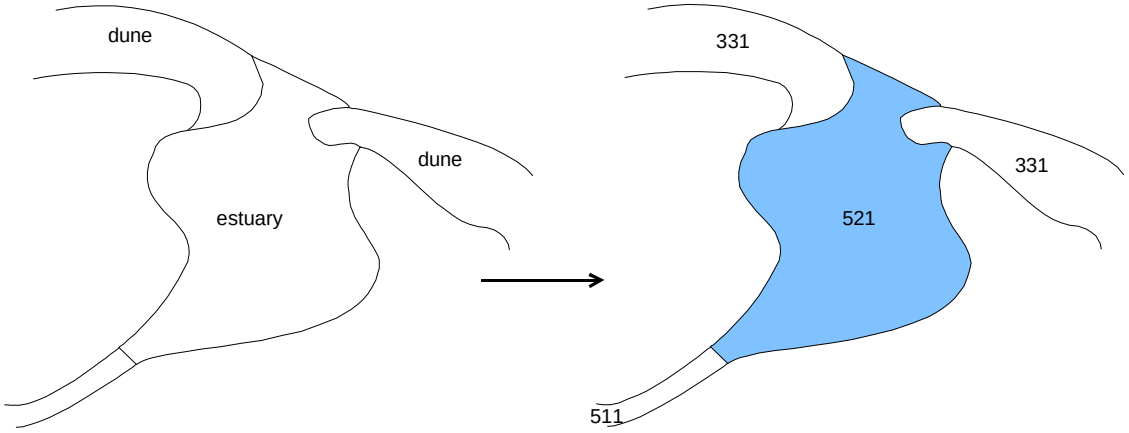


Texture of salt or brackish water

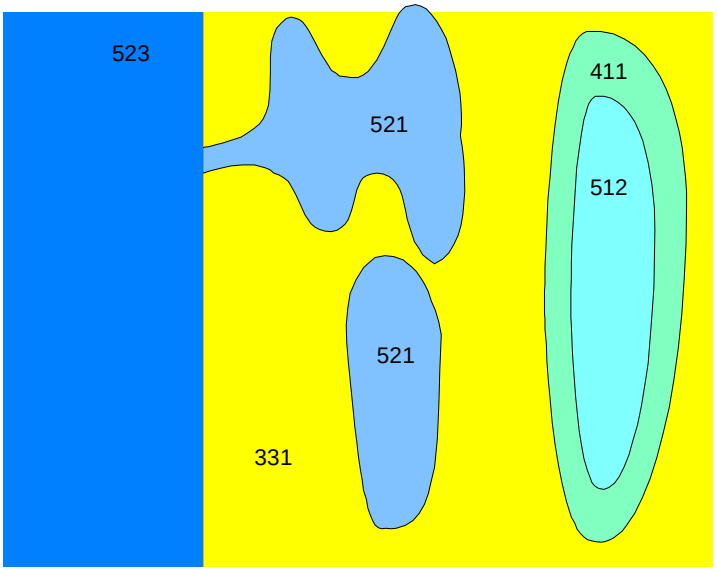
Fig. 118 A generalised pattern of the class 521

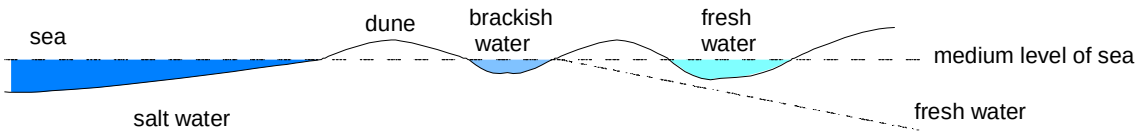
Fig. 119 Representative demonstration of the quoted class on example of coastal lagoon (Baltic Sea, Lithuania)

Generalisation:
- In case of estuarine lagoon shape as described below, priority should be given to lagoon class.



- In case of water bodies along the shoreline, its geomorphologic position regarding to the water table must be taken into account. Normally:





No particularity was identified in this class.

522 Estuaries

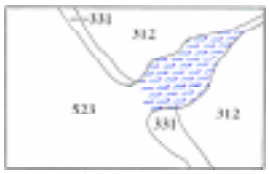
The mouth of a river within which the tide ebbs and flows.

This heading includes:

- the water and the channel bed with the fringing vegetation zone < 25 ha.

This heading excludes:

- bays and narrow channel (class 523),
- fjords or fiards, ryas and straits (class 523),
- fringing vegetation along the estuary channel bed > 25 ha (class 421).



Texture of estuary water surface

Fig. 120 A generalised pattern of the class 522

Fig. 121 Representative demonstration of the quoted class on example of estuary (in French Brittany)

Generalisation:

- In practice, upstream maritime influence is stopped by the first floodgate; downstream, the estuary limit is arbitrary.

No particularity was identified in this class.

523 Sea and ocean

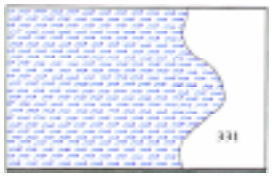
Zone seaward of the lowest tide limit.

This heading includes:

- sea water.

This heading excludes:

- archipelago of lands located inside sea/ocean areas,
- sea water areas as part of port areas which include sea water to reach a zone > 25 ha.



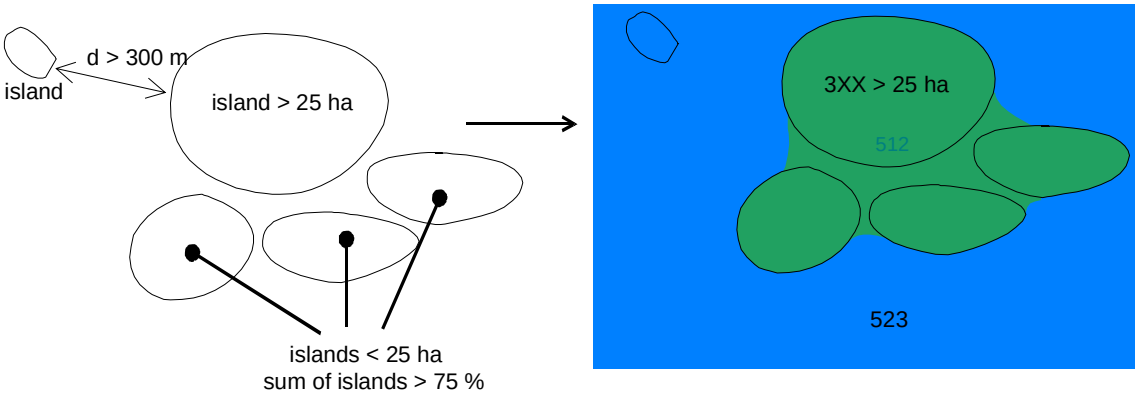
Texture of sea water

Fig. 122 A generalised pattern of the class 523

Fig. 123 Representative demonstration of the quoted class on example of Baltic Sea (Lithuania)

Generalisation:

- The same generalisation rule as for archipelago of lakes (class 512) should be applied on two conditions:
  1) resulting island polygon > 25 ha,
  2) the new zone created is composed of 75% of land.



No particularity was identified in this class.

5 References

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