CORINE Land Cover nomenclature conversion to Land Cover Classification system

The CORINE Land Cover (CLC) nomenclature

The CORINE Land Cover is a vector map with a scale of 1:100 000, a minimum cartographic unit (MCU) of 25 ha and a geometric accuracy better than 100m. It maps homogeneous landscape patterns, i.e. more than 75% of the pattern has the characteristics of a given class from the nomenclature. This nomenclature is a 3-level hierarchical classification system and has 44 classes at the third and most detailed level (Table 1). In order to deal with areas smaller than 25ha a set of generalisation rules were defined.

Table 1 - CORINE Land Cover (CLC) nomenclature (Source: http://www.igeo.pt/gdr/pdf/CLC2006_nomenclature_addendum.pdf).

Level 1	Level 2	Level 3
1 Artificial surfaces	11 Urban fabric	111 Continuous urban fabric
		112 Discontinuous urban fabric
	12 Industrial, commercial	121 Industrial or commercial units
	and transport units	122 Road and rail networks and associated land
		123 Port areas
		124 Airports
	13 Mine, dump and	131 Mineral extraction sites
	construction sites	132 Dump sites
		133 Construction sites
	14 Artificial, non-agricultural	141 Green urban areas
	vegetated areas	142 Sport and leisure facilities
2 Agricultural areas	21 Arable land	211 Non-irrigated arable land
		212 Permanently irrigated land
		213 Rice fields
	22 Permanent crops	221 Vineyards
	•	222 Fruit trees and berry plantations
		223 Olive groves
	23 Pastures	231 Pastures
	24 Heterogeneous	241 Annual crops associated with permanent crops
	agricultural areas	242 Complex cultivation patterns
		243 Land principally occupied by agriculture, with significant areas of natural vegetation
		244 Agro-forestry areas
3 Forest and	31 Forests	311 Broad-leaved forest
semi natural areas		312 Coniferous forest
		313 Mixed forest
	32 Scrub and/or herbaceous	321 Natural grasslands
	vegetation associations	322 Moors and heathland
		323 Sclerophyllous vegetation
		324 Transitional woodland-shrub
	33 Open spaces with little or	331 Beaches, dunes, sands
	no vegetation	332 Bare rocks
		333 Sparsely vegetated areas
		334 Burnt areas
		335 Glaciers and perpetual snow
4 Wetlands	41 Inland wetlands	411 Inland marshes
		412 Peat bogs
	42 Maritime wetlands	421 Salt marshes
		422 Salines
		423 Intertidal flats
5 Water bodies	51 Inland waters	511 Water courses
		512 Water bodies
	52 Marine waters	521 Coastal lagoons
		522 Estuaries

Method

In order to convert CLC nomenclature to the LCCS using software version 3 Beta, two different approaches may be taken:

- 1) input all class descriptors;
- 2) input main class descriptors, enough to discriminate classes;

The approach that was taken was the second option: input of main class descriptors, enough to discriminate classes.

The following chapters are a compilation of questions and/or remarks that came from the work of describing CLC classes. Some of these questions are related to prior version (Beta) of the software and were already answered by Mr António Di Gregorio. The unanswered questions were prepared using recent version 1.02 of LCCS3.

Limitations in the conversion

The process of converting the CLC Nomenclature to the LCCS was limited by given situations that are listed bellow:

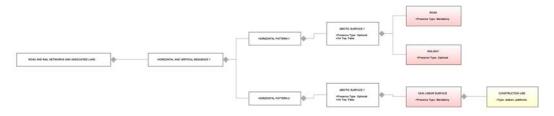
Answered questions

• Some CLC classes have generalization rules essential for determining given landscape patterns that seem impossible to describe using the LCCS.

A: Using the LCCS "LAND COVER CHARACTERISTICS" the user can describe Landform, Lithology, Soils etc,. The list is "open ended" other characteristics can be added.

No documentation exists (is available) explaining the application of Horizontal and Vertical patterns, thus in given classes it's not clear how to describe the defining criteria. For example: in CLC class 121 Road and rail networks and associated land, rail networks are described as an element within an horizontal + vertical pattern; but when adding a new element for describing train stations its not clear if either its included in a new vertical pattern or in a new horizontal + vertical pattern.

A: It is true we are preparing a full documentation of the software and software's rules. Regarding the class you mention I am sending to you the picture in JPG of the class as translated by us.



• If an element with its characteristics includes all criteria but one for a given CLC class, can it be applied (Figure 1) or is it necessary to create different vertical patterns and respective element characteristics (Figure 2).



Figure 1 - Agro-forestry class description - option A

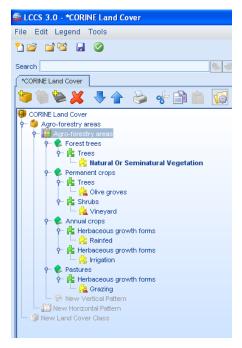
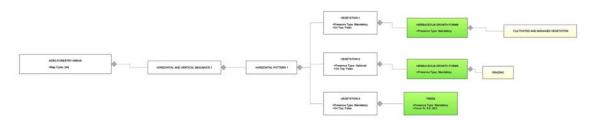


Figure 2 - Agro-forestry class description - option B

A: The logic of LCCS 3 is to translate a Land Cover category of an existing legend with an "object oriented" method therefore the "Basic Objects" must be all selected. I am sending to you the picture of our translation of this class.

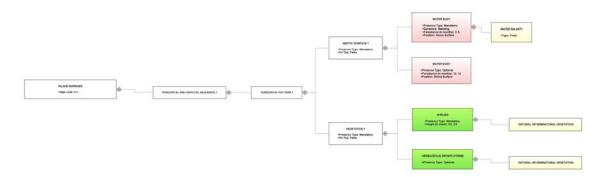


 For an area of natural vegetation that was affected by a recent fire, the CLC nomenclature has a specific class (334 Burnt areas). How is it translated to the LCCS using the burnt status characteristic if an interval of values does not apply to the original criteria.

A: You can simply say the status is "burned" without applying an interval of values.

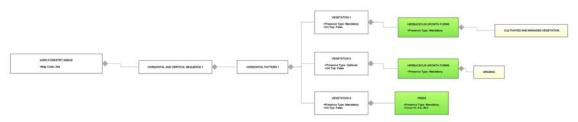
 Defining wetlands in the LCCS is not as straightforward as it was in earlier LCCS versions.

A: It is true. LCCS 3 is now truly "object oriented" to describe a wetland situation you must now describe (with objects) the situation in the reality. In this case there are two layers one of vegetation (with vegetation characteristics if applicable) and one of water (with water characteristics as persistence, salinity type, etc). I am including a JPG picture of this class as translated by us.



Unanswered questions

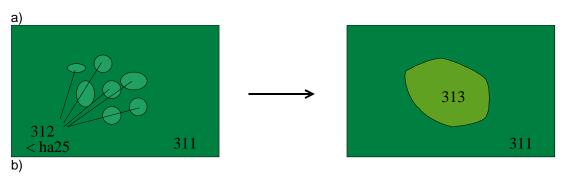
 Regarding the translation of class 244 – Agro-forestry areas, FAO used the following structure:

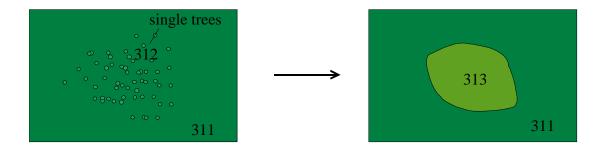


In this case, though we agree it is a good translation, we still have 2 questions: a) isn't the concept of "Herbaceous growth forms used for grazing" included in "Herbaceous Growth forms cultivated and Managed"? b) this description is excluding the case of Permanent crops under storey of Forest Trees (e.g. Olive trees and Oak trees). We suggest this form:

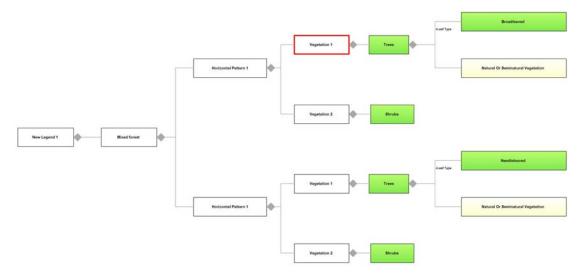


- When Land Cover class includes Horizontal pattern A and/or Horizontal pattern B, does "Cover %" have any influence? e.g. If Horizontal Pattern A covers 80% of the area, is Horizontal Pattern A limited to 20%? Shouldn't a "Presence type" property be included in Horizontal Patterns too?
- The case of CLC class Mixed forests is difficult to describe because it predicts two situations:

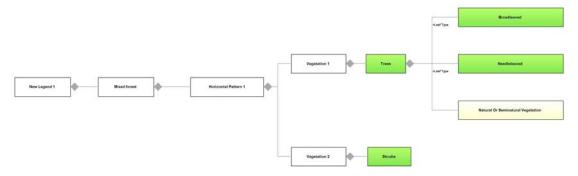




For situation a) we suggest the following structure:



For situation b) we suggest the following structure:



How can both solutions be included in the same Land Cover class description?

- It was not clear for us when to use "Mixed classes".
- Should Land Cover class names be propagated to Horizontal and/or Vertical patterns like in the following example?



Problems and/or limitations of the software platform

Answered questions

• There is no information about the specific version of the software;

A: Correct, you have a beta version of the software that was for internal use

• The printing options are very limited. There isn't any way of printing automatic reports of the legends inputted specifications;

A: I will check this with the software programmers

Shouldn't the Percentage property for Woody leaf types be set as an interval of values?

A: Correct all the intervals have been set as interval values

 While validating the legend when the message shown is "A vertical pattern must have only one mandatory element" should say: "A vertical pattern must have at least one mandatory element"

A: Thank you for the suggestion we adding some XOR rules in this part. We will verify .

 When inputting a "map code" for the Land Cover classes it is not saved with the rest of the data.

A: I will chek this with the software programmers.

• In User-defined structures manager its not clear what are the "enumerations" for;

A: This refers to the UML. When you add a "user defined" element you are adding something to the general UML to wich LCCS 3 is referring

Is it possible to manually reorganize the order of classes?

A: In the final version we are finzalizing classes will be reordered in two ways: According to predefined LCCS 3 order (that uses an "object oriented" way; According to a user defined order.

• Is it possible to create as much user-defined structures as one might want/need? What are the rules to do so?

A: Yes you can add as many characteristics as you want (you cannot add basic objects). We are writing the tutorial to explain how to do it.

Unanswered questions

- It would be interesting to automatically compare the Cover percentages of given elements when validating the legend, to prevent overlapping of definitions;
- When the user adds a property and selects type enumeration, the selection of the user defined enumeration should be done in a field called "Select enumeration" and not "Default value";
- The various windows of the software sometimes overlap hiding buttons and other important elements;
- It would be important for the user to be able do close some windows;
- It would be important for the user to be able to move classes up and down
- When exporting class structure as jpg image, could the <u>descriptors</u> and <u>characteristics</u> include properties also? Could the user select which classes to export as jpg image?