Land cover data: a short theoretical introduction

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Introduction

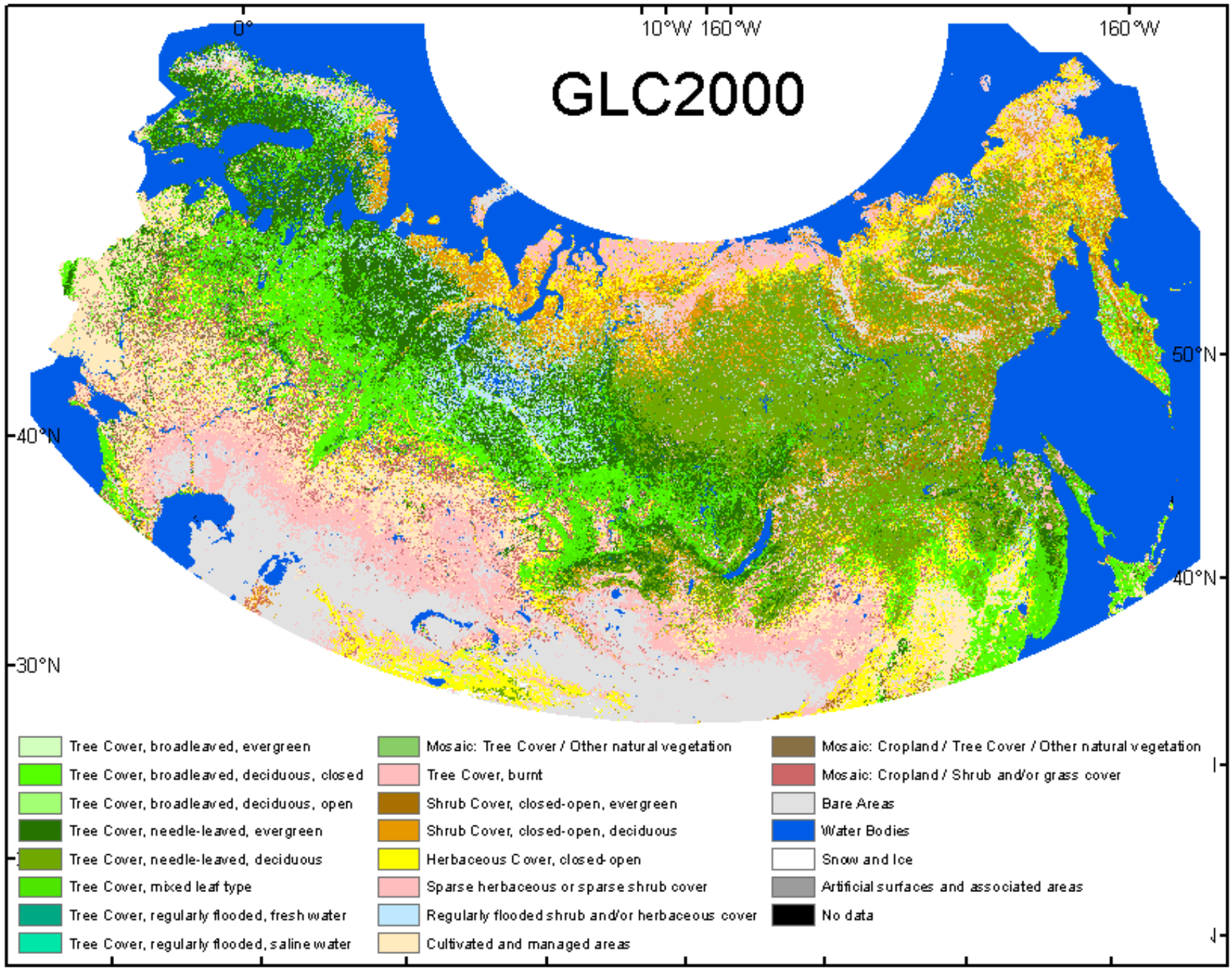
- Land use (LU) – defined by economic terms
- Land cover (LC) – visible features
- Most LU/LC data are derived from remote sensing/air photos
- Used as early as 1930
- USGS later developed a classification system
- “A Land Use And Land Cover Classification System For Use With Remote Sensor Data”, Anderson et al. (1976), USGS

Visual interpretation

- Visual classification of images
- Interpreters look at imagery and draw boundaries to mark categories
- E.g. ***Cropped agricultural land*** is recognized by systematic division of fields into rectangles or circles, with smooth even textures
- ***Pasture*** is more irregular in shape, a mottled texture, medium tone with possibly some isolated patches of trees
- Aerial photos can be helpful to complete interpretation

Automatic image classification

- Appears straightforward, but:
  - Selection of images – what season, what dates are of most significance?
  - Classification algorithm – needs to be chosen based on region
- Advantages
  - Use of multispectral data
  - Accurate registration and atmospheric corrections

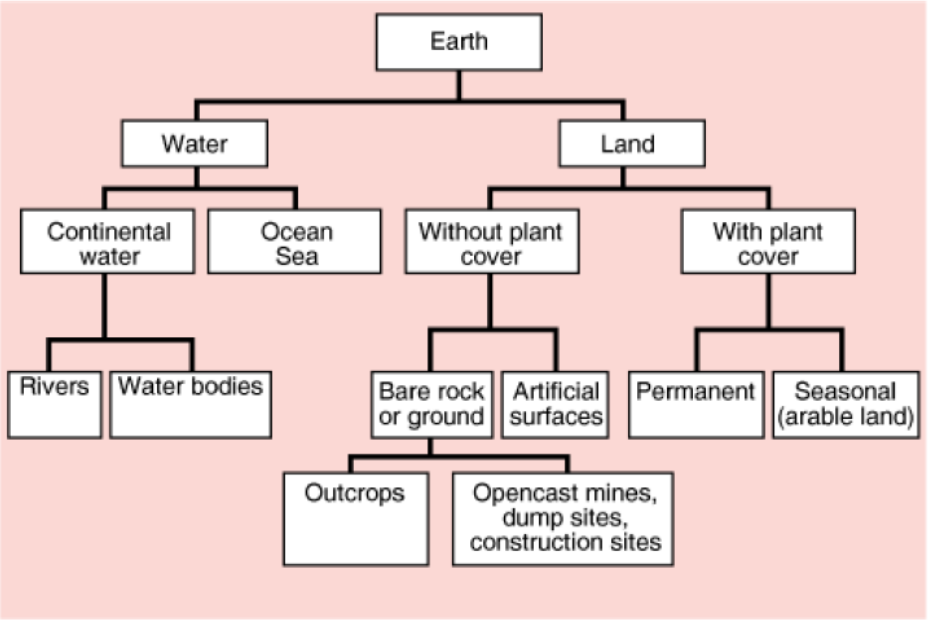

GLC2000
0°
10°W
160°W
160°W
50°N
40°N
40°N
30°N
Tree Cover, broadleaved, evergreen
Tree Cover, broadleaved, deciduous, closed
Tree Cover, broadleaved, deciduous, open
Tree Cover, needle-leaved, evergreen
Tree Cover, needle-leaved, deciduous
Tree Cover, mixed leaf type
Tree Cover, regularly flooded, fresh water
Tree Cover, regularly flooded, saline water
Mosaic: Tree Cover / Other natural vegetation
Tree Cover, burnt
Shrub Cover, closed-open, evergreen
Shrub Cover, closed-open, deciduous
Herbaceous Cover, closed-open
Sparse herbaceous or sparse shrub cover
Regularly flooded shrub and/or herbaceous cover
Cultivated and managed areas
Mosaic: Cropland / Tree Cover / Other natural vegetation
Mosaic: Cropland / Shrub and/or grass cover
Bare Areas
Water Bodies
Snow and Ice
Artificial surfaces and associated areas
No data

GLC2000 – European Commission

- The GLC2000 maps are based on daily observations made from 1st November 1999 to 31st December 2000 by the VEGETATION sensor on the SPOT 4 satellite
- Spatial resolution: 1km at equator

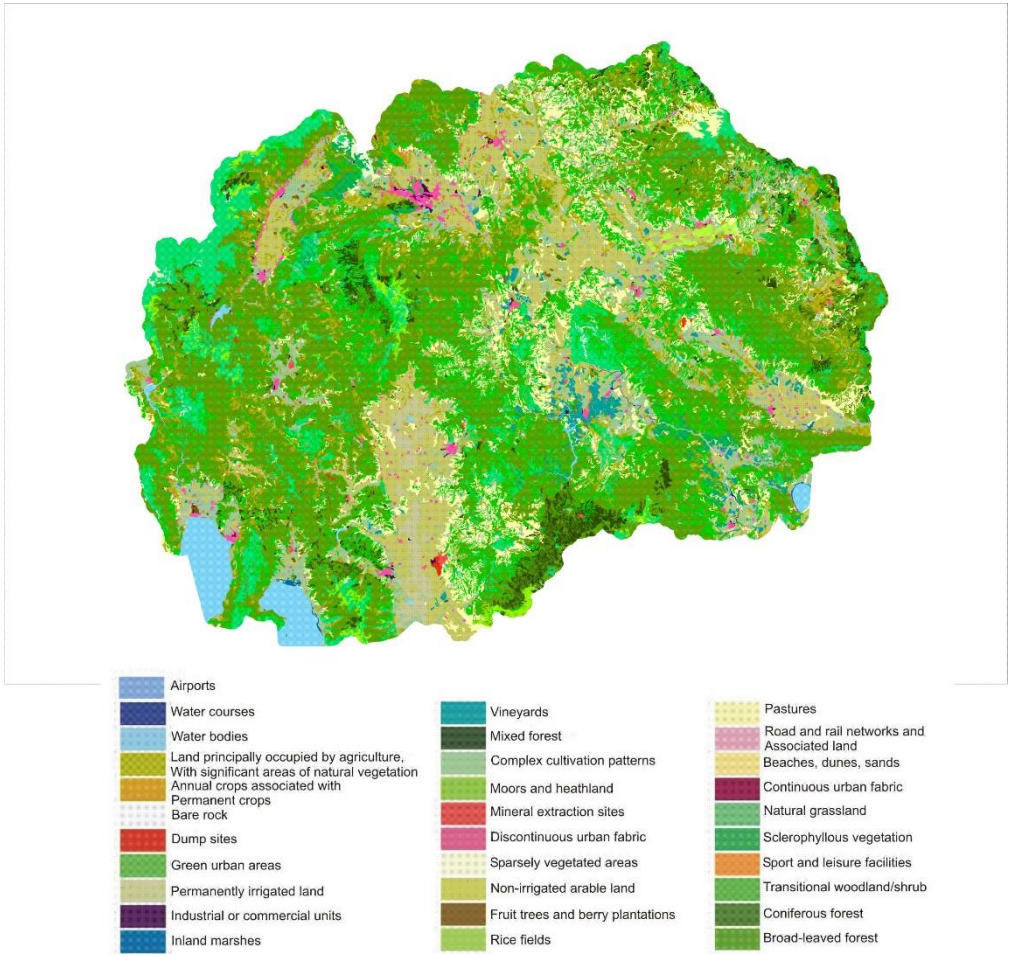
Methodology

- Choose a mapping scale
- Compile of topographic maps available
- Decide on the size of the unit area
- Nomenclature
- Terminology

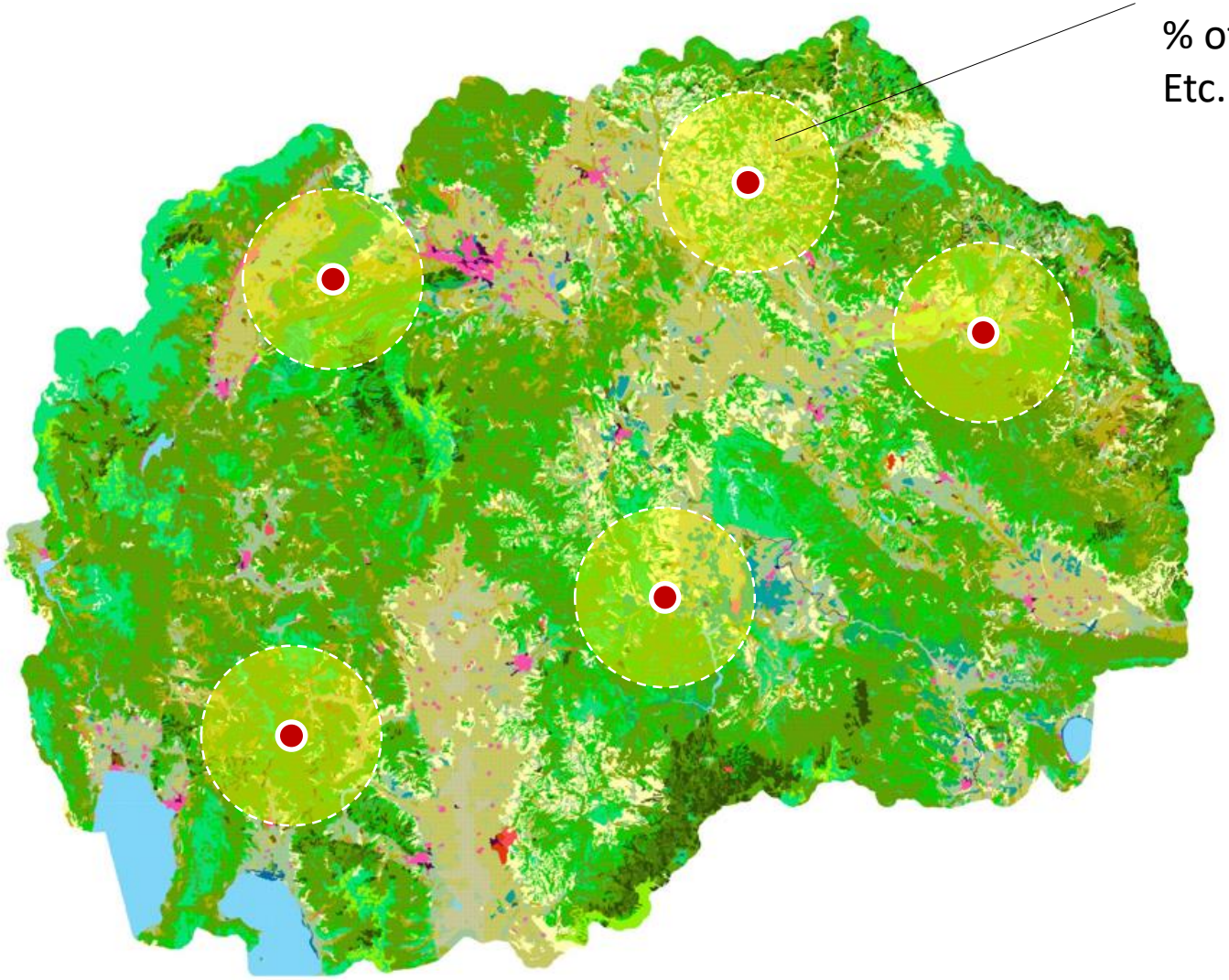


Level 1	Level 2	Level 3
1. Artificial surfaces	1.1. Urban fabric	1.1.1. Continuous urban fabric 1.1.2. Discontinuous urban fabric
	1.2. Industrial, commercial and transport units	1.2.1. Industrial or commercial units 1.2.2. Road and rail networks and associated land 1.2.3. Port areas 1.2.4. Airports
	1.3. Mine, dump and construction sites	1.3.1. Mineral extraction sites 1.3.2. Dump sites 1.3.3. Construction sites
	1.4. Artificial non-agricultural vegetated areas	1.4.1. Green urban areas 1.4.2. Sport and leisure facilities
2. Agricultural areas	2.1.Arable land	2.1.1. Non-irrigated arable land 2.1.2. Permanently irrigated land 2.1.3. Rice fields
	2.2. Permanent crops	2.2.1. Vineyards 2.2.2. Fruit trees and berry plantations 2.2.3. Olive groves
	2.3. Pastures	2.3.1. Pastures
	2.4. Heterogeneous agricultural areas	2.4.1. Annual crops associated with permanent crops 2.4.2. Complex cultivation 2.4.3. Land principally occupied by agriculture, with significant areas of natural vegetation 2.4.4. Agro-forestry areas
3. Forests and semi-natural areas	3.1. Forests	3.1.1. Broad-leaved forest 3.1.2. Coniferous forest 3.1.3. Mixed forest
	3.2. Shrub and/or herbaceous vegetation association	3.2.1. Natural grassland 3.2.2. Moors and heathland 3.2.3. Sclerophyllous vegetation 3.2.4. Transitional woodland shrub
	3.3. Open spaces with little or no vegetation	3.3.1. Beaches, dunes, and sand plains 3.3.2. Bare rock 3.3.3. Sparsely vegetated areas 3.3.4. Burnt areas 3.3.5. Glaciers and perpetual snow
4. Wetlands	4.1. inland wetlands	4.1.1. Inland marshes 4.1.2.Peatbogs
	4.2. Coastal wetlands	4.2.1. Salt marshes 4.2.2. Salines 4.2.3. Intertidal flats

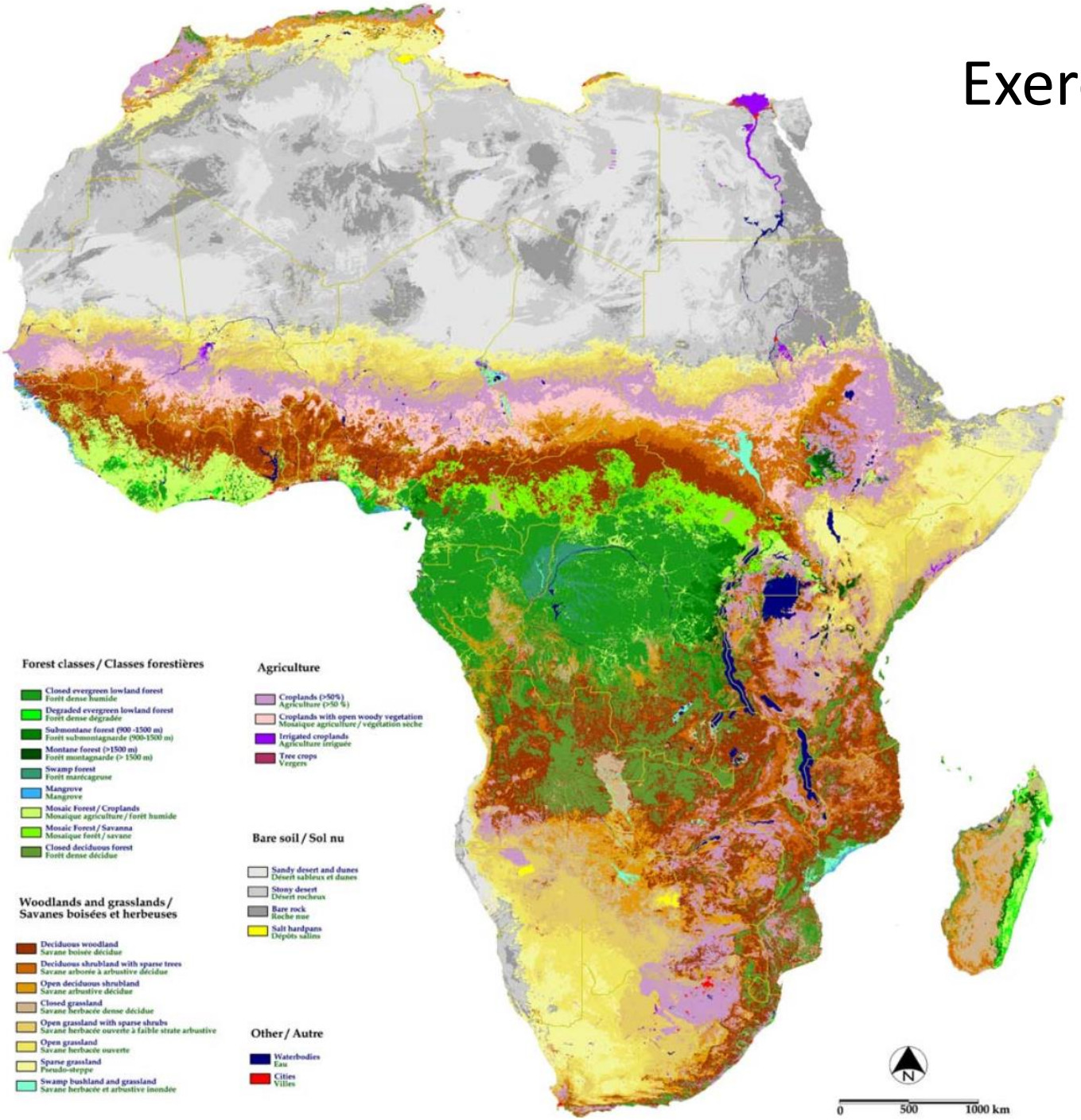
From qualitative…



To quantitative …



Exercise


Forest classes / Classes forestières
Closed evergreen lowland forest
Forêt dense humide
Degraded evergreen lowland forest
Forêt dense dégradée
Submontane forest (900 -1500 m)
Forêt submontagnarde (900-1500 m)
Montane forest (>1500 m)
Forêt montagnarde (> 1500 m)
Swamp forest
Forêt marécageuse
Mangrove
Mangrove
Mosaic Forest / Croplands
Mosaique agriculture / forêt humide
Mosaic Forest / Savanna
Mosaique forêt / savane
Closed deciduous forest
Forêt dense décidue
Woodlands and grasslands / Savanes boisées et herbeuses
Deciduous woodland
Savane boisée décidue
Deciduous shrubland with sparse trees
Savane arborée à arbustive décidue
Open deciduous shrubland
Savane arbustive décidue
Closed grassland
Savane herbacée dense décidue
Open grassland with sparse shrubs
Savane herbacée ouverte à faible strate arbustive
Open grassland
Savane herbacée ouverte
Sparse grassland
Pseudo-steppe
Swamp bushland and grassland
Savane herbacée et arbustive inondée
Agriculture
Croplands (>50%)
Agriculture (>50 %)
Croplands with open woody vegetation
Mosaique agriculture / végétation seche
Irrigated croplands
Agriculture irriguée
Tree crops
Vergers
Bare soil / Sol nu
Sandy desert and dunes
Désert sableux et dunes
Stony desert
Désert rocheux
Bare rock
Roche nue
Salt hardpans
Dépôts salins
Other / Autre
Waterbodies
Eau
Cities
Villes
N
0
500
1000 km