

## **10. Typologies of European mountain areas**

This chapter brings together data and information presented in the previous chapters, with the aim of providing a diagnosis in the form of three typologies of the mountains of the study area, based on available quantitative information.

### **10.1 Principles for typology development**

Chapters 4, 5, 6, 7 have presented a number of profiles and trends within the mountain regions of the study area. The compilation and analysis of this information is a key element of the process to fulfil one objective of the project: to propose typologies of mountain areas in Europe. We have developed three typologies in order to have different composite perspectives on mountain areas, according to the following themes:

- social and economic capital;
- infrastructure, accessibility and services;
- land use and land covers.

The social and economic processes taking place in mountain areas are often described. As shown in Chapter 5 and discussed also in Chapter 9, these areas have to struggle with difficult demographic processes (e.g., overageing of population, migration processes) and economic situations (e.g., lack of investment, agriculture remaining as an important sector). The typology on ‘social and economic capital’ draws on data presented in Chapters 5, 6 and 7.

The aim of the typology on ‘infrastructure, accessibility and services’ is to provide insight into public infrastructure supply such as universities and airports, as well as linear transport infrastructure as road and railway networks. It brings together many of the issues presented in Chapter 7.

The environment is one of the most important fields of concern in mountain areas. Hence, a typology on ‘land use and land covers’ takes into account different aspects of land covers and uses, and environmental potentials, drawing mainly on data from Chapter 4.

The typologies are based on statistical approaches and constructed at the level of national massifs, i.e. groupings of mountain municipalities, on the basis of high/low values for a set of indicators; the threshold values are explained below. Since some data are missing for some countries (Annex 1), it has not been possible to use cluster analysis or other multi-variate techniques to construct the typologies.

### **10.2. Typology for social and economic capital**

Three quantitative variables are used for the typology on social and economic capital: population density, population trend and access to markets. Other relevant indicators were also considered, but did not change the overall picture significantly. The three selected dimensions are divided into the categories shown in Table 10.1.

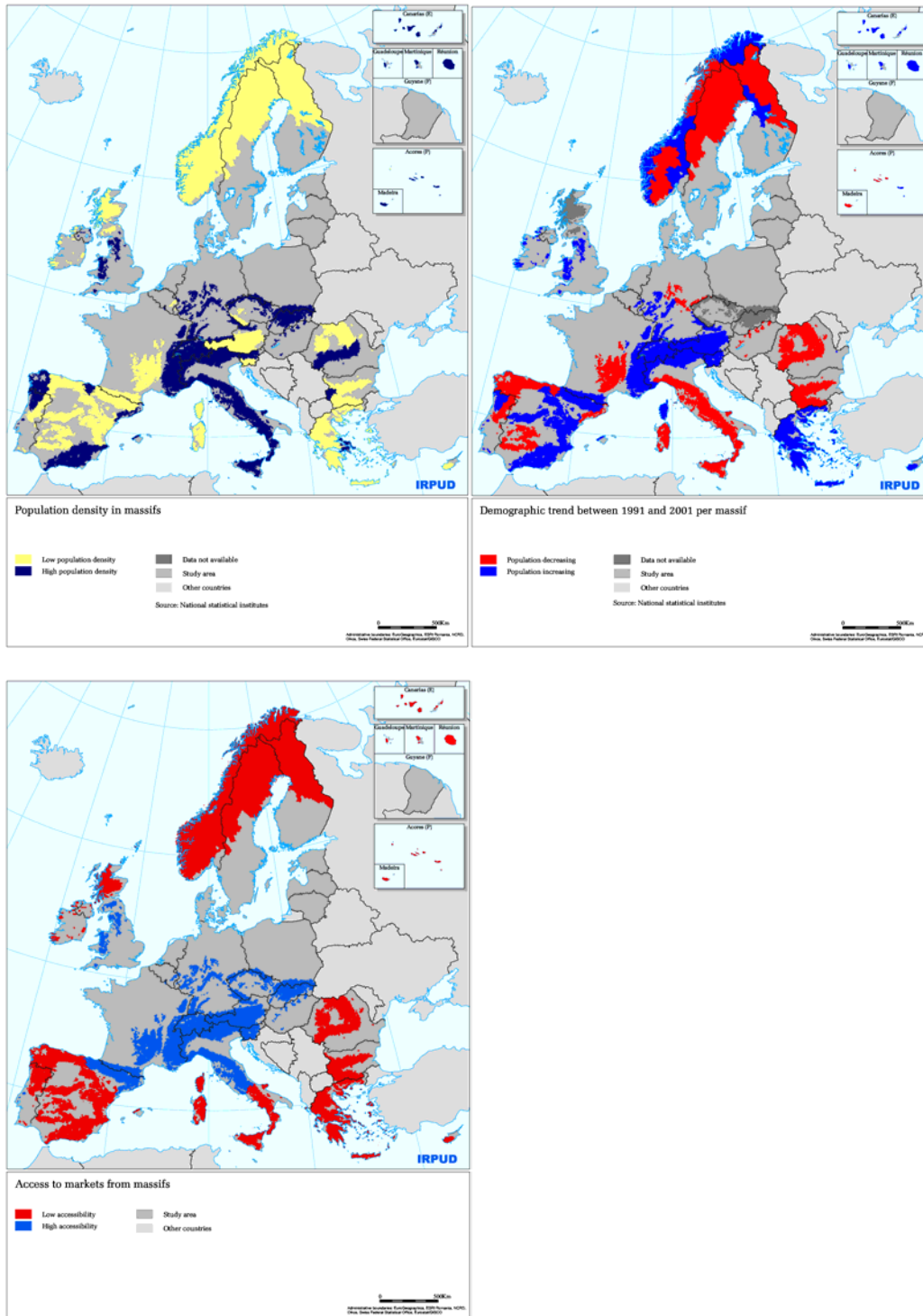
*Table 10.1. Criteria defining the typology of social and economic capital*

1) Population development	Change in absolute number of inhabitants in the massif from 1991 to 2001 <ul style="list-style-type: none"> <li>• Positive: population increase</li> <li>• Negative: population decrease</li> </ul>
2) Population density	The average density for mountain massifs across the study area is 67 inhabitants/km <sup>2</sup> . <ul style="list-style-type: none"> <li>• High density: above average</li> <li>• Low density: below average</li> </ul>
3) Access to markets	The potential for economic activity at any location is a function of its proximity to other economic centres (car travel time) and of its economic size (here measured as total population). The weighted average over all massifs (=33) of the standardised accessibility is used as the threshold here. The higher the indicator value, the better the accessibility of a massif: <ul style="list-style-type: none"> <li>• High accessibility: massifs above the threshold</li> <li>• Low accessibility: massifs below the threshold</li> </ul>

Maps of these indicators are shown in Figure 10.1, and the detailed results are shown in Figure 10.2. Based on average figures for the study area, the number of massifs with a positive population development is approximately the same as with a negative development, and there is no clear connection between population development on one hand and population density and access to markets on the other. There is, however, a strong co-variation between the latter two indicators: massifs with high population density generally also have good access to markets, and vice versa:

- high scores on both indicators are found in several massifs in the Alps, Germany, and Italy, and also close to large Spanish and Portuguese cities;
- low scores on both indicators are found in massifs located in the peripheral parts of Europe, such as the Nordic countries, Ireland, Portugal, Spain, Romania and Bulgaria.

Figure 10.1. Maps of indicators used to derive typology ‘social and economic capital’



These three indicators are combined in a typology of massifs as shown in Figure 10.2, with the following categories:

- 1) *“The best preconditions” (yellow): High access to markets, population growth, high population density*

This category corresponds to a group of mountain areas that, with the exception of a few small Portuguese mountain areas, are centrally positioned within Europe. They include major urban areas and generally characterised by a relative economic dynamism. Tertiary employment is most over-represented only in the French Alps and in Swiss Mittelland. All other massifs in this category either have a strong primary sector (Bohemia, Swiss, German and Western Italian Alps) or major manufacturing activities (e.g. other western German mountain areas, Central and Eastern Italian Alps, England and Wales). Proximity to markets has allowed these areas to develop a diversified economic basis, and to have a favourable demographic evolution. Most of these areas are positioned between major demographic and economic centres. The main threat is therefore that their high economic potential may lead to over-exploitation with attendant environmental impacts.

- 2) *“High potentials, negative population trends” (brown): High access to markets, high population density, but population decline*

These mountain areas have not benefited from their proximity to markets in the same way as the previous category. Either the nearby dominant cities have not contributed to growth in a wider territorial context (Catalan and Basque mountains) or the mountain area is insufficiently integrated in nearby urban networks (e.g. French Ardennes, Polish and Czech Carpathians). In the northern Apennines of Italy, low fertility rates at the national level contribute to this classification.

- 3) *“Low population density pockets near high population density areas” (green): High access to markets and low density*

In these areas, topography has had a more pronounced effect on human settlements: they appear as low density “pockets” close to high-density areas. The vast majority of these areas in close proximity to major urban centres experience population growth; the only exceptions are the Massif Central and Morvan in France. (It should be noted that demographic trends are unknown for the Czech Republic and the UK).

- 4) *“Remote with low population densities” (blue): Low access to markets, primary sector over-represented*

One group of massifs in this category with low accessibility to markets has a markedly higher proportion of employment in the primary sector than the European average. These are typically rural massifs, generally with a low population density. There are great contrasts in population trends in these massifs between 1991 and 2001. In extremely peripheral areas of Sweden and Finland, as well as in all concerned Iberian massifs except the Serra Algarvia in Portugal and

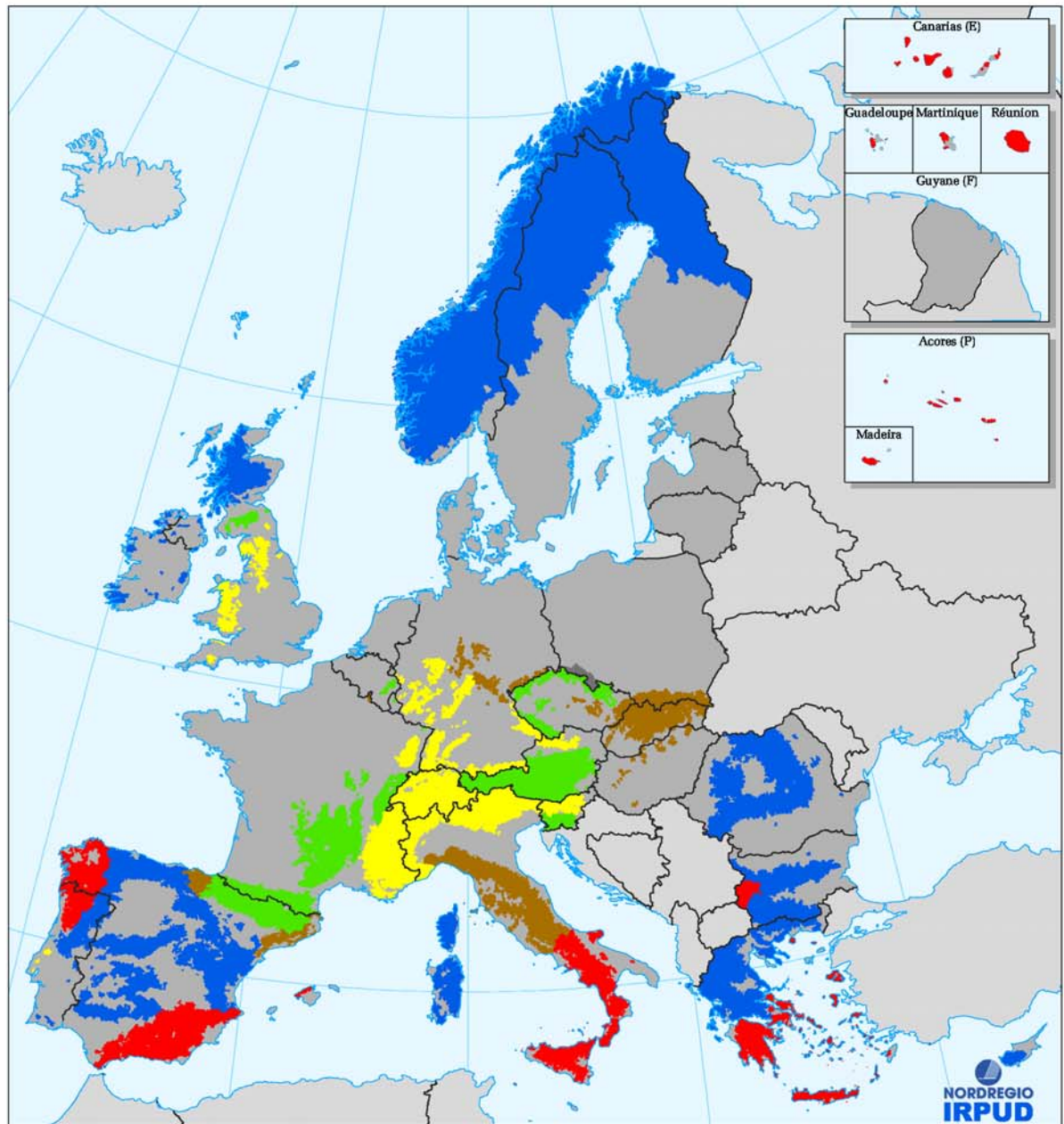
the Iberic System in Spain, populations have decreased. In contrast, all Irish and Greek massifs falling into this category have experienced population increases. The other massifs with low access to markets and low population densities have more varied profiles. While the Swedish and Norwegian massifs have very high employment in the public sector, all remaining mountain areas in this category have a large manufacturing sector. These massifs are situated in Scotland (UK), central Spain, northern Greece, Bulgaria, Finland and Sweden.

5) *“Remote with high population densities” (red): High density, low access to markets*

Massifs with low access to markets and high population densities are found mostly in Southern Europe, surprisingly enough in areas situated further away from the European core than the previous category. Population decline mainly characterises the Italian and Portuguese massifs in this category, while there is population growth in the corresponding mountain areas in Greece, the Canary Islands and the Balears. The areas with population growth in this category have a significant tourism sector. In all other massifs, with population decline, the primary sector is over-represented.

At the level of massifs, there is no clear core-periphery trend, and most countries show a great diversity of situations. This reflects particularly the fact that, as shown in Chapter 5, the clearest demographic characteristic of mountain areas is the extreme diversity of situations encountered within individual massifs. The variety of situations within massifs is a particular challenge for policymakers, and also for research. A new major effort for data collection is necessary with regard to taking the current study forward and to analysing socio-economic challenges at a lower geographical level.

Figure 10.2. Classification of massifs according to typology 1



Classification of massifs according to typology 1

		Low population density	High population density
High access to markets	Population growth		
	Population decline		
Low access to markets	Population growth		
	Population decline		

- " The best preconditions "
- " High potentials, negative population trends "
- " Low population density islands near high population density areas "
- " Remote with low population densities "
- " Remote with high population densities "

- Not classifiable - missing data
- Study area
- Other countries

0 500Km

Administrative boundaries: EuroGeographics, ESRI Romania, NCRD, Okeo, Swiss Federal Statistical Office, Eurostat/GISCO

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Table 10.2. Massif typology – Social and economic capital

		Population density	
		low	high
Access to markets	High	<p>Population growth</p> <p>Southern Uplands, (UK) Czech Sudetes, (CZ) Sumava - Cesky Les, (CZ) Brdy, (CZ) Czech Ore mountains, (CZ) French Pyrenees, (FR) Austrian Alps, (AT) Cotes bourguignonnes, (FR) Schwabian Alb (Swiss), (CH) Luxembourg Ardennes, (LU) Spanish Pyrenees, (ES) Dinaric Mountains, (SI) Koszeg, (HU) French Jura, (FR) Northern Vosges, (FR) Belgian Ardennes, (BE) Massif Central, (FR) Morvan, (FR)</p>	<p>Population decline</p> <p>Western Alps, (IT) Austrian Bohemian mount, (AT) Swiss Alps, (CH) Swiss Jura, (CH) German Bohemian mountai, (DE) Bavarian Alps, (DE) Complexo estremenho, (PT) Dartmoor and Exmoor, (UK) North Slovenia Alps, (SI) Welsh Mountains, (UK) Northern English Mountains (UK)</p>
	Low	<p>Northern Ireland Mouna, (UK) Mourne Mountains (UK), (UK) Troodos, (CY) Kerry mountains, (IE) Connacht mountains, (IE) Pindos, (GR) Donegal mountains, (IE) Olympos and Central Gre, (GR) Rodopi, (GR) Waterford Mountains, (IE) Cumbria, (IE) Serra Algarvia, (PT) Slieve Bloom Mountains, (IE) Muntii Macinului, (RO) Corsica, (FR) Wicklow, (IE) Iberic System, (ES) Coastal mountain areas, (NO) Ostrobothnia and coasta, (FI) Highlands and Islands, (UK) Central System, (ES) Finnmark and northern T, (NO) Border area - Troendela, (NO) Oestland mountain areas, (NO) Acores - grupo ocidenta, (PT) Mountain Lapland, (FI)</p>	<p>Forest Lapland, (FI) Vaesterbotten, (SE) Kainuu and Koillisma -, (FI) Vaermland, (SE) Mountains of Sardinia, (IT) Rodopi Planina, (BG) Sierra Morena, (ES) Toledo Mountains, (ES) Cantabrian Range, (ES) v non-massif mountain are, (PT) Stara Planina, (BG) planalto transmontano -, (PT) Cordilheira central, (PT) Lapland, (SE) Aangermanland, (SE) Hardangervidda - Southe, (NO) Eastern Romanian Carpat, (RO) Southern Romanian Carpa, (RO) Muntii Apuseni, (RO) Leon Mountains, (ES) Sredna Gora, (BG) Nordland - Troms, (NO) Norrbotten, (SE) Jamtland - Harjedalen -, (SE) Jotunheimen - Rondane -, (NO)</p>

### 10.3 Typology for infrastructure, accessibility and service

The typology ‘infrastructure, accessibility and services’ is a combination of several indicators, obtained by a multi-criteria analysis. This typology is dedicated to measuring the quality of infrastructure, the level of services of social facilities and the level of accessibility of a region. In general, it deals with a region’s infrastructure supply. Table 10.2 shows the hierarchy of the indicators and their weights in brackets. The measures of accessibility take into account two spatial levels (national and regional), trying to capture the different dimensions.

*Table 10.3. Criteria defining the typology of infrastructure, accessibility and services*

	National level (40 %)	Airline distance to national capital cities
Accessibility (40 %)	Regional level (60 %)	Airline distance to next 3 cities >100,000 inhabitants (50 %)
		Amount of people living in a 1 hour travel time (based on car travel) (50 %)
Services (30 %)	Education (60 %)	Proportion of massif population with more than 1 hour car driving time to nearest university
	Health (40 %)	average airline distance to next hospital by massif
Transport infrastructure (30 %)	Roads (50 %)	Density of roads by massif
	Rail (30 %)	Density of railways by massif
	Airports (20 %)	Travel time to nearest airport by massif

Accessibility to universities is calculated by  $A_i = \sum w * d^{-\beta}$  where:  
 $w$  = amount of students and  
 $d$  = travel time.

Peripherality measures to facilities by car (standardised at national averages) are calculated the same way as the accessibility to universities, except that one factor does not represent the amount of students, but the total population.

The maps of the indicators are provided in Figures 10.3 and 10.4, and the resulting typology is shown in Figure 10.5. It divides the massifs into four categories based on their distance to the national capital, their population density, the distances to universities and hospitals, travel time to nearest airport, and the density of the road and rail network. The analysis compares mountain massifs to each other, not to the EU 27+2 average. There are of course different patterns for each of these indicators, but taken together a core-periphery pattern is evident.

Figure 10.3. Maps of first four indicators used to derive typology of infrastructure, accessibility and service

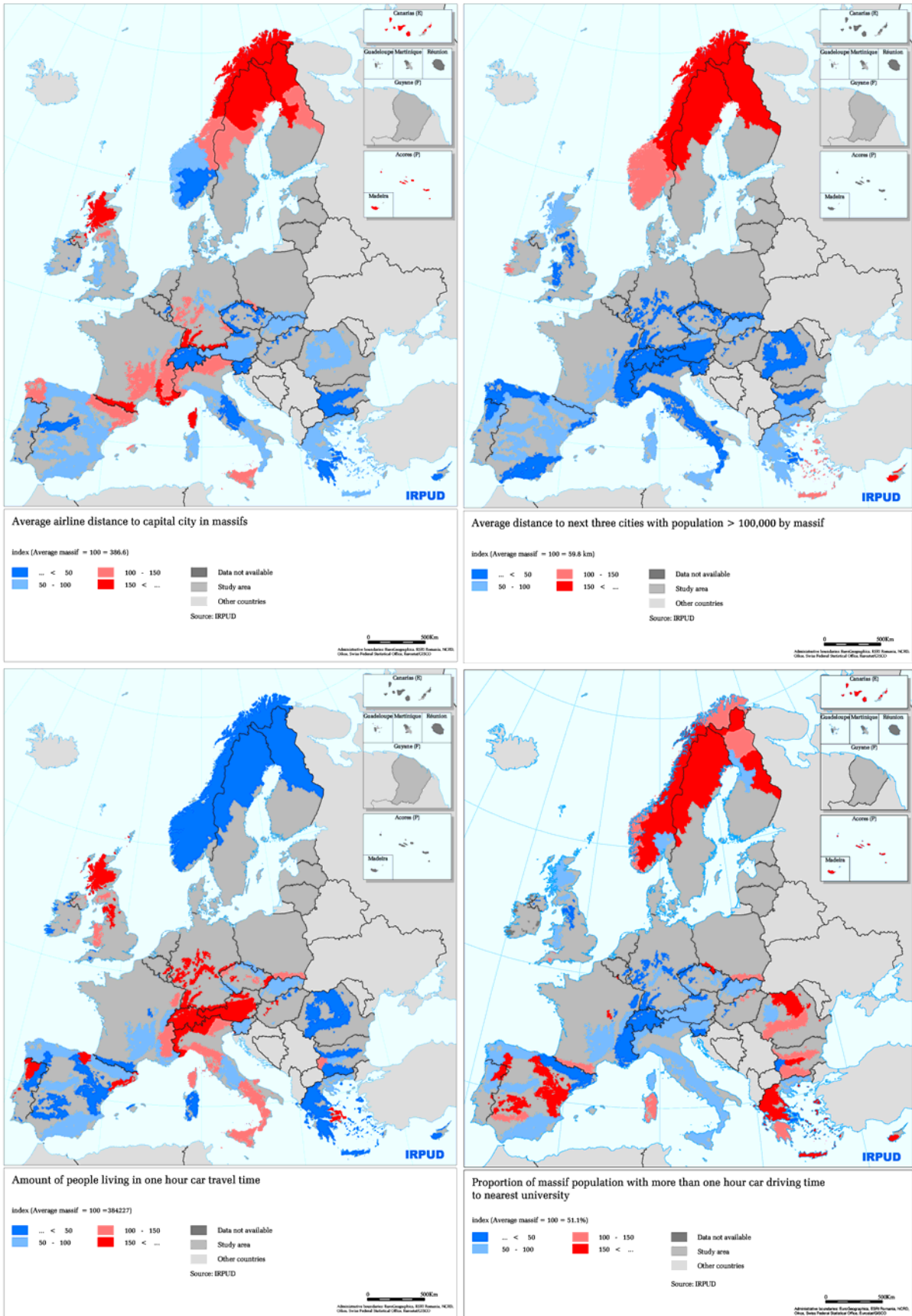


Figure 10.4. Maps of second four indicators used to derive typology of infrastructure, accessibility and service

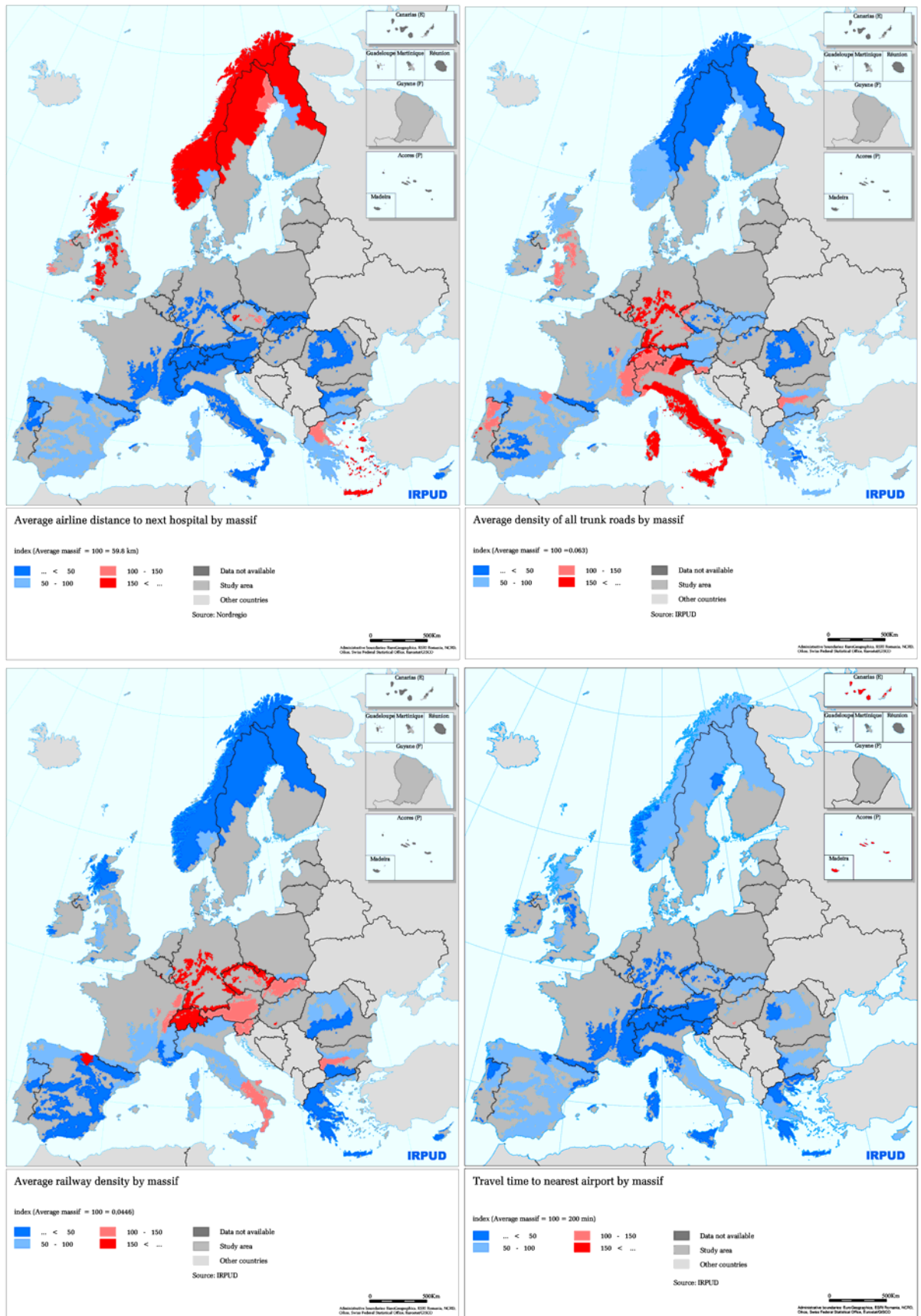
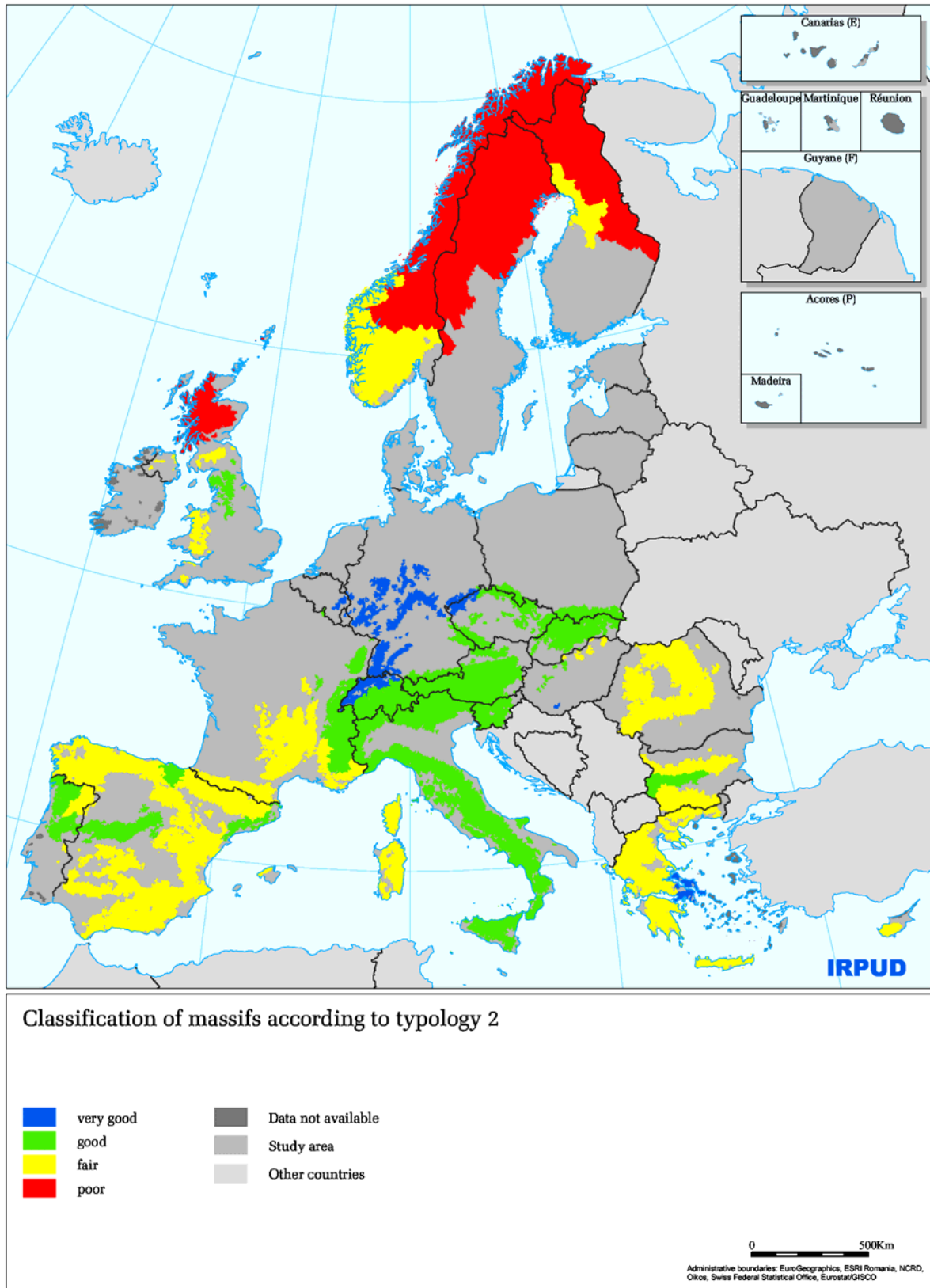


Figure 10.5. Classification of massifs according to typology 2



As shown in Figure 10.4 and Table 10.3, most massifs that score ‘very good’ or ‘good’ extend from the Northern English Mountains down to Sicily in the west and Slovakia in the east. The Alps are included, as are the Carpathians, the Sudetes, all German massifs and the Ardennes. There are also three Spanish, two Portuguese, and two Bulgarian massifs in this group.

Massifs with a ‘fair’ accessibility to infrastructure and service are located in a circle around the two first groups. The category is dominated by massifs in Greece, Bulgaria, Romania, and Spain. The Massif Central and the Mediterranean Alps in France are also included, as are the Southern Uplands and Wales in the UK, massifs on the south coast of Norway, and Ostrobothnia and the coastal hinterland in Finland.

Massifs with ‘poor’ accessibility to infrastructure and service are found north of these, in the Highlands and Islands (UK) and in Norway (all except three), Sweden (all massifs) and Finland (all but one). This clearly illustrates that these countries are extremely peripheral in the European context.

Finally, it should be noted that the transition zones around mountain areas are far more accessible than the massifs themselves.

*Table 10.4: Massif typology – infrastructure, accessibility and services*

**Very good (-80 – 30)**

<b>Massif range</b>	<b>Country code</b>	<b>Index value</b>
Italian Dinaric mountains	IT	-79.3
Mittelland plateau	CH	-44.4
Belgian Ardennes	BE	-2.9
Rhenish Slate Mountains (German part)	DE	-0.9
Luxembourg Ardennes	LU	-0.8
Black forest - Schwabian and Frankonian Alb	DE	8.2
German low mountains, northern part	DE	12.8
Mecsek	HU	14.7
Swiss Jura	CH	15.2
German Ore mountains	DE	20.3
German low mountains, southern part	DE	21.1
Czech Ore mountains	CZ	24.3
Evia - Viotia - Attiki	GR	25.0
Upper Rhine Valley	DE	28.4

**Good (30 - 90)**

Schwabian Alb (Swiss)	CH	33.8
Swiss Alps	CH	37.4
Bavarian Alps	DE	37.8
Basque Mountains	ES	38.9
German Sudetes	DE	41.6
Transdanubian Mountains	HU	46.1

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Central Alps	IT	47.9
Western mountains	BG	48.3
Northern English Mountains	UK	48.7
Czech Carpathian Mountains	CZ	49.1
Catalan Range	ES	55.1
Dinaric Mountains	SI	57.3
Southern Appennines	IT	57.9
Brdy	CZ	58.6
Northern Appennines	IT	60.0
Cotes bourguignonnes	FR	60.4
Austrian Bohemian mountains	AT	60.9
Vosges	FR	64.1
Austrian Alps	AT	64.3
Mountains of Sicily	IT	64.3
Macico Noroeste	PT	64.6
Czech Sudetes	CZ	65.8
Central Appennines	IT	66.0
French Ardennes	FR	66.4
North Slovenia Alps	SI	67.4
Western Alps	IT	69.3
Northern Vosges	FR	69.6
German Bohemian mountains	DE	71.8
Northern Alps	FR	76.8
Slovak Carpathian mountains	SK	77.2
French Jura	FR	78.0
Eastern Alps	IT	79.3
Sredna Gora	BG	83.4
Sumava - Cesky Les	CZ	83.5
Polish Carpathian mountains	PL	84.9
Moravian hills	CZ	85.5
Polish Sudetes	PL	85.7
Cordilheira central	PT	87.3
Central System	ES	88.0
<b>Fair (90 - 150)</b>		
Cantabrian Range	ES	91.9
North Hungarian mountain areas	HU	92.4
Stara Planina	BG	93.7
Oestland mountain areas	NO	93.9
Mediterranean Alps	FR	94.3
Rodopi	GR	94.6

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Spanish Pyrenees	ES	96.1
Massif Central	FR	96.5
Galician Massif	ES	97.5
Southern Romanian Carpathian mountains	RO	98.5
Betic Systems	ES	99.2
Muntii Apuseni	RO	100.6
Welsh Mountains	UK	101.6
Rodopi Planina	BG	102.4
Mountains of Sardinia	IT	102.7
Peloponnesean mountains	GR	104.9
Northern Ireland Mountains	UK	106.2
non-massif mountain areas	PT	106.2
Balearic Islands	ES	112.1
Eastern Romanian Carpathian mountains	RO	112.8
Iberic System	ES	113.2
Planalto transmontano - Beirao	PT	114.0
Olympos and Central Greece	GR	117.3
Pindos	GR	117.8
Corsica	FR	119.4
Sierra Morena	ES	121.2
Koszeg	HU	123.0
Morvan	FR	124.8
French Pyrenees	FR	125.1
Leon Mountains	ES	125.4
Toledo Mountains	ES	128.9
Southern Uplands	UK	132.0
Ostrobothnia and coastal hinterland	FI	137.0
Coastal mountain areas	NO	138.0
Crete	GR	138.4
Troodos	CY	139.0
Hardangervidda - Southern mountain areas	NO	139.4
Dartmoor and Exmoor	UK	140.8
<b>Poor (150 – 270)</b>		
Vaermland	SE	151.5
Jotunheimen - Rondane - Dovre	NO	152.2
Highlands and Islands	UK	156.8
Border area - Troendelag	NO	157.1
Aangermanland	SE	164.7
Kainuu and Koillisma - Hill region	FI	167.3
Vaesterbotten	SE	168.4

Jamtland - Harjedalen - Dalarna	SE	168.5
Norrbottnen	SE	181.1
Forest Lapland	FI	191.2
Lapland	SE	213.6
Nordland - Troms	NO	216.0
Mountain Lapland	FI	251.4
Finnmark and northern Troms	NO	269.6

#### 10.4 Typology for land use and land covers

The methodological approach concerning the typology ‘land use and land covers’ is similar to that for social and economic capital. Table 10.4 shows the table used to derive the typology.

*Table 10.5. Grid to define typology of land use and land covers*

			Climatic contrast index			
			Low		High	
			Slope flat	Slope rough	Slope flat	Slope rough
Relative balance of arable land and grassland	Arable land > grassland	Share of forests high				
		Share of forests low				
	Arable land < grassland	Share of forests high				
		Share of forests low				

The following thresholds were used to derive the indicators:

- Share of forests high = over 30% of area covered by forests
- Rough slope = over 4.1% average slope in massif (value based on the mean slope for mountain areas within the study area)
- Climatic contrast index over or under 50 (value based on a natural break in the data, with a leap from 44 to 69 in the values)

The maps showing the indicators are shown in Figure 10.5, and the resulting typology in Figure 10.6 and Table 10.5.

Figure 10.6. Maps of indicators used to derive typology 'land use and land covers'

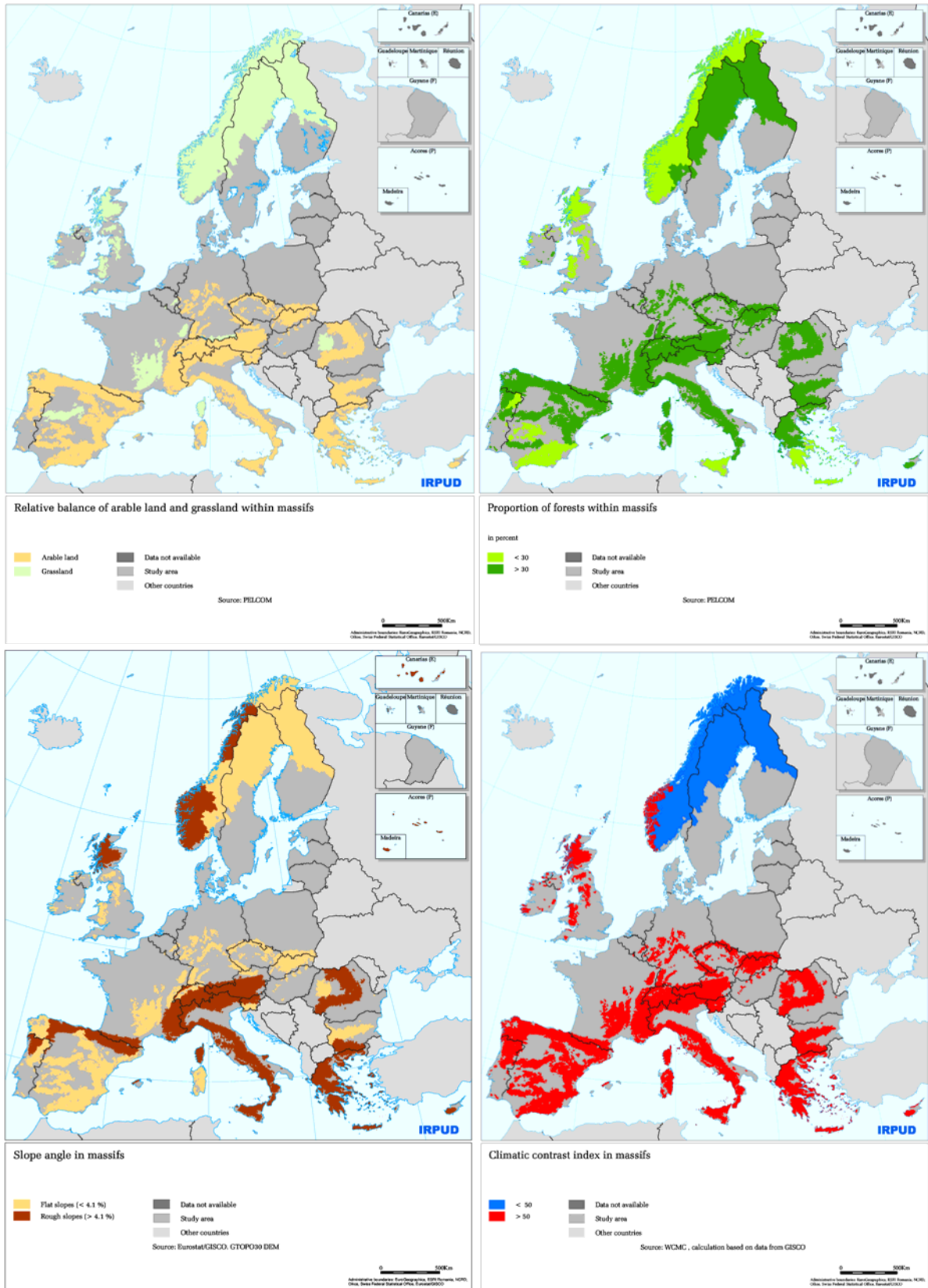
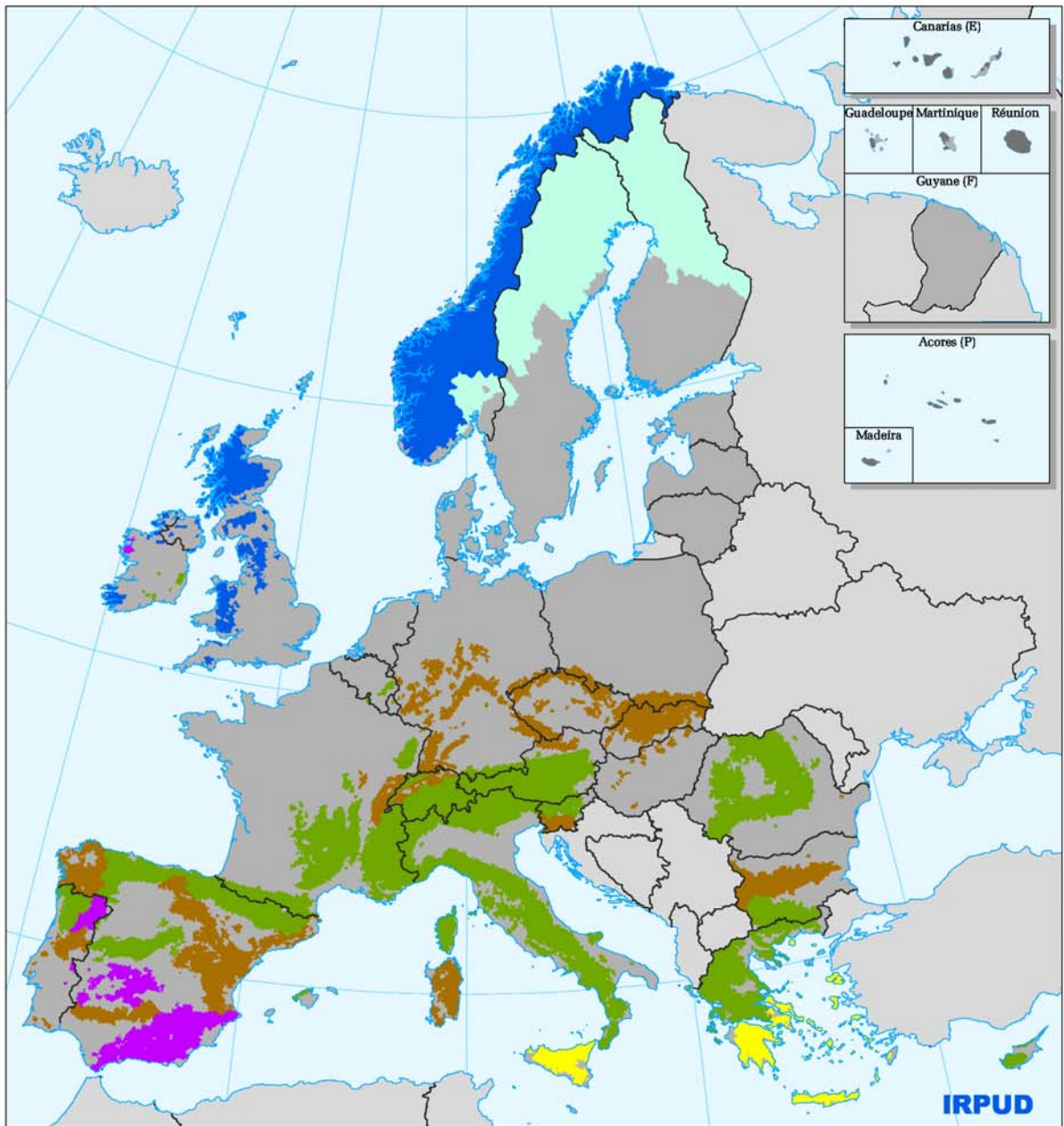


Figure 10.7. Classification of massifs according to typology 3



Classification of massifs according to typology 3

		Climatic contrast index				
		Low		High		
		Slope flat	Slope rough	Slope flat	Slope rough	
Relative balance of arable land and grassland	Arable land > grassland	Share of forest area high	X	X		
		Share of forest area low	X	X		
	Arable land < grassland	Share of forest area high		X		
		Share of forest area low				

- Not classifiable - missing data
- Study area
- Other countries

0 500Km

Administrative boundaries: EuroGeographics, ESRI Romania, NCRD, Okeos, Swiss Federal Statistical Office, Eurostat/IGSCO

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Table 10.6. Massif typology – land use and land covers

		climatic contrast index					
		low		high			
		slope flat	slope rough	slope flat	slope rough		
relative balance of arable land and grassland	arable land > grassland	share of forest high	Koszeg, (HU)		Moravian hills, (CZ)	Austrian Alps, (AT)	Rodopi, (GR)
			Sredna Gora, (BG)		German low mountains, northern part, (DE)	Swiss Alps, (CH)	Basque Mountains, (ES)
	share of forest low	share of forest low	Stara Planina, (BG)		German low mountains, southern part, (DE)	Mediterranean Alps, (FR)	Cantabrian Range, (ES)
			Western mountains, (BG)		German low mountains, southern part, (DE)	Northern Alps, (FR)	Eastern Romanian Carpathian mountains, (RO)
arable land < grassland	share of forest high	share of forest high	Schwabian Alb (Swiss), (CH)		Cotes bourguignonnes, (FR)	Central Alps, (IT)	Southern Romanian Carpathian mountains, (RO)
			Black forest - Schwabian and Frankonian Alb, (DE)		Mecsek, (HU)	Eastern Alps, (IT)	Southern Romanian Carpathian mountains, (RO)
arable land < grassland	share of forest low	share of forest low	Austrian Bohemian mountains, (AT)		Transdanubian Mountains, (HU)	Western Alps, (IT)	Macico Noroeste, (PT)
			Austrian Bohemian mountains, (AT)		Complexo estremenho, (PT)	North Slovenia Alps, (SI)	Macico Noroeste, (PT)
arable land < grassland	share of forest high	share of forest high	Sumava - Cesky Les, (CZ)		Serra Algarvia, (PT)	North Slovenia Alps, (SI)	Balearic Islands, (ES)
			Sumava - Cesky Les, (CZ)		Muntii Macinului, (RO)	Central Appennines, (IT)	Swiss Jura, (CH)
arable land < grassland	share of forest low	share of forest low	German Bohemian mountains, (DE)		French Jura, (FR)	Northern Appennines, (IT)	Pentadaktylos, (CY)
			Czech Carpathian Mountains, (CZ)		Mittelland plateau, (CH)	Southern Appennines, (IT)	Spanish Pyrenees, (ES)
arable land < grassland	share of forest high	share of forest high	North Hungarian mountain areas, (HU)		Upper Rhine Valley, (DE)	Rodopi Planina, (BG)	French Pyrenees, (FR)
			Polish Carpathian mountains, (PL)		Mountains of Sardinia, (IT)	Olympos and Central Greece, (GR)	Leon Mountains, (ES)
arable land < grassland	share of forest low	share of forest low	Slovak Carpathian mountains, (SK)		Czech Ore mountains, (CZ)	Pindos, (GR)	Troodos, (CY)
			Catalan Range, (ES)		German Ore mountains, (DE)		
arable land < grassland	share of forest high	share of forest high	Cordilheira central, (PT)		German Ore mountains, (DE)		
			Cordilheira central, (PT)		Rhenish Slate Mountains (German part), (DE)		
arable land < grassland	share of forest low	share of forest low	Italian Dinaric mountains, (IT)		Northern Vosges, (FR)		
			Dinaric Mountains, (SI)		Sierra Morena, (ES)		
arable land < grassland	share of forest high	share of forest high	Galician Massif, (ES)		Czech Sudetes, (CZ)		
			Galician Massif, (ES)		German Sudetes, (DE)		
arable land < grassland	share of forest low	share of forest low	Iberic System, (ES)		Polish Sudetes, (PL)		
			Brdy, (CZ)		Toledo Mountains, (ES)		
arable land < grassland	share of forest high	share of forest high	Betic Systems, (ES)		Mittelland plateau, (CH)	Swiss Alps, (CH)	Southern Romanian Carpathian mountains, (RO)
			Betic Systems, (ES)		Mountains of Sardinia, (IT)	Mediterranean Alps, (FR)	Crete, (GR)
arable land < grassland	share of forest low	share of forest low	Slovak Carpathian mountains, (SK)		Rhenish Slate Mountains (German part), (DE)	Central Appennines, (IT)	Aegian island mountains, (GR)
			Iberic System, (ES)		Toledo Mountains, (ES)	Northern Appennines, (IT)	Mountains of Sicily, (IT)
arable land < grassland	share of forest high	share of forest high	Connacht mountains, (IE)		Planalto transmontano - Beirao, (PT)	Southern Appennines, (IT)	Peloponnesian mountains, (GR)
			non-massif mountain areas, (PT)			Rodopi, (GR)	Peloponnesian mountains, (GR)
arable land < grassland	share of forest low	share of forest low	Ostrobothnia and coastal hinterland, (FI)			Evia - Viotia - Attiki, (GR)	Spanish Pyrenees, (ES)
			Aangermanland, (SE)				
arable land < grassland	share of forest high	share of forest high	Norrbottn, (SE)				
			Vaesterbotten, (SE)				
arable land < grassland	share of forest low	share of forest low	Jamtland - Harjedalen - Dalarna, (SE)				
			Forest Lapland, (FI)				
arable land < grassland	share of forest high	share of forest high	Kainuu and Koillisma - Hill region, (FI)				
			Mountain Lapland, (FI)				
arable land < grassland	share of forest low	share of forest low	Lapland, (SE)				
			Oestland mountain areas, (NO)				
arable land < grassland	share of forest high	share of forest high	Oestland mountain areas, (NO)				
			Vaermland, (SE)				
arable land < grassland	share of forest low	share of forest low	Border area - Troendelag, (NO)				
			Finmark and northern Troms, (NO)				
arable land < grassland	share of forest high	share of forest high	Nordland - Troms, (NO)				
			Hardangervidda - Southern mountain areas, (NO)				
arable land < grassland	share of forest low	share of forest low	Jotunheimen - Rondane - Dovre, (NO)				
arable land < grassland	share of forest high	share of forest high					
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To a large extent, this typology of massifs is like a classical ecological classification, and will have particular value when combined with the other typologies. It contains seven groups of massifs:

- 1) forested middle mountains: these mainly comprise the relatively low and low-angle Hercynian mountains that stretch from the Jura to the Carpathians of Slovakia, as well as a number of Spanish ranges, the Dinaric mountains of Slovenia and the Stara Planina of Bulgaria;
- 2) steep forested mountains: these are the steep ‘Alpine mountains’ forested at lower altitudes, but usually extending up to an alpine zone, sometimes with glaciers: the Alps, Apennines, Pyrenees, Cantabrian mountains, Romanian Carpathians, and Balkans;
- 3) low-angle open Iberian mountains: the Betic and Iberic Systems and Toledo mountains of Spain;
- 4) open low-angle Mediterranean mountains: the mountains of Sicily, Crete and the Peloponnese in Greece;
- 5) cold forested mountains: the mountains of Finland, Sweden and the Oestland mountains of Norway;
- 6) northern low-angle oceanic mountains: the glaciated mountains of Ireland, the UK, and most of Norway.