SUBREGIONAL WORKSHOP FOR SUBSAHARAN WEST AFRICA ON VALUATION AND INCENTIVE MEASURES
Ouagadougou, Burkina Faso, 14–17 May 2013

ENVIRONMENTAL AND ECOSYSTEM ACCOUNTING

Systems & Species Biodiversity Change Accounting

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Preliminary remarks

- Computing stocks of systems is possible: terrestrial ecosystems (via land cover), rivers, coastal water systems…

- Computing stocks of species is possible for only a small number of them; only change can be observed via sampling

- In general, only a subset of all possible species is observed (typically, endangered species) ➜ biased sample

- Data on species are very heterogeneous ➜ need to be resampled to systems…

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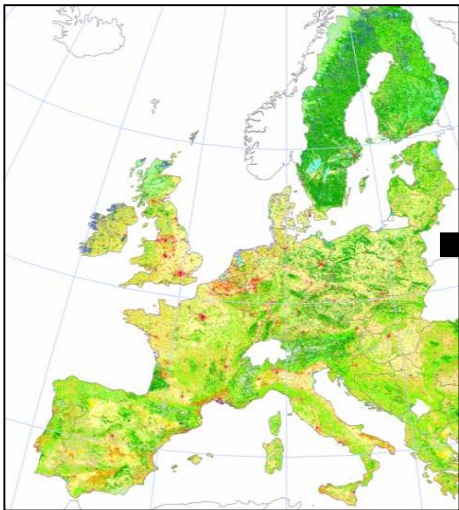
Presentation based on:

The making of the biodiversity/species index for LEAC/Ecosystem capital accounts in Europe

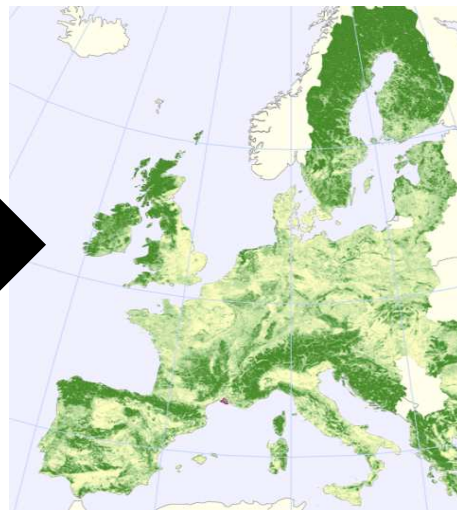J.-L. Weber*, E. Ivanov[+], R. Spyropoulou*, O.Gomez*

* European Environment Agency

[+] University of Nottingham

Accounting for systems: Net Landscape Ecological Potential of Europe
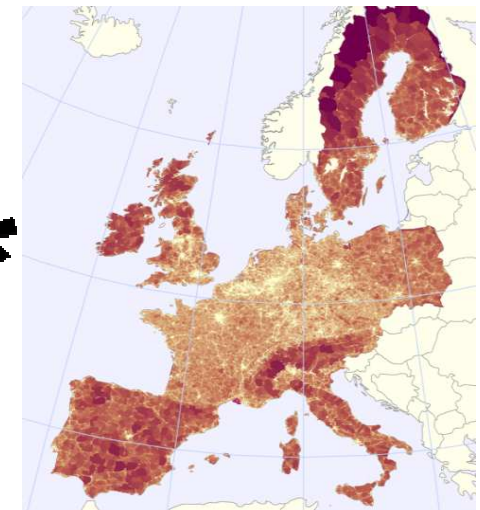

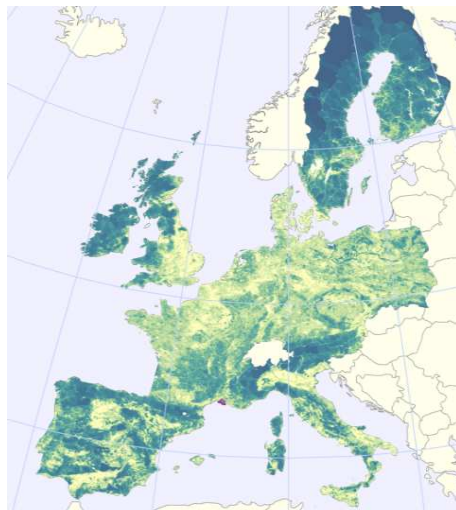Corine land cover map (*CLC is derived from satellite images*)

Green Landscape Index (*derived from CLC*)

*
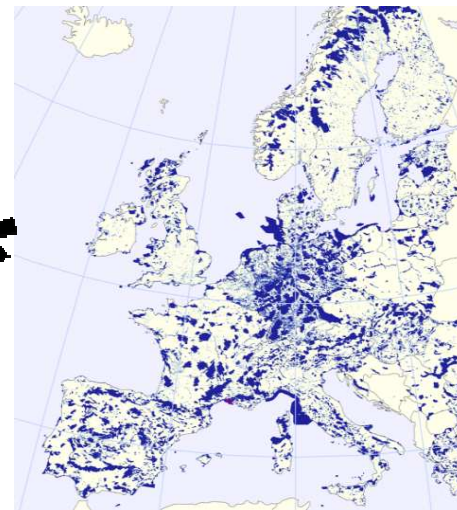
Nature Value (*Naturilis, derived from Natura2000 and other designated areas*)

*

Fragmentation (*Effective Mesh Size (MEFF) derived from TeleAtlas Roads and CLC*)

Landscape Ecological Potential (LEP) 2000, by 1km² grid cell

and
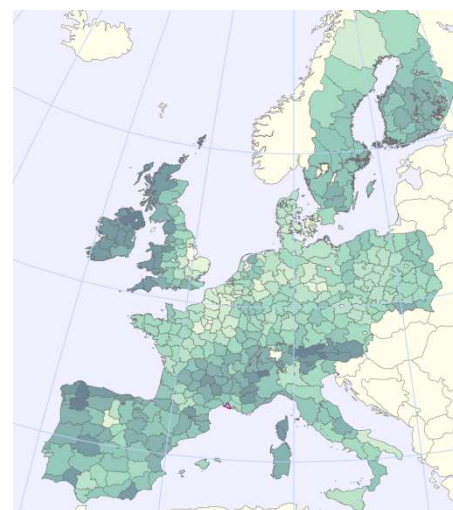
LEP 2000 by NUTS 2/3

Accounting for species with a very imperfect databases

- Example of use of the European reporting to the Habitats Directive, Article 17, 2006

- 1200 species all other Europe (no birds)

- Estimated spatial relevance – 10 km x 10 km

- Distribution maps (2006)

- **Attributing species into their most preferred habitat / Ecosystem (one specie can belong to more than one group): Forest, Agriculture, Grassland, Shrubland, Forest, Wetlands and water, Coasts**

- **Selection of indicators ➜ 2 indexes**

- Population trends 2000-2006 (Increasing, Stable, Decreasing)

Index T1: no of species Increasing + Stable – Decreasing

- Future prospects as seen in 2006 (good, poor, bad)

Index T2: no of species with good- poor- bad future prospects

Example of forest species

Jean-Louis Weber

Input 1: Number of forest species reported with « future = bad or poor»
Note that several « forest » species can be found in other ecosystems as well.

Legend:
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 22

☑ dlt34_forest_0-1
- 1

Jean-Louis Weber
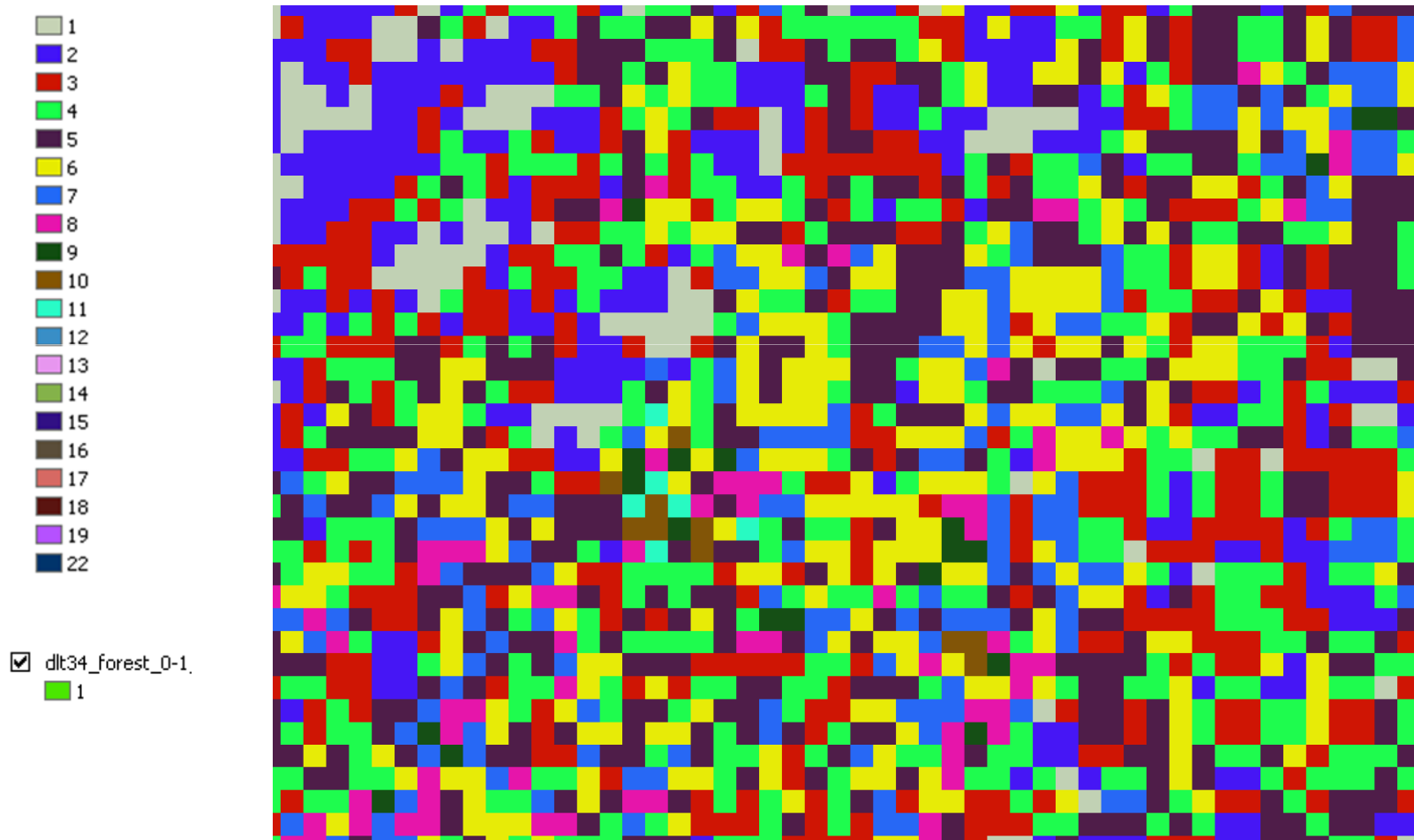
Input 2: Forest Dominant Landscape Type 34
(more than 1/3 of land cover is forest...)

☑ dlt34_forest_0-1
　　☐ 1
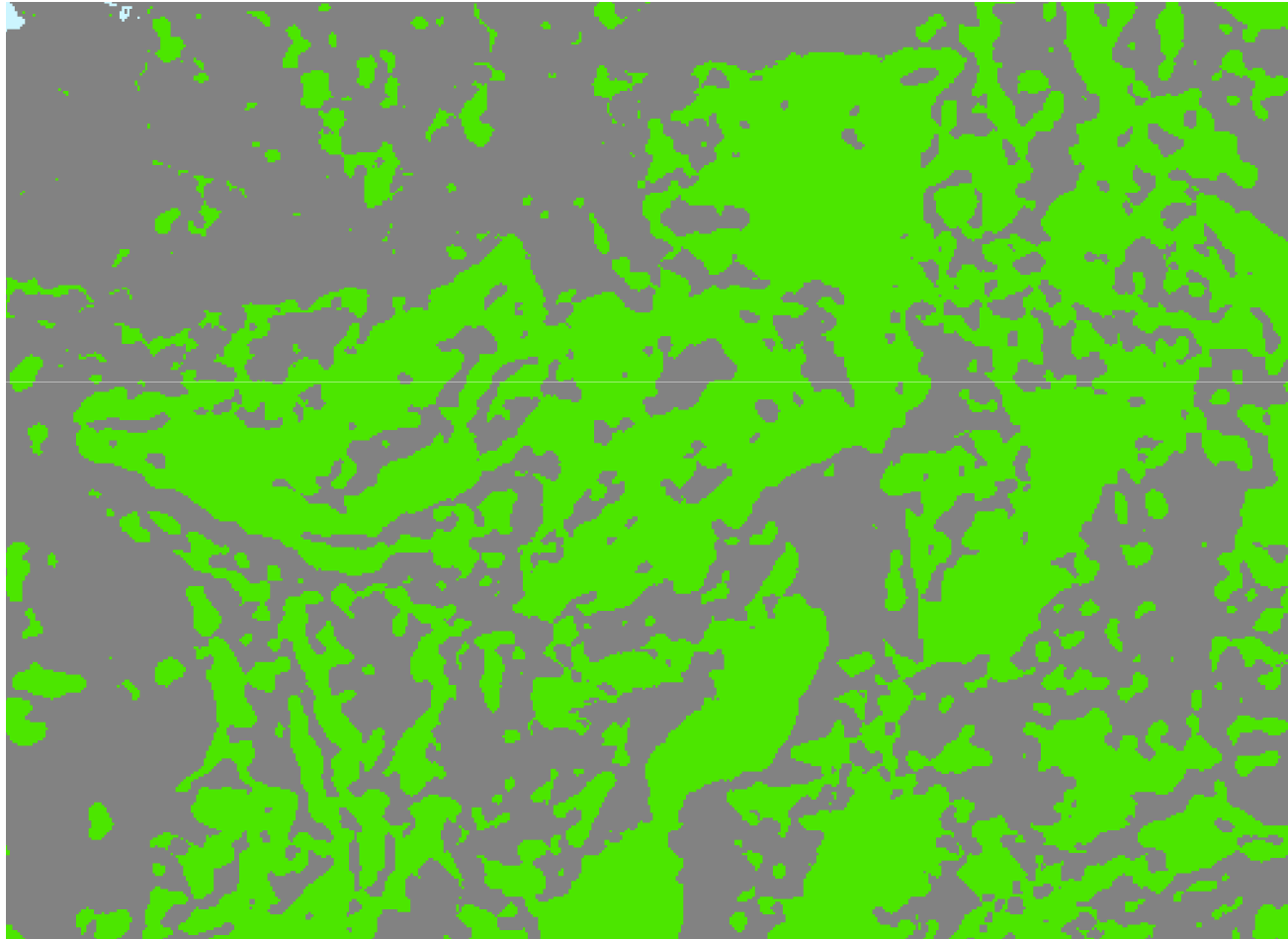
Filtering of resampled data
with the map of Forest Dominant Landscape Type 34 (1 km x 1 km)

Jean-Louis Weber
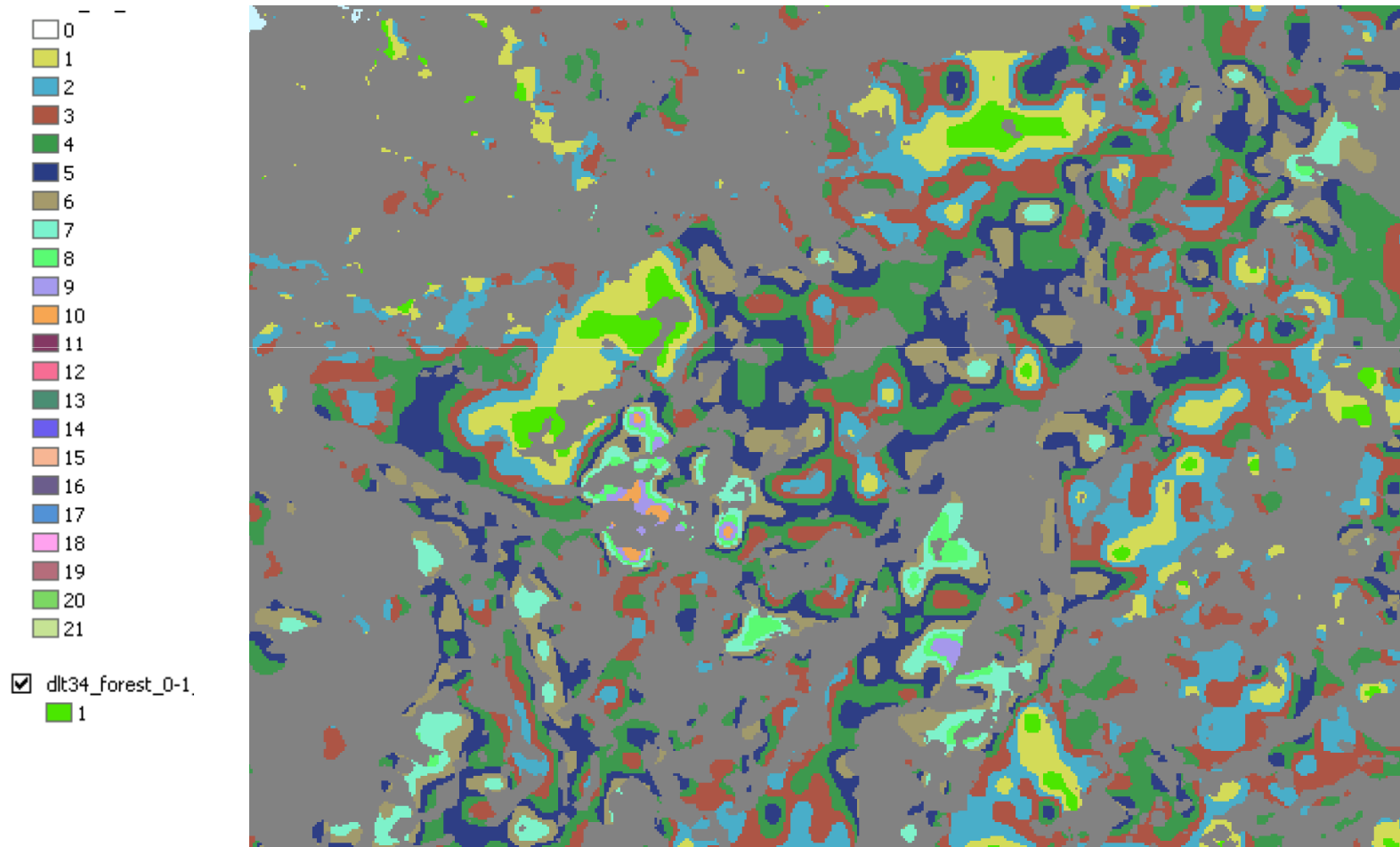
Similarly processed data for Forest:
number of species with « future = good »

VALUE
- 1 - 2
- 3 - 4
- 5 - 5
- 6 - 6
- 7 - 8
- 9 - 9
- 10 - 10
- 11 - 12
- 13 - 13
- 14 - 14
- 15 - 16
- 17 - 17
- 18 - 18
- 19 - 20
- 21 - 21

☑ dlt34_forest_0-1.
- 1

*Bright green =
DLT34 forest
with no data*

Jean-Louis Weber
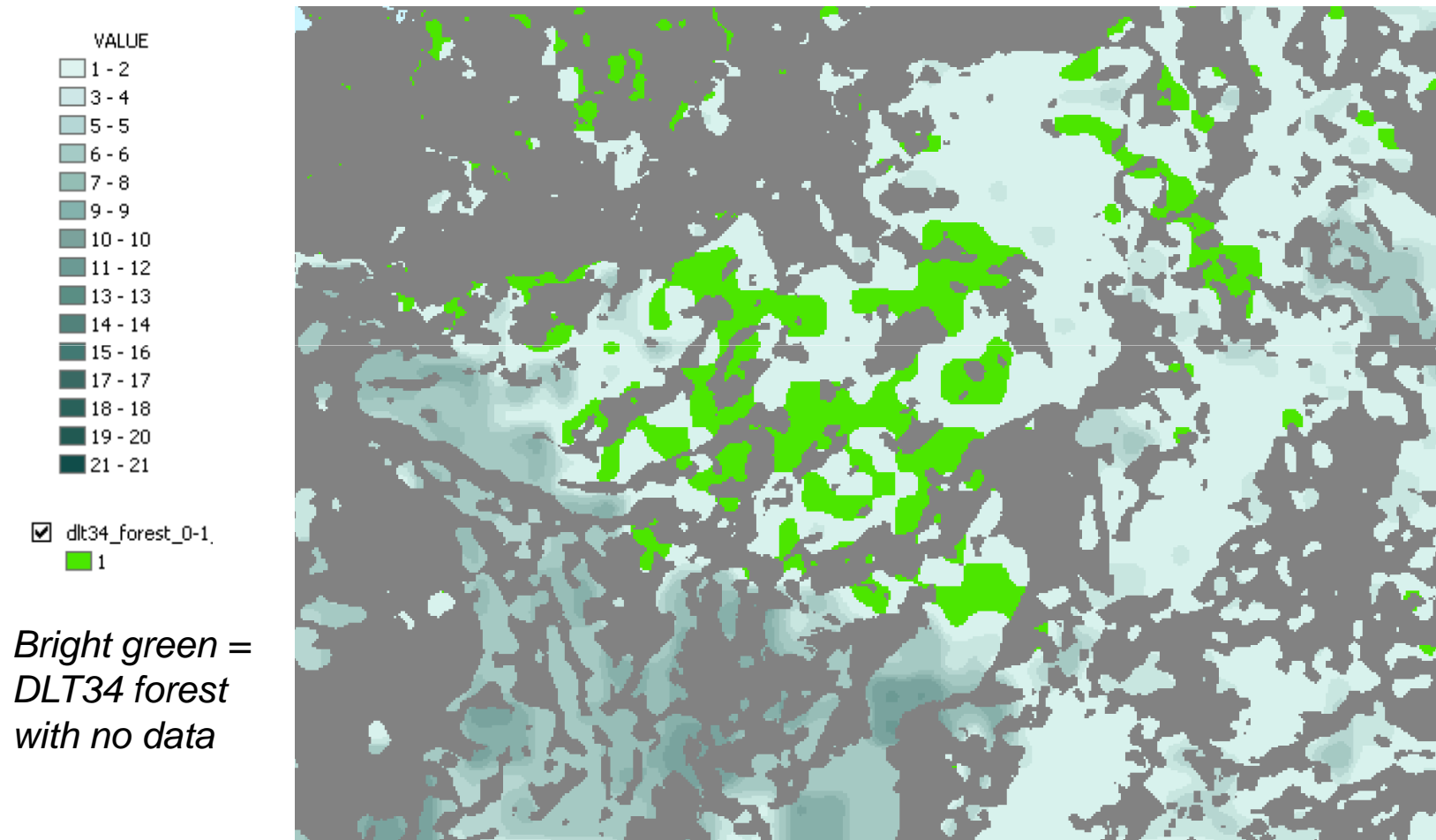
Forest : future prospects index :
Number of species with « future good minus future bad+poor »

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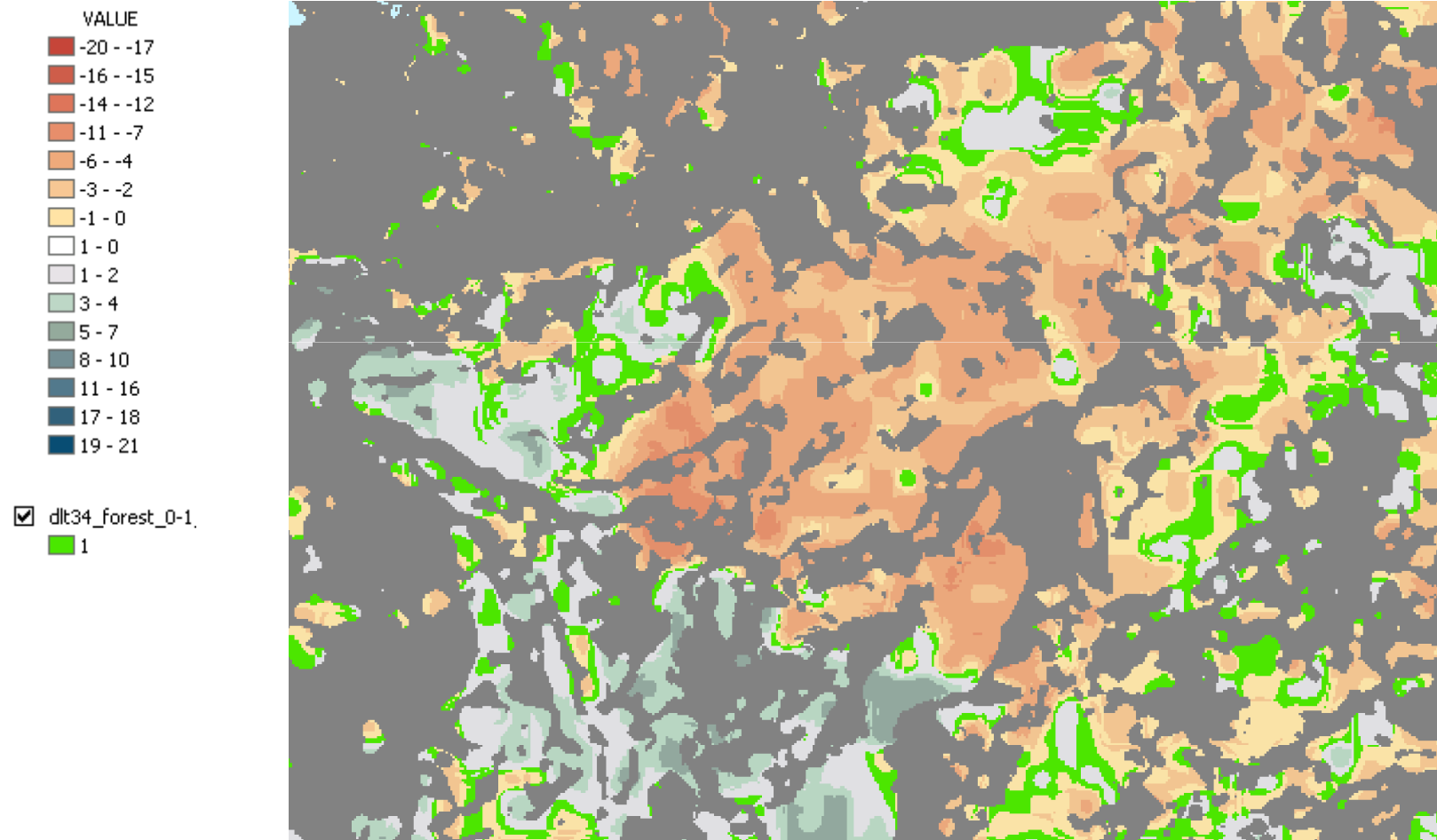
Forest species population index : No of species with population increase and stable minus no of species with decrease

VALUE
- -14
- -13 - -12
- -11 - -10
- -9 - -7
- -6
- -5
- -4
- -3 - -2
- -1
- 0
- 1
- 2
- 3
- 4
- 5 - 8

Jean-Louis Weber
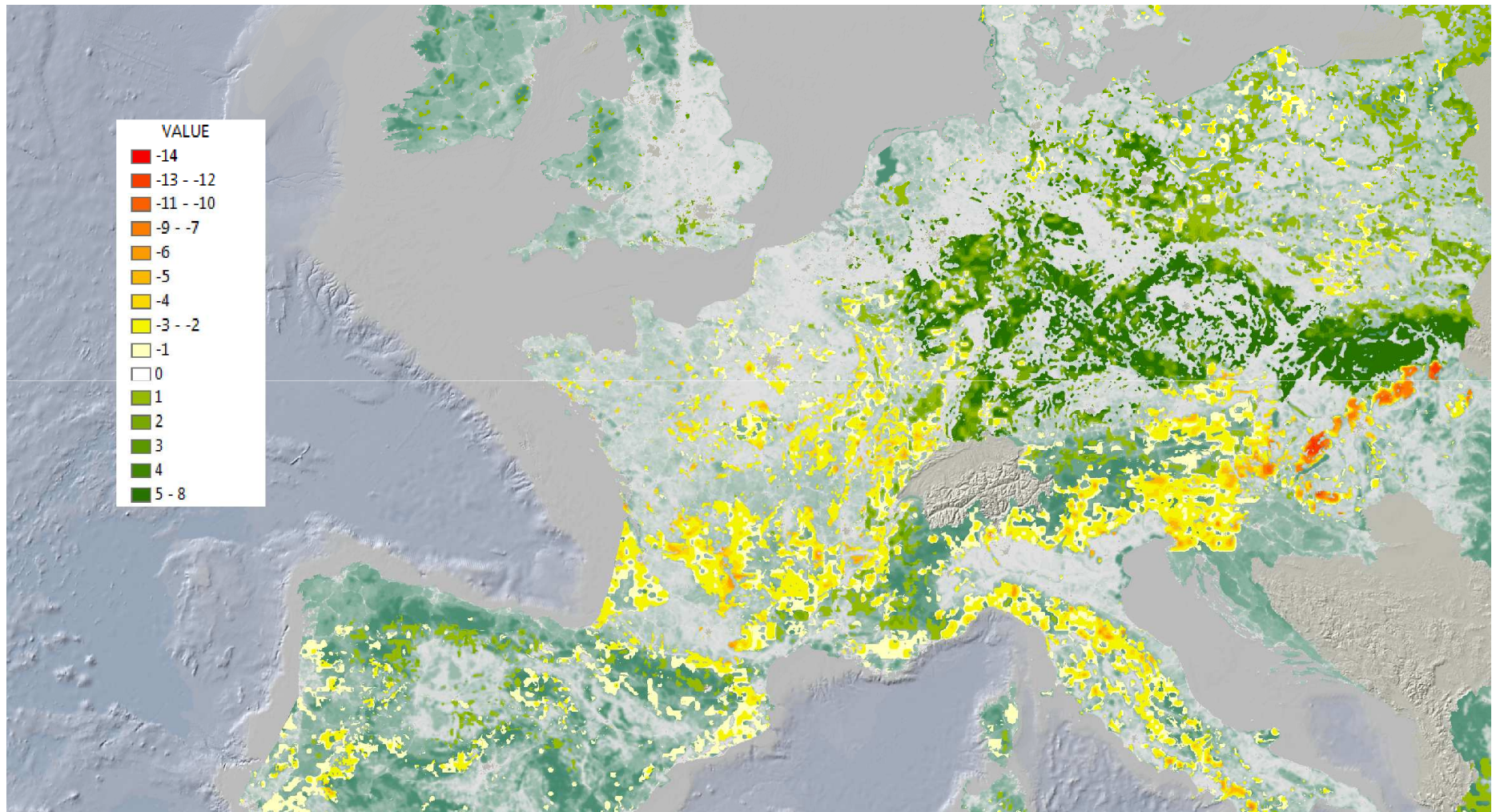
Results

Net landscape ecological potential (nlep) 2000 (observed)

nlep by sub-basins

nlep00xx

<VALUE>

- 0
- 1 - 4
- 5 - 26
- 27 - 32
- 33 - 35
- 36 - 37
- 38 - 38
- 39 - 39
- 40 - 41
- 42 - 42
- 43 - 43
- 44 - 45
- 46 - 47
- 48 - 47
- 48 - 49
- 50 - 50
- 51 - 51
- 52 - 52
- 53 - 54
- 55 - 55
- 56 - 55
- 56 - 56
- 57 - 57
- 58 - 58
- 59 - 59
- 60 - 61
- 62 - 63
- 64 - 66
- 67 - 69
- 70 - 72
- 73 - 79
- 80 - 92

+90

+1
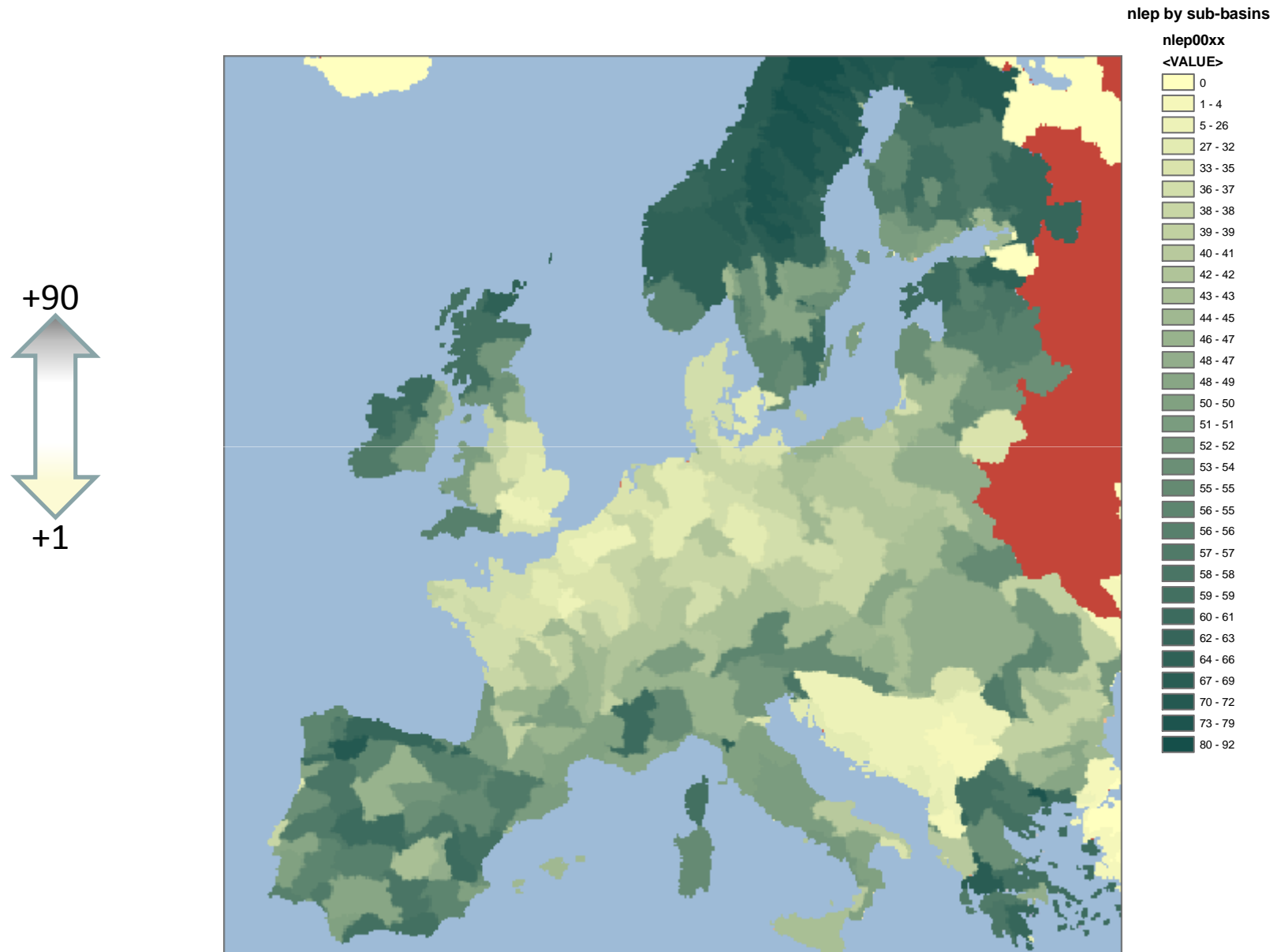
Net landscape ecological potential (nlep) 2010 (nowcast)

+90

+1

nlep by sub-basins

nlep00xx
<VALUE>

	0
	1 - 4
	5 - 26
	27 - 32
	33 - 35
	36 - 37
	38 - 38
	39 - 39
	40 - 41
	42 - 42
	43 - 43
	44 - 45
	46 - 47
	48 - 47
	48 - 49
	50 - 50
	51 - 51
	52 - 52
	53 - 54
	55 - 55
	56 - 55
	56 - 56
	57 - 57
	58 - 58
	59 - 59
	60 - 61
	62 - 63
	64 - 66
	67 - 69
	70 - 72
	73 - 79
	80 - 92
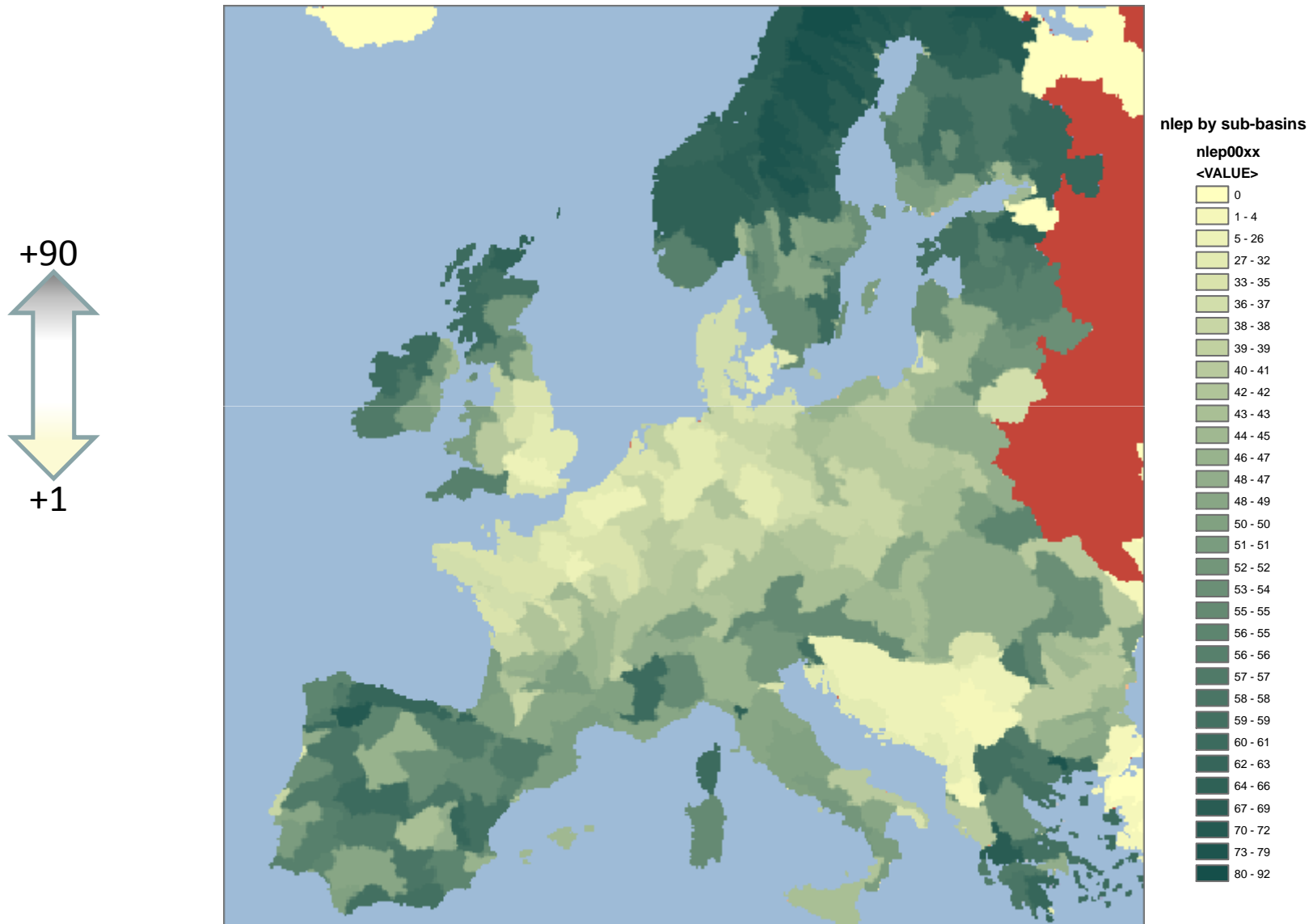
T1 Species "Populations trend" index, by sub-basins

Art17 Populations trend index, by sub-basins

a17_0006xx

<VALUE>

- -13.2 - -2.4
- -2.3 - -1.8
- -1.7 - -1.3
- -1.2 - -0.9
- -0.8 - -0.6
- -0.5 - -0.5
- -0.4 - -0.3
- -0.2 - -0.2
- -0.1 - 0
- 0.1 - 0
- 0.1 - 0.1
- 0.2 - 0.1
- 0.2 - 0.2
- 0.3 - 0.3
- 0.4 - 0.5
- 0.6 - 0.8
- 0.9 - 1
- 1.1 - 1.2
- 1.3 - 1.5
- 1.6 - 1.9
- 2 - 2.3
- 2.4 - 3.2
- 3.3 - 4.4
- 4.5 - 11.9
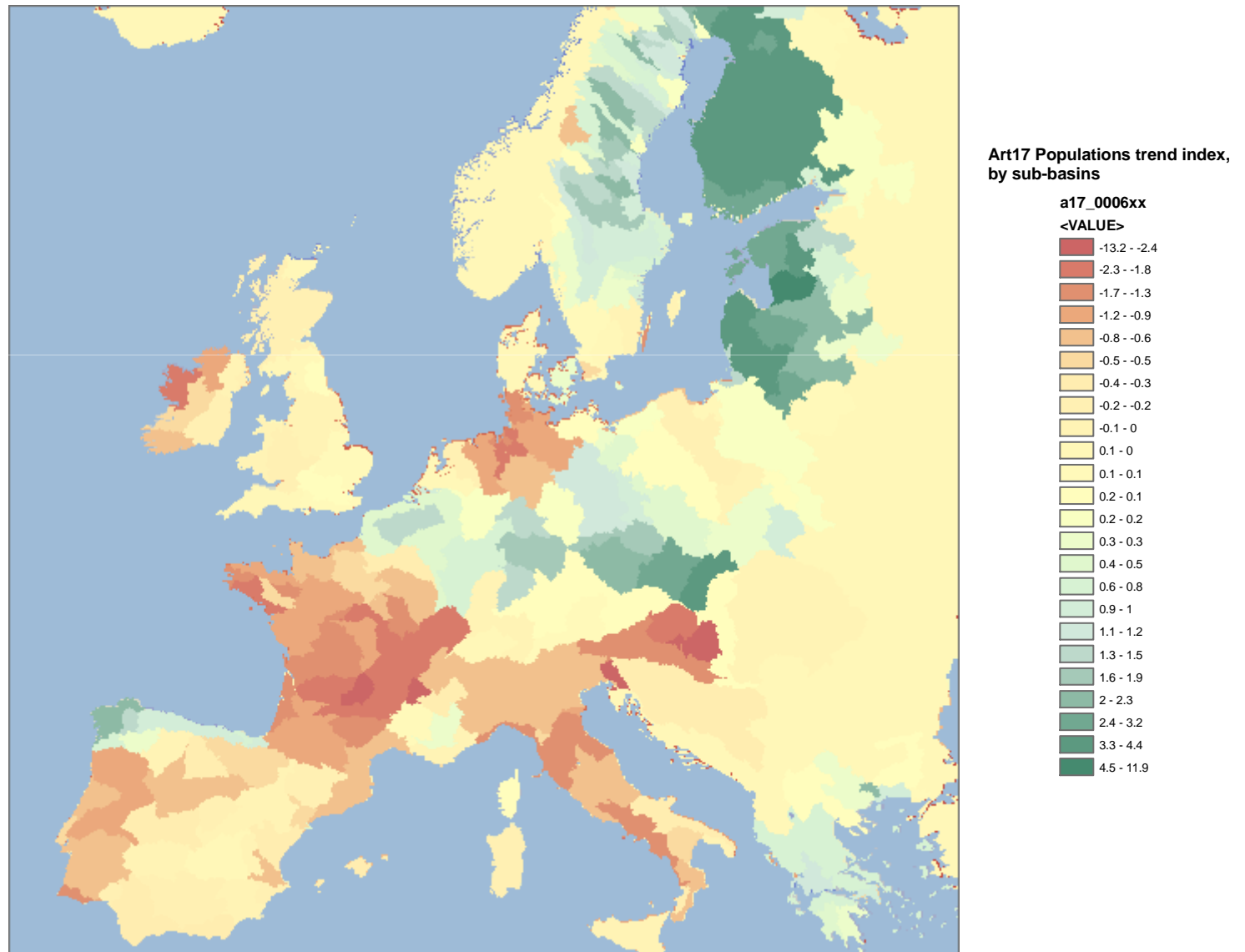
T2 Species "Future prospect" index, by sub-basins

Art17 Future prospect index, by sub-basins

a17_0610x

<VALUE>

- -13.2 - -2.4
- -2.3 - -1.8
- -1.7 - -1.3
- -1.2 - -0.9
- -0.8 - -0.6
- -0.5 - -0.5
- -0.4 - -0.3
- -0.2 - -0.2
- -0.1 - 0
- 0.1 - 0
- 0.1 - 0.1
- 0.2 - 0.1
- 0.2 - 0.2
- 0.3 - 0.3
- 0.4 - 0.5
- 0.6 - 0.8
- 0.9 - 1
- 1.1 - 1.2
- 1.3 - 1.5
- 1.6 - 1.9
- 2 - 2.3
- 2.4 - 3.2
- 3.3 - 4.4
- 4.5 - 11.9
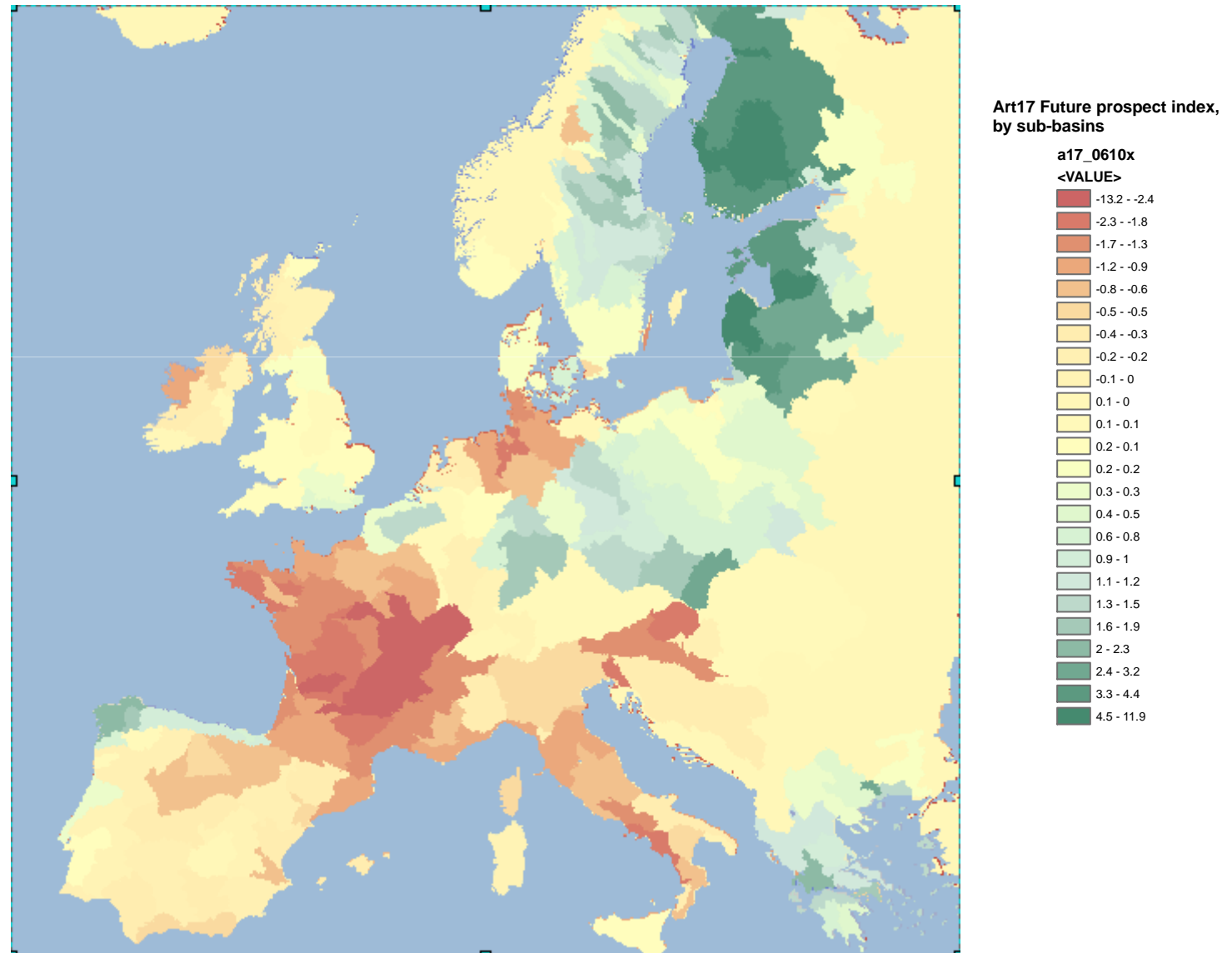
Ecosystem Capital Accounts: Landscape/Biodiversity Capacity Account

Species change mean indexes pre- and post 2006, by ecosystems

Ecosystem Capital Accounts:
Mean Species/Biodiversity Indexes by Dominant Ecosystem Types

Legend:
- "Populations Trend" (Art.17) Mean Index -10 +10
- Future Prospect (Art.17) Mean Index -10 +10

Categories: 1 - Urban, 2 - Broad pattern agriculture, 3 - Agriculture mosaics & pastures, 4 - Forests, 5 - Natural grass & shrubs, 6 - Bare land, 7 - Wetland & water, 8 - Composite landscape, EU25
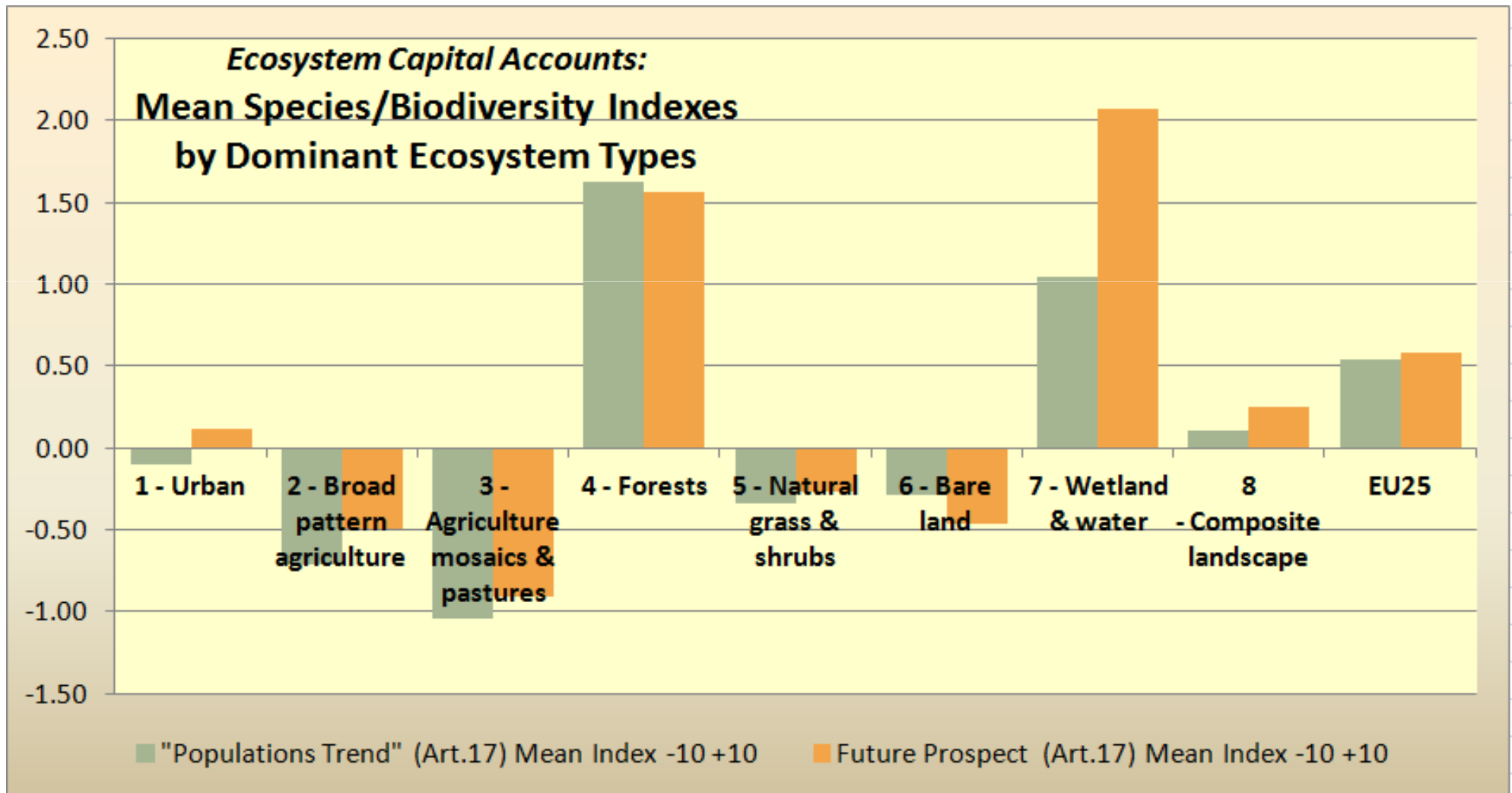
Landscape/species capacity 2000 by sub-basins

Land bio-capacity, by sub-basins

landcapa00_M
MEAN_1

- 0 - 6.2
- 6.3 - 23.8
- 23.9 - 30.4
- 30.5 - 33.8
- 33.9 - 36
- 36.1 - 38
- 38.1 - 39.4
- 39.5 - 40.5
- 40.6 - 42
- 42.1 - 43.3
- 43.4 - 44.7
- 44.8 - 46.3
- 46.4 - 47.5
- 47.6 - 48.7
- 48.8 - 49.6
- 49.7 - 50.7
- 50.8 - 52.4
- 52.5 - 54.1
- 54.2 - 55.2
- 55.3 - 56.4
- 56.5 - 57.6
- 57.7 - 58.4
- 58.5 - 59.2
- 59.3 - 61.5
- 61.6 - 63
- 63.1 - 64.5
- 64.6 - 67.2
- 67.3 - 70.5
- 70.6 - 73.7
- 73.8 - 77
- 77.1 - 80.9
- 81 - 91.5

+100

+1
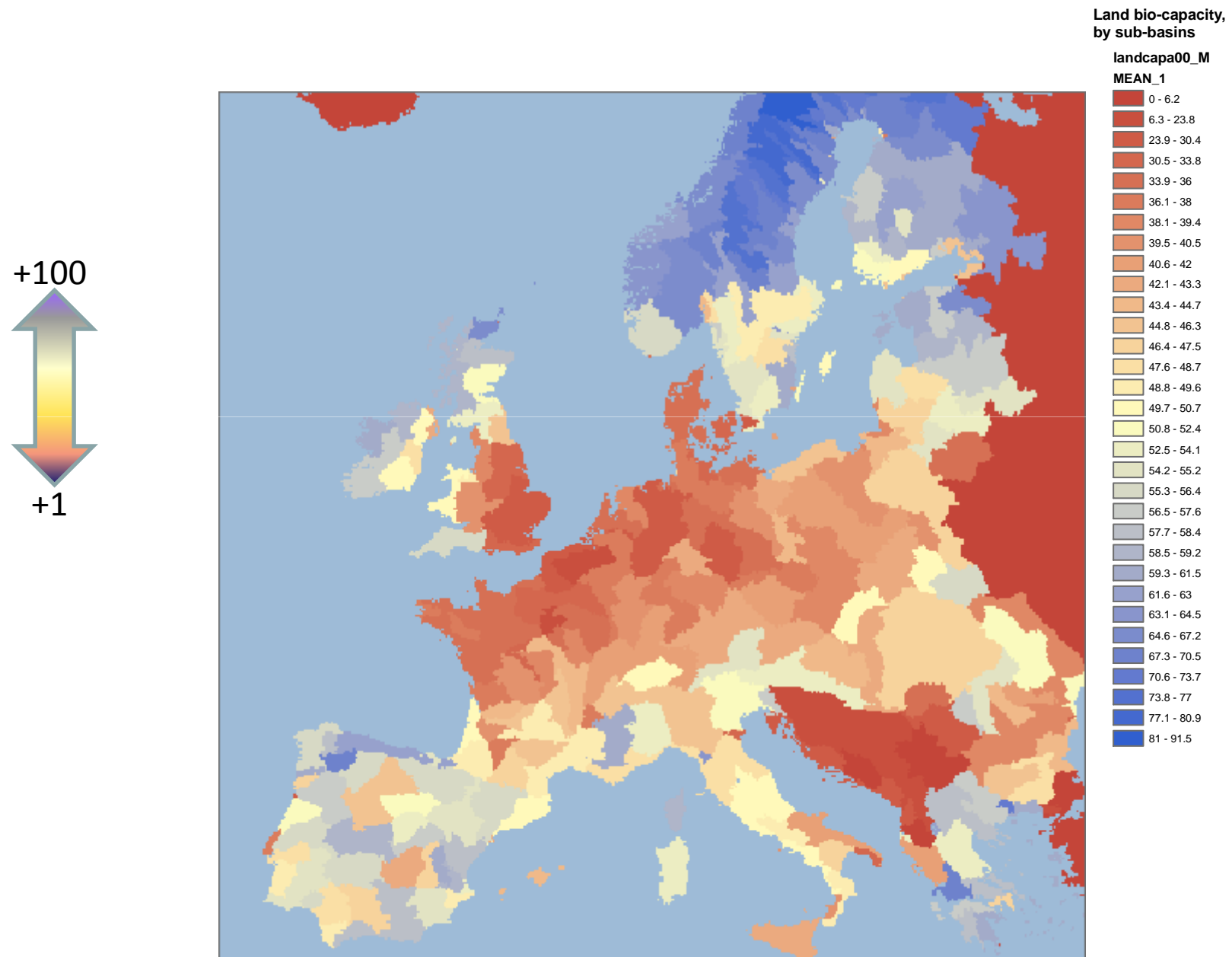
Landscape/species capacity 2006 by sub-basins

Land bio-capacity, by sub-basins

landcapa00_M MEAN_1

- 0 - 6.2
- 6.3 - 23.8
- 23.9 - 30.4
- 30.5 - 33.8
- 33.9 - 36
- 36.1 - 38
- 38.1 - 39.4
- 39.5 - 40.5
- 40.6 - 42
- 42.1 - 43.3
- 43.4 - 44.7
- 44.8 - 46.3
- 46.4 - 47.5
- 47.6 - 48.7
- 48.8 - 49.6
- 49.7 - 50.7
- 50.8 - 52.4
- 52.5 - 54.1
- 54.2 - 55.2
- 55.3 - 56.4
- 56.5 - 57.6
- 57.7 - 58.4
- 58.5 - 59.2
- 59.3 - 61.5
- 61.6 - 63
- 63.1 - 64.5
- 64.6 - 67.2
- 67.3 - 70.5
- 70.6 - 73.7
- 73.8 - 77
- 77.1 - 80.9
- 81 - 91.5

+100

+1
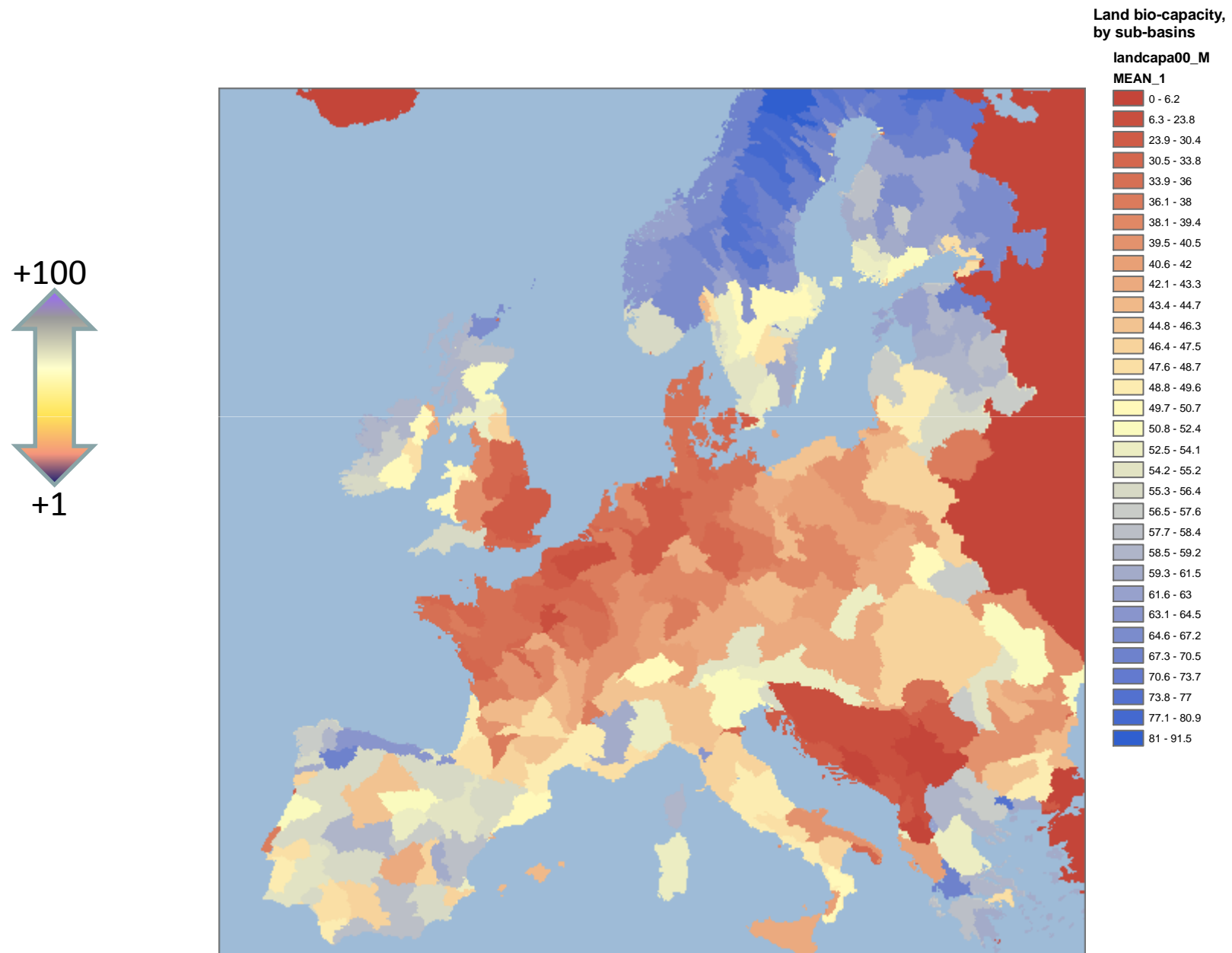
Landscape/species capacity 2010 by sub-basins

Land bio-capacity, by sub-basins

landcapa00_M MEAN_1

- 0 - 6.2
- 6.3 - 23.8
- 23.9 - 30.4
- 30.5 - 33.8
- 33.9 - 36
- 36.1 - 38
- 38.1 - 39.4
- 39.5 - 40.5
- 40.6 - 42
- 42.1 - 43.3
- 43.4 - 44.7
- 44.8 - 46.3
- 46.4 - 47.5
- 47.6 - 48.7
- 48.8 - 49.6
- 49.7 - 50.7
- 50.8 - 52.4
- 52.5 - 54.1
- 54.2 - 55.2
- 55.3 - 56.4
- 56.5 - 57.6
- 57.7 - 58.4
- 58.5 - 59.2
- 59.3 - 61.5
- 61.6 - 63
- 63.1 - 64.5
- 64.6 - 67.2
- 67.3 - 70.5
- 70.6 - 73.7
- 73.8 - 77
- 77.1 - 80.9
- 81 - 91.5

+100

+1
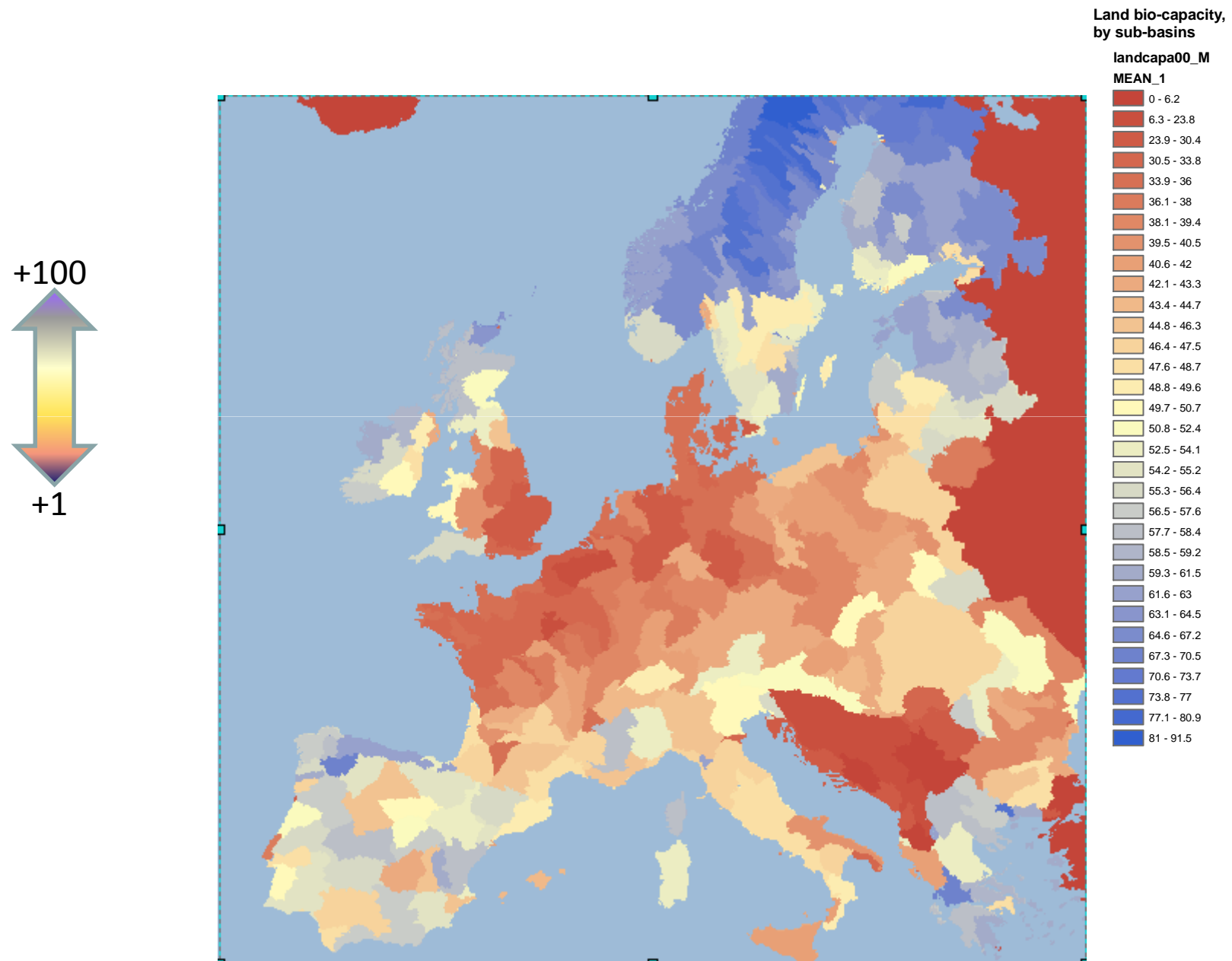
Change in landscape/species capacity 2000-2006, by sub-basins

Land bio-capacity, change 2000-2006 by sub-basins

Calculation

<VALUE>

- -2.91 - -1.9
- -1.89 - -1.23
- -1.22 - -0.88
- -0.87 - -0.63
- -0.62 - -0.54
- -0.53 - -0.48
- -0.47 - -0.43
- -0.42 - -0.37
- -0.36 - -0.33
- -0.32 - -0.29
- -0.28 - -0.23
- -0.22 - -0.14
- -0.13 - -0.04
- -0.03 - 0.29
- 0.3 - 1.99
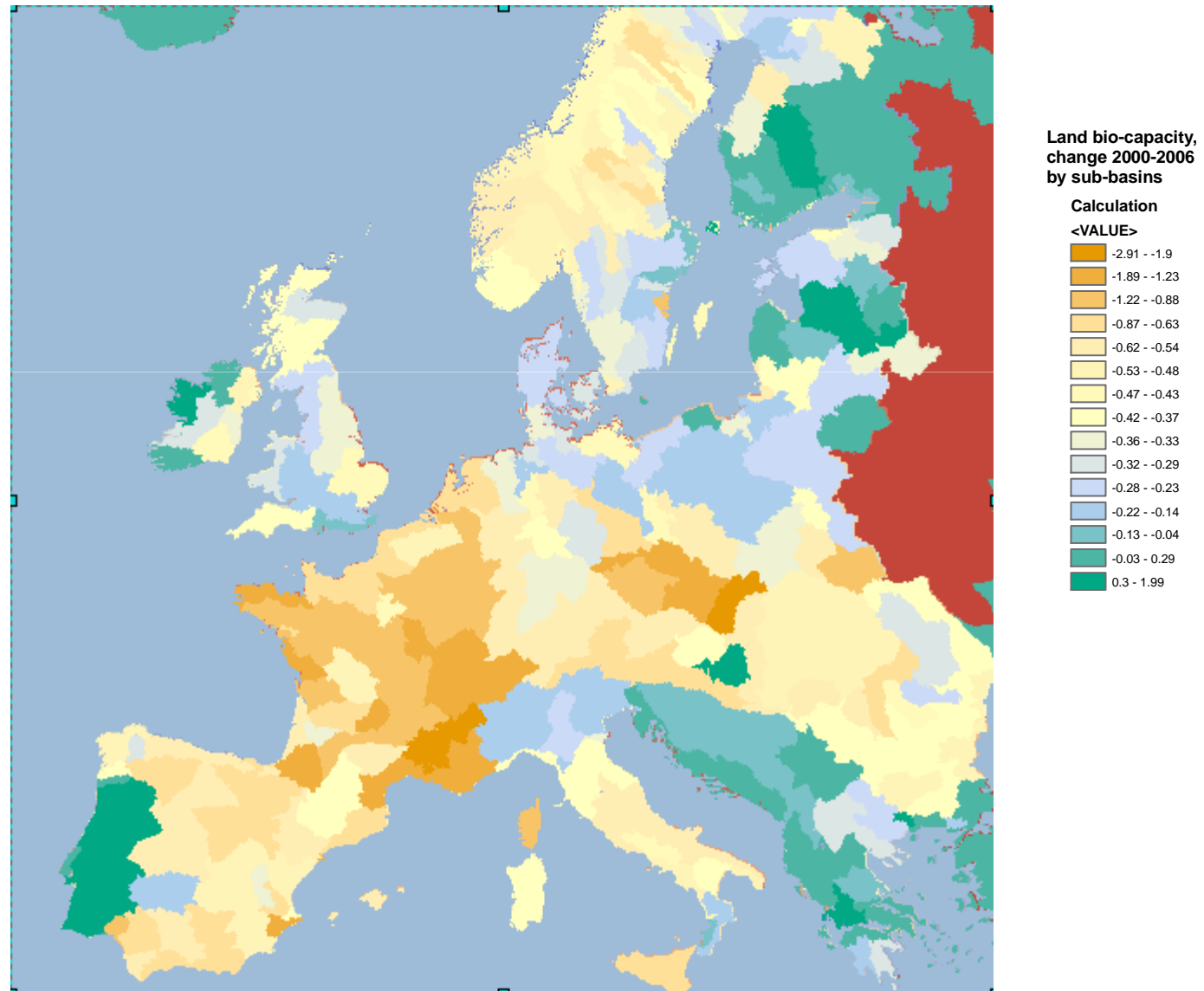
Systems and Species Biodiversity Accounts

Systems and species biodiversity accounts
Basic land cover accounts (per memory - priority task)
Stocks of land cover
Consumption of land cover
Formation of land cover
Basic balance of ecosystem infrastructure integrity, stocks and changes
Landscape ecosytem potential (surface x composite quality index)
Green background landscape index (GBLI)
Landscape high nature value index (f(protection) or 1/vulnerability)
Landscape fragmentation index (km roads by km2)
Landscape green ecotones index
Rivers ecosytem potential (length x composite quality index)
River ecosystems background potential index (standard river km)
Rivers high nature value index (f(protection) or 1/vulnerability)
Rivers fragmentation index
Rivers green ecotones index
Sea coastal ecosystem potential index
Sea coastal ecosystems background index (TBD)
Sea coastal ecosystems high nature value index (f(protection) or 1/vulnerability)
Sea coastal ecosystems fragmentation index
Sea coastal ecosystems green ecotones index

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Systems and Species Biodiversity Accounts

= Change in accessible basic resource; when < 0, stress on resource ➜ degradation

Table of Indexes of Ecosystem State/Distress	
	Change in net ecosystem integrity
	Change in landscape ecosytem potential
	Change in rivers ecosytem potential
	Change in sea coastal ecosystem potential
	Diagnosis of species/biotopes health
	Change in threatened species diversity
	Change in species population health
Population accessibility to green infrastructure neighbourhood ecosystem services	
	Population
	Basic GINES values (population in a neighbourhood from ecosystem types of n km, inverse to distance proportional)
GINES accessibility limiting factors	
	Limitation due to transport
	Limitation due to public or private legal barriers

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