Participation of Slovenia in WGE LRTAP

Slovenian Forestry Institute (GIS) & Slovenian Forestry Service (ZG)
University of Ljubljana, Biotechnical Faculty (BF)
Institute Jožef Stefan, Ljubljana (IJS)
Slovenian Environmental Agency (ARSO)

Participation in WGE programmes

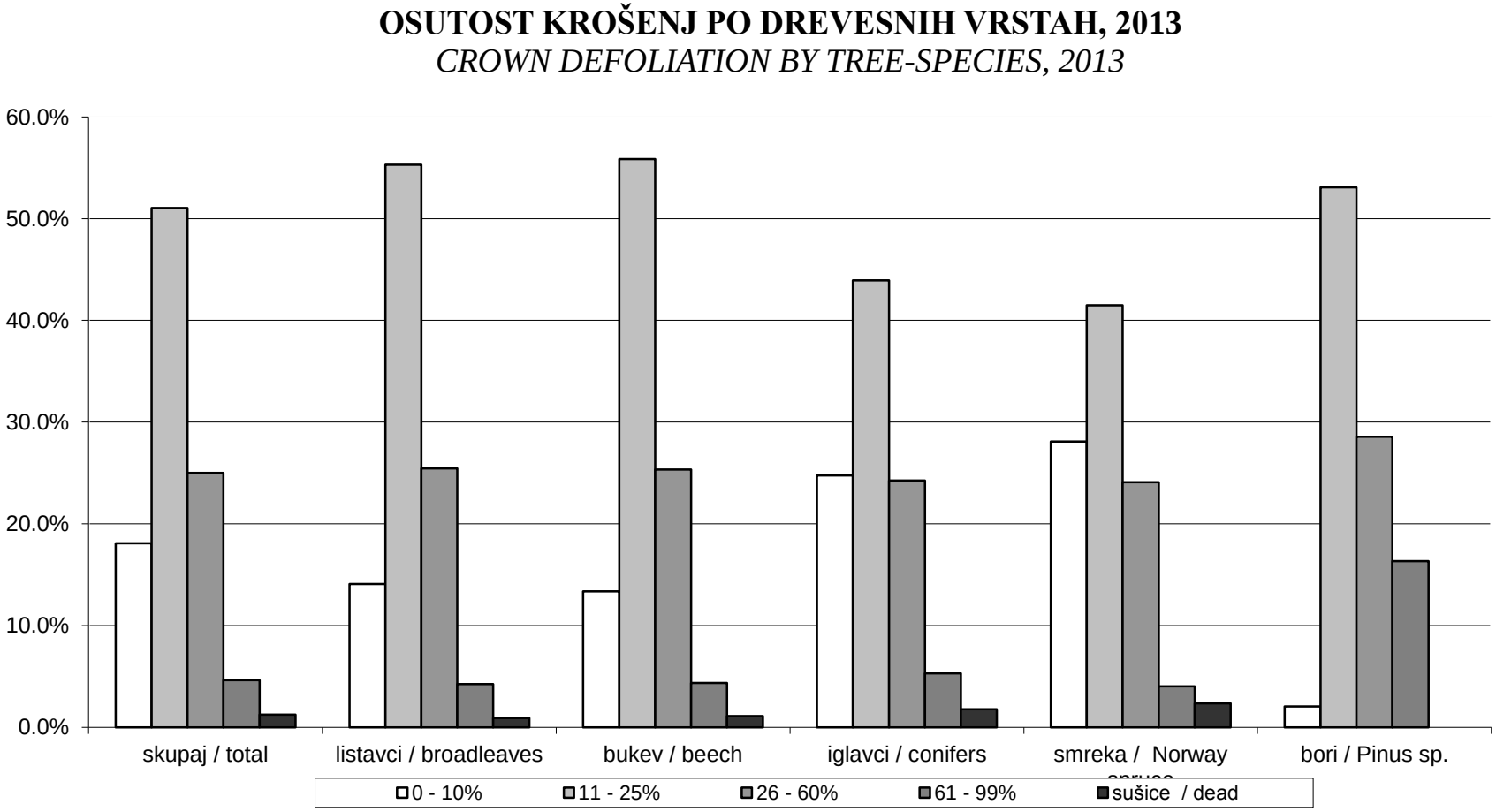
- **ICP Forest**, **Level I**- from the beginning;
  Level II- from 2002 ?

(Slovenian Forestry Institute & Slovenian Forestry Service, UL BF, IJS, ARSO)

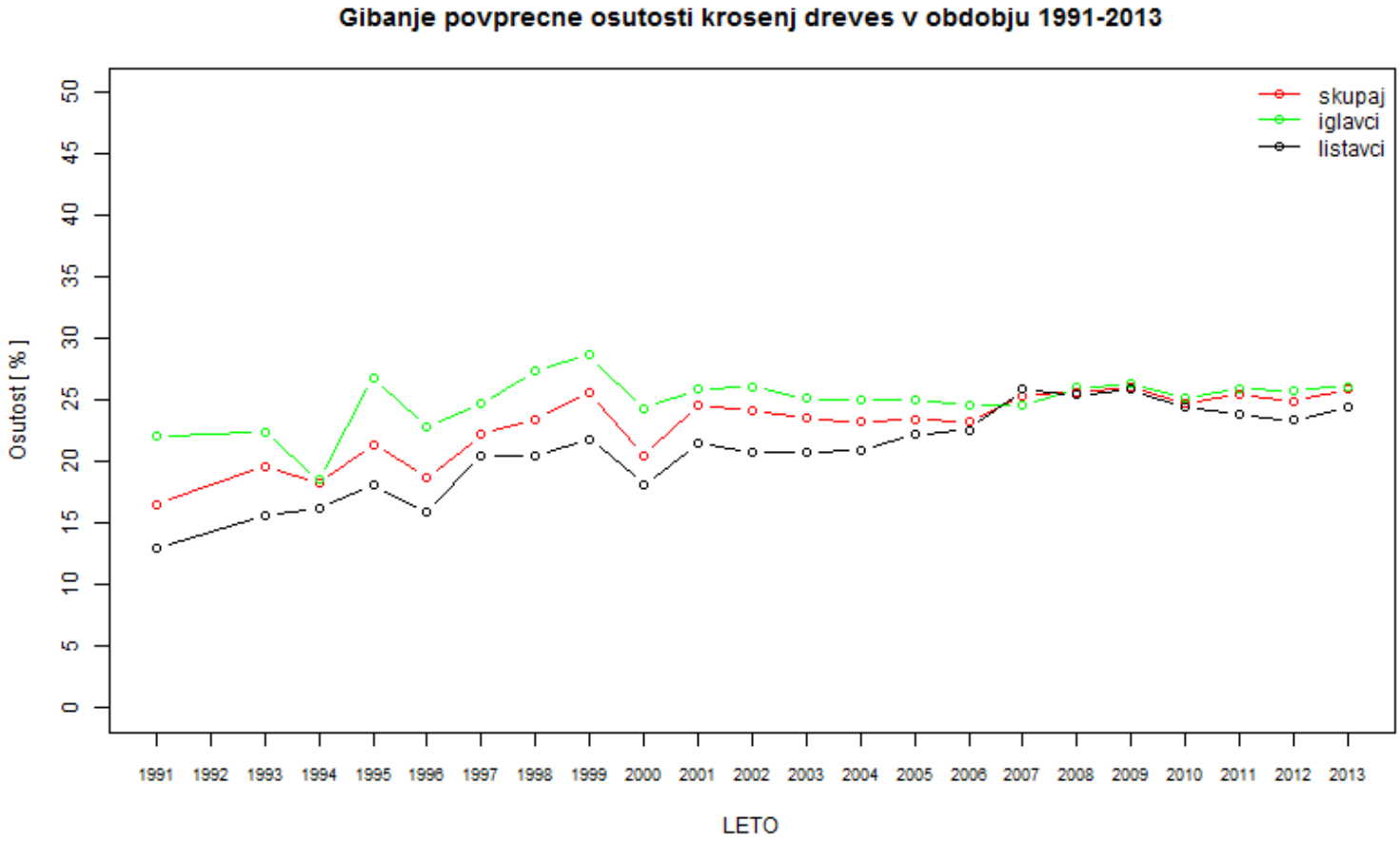
Level I : agreed activities (4 x 4 km grid, 16 x 16 km grid; additional activities: several bioindication methods (epiphytic lichen mapping); **forest die-back inventory in slowly converting to forestry inventory**

- http://www.forestdata.org/futmon/fm_start.php
-

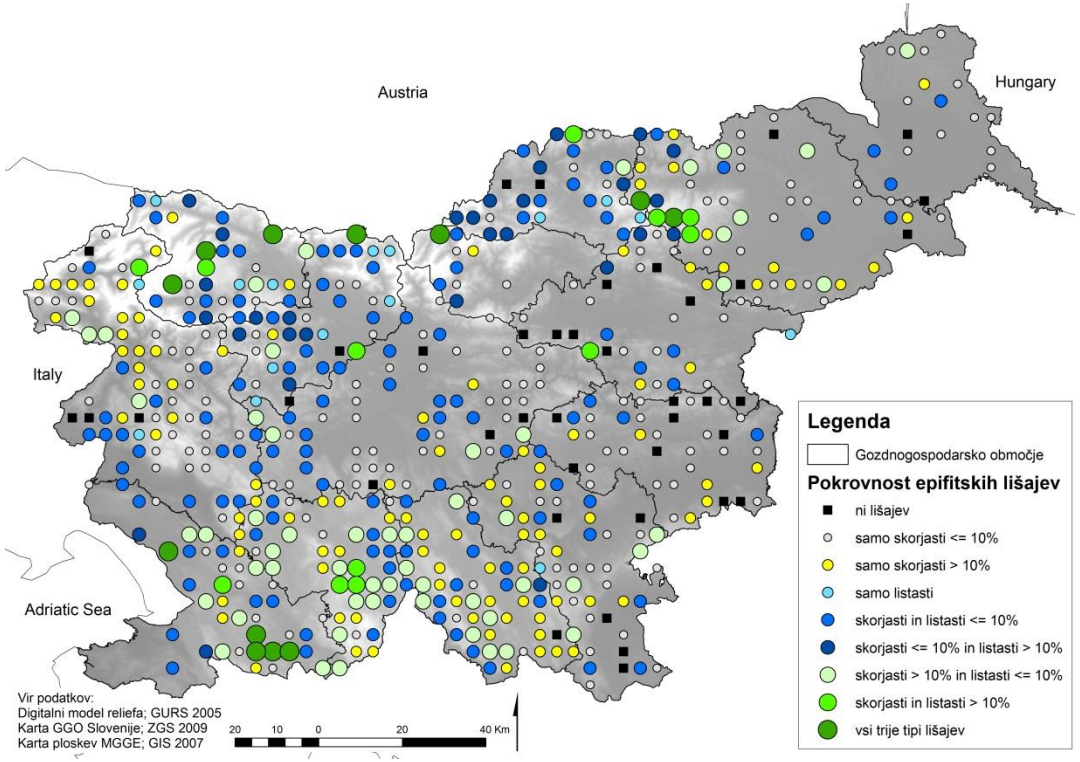
ICP-Forest-Level I- 44 plots observed each year



ICP-Forest-Level I- some data: Average crown defoliation in the period 1991-2013



Epiphytic lichen cover, compiled for all tree species; forest inventory 2007



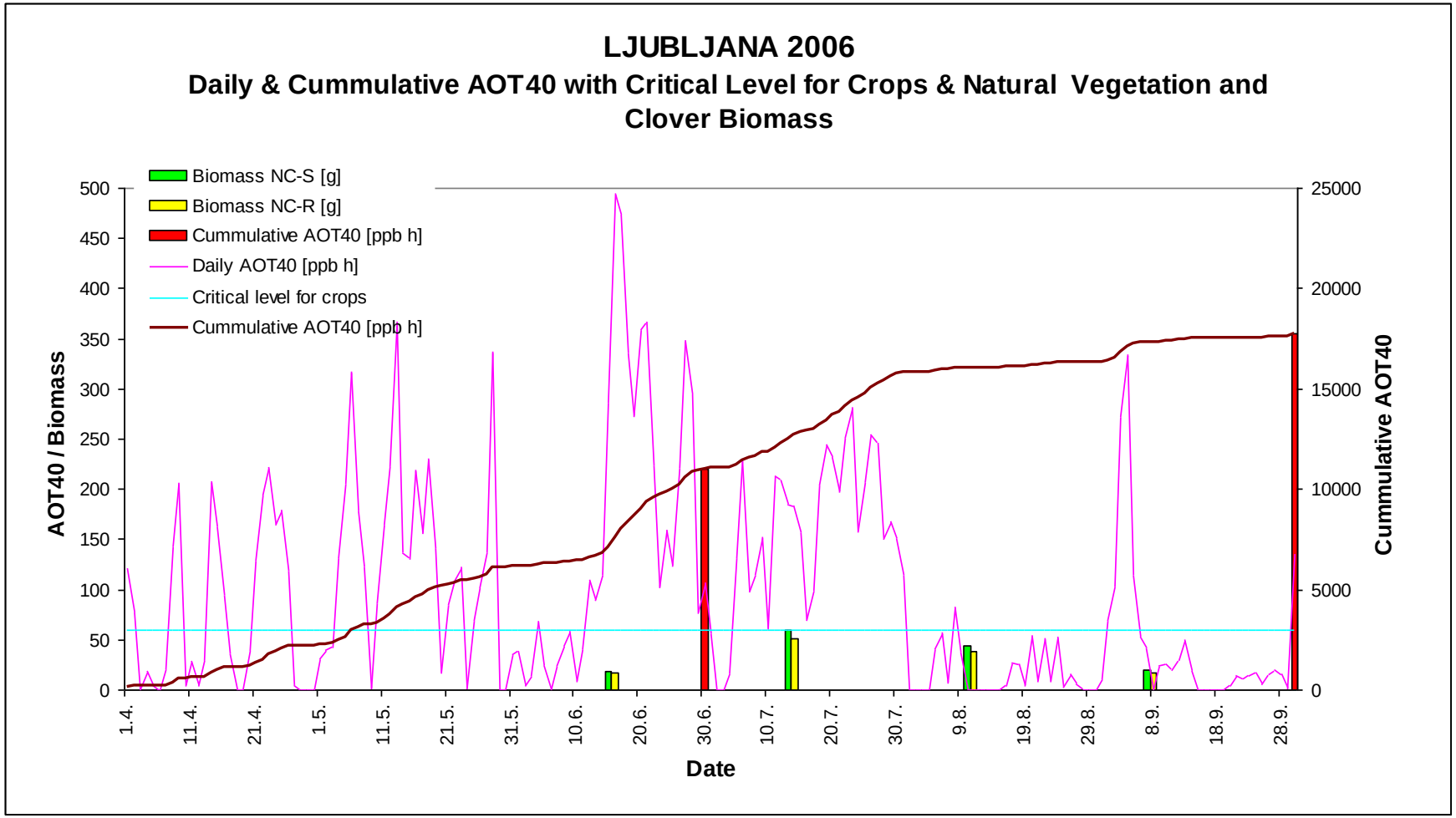
ICP-Forest-Level II (12 plots): each year activities

- Deposition (bulk + throughfall)
- Phenology
- Meteorology
- Soil solution
- Growth
- Defoliation and damages
- Ozone injuries
- Ambient air quality (passive samplers for ozone)
- Foliar nutrition status – foliar analysis (every 2 years)
- Ground vegetation (every 5 years)
- Soil (every 10 years)

ICP – Vegetation; participation since 1996

UL BF, Ljubljana, IJS, Ljubljana, ERICo, Velenje)

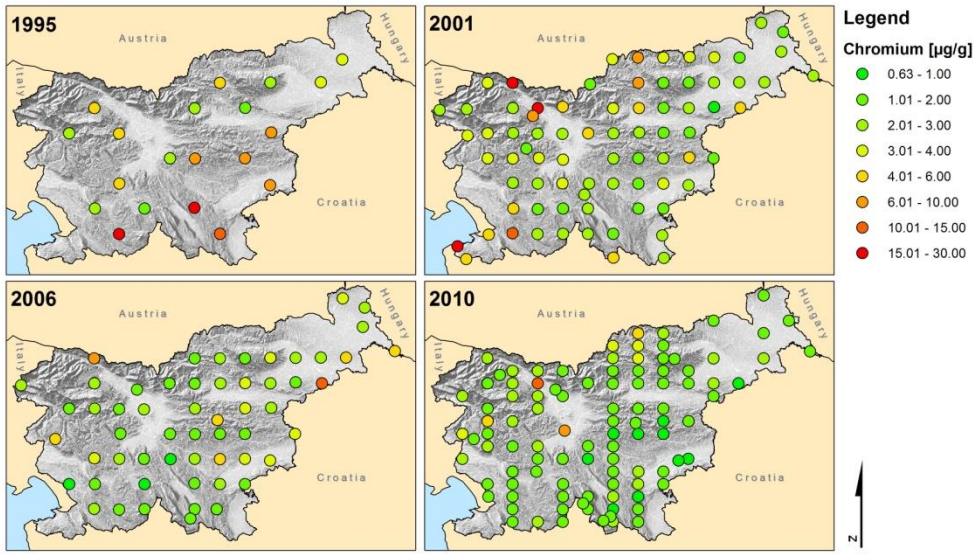
- **Monitoring tropospheric ozone impact**: use of standardised bioindicators (tobacco, white clover, brown napweed,..) within the ICP – Vegetation protocols; few physiological measurement, observation of injuries in natural, crop and ornamental plants in collaboration with GIS


LJUBLJANA 2006
Daily & Cummulative AOT40 with Critical Level for Crops & Natural Vegetation and Clover Biomass
Biomass NC-S [g]
Biomass NC-R [g]
Cummulative AOT40 [ppb h]
Daily AOT40 [ppb h]
Critical level for crops
Cummulative AOT40 [ppb h]
AOT40 / Biomass
Cummulative AOT40
Date
0
50
100
150
200
250
300
350
400
450
500
0
5000
10000
15000
20000
25000
1.4.
11.4.
21.4.
1.5.
11.5.
21.5.
31.5.
10.6.
20.6.
30.6.
10.7.
20.7.
30.7.
9.8.
19.8.
29.8.
8.9.
18.9.
28.9.

ICP – Vegetation: monitoring deposition of air pollutants in mosses: (IJS, GIS, UL BF)

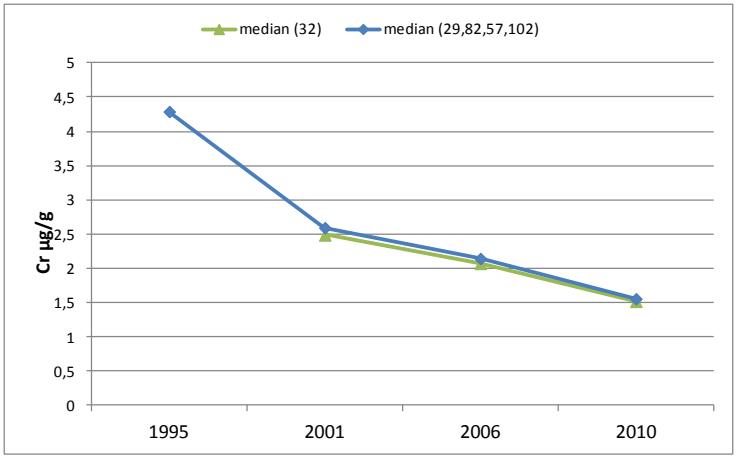
- Deposition of metals in mosses (lichens)
- Deposition of N- pollutants (NO_3^-, NH_4^+) in mosses
- Evaluation of sampling method
- Deposition of PAH in mosses

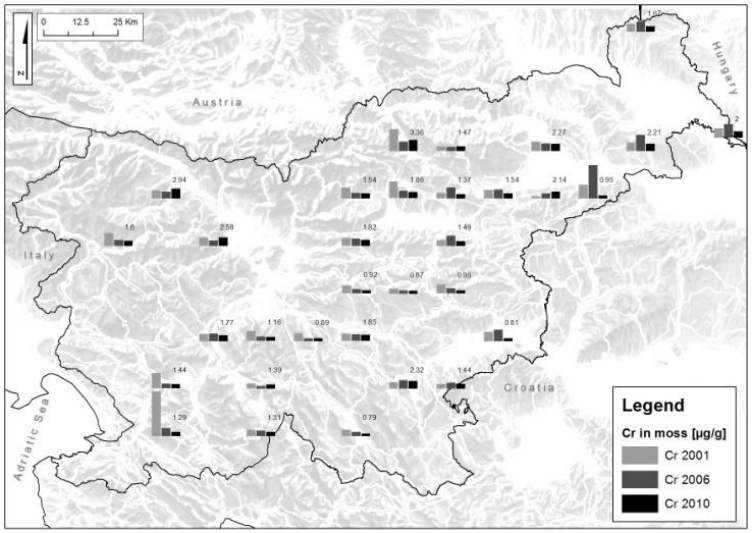
Temporal trends 1995-2010 of Cr, national level



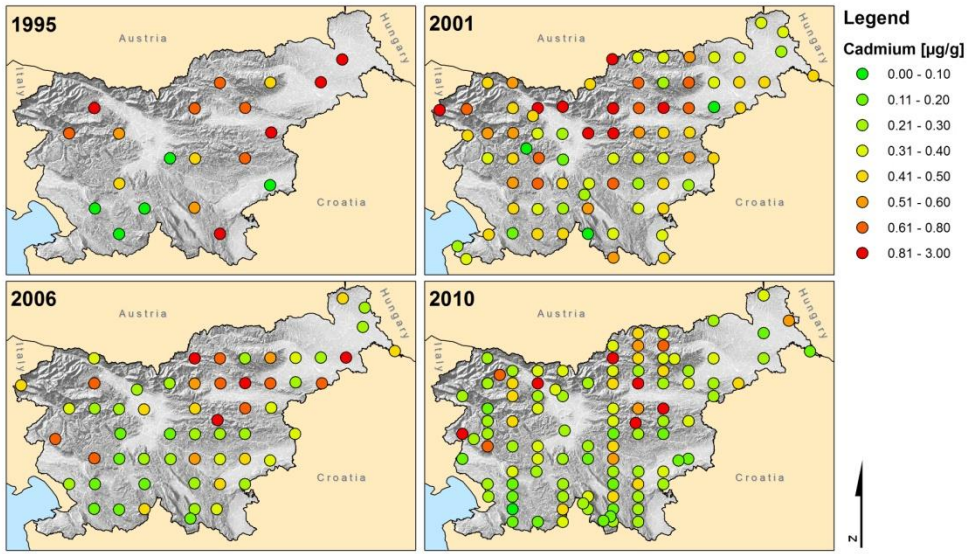
Change 1995-2010

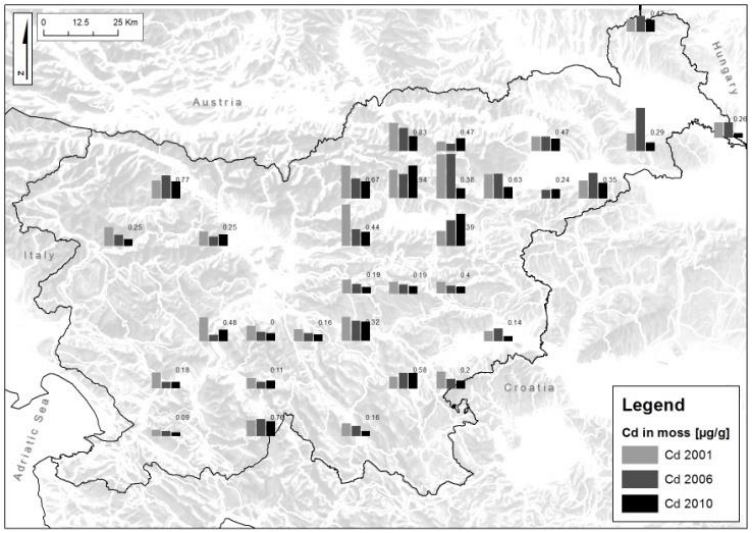
63,8 %





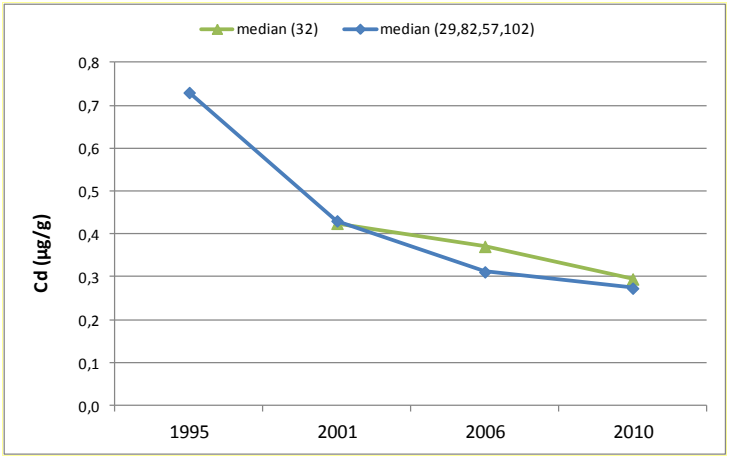
Temporal trends 1995-2010 of Cd, national level



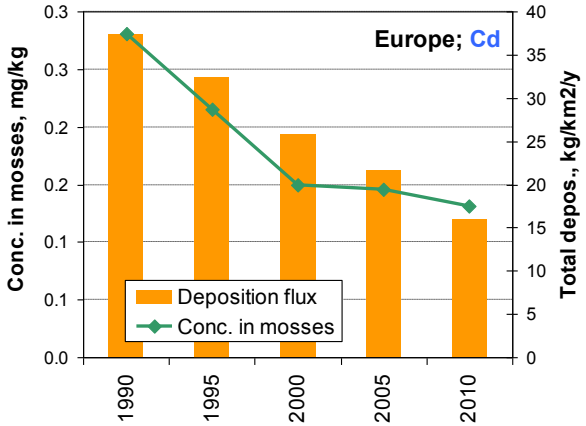


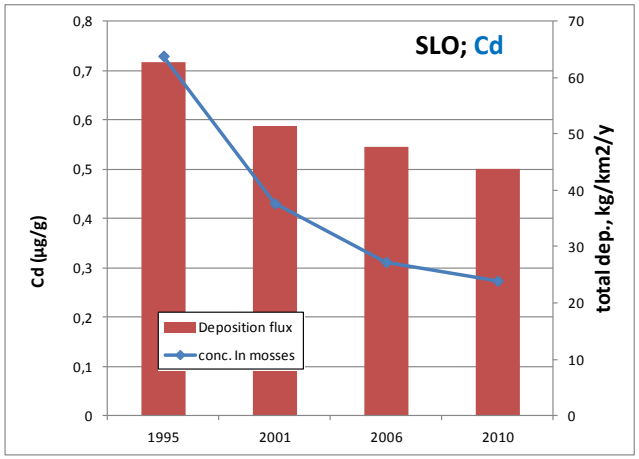
Change 1995-2010

62,5 %



Comparison: concentrations in mosses/estimated model deposition*





*Deposition was calculated by **EMEP** (European Monitoring and Evaluation Programme), MSC-E ; 64 sampling sites for Cd (Pb) + emission data → modelling deposition

Web-site: WWW.msceast.org

Reductions (1990/2010)

Deposition
2.3 times

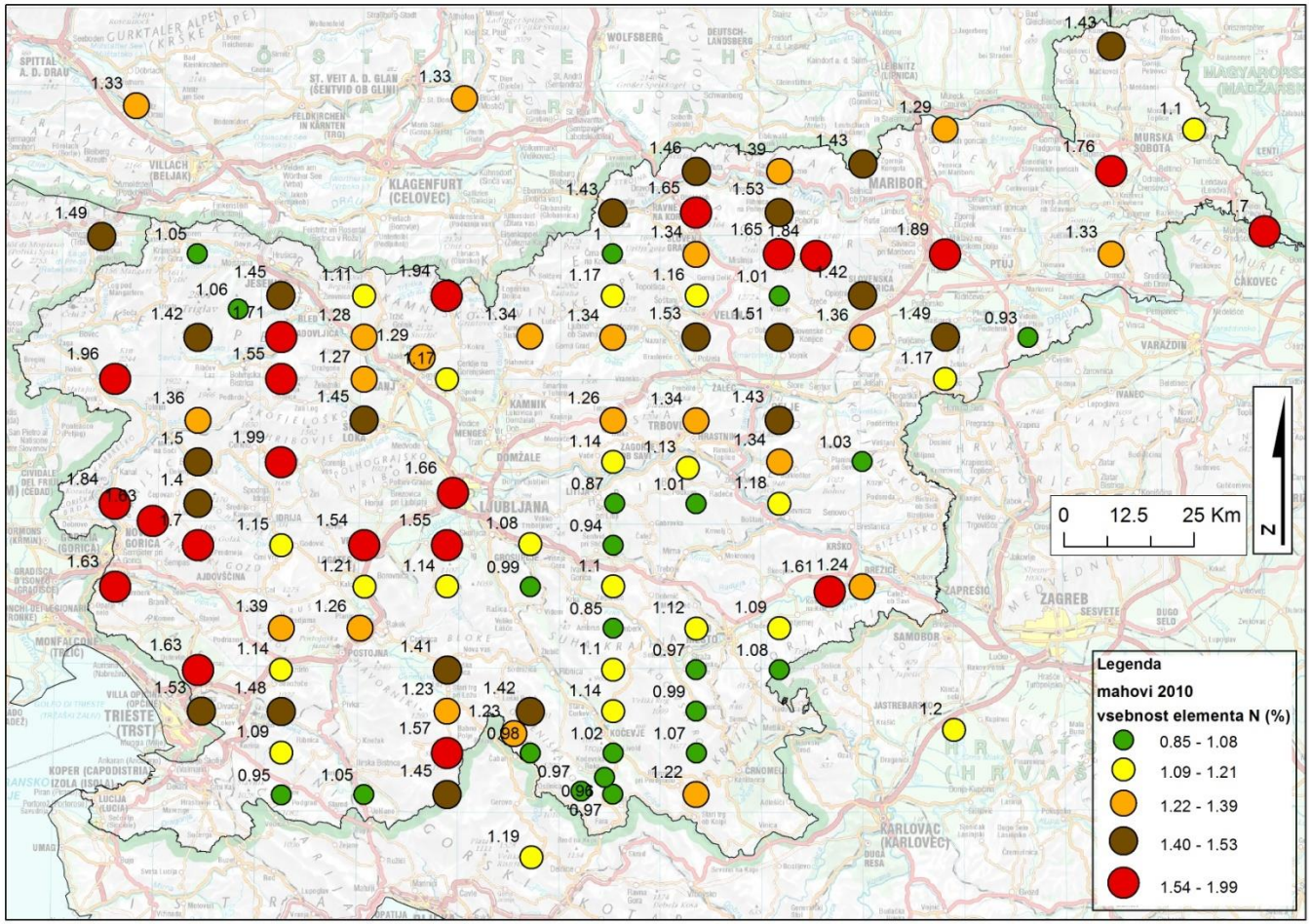
Conc. in mosses
2.1 times

Reductions (1995/2010)

Deposition
1.4 times

Conc. in mosses
2.7 times

N (%) content in mosses (*Hypnum cupressiforme*), sampled in 2010



ICP- Mapping & Modelling

- Participation in two calls
- N, S load assesment in forests
- Data from EMEP and ICP-Forest Level II

Perspectives in future

- **Problems:**
- Cutting fonds for environmental monitoring,
- WGE activities are not compulsory
- Priority conflicts in environmental monitoring at the European scale regarding activities of CLRTAP and collision in funding with other conventions at the European and national level
- **Promisses:**
- At least ICP-Forest activities are implemented in forestry legislation
- Originaly forest die-bacl inventory has become/remained the only national forest inventory (multipurpose inventory) in Slovenia and the only methologically grounded monitoring of terrestrial ecosystems

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