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Chair of Landscape Ecology

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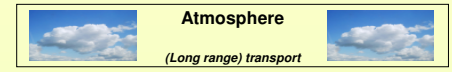
Factors Influencing the Metal Accumulation in Mosses

Background



Cu, Cr, As, Cd, Pb, Ti, V, Sb, Zn, Ni, Fe, NO_x, NH_x

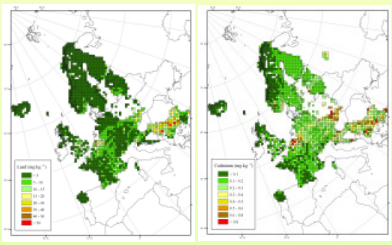
Emission

Wet and dry deposition bioaccumulation

Emission sources

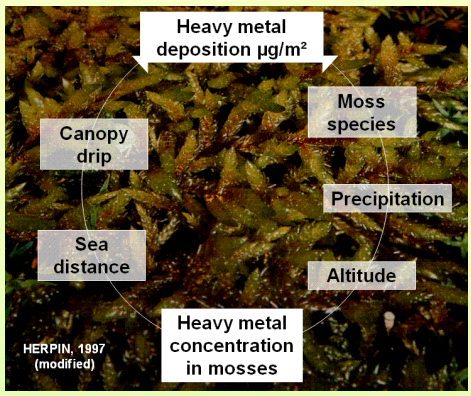
Ectohydric mosses

- Heavy Metals in Mosses Surveys 1990, 1995, 2000 and 2005 in Europe
- Spatiotemporal patterns of metal and nitrogen bioaccumulation
- Empirical design according to UN ECE experimental protocol



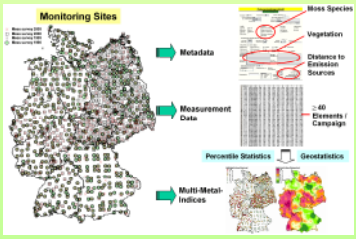
Goal

Different factors are assumed to influence the metal accumulation of mosses. The goal is to assess and rank these influence factors.

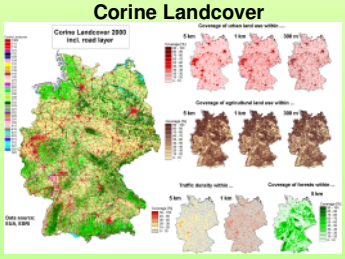


Data

Monitoring data



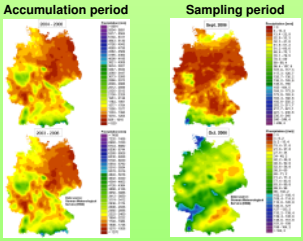
Corine Landcover



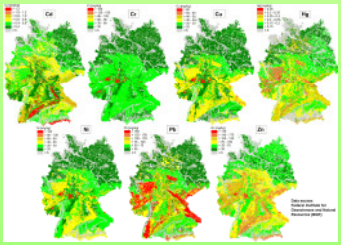
Precipitation sums

Accumulation period

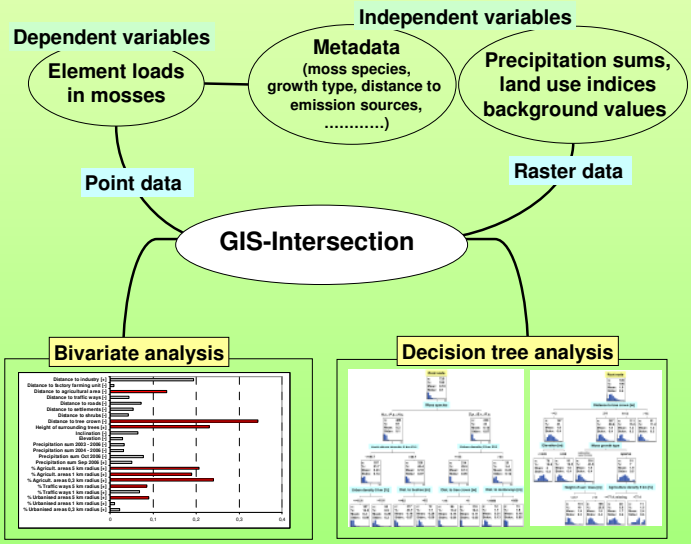
Sampling period



Background values in upper soil



Methodology



Results

Bivariate Correlations

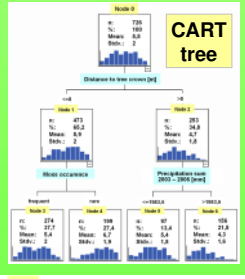
	As	Cd	Cr	Cu	Fe	Hg	Ni	Pb	Sb	Ti	V	Zn	MMI*
Forest land use within 5 km radius		+	–					+	+		–	–	
Urban land use within 300 m radius		–	+	+	+					+			
Urban land use within 1 km radius			+	+	+				+	+			+
Urban land use within 5 km radius	+	+	+	+	+		+	+	+	+	+	+	+
Traffic density within 1 km Radius				+	+				+	+			
Traffic density within 5 km Radius				+	+		+		+	+		+	+
Agricultural land use within 300 m radius			+		+			+	–				
Agricultural land use within 1 km radius	+				+				–	+			
Agricultural land use within 5 km radius		–	+					–	–				
precipitation within sample period - September			–				+			+			
precipitation within sample period - October			–					+	+		+		+
precipitation within growth period - 2 years	–	+	–		–		+	+	+	–			
precipitation within growth period - 3 years	–	+	–		–			+	+	–	+		
Distance to North / Baltic Sea	+	+	–	+	+	+	+	+	+	+	–		+
Elevation	+		–					+	+	+	–	–	
Inclination			–	–								–	
Height of surrounding trees		+	–	+		+	+	+	+			–	+
Distance to tree crown	–	–		–	–	–	–	–	–	–	–	–	–
Distance to bushes													
Distance to human settlement			–	–								–	
Distance to road				–							–	–	
Distance to motorway			+					–	–				
Distance to agricultural land use								+	+				
Distance to factory farming													
Distance to industry													
Background values in upper soil		+	–				+	+				–	
moss species	+	+	+	+	+	+	+	+	+	+	+	+	+
moss growth type	+	+	+		+	+	+	+	+	+	+		+
moss frequency	+	+	+	+	+	+	+	+	+	+	+	+	+

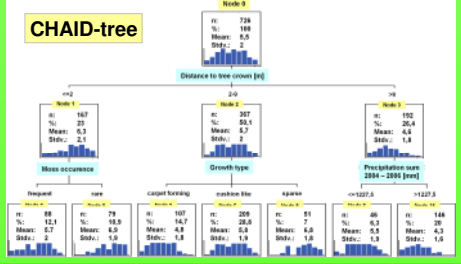
MMI* = Multi-Metal-Index (12 elements)

	no data available
	no significant correlation (p > 0,05)
+	significant positive correlation (p < 0,05)
–	significant negative correlation (p < 0,05)
+	highly significant positive correlation (p < 0,01)
–	highly significant negative correlation (p < 0,01)

Decision trees

Target variable: Multi-Metal-Index 2005 (As, Cd, Cr, Cu, Fe, Hg, Ni, Pb, Ti, Sb, V, Zn)





Conclusions

The metal accumulation in mosses is significantly associated to
- urban and traffic density
- canopy drip
- moss specific criteria
- precipitation
- sea spray effect
- elevation

The investigations should be repeated
- using real emission and deposition data
- with data from other national moss surveys

References

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