



IOŚ-PIB

INSTYTUT OCHRONY ŚRODOWISKA
PAŃSTWOWY INSTYTUT BADAWCZY

Integrated Monitoring Network in Poland

Current Status and Future Perspectives

Krzysztof Skotak, Tomasz Pecka

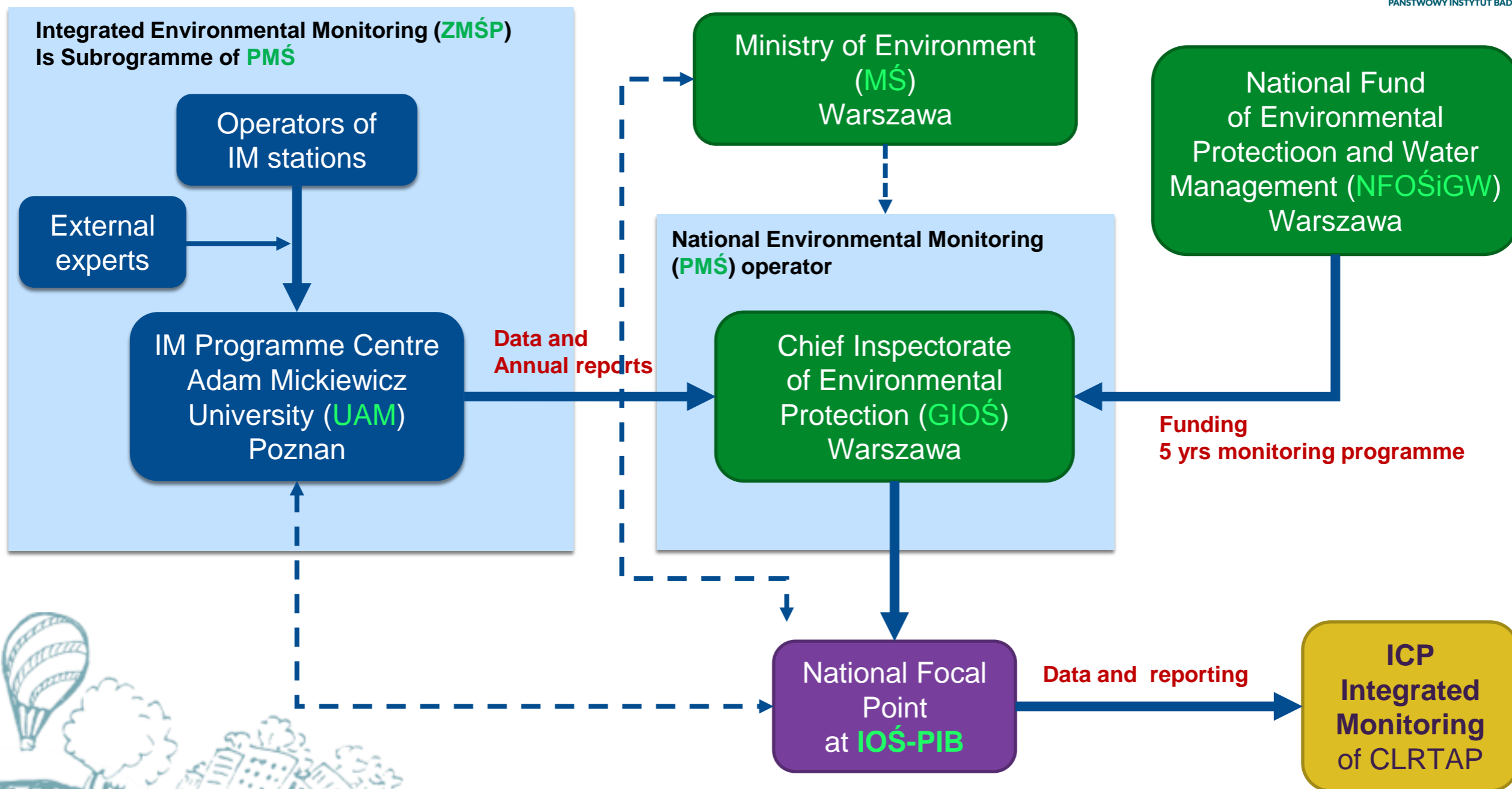
Institute of Environmental Protection – National Research Institute (IOŚ-PIB)

IM in Poland – brief history and way to ICP IM

- 1992 – Establishing IM Programme in PL,
- 1994 – IM-PL being operational in 6 stations, programme based on IM Manual 1993,
- **1994 – ongoing** – monitoring, data, reports for PL authorities
-
- 2014 – Joining ICP IM dynamic modelling work (T.Pecka),
- 2015 – Joining TF IM meetings (K.Skotak, T.Pecka),
- 2016 – Technical document of ICP IM and IM-PL program consistency assessment (prepared by IOŚ-PIB),
- 2016 – Decision to join ICP and TF with **9 IM-PL stations**
- 2017 – **Contact Point in IOS-PIB, based on NFP CLRTAP (MŚ) and coordinators IM-PL**

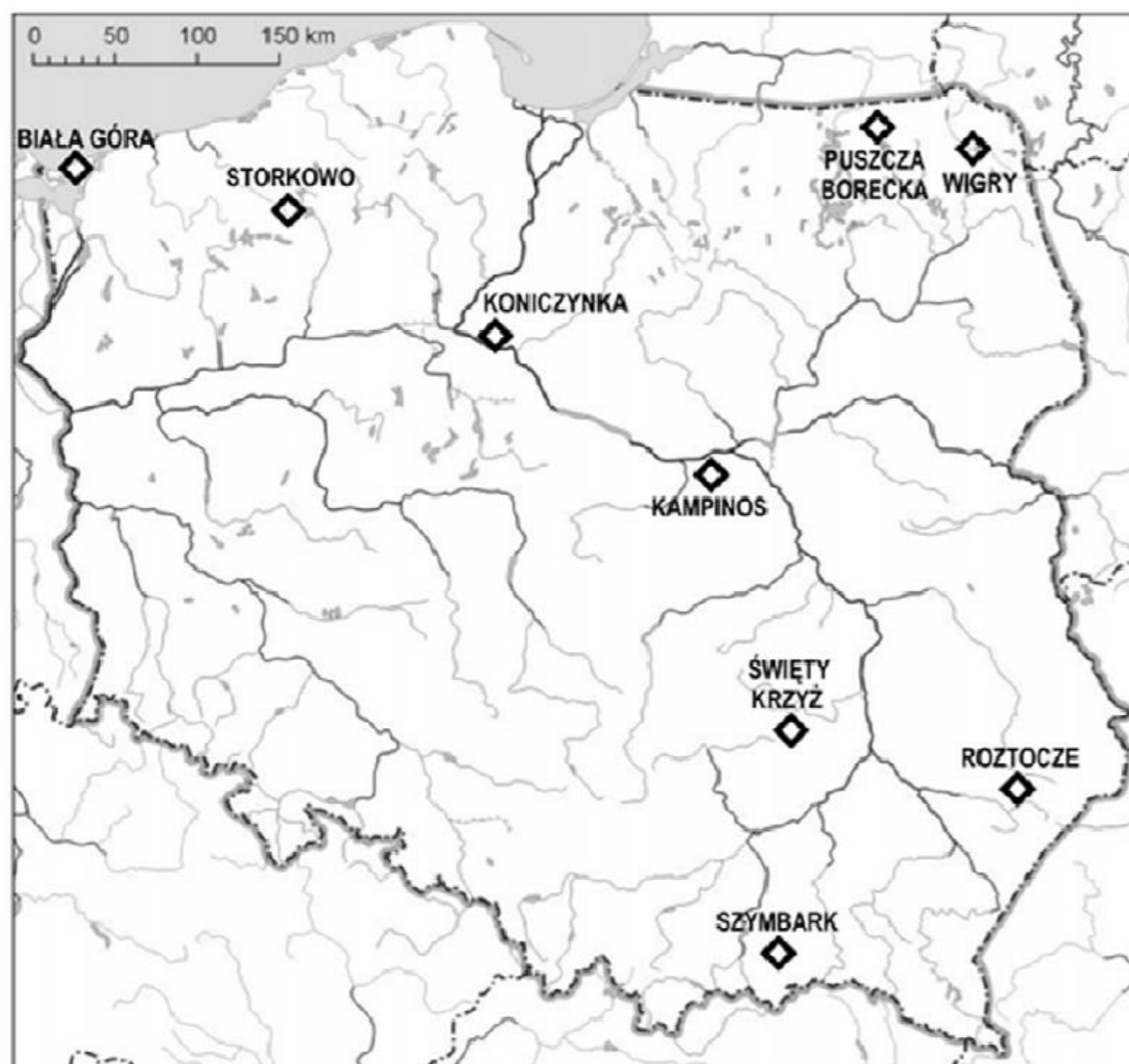


IM in Poland – organizational chart



ZMŚP – Integrated Environmental Monitoring
PMŚ – National Environmental Monitoring

Integrated Monitoring stations in Poland

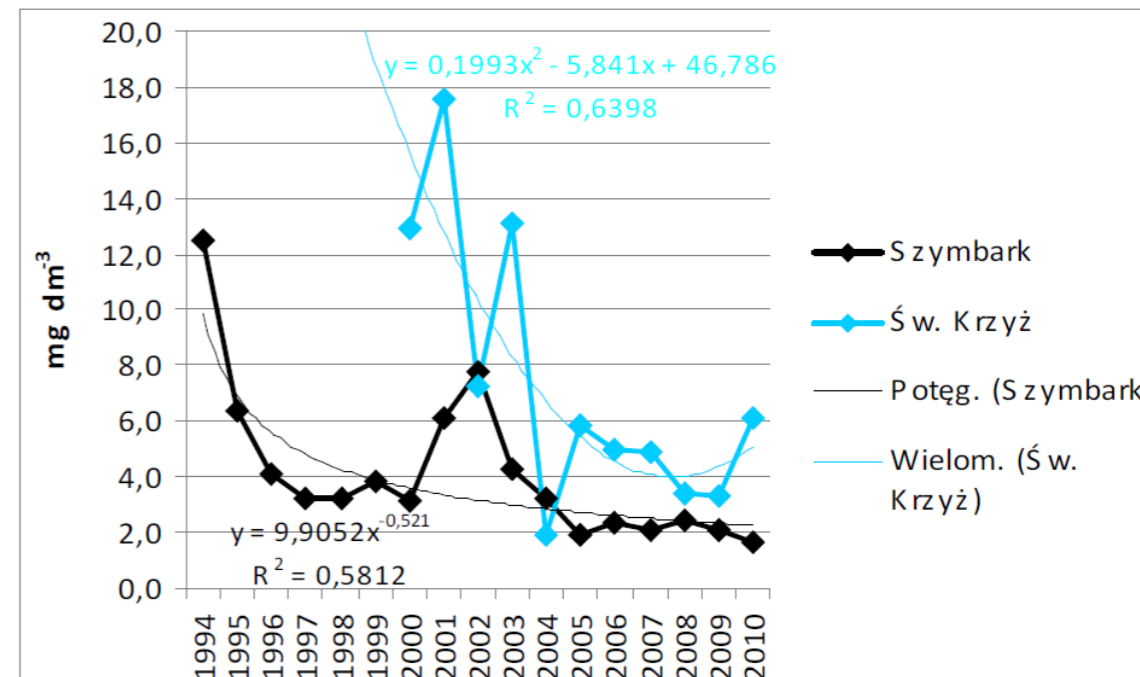
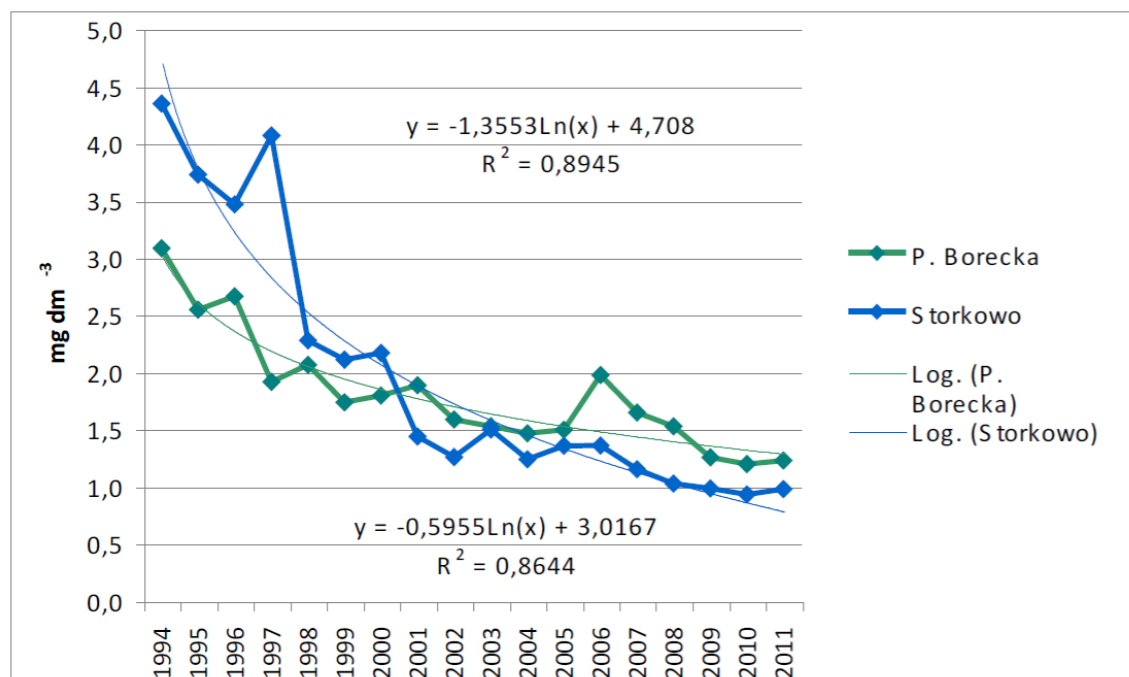


Code	Name	Geogr Location	Climate*		Ecosystem type	Soil type	Natura 2000
			Temp [°C]	Prec [mm]			
01ZM	Puszcza Borecka	Postglacial Lakeland	7,2	683	Hornbeam/spruce forest	Sand-loam	+
05ZM	Wigry	Postglacial Lakeland	7,2	612	Spruce forest	Sand, Sand-loam	+
06ZM	Storkowo	Postglacial Lakeland	7,9	706	Forest/Grassland	Sand-loam	+
07ZM	Koniczynka	Postglacial Lakeland	8,4	573	Agriculture	Loam	
08ZM	Kampinos	Central Lowlands	8,1	543	Pine forest	Sand, Sand-loam	+
09ZM	Święty Krzyż	Highlands	8,2	723	Fir forest	Silt, loam-silt	+
10ZM	Szymbark	(Low) Mountains	7,6	810	Hornbeam/spruce forest	Silt-sand, silt	
11ZM	Biała Góra (Wolin)	Costal lowlands	9,1	639	Beech forest	Sand, loam	+
12ZM	Roztocze	Highlands	8,1	680	Pine/fir forest	Sand, Sand-loam	+

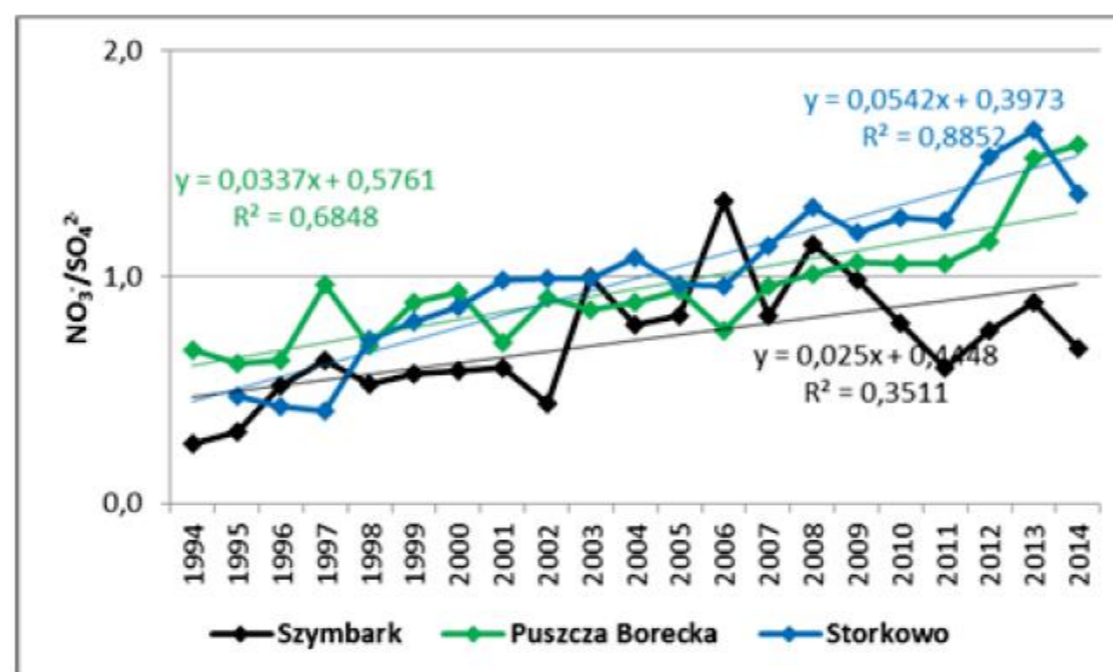
* long-term average



Atmospheric deposition trends

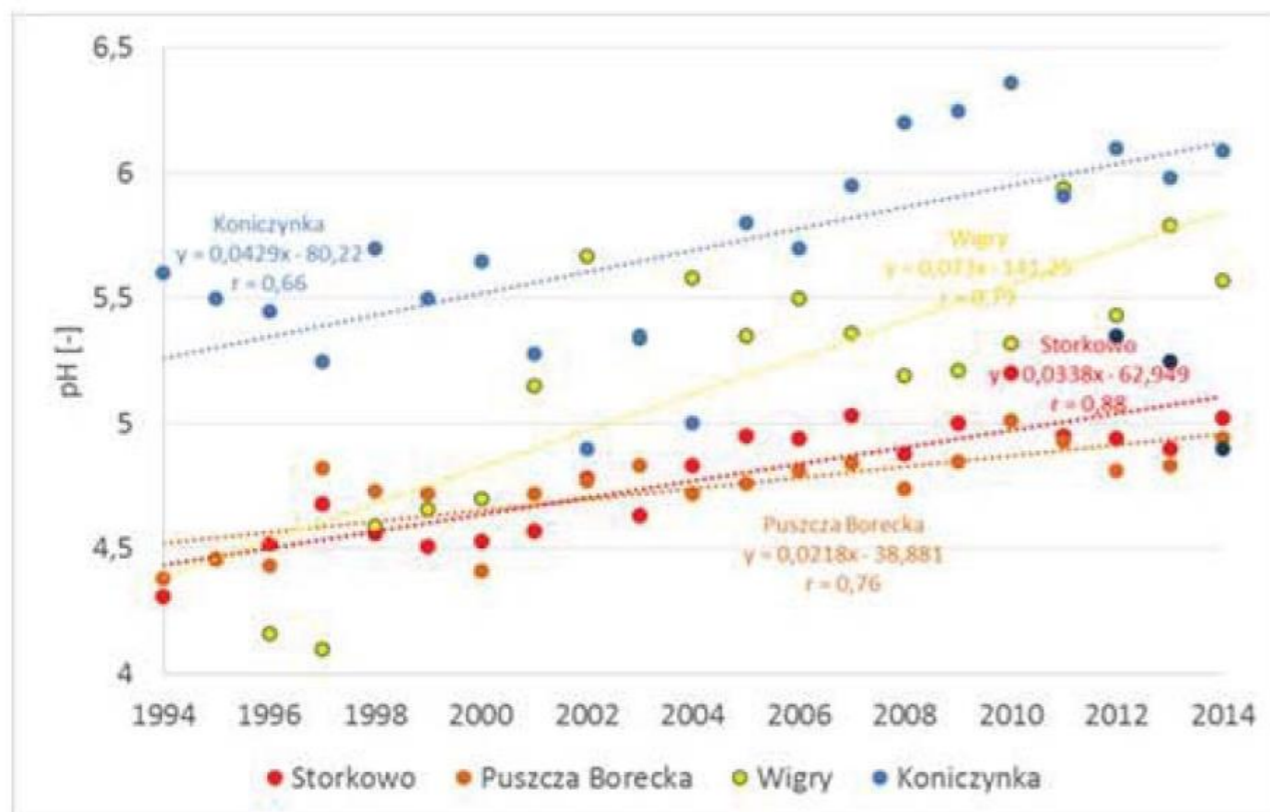


Sulphur concentration in rainfall 1994-2011 (IM-PL Report 2012)

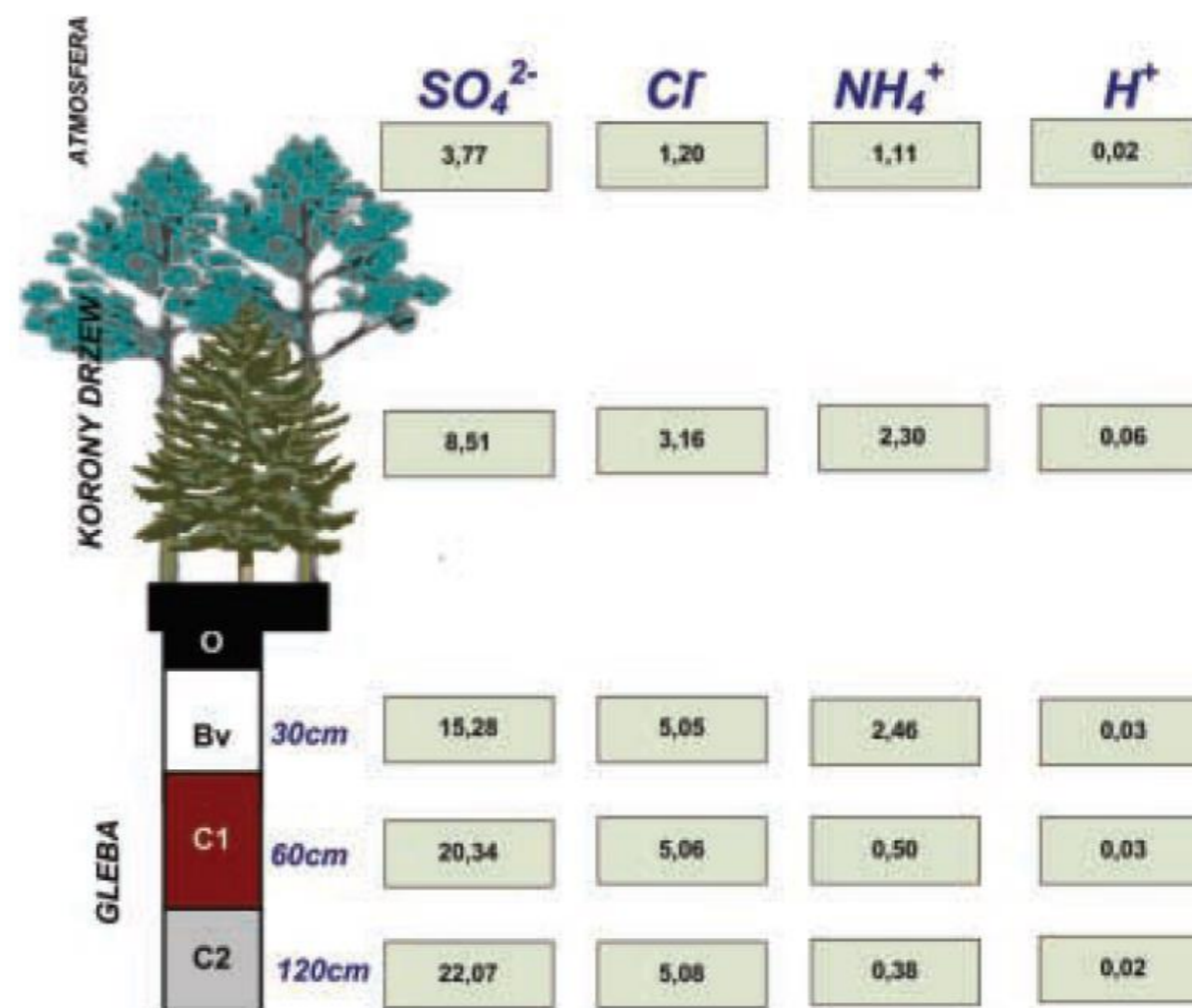


SO_x/NO_x depositon ratio 1994-2014 (IM-PL Report 2015)

Ecosystem fluxes and responses to deposition



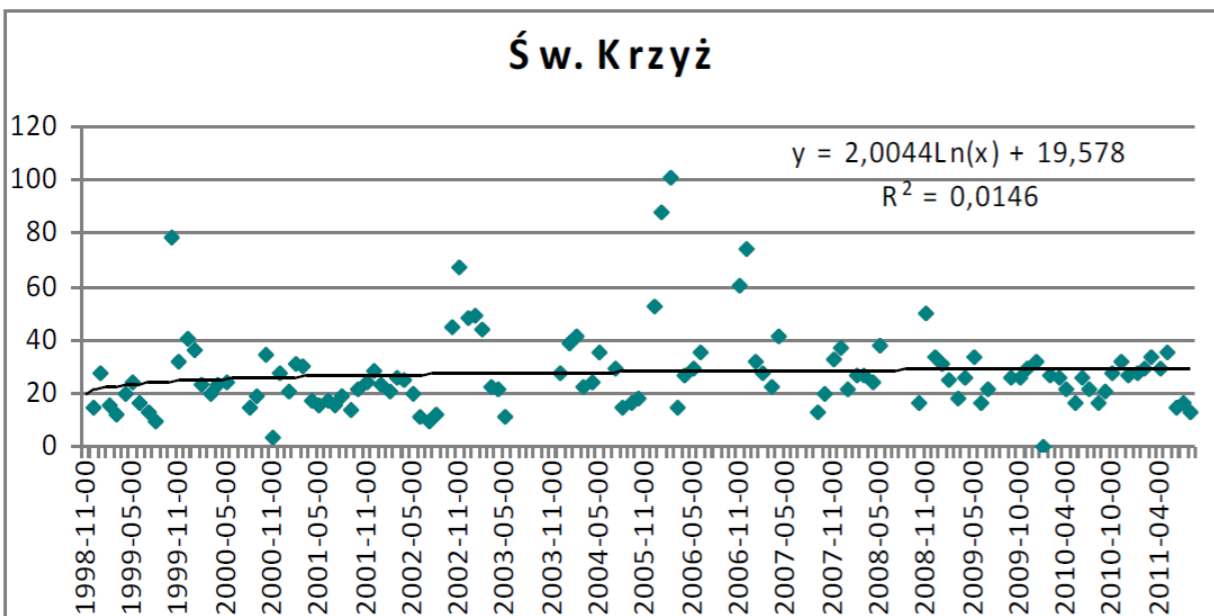
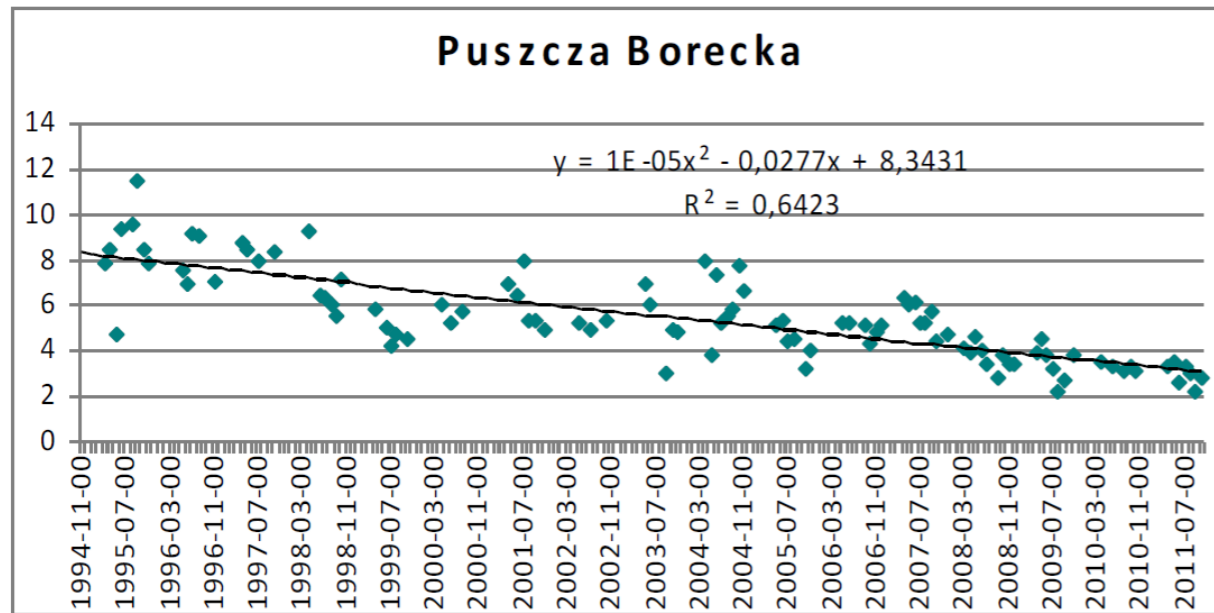
Soil recovery from acidification 1994-2014, (IM-PL Report 2015)



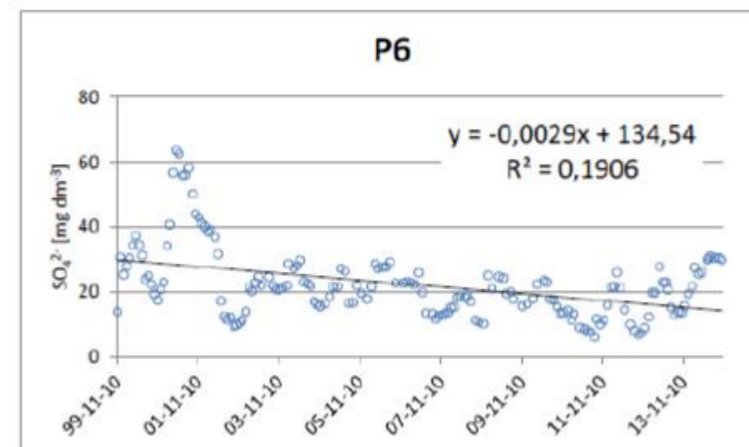
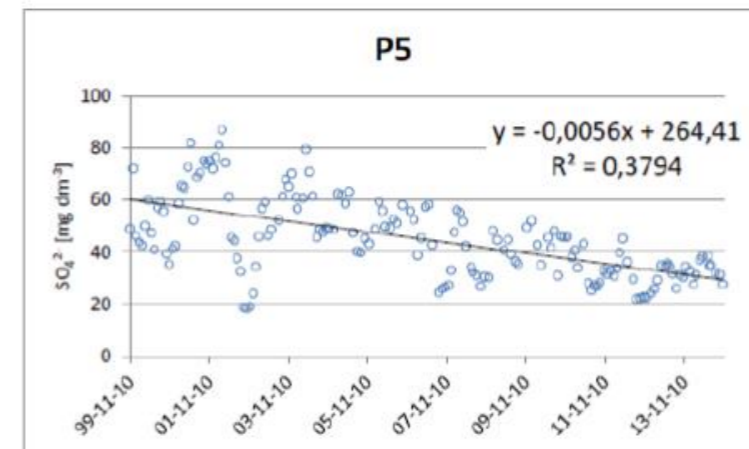
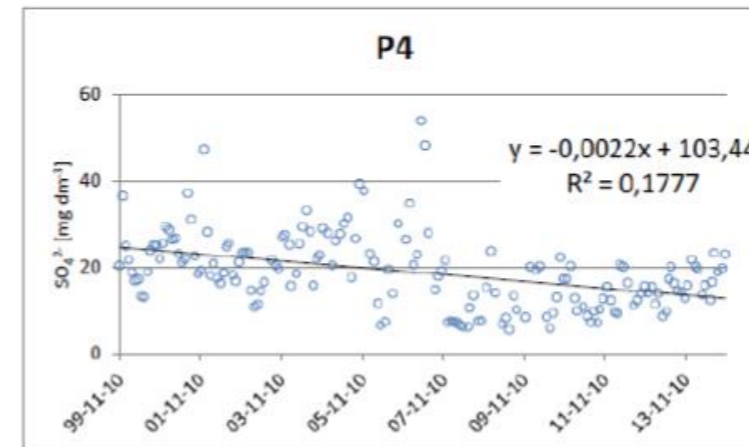
Ions budget distribution [mg/l]:
 rainfall → canopy interactions → soil water in profiles (cm)
 1996-1999, Storkowo (IM-PL Report 2004)



Groundwater and catchment runoff – sulphur

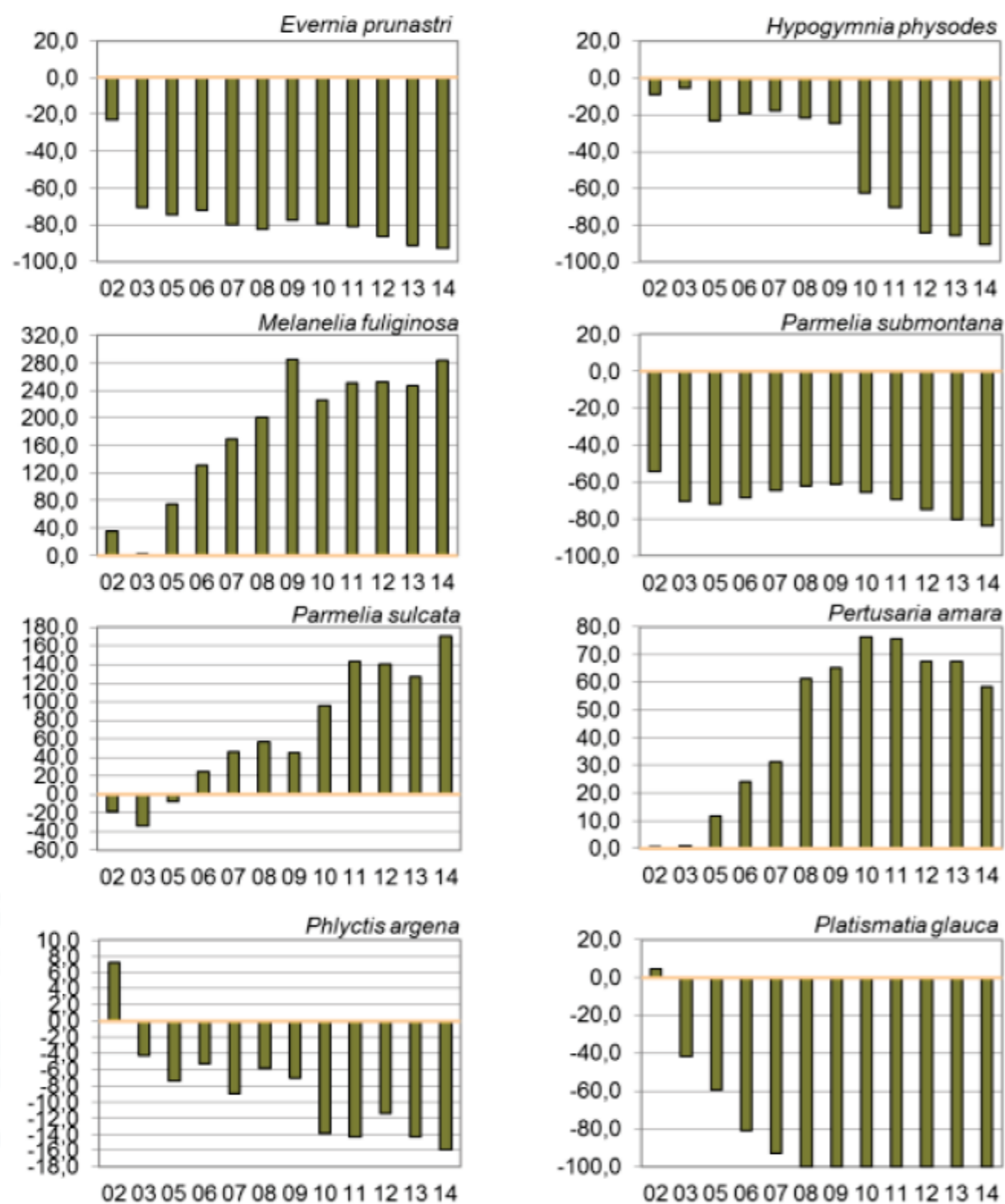


Sulphur at catchment's runoff since mid 1990 (IM-PL Report 2012)

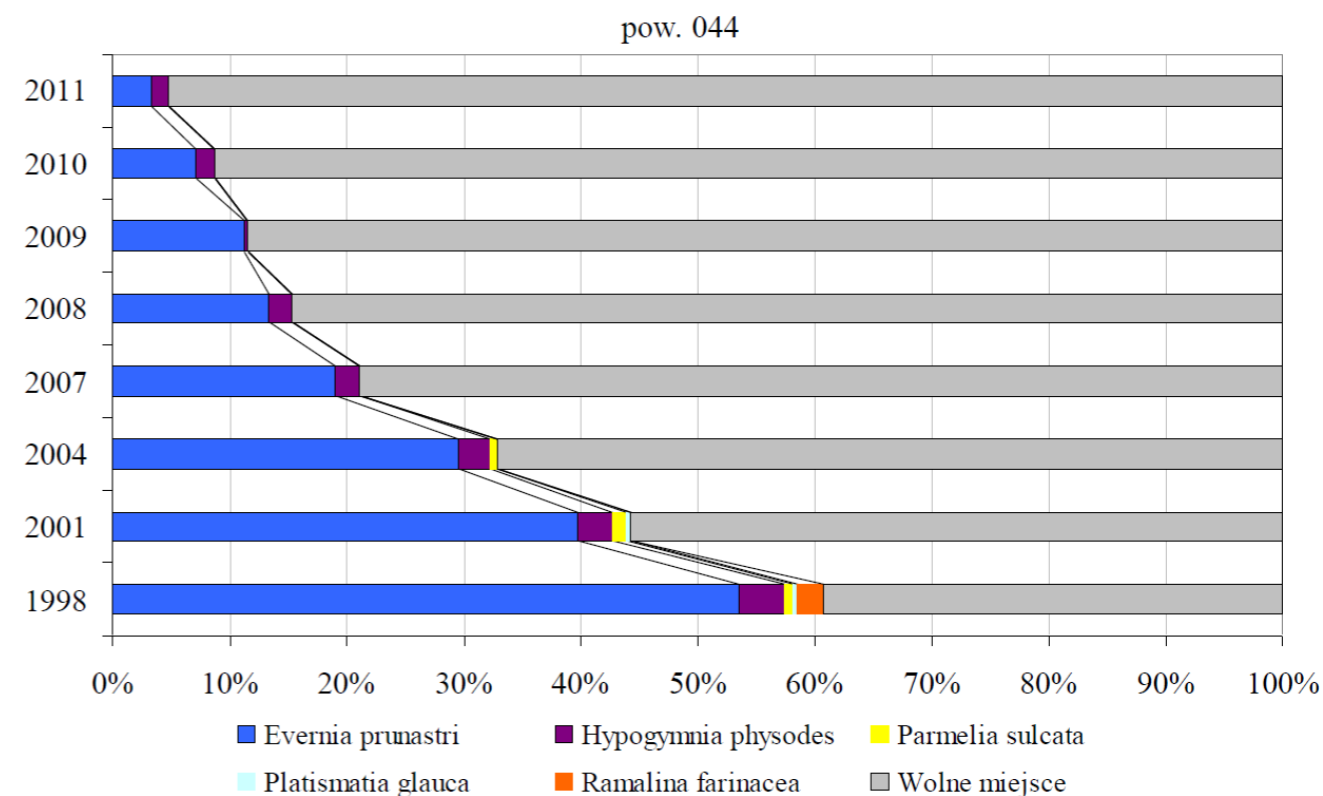


SO4 in groundwater 1999-2014, Storkowo (IM-PL Report 2015)

Other subprogrammms – Lichens example



Lichens species cover change 2001-2014, (IM-PL Report 2015)



Declining Lichens: number of species and cover 1998-2011, Wigry (IM-PL Report 2012)

IM station Puszcza Borecka (IOŚ-PIB)



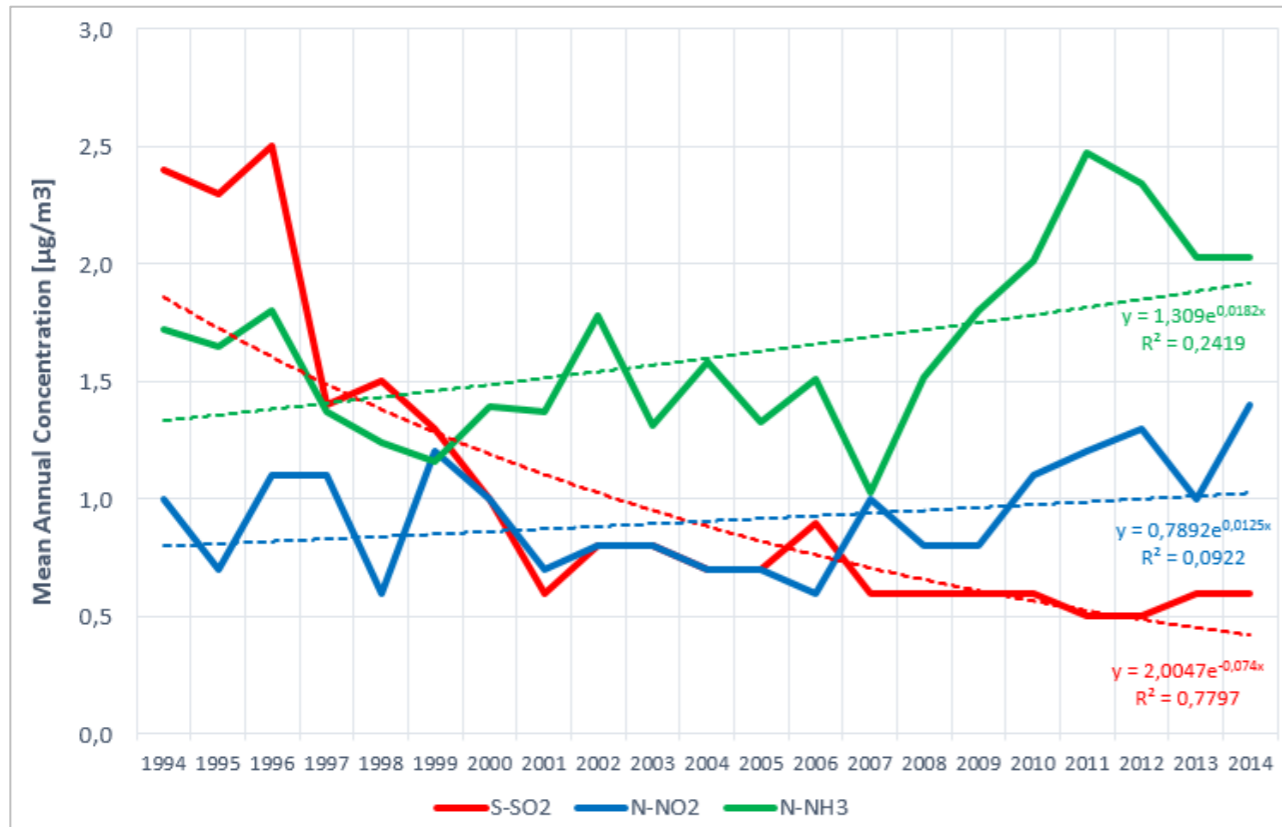
Focus on Air Quality:

- PM10, PM2.5, PM1
- SO_x, NO_x, NH_y
- CO₂, O₃

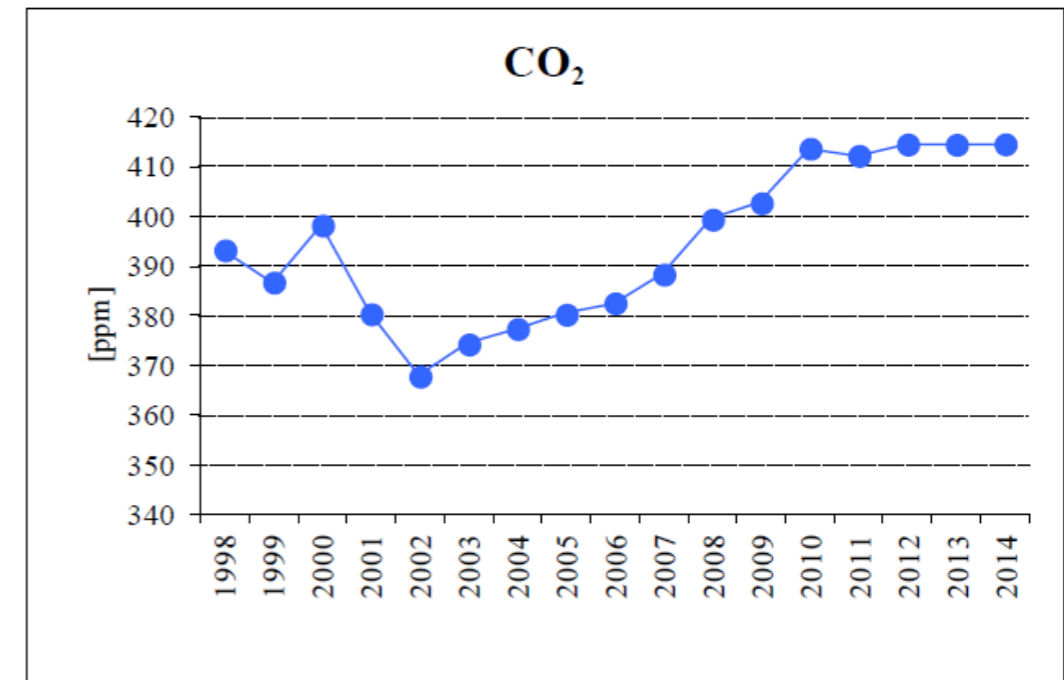
**EMEP super station &
EIONET rural station**



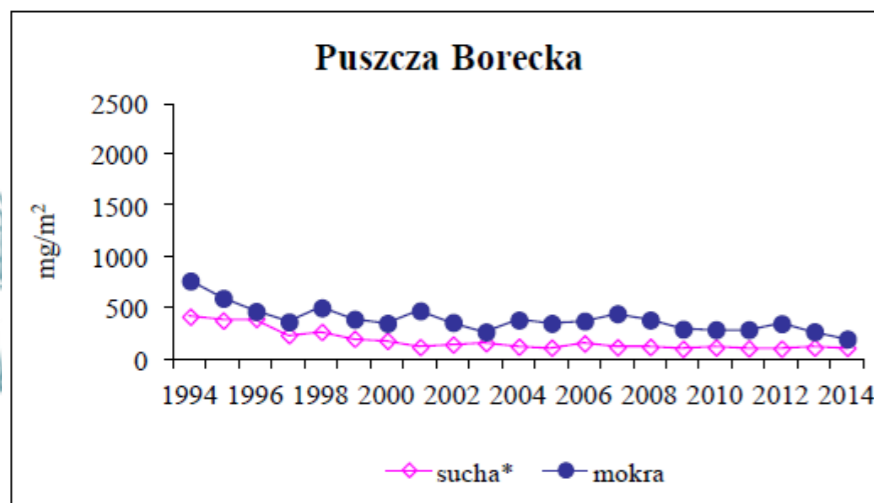
Puszcza Borecka – Air Quality and Deposition



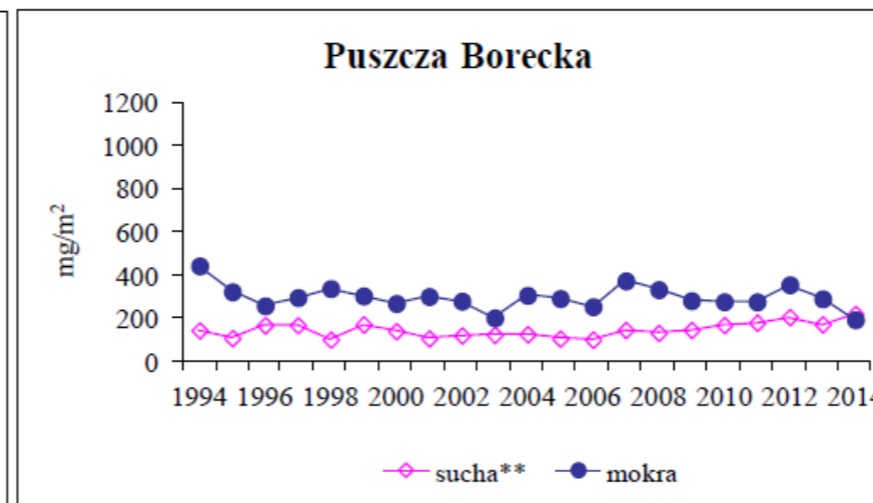
S and N mean annual concentrations [$\mu\text{g}/\text{m}^3$] 1994-2014, (IM-PL Report 2015)



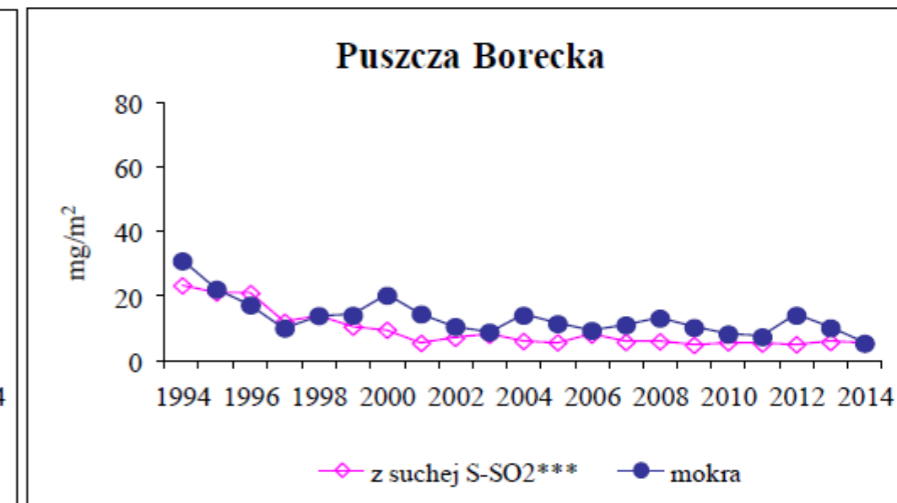
CO₂ concentration [ppm] for 1998-2014, (IM-PL Report 2015)



S dep



NO_x dep

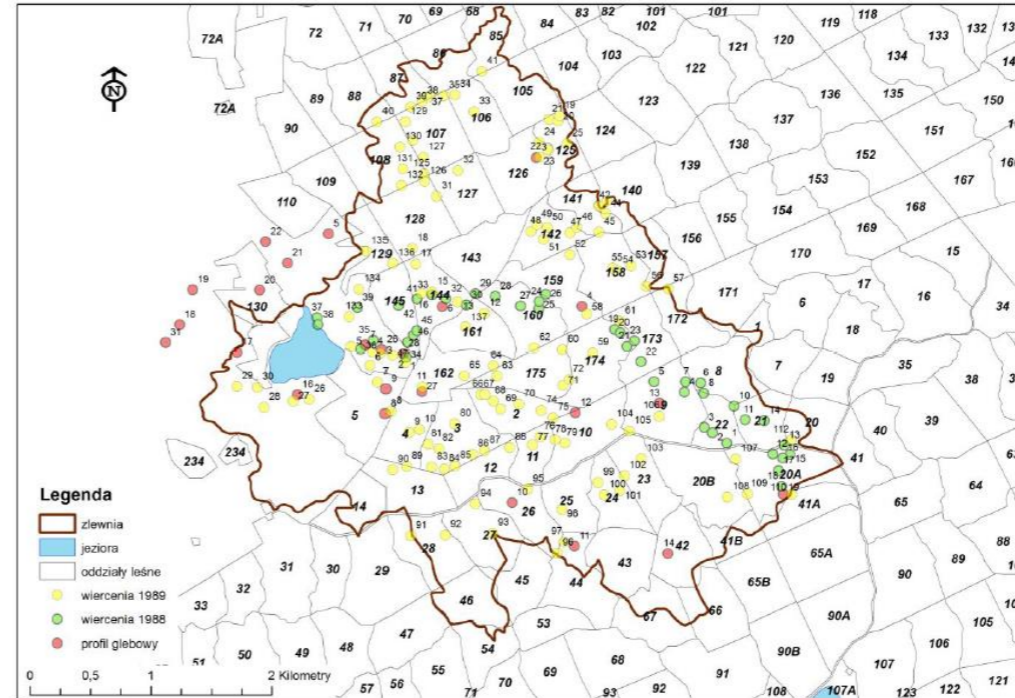
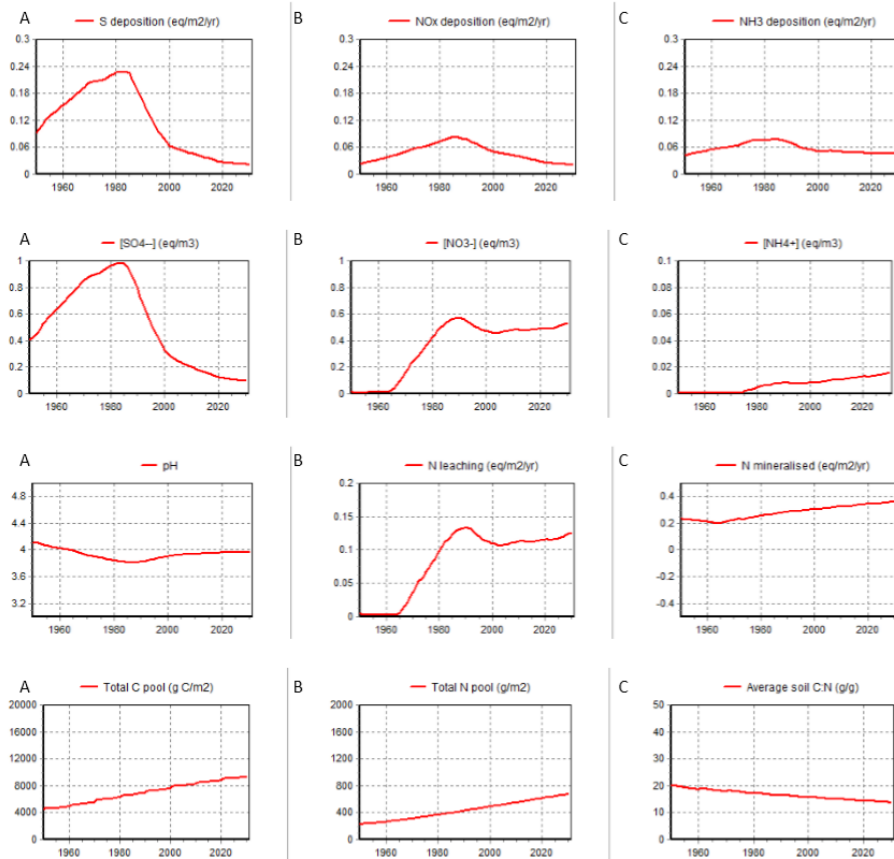


Hydrogen dep

Wet (blue) and dry (violet) deposition [mg/m^2] for 1994-2014, (IM-PL Report 2015)

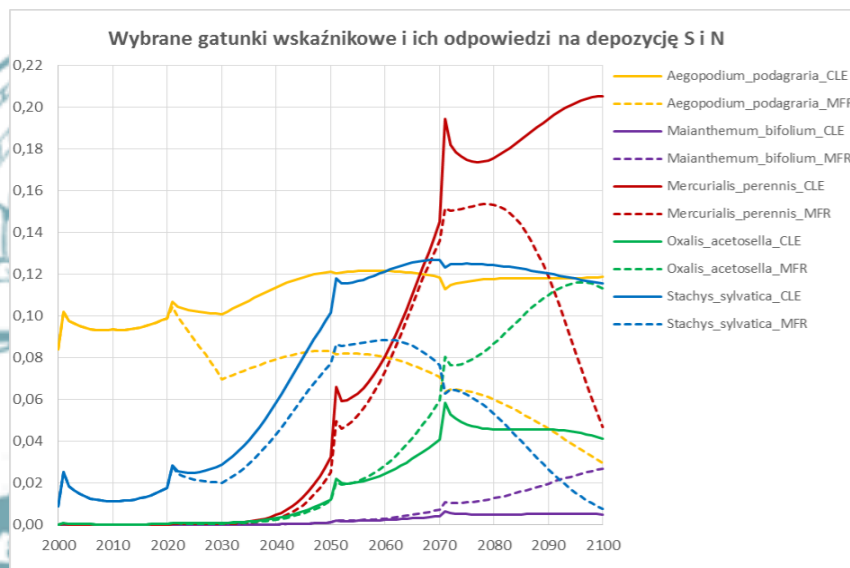
#ŚrodowiskoŻyciem

Puszcza Borecka – Environmental modelling

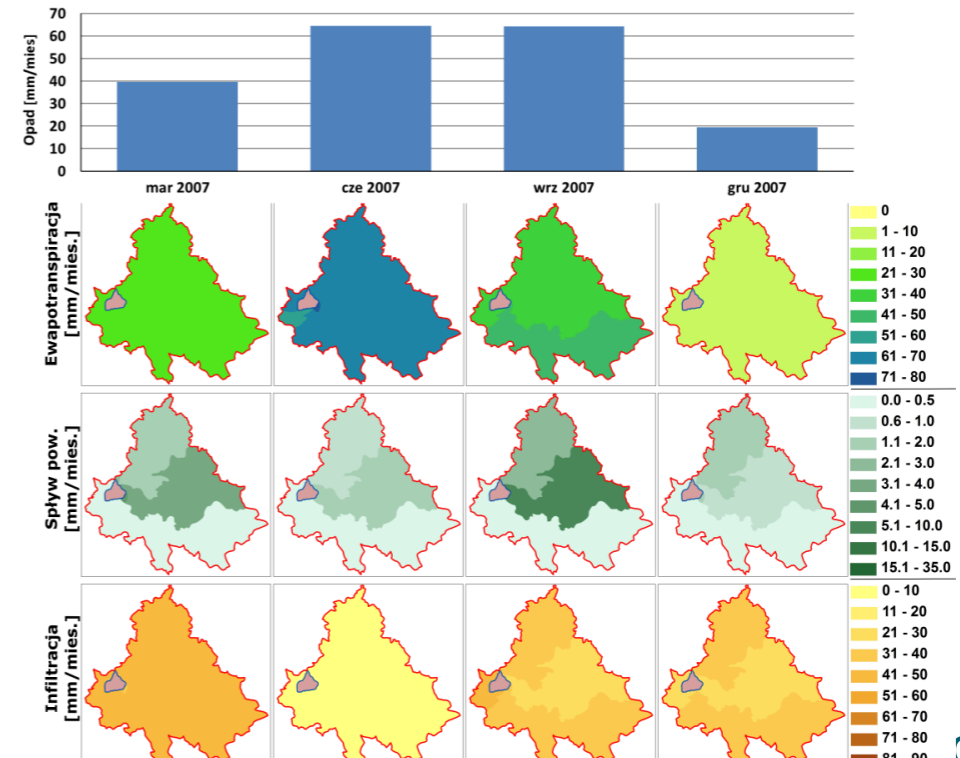


GIS inventory and catchment spatial database

Testing VSD+/MetHyd/GrowUp modelling package



Testing PROPS with CLE and MFR deposition scenarios



Catchment hydrological modelling with SWAT

IM in Poland – monitoring programme

The inconsistencies between IM-PL and ICP IM programs were found:

Because we have.....

- ✓ different size of catchment (big & small)
- ✓ different framework rules (e.g. all Programmes are mandatory)
- ✓ minor methodological differences
- ✓ both monitoring and assessment Programmes
- ✓ some mandatory parameters in ICP IM are not mandatory in IM-PL
- ✓ different assessment period (ICP IM calendar year, IM-PL hydrological year)
- ✓ quality control system is still in implementation

Monitoring programme consistency

IM Poland Programme (ZMŚP)				ICP IM programme				ZMSP to ICP IM consistency (%)	
Subprog code	Parameters			Subprog code	Parameters			Mandatory	Optional
	Total	Mandatory	Optional		Total	Mandatory	Optional		
A1	19	14	5	AM	12	9	3	100%	67%
B1	10	2	8	AC	10	9	1	22%	100%
C1	21	10	11	PC	27	12	15	83%	73%
C2	22	11	11	TF	28	14	14	79%	79%
C3	22	11	11	SF	28	14	14	79%	79%
E1	32	16	16	SC	32	20	12	60%	92%
F1	26	13	13	SW	33	16	17	75%	65%
F2	29	18	11	GW	32	17	15	71%	80%
G2	16	5	11	LF	23	13	10	38%	40%
H1	33	21	12	RW	33	16	17	75%	76%
H2	29	17	12	LC	33	14	19	71%	74%
J2	24	8	16	VG	15	10	5	30%	0%
K1	9	3	6	FD	8	4	4	50%	100%
M1	2	2		EP	6	5	1	20%	0%
TOTAL	294	151	143	TOTAL	320	173	147	61%	66%

ZMSP to ICP IM program consistency:
61% Mandatory parameters
66% Optional parameters

IM station	IM Programme codes													
	Mandatory										Optional			
	AM	AC	PC	TF	SC	SW	LF	RW	VG	EP	SF	GW	LC	FD
01ZM Puszcza Borecka	+	+	+	+	+	+	+	-	+	+	+	+	+	+
05ZM Wigry	+	PASIV	+	+	+	+	+	+	+	+	-	+	-	+
06ZM Storkowo	+	PASIV	+	+	+	+	+	+	+	+	-	+	+	+
07ZM Koniczynka	+	WIOŚ	+	-	+	+	-	+	+	+	-	+	+	-
08ZM Kampinos	+	WIOŚ	+	+	+	+	+	+	+	+	-	+	-	+
09ZM Święty Krzyż	+	WIOŚ	+	+	+	+	+	+	+	+	+	+	-	+
10ZM Szymbark	+	WIOŚ	+	+	+	+	+	+	+	+	+	+	-	+
11ZM Biała Góra	+	PASIV	+	+	+	+	+	+	+	+	+	+	+	+
12ZM Roztocze	+	WIOŚ	+	+	+	+	+	+	+	+	+	+	-	+

PASSIV – on site, passive methods
WIOŚ – nearest air quality monitoring station operated by WIOŚ (regional GIOŚ)

IM stations ICP IM consistency:

- **Mandatory:** from 50% (Koniczynka) to 68% (Puszcza Borecka)
- **Optional:** from 52% (Koniczynka) to 69% (Święty Krzyż).

Our sites for ICP IM

1. 01ZM Puszcza Borecka
2. 05ZM Wigry
3. 06ZM Storkowo
4. 07ZM Koniczynka
5. 08ZM Kampinos
6. 09ZM Święty Krzyż
7. 10ZM Szymbark
8. 11ZM Wolin
9. 12ZM Roztocze

ICP IM		
code	Name	Obligatory
AM	Meteorology	Obligatory
AC	Air Chemistry	
PC	Precipitation chemistry	
TF	Throughfall	
SC	Soil chemistry	
SW	Soil water chemistry	
LF	Litterfall chemistry	
RW	Runoff water chemistry	
VG	Vegetation (intensive plot)	
LC	Lake water chemistry	Subprogramme

Data submission possible since 2016 ...



Conclusions

- IM data for Poland since 1994
- 9 stations proposed to join ICP IM with ICP IM mandatory Programmes
- To be discussed data (stations) useful for ICP IM
- Adjustments of monitoring programmes for some stations are needed
- Data submission possible since 2016 in the routine way
- Sites meta-data are under preparation
- Any good ideas, hints from TF/ICP IM community very welcome !





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 PAŃSTWOWY INSTYTUT BADAWCZY



● RU12
Astrakhan (Russia)

● RU03
Caucasus (Russia)

● CA01
Turkey Lakes/B (Canada)

- PL01 Puszcza Borecka
- PL05 Wigry
- PL06 Storkowo
- PL07 Koniczynka
- PL08 Kampinos
- PL09 Święty Krzyż
- PL10 Szymbark
- PL11 Wolin
- PL12 Roztocze

(site codes to be fixed)

● Site with on-going data submission ● Site with earlier data only ● IM sites in Poland

April 2017



#ŚrodowiskoŻyciem



Thank you for your attention

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#ŚrodowiskoŻyciem

