POPs in the past and in the future. A few notes on the Effectiveness Evaluation of the Stockholm Convention in 2017

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Outline

The chemistry of the environment over the past 100 y

The planning and implementation of the Stockholm Convention Effectiveness Evaluation of 2017

Outlook

The chemistry of the environment over the past 100 years

Periods

1905 – 1920 , 1921 – 1935 , 1936 – 1950 , 1951 – 1965 , 1966 – 1980 , 1981 – 1995 , 1996 – 2010 , 2011 - 2025

Historiographical pathways

- Science and technology
- Monitoring and effectiveness
- Regulation

Period	Science	Monitoring	Regulation
1905 - 1920	Haber Bosch, Isotopes, PCB synthesis	No traces of artificial organohalogens in most environmental samples	Chemical weapons, oil spills. ILO
1921 - 1935	Mass Spec, X rays, early industrial production of organohalogens, antibiotics	Early monitoring of radiation Low levels of organohalogens detectable in sediments and museum samples	Int Comm Radiological Protection
1936 - 1950	Vast increase in the volume of production and release of isotopes, organohalogens and antibiotics in military context	Early monitoring of antibiotic resistance, atmospheric LRT of isotopes. High levels of PCB and DDT in some locations	United Nations Local air pollution regulations around large plants (dilution) Radiological protection
1951 - 1965	Expansion to massive civilian commercial production, use and release of isotopes, antibiotics and organohalogens.	Global atmospheric monitoring of isotopes, early measurements of organohalogens in remote sites. Accidents, with organohalogens Osaka, Meknes, Swiss army	Oil spills , risk management in large industrial plants CERN, IAEA

Period	Science	Monitoring	Regulation
1951 - 1965	Expansion to massive civilian commercial production, use and release of isotopes, antibiotics and organohalogens.	Global atmospheric monitoring of isotopes, early measurements of organohalogens in remote sites.	Oil spills , risk management in large industrial plants CERN, IAEA
1966 - 1980	>2000 Nuclear tests, Acid rain, Agent orange, HR mass spec. Computing FFT, Satellites	Seveso, stable monitoring begins in Japan, Great Lakes, the Arctic, the Baltic ...	UNEP, MEDPOL, LRTAP. Clean Air Act. EPA.
1981 - 1995	AIDS, PCR, EDS, http://	PCB, drins, HCHs, DDTs, PCDD/Fs measured in all media everywhere	LRTAP Critical Loads, EMEP, WGE. GL, AMAP, OSPAR, HELCOM. Rio. ILO169
1996 – 2010	Global multimedia LRT, and pathways models. Emission inventories.	Significant global decreases of "legacy POPs"	LRTAP POPS, Stockholm, Basel, Rotterdam, EU framework directives REACH
2011 - 2025	New analytical tools wet and dry	Thousands of substances of concern, multiple end points, long records	EE, Labor, Natives, nested and integrated regulations,

The planning and implementation of the Stockholm Convention
Effectiveness evaluation of 2017

The “POPs” concept

By the mid 1990s monitoring evidence lead to two conclusions

A number of artificial toxic substances sharing similar chemical structures and behavior were found in all media and all locations including remote sites. Thus national regulations only could not be effective , the approach had to be international and global

The number of chemical substances of concern was large and substance by substance regulation could not work, thus POPs criteria

The SC and Article 16 :

Effectiveness : approaching the objective (decrease POPs) , Article 17
Compliance: adequate implementation of agreed measures.
Different metrics.

The implementation of article 16 on Effectiveness Evaluation started in 2004 by establishing the Global Monitoring Plan (GMP) and the 5 Regional Organization Groups.

The GMP delivered 5 Regional reports and Global report in 2009.

The second 5 regional reports were presented at COP7 in 2015

The framework to proceed with a full Effectiveness Evaluation was developed and proposed by a EE WG to the COP5 (2011) and adopted by COP6 , (2013) the EE Committee was established at COP7 (2015) and presented the first EE report at COP8 in 2017, based on the GMP reports and the information from National Implementation Plans and reporting under article 5 compiled by the Secretariat.

The EE and GMP reports presented at COP8 (2017) represent a first, limited, attempt of a coherent global mass balance for all listed POPs

- **Outlook**

	Science	Monitoring	Regulation
2011 - 2025	New analytical tools wet and dry	Thousands of substances of concern, multiple end points, long records	EE, Labor, Natives, nested and integrated regulations,

Science

New analytical tools

wet

In sample collection and laboratory analysis, bioassays.

dry

In data analysis, algorithmic mining. Modeling of available long term samples collections.

Monitoring and Effectiveness evaluation

- Improve interpretation and modeling of monitoring and regulatory action undertaken in the past.
- Improve understanding of pathways at all scales in the context of ecosystem science and design monitoring strategies adapted to work in the next few decades making best use of the data gathered in the past few decades.
- Improve global mass balance estimates for all substances, stock, production, emissions, estimates in product and waste, presence in core media >> improved reporting and monitoring
- Improve competence to attribute environmental changes to actions undertaken and structural vulnerability
- Decrease time lags between early warnings and effective regulation (may be from 30y to 15 y)
- Better work with alternatives, GMP<>POPRC
- Sustain regional and international long term monitoring and sample archives

Regulations

- Towards coherent chemical/environmental nested regulations, local, regional, national, international. See the SC EE report
- Improve reporting, archiving, transparency, accountability.
- Improve link and synergy with work on Labor, HR and minorities. See ILO 169

Concluding

- Regulation and international cooperation works, the job is far from over
- From short term response to long term sustained vigilance,
fire fighters>>met service
- Develop reasonable global mass balances for listed POPs
- Decrease timelags early warning / regulation
- Do a better job tracking alternatives early on
- Improve reporting including developing metrics that enable global mass balance
- Improve depth and grain of understanding of monitoring and release estimates in recent decades

there is a history of environmental chemistry
and
an environmental chemistry of history

Thank you