European Environment Agency (EEA)

www.eea.europa.eu

Copenhagen, Denmark

The EEA mission

"The EEA aims to support sustainable development and to help achieve significant and measurable improvement in Europe's environment, through the provision of timely, targeted, relevant and reliable information to policy making agents and the public"

EEA member and collaborating countries

Member countries
Collaborating countries

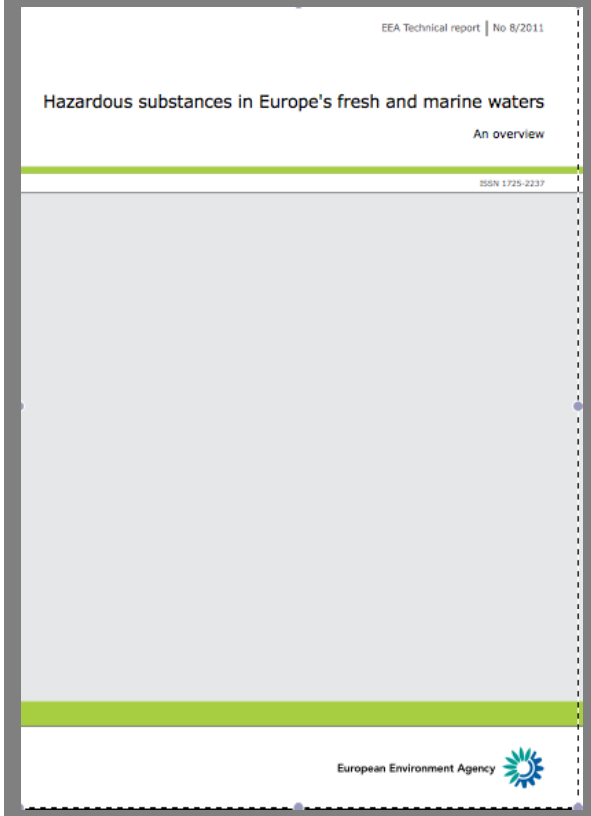
State of the Environment in Europe Report (SOER)

SOER 2010

Astana 2011

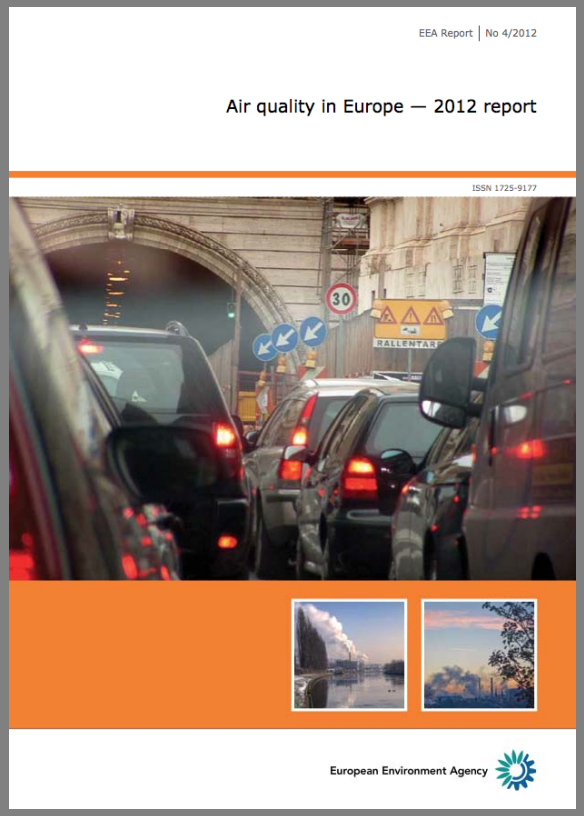
Relevant EEA Reports (www.eea.europa.eu)

Hazardous substances
EEA Technical Report 8/2011



Endocrine disrupters
EEA Technical Report 2/2012

Air quality in Europe 2012
EEA Technical Report 4/2012

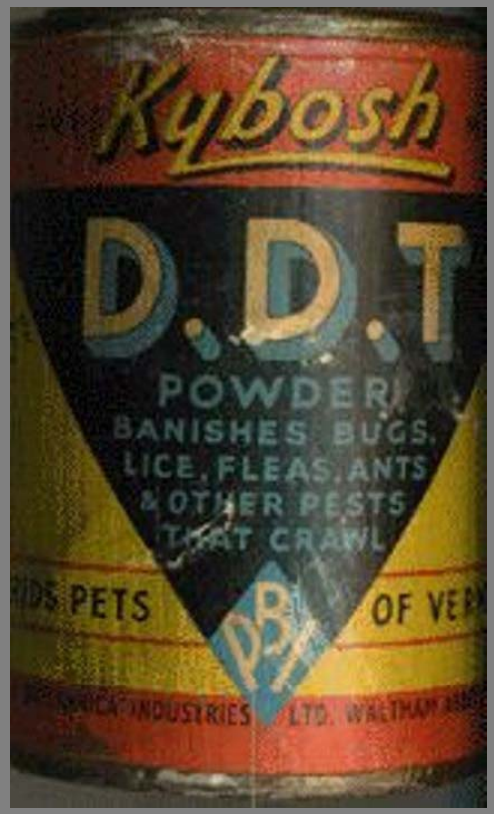


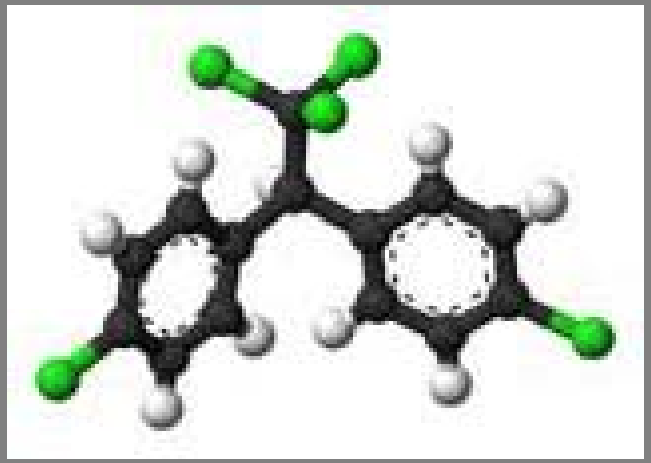
Environmental Monitoring

Peter Pärt
European Environment Agency

DDT

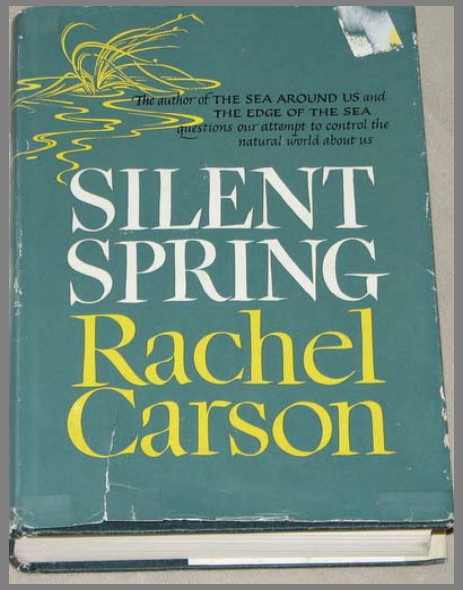
(The “mother” of Environmental Toxicology)





Dichloro-diphenyl-trichloro-ethane

"Silent Spring"



Rachel Carson
(1907-1964)

Silent spring raised awareness of the presence negative impact of DDT in the environment

Søren Jensen

1964 --- A Swedish researcher of Danish orign, Dr. Soren Jensen, was trying to study DDT levels in human blood when a mysterious group of chemical compounds kept recurring in his samples, interfering with his analyses. The compound was found in both wildlife an human samples from as early as 1935, before DDT was introduced. He finally identified the compound as a polychlorinated bisphenol or **PCB**

DDT and PCB

- Lipid- or fat soluble
- Persistent – resistant to degradation
- Bioaccumulating – concentration in the body increases over time
- Biomagnifying – concentration increases along the food chain. Top predators have the highest levels
- Reprotoxic, immunotoxic in wildlife
- Declining population – almost extinction in top predators (white tailed sea eagle, peregrine falcon, kestrel, otters, seals, whales, dolphins

Environmental monitoring driving legislation

Peregrine falcon

Kestrel

Dolphin

Seal

European otter

DDT ban Europe (EU): 1981

PCB ban Europe (EU): 1985

PCB, UNEP Stockholm Convention on POPs: 2001

Swedish Baltic Monitoring Program (start 1972)

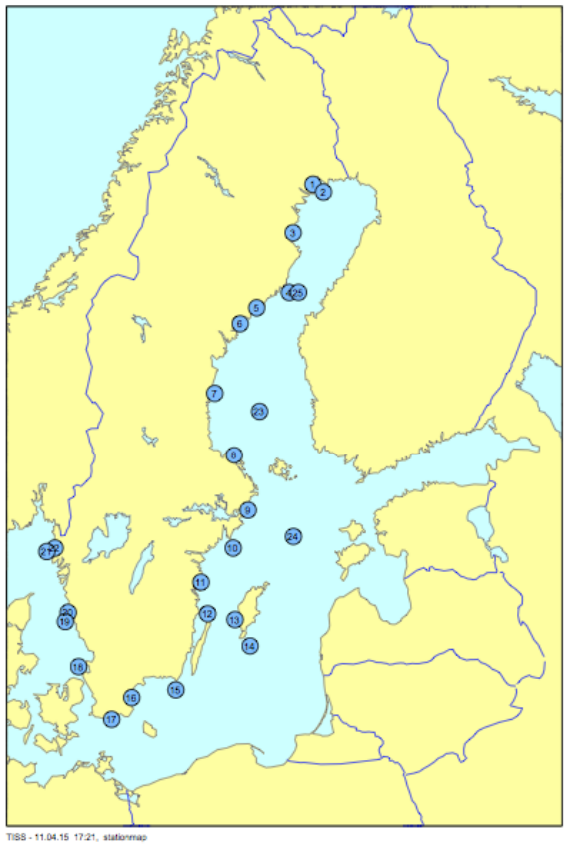


Figure 5.1. Sampling sites within the National Swedish Marine Monitoring Programme; 1) Runefjärden, 2) Harufjärden, 3) Kinnbacksfjärden, 4) Holmöarna, 5) Örefjärden, 6) Gaviksfjärden, 7) Långvindsfjärden, 8) Ängskärsklubb, 9) Lagnö, 10) Landsort, 11) Kvädöfjärden, 12) Byxelkrok, 13) St.Karlsö, 14) SE Gotland, 15) Utlängan, 16) V. Hanöbukten, 17) Abbekås, 18) Kullen, 19) Fladen, 20) Nidingen, 21) Väderöarna, 22) Fjällbacka, 23) Bothnian Sea offshore site, 24) Baltic Proper offshore site, 25) Bonden.

Swedish Baltic Monitoring program
Species

Cod

Species	N of individual specimen	%
Herring	5640	51
Cod	1090	10
Perch	970	9
Eelpout	530	5
Dab	350	3
Flounder	340	3
Guillemot	600	5
Blue mussel	1580	14
Total	11100	100

Herring

Guillemont

Perch

Eelpout

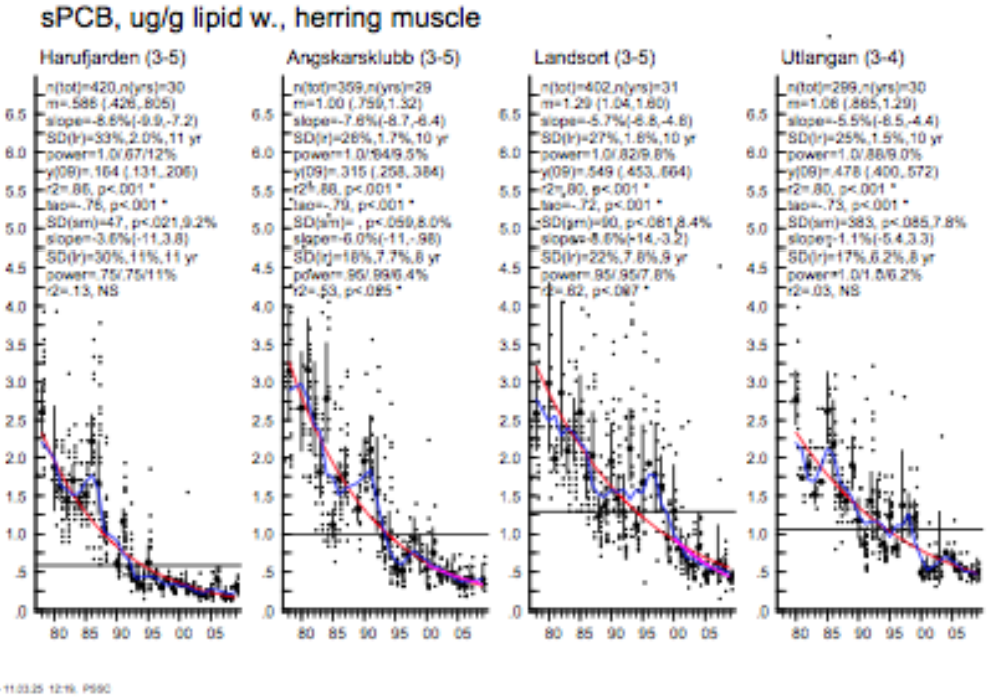
Flounder

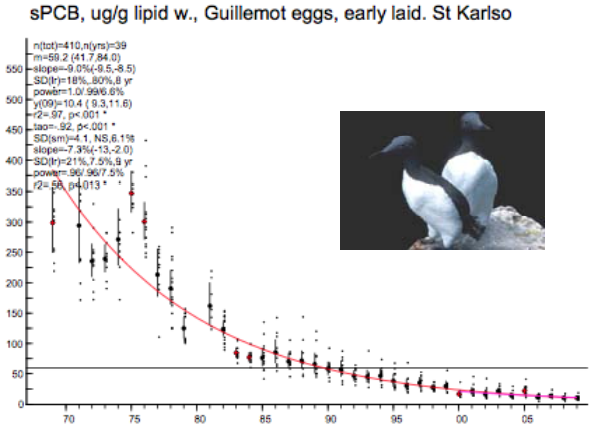
Blue Mussel

Dab

Swedish Baltic Monitoring program
Example of results

sPCB



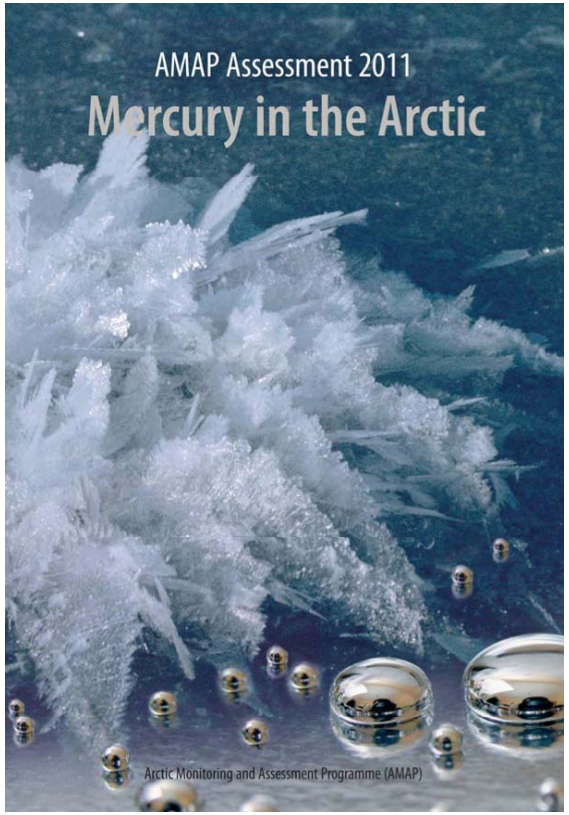


International Monitoring Programs

- **AMAP** (Arctic Monitoring and Assessment Program)
- **OSPAR** (Oslo-Paris Convention for the Northern Atlantic)
- **HELCOM (**Helsinki Convention for the Baltic)
- **MED POL Program** (UNEP Mediterranean Action Plan)
- **UNEP Stockholm Convention on POPs**
- **CLRTAP** (The Convention on Long-Range Trans boundary Air Pollution)
- **REACH** (European Union)
- **Water Framework Directive** (European Union)

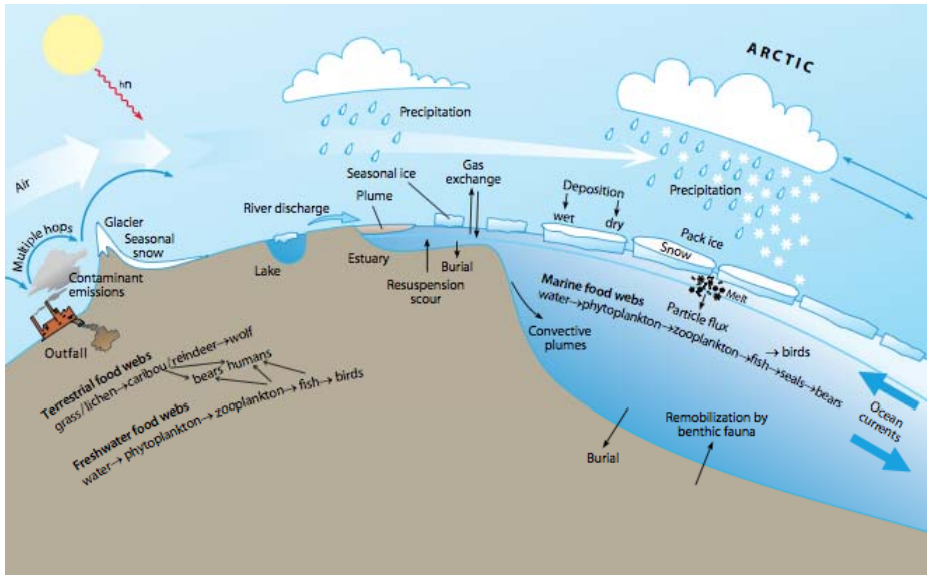
AMAP

(www.amap.no)



Why the Arctic?

Pollutants are trapped in cold regions because of a distillation process



Legacy POPs

PCBs

Polychlorinated biphenyls (PCBs) are a group of chemicals that have been used in a number of applications including transformer and capacitor oils, hydraulic and heat-exchange fluids, lubricating and cutting oils, and as plasticizers and joint sealants. The manufacture and use of PCBs are banned under the Stockholm Convention but they are still present in some existing products, such as old electrical equipment. Countries have until 2025 to take action to phase out use of existing equipment with PCBs and have to eliminate or treat the recovered PCBs by 2028. The Convention also requires that countries take steps to limit emission of PCBs with the aim to eventually eliminate releases into the environment. PCBs have a range of toxic effects. The most significant is that they affect the immune system and disturb behavior and reproduction in birds, fish and mammals. In the Arctic, they affect the polar bear population in particular. As one of the most ubiquitous pollutants, they also play a major role in impact of POPs on human health.

DDT and DDE

DDT has been used widely to kill insects and is still used against mosquitoes to control malaria in some parts of the world. The Stockholm Convention limits the production and use of DDT to controlling disease. It also allows DDT as an intermediate in production of the pesticide dicofol in countries that have registered this exemption. Measurements often refer to DDE which is a toxic and persistent breakdown product of DDT. DDT-DDE affects sex hormones and thus reproduction. It has been identified as the major cause of egg-shell thinning and decline of populations of predatory birds such as the peregrine falcon. The decreasing levels in the environment have been important for the recovery of bird populations although the previous AMAP assessment (2002) concluded that egg-shell thinning was still a concern for several bird populations. This assessment includes reports on 7-17 percent eggshell thinning in ivory gulls in four colonies in Svalbard and Russia compared to pre-DDT levels. This is approaching a degree of eggshell thinning that is known to cause declines in bird populations.

Chlordane

Chlordane is used to control termites and is also used as a broad-spectrum insecticide for agricultural crops. The Stockholm Convention limits the production and use to narrowly prescribed purposes and to countries that have registered for exemptions. Chlordane affects reproduction and the immune system.

HCB

Hexachlorobenzene (HCB) is a past-use fungicide and has also been emitted to the environment as a by-product from the production of chlorinated pesticides, incineration, and metallurgical processes. The Stockholm Convention limits the production and use to narrowly prescribed purposes and to countries that have registered for exemptions.

HCHs

Hexachlorocyclohexane (HCH) comes in several different chemical forms (isomers). The gamma-isomer (γ-HCH) is the same as the insecticide lindane. Mixtures containing the alpha (α-) and beta (β-) isomers were banned or its use was phased-out in the 1980s. Use of lindane has declined from the 1980s and 1990s. Canada, a major North American user, deregistered use of lindane in agriculture in 2004. Lindane has a range of toxic effects including effects on the nervous system, reproduction, and the immune system.

Dioxins and furans

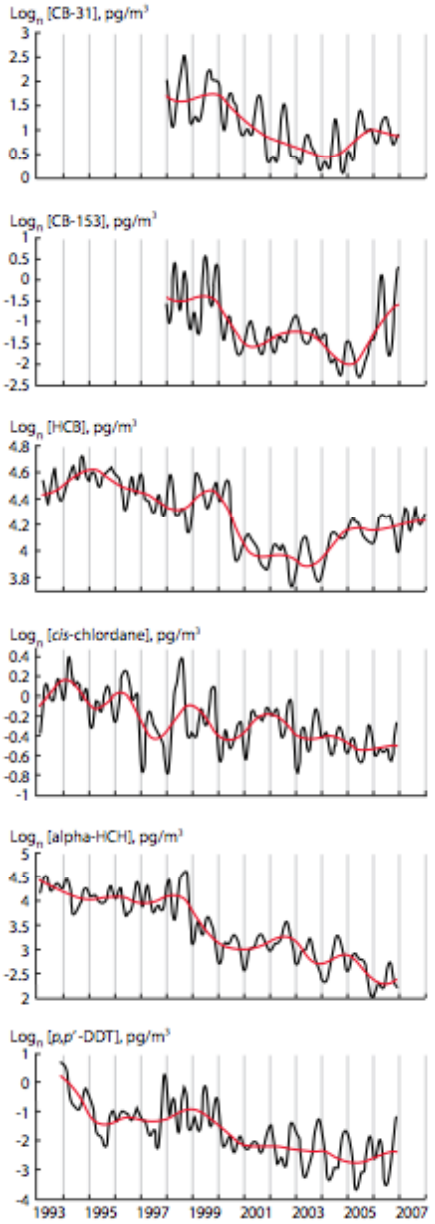
Dioxins and furans are created as by-products in high-temperature processes, such as waste burning and metallurgical industries, and as trace contaminants in some herbicides and in PCB mixtures. The Stockholm Convention and the UN ECE LRTAP POPs Protocol regulate emissions. The toxic mechanism is the same as for dioxin-like PCBs and includes effects on reproduction, the immune system and increased risk of cancer.

Toxaphene

Toxaphene is an insecticide that was widely used until the 1990s. It is regulated by the Stockholm Convention and the UN ECE LRTAP POPs Protocol.

Mirex

Mirex was used as insecticide and fire retardant until 1978. It is regulated by the Stockholm Convention and the UN ECE LRTAP POPs Protocol.

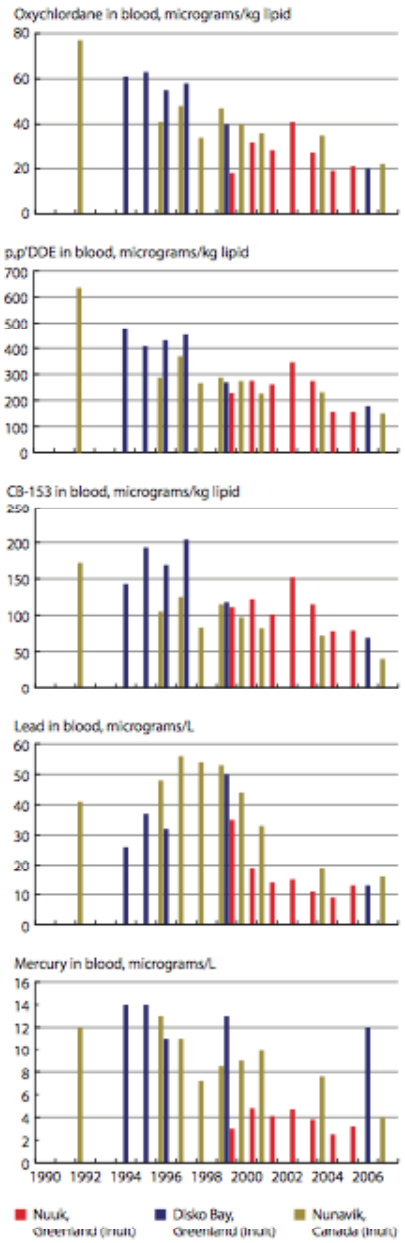


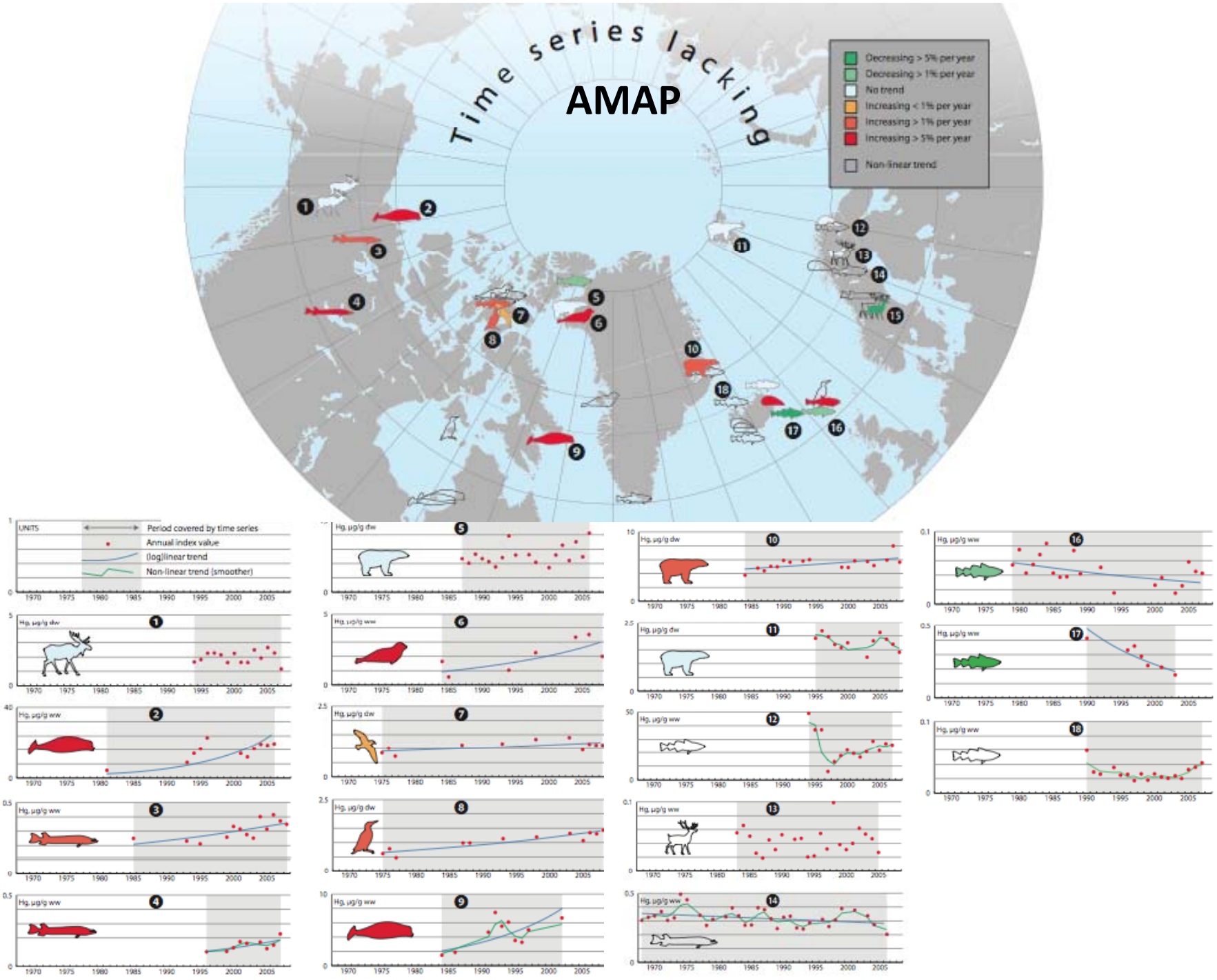
POPs in air

(Svalbard)

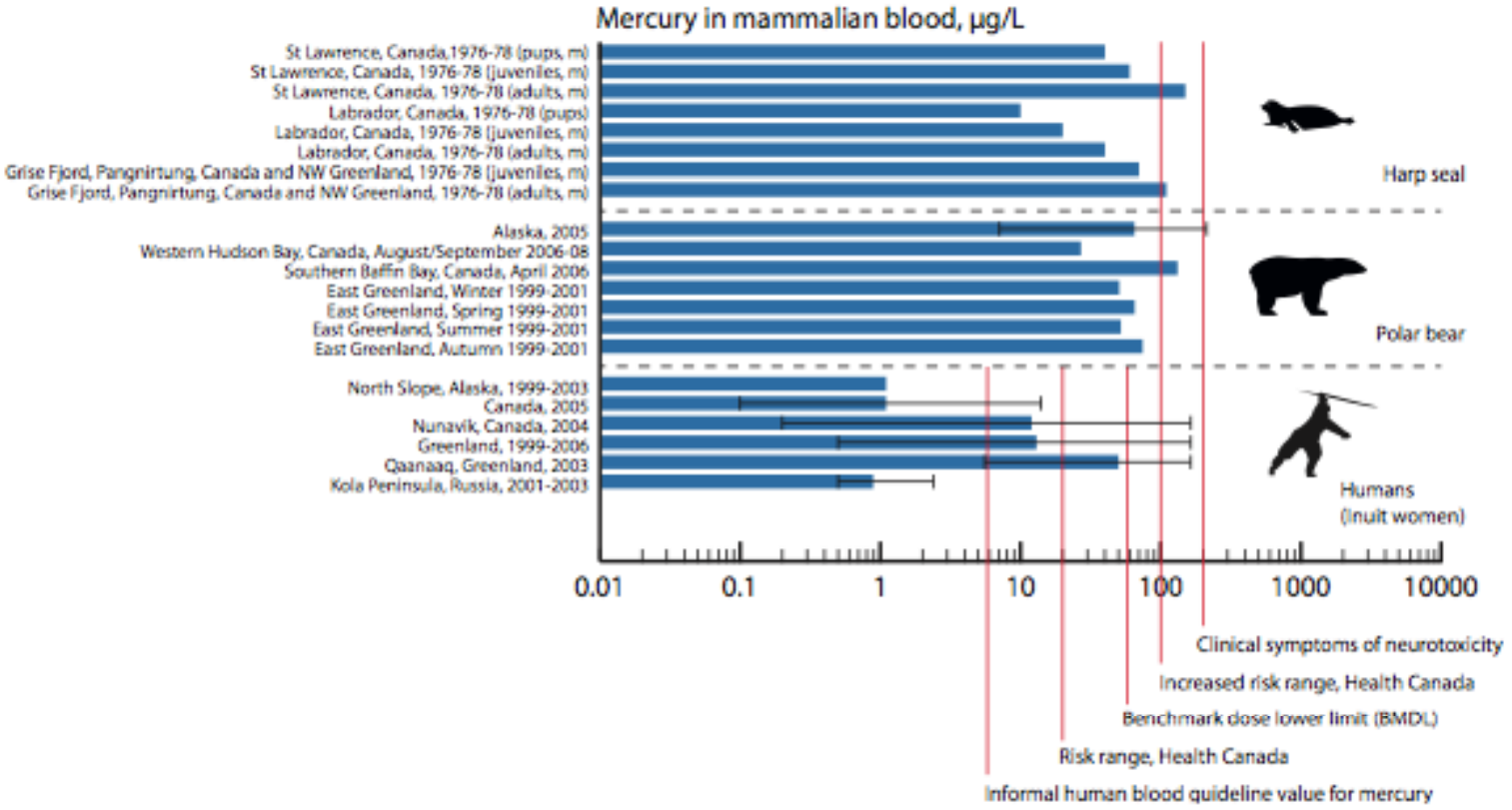
www.amap.no

Human contamination




Time series lacking
AMAP
Decreasing > 5% per year
Decreasing > 1% per year
No trend
Increasing < 1% per year
Increasing > 1% per year
Increasing > 5% per year
Non-linear trend
UNITS
Period covered by time series
Annual index value
(log)linear trend
Non-linear trend (smoother)
Hg, µg/g dw
Hg, µg/g ww
1970 1975 1980 1985 1990 1995 2000 2005

Human exposure to mercury



Global Environmental Monitoring
(from measurements to satellites)

Global Monitoring for Environmental Security (GMES)

GMES (Global Monitoring for Environment and Security) is a European initiative for the implementation of information services dealing with environment and security. It will be based on observation data received from Earth Observation satellites and ground based information. These data will be coordinated, analysed and prepared for end-users, so they can better understand each other and make environmental and security-related information available to the people who need it through enhanced or new services.

http://www.gmes.info/

European Commission
Enterprise and Industry

Share

Space

GMES - Observing our planet for a safer world

Managing natural resources and biodiversity, observing the state of the oceans, monitoring the chemical composition of our atmosphere: all depend on accurate information delivered in time to make a difference. The European initiative for the Global Monitoring for Environment and Security (GMES) provides data to help deal with a range of disparate issues including climate change and border surveillance. Land, sea and atmosphere - each is observed through GMES, helping to make our lives safer.

GMES
Global Monitoring for Environment and Security

The purpose of GMES is to deliver information on environment and security which correspond to identified **user needs**.

GMES services:

- are based on **Earth monitoring data**, collected from space (satellites), air (airborne instruments, balloons to record stratosphere data, etc.), water (floats, shipboard instruments, etc.) or land (measuring stations, seismographs, etc.)
- produce **output information** in the form of maps, datasets, reports, targeted alerts, etc.

After years of research investment, GMES is soon to become a fully operational service programme which is expected to help people and organisations take action, make appropriate policy decisions and decide on necessary investment. GMES also has great potential for businesses in the services market, which will be able to make use of the data it provides free of charge.

GMES services can be divided into:

- land, marine and atmosphere services - providing systematic monitoring and forecasting the state of the Earth's subsystems at regional and global levels
- emergency and security services - providing support in the event of emergencies and humanitarian aid needs, in particular to civil protection authorities, also to produce accurate information on security related aspects (e.g. maritime surveillance, border control, global stability, etc.)
- climate change service - helping to monitor the effects of climate change and assessing mitigation measures.

The GMES service component depends on Earth observation data, collected from space (satellites), air (airborne instruments, balloons to record stratosphere data, etc.), water (floats, shipboard instruments, etc.) or land (measuring stations, seismographs, etc.). These facilities are called the GMES infrastructure component; non-space based installations in the GMES infrastructure component are generally referred to as "in situ component".

By securing the sustainability of an information infrastructure necessary to produce output information in the form of maps, datasets, reports, targeted alerts, etc..., GMES helps people and organisations to take action, make appropriate policy decisions and decide on necessary investments. GMES also represents a great potential for businesses in the services market, which will be able to make use of the data and information it provides according a full an open access principle.

Earth observation-based services already exist in Europe, but they are dispersed at national or regional level and cannot rely on a sustainable observation capacity. With the exception of meteorological services, long-term availability and reliability of information is not guaranteed. This is why, in order to contribute to improve its response to ever growing challenges of global safety and climate change, Europe develops a sustained and reliable Earth observation system of its own

Key documents

Thank you!

Copenhagen, Denmark

www.eea.europa.eu