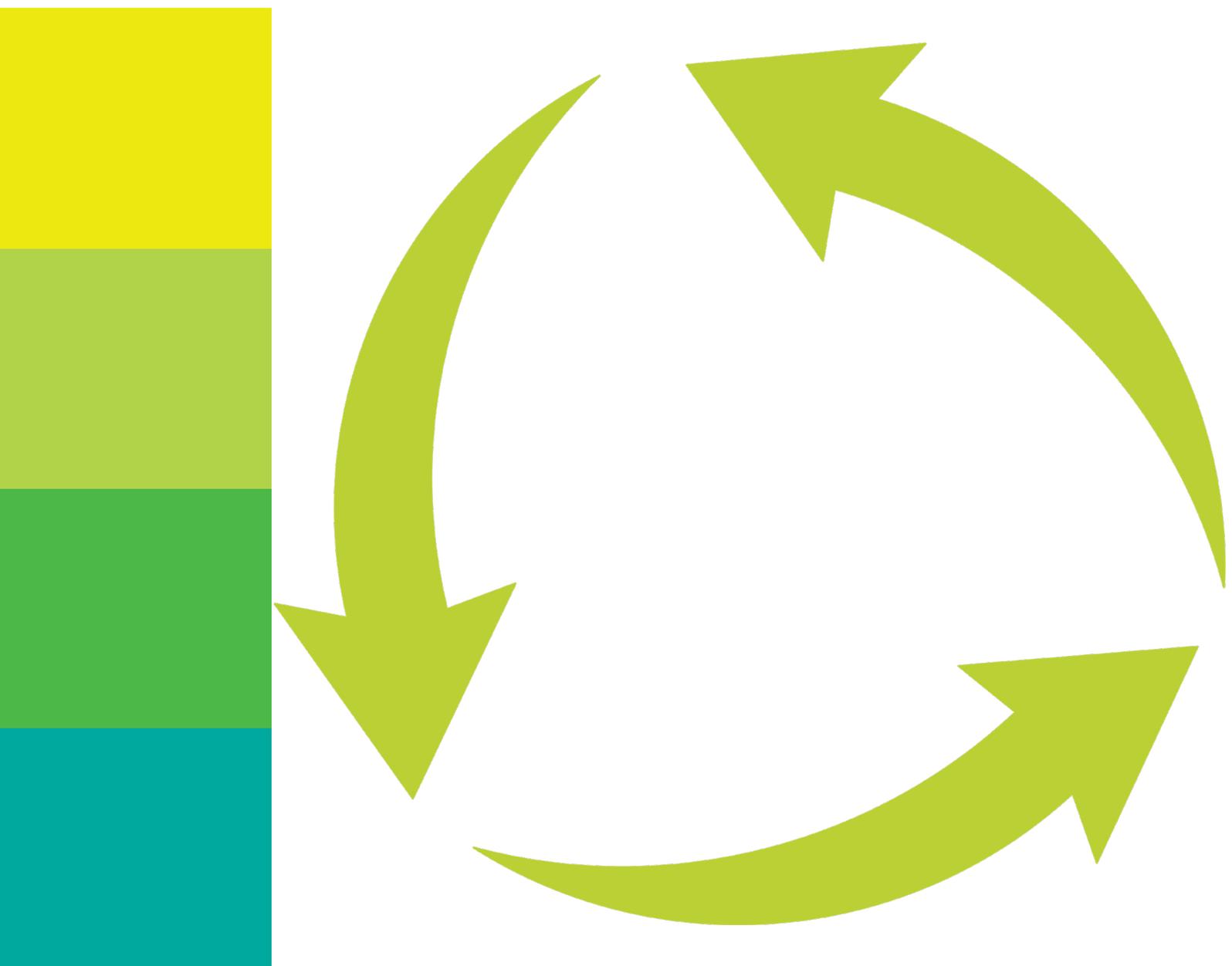


Towards a Safe Circular Economy without Hazardous Chemicals



Swedish Society
for Nature Conservation

For humankind to thrive, we rely on numerous services from the Earth, including various natural resources and ecosystem services. Continuing "business as usual" is not an option, since the way we are treating the planet causes unrepairable changes to the climate as well as the biodiversity, and pollutes water, air and soil, essential to life. Agenda 2030 addresses these challenges in several of the sustainable development goals.¹ There are also a number of reports addressing the problems.²

Circular economy has risen as a solution; a strategy to change the economy to become more sustainable. Instead of the linear economy of "take, make, dispose", the idea is to reuse and recycle as much as possible, creating loops of products, mate-

rials and nutrition. While the idea of a circular economy basically is straight forward, it has some challenges. One of them, not often spoken of, is to get rid of hazardous chemicals in the loops. Otherwise, these chemicals will end up in consumer products and may cause health problems like cancer and reproductive and developmental disorders, as well as having negative impacts on the environment and the biodiversity. An adoption to a circular economy has the potential to lead to better health among workers and citizens - if the issue about hazardous chemicals is addressed.

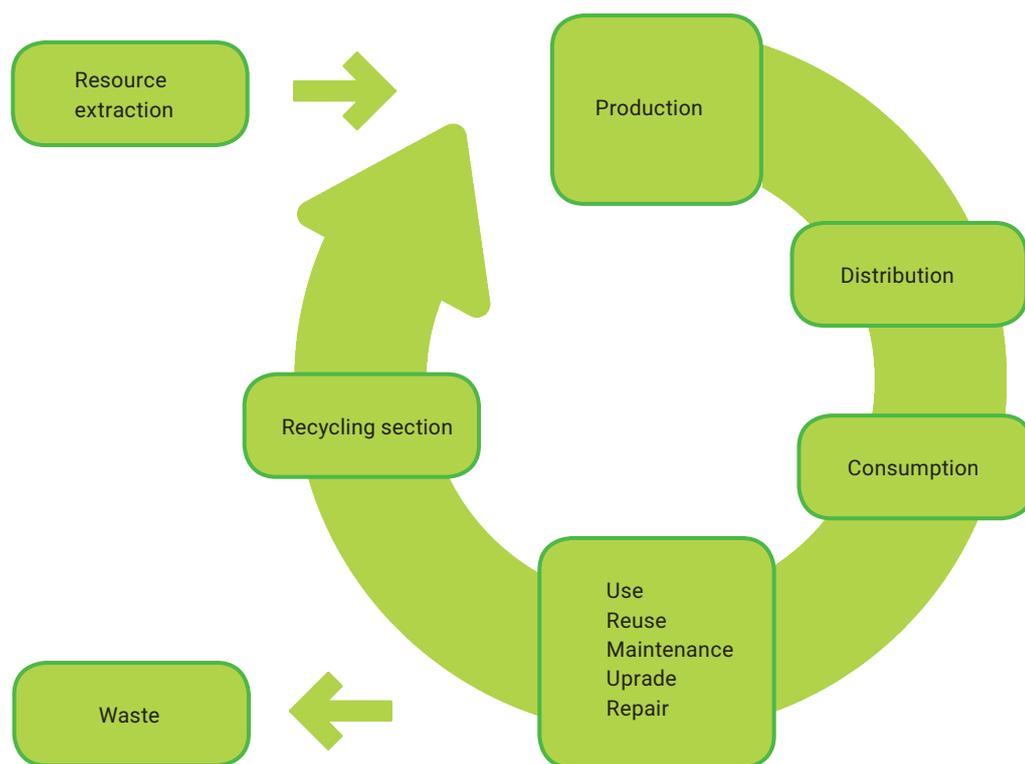


Figure 1. Schematic view of the life of products in a circular economy, where products are used for a long time, reused, maintained, upgraded and repaired as many times as possible before they are taken apart and the different materials are used in the production of new products.

1. The Agenda 2030 and ecosystems, Stockholm Resilience Center, 2016.
 2. Towards a pollution-free planet, UNEA/UNEP, 2017; Don't pollute my future! The impact of the environment on children's health, WHO, 2015; The Lancet Commission on

pollution and health, Landrigan et al., The Lancet, Vol. 391, No. 10119, 2017; The Lancet Commission on planetary health, Whitmee et al., The Lancet, 386, 1973-2028, 2015

Regrettably, numerous hazardous chemicals are used in products and materials.³ This is true for products currently in use, as well as for production of new products. Citizens around the world are anxious about how these chemicals will affect their health and the environment and entrepreneurs, especially in low- and mid-income countries, believe that better regulation would benefit their business.⁴ Some of the hazardous chemicals are regulated by conventions, or by laws in certain regions or countries. But since product supply chains, distribution and associated material flows often are international, a global solution to minimize the hazardous chemicals would be the best approach to get a safe circular economy that does not endanger human health or the environment.

Hazardous chemicals are in this text defined as chemicals having listed effects:

Health effects

- **Acute mammalian toxicity**
- **Carcinogenicity**
- **Mutagenicity/genotoxicity**
- **Reproduction toxicity**
- **Development toxicity**
- **Endocrine disruptions**
- **Neurotoxicity**
- **Systemic toxicity/organ effects**

Environmental effects

- **Acute aquatic toxicity**
- **Chronic aquatic toxicity**
- **Persistence**
- **Bio-accumulation**

Sustainable resources management

We depend upon the usage of natural resources, but the withdrawn amounts have to be within the boundaries of what the Earth can manage without depletion of the resources.⁵ It has to be assured that hazardous chemicals are not released or spread during resource withdrawal like mining, farming, forestry, and water usage, as well as during subsequent refining of the resources.

One of the main benefits of a circular economy is that it may partly help in decoupling economic growth from environmental degradation, since withdrawal and reprocessing are contributing reasons of dispersion of hazardous chemicals in the environment, impoverishment of natural resources and biodiversity degradation. Reuse and recycling of materials is one way which would result in less usage of new natural resources, while other ways are smarter design and cooperative usages. Still, some extraction or production of virgin materials will always be needed, as the number of recycling loops often is limited because of material degradation and diffusion. Therefore, it is important to continue to strive for more sustainable resource withdrawal and reprocessing methods.

Sustainable and hazardous free production

Sustainable production includes all steps from design, choice of resources, chemical contents and processing chemicals to choice of methods. Products need to be designed durable, easily repaired and recyclable, and spare parts need to be readily

3. Chemicals in products – challenges and approaches, Swedish Chemical Agency, 2016; POPs recycling contaminates children's toys with toxic flame retardants, Arnika/ IPEN, 2017.
4. Missing pieces, Swedish society for nature conservation, 2016.
5. Steffen et al. 2015. Planetary Boundaries: Guiding human development on a changing planet. Science Vol.

available in the markets for long periods of time.

As a principle, hazardous chemicals should not be used in the production or in the resulting product. If hazardous chemicals are unavoidable, because no substitute is available, they should be limited to as few as possible and used only in separate components easy to remove. Safety information for workers, retailers, users and recyclers should be clear and readily available. A key issue is transparent information about where in a product the hazardous chemicals are, and in which concentrations.

Some industries have set up chemical management systems (CMS) with transparency and information sharing schemes for hazardous chemicals. These systems apply to the supply chains all the way to recyclers, for example in the automotive, electronics, aerospace and metalworking industries.⁶ However, most industries have not yet reached the point where they prioritize establishment of such systems on a voluntary basis, which is why top down legislation may be necessary.

To support good management of hazardous

chemicals, global criteria for hazardous chemicals with negative health and environmental effects should be agreed upon. Harmonized hazard recognition and communication would facilitate safer handling of materials and products. This would create a level playing field on the global market for companies, facilitating trade even better. It could also address the issue of double standards, where products with banned or regulated hazardous chemicals in one country may be sold to countries with less stringent or no regulation/bans for the chemicals in question. The global definition of hazardous chemicals should be based on the GHS⁷ standards, which are already in use in many countries.



Figure 2. Example of GHS pictograms.

6. Walter R. Stahel, The Performance Economy, 2nd Edition

7. Globally Harmonized System of Classification and Labelling of Chemicals

Sustainable consumption

To spare natural resources and reduce pollution, consumption of products has to decrease generally, as well as change from new products toward reused or recycled ones. To facilitate such transition of the market, economic instruments could be used to favor reused and recycled materials and products without hazardous chemicals. Furthermore, other concepts than owning must be developed and promoted, like leasing, sharing and product stewardships. Still, consumer products have to be free from hazardous chemicals, to secure public health and the environment. The same criteria should apply for recycled materials as for new materials.

Toxics free recycling

Products should preferably be maintained, reused and repaired as long as possible. When this is no longer suitable or desirable, their materials should be recycled to become raw materials for new products, provided it is not too expensive energetically or poses risks to human health or the environment. This requires systems for sorting and collecting waste to be established and maintained.

Crucial for recycling is that all materials have to be free from hazardous chemicals. Since this is not the case today, the amount of materials that can be recycled is lower than desirable in a circular economy. Therefore, information about the chemical contents in materials must be available throughout the life cycle of the product. Products and materials containing hazardous chemicals should be withdrawn from the recycling loops and destructed in a safe way.

Chemicals recognized as safe today, may be considered hazardous in the future due to increased knowledge. Therefore, it would be desirable to have disclosure of the complete chemical contents along the supply chain, to secure non-toxic material

loops now and in the future. A first step is to agree on information sharing for known hazardous chemicals.

Safe circular economy

There are many models for circular economies, but for safe operation they all share the necessary precondition of transparency about hazardous chemicals. The following are crucial prerequisites for safe handling of hazardous chemicals, enabling improved, safe and increased recycling of materials, and thus supporting circular economy:

- information of the chemical contents of all constituent components in a product;
- chemical management systems handling the information flow for the chemical contents of products throughout their entire life cycle;
- global definition of criteria for hazardous chemicals, built on GHS codes;
- and implementation of GHS in all countries.

Conclusions

A circular economy has the potential to address several targets of the sustainable development goals in Agenda 2030, relating to human health and the environment, sustainable management of natural resources as well as creation of jobs and economic growth. Key to success, however, is the recognition that elimination of hazardous chemicals in materials flows for reuse and recycling is an absolute prerequisite for a circular economy to function to its full potential.

Related is also transparency and sharing of information on the presence of hazardous chemicals in products and their constituent components, throughout the life cycles of products. Failure to properly address this issue can make a circular economy a hazard for human health and the environment, as hazardous chemicals may spread with reused and recycled materials

in a non-transparent and uncontrolled manner. This would aggravate already existing problems, while in the short perspective promoting job creation and economic growth.

Furthermore, transparency is a prerequisite for a number of basic human rights to become effective, among them the right for workers to protect and remove themselves from chemical hazards in the occupational environment (the ILO Occupational Safety and Health Convention)⁸, and the right to remediation (the Covenant on Political and Civil Rights)⁹.

In 2013, the United Nations Environment Programme published the report “Cost of Inaction on the Sound Management of Chemicals”¹⁰. It clearly showed the forgotten economic costs for the society from failure to manage chemicals properly. The report is an important reminder to decision makers that economic growth and poverty reduction initiatives are undermined if chemicals are not properly addressed throughout their life cycles. A circular economy is an opportunity to create safe management of chemicals, and at the same time promote the economy and its sustainability.

Policy recommendations

- Implementation of GHS in all countries.
- Agree on global definitions of hazardous chemicals.
- Develop standards for information-sharing systems.
- Agree on a global instrument for regulation of currently un-regulated hazardous chemicals, including within mixtures, materials and products, with information-sharing requirement throughout the supply chains, all the way to recyclers.
- Establish and maintain collecting and sorting systems for waste.
- Develop standards for reused and recycled materials.
- Control of legal compliance.

8. Convention on Occupational Safety and Health and the Working Environment (No 155), 1981.

9. International Covenant on Civil and Political Rights, 1976.

10. Cost of Inaction on the Sound Management of Chemicals, UNEP, 2013.

How transparency on hazardous chemicals can fulfill Agenda 2030 goals

With information on the chemicals used in the production of materials and products, and remnant concentrations in materials and products, precaution can be taken to act on following SDG targets:

SDG target	Justification
SDG 1, target 1:5	Transparency can help us reduce exposure to hazardous chemicals that may result in costly health impacts and deteriorated ecosystem services, undermining anti-poverty ambitions. This would lead to reduced exposure to environmental shocks, one of which is chemical pollution.
SDG 3, target 3:9	Transparency can help us avoid pollution of the environment, and unnecessary exposure to hazardous chemicals, thereby contributing to substantially reducing the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
SDG 6, target 6:3	Transparency can help us avoid pollution of water bodies and the groundwater, ensuring that hazardous chemicals do not end up in drinking water.
SDG 8, target 8:8	Transparency can help us avoid unnecessary exposure to hazardous chemicals in the working environment, and facilitate substitution for less hazardous alternatives.
SDG 9, target 9:2	Transparency will facilitate substitutions of hazardous chemicals in production systems of materials and products, so that industries can become more sustainable.
SDG11, target 11:6	Transparency can promote a safe circular economy, so that more materials can be safely reused and recycled. This could reduce waste volumes, as well as improve the air quality in cities, as less waste would have to be burned, and less new materials produced and refined, and used for manufacturing of new products.
SDG 12, target 12:4	Transparency of chemicals in materials is at the core of safe management of chemicals throughout their life cycles.
SDG 14, target 14:1	Transparency of chemicals in materials can promote safe circular economies, so that less waste end up in the oceans, as well as less hazardous chemicals, because substitutions can be done to safer alternatives.
SDG 15, targets 1:15 and 15:5	Transparency of chemicals in materials can promote safe circular economies, so that less waste end up in the environment, as well as less hazardous chemicals, because substitutions can be done to safer alternatives. This helps us preserving ecosystems and their biodiversity. The targets serve to protect terrestrial and limnic ecosystems and their biodiversity.

Globally regulated hazardous chemicals 2018

Minimata convention

Mercury

Stockholm convention

Annex A, eliminate production and use of:

Aldrin
Chlordane
Chlordecone
Decabromodiphenyl ether (c-decaDBE)
Dieldrin
Endrin
Heptachlor
Hexabromobiphenyl
Hexbromocyclododencane
Hexa bromodiphenyl ether and hepta bromodiphenyl ether
Hexachlorobenzene
Hexachlorobutadiene
Alpha hexachlorocyclohexane
Beta hexachlorocyclohexane
Lindane
Mirex
Pentachlorobenzene
Pentachlorophenol and its salts and esters
Polychlorinated biphenyls (PCB)
Polychlorinated naphthalenes
Short-chain chlorinated paraffins (SCCPs)
Technical endosulfan and its related isomers
Tetra bromodiphenyl ether and penta bromodiphenyl ether
Toxaphene

Annex B, restrict the production and use of:

DDT
Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F)

Annex C, reduce unintentional production of:

Hexachlorobenzene (HCB)
Hexachlorobutadiene (HCBD)
Pentachlorobenzene
Polychlorinated biphenyls (PCB)
Polychlorinated dibenzo-p-dioxins (PCDD)
Polychlorinated dibenzofurans (PCDF)
Polychlorinated naphthalenes

Rotterdam convention

The convention aims to allowing countries to take informed decision on whether they want to import those chemicals or not. Annex III to the convention lists 50 substances subjected to the "Prior informed consent (PIC)" procedure.

Basel convention

The convention aims to reduce, restrict and ban transboundary hazardous waste movements, to protect human health and the environment. Annex I to the convention lists waste categories and hazardous characteristics that are covered.

Montreal protocol

The protocol aims to reduce the production and consumption of ozone depleting substances. Annex A to F lists substances covered by the protocol.

How EU define substances of very high concern

In the EU, very hazardous chemicals, in the legislation called substances of very high concern (SVHC), are covered by specific requirements within the EU chemical legalization REACH.

Substances with the following hazard properties may be identified as SVHCs:

- Substances meeting the criteria for classification as carcinogenic, mutagenic or toxic for reproduction (CMR) category 1A or 1B in accordance with the CLP Regulation.
- Substances which are persistent, bioaccumulative and toxic (PBT) or very persistent and very bioaccumulative (vPvB) according to REACH Annex XIII.
- Substances on a case-by-case basis, that causes an equivalent level of concern as CMR or PBT/vPvB substances. These include, for example, endocrine disrupting chemicals.

Once a substance is identified as an SVHC, it is included on the Candidate List. The inclusion on the Candidate List brings immediate obligations for suppliers of the substance, such as:

- supplying a safety data sheet;
- informing about the presence of SVHC in a product to the downstream buyer/user and communicating about safe use;
- within 45 days responding to consumer requests about information on the presence of SVHCs;
- notifying the EU Chemicals Agency ECHA if the article they produce contains an SVHC in quantities above one ton per producer/importer per year and if the substance is present in those articles above a concentration of 0.1% (w/w).
- All substances identified as SVHCs are also subjected to the authorization process, which aims to substitution to less hazardous alternatives or technologies.

Conventions, Declarations, Principles and global agreements in force, entailing or calling for transparency of chemicals

- **The Declaration of the United Nations Conference on the Human Environment; Stockholm Declaration (1972)**

Principle 6 proclaims that the just struggle of the peoples of all countries against pollution should be supported.

Principle 7 calls in States to take all possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to danger amenities or to interfere with other legitimate uses of the sea.
- **The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (1989)**
- Each party shall take the appropriate measure to ensure that persons involved in the management of hazardous waste or other waste arising from such management and, if such pollution occurs, to minimize the consequences thereof for human health and the environment. Parties shall undertake to review periodically the possibility for the reduction of the amount and/or the pollution potential of hazardous waste and other wastes which are exported to other States, in particular to developing countries.
- **The International Labour Organization Chemicals Convention (1990)**
- Specifically address the protection of workers from harmful effects of chemicals at the workplace.
- **Rio Declaration on Environment and Development (1992)**
- Principle 13 calls in States to develop national law regarding liability and compensation for victims of pollution and other environmental damage.
- Principle 16 calls upon National authorities to endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.
- **The Convention on Biological Diversity (1992)**
- The convention states that sustainable use of biological diversity, as well as conservation, is of critical importance for meeting the food, health and other needs of the world population.
- **The Rotterdam Convention on Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998)**
- Promote shares responsibility and cooperative efforts, for example by information exchange, among parties in the international trade of hazardous chemicals in order to protect human health and the environment from potential harm.
- **The Stockholm Convention on Persistent Organic Pollutants (2001)**
- Calls upon States to eliminate or restrict the production, use, trade, release and storage of persistent organic pollutants.

- **International Health Regulations (IHR) (2005)**
- Promote the international community to prevent and respond to public human health risks and emergencies that can have devastating impacts on human health and economies.
- **The Strategic Approach to International Chemicals Management (SAICM) (2006)**
- Promote chemical safety around the world by its policy framework about sound management of chemicals throughout their life cycle.
- **The Bali Declaration on Waste Management for Human Health and Livelihood (2008)**
- Reaffirming the commitments of the Basel Convention.
- **The objective of the Minamata Convention on Mercury (2013)**
- A global treaty aiming to protect human health and the environment from mercury and mercury compounds.

The Swedish Society for Nature Conservation is an environmental organisation with power to bring about change. We spread knowledge, map environmental threats, create solutions, and influence politicians and public authorities, at both national and international levels. Moreover, we are behind one of the world's most challenging ecolabellings, "Bra Miljöval" (Good Environmental Choice). Climate, the oceans, forests, environmental toxins, and agriculture are our main areas of involvement.

PG 90 19 09-2

Åsögatan 115
Box 4625, SE-116 91
Stockholm, Sweden

+46 (0)8 702 65 00
www.naturskyddsforeningen.se



**Swedish Society
for Nature Conservation**