Swiss Agency for
the Environment,
Forests and
Landscape SAEFL

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Chemicals

Shifting the onus of responsibility onto industry

Background

Chemicals are ubiquitous. To date, over 18 million different chemical compounds have been produced worldwide. Of these, around 100,000 substances are used commercially. Chemicals are involved in almost every product we use: foodstuffs, pharmaceuticals, petrol, adhesives, cosmetics, plastics and paints. They have changed our lives and environment – and not always for the better. Familiar examples of problematic substances include the insecticide dichlorodiphenyltrichloroethane (DDT), which impairs reproduction in birds as a result of eggshell thinning, and asbestos, which can cause lung cancer and mesothelioma (cancer of the chest and abdominal linings). In these cases, measures were not taken until after the damage was done because knowledge about the adverse impacts of these chemicals was not available before they were used in large quantities. Today, new substances are subject to mandatory testing and evaluation. However, there remains a considerable backlog of existing substances that have yet to be assessed.

Threats facing humans and the environment

The following classes of substances in particular give rise to concern:

Persistent organic pollutants (POPs), i.e. extremely long-lived substances that are not soluble in water but are readily absorbed in fatty tissue. When they are released into the environment, they are not broken down in soil, water or air but accumulate in the food chain, leading also to human exposure. The more volatile members of this class can also migrate over long distances and contaminate the environment at remote sites. For example, DDT or the industrial chemicals polychlorinated biphenyls (PCBs) have been detected in areas such as the Arctic where they have never been used.

Endocrine-disrupting chemicals (EDCs), i.e. substances that can interfere with the functioning of the hormone system in humans and animals. In humans, the association between endocrine disorders and exposure to chemicals remains poorly understood and highly controversial. In wildlife, however, there appears to be a clearer link between exposure to EDCs and adverse effects. Fertility has been shown to be impaired in species ranging from snails, reptiles and fish to mammals. Specific examples include feminization of fish downstream of wastewater treatment works, infertility among female sea otters exposed to high levels of PCBs, and masculinization of female whelks in coastal waters as a result of exposure to tributyltin from antifouling paints.

Ozone-depleting substances and greenhouse gases. A special type of environmental hazard is posed by these two groups of highly stable fluorinated compounds, which accumulate in the atmosphere. Rather than producing effects directly toxic to humans or the environment, these substances or their derivatives alter the global atmosphere. Thus, chlorofluorocarbons (CFCs), halons and related gases deplete the stratospheric **ozone layer** (at an altitude of 12–50 km), allowing increased levels of damaging high-energy UV-B radiation to penetrate to the surface of the earth. The structural changes caused by ozone depletion may also have unpredictable consequences for the earth's climate. Partly similar fluorinated compounds, which do not however contain chlorine or bromine – hydrofluorocarbons (HFCs) perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) – also affect the climate, by acting as potent **greenhouse gases**. The global-warming potential of these substances is a hundred to many thousand times greater than that of CO_2.

Measures taken to date

In industrialized nations, use of the "worst" substances has been prohibited or tightly restricted by regulatory means over the last 30 years. In **Switzerland**, this involved changes to legislation on toxic substances and environmental protection. As a result, environmental pollution has been substantially reduced. Thus, there have been marked decreases in concentrations of known pollutants such as lead, mercury, cadmium, polychlorinated dioxins, PCBs, DDT and nonylphenol in surface waters, sediments and other environmental samples. Of fundamental importance in this process is the Precautionary Principle: Whenever reliable scientific evidence is available that a substance may have an adverse impact on human health and the environment but there is still scientific uncertainty about the precise nature or the magnitude of the potential damage, decision-making must be based on precaution in order to prevent damage to human health and the environment.

As is shown by the example of ozone-depleting substances or a number of POPs, certain problems cannot be resolved merely by measures taken at the national or regional level. Worldwide problems necessitate **global measures** and international agreements. Conventions of this kind also provide a way of ensuring that measures taken in industrialized nations are also implemented in developing countries. In the chemicals field, the relevant agreements are as follows:

1. The **Basel Convention** on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The aim of the 1989 Convention is to minimize transboundary movements of hazardous wastes, to ensure that they are disposed of in an environmentally sound manner as close as possible to the site of origin, and in general to reduce the amounts of special wastes generated.
2. The **Stockholm Convention** on Persistent Organic Pollutants (POPs). This Convention calls initially for the elimination of twelve extremely toxic and persistent pollutants, the so-called dirty dozen. These include the insecticides aldrin, chlordane and DDT; the industrial chemicals PCBs and hexachlorobenzene; and chlorinated dioxins and furans, mainly released as undesirable by-products in combustion processes.
3. The **Rotterdam Convention** on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. This Convention is designed to protect developing countries. Mandatory notification procedures ensure that when a chemical is banned or its use is severely restricted in an exporter's country for reasons of environmental or health protection, shipments cannot be made without the consent of the importing party.
4. The **Montreal Protocol** on Substances that Deplete the Ozone Layer. The 1987 Protocol – which came into force in 1989 and has since been amended four times – seeks to reduce and ultimately eliminate global emissions of ozone-depleting substances. For each of the various substance classes, it lays down a binding schedule for the phasing-out of production and international trade. For example, CFCs have been banned in industrialized countries since 1996 and are to be phased out in developing countries by 2010.
5. The **Kyoto Protocol.** Preparations for the entry into force of the 1997 Protocol are currently under way around the world. The aim is to prevent climate change by reducing emissions of greenhouse gases, particularly in developed countries. The gases in question are CO_2, methane, nitrous oxide and a number of synthetic greenhouse gases (HFCs, PFCs and SF_6). Each country is required to reduce its greenhouse gas emissions by a specified percentage compared with the baseline year of 1990 (Switzerland: 8%).

Agenda for the future

Placing the onus of responsibility on industry: The EU White Paper "Strategy for a future Chemicals Policy" is currently being implemented in EU legislation. This will make industry responsible for the safety of its products. The White Paper also specifies a mandatory authorization procedure for substances that are carcinogenic, mutagenic or toxic to reproduction, or persistent, bioaccumulative and toxic; i.e. special attention is paid to endocrine disrupters and substances with POPs characteristics. Under the proposed system, registration of basic information will be required for all substances with an annual production volume exceeding 1 tonne, regardless of whether they are classified as new or existing. SAEFL takes the view that Switzerland's future chemicals policy should also incorporate the new instruments proposed in the EU White Paper, thus requiring the chemical industry to assume greater responsibility for its products.

Strengthening chemicals control and environmental research: The evaluation of substances that have not been adequately investigated to date and the implementation of a new mandatory authorization system will also impose additional burdens on the authorities. These tasks can only be carried out efficiently by means of international cooperation. If Switzerland is to make an active contribution to this process, investments in chemicals control will have to be substantially increased. The same is true of environmental research, where there is also a need for additional international coordination of efforts to develop methods for testing the environmental impact of chemicals. Switzerland should be prepared to make such a commitment, as pharmaceuticals and chemical products are the country's largest export sector, accounting for CHF 18 billion a year.

Strategy for chemicals management: In order to optimize cooperation, support should also be provided for the close proximity of international processes. Switzerland is therefore seeking to host the Permanent Secretariat of the Stockholm (POPs) and the Rotterdam (PIC) Convention in Geneva. This would lead to the establishment of a global centre of expertise in chemicals and waste in Geneva's International Environment House, which is already home to the Secretariat of the Basel Convention (cf. Geneva information sheet). This centre is to be further expanded in future. Initially, under the direction of UNEP, an international strategy is to be developed for chemicals management. Switzerland is also supporting efforts to establish, in the medium term, international regulations for heavy metals such as lead, mercury and cadmium, and for endocrine-disrupting chemicals.

Further information:

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