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## Chemical Safety and Development



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# **Chemical Safety and Development**

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# 1 Abstract

The process of industrialisation that has transformed the world over the past two centuries is inseparably linked with the production and use of chemicals. The techniques of coping with the side effects of this development, however, are still in their infancy. Evidence of this is seen in the huge numbers of contaminated sites with toxic wastes, obsolete pesticides and decaying industrial plants. Legislation and the establishment of licensing and inspection bodies have not kept pace with the problem - not in the industrialised world and even less so in developing and threshold countries.

Environmental damage and health risks resulting from inappropriate handling of chemicals are at their greatest in the poorest countries. Poverty, illiteracy, exploitative working conditions and the lack of a legal framework are among the reasons. Smallholders spray pesticides without protective clothing, they are unable to read the instructions for use or the warnings on the packet, and they send out their children to spray toxins. Animals drink from pesticide-ridden irrigation channels, or the water is taken for washing vegetables. Pesticides are used for fishing and for "protecting" dwellings and food stocks against vermin. Similar dangers are posed by the way chemicals are handled in small informal workshops and dyehouses, tanneries, textile production shops and carpet factories. Sudden deaths of children or domestic animals, unfamiliar illnesses and miscarriages or deformities are explained away with the traditional interpretations - as witchcraft or as punishment from the gods or spirits.

Chemical safety is still a young field in development cooperation, but it is one that is emerging more and more as a trans-sectoral theme. Almost all fields of development cooperation and environmental policy are affected: protection of the environment and natural resources, health, education, women, agriculture, land rights, industrial policy, health and safety at work, trade unions, child labour, human rights, good governance, the fight against corruption, the efficiency of state institutions, and questions of international

cooperation, such as those relating to the implementation of conventions, safety standards and industrial standards. In all of these areas chemical safety can be seen as an indicator of successful development - and this is true everywhere, in industrialised countries just as much as in threshold countries and developing countries.

Germany has many years of experience in the practical application of chemical management systems, and this can be put to use in technical cooperation with developing countries. As the third largest producer of chemicals (after the USA and Japan) and the world's largest exporter of chemicals, Germany also has particular responsibility with respect to developing countries, which are valued as customers but which themselves do not yet have the technical and governmental capacities to ensure sound management of imported chemicals and chemical plants.

The Pilot Project on Chemical Safety, a project run by the Gesellschaft für Technische Zusammenarbeit (GTZ) on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ) and in close cooperation on a technical level with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), coordinates the transfer of technical expertise and the provision of specialist advice in matters relating to chemical safety in developing countries. The project does this in response to queries from developing countries, where there is a high degree of problem awareness at the state level thanks to the activities of international organisations such as the United Nations Environmental Programme (UNEP) and internationally and locally active non-governmental organisations (NGOs).

Active examination of the subject of chemical safety with a view to practical action was stimulated by the work of the UN organisations and the debates of the 80s and 90s surrounding the negotiation of international conventions on trade in and handling of hazardous substances. The

significance of these conventions for achieving lasting improvement in the management of chemicals cannot be rated highly enough. In all countries, anyone who wishes to continue working in the direction that has been embarked upon can do so with reference to the convention targets. This is particularly important in the case of the PIC Convention and the POPs Convention, because the inventory of chemicals subject to the convention as recorded so far is not

complete. It can and should be expanded in the specified direction.

The international conventions set out the framework for the sound management of chemicals. Actual implementation of the objectives is the responsibility of the countries themselves. This is where bilateral assistance is called for, and where the future tasks of development cooperation in the field of chemical safety will be focused.

## 2 Chemical safety - what is it about?

The process of industrialisation that has transformed the world over the past two centuries is inseparably linked with the production and use of chemicals. Knowledge of chemical processes has hugely expanded, and non-experts no longer have any hope of keeping track of the great number of chemical products. Chemical products are part of everyday life all around the world - in the wilds of Siberia just as much as in the slums of Calcutta, among the fishermen of Sulawesi just as much as with the Tuareg in the Sahara, and for settlers in the Amazon Basin just as much as for building workers in Shanghai.

Nowhere in the industrialised world or in developing countries are there such things as “chemical-free zones”. The techniques of coping with the side effects of this development, however, are still in their infancy. Policy measures have been completely unable to keep up with the headlong expansion in the use of chemicals. Evidence of this is seen in the host of contaminated sites - old toxic waste dumps, decaying industrial plants, ships’ graveyards etc. - in the industrialised countries themselves. Legislation, institution-building and the establishment of licensing and inspection bodies have much catching up to do - in the industrialised world and even more so in developing and threshold countries.

It is not by chance that the environmental harm resulting from improper handling of

chemicals is most serious in the poorest countries. And the poorest of the poor suffer the most. These are women and children on remote plantations who are poisoned by pesticides, people living on rubbish heaps or in slums in the shadow of dilapidated industrial plants, children working in run-down factories, ruining their health, and people who have never learnt to read or write and handle the most hazardous substances without being aware of the risks.

In the debates on development matters, the problems of chemical safety are a relatively recent topic, which has only begun to take shape in the past few years. It is true that accidents, scandals and criminal practices have drawn the public’s attention to the unsolved problems of chemical management for decades now - one need only remember the reports of scandalous “waste colonialism” in the 70s and 80s, the accident with toxic gas in Bhopal, India, and the dioxin incident in Seveso. Expressing horror after a disaster is of little use, however. What is needed is assertive and preventative confrontation of the problems. Accidents and disasters can only be prevented by precautionary measures: by laws and inspections, by better information and education about risks, and not least by making changes in chemical production, by the prohibition of hazardous substances and dangerous practices, and by the promotion of better, more environmentally friendly technologies. (*For more on trade in toxic waste, see Appendix IV*).

### **“Ka ta mata” - that won’t kill you**

**An embarrassed shrugging of the shoulders is the most common response of farmers in the Caribbean and Latin America when they are spoken to about the danger of pesticides. “Ka ta mata” is a Creole saying which means “that won’t kill me”. Farmers spray pesticides on their fields in bare feet and wearing short trousers. Sometimes they use only a brush and a bucket. By no means all farmers have access to a sprayer, and protective clothing is often too expensive or too uncomfortable to wear in the tropical or subtropical heat. No protective clothing is available for children anyway. And children in particular are often sent out to spray pesticides and herbicides, because spraying toxins is classed as “light work”. The fact that pesticides are referred to as ‘medicina’ - medicines - contributes to the misjudgement and belittling of insecticides and weed killers.**

### **3 Chemical safety is becoming an indicator for successful development and a trans-sectoral theme in development policy**

In recent years chemical safety has been emerging more and more as a trans-sectoral theme which affects almost all fields of development cooperation and environmental policy: protection of the environment and natural resources, health, education, women, agriculture, industrial policy, health and safety at work, trade unions, child labour, human rights, good governance, the fight against corruption, the efficiency of state institutions,

and questions of international cooperation, such as those relating to the implementation of conventions, safety standards and industrial standards. In all of these areas chemical safety can be seen as an indicator of successful development - and this is true everywhere, in industrialised countries just as much as in threshold countries and developing countries.

#### **3.1 Environmental protection and conservation of natural resources**

The first area to be examined is environmental protection and conservation of natural resources, which has long been one of the focuses of German development cooperation. At the Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, the world community committed itself to the guiding principle of sustainable, forward-looking development in all regions of the world and to strategies aimed at safeguarding the future of the world as a whole. Agenda 21, which was adopted by the heads of state and government at this "Earth Summit", includes a wide-ranging set of tasks on the subject of chemical safety in Chapter 19. The objective is to make use of the achievements and benefits of the chemical industry - fertilisers, crop protection products, medicines, plastics etc. - to improve living conditions, to develop agriculture in poor countries and, for example, to exploit mineral resources, but to do so without harming the environment.

This objective is far from being achieved. It is still the case that increased returns in agriculture and foreign exchange earnings

from mining and industry are bought by poisoning soils and rivers, by damaging people's health and even by causing long-term, irreparable desertification. Entire tracts of land are polluted, such as the region around the Aral Sea, and every country in the world has old sites with problem chemicals, toxic waste dumps, derelict industrial plants with contaminated soils, and stocks of pesticides that can no longer be used, some larger, some smaller. The global climate changes linked with greenhouse gases, a phenomenon whose causes and dangers have been analysed and discussed for more than a quarter of a century, are the result of chemical management which is not - or not yet - working satisfactorily. In this case the connection between the environment and development is all too apparent. There is barely any other topic where it is so obvious how wrong it is to imagine that environmental protection is a "luxury" to which politicians might turn their attention when the major economic and social problems have been solved.

#### **3.2 Poverty alleviation and health and safety at work**

Handling chemical products is by no means a privilege of the rich and educated in developing countries - on the contrary. The poorest of the poor may not be able to afford to buy a bottle of Coke, but they spray paraquat - one of the most dangerous

herbicides - which is sometimes filled in Coke bottles and has the same brown colour as Coca-Cola. No-one knows the number of cases of poisoning and often deadly accidents. What is clear, though, is that the poor have most to do with toxic substances:

in agriculture with pesticides, herbicides and fertilisers, and in industry with every imaginable chemical. Spraying toxins is considered to be "light work", which is why children are often entrusted with it. Children also walk barefooted through freshly sprayed fields and eat what they find. Sometimes

extremely serious poisoning occurs, as in 1999, in the cotton-growing regions in the north of Benin.

*(See box and Appendix IV - Pesticide poisoning in Benin 1999).*

### **Death from cotton pesticides**

**In the summer of 1999, 37 people died of endosulfan poisoning in the cotton-growing regions in the north of Benin. This broad-spectrum insecticide is classified as moderately hazardous by the World Health Organisation (WHO). The Cotton Research Institute in Benin had recommended the use of endosulfan after the cotton bollworm had developed increasing resistance to pyrethroid, which had been used previously. Once the cases of lethal poisoning became known, the state agricultural promotion society SONAPRA defended the distribution of endosulfan with the comment that experience with endosulfan in Australia and the USA had been good. Admittedly, pesticide containers are not reused in the home in those countries. No children or animals walk across freshly sprayed fields, and virtually no Australian farmer would hit upon the idea of using cotton pesticides for preserving food. (Detailed description in the Appendix IV)**

The worst conditions are often to be found in small, informal workshops, dyehouses, tanneries, carpet factories and textile factories, where children are often also employed. Poverty alleviation projects aimed at promoting the informal sector should therefore always keep an eye on how chemicals are handled in the branch of industry being supported. Even in the high-tech sector, though, it is the poorest people who are most likely to become the victims of irresponsible handling of dangerous materials. In the seventies the world public was startled by reports that dangerous maintenance and cleaning work at the Indian nuclear power station of Tarapur was being carried out by people unable to read or write. These extremely poor people were glad that they had an opportunity to earn money at all, and they were unaware of the risks of their cleaning jobs. To this day, this pattern of dealing with hazardous substances has changed little in most developing countries.

In developing countries it is always the poorest and the least educated who do the most dangerous jobs, day labourers who have no choice but to take any work, women and children who live from hand to mouth, and all those trusting people who ruin their health with dangerous chemicals out of a sense of duty to their employers and their families. Many of these poor people in developing countries live in housing that is polluted by gaseous emissions, refuse, noise, contaminated water and poisoned soils. The poorer the people, the more wretched their environment - this is true at least for the ecological condition of urban living quarters. An indicator for pollution by chemicals and environmental toxins should therefore be introduced for poverty alleviation programmes. Every improvement achieved in this respect would have far-reaching effects on the overall situation of people in both urban and rural areas.

### **"Doudou" stood next to sugar and salt in Uganda**

**Aldrin breaks down to form dieldrin, and is considered to be the most powerful carcinogen in the body. Both of these insecticides were produced for many years by the Shell Corporation, and were exported to developing countries until the late 80s. In the mid 80s, development aid workers reported from Uganda, where dieldrin was used to 'protect' bananas, that this poison in the form of a white powder was being weighed and sold in the same containers and on the same scales as sugar and salt. The farmers said everyone used Doudou, as they called dieldrin. At the end of the 90s no manufacturer was known to be producing aldrin or dieldrin. In developing countries, however, both are still available for purchase. Drums of the toxic substances are found on rubbish dumps.**

### 3.3 Education, health and human rights

In almost all industrialised countries the law now requires proof of expert knowledge from anyone using dangerous chemicals, and in particular certain pesticides. In contrast, many people handling dangerous chemicals in developing countries - pesticides and herbicides in agriculture, industrial chemicals or toxic waste - are unable to read or write at all, or have had very little school education. They have no chance of understanding what they are dealing with. They ruin their health or that of their children, endanger their reproductive capability or poison their drinking water and food, without knowing it. This is a violation of human rights, a violation

of the right to freedom from bodily harm and the right to self-determination.

The conclusion to be drawn from this is that handling dangerous chemicals ought only to be allowed under the condition that the people have a level of education which enables them to assess what they are doing. Sound management of chemicals must ensure that handling chemicals does not cause serious impairment to health. This, though, remains an unsolved problem in developing countries, and especially in remote rural areas.

#### **Poor state of health and toxicity**

**One problem with the use of agrochemicals that has received little attention so far is the different way that organisms react to toxic substances - depending on whether they are in a generally good or poor nutritional condition and state of health. It has been established in animal experiments, for example, that the toxicity of parathion is greatly increased as a result of protein deficiency. Undernourishment and malnutrition, a high incidence of infectious diseases and intestinal parasites, extreme physical strain, the intake of other toxins (nicotine, alcohol, coca, opium etc.) and the existence of other damage caused by diseases (such as hepatitis), previous pesticide poisoning or psychological stress factors can result in an individual level of toxicity which may be well below the estimated toxicity threshold. It can be assumed that in many developing countries pesticides need to be classified as being much more dangerous on account of these conditions and the lack of user protection, and that the rate of poisoning cases is far higher than estimated.**

Existing chemical pollution and environmental poisoning in the successor states to the Soviet Union (Newly Independent States) and the countries of Central and Eastern Europe (CEE) represent a particular problem. In these transition countries it is not a lack of education or highly qualified experts that is the problem, but rather the sheer extent of the pollution of soils, water and old, disused industrial plants. All NIS countries have major

social and economic difficulties. They are burdened by the legacy of decades of ruthless exploitation of natural resources. Although environmental protection is now seen by many citizens and environmental groups as an important topic, the practical and political translation of environmental goals into tangible action still has a long way to go.

### 3.4 Industrial environmental protection - a particular opportunity for developing and transition countries

Even into the 1950s, smoking chimneys were viewed in Germany as a sign of entrepreneurial prosperity, and foam on rivers was accepted as an unavoidable accompaniment to the beginnings of the economic miracle. It was only in the late 50s that the authorities began to make consistent attempts to stem pollution of the air, water

and soil and to create the legal foundations for the protection of water and ambient air. In the early 60s, the environmental impact of industry became a political topic for the first time. "The sky over the Ruhr should be blue again" was one of the election slogans of the SPD, which admittedly met with a rather timid response among the public. It was only in the

late 60s and 70s that civil rights organisations and environmental groups got to grips with the subject. Emission control standards were laid down, laws and inspection procedures tightened, and technologies for subsequent containment of the evils developed, such as filters or facilities for downstream wastewater treatment.

As far as technological development in the old industrialised countries was concerned, this sequence of events - first industrialisation, then environmental protection - meant that industrial plants had to be retrofitted with environmental technology. In the jargon, this is known as providing "end-of-pipe" solutions. Almost another 20 years passed before consistent attempts were made to master industrial environmental problems with technologies that are integrated into the production process. In Germany, the model of an environmentally friendly recycling economy took shape in the mid-90s. Acceptance of the

need for integrated approaches prevailed not least because of the high non-productive costs of end-of-pipe solutions.

Environmental protection technologies for post-production cleanup did not become an export hit, either, as had been initially hoped by environment and development politicians. Countries such as China, which suffer enormous environmental problems, are today more interested in preventative environmental protection technologies, which have distinct cost advantages: fewer pollutants and emissions are produced, and better use is made of the raw materials. Why should they not skip a stage of industrialisation - that of retrospective environmental protection - and head straight for an environmentally friendly recycling economy? In the meantime such questions are being discussed in many developing and threshold countries, which certainly see that they have the opportunity not to repeat all the mistakes of the old industrialised countries.

## **4 Germany's particular responsibility for chemical safety**

Some 50,000 chemicals are currently marketed in the European Union. Western Europe is the biggest chemical-producing region in the world. This is where 33% of all chemicals of the world are produced, and one third of this production originates in Germany. In Germany itself, the chemical industry is the fourth largest industrial sector. In an international comparison, Germany is the third largest chemical producer after the USA and Japan, and with a share of roughly 16% of global chemical exports, Germany is the biggest exporter.

These facts alone explain why Germany has special responsibility for the safety of chemicals and for broadening awareness of the problems surrounding chemical safety. Development cooperation in chemical management is not a zero-sum game. The assistance given especially in building up efficient information and inspection systems benefits the rich countries at least as much as the poor ones, because it creates the prerequisites for finding permanent solutions to the problems of industrialisation and not burying them in deserts or oceans.

## **Reasons for the frequency of pesticide poisoning in developing countries**

### **Climate**

The personal protective clothing recommended by manufacturers - shoes or boots, rubberised protective suits, gloves, perhaps full-face masks - is barely appropriate for wearing in a tropical climate, if at all. The customary protective clothing is not suitable for some pesticides (methyl bromide).

### **Poverty - lack of legal framework**

Smallholders often have no protective clothing or the wrong type, because they are too poor to buy any. Children are also put to work spraying, and for them there is no protective clothing at all. If farm workers' huts are situated on plantation land or on the edge of fields which are sprayed from the air, the people are usually unable to defend themselves to stop their gardens, water supplies, animals and children being sprayed as well.

### **Illiteracy**

Farmers can read neither the instructions for use nor the warnings, either because they are unable to read at all or because they do not understand the language the instructions are written in (English/French/Spanish). They are also unable to do the calculations to work out concentrations and dilutions, and complicated calculations such as those needed for integrated plant protection are completely beyond them.

### **Feudal systems - lack of health and safety rules**

In many countries in Latin America, Africa and Asia the structures of land ownership are still feudal in many cases. Smallholders' rights of tenure and land use have little security attached to them, and as tenants or farm workers their existence is dependent on the plantation administrators, landowners or wholesale traders of the region. These people determine the working conditions, and it is usually impossible for small farmers to insist on health and safety precautions. Agricultural trade unions and smallholders' associations are often repressed and criminalized.

### **Lack of information - fatalism**

Smallholders and farm workers are barely aware of the harmfulness of the pesticides that they use. The term 'medicina' plays a part in belittling the danger of these toxic substances in Latin America. By association it suggests that they are "medicine for plants". Farmers trust the information from state authorities or dealers who supply the pesticides and who themselves often have little specialist knowledge. If the type of agent being sprayed is changed, for example because of resistances developing as in the case of cotton growing in Benin, farmers sometimes continue with their old patterns of use. This can have catastrophic, even lethal consequences. Even if the farm workers have a suspicion of the danger of the agents they are spraying because of their repeated experience with poisoning, they see no alternative for themselves and their families. Damage to health is simply accepted as being inevitable.

### **Lack of awareness of dangers - lack of caution**

When smallholders use pesticides, they rarely acquire them in their original packaging. In local shops the pesticides are often stored alongside foodstuffs. They are transferred into everyday containers and bottles, which are usually inadequately labelled, and are transported on the roofs of buses together with goats, pigs and sacks of rice. Empty pesticide containers are used for storing foods, and conversely pesticides are kept in Coke bottles. It also happens that seeds that have been treated to prevent fungal infection are sold as food and eaten, either by mistake or out of need.

### **Poor nutrition**

Undernourishment and malnutrition in conjunction with a generally poor state of health increase the risk of poisoning by pesticides in developing countries.

## Misuse of pesticides

Either in ignorance of the dangers or due to unscrupulous behaviour, pesticides are also used for fishing. Quick-acting insecticides are poured into ponds, the dead fish drift to the surface and can be collected easily from the boat. People looking at the fresh fish on a market stall cannot tell how it died. Pesticides are also used to “protect” homes and food stocks against vermin and pests.

## Lack of hygiene - lack of water

Anyone who sprays pesticides - no matter what health and safety conditions apply, even the best - should have enough running water available immediately afterwards in order to wash themselves thoroughly. In developing countries this is rarely the case. Farm workers and smallholders often use pesticide-ridden irrigation channels to wash themselves, their clothing and the spraying apparatus. Soon afterwards, children play at these same ditches, animals drink from them and vegetables are washed in them before they are taken to market. In the arid regions of the Sahel there is no alternative to this if there is not enough well water for the people and the cattle, and if in some cases the water has to be carried several kilometres.

## Viewing poisoning as “witchcraft”

The sudden inexplicable death of children or domestic animals, unfamiliar diseases, miscarriages, deformities or infertility of women are given traditional explanations by poor farmers in remote areas - as the work of witches and evil spirits, and as punishment by spirits and gods for misdeeds. In Africa it is not only the uneducated who usually consider “witchcraft” to be the most obvious explanation for strange accidents.

## 5 Chemical safety in German development cooperation

Germany has many years of experience in the practical application of chemical management systems, and this can be put to use in technical cooperation with developing countries. As the world’s largest chemical exporter, the Federal Republic of Germany also has particular responsibility with respect to developing countries, which are valued as customers but which themselves do not yet have the technical and governmental capacities to ensure safe management of imported chemicals and chemical plants.

In bilateral cooperation, environmental protection and the conservation of natural resources has been a focal area of German development policy since the early 70s. Since 1986 there has also been an obligation to perform an environmental impact assessment for all development projects. At the multilateral level, the Federal German Government has actively participated in drawing up international conventions on global environmental protection for many years (*see also box on pp. 16*):

- The Framework Convention on Climate Change, aimed at stabilising the

concentration of greenhouse gases in the atmosphere;

- The Convention on Biological Diversity, aimed at preserving the diversity of species and ecosystems;
- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes;
- The Convention to Combat Desertification;
- The PIC Convention (Rotterdam Convention) on the orderly exchange of information on and the compliance with import decisions in international trade with hazardous chemicals;
- The Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on phasing out the use of substances that deplete ozone in the stratosphere, chlorofluorocarbons (CFCs) and halons;
- The POPs Convention (Stockholm Convention) on prohibition of the

production and use of certain persistent organic pollutants (POPs). *(For more on POPs refer to the Appendix II).*

There are numerous points where these seven conventions overlap, and in all conventions questions of chemical management and chemical safety play a more or less prominent role. The variety of projects and programmes on the multilateral and bilateral levels in which there are matters relating to the handling of chemicals is equally broad. These include water and wastewater programmes, urban renewal, the reduction of toxic wastes in trade and industry, for example in tanneries and textile factories, in mining, in metalworking, the paper and printing industry, in dyehouses and petrochemical plants. Measures directed at site-appropriate land use and at the conservation of soil fertility have a great deal

to do with responsible handling of chemicals, especially pesticides and fertilisers. Another major problem is contaminated sites polluted with chemicals. In Mauritania, Pakistan and other countries the GTZ has organised the safe disposal of obsolete pesticides.

Assistance for developing and threshold countries in implementing the international conventions is financed primarily by the Global Environment Facility (GEF) of the World Bank. In the period from 1991 to 1994 the GEF was funded with \$1.13 billion, and in both 1994 and 1998 an additional \$2 billion was provided. The Federal German Government has an approximately 12% share in the GEF. All in all during the 90s the Federal German Government provided roughly DM 100 million for bilateral projects on the promotion of chemical safety.

### **Wind energy instead of CO2 emissions**

75% of China's energy supplies come from coal - in many cases unwashed, particularly environmentally harmful coal. As a result, some 20 million tonnes of sulphur are emitted every year. In eastern and southern China acid rain has become a serious problem in the meantime. The Federal German Government supports wind farm programmes in order to make renewable energies usable.

### **Controls and training in the handling of pesticides**

In Tanzania, Mauritania, Jordan, El Salvador and Honduras the GTZ organises programmes to improve state controls of the distribution and marketing of pesticides and other agrochemicals as well as training programmes on the appropriate handling of pesticides and fertilisers.

### **Toxic chemicals - danger for the diversity of species**

Madagascar is famous for its great diversity of species. However, the development of agriculture and industry have led to the use of highly toxic chemicals, the spread of which in the meantime constitutes a serious threat to the ecosystems of this island off the coast of East Africa. A GTZ project running since 1995 is endeavouring to raise the awareness of the population and those with political responsibility, to train local experts and to provide advice on the statutory regulation of procedures for dealing with hazardous chemicals.

## **6 The GTZ Pilot Project on Chemical Safety**

The Pilot Project on Chemical Safety, a project run by the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ) and in close cooperation on a technical level with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), coordinates the transfer of technical

expertise and the provision of specialist advice in matters relating to chemical safety in developing countries. The project does this in response to queries from developing countries, where there is a high degree of problem awareness at the state level thanks to the activities of international organisations such as the United Nations Environmental Programme (UNEP) and internationally and

locally active non-governmental organisations (NGOs). (For more about UNEP, see Appendix I)

Project activities focus on:

- integrating chemical safety into development cooperation measures,
- implementing the Rotterdam (PIC) and Stockholm (POPs) Conventions,
- building institutional capacity for implementation of the conventions in developing countries,

- testing tools for sustainable chemical safety under the conditions prevailing in developing countries, and on
- promoting collaboration among public and non-state actors in dealing with chemical safety issues.

The work centres on building human resources and institutional capacities in partner countries. Through pilot measures, the aim is to ascertain ways of improving chemical safety in developing countries and to show how this can be sustainably implemented in accordance with internationally accepted standards.

## 6.1 Examples of projects

### 6.1.1 Argentina

Cooperation between the GTZ Pilot Project on Chemical Safety and Argentina began in 1998. A planning conference was held with representatives of some 30 state institutions and non-governmental organisations (NGOs), at which the National Profile (see box p. 21) for chemical management in Argentina was presented and a national coordination team was nominated. The first national workshop for the setting of priorities took place in the same year, and technical working groups were formed. Regional seminars were also held in order to guarantee the involvement of the provinces and to respect Argentina's federal system of government. Individual focal areas were addressed by technical working groups examining the following topics among others:

- Response to accidents with chemicals
- Right to information
- Carcinogenic substances and work - e.g. asbestos
- POPs (persistent organic pollutants)
- Pesticides - risk assessment methods
- Legislation on chemicals
- Substances affecting the hormone system
- Transport of chemicals

- Obsolete chemicals and contaminated sites

In April 2000 a workshop was conducted with the six responsible Argentinean ministries on implementation of the PIC Convention. In order to facilitate interministerial communication, the ministries were equipped with computers and software. In Argentina it is the Ministry of Health, which is the driving force behind implementation of the National Action Plan for chemical management. The current problems are acute and chronic poisoning by pesticides, industrial chemicals, the management of chemical accidents, and the establishment and networking of toxin information centres. Some chemicals have been prohibited in the meantime, for example parathion, monocrotophos, all pesticides based on chlorinated hydrocarbons, the use of methyl bromide in the health sector, polychlorinated biphenyls (PCBs) and pentachlorophenol (PCP). Trade in some products has been restricted; there is now a ban on the use of PVC in toys for children under three years, for example.

The GTZ Pilot Project on Chemical Safety has been providing targeted support for three areas of chemical safety since 1998.

## A. Establishment of poison control centres in Argentina

The GTZ is supporting the establishment and networking of 19 poison control centres and 16 laboratories in Argentina. This is intended to give toxicologists and doctors in the emergency departments of hospitals the means to treat cases of poisoning quickly and effectively. The project is under the overall control of the Argentinean Ministry of Health,

which is also responsible for training toxicologists to use the databases. The Biochemical Faculty of the University of Buenos Aires trains the laboratory doctors. The Pilot Project on Chemical Safety has equipped the 19 poison control centres with computers and the necessary software, and has financed the training for the toxicologists.

### **Death from paraquat**

Herbicides long had the reputation of being less harmful to people than insecticides, because in evolutionary terms plants are further removed from human beings than insects are. There are, though, dangerous exceptions. The most well known is the herbicide paraquat, which was prohibited in Germany in the mid-80s. It leads to a particularly painful, slow death, while the person retains full consciousness. As a result of gradual hardening of the connective tissue in the lungs (pulmonary fibrosis), people who have inhaled this poison die from asphyxiation after about two weeks. Because paraquat is a brown liquid, it is sometimes confused with whisky or Coca Cola. Oral burns caused by paraquat have been described as probably the most agonising form of death from pesticides. The oesophagus and lungs are slowly eaten away. In some cases the victims bring up their own oesophagus during vomiting - and are fully conscious. The death struggle can last three weeks. In response to such cases of deadly confusion, unpleasant-smelling substances and emetics have been added to paraquat, but poisonings have still occurred. Farm workers who have been dealing constantly with pesticides for years have often lost their sense of taste and smell.

## B. Safety of plant protection products

The problem is well-known: manufacturers of pesticides and herbicides state that their products are safe for humans and the environment provided that the safety instructions specified by the manufacturer are followed. However, people in developing countries are often not in a position to do so. The Argentinean Ministry of Health has concluded from this that the standards created for industrialised countries cannot be applied to developing countries, and that there are plant protection products which

cannot be used safely in developing countries. The sale and use of these products ought therefore be regulated even more tightly than in the industrialised countries. The GTZ Pilot Project supports interdisciplinary working groups made up of doctors, farmers, geographers, chemists, experts in industrial medicine, toxicologists, sociologists etc., which are appointed by the Argentinean Ministry of Health to develop their own risk assessment applicable to local conditions in Argentina.

## C. Carcinogenic substances at the workplace

In relation to the subject of health and safety at work, and in particular the problem of handling carcinogenic substances at the workplace, the GTZ Pilot Project has initiated an intensive exchange of information between the Argentinean authorities and the

responsible German bodies, especially the Federal Ministry of Labour and Social Affairs (BMA) and the Federal Institute for Employment Protection and Industrial Medicine (BAuA) in Dortmund.

### 6.1.2 Thailand

In Thailand the activities of the GTZ Pilot Project on Chemical Safety focus on dioxin and furan emissions. The Thai partner is the Pollution Control Department, which is drawing up an inventory of potential sources of dioxin and furan emissions in collaboration with the Department of Industrial Works. Both of these chemicals are among the substances, which have been proscribed around the world by the Convention on Persistent Organic Pollutants (POPs Convention). Potential sources of emissions with high dioxin and furan concentrations in Thailand include incineration plants for domestic refuse and health care waste, which have to deal with huge amounts of plastics every day. Dioxins and furans can also be formed in smelting plants where scrap metals are recycled, and also in the innumerable crematoria in Thailand where cremations are

performed in accordance with the local culture.

The problem of dioxins and furans in Thailand was debated at a workshop supported by the GTZ in Bangkok in May 1999, and the line of action was discussed. Towards the end of 2000, the first measurements of emission concentrations were taken at representative industrial plants in line with international standards, because a basis of reliable data is essential when developing strategies to reduce dioxins and furans. This is the first time that the dioxin-furan problem has been systematically addressed in a developing country. At the international level the Pilot Project serves to support efforts to implement the POPs Convention.

## 7 International conventions on chemical safety

Active examination of the subject of chemical safety with a view to practical action was stimulated by the debates of the 80s and 90s surrounding the negotiation of international conventions on trade in and handling of hazardous substances. The negotiation of international conventions is endlessly laborious, but their significance for achieving a lasting improvement in the management of chemicals and for redirecting the process of industrialisation in the long term cannot be rated highly enough.

The conclusion of an international convention anchors in place a system of coordinates, which sets the direction in which the global community intends to move. This acts as a signal for the international public, and for politics, business, science and non-governmental organisations in the various industrial and developing countries. Decisions made by business on investment in technological innovations take account of the goals identified in these conventions, and politicians risk critical probing from NGOs and the public. Even if the tempo of implementation of the convention goals

differs from country to country, and resistance and setbacks are inevitable, the conclusion of a convention creates an incontrovertible fact, which has long-term consequences.

In every country, anyone who wants to continue working in the direction that has been laid down can cite the goals of the convention. In the case of the PIC Convention and the POPs Convention this is an important point, because the current inventory of chemicals coming within the scope of the convention is not yet complete. It can and should be expanded in the prescribed direction. For politicians, scientists and NGOs from developing countries the importance of the negotiation process itself should also not be underestimated. The conferences and workshops act as an information clearing house for everyone, including representatives of countries where environmental questions are not yet a major concern. The conferences offer opportunities to exchange experience, forge contacts and provide mutual support, opportunities, which are particularly important for countries where

environmental protection is still at an early stage of development.

## **Vienna Convention – Montreal Protocol**

In the 1980s, the Vienna Convention for the Protection of the Ozone Layer of 1985 and the Montreal Protocol on Substances that Deplete the Ozone Layer of 1987 had already raised awareness of international environmental and chemical problems. The aim of both of these agreements is to bring about the controlled phasing out of the production and use of substances that damage the ozone layer. The Montreal Protocol has been amended and broadened several times. In particular, the deadlines for phasing out certain substances have been brought forward, new substance groups have been included and developing countries have been more closely involved.

## **Basel Convention**

According to the Basel Convention of 1989 on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the export, import and transit of wastes is permissible only after all countries concerned have been notified in advance and their approval has been obtained. The consignment of wastes to non-signatory states is forbidden as a matter of principle, and only permissible in exceptional cases. The export of wastes to regions south of the 60th parallel, in other words to the Antarctic, is fundamentally prohibited. The exporter and, secondly, the country of origin of the waste are responsible for compliance with the Convention. There is an obligation to take back the waste in the event of abortive or illegal waste exports.

## **Chemical Weapons Convention**

The aims of the Chemical Weapons Convention of 1993 are the prohibition, strict and effective international control and disposal of all types of weapons of mass destruction, including the manufacture and storage of biological and chemical weapons. Each signatory state undertakes never to develop or use chemical weapons and also undertakes to destroy all chemical weapons on its territory.

## **Rotterdam Convention (PIC Convention)**

The Rotterdam Convention of 1998 governs the transboundary trade in certain hazardous toxic substances. PIC stands for Prior Informed Consent. The Convention deals with the regulated exchange of information about the characteristics of the chemicals - for example physical-chemical, toxicological and ecotoxicological properties and state-imposed regulations - and the respecting of decisions taken by importing countries, for example import bans. Annex III to the Convention lists the chemicals and chemical groups, which fall within the terms of the PIC Convention.

The Convention stipulates that every signatory state should name one or more national authorities, which assume responsibility for implementation of the Convention. The signatories are to cooperate in setting up the necessary infrastructure and capacities for chemical management. In so doing they must take into account *“the particular requirements of developing countries and countries with economies in transition”*.

## **Stockholm (POPs) - Convention**

Within the framework of the POPs Convention, the production and use of certain persistent organic pollutants (POPs) is prohibited, or their release is greatly restricted. The long-lived toxins referred to as POPs damage the immune system and the nervous system, are carcinogenic, cause deformities and developmental defects, and have a detrimental effect on fertility. They are extremely long-lived, are transported around the globe by air currents and in flows of water, and are distilled in the coldest parts of the world, in arctic regions and in high mountain areas.

The twelve toxins classified as POPs to date have been prohibited for several years in Germany and other industrialised countries. These are the pesticides aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, toxaphene and hexachlorobenzene, the transformer oil PCB, and the dioxins and furans formed unintentionally during incineration processes. The Convention lists a number of exceptions for developing and transition

countries. For example, until alternative methods of control are introduced, it is permitted to continue using DDT against the malaria carrier, the anopheles mosquito. A transitional arrangement allows that PCBs do not have to be replaced in existing installations such as transformers until 2025. The banning of 12 named POPs, known as the “dirty dozen”, passed largely without dispute in the earlier negotiations. A matter that was long unresolved, however, was the question as to what criteria should be used in future to classify substances as POPs and include them in the banned list. The European Union (EU) stood up for a strict precautionary principle, while the USA, Canada, Japan and Australia preferred softer regulations. The Convention that has now been agreed defines criteria, which are acceptable to all parties.

## 8 The principles of chemical safety in Agenda 21 of the environmental summit in Rio

The famous Chapter 19 of Agenda 21, which was adopted by the heads of state and government at the Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, sets out the principles for internationally effective chemical safety and sound management of chemicals. Chapter 19 lists objectives for the environmentally compatible handling of toxic chemicals, including measures to prevent illegal international trade in toxic and hazardous products. The programme of work for the international community as formulated in this Chapter includes the following:

- Expanding and accelerating international assessment of chemical risks;
- Harmonisation of classification and labelling of chemicals;
- Information exchange on toxic chemicals and chemical risks;

- Establishment of risk reduction programmes;
- Strengthening of national capabilities and capacities for management of chemicals;
- Prevention of illegal international traffic in toxic and dangerous products.

Chapter 19 of Agenda 21 also stresses how important it is to coordinate international and regional activities and to intensify international cooperation in the field of chemical safety. “Risk assessment is resource-intensive”, the text states. “It could be made cost-effective by strengthening international cooperation and better coordination, thereby making the best use of available resources and avoiding unnecessary duplication of effort”. However, each nation should have a “critical mass” of technical staff with experience in the analysis of toxic substances.

## 9 Instruments for improving chemical safety in developing countries

In Chapter 19 of Agenda 21, governments are called upon to join with international organisations in promoting technologies which prevent as much as possible the generation of toxic chemicals and endangering of humans and the environment. At the same time the states are called upon to conduct national surveys on the inventories of pesticides which may have been approved for import in the past on false assumptions, or which have passed their expiry date. Above all when dangerous pesticides are replaced by other, less toxic or

more environmentally friendly methods of pest control, the old hazardous wastes must not be forgotten.

Many countries have institutions that are responsible for chemical risks. In many cases, however, these have not yet reached the stage where they operate efficiently. They are unable to assess problematical chemicals, and nor are they capable of controlling the routes by which the chemicals are transported and forms in which they are processed. The institutions suffer from a

shortage of scientific and technical facilities for assessing the risks from toxic chemicals

and likewise a lack of means to control the misuse of toxic substances.

**Agenda 21 names the following basic elements for sound management of chemicals:**

Information gathering and dissemination

Adequate legislation

Capacities for risk assessment

Risk management

Capacity for the implementation and enforcement of a chemicals policy

Capacity for rehabilitation of poisoned persons and contaminated soils

Effective education programmes

## 10 Capacity building in the field of chemical management

The best laws and international agreements on chemical safety are of little use if there are no institutions and experts in the developing countries to implement them. This is why UNITAR, the UN Institute for Training and Research, launched a training programme on the application of international and national environmental law in 1997. Its aim is to build capacity in developing countries at all levels of society. The training programmes are directed at employees of ministries and subsidiary authorities, scientists and students concerned with environmental law and chemical safety, representatives of business, industry and the media, and non-governmental organisations (NGOs).

In conjunction with the IOMC, UNEP and the Secretariat of the Intergovernmental Forum on Chemical Safety (IFCS), UNITAR has published a guide to drawing up National Profiles on chemical safety, which are intended to enable an assessment to be made of the current state of the national structures of chemical management. As well as this, UNITAR has organised a series of workshops on those areas of chemical management which have proved to be particularly important in the context of the National Profiles and the experience of the Intergovernmental Forum on Chemical

Safety. The topics covered have included the following:

- Improvement of national information systems and the exchange of information on sound management of chemicals (Sept. 1998);
- Education and awareness-raising on the subject of chemical safety (Oct. 1998);
- National legislation and chemicals policy (June 1999);
- Strengthening of national capacities in order to improve decision-making and to reduce risks in dealing with certain important chemicals (Oct. 1999).
- The UN organisations (*see Appendix*) set out the international framework for the sound management of chemicals and for other major environmental topics. At the same time they perform valuable preparatory work for organising those involved at the national level. Actual implementation of the objectives is the responsibility of the individual countries. This is where bilateral assistance is called for, and where the tasks of development cooperation in the field of chemical safety will be found in the future.

## APPENDIX

## Appendix I

### International organisations for chemical safety and the management of chemicals

#### UNEP Chemicals

A central role in the organisation of international activities for promoting chemical safety is played by UNEP Chemicals, the chemicals department of the United Nations Environment Programme (UNEP). UNEP Chemicals, which is based in Geneva, Switzerland, coordinates all activities in the UN system and at the international level aimed at implementing environmentally friendly and sound management of dangerous chemicals.

The work carried out by UNEP Chemicals includes support for individual countries in building technical capacities and institutions to implement sound management of chemicals. This covers scientific institutes, databases, authorities and experts in the field of supervision of the production, trading and handling of chemicals, training and upgrading of national human resources in developing countries, the provision of advice on legislation, the exchange of information on matters of chemical safety, organising conferences and workshops for the exchange of experience, and preparation and negotiation of international conventions such

as the PIC Convention and the POPs Convention.

UNEP Chemicals has produced an entire series of publications on specialist topics - usually in collaboration with the IOMC (Inter-Organisation Programme for the Sound Management of Chemicals) and other international organisations. In March 2000, for example, it published extensive documentation with country studies on persistent organic pollutants (POPs), guidelines on the identification of polychlorinated biphenyls (PCBs) and materials containing PCBs (Aug. 1999) and an inventory of global capacities for the disposal of PCBs (in particular high-temperature incineration).

In March 2001 UNEP published a handbook on how to draw up inventories of dioxin sources (Dioxin Inventories Toolkits).

*Information about ongoing activities is provided in:*

*UNEP Chemicals Newsletter, and on the home page: [www.CHEM.UNEP.CH](http://www.CHEM.UNEP.CH)*

#### IOMC - Inter-Organisation Programme for the Sound Management of Chemicals

The Inter-Organisation Programme for the Sound Management of Chemicals (IOMC) was set up in 1995, and today encompasses the following organisations:

- UNEP (United Nations Environment Programme)
- ILO (International Labour Organisation)
- FAO (Food and Agriculture Organisation of the United Nations)
- WHO (World Health Organisation)
- UNIDO (United Nations Industrial Development Organisation)

- OECD (Organisation for Economic Cooperation and Development)
- UNITAR (United Nations Institute for Training and Research)

The founding of the IOMC has its origins in a recommendation by the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992. The objective is to strengthen international cooperation in the field of chemical safety and improve the coordination of activities at the international, intergovernmental and national level.

## **IPCS - International Programme on Chemical Safety**

The International Programme on Chemical Safety (IPCS) was launched in 1980 as a joint programme between the World Health Organisation (WHO), the International Labour Organisation (ILO) and the UN Environment Programme (UNEP). Its establishment can be traced back to the 1972 United Nations Environmental Conference in Stockholm, where the environmental and health risks from chemicals attracted widespread international attention. At the time the WHO had been given the task of organising programmes to contain the dangers emanating from chemicals.

In 1977 the World Health Assembly decided that long-term strategies were necessary in order to implement chemical safety. This resulted in the launch of the IPCS, which has its headquarters at the WHO in Geneva. The tasks of the IPCS include drawing up extensive documentation on environmental and health risks from chemicals and providing information on dangers with practical instructions for doctors and authorities.

*(IPCS International Programme on Chemical Safety, World Health Organisation, CH-1211 Geneva, Switzerland  
e-mail:ipcsmail@who.ch*

## **IFCS - Intergovernmental Forum on Chemical Safety**

The Intergovernmental Forum on Chemical Safety (IFCS) was set up in 1994 at the International Conference on Chemical Safety in Stockholm. The purpose of the Forum is to bring together governmental and non-governmental organisations in implementing the chemical-policy goals of the Environment

Summit at Rio de Janeiro (UNCED) in 1992 (Chapter 19 of Agenda 21).

*IFCS (Intergovernmental Forum on Chemical Safety, web site:  
<http://www.who.ch/whosis/ifcs/ifcshome.htm>)*

### **The Chemical Safety Conference of 1994**

- founding of the Intergovernmental Forum on Chemical Safety (IFCS)

**With the aim of controlling and harmonising the implementation of Chapter 19 of Agenda 21 around the world, the United Nations Environment Programme (UNEP), the International Labour Organisation (ILO) and the World Health Organisation (WHO) organised a Chemical Safety Conference in Stockholm in April 1994. The 130 participating states at the conference founded the Intergovernmental Forum on Chemical Safety (IFCS), which draws up recommendations for governments and for international and intergovernmental organisations.**

**As an important instrument for improving global cooperation in the field of chemical safety, the IFCS recommends to individual states that they conduct an assessment of the current condition of their national structures of chemical management and draw up a *National Profile*. The purpose of these National Profiles is to provide information about the various spheres of responsibility and procedures applicable to chemical substances and to comment on the effectiveness of individual rulings. It was also borne in mind that the National Profiles of the industrialised countries can serve as models for developing countries and transition countries. The United Nations Institute for Training and Research (UNITAR) together with the IFCS Secretariat has published a set of guidelines to assist in compiling National Profiles by specifying structures and providing advice on approaches to the work. This is intended to ensure that the National Profiles will be internationally comparable.**

**(The German report was published in 2000. (U. Stirba, U. Kowalski, U. Schlottmann, "National Profile - Chemikalienmanagement in Deutschland", Schriftenreihe der Bundesanstalt für Arbeitsschutz and Arbeitsmedizin, Sonderschrift - p. 59).**

## Appendix II.

### POPs - Persistent Organic Pollutants

The Arctic is said to be one of the last regions of the Earth still untouched by human hand. Its ice landscapes, thousands of kilometres away from the major industrial centres, give the impression of purity and unspoiled nature. This is why scientists were shocked by a chance discovery. In the breast milk of Inuit women they found concentrations of pollutants considerably above those in Europe or North America. Among Eskimos in the North of Canada they found as high a level of polychlorinated biphenyls (PCBs) as is otherwise only found in victims of serious chemical accidents.

The animal world is also affected. Polar bears in Greenland give birth to deformed young. It is a sad irony that precisely when they were looking for individuals with little exposure to pollutants in remote Inuit villages to act as controls, scientists should come across people with the highest levels of pollutants: the inhabitants of Broughton Island, near Baffin Island. It was above all the reports of their exposure that caused a social disaster for these people. Other Inuit communities avoided the "PCB people", and stopped trading with them and even marrying them.

Long-lived toxins known as persistent organic pollutants, or POPs for short, are the reason

for the "poison alarm" in the Arctic. POPs are very slow-degradable organic pollutants, which accumulate in the food chain. Humans and animals at the end of the food chain are most seriously affected. Once they have been taken up by the body, they stubbornly resist the body's own degradation mechanisms and are also passed on to offspring. The potential harm caused to health may take various forms, but is not yet adequately researched.

In the case of animals these persistent pollutants seem above all to cause impairment to reproductive capability and damage to the immune system and nervous system. Investigations suggest that also in the case of humans there is a connection between exposure to POPs and many symptoms of diseases. These include hormone-dependent tumours, deformities of the male reproductive organs, deficiencies of the immune system, neurological disorders, defective concentration and reduced intellectual capacity. Foetuses and children are at particular risk from persistent pollutants, because POPs, which interfere with the hormone, immune and nervous systems are particularly liable to cause serious damage during the developmental phase.

### **Agent Orange - the legacy of the Vietnam War**

**The Vietnam War ended more than a quarter of a century ago. The children of the war veterans, however, and their children after them, are still suffering from the lingering consequences of the war. Between 1961 and 1971, more than 70 million litres of plant poison were sprayed across the country. The highly toxic, dioxin-containing Agent Orange was supposed to defoliate the forests and in that way rob the Vietcong of the camouflage for their supply routes. During these ten years of war, the largest human experiment in the history of chemistry took place in Vietnam. The consequences are devastating. Hundreds of thousands of children were born with terrible deformities or were stillborn. No one knows the number of cripples and seriously disabled. The US Government initially maintained that dioxin was no more dangerous than aspirin. Around 5,000 scientists, including 17 Nobel Prize winners, appealed in vain to the US Government in 1967 to stop the use of toxic substances in the war. An expedition to the war regions to study the consequences of the defoliation action was not sent until 1970. Its results brought about the end of the American use of chemical substances in Vietnam.**

## Global distillation

Persistent toxic substances are globetrotters. A PCB molecule that was produced in Leverkusen in the 1950s may today be found at any point on Earth: in penguins in the Antarctic, in a baby's chubby arms or in a man's sperm. After months or years of migrating through the air or the oceans, POPs tend largely to settle out in the cold regions of the Earth. The phenomenon known as global distillation, discovered only a few years ago, has the effect that they are transported to and concentrated in the Arctic zones and high mountain areas. The fateful fact is that global distillation transports persistent toxins to precisely those parts of the earth where it is most difficult for them to be degraded. The range of persistent toxins is highly varied, originating as they do from numerous sources and areas of use. The following types of substances are distinguished:

- Persistent pollutants, which are manufactured intentionally and used as chemicals or in end products, such as brominated flame-retardants, PVC plasticisers, pesticides, or musk fragrances in detergents and perfumes. They are released over long periods of time from the end products.
- Persistent pollutants, which occur as emissions, for example in wastewater, solid waste or exhaust gas.
- Persistent pollutants, which are formed as by-products - usually unwanted - during the production of chemicals (such as HCB - hexachlorobenzene) or in incineration processes (e.g. dioxins).

The main sources of POPs in Western Europe are now no longer the smoke stacks or effluent pipes of industry, but instead diffuse emissions, additives in plastics, paints and leather, biocides and pesticides.

### **Dirty Dozen**

**Aldrin**

**Chlordane**

**DDT**

**Dieldrin**

**Dioxins**

**Furans**

**Endrin**

**Heptachlor**

**Hexachlorobenzene**

**Mirex**

**PCB**

**Toxaphene**

**insecticide (termites, ants)**

**insecticide (termites, soil pests)**

**insecticide (anopheles mosquitoes, tsetse flies)**

**insecticide (termites, locusts)**

**by-products of chemical processes and incineration**

**by-products of chemical processes and incineration**

**insecticide, rodenticide**

**insecticide (termites, ants)**

**Fungicide, plasticiser for plastics**

**insecticide (ants)**

**cooling and insulating liquid**

**insecticide, rodenticide**

## Appendix III

### A new generation of persistent toxins

Most of the familiar names among the POPs, such as the Seveso poison dioxin, the PCBs used as transformer coolants, the wood preservative pentachlorophenol (PCP), DDT and other insecticides are now heavily restricted in terms of their production and use, or even entirely prohibited. There are new generations of dangerous chemicals, however, which are an increasing cause of concern to environmental experts and which in their opinion should be included in the POPs Convention as quickly as possible. Some of these are described below.

#### Chlorinated paraffins

Oily to wax-like substances, of which approximately 200 different types are used in industry, as plasticisers for PVC and coatings, in paints, and as lubricants for metalworking. In terms of their chemical structure, chlorinated paraffins are carbon chains with a chain length of between 10 and 30 carbon atoms, which are chlorinated to differing degrees. Short-chain chlorinated paraffins (with 10 to 13 carbon atoms) are acutely highly toxic to aquatic organisms. Reduced reproductive capability and an increased tendency toward miscarriages and tumours as a result of chlorinated paraffins have been observed in rats and rabbits.

#### Lindane

An insecticide from the family of hexachlorocyclohexanes (HCHs), Lindane is used for treating seeds, is (or was) a constituent of wood preservatives and in developing countries is used for the control of stored-products pests, harmful beetles, bugs and parasites of animals. Lindane accumulates in fatty tissue, has negative effects on reproduction, the liver and the immune system, and is considered to be a cancer promoter. Symptoms of acute poisoning are nausea, convulsive fits and respiratory paralysis. (Lindane is no longer approved for use as a pesticide in Germany).

#### Phthalates

These are esters of phthalic acid, which are predominantly used as plasticisers in plastics - above all in polyvinyl chloride (PVC) - but also in paints and varnishes. Phthalates are classified by the International Agency for Research on Cancer (IARC) as potentially carcinogenic toxins. There is still little known about how they work, but in animal experiments an impairment of fertility and damage to embryos have been observed.

#### Polybrominated flame retardants

These are mostly admixed to plastics. Important brominated flame-retardants include tetrabromobiphenol A (TBBA), polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs). TBBA is today the most commonly used substance in the IT industry, while PBDEs are used in textiles. Although there is a voluntary commitment by the German plastics-producing industry no longer to use certain brominated flame-retardants in plastics, this does not apply to all brominated flame-retardants and has no effect on imported products.

The flame-retardants are in some cases contained loosely in the material and are washed out, and they gas out of televisions, printers and monitors during normal operation. As an indication of their great stability, they have been detected even in sperm whales in the open Atlantic. The concentration of brominated flame-retardants in breast milk is currently doubling every five years. They affect the thyroid gland and sexual hormones, and are subject to virtually no restrictions in Germany.

#### Tributyltin (TBT)

This biocide in marine paints is intended to prevent algae, mussels and acorn barnacles from colonising the ship's hull. These and similar organic tin compounds are also used as stabilisers in PVC products, in disinfectants, fungicides, wood preservatives and impregnating agents. TBT has androgenic potential and in many areas of ocean has resulted in the extinction of the common whelk

## Appendix IV

### Trade in toxic waste

#### Africa's leading role in stemming the spread of waste colonialism

##### Environmental awareness and waste colonialism

A new line of business emerged on the world market in the early 1980s: the international waste trade. The broad social debate on environmental matters had forced the introduction of tighter regulations on the treatment and disposal of wastes in industrialised countries. More and more types of waste were recognised as being toxic and dangerous, and were classified as "hazardous waste". In the USA, for example, the cost of disposing of hazardous wastes rose more than five-fold in the 1980s. At the same time, NIMBY (Not In My Back Yard) groups, civic action groups and environmental associations blocked landfill sites from being opened and incineration and recycling plants from being built.

This new environmental awareness in the rich countries led paradoxically to a form of "waste colonialism". As early as 1988, 68

non-OECD countries had received offers relating to toxic waste from industrialised countries, and in some cases had accepted them. In the same year, Greenpeace documented 150 waste export projects from industrialised countries to countries of the Third World and the Eastern bloc. In public in the West, the waste brokers and waste exporters argued that they wanted to store substances that are a danger to groundwater in "isolated desert areas" in remote regions of the world, where they could cause no harm. In reality these were mostly tropical and subtropical areas, often densely populated coastal zones, such as Puerto Cabello in Venezuela, Koko in Nigeria and Tahiti in the Pacific. Toxic waste was used in the recipient countries as fertiliser, building material, road surfacing mix and filling material for reclaiming land from the sea, or simply dumped for money.

##### Basel Convention on the Control of the Movement of Wastes

From 1987 onwards the UN Environment Programme (UNEP) took this matter upon itself and organised international negotiations on the problem. These ultimately led to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, which was concluded by 115 states in March 1990. The Basel Convention essentially applied the existing guidelines in industrialised countries (OECD and EC) to the global trade in waste,

and required written notification of and approval from a recipient country when the exporting of waste is planned. The Basel Convention includes an obligation to register with the Secretariat of the Convention in Lausanne and a take-back obligation for illegal or abortive exports - as the responsibility of the state, if necessary.

##### Bamako Convention of the Organisation of African Unity (OAU)

At that time it was not possible to push through the general ban on toxic waste exports from industrialised countries to developing countries, called for above all by African nations, or the demand that exported waste must be treated at the same technical level in the recipient country as it would be in the country of origin. Thereupon the

Organisation of African Unity (OAU) drew up a convention of its own, known as the Bamako Convention, which was agreed in 1991 and came into force in April 1998. It prohibits all imports of hazardous, toxic or radioactive waste to member states of the OAU.

## **Banning of imports of toxic waste in the Lomé IV Convention**

This initiative by the African states was also included in the Lomé IV Convention by the European Union with its partner countries in Africa, the Caribbean and the Pacific (ACP). The Lomé IV Convention of 1990 places a ban on all imports of toxic waste by the ACP

states. As a result, for the first time the European Union - after repeated attempts made in the European Parliament - had committed itself to banning exports to about half of all developing countries.

## Appendix V

### Obsolete pesticide stockpiles in Africa

Africa has played a pioneering role among developing countries in enforcing a general ban on imports of toxic waste. At the same time, many African countries still have immense problems with existing chemical pollutants. The substances concerned include toxic waste that entered the country before the ban or by unknown routes, but above all obsolete pesticides, in other words

pesticides that have passed their expiry date or whose use is now prohibited.

In December 2000, Greenpeace published an inventory under the following title:

*“POPs in Africa, Hazardous Waste Trade 1980-2000 - Obsolete Pesticide Stockpiles”*

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### Obsolete pesticide stockpiles in Africa

*The inventory is based on data from the UN Food and Agriculture Organisation (FAO) and on research by Greenpeace. No data is available for some countries.*

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|                          |   |
|--------------------------|---|
| Algeria                  | 20 tonnes of obsolete dieldrin  |
| Benin                    | 409 tonnes of obsolete pesticides in 9 locations  |
| Botswana                 | 426 tonnes of obsolete pesticides   |
| Burkina Faso             | 54 tonnes of obsolete pesticides in 11 locations  |
| Burundi                  | 57 tonnes of obsolete pesticides<br>(according to FAO estimations, the tiny country of Burundi imported some 14,000 tonnes of pesticides between 1985 and 1997. This is equivalent to 70% of the total stocks of obsolete pesticides in Africa.)  |
| Cameroon                 | 225 tonnes of obsolete pesticides in 7 locations (DDT, dieldrin, lindane). It is reported that old stocks had been cleared from pesticide storage locations in order to make space for new deliveries. In the course of a general wave of privatisation, formerly government-owned stocks were distributed to unknown recipients. The market is now supplied with obsolete pesticides from these private depots. The administrator of the pesticide depot in Kumba complained that at the end of 1998 all of the pesticide supplies for an agricultural project scheduled to run for seven years had been delivered at once at the port of Douala. At great expense, the pesticides had to be taken to Kumba, where, however, there were no appropriate storage facilities for the pesticides. Some of the supplied pesticides were entirely unknown to the farmers, while others were ones for which they saw no need. (Since 1990, illegal trade in waste has even been punishable by the death penalty in Cameroon.) |
| Cape Verde               | 23 tonnes of obsolete pesticides  |
| Central African Republic | 238 tonnes of obsolete pesticides in three locations (DDT, methyl parathion)  |
| Congo (Zaire)            | 591 tonnes of obsolete pesticides in 5 locations  |
| Côte d'Ivoire            | 828 tonnes of obsolete pesticides (of these, 821 tonnes were removed by Shell in 1997/98)   |
| Egypt                    | Import and export of toxic waste banned   |

|                            |   |
|----------------------------|---|
| Equatorial Guinea          | 146 tonnes of obsolete pesticides   |
| Eritrea                    | 223 tonnes of obsolete pesticides in 41 locations (DDT, dieldrin, lindane)  |
| Ethiopia                   | 1,924 tonnes of obsolete pesticides in 38 locations (DDT, dieldrin, lindane)  |
| Gambia                     | 35 tonnes of obsolete pesticides in 11 locations  |
| Ghana                      | 84 tonnes of obsolete pesticides in 15 locations  |
| Guinea                     | 4 tonnes of obsolete pesticides   |
| Guinea Bissau              | 16 tonnes of obsolete pesticides in 5 locations   |
| Kenya                      | 94 tonnes of obsolete pesticides in 38 locations  |
| Liberia                    | In Liberia the importing of toxic waste is punishable by 10 - 25 years' imprisonment, and ships or aircraft used for importing waste will be confiscated. Pesticide stocks are not known.   |
| Madagascar                 | 76 tonnes of obsolete pesticides at 5 locations (70 tonnes of dieldrin were removed in 1993 with the assistance of the GTZ and support from Shell).   |
| Malawi                     | 213 tonnes of obsolete pesticides in 18 locations   |
| Mali                       | 238 tonnes of obsolete pesticides in 15 locations   |
| Mauritania                 | 257 tonnes of obsolete pesticides in 11 locations. Of these, 200 tonnes of dieldrin were removed by the GTZ with support from Shell Netherlands and incinerated in Rotterdam.   |
| Morocco and Western Sahara | 2,265 tonnes of obsolete pesticides in an unknown number of locations (endrin, DDT, dieldrin, heptachlor, parathion).   |
| Mozambique                 | 443 tonnes of obsolete pesticides at 40 locations (aldrin, DDT, EDB, endrin, parathion)   |
| Namibia                    | 245 tonnes of obsolete pesticides (202 tonnes were taken to South Africa and incinerated in the United Kingdom).  |
| Niger                      | 52 tonnes of obsolete pesticides in 14 locations  |
| Nigeria                    | Pesticide stocks are not known. Nigeria was at the head of the international "Dumpwatch" movement, a network of government bodies, environmental groups, shipping agencies etc. set up to monitor and combat trade in toxic waste. Previously Nigeria had at times been the most important destination for exports of radioactive wastes, in particular. (In 1988 Nigeria introduced the death penalty for everyone - including foreigners - who imports toxic waste into Nigeria). |
| Sao Tomé e Príncipe        | 7 tonnes of obsolete pesticides   |
| Senegal                    | 495 tonnes of obsolete pesticides at 7 locations (dieldrin, lindane, parathion)   |
| Seychelles                 | 20 tonnes of obsolete pesticides  |
| Sierra Leone               | 12 tonnes of obsolete pesticides at 5 locations   |
| South Africa               | 491 tonnes of obsolete pesticides at 9 locations, including aldrin, DDT and dieldrin. In 1998 the South African Government and the agricultural association AVCASA collected 1,040 tonnes of obsolete pesticides in South Africa itself and in Swaziland and Namibia. 740 tonnes were incinerated in the United Kingdom. Of these, 280 tonnes were persistent organic pollutants (POPs).  |

In September 2000 South Africa permitted the import of 60 tonnes of toxic waste contaminated with lead and arsenic from Australia. By way of explanation the government declared that it had not yet ratified an amendment to the Basel Convention, which would prohibit this. As a deliberate breach of the Basel Convention, the case provoked fierce protests from South African environmentalists.

|           |  |
|-----------|--|
| Sudan     | 1,097 tonnes of obsolete pesticides at 30 locations (DDT, lindane, parathion, toxaphene)   |
| Swaziland | 9 tonnes of obsolete pesticides  |
| Tanzania  | 57 tonnes of dinitromethylphenol were removed in 1996 with the support of the GTZ. 971 tonnes of obsolete pesticides were removed in 1995 with Dutch support. In 1998 some 1,000 tonnes were identified in about 300 warehouses; most of these stocks will have to be incinerated.   |
| Togo      | 143 tonnes of obsolete pesticides in at least 11 locations (dieldrin, heptachlor, lindane, parathion)  |
| Tunisia   | 882 tonnes of obsolete pesticides in at least 20 locations   |
| Uganda    | 214 tonnes of obsolete pesticides. 50 tonnes of dieldrin were removed in 1993 with the aid of the FAO, and in the spring of 2000 Novartis took back 40 tonnes of cotton herbicides originating from Switzerland for incineration. The herbicides had been purchased by the Ugandan Government in the 80s but had not been used because of the war. |
| Zambia    | 602 tonnes of obsolete pesticides at 7 locations   |

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## Appendix VI

### Pesticide poisoning in Benin in 1999

Cotton pesticides continue to cause serious harm. The dangers to humans and the environment are particularly great where pesticides are used in conditions of poverty and without expert knowledge. This is illustrated by an example of poisonings in Benin, about which the Pesticide Action Network (PAN) has reported<sup>\*)</sup>. Between May and September 1999 in the province of Borgou in Benin, 73 people were poisoned by endosulfan, and 37 of them died of the consequences. Growers of cotton, fruit, coffee, oil-seed, tea and vegetables use endosulfan as a broad-spectrum insecticide against insects and mites. It is classified by the World Health Organisation (WHO) as moderately hazardous. The symptoms of endosulfan poisoning include headaches, dizziness, disorientation, abdominal pains and fainting.

The use of endosulfan in Benin had been recommended by the Cotton Research Institute RCF (Recherche Coton et Fibres) because of the increasing resistance of the cotton bollworm to the pyrethroid used previously. This was why, in early 1999, the state agricultural promotion society SONAPRA (Société Nationale pour le Promotion Agricole) had distributed Callisulfan 350 EC TBV (endosulfan 350 g/l) from the French company Calliope in the province of Borgou. Following the reports of the deadly pesticide poisoning, the authorities defended their decision by stating that experience with endosulfan in Australia and the USA had been good. "However, cotton growing conditions and socio-economic conditions differ enormously between Australia and West Africa", the PAN report states. "In Australia cotton is produced on large, highly mechanised farms of several thousand hectares with precisely demarcated fields. No cattle roam around the fields and crop residues are not fed to animals. Pesticide containers are not reused in homes. Virtually no farmer would use leftover cotton pesticides on food crops. The situation

in Benin and elsewhere in West Africa is entirely different".

It is common practice in Benin to grow food crops in and around the cotton fields, to spray stored foods and to reuse empty pesticide containers. Farmers do not have proper protective clothing, and apply the pesticides bare-foot or in sandals. During spraying it is quite possible that there will be men, women and children on the field, as well as hens, sheep or ducks. The level of protein available to farmers in their diet is low, and pesticides are sprayed by undernourished people. This increases their susceptibility to poisoning. Cotton pesticides are also used for the protection of food stocks - among other things because they are the only pesticides available in the rural areas of northern Benin. A credit system provides the basis for distributing cotton pesticides over the entire region. "For the most part, users are poorly informed about pesticides. All of these facts are well known in West Africa and should have been taken into account before endosulfan was used", the report concludes.

It should also be added that cotton is one of the few cash crops in Benin that earns foreign exchange. The business of cotton is in the hands of rich traders and landowners in the north, who have no interest in the school education or professional training of their smallholders, let alone the education of women. In Benin as a whole, therefore, 70% of women are unable to read or write, and in the remote cotton-growing regions in the north the figure is likely to be over 90%. Women are supposed to carry water and pick cotton. Education could give them the wrong ideas. For this reason alone, public awareness-raising campaigns together with active and assertive addressing of the problems of chemical safety in as many areas of development cooperation as possible would make a significant contribution to poverty alleviation in Benin.

| <b>Reasons for poisoning with endosulfan in the province of Borgou (Benin) during the cotton season 1999/2000*</b> |                   |               |
|--|-------------------|---------------|
| <b>Reasons</b>   | <b>Poisonings</b> | <b>Deaths</b> |
| <b>Suicide</b>   | <b>4</b>          | <b>4</b>      |
| <b>Transport of pesticides together with food</b>  | <b>14</b>         | <b>6</b>      |
| <b>Inhalation during application</b>   | <b>1</b>          | <b>1</b>      |
| <b>Reuse of pesticide containers</b>   | <b>5</b>          | <b>3</b>      |
| <b>Food plants from intercropping with cotton</b>  | <b>21</b>         | <b>5</b>      |
| <b>Sprayed vegetables</b>  | <b>18</b>         | <b>14</b>     |
| <b>Spraying food stocks</b>  | <b>10</b>         | <b>4</b>      |
| <b>Total</b>   | <b>73</b>         | <b>37</b>     |
| * Pesticide Action Network (PAN Germany), Pestizid-Brief May/June 2000, pp. 3ff                                    |                   |               |

## Abbreviations

|              |   |
|--------------|---|
| ACP          | African, Caribbean and Pacific (partner) states (of the EU)   |
| BAuA         | Federal Institute for Employment Protection and Industrial Medicine   |
| BMA          | Federal Ministry of Labour and Social Affairs   |
| BMU          | Federal Ministry for the Environment, Nature Conservation and Nuclear Safety  |
| BMZ          | Federal Ministry for Economic Cooperation and Development   |
| CEE          | Central and Eastern Europe  |
| CFCs         | chlorofluorocarbons   |
| EC           | European Community  |
| EU           | European Union  |
| FAO          | Food and Agriculture Organisation of the United Nations   |
| GEF          | Global Environment Facility   |
| GTZ          | Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH  |
| HCB          | hexachlorobenzene   |
| HCHs         | hexachlorocyclohexanes  |
| IARC         | International Agency for Research on Cancer   |
| IFCS         | Intergovernmental Forum on Chemical Safety  |
| ILO          | International Labour Organisation   |
| IOMC         | Inter-Organisation Programme for the Sound Management of Chemicals  |
| IPCS         | International Programme on Chemical Safety  |
| NIMBY groups | “Not In My Back Yard” groups  |
| NGO          | Non-governmental organisation   |
| NIS          | Newly Independent States (successor states to the Soviet Union)   |
| OAU          | Organisation of African Unity   |
| OECD         | Organisation for Economic Cooperation and Development   |
| PAN          | Pesticide Action Network  |
| PBBs         | polybrominated biphenyls  |
| PBDEs        | polybrominated diphenyl ethers  |
| PCBs         | polychlorinated biphenyls   |
| PCP          | pentachlorophenol   |
| PIC          | prior informed consent - exchange of information on and compliance with import decisions in trade with toxic substances |
| POPs         | persistent organic pollutants   |
| PVC          | polyvinyl chloride  |
| RCF          | Recherche Coton et Fibres (cotton research institute in Benin)  |
| SONAPRA      | Société Nationale pour le Promotion Agricole  |
| SPD          | Sozialdemokratische Partei Deutschlands (Social Democratic Party of Germany)  |
| TBBA         | tetrabromobiphenol A  |
| TBT          | tributyltin   |
| UN           | United Nations  |
| UNCED        | United Nations Conference on Environment and Development  |
| UNEP         | United Nations Environmental Programme  |
| UNITAR       | United Nations Institute for Training and Research  |
| UNIDO        | United Nations Industrial Development Organisation  |
| WHO          | World Health Organisation   |