



Energy & Environment Practice  
**Gender Mainstreaming** *Guidance Series*  
Chemicals Management

# Chemicals and gender

**UNDP** ENVIRONMENT & ENERGY GROUP



- 2 Why is the sound management of chemicals important to economic and social development
- 3 Why is gender relevant to policymaking and programming in the area of sound management of chemicals
- 5 Factors justifying a gender-differentiated approach in sound chemicals management
- 5 Factors Influencing Human Exposure to Toxic Chemicals
- 7 Policy recommendations
- 7 How can UNDP strengthen the gender dimensions of its work in the area of chemicals management
- 15 Mainstreaming gender considerations to develop or strengthen a sound management of chemicals (SMC) regime

Scenarios:

- 4 Cadmium scenario
- 11 Maternal health scenario
- 12 Male worker scenario
- 13 Nickel scenario

Boxes:

- 3 What is gender mainstreaming?
- 6 Persistent Organic Pollutants (POPs)
- 6 Heavy metals
- 8 Endocrine Disrupting Chemicals (EDCs)
- 9 Maternal health and breast milk contamination
- 20 Table 1: Examples of Potentially Hazardous Chemicals, their Use and Potential Adverse Health Effects



Energy & Environment Practice  
**Gender Mainstreaming** *Guidance Series*  
Chemicals Management

# Chemicals and gender

“

Wherever we look - and especially if we look through the lens of poverty - we see that women still bear the greatest burdens.

”

*United Nations Secretary-General Ban Ki-moon*

# WHY is the sound management of chemicals important TO economic and social development?



Chemicals bring a number of benefits to modern societies. Chemicals are used in life-saving medicines, purification agents for treating drinking water supplies, and agricultural chemicals (e.g. pesticides and fertilisers) that boost on-farm productivity, among other uses. However, despite these important economic, social, and health benefits, chemicals can be extremely harmful if they are not properly managed. Effects on human health and the environment can be immediate and catastrophic, as in the case of oil spills, large accidental releases of industrial chemicals, and acute pesticide poisonings. In the longer term, extended exposure to toxic chemicals in water, food, air, and soil, as well as to chemical products, can cause or exacerbate many serious human health issues, including damage to reproductive and neurological systems, as well as cancer.

There is an established link between poverty and the increased risk of exposure to toxic and hazardous chemicals. Exposure of poor people to toxic chemicals is often strongly correlated to geography. In urban settings, low-income or minority populations typically reside in neighborhoods considered undesirable, such as areas adjacent to industrial zones. These places can be major sources of environmental exposure to toxic chemicals, originating from factories, landfill sites, incinerators, and/or hazardous waste dumps.

In rural areas, where three-quarters of the world's poor live, most chemical exposure is linked to pollution brought by polluted water sources as well as the use of pesticides in agriculture. The improper use, management, and storage of pesticides and chemical fertilisers can result in contamination of air, food, soil, and drinking water (e.g., through pesticide and nitrate run-off), leading to increased human exposure and associated health risks.

A strong chemicals management regime in place will contribute towards the achievement of the Millennium Development Goals (MDGs). The sound management of chemicals ties to the MDGs in a number of ways. While most linkages between the sound management of chemicals and the MDGs have focused on MDG 7 (Environmental Sustainability), SMC contributes to the achievement of all the MDGs, particularly to MDG 3 (Gender Equality) and MDG 5 (Maternal Health).

# WHY is gender relevant to policymaking and programming in the area of sound management of chemicals?

While policymakers are beginning to understand the important role played by the sound management of chemicals (SMC<sup>1</sup>) in economic and social development, it is also important to recognize the significant linkages between gender and chemicals.

Levels of exposure to toxic chemicals—as well as the resulting impacts on human health—are determined by social as well as biological factors. Determined by social roles, women, men, and children are exposed differently to toxic chemicals in daily life. The differences include the kinds of chemicals encountered as well as the level and frequency of such exposures. In addition men, women, and children vary in their physiological susceptibility to the effects of exposure to toxic chemicals.

For instance, in agricultural communities in developing countries, men may be at higher risk of direct exposure to chemical pesticides during application, while women (and sometimes children) may be more likely to be indirectly exposed during planting and harvesting. At the same time, biological factors—notably size, physiological, hormonal, and enzyme differences between women and men, and between adults and children—also influence susceptibility to health damage from exposure to toxic chemicals. Many examples also show that there are certain especially sensitive periods to specific chemicals during fetal and child development.

## What is gender mainstreaming?

‘Gender’ refers to the socially constructed rather than biologically determined roles of women and men as well as the relationships between them in a given society at a specific time and place. These roles and relationships are not fixed, but can and do change.

‘Gender mainstreaming’ has been defined by the United Nations Economic and Social Council as ‘a strategy for making women’s as well as men’s concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of the policies and programmes in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetuated’. The relative status of women and men, the interaction between gender and race, class and ethnicity, and questions of rights, control, ownership, power, and voice—all have a critical impact on the success and sustainability of every development intervention.

In practice, gender mainstreaming means identifying gaps in gender equality through the use of sex-disaggregated data; developing strategies to close those gaps; putting resources and expertise into implementing strategies for gender equality; monitoring implementation; and holding individuals and institutions accountable for results. Gender mainstreaming is not an end in itself; it is a process whose ultimate goal is to achieve gender equality (Millennium Development Goal 3).

Expanded freedoms for all—women and men, girls and boys—is UNDP’s goal, both because it is necessary for development effectiveness and because equality is a core value of the UN Charter, a value all UNDP staff have pledged to protect as representatives of the UN system.

<sup>1</sup> Sound management of chemicals (SMC) is the application of best management practices throughout the life cycle of chemicals to minimise, and where feasible eliminate, the potential for exposure of people and the environment to toxic and hazardous chemicals, as well as those chemicals suspected of human and/or environmental toxicity.

## Cadmium scenario

A small village was situated at the river side. The river was a blessing. Not only was the water used to irrigate the rice fields, but it also served the village with drinking water and fish. Women washed clothes in the river and children played in the water. Most women worked in the rice field while the men worked at the zinc mine that was situated up-streams of the village. The production of zinc was high and there were employment opportunities for all of the men who could work.

After several years, the older women started to complain about back and leg bone pain, and problems with their kidneys. They visited a doctor, who found proteins in their urine. Some of the women suffered from multiple bone fractures, and their skeleton became deformed. Eventually, it was determined that the river water was contaminated with cadmium, which is a by-product in zinc production. Consequently, large amounts of cadmium were released into the river, and the river water contaminated the rice fields. Rice efficiently accumulates cadmium as it grows, and consequently, the population was exposed to cadmium through food intake over a long period of time. The cause of the symptoms that the women suffered from is not yet fully understood, but the combination of long-term cadmium exposure with general malnourishment and low body iron stores are some of the key factors of the disease.

Cadmium has many uses including: the plating of iron and steel to protect from corrosion, in pigments and paints, batteries, and many electronic applications. Increasing levels of cadmium on agricultural land is often the result of atmospheric deposition and the use of fertilizers and sewage sludge, which often contain cadmium. Leaking and burning of wastes can add to increasing cadmium levels in soil. Once in the soil, cadmium is taken up by the growing crop. People are exposed mainly through food, especially rice, wheat and other crops, and smokers are exposed through tobacco smoking. The absorption of cadmium in the gastrointestinal tract is quite low (less than 5 percent), however, at low body iron stores, the uptake is much higher, at about 20 percent. Since low body iron stores are common among women of childbearing age all over the world, women constitute a risk group for cadmium exposure.

Cadmium has a very long half-life within the body (about 30 years), and therefore accumulates over time. Negative health effects are typically experienced after long-term low-level cadmium exposure. The kidney and bone are the primary targets of cadmium toxicity.



Conventional agriculture chemicals cause about 20,000 deaths per year, most of which occur in developing countries, where regulatory, health, and education systems are the weakest (FAO 2007). Here poor people routinely face unacceptably high risks of poisoning because of their occupations, living conditions, lack of knowledge about the chemicals they handle, and limited access to sources of uncontaminated food and drinking water. Given that women represent about 70% of agriculture labour force in developing countries, they share the burden of injuries. Exposure to lower levels of pesticides can also cause long-term effects, such as cancer or damage to the reproductive system. Most human pesticide exposures are involuntary, unknowing and unwilling.

A number of toxic chemicals<sup>2</sup> have been identified as being of particular concern and which impact men and women differently. These chemical substances can be divided into three key groups:

- » **Persistent, bioaccumulative, and toxic (PBT) substances:** such as Persistent Organic Pollutants (POPs)
- » **Heavy metals:** include elements such as cadmium, lead, mercury, etc.
- » **Endocrine Disrupting Chemicals (EDCs):** substances that can cause adverse effects by interfering in some way with the body's hormones.

## Factors justifying a gender-differentiated approach in sound chemicals management

### Differences in Physiological Susceptibility and Health Effects of Toxic Chemicals

Women, men and children vary in their physiological susceptibility to the effects of exposure to toxic chemicals. Women may have different susceptibility to the impacts of toxic chemical exposure, e.g. due to differences in physiology and in connection with their reproductive cycles. With generally a higher proportion of body fat, women are also more likely to store more environmental pollutants in their tissues. At particular stages of their lives, such as pregnancy, lactation, and menopause, women's bodies undergo rapid physiological changes that also may change their vulnerability to health damage from toxic chemicals. Studies suggest that women's exposure to pesticides can cause miscarriages, premature births, birth defects, and low birth weight (WHO 2004).

In addition, a substantial portion of a woman's chemical burden can be passed on to the unborn child through the placenta, as well as during breast-feeding. For maternal and infant health protection, exposure of girls and women prior to and during childbearing years to chemicals poses risks to the future generations and thus must be minimized to the extent possible.

Men also have unique vulnerabilities based on their physiology that are prone to interference by chemical substances. Trends showing a worldwide increase in incidents of testicular cancer and a conspicuously high prevalence of this disease and other reproductive disorders in men in more industrialized countries are currently not fully explained. One major hypothesis is that endocrine disrupting chemicals and pollutants affect foetal testis development, and maternal exposure to EDCs may increase the risk of cancer, defects to external genitalia, as well as, impaired sperm function.

Children are generally at greater risk of health damage from toxic exposures because their rapid development and dynamic periods of growth (with which chemical exposure can interfere) increases their physiological sensitivity. Fetal exposure at critical times may have harmful effects that do not become evident until in school, at puberty or adulthood. Small children may absorb chemicals more efficiently and excrete them more slowly, resulting in greater body burdens of toxic contaminants. Moreover, children's intake of proportionally greater amounts of these environmental contaminants via water, air and food (relative to body size) further magnifies the risks.

### Factors Influencing Human Exposure to Toxic Chemicals

The factors influencing women's exposure to toxic chemicals may be grouped into two categories: workplace and household.

**Differences in workplace exposures.** The level and type of chemical exposure at the workplace often differs by gender because women and men generally perform different tasks. The International Labour Organisation (ILO 2005) estimates that hazardous substances kill about 438,000 workers annually, and 10% of all skin cancers are estimated to be attributable to workplace exposure to hazardous substances. Especially in developing countries, health and safety standards often are lax or poorly enforced, with severe consequences for worker health.

<sup>2</sup> A list of substances of concern with use and exposure routes and associated health effects can be found in Table 1.

## Persistent Organic Pollutants (POPs)

Persistent organic pollutants (POPs) are a group of chemicals which have been intentionally or inadvertently produced and introduced into the environment. Due to their stability and transport properties, they are now widely distributed around the world, and are even found in places where they have never been used or produced, such as the arctic region. The POPs include pesticides, industrial chemicals, and chemicals in articles as well as substances formed as by-products. Given their long half-lives and fat solubility, POPs tend to bioaccumulate up the food chain, especially in the fatty tissue of older animals. POPs appear at higher concentrations in fat-containing foods, including fish, meat, eggs and milk. POPs are also present in the human body and relatively high levels are found in human breast milk.



As a group, POPs are of concern for both environmental and human health reasons, most notably, because of their potential effects on the endocrine system, but also because of how they affect the immune system, liver, cognitive ability, the reproductive system (including low birth weight), and their ability to cause cancer. Of particular concern for humans, is chronic low-level exposure to POPs during fetal development, infancy and childhood. This exposure can impact critical and vulnerable windows of development with lifelong negative consequences. Infants and children are more vulnerable to POPs than adults, because while they are developing and growing, they have higher intake than adults (based on body weight) and the developing brain, immune system, endocrine system and reproductive organs are very sensitive during this period of life.

## Heavy metals

Heavy metals such as lead, cadmium, arsenic and mercury are highly toxic, affecting cognitive, neurological and reproductive functions, and are associated with negative effects in many organs and tissues, including kidneys, brain, bones, and the cardiovascular and respiratory systems. They are also highly bio-accumulative, and health effects may occur after long-term low-level exposure.



Mercury and lead have raised the highest concerns in the international community as they are known to have adverse effects on pregnancy and the unborn child. While exposure to these metals is known to occur via atmospheric, agricultural soil and waterway pollution, paints, and product waste, a less well-known but also important source of exposure for women is through the application of cosmetics. To illustrate, many face creams purporting to have skin lightening properties have been found to contain mercurial ingredients. Since levels of such ingredients may be below specified regulatory limits, they are not declared on the labels of cosmetic products but they may have impacts on women, ranging from minor issues such as skin rashes, to more major implications, such as damage to the brain, nervous system, kidneys and the unborn child. Please see Table 1 for more information. Inter-governmental negotiations on restricting the use and release of mercury have been initiated with the aim of concluding a legally binding agreement by 2013.



Depending on social circumstances in particular communities, men may be at greater risk of exposure to toxic chemicals used, for instance, in artisanal gold mining operations (such as toxic mercury vapors that are released when gold is extracted from ore), tannery operations (chemicals such as bisphenol A are used in hair removal products) and mechanical workshops (through exposure to toxic solvents being released from paint). In many societies, it is generally accepted that men can be asked to do more dangerous jobs than women therefore increasing the likelihood of exposure to hazardous situations and chemicals, while also increasing the segregation of women into the lower rungs of the work force.

Women may be at greater risk from hazardous ingredients and chemicals contained in cleaning agents, professional cosmetic and personal care products or those used in textile processing. In the health care sector, women generally represent the majority of the workers (e.g., nurses, pharmacy workers), which increases their chances of exposure to chemical agents used in medical procedures.

Note that children may also be at risk of occupational exposure to toxic substances, including agricultural chemicals. For example, surveys have found that in several countries, children are engaged in the application of pesticides to commercial crops, directly exposing them to highly toxic residues.

**Differences in household exposures.** Many chemical products or products that contain concentrations of toxic chemicals are used in households for cleaning (e.g., washing and cleaning agents), personal care (e.g., cosmetics and personal products such as soaps, creams, shampoos), and pest control (e.g., rat poison, garden insecticides, etc.). Also pesticides and house building materials are often stored in the home, even in the kitchen, and pesticide containers are at times recycled for other uses. Because women and girls usually assume responsibility for cleaning and household management, they are the ones more likely to be exposed to toxic chemicals found in cleaners, insecticides, etc. Women and girls also tend to use more jewelry, cosmetics and personal care products than men, and so are more likely to be affected by exposure to potentially dangerous ingredients or adulteration of such products.

Small children also have higher exposure due to certain habits, such as the hand-to-mouth behavior

that can result in high exposure to chemicals and pollutants in soil or indoor dust. Their unique behavioral patterns may also lead to increased risk of exposure to chemicals. Compounding the risk is children's lack of ability and capacity to make choices regarding behaviors or avoiding hazardous environments that increase the risks of exposure.

## Policy Recommendations

In conclusion, men and women are exposed to differing levels of toxic chemicals and they have different health reactions when they are exposed to toxic chemicals. Thus, gender is a critical component to consider when formulating policies and programmes in the area of sound management of chemicals.

However, current health and exposure models have not been targeted by gender. Going forward, it is important to collect epidemiological health data on chemical exposures that are gender-specific. Exposure scenarios, particularly concerning releases of POPs, heavy metals, and endocrine disrupting chemicals, must be examined by gender. This information will enable policy-makers to formulate policies and take action that is targeted by gender. It is important to document the experiences of both women and men and to collect sex-disaggregated data that take into account the realities of people's everyday lives to ensure that development policies are relevant, effective and on target.

## How can UNDP Strengthen the gender dimensions of its work in the area of chemicals management?

The sound management of chemicals (SMC) is essential to the achievement of sustainable development, including the eradication of poverty and disease, the improvement of human health and the environment and the elevation and maintenance of the standard of living in countries at all levels of development.

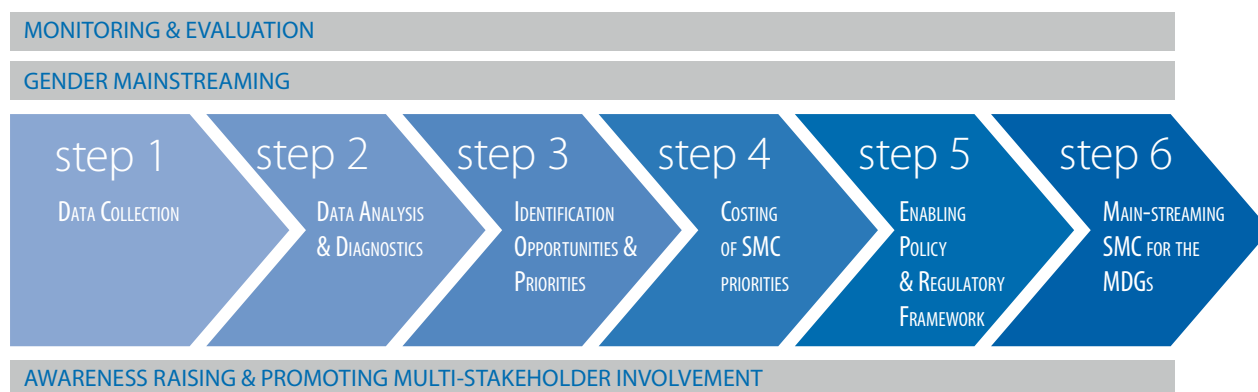
UNDP plays a key role in supporting client countries in identifying gaps and needs in chemicals management policies and frameworks; determining visions, priorities, and targets; formulating policies; and, integrating chemicals management and related objectives into

MDG-based national development strategies and poverty reduction strategies.

UNDP can support its partners in incorporating and addressing the priority concerns of vulnerable groups—including children, pregnant women, workers,

the elderly, and the poor—as countries go through the multi-step process of assessing and strengthening capacity to manage chemicals safely. UNDP's stepwise approach for incorporating SMC within national development plans comprises several elements (see Figure 1).<sup>3</sup>

Figure 1. Steps for Mainstreaming SMC in National Development Strategies



## Endocrine Disrupting Chemicals (EDCs)

Endocrine disruptors are substances that can cause adverse effects by interfering in some way with the body's hormones, causing harm to adults or their children. Under the control of the central nervous system, hormones are secreted by endocrine glands, thyroid, ovaries, testes and adrenals, into the bloodstream and travel through the body to specific organs, where they exert control over cells by binding to specific cellular receptor proteins. Hormones can then cause their receptor to interact directly on the DNA. These hormone receptors control or regulate key bodily functions and processes including development, growth and reproduction.

There are many examples of industrial, waste, pesticide and cosmetic chemicals that have been shown to interact with these hormone receptors in the same way as hormones, with different potencies, or as inhibiting the hormonal functions. These are commonly referred to as endocrine disrupting chemicals (EDCs) or endocrine active substances (EAS). Many of these chemicals are persistent and bioaccumulative, such as POPs; while other examples include many currently manufactured chemicals, such as the industrial chemical Bisphenol A, which is used in plastics that humans are continuously exposed to. More examples are given in Table 1.

EDCs differ from other toxic substances because they can interfere with normal blood hormone levels and have effects at very low doses. They can disrupt the hormonal regulation of normal cell differentiation, growth and development, metabolism and reproduction throughout life. Such effects can occur at levels far lower than those of traditional concern to toxicologists, and they also interact in an additive manner so that exposure to many EDC chemicals increases the risk of health effects.

The health effects associated with EDCs include the following:

- » Increased risk of breast, testicular and prostate cancers
- » Decreases in sperm counts and quality
- » Increased incidence of defects in the male reproductive tract
- » Changes in sex ratio (declining proportion of boys)
- » Neurological and behavioral disorders in children
- » Impaired immune function

<sup>3</sup> The UNDP Guide for Integrating the Sound Management of Chemicals into MDG-Based Development Planning

In the following section, we discuss two overarching interventions—namely, awareness raising and ensuring multi-stakeholder participation—that will contribute to the success of all subsequent stages of the process of strengthening a national SMC regime. We then discuss priorities for UNDP support to assist partners with mainstreaming gender considerations at each step in the process of developing their chemicals regimes.

- » **Raise awareness of the linkages between chemical exposures, the effects on human health and the environment, and gender differences in risks and impacts.** In most communities people are unaware of their routine, even daily, exposure to toxic chemicals in the workplace, at home, and in the general environment. Thus, raising awareness of the immediate health risks of toxic chemicals used in agriculture, mining, health services, manufacturing, and household and both household and hazardous waste stream activities in developing countries is a necessary, overarching intervention that informs work at all subsequent stages of the policy process.

Among the issues that countries can be encouraged to examine are the social factors that influence human exposure to chemicals (such as risks associated with the gender division of labour), as well as the role of physiological differences between women, men, and children in determining the health impacts of toxic exposures. Also, partners can be encouraged to pay attention to the differing implications of chemical pollution of the environment for women and men, such as impacts on women's workload due to gender-determined roles.

For example, women's workload may be increased when family members fall ill due to occupational or environmental exposure to chemical hazards, since women usually bear the primary responsibility for caring for the sick. Similarly, chemical contamination of water and food sources may add to the workload of women and girls if they have to travel farther to find safe water and food.

## Maternal health and breast milk contamination

Certain types of chemicals can induce, cause, or accumulate in dangerous levels in humans leading to adverse reproductive, developmental, immunological, hormonal and carcinogenic effects. Exposure to these chemicals can also result in miscarriages, low birth weight babies and premature births. Women can pass on these toxic chemicals to their children, both prenatally and through breastfeeding. Thus, managing chemicals properly can help safeguard maternal health, and the health of future generations.

Extensive data has been compiled on how breast milk accumulates and harbors persistent organohalogenes, including POPs. Breast milk can also be a source of exposure to heavy metals and volatile solvents. A number of international studies demonstrate that a high level of toxic contaminants, including POPs, is found in human breast milk. Nevertheless, despite the overwhelming evidence of breast milk contamination above recommended levels by harmful chemical substances, the advantages of breast feeding (such as high nutrient value, possibility of contaminated water used for formula milk) still outweigh its potential risks.

Although maternal health is an important priority of the development community, as the 2009 MDG Report shows, maternal health is the goal towards where there has been the least progress so far. The World Health Organization (WHO) is currently collecting baseline data assessing the levels of POPs contamination of breast milk. Given the health risks posed to future generations, improved breast milk monitoring and evaluation activities need to be implemented, and more vulnerable populations, such as those living near contaminated water, land and waste sites, should be the focus of development interventions that take women's needs and experiences into account equally to those of men.



Below is a checklist that can serve as a basis for awareness raising efforts, with modifications to tailor it according to the country's situation.

#### AWARENESS RAISING: SAMPLE CHECKLIST FOR INTEGRATING GENDER ASPECTS

- ✓ Are national/regional social factors that influence human exposure to chemicals identified/covered (such as risks associated with gender division of labour)?
- ✓ Is importance given to the linkages between SMC and the MDGs (e.g., the positive effects of SMC on attaining the MDGs, such as increased maternal health, lower child mortality, higher crop yields, clean water, etc.)?
- ✓ Have the health effects of chemical exposure been linked to the physiological differences between men, women, and children, as well as differences at various stages of development (i.e., conception, gestation, infancy, childhood, adolescence, and adulthood)?
- ✓ Are different social and economic implications of chemical pollution for women and men recognised?
- ✓ Are there different medical health reporting systems for women and men, and gender variability in quality of care also at different life stages?
- ✓ In development of training/awareness campaigns, have biases in educational systems been taken into account (e.g., participating women might be less equipped to understand, cope with, and anticipate the implications of chemicals exposure and environmental change or resource conditions)?
- ✓ Do awareness-raising activities target all stakeholders, their requirements, and their challenges? Is the timing of activities conducive to participation by all stakeholders?

» Promote a multi-stakeholder approach to ensure the participation of women and vulnerable populations in policy development and decision-making processes. SMC is a cross-sectoral issue that is best considered in a multi-disciplinary, multi-stakeholder context. Like awareness raising (discussed above), working with partners to encourage a multi-stakeholder, gender-sensitive approach is an overarching intervention that will help ensure the success and sustainability of all subsequent interventions in the multi-step process of assessing and strengthening a nation's chemicals management regime.

Among the key stakeholders that should be involved throughout the process are the relevant national ministries involved in aspects of chemicals management (e.g. ministries of environment, industry, labour, health, women, agriculture, education, trade, etc.), industry associations, labour organisations, laboratories, universities, NGOs, civil society organisations, etc.

Since women and other vulnerable populations (e.g., farmers and farm labourers, industrial workers, indigenous communities, etc.) tend to be under-represented in the chemicals sector and related policy and decision-making processes, affirmative steps are needed to ensure adequate participation of all stakeholders. This can be achieved by, for example, reaching out to labour organisations, NGOs, and other groups with significant representation of women and other vulnerable groups. Outreach to NGOs and others working on gender, health, and environmental issues at the grassroots level is another key step.

Women also need to be equally involved as stakeholders not only because of their vulnerability but also because they have specific knowledge and skills as active agents of change to offer in the process of formulating policies; and, integrating chemicals management and related objectives into MDG-based national development strategies and poverty reduction strategies. Women's equal access to information and resources increases the effectiveness of programs and projects.

## Maternal health scenario

In a village, a pregnant woman has been consuming a lot of fish from a nearby lake during her life. Unfortunately, the lake is close to a power company and has been polluted by leaking transformers. As a result, the woman has accumulated high levels of PCBs and dioxins. Since she is thin, the concentrations are high because these pollutants are stored in fat. She has also lived her entire life in a rural area on a farm, where the DDT and endosulphan pesticides have been stored in the kitchen of her small house. This has led to her exposure to these potentially endocrine disrupting pesticides although she has not sprayed the crops herself. Now that she is pregnant, these chemicals will cross the placenta and reach the fetus. She does not know that these chemicals can harm her baby. The baby may be born small, with low birth weight and would really need the nutritious food that the mother's milk can provide. However, even higher levels of these chemicals are in the breast milk that flows into the baby's small stomach, where the intestines absorb as many nutrients from the mother as possible. But unfortunately, pollutants and chemicals

are also being absorbed efficiently. The intake of dioxins and PCBs can be up to 100 times higher in the infant than in the mother (in relation to body weight). This means that the infant accumulates dioxins and PCBs as well as persistent pesticides during a very critical window of development. Consequently, as the baby grows, he/she may have a poorer defense to infections than if he/she had not been exposed to these chemicals. Moreover, when starting school, the child may have difficulties with important functions, such as motor activity, memory and attention. This will certainly lead to poorer performance in school and could influence the child's future. Upon reaching adulthood, in utero and infant exposure to such endocrine disrupting chemicals may create long term reproductive health and fertility problems, by affecting the development of the sexual organs and functions. Thus, if the child manages to survive childhood infections, it is possible that he/she may experience problems with learning and fertility in the future.



## Male worker scenario

A man is hurrying home from work. It is late and he is tired after spending another long day in the toy factory. He has been working at the factory in the production of plastic toys since he was a young teenager, similar to his parents. He is now married to a wonderful woman and he has never in his life been so happy. After his hard work, he can relax with her and she always prepares nice meals for him when he comes home hungry. The only concern for him is that they have tried to get pregnant for several years without success. He and his wife both long for children and they are eager to start their own family. Now his fellow co-workers at the factory have started to question whether the chemicals they use in the production of the plastic toys could be damaging their ability to have children. He is not the only one working at the factory without children. Someone said that the phthalates used as plasticizers are toxic to their sperm. Could this be the reason behind his wife's inability to get pregnant? If he could, he would quit and look for another job. But this factory is the only employer in the area where an uneducated man like him could be employed. He promises himself that if they ever succeed in having children, he will work hard so that his children can go to school to become more

qualified and obtain jobs less harmful than his job at the toy factory.

Five years later, the man and his wife at last have at last succeeded in having children. It took them 15 years of trying to create their own family. What they did not know was that the exposure of his mother to phthalates, when she was pregnant with him, may have contributed to his reduced fertility. Moreover, his own exposure to the same phthalates may not have improved his chances to become a father. Phthalates can inhibit the normal male hormone androgen and they are especially toxic to the male fetus.



## Nickel scenario

When I was a little girl, I wanted to be as pretty as my older sister and convinced my mother to pierce my ears. It was a relatively painless process and nearly everyone admired my new earrings. A few years later, it became fashionable to have jewelry made of silver-like metal and I was so proud when I managed to buy my own watch with a metal bracelet. I have always enjoyed feeling beautiful, and began experimenting with applying different types of makeup at an early age. Dark mascara made my eyes really sparkle on Graduation Day. One of the gifts that I received after completing my final exam was a new mobile phone with a shiny silver cover. My first job was as a cashier at the supermarket where among other things, I was responsible for counting the daily cash and sorting all the coins. When at work, I met the world's most wonderful man, and he gave me a ring made of white gold, with our names engraved inside! But after a few weeks, I started getting a red rash on the ring finger. It itched and eventually, I had to remove the ring. Soon I noticed that the eczema had spread to other parts of my hands, especially, after the days I had been responsible for coin sorting. Even my ears started to become swollen, red and scaly, so I couldn't wear my earrings anymore. At work, I now had to wear gloves.

One night, when I was dressing up for a party, I had a swollen reaction in my eyes from the mascara. Instead of sparkling eyes, it looked like I had cried for hours. When I told my female colleagues about these problems, many of them recounted similar experiences and gave me good advice on how to avoid the sensitivity inconveniences of nickel, the metal I had become so allergic to.

Statistics show that contact dermatitis and hand eczema are more common in women than in men. Hand eczema is the most common occupational skin disease and creates high costs for society, negatively affecting the working capacity and quality of life, and long-term prognosis is unfavorable with continued exposure. Nickel allergy, which is the most frequent contact allergy, can be seen as redness, swelling, blistering, cracking and itching from objects that release nickel ions on skin contact. Several of the most common causes of nickel allergy are consumer products, to which women are more likely to be exposed to than men, such as, earrings, jewelry and buttons. Nickel may also be released from everyday objects such as coins, keys, scissors, other tools and utensils, resulting in hand eczema



Engaging with relevant industries and enterprises can also be a powerful focal point for change. Corporate environmental and social responsibility are on the rise and involving industrial companies and small and medium enterprises in stakeholder consultations throughout the process may contribute to the development of codes of conduct and other steps to reduce chemical hazards for workers and other vulnerable populations.

Below is a checklist that can serve as a basis for a multistakeholder approach, with modifications to tailor it according to the country's situation.

#### MULTI-STAKEHOLDER APPROACH: SAMPLE CHECKLIST FOR INTEGRATING GENDER ASPECTS

- ✓ Are mechanisms in place to promote gender balance among participants?
- ✓ Do professional women participate (through, for example, labour organisations representing large numbers of women, as well as through universities and/or NGOs)?
- ✓ Are representative ministries for vulnerable populations participating (e.g., health, women's affairs, labour, environment, agriculture, industry, etc.)?
- ✓ Are NGOs and CSOs working on gender, health and environmental issues participating? Are networks and relationships with these organisations being strengthened?
- ✓ Are industries and enterprises that impact the health of workers and vulnerable populations participating in stakeholder consultations?



“





In the following section, we discuss priorities for UNDP support to assist partners with mainstreaming gender considerations at each step of a national process to develop or strengthen a sound management of chemicals (SMC) regime.

**STEP 1: ENSURE COLLECTION OF SEX-DISAGGREGATED DATA AND INFORMATION RELEVANT TO SMC.** The development of a national situation report is an important first step in assessing a country's current SMC capacity. In this step, a country determines what capacity current exists, based on data and information gathered from surveys, research, and programmes, such as data collected during GEF-POPs enabling activities and the development of country programmes, as well as data from PRSPs and an existing National Chemical Profile.

Supporting partners in the collection and review of data and information relevant to the gender dimensions of chemical safety is a key priority for UNDP efforts. Below is a checklist that can serve as a basis for such efforts, with modifications to tailor it according to the country's situation.

**STEP 1 – COLLECTION OF SEX-DISAGGREGATED DATA RELEVANT TO SMC: SAMPLE CHECKLIST FOR INTEGRATING GENDER ASPECTS**

- ✓ Are available data on chemicals disaggregated on the basis of sex, ethnicity, geography, type of labour, religion, and language?
- ✓ Do existing mechanisms for consultation and coordination on SMC include provisions for ensuring gender equality in opportunities for participation?
- ✓ Do current development plans and priorities for chemicals management address social, health, and environmental implications for the most vulnerable populations?
- ✓ With regard to assessment of hazards and risks associated with chemicals (in occupational safety and health policies, for example), are the different health implications for men, women, and children taken into consideration?

**STEP 2: INTEGRATE SEX-DISAGGREGATED DATA IN DATA ANALYSIS AND DIAGNOSTICS.** In this step, a country looks at the quality and applicability of the data gathered in Step 1 and considers what these data reveal about national capacity for SMC. To integrate gender dimensions into this step, countries can examine the results of data analysis and diagnostics in terms of gender-related issues, such as differences in risks and vulnerability in various groups in society (workers, indigenous communities, etc.). The following checklist includes examples of gender-related aspects of data analysis and diagnostics related to national SMC capacity.

**STEP 2 – DATA ANALYSIS AND DIAGNOSTICS FOR NATIONAL SMC CAPACITY: SAMPLE CHECKLIST FOR INTEGRATING GENDER ASPECTS**

- ✓ Are data on SMC sufficiently comprehensive to support drawing of conclusions concerning health implications (e.g., for women of childbearing age, children, workers, and the poor)? If so, does a gender-sensitive analysis, including gender relevant chemical exposure measurement in biological matrices, show discrepancies in the vulnerability of certain populations to chemical exposures?
- ✓ Are there gender-related gaps in capacity for SMC implementation, management, and service delivery (institutions, industry, health care, education)?
- ✓ Who are the beneficiaries of the current SMC regime? From a health, environmental, social, or economic perspective, do women, children, and the poor benefit from existing national capacity (policies, legislative frameworks, regulations, etc.)?
- ✓ How broad is the knowledge of SMC and how well is knowledge of chemicals and their use and application disseminated among women and vulnerable populations (e.g., is there a need for more effective educational programs)?
- ✓ Are stakeholders (such as industry, CSOs, NGOs, women, indigenous communities, the poor and other vulnerable groups, etc.) included in relevant SMC planning and implementation processes?

**STEP 3: INTEGRATE GENDER ASPECTS IN IDENTIFICATION OF NATIONAL OPPORTUNITIES AND PRIORITIES FOR SMC.** The third step in the process is identifying opportunities and priorities for strengthening national capacity for SMC, based on data analysis and diagnostics carried out in the previous step. This step encompasses two phases, the first of which is to list and describe opportunities without ranking them in terms of priority.

It is crucial that gender aspects be adequately addressed during the identification of opportunities so these can be then considered during the priority-setting phase. The checklist below highlights examples of questions to ask to ensure mainstreaming of gender considerations in the context of identification of opportunities.

Once the opportunities have been identified, priority setting can be undertaken. Because each country situation is unique, the criteria used for determining priorities will vary. Whatever the nature of these criteria, they should incorporate gender-related dimensions. The following checklist provides examples that can be kept in mind to ensure mainstreaming of gender considerations in setting priorities.



**STEP 3, PHASE 1 – IDENTIFICATION OF OPPORTUNITIES: SAMPLE CHECKLIST FOR INTEGRATING GENDER ASPECTS**

- ✓ Is a gender expert or a representative from a women's health organisation present to assist in the identification of opportunities linked to gender issues?
- ✓ Have opportunities been identified linked to the MDGs? For example, promotion of women's participation in science education and laboratory capacities and their participation in policy and legislative decision-making (MDG 3 - Promote gender equality and empower women) and promotion of safe handling of household chemicals (MDG 4 – Reduce child mortality and MDG 5 – Improve Maternal health)
- ✓ Have opportunities been identified related to meeting obligations under chemicals-related multilateral agreements (e.g., Stockholm Convention, Montreal Protocol, Basel and Rotterdam Conventions) that address hazards and risks with particularly harmful impacts on women and children?



**STEP 3, PHASE 2 – CRITERIA FOR SETTING PRIORITIES FOR SMC: SAMPLE CHECKLIST FOR INTEGRATING GENDER ASPECTS**

- ✓ Are the severity, scale, and duration of negative, chemicals-related impacts on vulnerable populations taken into consideration? For example:
- ✓ Health impacts on women and men and the indirect impacts on future generations (e.g., economic implications of additional health care provision and lost work days due to illnesses related to chemicals exposure)
- ✓ Social impacts related to chemicals exposure (e.g., implications for women's workload in caring for sick family members, searching for non-polluted sources of water and food for household use, etc.)
- ✓ Do the benefits associated with use of potentially hazardous chemicals (such as the use of DDT to combat malaria) outweigh the long-term health, social, and economic costs to vulnerable populations (e.g., would it be worthwhile to switch to less harmful methods for combating malaria)?

#### STEP 4: COSTING MAINSTREAMING OF GENDER DIMENSIONS IN SMC.

Obtaining the necessary financial resources for integrating gender dimensions while improving a national chemicals regime will not occur without securing the buy-in of central finance and economic development agencies of government. Therefore, effective communication with decision-makers—who rely primarily, though not exclusively, on economic information—is crucial.

Economic assessment is therefore a vital tool for determining priorities. For this reason, environment and health effects associated with a priority SMC problem often require valuation in economic terms in order to receive adequate consideration in national budgets and development plans.

An integrated economic analysis of effects can capture the hidden costs and benefits of policy options as well as the synergies and institutional economies of scale that may be achieved through complementary policies that support sustainable development. Many approaches have been developed to analyse the economic costs and benefits of policy options; the four most commonly used are described in the **UNDP Guide for Integrating the Sound Management of Chemicals into MDG-Based Development Planning (UNDP 2010)**.



#### STEP 4 – COSTING MAINSTREAMING OF GENDER DIMENSIONS IN SMC

- ✓ The costing exercise has to be performed on a country-by-country basis as it depends on the SMC priorities and gender dimensions a country selects in Step 3

**STEP 5: INTEGRATE GENDER CONSIDERATIONS IN ENABLING LEGISLATION RELATED TO SMC.** Establishing an enabling legislative framework can be an important aspect of strengthening national capacity for SMC. The existence of well-crafted enabling legislation paves the way for addressing new issues related to SMC as they arise, including issues associated with the introduction of novel chemical substances over time as well as with the discovery of new concerns related to existing chemicals.

The following checklist includes elements that could be addressed by SMC legislation and regulations to promote gender equality and the protection of vulnerable populations.



#### STEP 5 – SMC ENABLING LEGISLATION: SAMPLE CHECKLIST FOR INTEGRATING GENDER ASPECTS

- ✓ Education/awareness raising and outreach on chemicals safety, risks, and management, targeted toward the general public and vulnerable populations
- ✓ Right-to-know (vulnerable populations should have easy access to information on risks, contaminated sites and/or living/working areas, prohibited or restricted substances, chemical data safety sheets, etc.)
- ✓ Workplace safety (vulnerable populations, because of their low status, exert less control over their work environment, therefore occupational health and safety and enforcement provisions should be put in place to protect them at work from chemical exposure, accidents, disasters, etc.)
- ✓ Access to health screening, poison centres, and compensation from employers (women's occupational health problems are under-diagnosed and their claims for compensation disproportionately refused, authorities should require regular health screenings and assessments as well hold employers accountable for damage done)
- ✓ Proper labelling and classification of chemicals (will help vulnerable groups to better understand requirements for safe handling and storage of chemicals at home/work)

**STEP 6: ADDRESS GENDER ASPECTS OF MAINSTREAMING SMC INTO NATIONAL STRATEGIES AND PLANS.** Countries incorporate SMC priorities, based on the results of the previous steps, into national development plans and sector strategies. UNDP can provide assistance to partners in ensuring that this mainstreaming of SMC priorities reflects gender-related considerations. An essential element of this stage is to make sure that there is a clear understanding of how and when to seek opportunities for representation of these priorities.



#### STEP 6 – MAINSTREAMING SMC IN NATIONAL STRATEGIES AND PLANS: SAMPLE CHECKLIST FOR INTEGRATING GENDER ASPECTS

- ✓ How do the most important national development planning processes (UNDAF, CCA, PRSP, etc.) occur (timing/cycle) relative to SMC and gender related considerations and what/when are important decision points?
- ✓ Who are the main actors or decision makers (government and/or non-government) and who must be influenced /engaged (and how many times) to ensure taking up of SMC/gender priorities?
- ✓ Who are important stakeholders that can support advocacy for SMC and gender priorities?
- ✓ What communication strategies and materials will be most effective to influence the stakeholders that are relevant to the campaign?

TABLE 1: EXAMPLES OF POTENTIALLY HAZARDOUS CHEMICALS, THEIR USE AND POTENTIAL ADVERSE HEALTH EFFECTS

SUBSTANCE AND CLASS OF CONTAMINANT	USE AND SOURCE OF EXPOSURE	GENDER USE/ COUNTRY	ASSOCIATED ADVERSE HEALTH EFFECTS
4-aminobiphenyl (4-ABP)	<i>Cosmetics use:</i> Black, red and blonde hair dyes.	Global	Human urinary bladder carcinogen.
Bisphenol A (BPA) [EDC]	<i>Household and industrial use:</i> Extensively used in various products, polycarbonate plastics and epoxy resins. Receipts  <i>Cosmetics use:</i> Nail polish, skin creams, bath lotions, cosmetic dentistry and fillings  <i>Food use:</i> Can linings Plastics	Global	Disturbs fetal development of reproductive and central nervous systems. Possibly associated with several common diseases. The developing child is more susceptible than adults. Endocrine active, estrogenic.
DDT [POP, EDC]	<i>Organochlorine pesticide:</i> malarial use	Africa, Asia	Reproductive disorders and hormone-related cancer. Endocrine active, estrogenic and anti- androgenic.
	<i>Environmental and food contaminant</i>	Global	
Cadmium [Heavy metal, EDC]	<i>Household and industrial use:</i> Batteries, color pigments and stabilizers for plastics, electroplating, galvanizing, semiconductor in electronic devices, phosphate fertilizers  <i>Environmental use:</i> cadmium containing fertilizers on agricultural land  <i>Exposure:</i> Food and drinking water, tobacco smoking	Global	Kidney and bone damage, cancer, human carcinogen, possibly estrogenic.

SUBSTANCE AND CLASS OF CONTAMINANT	USE AND SOURCE OF EXPOSURE	GENDER USE/ COUNTRY	ASSOCIATED ADVERSE HEALTH EFFECTS
Lead [Heavy metal]	<p><i>Household use:</i> Lead-based paint, batteries, solders, lead-soldered food cans, lead-glazed pottery, ammunition, plastic stabilizers, cosmetics (surma and kohl)</p> <p><i>Environmental use:</i> leaded petrol, traffic emissions, cable covering, water pipes</p> <p><i>Exposure:</i> Food and drinking water, contaminated soil and dust, hand-to-mouth activity in children</p>	Global	Adverse effects on nervous system and cognitive development (children are more susceptible than adults), kidney damage, reduced hemoglobin production, anaemia, reproductive effects.
Mercury [Heavy metal]	<p><i>Cosmetics use:</i> Skin lightening creams and soaps, eye make-up and eye make-up remover (phenyl mercuric salts)</p> <p><i>Industrial, medical and household use:</i> Artisanal gold mining; chlorine and caustic soda production, batteries, vapor lamps, switches, thermometers, dental amalgam fillings</p> <p><i>Exposure:</i> Methyl mercury in fish (especially predatory fish), inhalation of mercury vapor, dermal uptake</p>	Women Middle East, Asia and Africa	<p>Skin rashes, damage to the nervous system and kidneys. The developing child is more susceptible than adults.</p> <p>Methyl mercury and mercury vapor is neurotoxic, possibly carcinogenic.</p> <p>Metallic mercury and inorganic mercury compounds are nephrotoxic.</p>
Parabens [EDC]	<p><i>Cosmetics use:</i> Preservative used in skin creams, shampoos, sunscreens</p>	Global	Some are endocrine active, interferes with estrogen and androgen. Some parabens are weak skin sensitizers.
Phthalates [EDC]	<p><i>Cosmetics use:</i> Personal care products, skin moisturizers, perfumes, lipstick</p> <p><i>Household use:</i> Plastics</p>	Women Global	Some show effects on reproduction and development. Endocrine active, interfering with estrogen and androgen hormones.

SUBSTANCE AND CLASS OF CONTAMINANT	USE AND SOURCE OF EXPOSURE	GENDER USE/ COUNTRY	ASSOCIATED ADVERSE HEALTH EFFECTS
Polybrominated diphenyl ethers (PBDEs) [POP, EDC]	<p><i>Industrial and household use:</i> Flame retardants (in upholstery, electrical goods, etc.)</p> <p><i>Environmental and Food contaminant</i></p>	Global	Effects on reproduction and development. The developing child is more susceptible than adults. Endocrine active, interfering with thyroid hormones.
Polychlorinated biphenyls (PCBs) [POP, EDC]	<p><i>Industrial use:</i> Electrical transformers, now banned, but exposure continues from dumping.</p> <p><i>Environmental and Food contaminant:</i> Meat, fish, egg and dairy products.</p>	Global	Varied mechanisms, depending on the type of PCB. Dioxin like PCBs - Impaired fetal development of reproductive, nervous and immune systems. The developing child is more susceptible than adults. Possible carcinogen. Chloracne at high exposures. Endocrine active, interfering with estrogen.
Polyfluoroalkyl chemicals (PFCs), such as PFOS and PFOA [POP, EDC]	<p><i>Industrial use:</i> Surfactants</p> <p><i>Household use:</i> Waterproofing, flame retardants, Teflon</p> <p><i>Environmental and Food contaminant</i></p>	Global	Impairs reproduction. Endocrine active, interfering with thyroid hormones and lipid metabolism.
Dioxins (polychloro-p-dioxins and furans, (PCDD/Fs) [POP, EDC]	<p><i>Industrial use:</i> Byproduct produced via incineration and combustion. Contaminant in organochlorine products.</p> <p><i>Environmental and Food contaminant:</i> Meat, fish, egg and dairy products.</p>	Global	Impaired fetal development of reproductive, nervous and immune systems. Human carcinogen. Chloracne at high exposures. Associated with higher risk of diabetes, cardiovascular disease etc. Endocrine active, interfering with estrogen.
Paraphenylene diamine (PPD)	<p><i>Cosmetics use:</i> Frequently used as hair dye substance in hair dye products. Used in black-henna-tattoos.</p>	Women in Sudan Asia, Africa	Extremely potent skin sensitizer, asthma, renal failure.
Vinclozolin [EDC]	<p><i>Pesticide, Environmental and Food contaminant</i></p>	Global	Male reproductive toxicant. The developing child is more susceptible than adults. Endocrine active, interacting with androgen.



“

Vulnerable groups in developing countries such as children, women, indigenous people, the poor and workers suffer disproportionate impacts from chemical exposure due to, among others, high exposure levels from water, food, location of dwelling, occupational circumstances as well as lack of understanding on the needs to protect themselves and others from the chemical risks.

”

*Report of the UN Secretary-General for CSD-19 on Chemicals, 2010*



Text and production coordination: Klaus Tyrkko and Monica Gaba

Contributors: Dr. Suely Carvalho, Hilda van der Veen, Institute of Environmental Medicine Karolinska Institutet, and Miriam Jacobs

Designer: Sandra Rojas

Photography credits:

Cover photo: Rural woman and children - UNDP/UNCDF Bangladesh © UNDP Photo library/Salman Saeed

page 2: Industrial area © Istockphoto

page 4: Woman collects rice in Timor-Leste © UN Photo/Martine Perret

page 6: Exterminator © Istockphoto

page 6: Beauty face © Istockphoto

page 9: Woman and her child – Peru -Titicaca © UNDP Photo library

page 11: Woman and fish © UNDP Photo library

page 12: Plastic toys © Morguefile.com

page 13: Two women in Sorlamba, Liberia © UN Photo/Eric Kanalstein

page 14: Philippines-family in a window © UNDP Photo library/Adam Rogers

page 23: Eritrea, Soho families © UNDP Photo library/Tala Dowlatshahi

For further information, please contact:

**Dr. Suely Carvalho**

Chief, Montreal Protocol and Chemicals Unit

Environment and Energy Group

Bureau for Development Policy

United Nations Development Programme

Tel: +1 212 906 6687/5112

E-mail: [suely.carvalho@undp.org](mailto:suely.carvalho@undp.org)

[www.undp.org/chemicals](http://www.undp.org/chemicals)

[www.undp.org](http://www.undp.org)

© Copyright United Nations Development Programme, February 2011. All rights reserved.





For further information, please contact:

**Dr. Suely Carvalho**

Chief, Montreal Protocol and Chemicals Unit

Environment and Energy Group

Bureau for Development Policy

United Nations Development Programme

Tel: +1 212 906 6687/5112

E-mail: [suely.carvalho@undp.org](mailto:suely.carvalho@undp.org)

[www.undp.org/chemicals](http://www.undp.org/chemicals)

[www.undp.org](http://www.undp.org)

© Copyright United Nations Development Programme, February 2011. All rights reserved.