
**Open-ended Working Group of the International Conference
on Chemicals Management**

Second meeting

Geneva, 15–17 December 2014

Item 5 (b) of the provisional agenda*

**Emerging policy issues and other issues of concern: new
proposed emerging policy issue for consideration by the
International Conference on Chemicals Management at
its fourth session: environmentally persistent
pharmaceutical pollutants**

**New proposed emerging policy issue: environmentally
persistent pharmaceutical pollutants**

Note by the secretariat

I. Introduction

1. One of the functions of the International Conference on Chemicals Management, as set out in paragraph 24 (j) of the Overarching Policy Strategy of the Strategic Approach to International Chemicals Management, is to focus attention and call for appropriate action on emerging policy issues as they arise and to forge consensus on priorities for cooperative action.
2. Modalities for considering emerging policy issues were set out in the annex to resolution II/4 of the International Conference on Chemicals Management, on emerging policy issues. The process should be open, transparent and facilitated by the secretariat and provide for the participation of all stakeholders.
3. Environmentally persistent pharmaceutical pollutants have been nominated as a new emerging policy issue for consideration by the Conference at its fourth session.
4. The issue of environmentally persistent pharmaceutical pollutants was considered by the Open-ended Working Group at its first meeting, held in Belgrade from 15 to 18 November 2011. By its decision OEWG.1/4 B, the Working Group considered that some of the activities set out in the proposal did not meet the criteria for the issue to be considered an emerging policy issue and encouraged the proponent to further develop the proposal for consideration by the Conference following its third session.
5. In line with the decision, the Ministry of Environment of Peru, the Ministry of Housing, Land Planning and Environment of Uruguay and the International Society of Doctors for the Environment further developed the proposal and resubmitted it for consideration.
6. The proponents completed a questionnaire on the nomination of emerging policy issues, setting out why environmentally persistent pharmaceutical pollutants should be considered an emerging policy issue. They included a short description of the issue explaining how, in their view, it met the definition of an emerging policy issue. They also provided information aimed at facilitating

* SAICM/OEWG.2/1.

the assessment of the issue against the criteria set out in paragraph 2 (b) of the annex to resolution II/4. Their submission also described the proposed cooperative actions, or options for such actions, to be considered in moving forward on the nominated emerging issue, including a rationale for how the proposed actions would address the nominated issue.

7. The proposed actions are summarized by the secretariat below:
 - (a) To raise awareness of the issue as a global problem, of its adverse effects on the environment and of its potential adverse effects on human health;
 - (b) To initiate work to reduce the introduction of chemicals of pharmaceutical origin in the environment, promoting cost-effective and measurable prevention measures;
 - (c) To improve understanding of their risk to human health and the environment and encourage cooperative action on the part of all stakeholders;
 - (d) To consider implementing capacity-building programmes and technical cooperation activities to support Strategic Approach stakeholders in responding to the issue;
 - (e) To promote monitoring in order to support decision-making processes, prioritization of actions and the development of guidance and training tools within relevant sectors;
 - (f) To encourage the exchange of information through the clearing house of the secretariat and at regional meetings, workshops, training sessions, webinars and other mechanisms.
8. A summary of information against the criteria listed in paragraph 2 (b) of the annex to resolution II/4 has been prepared by the proponents and is set out in the annex to the present note.

II. Timelines and summary of comments by Strategic Approach stakeholders

9. The secretariat posted the environmentally persistent pharmaceutical pollutants dossier, as received from the proponents, on the Strategic Approach website on 7 April 2014 and invited comments from stakeholders by 11 July 2014. Comments were received from Germany, Mexico, Norway, Sweden, the United States of America, the European Union, the World Health Organization, Chem Trust, Health Care Without Harm, IWW Water Centre and Pesticide Action Network (PAN) Germany, and were subsequently posted on the Strategic Approach website (www.saicm.org) on 16 July 2014.
10. Comments received included the following:
 - (a) Support for the issue as an emerging policy issue for further consideration by the Conference at its fourth session;
 - (b) The magnitude of the problem underlines the urgency for cooperative and coordinated action as outlined in the nomination dossier;
 - (c) The need to distinguish between demonstrated adverse effects on ecosystems and the detection of pharmaceuticals in drinking water;
 - (d) The need to highlight the importance of preventing pharmaceuticals from entering the environment as the preferred approach, rather than focusing on clean-up.
11. One Government commented that the problem, scope and actions being proposed to address the issue, as well as the intended overall objective of the nomination, needed clarification.
12. One Government expressed concern that the issue was not covered by the framework of the Strategic Approach, according to the footnote to paragraph 3 (b) of the Overarching Policy Strategy.
13. The proponents reviewed the comments, revised the submissions as appropriate and resubmitted the final version on 4 September 2014 (see SAICM/OEWG.2/INF/14).
14. Information on the nominated new emerging policy issues will be provided by the proponents at a technical briefing to be held on Sunday, 14 December 2014, the day before the opening of the second meeting of the Open-ended Working Group.

III. Possible action by the Open-ended Working Group

15. The issue of environmentally persistent pharmaceutical pollutants is proposed for consideration by the Open-ended Working Group, taking into account the current work on existing

emerging policy issues and the relevance to the overall orientation and guidance towards achieving the 2020 goal of the Strategic Approach. The Open-ended Working Group may wish:

- (a) To review the issue and consider possible cooperative action as appropriate;
- (b) To consider proposing the issue for inclusion in the provisional agenda of the fourth session of the International Conference on Chemicals Management in accordance with the rules of procedure of the Conference;
- (c) To consider, as appropriate, its relevance to the Overarching Policy Strategy and Global Plan of Action of the Strategic Approach in including other mechanisms for capacity-building;
- (d) To request the proponents to prepare a summary of the current state of the issue to be considered by the Conference at its fourth session, taking into account any recommendations made by the Open-ended Working Group.

16. If the nominated issue is not considered to be an emerging policy issue, the Open-ended Working Group may wish to recommend other ways in which the issue may be addressed, such as by:

- (a) Disseminating information about the issue through the Strategic Approach website;
- (b) Including the issue as a topic for workshops or Internet-based consultations;
- (c) Encouraging regional groups to discuss the issue at regional meetings;
- (d) Forwarding the issue to other forums or individual stakeholders with relevant mandates for their consideration;
- (e) Highlighting the issue as a possible priority for Strategic Approach participants;
- (f) Making Strategic Approach participants aware of any funding associated with the proposal that may be available for intersessional work, bilateral projects or other opportunities.

Annex

Information provided by the proponents against the criteria listed in paragraph 2 (b) of the annex to resolution II/4

(a) **Magnitude of the problem and its impact on human health or the environment, taking into account vulnerable subpopulations and any toxicological and exposure data gaps**

Chemicals of pharmaceutical origin present in the environment are a global issue. This has recently been demonstrated by a database on the worldwide occurrence of chemicals of pharmaceutical origin in the environment (www.pharmaceuticals-in-the-environment.org/en/home/dok/2.php). The database covers at least 71 countries in all five United Nations regional groups. It indicates that in total 631 chemicals of pharmaceutical origin (or their transformation products) have been detected in the environment, including antibiotics, analgesics, lipid-lowering drugs, oestrogens and many other therapeutic groups.

Most chemicals of pharmaceutical origin have been detected in surface water and sewage effluent, but also in other environmental matrices, including groundwater, tap water/drinking water, manure and soil. According to the database, sixteen chemicals of pharmaceutical origin are found in surface water, groundwater and/or drinking/tap water in each of the five United Nations regional groups. In many countries, certain chemicals of pharmaceutical origin prevail at concentrations above established predicted no-effect concentrations and mainly in surface waters, suggesting adverse eco-toxicological effects on organisms and microorganisms at these locations. Urban wastewater discharge is the dominant emission pathway, while discharge from manufacturing, animal husbandry and aquaculture are important regionally.

Chemicals of pharmaceutical origin have adverse effects on the environment and biodiversity. Therapeutic levels of the hormone levonorgestrel have been found in rainbow trout downstream from a sewage plant. In a whole lake experiment, male fish exposed to synthetic oestrogen at concentrations found in polluted environments became feminized and within seven years were almost extinct, with downstream effects on the entire ecosystem. The antidepressant oxazepam alters the behaviour and feeding rate of the wild fish species *Perca fluviatilis* at environmentally relevant concentrations, so that antidepressants in surface water may alter animal behaviours that are known to have ecological and evolutionary consequences. Livestock excrements containing residues of antiparasitic macrocyclic lactones have shown to affect dung fauna, resulting in reduced degradation rates. Antibiotics reduce growth of plants and are toxic to photoautotrophic aquatic organisms. The anti-inflammatory drug diclofenac has been shown to cause kidney failure and death of Indian vultures feeding on livestock treated with the drug, leading to a significant decline in the Indian vulture population.

The impact on human health of chemicals of pharmaceutical origin in the environment cannot be clearly demonstrated yet. Based on the current level of scientific information, adverse impacts of the environmental exposure to chemicals of pharmaceutical origin present in the environment on human health are unlikely, as concentrations of these chemicals present in drinking water are generally below minimum therapeutic doses, although locally high concentrations of these chemicals occur in well water used as drinking water. Uncertainties prevail regarding the risks of low-level chronic exposure in humans, exposure from conception, during childhood and reproductive age and in other vulnerable populations (third age as well as in people with health conditions) due to the presence of chemicals of pharmaceutical origin in drinking water.

There is a gap of knowledge regarding multiple chemical exposures (additive, synergistic or antagonistic effects) to chemicals of pharmaceutical origin and multiple exposures to other pollutants concurrently present in surface and drinking water. There is a scarcity of systematic monitoring schemes. Increasing prevalence of antimicrobial resistance shows how the emission of antibiotics into the environment may have direct negative health consequences for human and veterinary health.

The presence in the environment of chemicals of pharmaceutical origin poses an increasing problem. As the world population is ageing, the production, use and disposal of pharmaceutical products are growing along with the demand of pharmaceuticals in food production and veterinarian uses. The degree of environmental pollution from chemicals of pharmaceutical origin can thus be expected to increase unless adequate global preventive measures are introduced.

(b) Extent to which the issue is being addressed by other bodies, particularly at the international level, and how it is related to, complements, or does not duplicate such work

The issue of chemicals of pharmaceutical origin present in the environment is currently insufficiently addressed at the international level. However, due to the global and interdisciplinary scope of the problem, international coordination is needed.

Initiatives at the international level include activities conducted by the World Health Organization, the joint United Nations project on sustainable procurement of pharmaceuticals and the Strategic Approach. The World Health Organization has conducted activities that address the issue of chemicals of pharmaceutical origin present in the environment to a certain extent, including the Prequalification of Medicines Programme, the Member State Mechanism on Substandard/spurious/falsely-labelled/falsified/counterfeit medical products and the Global Strategy for Containment of Antimicrobial Resistance. Moreover, chemicals of pharmaceutical origin present in the environment have been addressed to varying degrees in World Health Organization reports and guidelines on health care waste management, and in the assessment of health risks of pharmaceuticals in drinking water.

In Europe, a joint United Nations project (United Nations Development Programme, United Nations Environment Programme, United Nations Population Fund, United Nations Office for Project Services and World Health Organization) aims to improve the sustainability of the procurement procedures of United Nations agencies and criteria for health products and services, and thereby to diminish possible future negative environmental effects of pharmaceuticals. Two different approaches to reach the target are being undertaken: (i) to develop and implement World Health Organization evidence-based technical guidelines on sustainable procurement of health care products including pharmaceuticals, thereby creating an incentive for manufacturers to strive towards production of more “green” products; and (ii) to integrate environmental criteria into good manufacturing practice utilized by the World Health Organization to pre-qualify medications for procurement.

The Strategic Approach initiative on endocrine-disrupting chemicals partially overlaps the issue of chemicals of pharmaceutical origin in the environment, as some pharmaceuticals (e.g. hormones and contraceptives) have endocrine-disrupting properties.

In a recent workshop held in Geneva in April 2014 and organized by the German Federal Environment Agency, international experts gathered to discuss the current state of knowledge on the issue of chemicals of pharmaceutical origin in the environment as well as the results of a research project on the global occurrence of chemicals of pharmaceutical origin in the environment. At the national level, several countries have funded extensive research on chemicals of pharmaceutical origin in the environment (e.g., the United States of America, Canada, the European Union and China). An environmental risk assessment of these pharmaceutical chemicals is required in, for example, the United States and the European Union. This is partially harmonized via the International Cooperation on Harmonization of Technical Requirements for Registration of Veterinary Medicinal Products. At the national and local levels, initiatives to manage chemicals of pharmaceutical origin in the environment have started, such as the classification system of the Stockholm County Council and the Swiss programme to upgrade large sewage treatment plants.

(c) Existing knowledge and perceived gaps in understanding about the issue

Existing knowledge gaps in understanding of the issue of chemicals of pharmaceutical origin in the environment relate to the risks of early (since conception) and low-level chronic exposure in humans when present in drinking water or bio-concentrate in food. Moreover, uncertainties prevail regarding the combined (additive, synergistic or antagonistic) effects of multiple environmental chemical exposures (synergistic effect).

Understanding of the behaviour, fate and effects of chemicals of pharmaceutical origin in the environment should be further developed, especially of those that are widespread, are highly toxic, have been on the market for several years/decades, and/or are diffuse pollutants.

Furthermore, the scarcity of systematic environmental monitoring programmes, lack of a standardized, harmonized and comparable sampling system according to established analysis protocols, as well as regional capacity to support multi-centric studies, should be addressed.

There are currently no test methods to assess whether negative effects may occur after long-term environmental diffuse exposure in humans since conception and during the vulnerable period of development, on aquatic microorganisms, or how it may affect other animals. Consideration must be given to bioaccumulation in fish and other aquatic food used by humans. Therefore, the precautionary principle must be guiding.

Another important gap to be addressed is the importance of designing pharmaceutical chemicals, taking into consideration of their environmental fate, i.e., providing for degradation in the environment and excluding formation of active metabolites and degradants, among others.

(d) Extent to which the issue is of a cross-cutting nature

The global problem posed by the pollution of surface water (as well as groundwater, drinking water, tap water and to some extent farmland and soil) with chemicals of pharmaceutical origin and their residues is well known to scientists in the field.

Pharmaceuticals are synthetic chemicals belonging to a wide group of different chemical families and may also react differently in the environment as they are not conceived or designed to enter the environment. As there are thousands of different synthesized chemicals present in the environment at the same time, different interactions may occur and the result of these multiple exposures in humans and in nature are not sufficiently studied or understood.

Documented evidence shows that some pharmaceuticals enter and persist in the environment.

Little is known about the possible negative effects and impacts of environmentally persistent pharmaceutical pollutants in humans and the environment by diffuse and systematic exposure for long periods of time, especially during the vulnerable periods of development.

The issue of chemicals of pharmaceutical origin in the environment is of a cross-cutting nature, as it encompasses the issue of antibiotic resistance, among others, and endocrine disruptors.

Chemicals of pharmaceutical origin in the environment (such as antibiotics designed to kill bacteria and those designed to kill viruses) can increase risks of antimicrobial resistance. The presence of antimicrobials in the gut of humans and animals leads to the development of resistant bacteria and resistance genes that can be excreted in faeces and spread to wastewater, sludge, manure and soil. Resistance genes can also spread through the food chain, for example via human consumption of animals treated with antibiotics. Resistance genes can also develop in the environment if chemicals with antibiotic activity are present in the environment. The resistance genes from the increasing environmental reservoir can then be transferred to pathogenic bacteria. There is also evidence of an exchange of resistance genes between environmental bacteria and clinical isolates. The issue of antibiotic resistance is addressed for example by the World Health Organization.

Moreover, some chemicals of pharmaceutical origin in the environment have hormone activity (synthetic hormones) with endocrine disrupting potential. In a whole lake experiment, male fish exposed to synthetic oestrogen at concentrations found in polluted environments became feminized and within seven years were almost extinct, with effects on the entire ecosystem. The issue of endocrine disruptors is addressed by the Strategic Approach. These may affect microorganisms and wildlife in severe and unexpected ways.

(e) Information on the anticipated deliverables from action on the issue

Anticipated deliverables include greater visibility and policy engagement; greater coordination, consistency and synergies between different initiatives around the globe, engaging actors from different sectors; and improved capacity for assessing and managing risks from environmentally persistent pharmaceutical pollutants, in particular in developing countries. Particular outputs would include expert guidance for risk identification and assessment; priority setting for research and risk management/control actions; and information exchange and networking from which scientists and policy makers in developing countries and countries with economies in transition could especially benefit, resulting in greater understanding of environmentally persistent pharmaceutical pollutant issues and of the need for priority actions.
