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# New risks identified for aquatic wildlife from plastic compounds

**New evidence suggests that the adverse effects** on aquatic ecosystems of chemical compounds used in the manufacture of plastics are greater than previously thought. The study[1] reviewed data on five substances with known endocrine-disrupting effects on wildlife in rivers and waterways.

**Compounds such as bisphenol A** (BPA), and the phthalates DBP, DEHP, DIDP and DINP[2], are known as endocrine disruptors. BPA in particular is able to mimic the action of the sex hormone oestrogen. They are therefore listed as priority substances by the European Union and subject to environmental risk assessment (ERA) reports. Final ERA reports are available for DBP, DIDP and DINP, while the reports are still in the draft stage for BPA and DEHP.

The compounds are high volume plasticisers used to increase the workability of plastics. They constitute up to 50 percent of the weight of PVC plastics of which there is an annual production of 700,000 million tonnes in Europe and of 2.7 million tonnes worldwide. BPA accounts for about half this amount and is used to increase the plastic's ability to expand in the manufacture of polycarbonate plastic and in resins used to line cans.

They are not considered to be persistent chemicals in the environment as they are biodegradable to a certain extent, but they are nevertheless regularly detected in aquatic ecosystems because they are released continuously into the environment.

The researchers say that aquatic algae and invertebrates have the ability to bioconcentrate phthalates. They compared their new data with those in the existing ERA reports and found that the ERA reports had:

- An underestimate of the degree of exposure of aquatic wildlife to all five substances
- An underestimate of the potential of aquatic wildlife to bioconcentrate DBP and especially DEHP. Wildlife groups such as birds feeding on mussels may be particularly at risk
- Measurements in monitoring programmes show that DBP and DEHP reach higher concentrations in surface waters than those calculated in modelling scenarios, but the lower levels predicted by the models were used as a basis for the ERA reports
- Lack of sufficient monitoring data on DIDP and DINP
- Considerable evidence of the endocrine-disrupting effects of BPA on aquatic snails – including deformation of sexual organs and alteration to ovulation patterns – was not taken into account

The researchers conclude that none of the five ERA reports conclusively show that current exposure levels in European ecosystems are without risk for the aquatic environment. They also point out that the current ERA approach assesses each of these chemical compounds in isolation, whereas plasticisers, with a demonstrated ability to interact with the hormonal systems of animals, have the possibility of acting collectively, leaving the suitability of this approach open to question.

1. This study was conducted under the COMPRENDO (Comparative Research on Endocrine Disruptors) project supported by the European Commission under the Fifth Framework Programme. See: www.comprendo-project.org
2. DBP – di-butyl phthalate; DEHP – di-ethylhexyl phthalate; DIDP - di-isodecyl phthalate and DINP – di-isonyl phthalate

**Additional information:** The "Estr-a-liser" LIFE project (LIFE00 ENV/D/000346) successfully developed an immunoassay workstation prototype that offers the possibility to detect extremely low concentrations of endocrine disrupters in the whole water cycle (see project summary, website and layman's report). The APOP project (LIFE03 ENV/DK/000056) demonstrated the removal of endocrine disruptors and other hazardous compounds from treated wastewater to a non-hazardous level without estrogenic activity (project summary, website and layman's report)

**Source:** Oehlmann, J., Oetken, M., and Schulte-Oehlmann, U. (2008). A critical evaluation of the environmental risk assessment for plasticizers in the freshwater environment in Europe, with special emphasis on bisphenol A and endocrine disruption. *Environmental Research*. 108(2): 140-149.

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