



DETERGENT  
PHOSPHATES

Photo: DRP | Paul Csagoly

#### BACKGROUND STORY

## CLEAN CLOTHING, DIRTY RIVER

Cities in the central and lower Danube River Basin are major sources of phosphates in cleaning detergents that add to the nutrient pollution of water bodies. Many would like a phosphate ban to be introduced, but industry is generally against the idea.

### Clean or dirty?

You just washed three loads of clothing and hung it in the sun to dry. Family is thankful. You feel good and clean. Did you pollute?

It depends on whether your washing detergent contains 'phosphates' or not. Phosphates, or compounds with phosphorus (P), are added to some detergents to improve washing effectiveness. They soften the water in your machine, make it bubblier, ensure it's not too acidic and help dissolve cleaning agents. That's good for your clothes. But it could be bad for your river.

## TREATMENT OR P-FREE ALTERNATIVES?

Water from your washing machine probably drains into your municipal wastewater system. Upstream in the Danube River Basin (DRB), it will then probably be treated at a wastewater treatment utility before entering the Danube or one of its tributaries. Downstream, chances increase for it going directly into a river untreated.

Once in the river, it will combine with phosphates from other sources and other 'nutrients' (P being one). Nutrients can be a good thing. They are essential for plant growth. Excess volumes of nutrients in water, however, can cause massive algal blooms. Left unchecked, sub-surface life becomes deprived of oxygen and suffocates, killing fish, reducing biodiversity and emitting noxious odours. It reduces the value of many water uses, from drinking and swimming to fishing. It can even alter the plant community, food web and chemistry of a water body.

The International Commission for the Protection of the Danube River (ICPDR) says that mismanagement of nutrients in the DRB has led to severe ecological problems including the deterioration of groundwater resources and the eutrophication of rivers and lakes, and even more profoundly, of the Black Sea. The upcoming DRB Management Plan, coordinated by the ICPDR, will need to include measures to solve the Danube's nutrient problems.

The EC's European Environment Agency further finds nutrients a major environmental problem across Europe.

**To reduce phosphate pollution to Danube waters, there are two main options. The first is more and better sewage treatment. The second is making detergents "P-free".**

To treat phosphates in sewage, there are two main processes – chemical or biological. Chemicals are more effective but the removal process creates lots of sludge. That can be a big problem as sludge also needs to be removed and finding land for sludge deposition is becoming ever more difficult and costly. This will become a bigger issue with the new EU Landfill Directive which imposes a 65% reduction on biodegradable waste going to landfill. Option two, biological treatment, requires a higher initial investment, is more complex to operate and typically removes only 40-70% of the phosphates (which could breach EU directives). So removal with chemicals is now more prevalent in EU countries.

The main alternatives for phosphates in detergents are called 'zeolites' which are neither toxic nor lead to eutrophication. To date, Austria and Germany have virtually gone completely P-free and "pro-zeolite". Slovenian use of detergents is about 75% P-free. Czech Republic P-free detergent use is about 50%. These four countries together account for about 28% of the total DRB population.

Of the remaining DRB countries, only Hungary and Serbia and Montenegro use significant proportions of P-free detergents (about 50%), together accounting for a further 25% of the DRB population. The remaining seven DRB countries use little or no P-free detergents and make up almost half the entire DRB population. Information for Romania and Ukraine is scarce. Bulgarian P-free use is only about 5%. Moldova appears to have no P-free detergents available in its market.



Photo: Victor Mello

## COSTS AND INDUSTRY

Many different types of detergents are produced in, or imported to, DRB countries, with the market dominated by multinational companies. The largest by volume sales is the Unilever Group. Henkel-Merima is the largest manufacturer of detergents in the Balkan peninsula with exports to Bulgaria, Romania and the former Yugoslav republics. Procter & Gamble (P&G) is another big player.

AISE, the international Association for Soaps, Detergents and Maintenance Products, is the official representative body for detergent and cleaning product industries in the EU. Members are present in 28 countries including, in the DRB, the Czech Republic, Hungary, Romania, Slovenia, Slovakia, Austria and Germany.

There doesn't appear to be any major difference in terms of domestic or foreign detergent manufacturers producing P-free over P-based detergents. Some companies sell P-based detergents in one country while selling P-free detergents in another. Over the last five years, the domestic production of detergents has decreased in Bulgaria, Croatia, Hungary, Romania and Ukraine mainly because of rising internal economic problems and competition with detergent importers.

Many in the detergent industry argue against the benefits of going P-free. Many say, for example, that P-free detergents generally cost more. "Zeolites have been shown to be a cost-effective alternative for P-based detergents and there is no evidence of higher costs to consumers," says Helene Horth, an expert at WRc working as an independent consultant for the UNDP-GEF Danube Regional Project (DRP), looking into reducing detergent phosphate use in the DRB.

"It's hard to say," says Jaroslav Slunecko, a representative of a group of detergent producers in the DRB who are all members of AISE. "It's country and company dependent. Each company has a different supply chain and cost structure in each country. It's important to look at how and from where base materials and ingredients are supplied to make detergents. Local tax structures, transportation costs and the cost for a new factory also need to be considered. All these factors affect costs and prices for detergents." Each country also has consumers with different demands, he adds. Many Balkan country consumers prefer top-loading machines and hand-washing with high-sud phosphate-based detergents.

The industry's position, says Slunecko, is to support "freedom of formulation". "Companies should be free to formulate detergents that fit best with a specific place's consumer preferences, economic conditions and environmental situation.



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The environment is one important factor, but not the only one."

"Some applications like automatic dishwashers and industrial cleaners require phosphates," he adds. "You also have to consider other impacts that might occur with a switch to some alternatives. For example, consumer dissatisfaction due to dish cleaning failure leads to over-dosage, re-washing, and higher wash temperatures, all leading to more chemical release, energy and raw material consumption. In the end, it will be questionable what environmental impact you've really achieved."

Industry has also expressed concerns about the toxic effects of zeolites on humans and environment. The EC's Scientific Committee on Toxicity, Eco-toxicity and the Environment (CSTEE), however, found no threats from zeolites nor any problems with their use in countries where they have been used for over 15 years.

Interestingly, the EU produces less than 10% of the world's detergent phosphate (STPP) production and employs about 1000 people. In contrast, Europe accounts for about 50% of zeolite production world-wide and current production capacity exceeds demand. Increased demand for zeolite could therefore be met without a need for significant additional investments, and could actually result in increased employment and economic opportunities in EU, more than making up for any loss in STPP production. So an EU-wide ban against P-based detergents could mean an economic boost for the EU.

## THE SUCCESS OF GOING P-FREE

**CEEP, the Brussels-based research association of the European detergent and industrial polyphosphates industry, has argued that there is neither evidence nor any recorded case where a detergent P-ban itself resulted in environmental improvements. Not true according to the CSTEE, which found that, in Italy from 1982-1989, a complete elimination of detergent phosphates had reduced the total P load to the Adriatic Sea by 30%, substantially improving water quality and reducing eutrophication.**

"From this point of view, the measure (eliminating phosphates from detergents) is one of many other measures we have to apply for nutrient removal from waters."

Horth has found experience in Western Europe to show that the cost of introducing P-free detergents is much less than the additional costs needed for improving sewage treatment to deal with phosphate elimination. At the same time, where phosphates are used in detergents, this generally contributes only about one-third of total phosphates in sewage with the rest coming from human and food wastes



Photo: Victor Mello

"I don't think eliminating phosphates from detergents will be an important measure to reduce nutrient pollution in DRB waters," says Slunecko. He adds that, according to a 1999 study, detergents tend to account for only a minor part of total nutrient load – about 15% – with agriculture accounting for 50%, human waste 25% and the rest through background sources.

"Industry believes that no long-term solution to the problem of eutrophication will be possible without a clear commitment of stakeholders to fully implement waste water treatment plants and best management practices in agriculture. Industry will support all measures designed to reduce phosphate emissions into surface waters, either through sewage treatment plants or the marketing of phosphate-free products, provided proven cost-effective and environmentally sound alternatives are defined, yielding a sustainable resolution of eutrophication."

According to recent investigations in the Czech Republic, the phosphorus from detergents creates 23% of total phosphorus discharged to municipal wastewaters, says Doubravka Nedvedova from the Czech Ministry of Environment's Water Protection Department. Moreover, plants serving more than 10,000 people in the Czech Republic are equipped or will soon be equipped with phosphorus removal technology.

and other organic materials. P-free detergents therefore won't solve the whole problem, so it will still be necessary to have phosphate elimination at sewage utilities.

In the long-term, the cost of phosphate removal from sewage could be significantly improved with the development of phosphate recycling to convert sludge production into a valuable reusable resource such as farm fertilizer. However, the recycled sludge would have to comply with strict limits on toxic substances, such as heavy metals.

Overall, as demonstrated in Switzerland and the USA, the greatest benefits (70% to 90% reductions in phosphorus loads) to lakes and rivers resulted where a combination of reduced detergent phosphorus and improved wastewater treatment were implemented.

The same can be said for Austria. Here, the introduction of P-free detergents coupled with the building of new wastewater treatment plants led to a remarkable improvement in the quality of the Neusiedlersee, a lake shared by Austria and Hungary formerly impacted by eutrophication, says the ICPDR.

## PUSHING THE SWITCH

**In the DRB, two options exist for getting industry to switch to P-free production and sales – voluntary agreements or regulation through legislation. Austria was able to go 100% P-free through voluntary agreements with industry. In 2005, Germany did it through a combination of legislative and voluntary measures linked with the full cooperation of the detergent industry and public involvement.**

The Czech Republic started with a voluntary agreement between the Czech Association of Producers of Soaps, Cleaning Agents and Detergents and the Ministry of Environment. Partial success was achieved with total phosphate content in detergents almost halved between 1994-2003. However, non-members to the agreement (those producing P-based detergents) increased their market share resulting in increased phosphate levels in 2005, and the government reacted by enacting new legislation.

“The Czech lesson appears to apply to many former Central and Eastern European countries (CEE) in the Danube Basin,” says Horth. “It’s difficult to make voluntary agreements with industry work without legislative back-up. They prefer to wait for legislation.”

“To date, we have found many challenges to using voluntary agreements,” says Horth. “For example, without legislation, even if agreements can be made between national governments and industry or their trade associations, the field is left wide open for others to produce or import P-detergents.”

The EU does have a set of laws that apply to nutrients and household wastewater. For example, the UWWWT requires the removal of phosphates and/or nitrates if wastewater is discharged into areas that are sensitive to eutrophication. And the Water Framework Directive lists substances contributing to eutrophication as main pollutants. Such EU legislation has been transposed in EU Member States and in part by countries acceding to the EU and



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The goal of the UNDP-GEF DRP detergent project is to develop recommendations for reducing phosphorus in detergents, to be used as a basis for negotiating a voluntary ban between DRB countries and the detergent industry. It is based on a review of existing laws and voluntary agreements and an evaluation of current data on the DRB use of detergents.

other Danube countries. However, in some cases, countries have been granted considerable transition periods (e.g. Bulgaria has until 2015 to fulfil the UWWWT).



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"It isn't enough," says Horth. "True progress will only be made in the DRB if the EU enacts legislation banning phosphates in detergents. This is not an alternative to improved sewerage connection and treatment, or good agricultural practice, but a necessary complementary action to counteract eutrophication."

A new EU Regulation on detergents entered into force October 8, 2005. Its Article 16 says: "...by April 2007, the Commission shall evaluate, submit a report on and, where justified, present a legislative proposal on the use of phosphates with a view to their gradual phase-out or restriction to specific applications."

"Any EU decision should be based on science," says Slunecko. "I can't say whether the EU should enact legislation to ban P-based detergents or not. Let's wait and see. Some EU countries now have such legislation, while others that don't are still producing P-based detergents. Industry will respect the EC's decision. We are committed to cooperating with local and national bodies and the ICPDR to find the best solutions."

As for Horth: "We hope that the 2007 review will support a phase-out of detergent phosphates, as we now have the curious situation where several EU countries have contributed significantly to combating eutrophication by reducing the use of P-detergents, either through national legislation or voluntary agreements, while others have not. Another step in the right direction will be to make consumers more aware of the problem and choices available to them. NGOs can be a big help here."

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