



Agriculture impacts aquatic macroinvertebrates more than wastewater

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Topics: Wastewater | Biodiversity | Ecosystems | Pollutants

A new study by an interdisciplinary team from Eawag has shown that substances from agriculture affect living organisms in rivers and streams to a greater extent than treated wastewater, which has less impact on the species composition of microorganisms.

Community wastewater treatment plants and agricultural practices are the primary sources of pollution in rivers and streams, and affect aquatic communities. Substances such as traces of pharmaceuticals, nutrients, biocides, resistant bacteria and heavy metals find their way into the watercourses from wastewater treatment plants, while agriculture is primarily responsible for inputs of plant treatment agents, fine sediments and nutrients. However, little was known until recently about the relative influences of the two sources, which is why Christian Stamm and his team set out to plug this gap with their [EcolImpact](#) project—resulting in a new study that was recently published in the journal “Science of the Total Environment”.

Between 2013 and 2014, he and his team took water samples every two months at 23 wastewater treatment sites, both above and below the outflow pipes. They used the samples to determine the water quality and identify what substances were present in the water. In the spring of each year, they identified the macroinvertebrates present upstream and downstream of the outflows.

Worms love wastewater

The results showed that the impact of agriculture outweighs the organic contamination from wastewater treatment plants. The incidences of insects and other small invertebrates downstream varied only slightly in comparison with those upstream. The only exception to this was worm-like organisms, which


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ollutants; pesticides' (97 chars) description => protected'Water pollution is ubiquitous
globally, yet how the effects of pollutants pr
opagate through natural ecosystems remains poorly understood. This is becaus
e the interactive effects of multiple stressors are generally hard to predic
t. Agriculture and municipal wastewater treatment plants (WWTPs) are often m
ajor sources of contaminants for streams, but their relative importance and
the role of different pollutants (e.g. nutrients or pesticides) are largely
unknown. Using a 'real world experiment' with sampling locations up- and dow
nstream of WWTPs, we studied how effluent discharges affected water quality
and macroinvertebrate communities in 23 Swiss streams across a broad land-us
e gradient. <br/> Variation partitioning of community composition revealed t
hat overall water quality explained approximately 30% of community variabili
ty, whereby nutrients and pesticides each independently explained 10% and 2%
, respectively. Excluding oligochaetes (which were highly abundant downstrea
m of the WWTPs) from the analyses, resulted in a relatively stronger influen
ce (3%) of pesticides on the macroinvertebrate community composition, wherea
s nutrients had no influence. Generally, the macroinvertebrate community com

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position downstream of the WWTPs strongly reflected the upstream conditions, likely due to a combination of efficient treatment processes, environmental filtering and organismal dispersal. Wastewater impacts were most prominently by the Saprobic index, whereas the SPEAR index (a trait-based macroinvertebrate metrics reflecting sensitivity to pesticides) revealed a strong impact of arable cropping but only a weak impact of wastewater. Overall, our results indicate that agriculture can have a stronger impact on headwater stream macroinvertebrate communities than discharges from WWTP. Yet, effects of wastewater-born micropollutants were clearly quantifiable among all other influence factors. Improving our ability to further quantify the impacts of micropollutants require...

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