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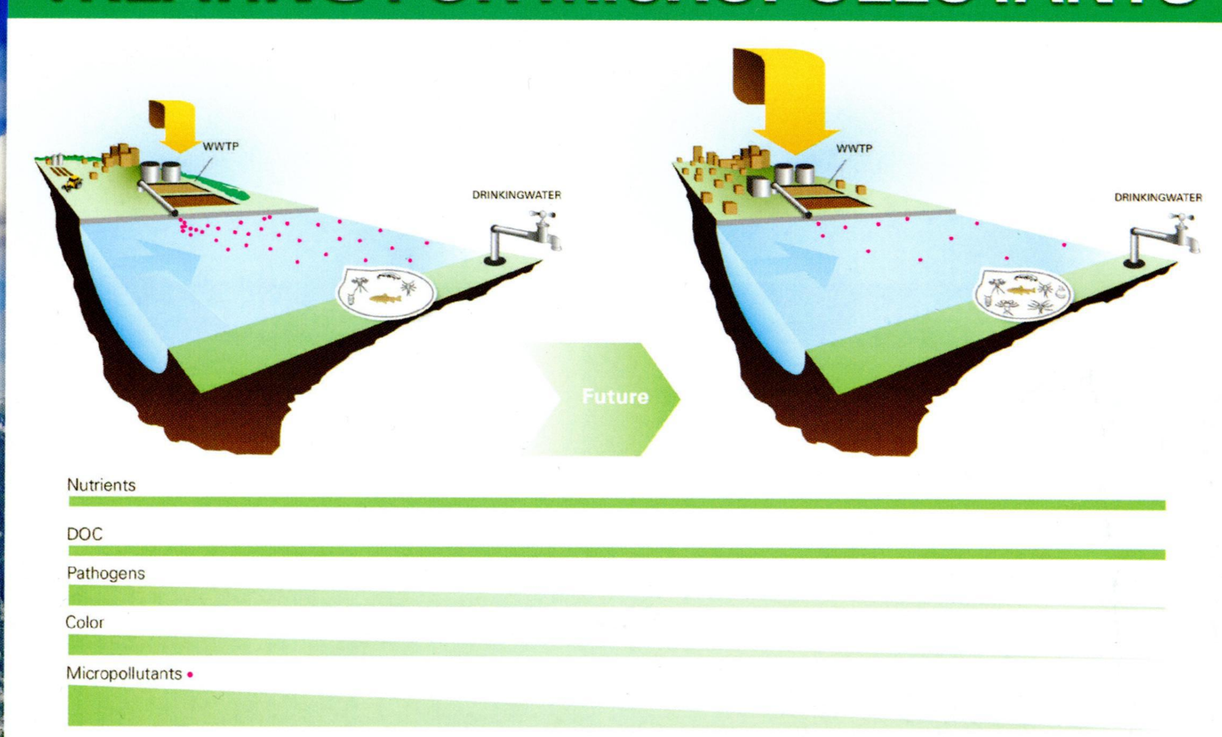
TREATING FOR MICROPOLLUTANTS



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ON THE COVER: Reducing micropollutant concentrations in the aquatic environment is an urgent and future-oriented strategy of worldwide importance, and requires multi-pronged and multi-barrier approaches. This issue's feature highlights the benefits of upgrading wastewater treatment plants and delivers the arguments, which might be of use for other countries, resulting in the Swiss national strategy for upgrading selected wastewater treatment plants.

Features

7683 dx.doi.org/10.1021/es500907n

Reducing the Discharge of Micropollutants in the Aquatic Environment: The Benefits of Upgrading Wastewater Treatment Plants

Rik I. L. Eggen,* Juliane Hollender, Adriano Joss, Michael Schärer, and Christian Stamm

Micropollutants (MPs) as individual compounds or in complex mixtures are relevant for water quality and may trigger unwanted ecological effects. MPs originate from different point and diffuse sources and enter water bodies via different flow paths. Effluents from conventional wastewater treatment plants (WWTPs), in which various MPs are not or not completely removed, is one major source. To improve the water quality and avoid potential negative ecological effects by micropollutants, various measures to reduce the discharge should be taken. In this feature we discuss one of these measures; the benefits of upgrading WWTPs toward reduced MP loads and toxicities from wastewater effluents, using the recently decided Swiss strategy as an example. Based on (i) full-scale case studies using ozonation or powder activated carbon treatment, showing substantial reduction of MP discharges and concomitant reduced toxicities, (ii) social and political acceptance, (iii) technical feasibility and sufficient cost-effectiveness, the Swiss authorities recently decided to implement additional wastewater treatment steps as mitigation strategy to improve water quality. Since MPs are of growing global concern, the concepts and considerations behind the Swiss strategy are explained in this feature, which could be of use for other countries as well. It should be realized that upgrading WWTPs is not the only solution to reduce the discharge of MPs entering the environment, but is part of a broader, multipronged mitigation strategy.Micropollutants (MPs) as individual compounds or in complex mixtures are relevant for water quality and may trigger unwanted ecological effects. MPs originate from different point and diffuse sources and enter water bodies via different flow paths. Effluents from conventional wastewater treatment plants (WWTPs), in which various MPs are not or not completely removed, is one major source. To improve the water quality and avoid potential negative ecological effects by micropollutants, various measures to reduce the discharge should be taken. In this feature we discuss one of these measures; the benefits of upgrading WWTPs toward reduced MP loads and toxicities from wastewater effluents, using the recently decided Swiss strategy as an example. Based on (i) full-scale case studies using ozonation or powder activated carbon treatment, showing substantial reduction of MP discharges and concomitant reduced toxicities, (ii) social and political acceptance, (iii) technical feasibility and sufficient cost-effectiveness, the Swiss authorities recently decided to implement additional wastewater treatment steps as mitigation strategy to improve water quality. Since MPs are of growing global concern, the concepts and considerations behind the Swiss strategy are explained in this feature, which could be of use for other countries as well. It should be realized that upgrading WWTPs is not the only solution to reduce the discharge of MPs entering the environment, but is part of a broader, multipronged mitigation strategy.

7690 dx.doi.org/10.1021/es405082t

Assessing the Impact of Multiple Stressors on Aquatic Biota: The Receptor's Side Matters

H. Segner,* M. Schmitt-Jansen, and S. Sabater

Aquatic ecosystems are confronted with multiple stress factors. Current approaches to assess the risk of anthropogenic stressors to aquatic ecosystems are developed for single stressors and determine stressor effects primarily as a function of stressor properties. The cumulative impact of several stressors, however, may differ markedly from the impact of the single stressors and can result in nonlinear effects and ecological surprises. To meet the challenge of diagnosing and predicting multiple stressor impacts, assessment strategies should focus on properties of the biological receptors rather than on stressor properties. This change of paradigm is required because (i) multiple stressors affect multiple biological targets at multiple organizational levels, (ii) biological receptors differ in their sensitivities, vulnerabilities, and response dynamics to the individual stressors, and (iii) biological receptors function as networks, so that actions of stressors at disparate sites within the network can lead via indirect or cascading effects, to unexpected outcomes.Aquatic ecosystems are confronted with multiple stress factors. Current approaches to assess the risk of anthropogenic stressors to aquatic ecosystems are developed for single stressors and determine stressor effects primarily as a function of stressor properties. The cumulative impact of several stressors, however, may differ markedly from the impact of the single stressors and can result in nonlinear effects and ecological surprises. To meet the challenge of diagnosing and predicting multiple stressor impacts, assessment strategies should focus on properties of the biological receptors rather than on stressor properties. This change of paradigm is required because (i) multiple stressors affect multiple biological targets at multiple organizational levels, (ii) biological receptors differ in their sensitivities, vulnerabilities, and response dynamics to the individual stressors, and (iii) biological receptors function as networks, so that actions of stressors at disparate sites within the network can lead via indirect or cascading effects, to unexpected outcomes.

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7700 dx.doi.org/10.1021/es502481q

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7825 S dx.doi.org/10.1021/es501452a

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7849 S dx.doi.org/10.1021/es501793h

Polychlorinated Biphenyls in Glaciers. 2. Model Results of Deposition and Incorporation Processes
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7866 S dx.doi.org/10.1021/es5002874

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7874 dx.doi.org/10.1021/es500632k

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7881 Ⓢ dx.doi.org/10.1021/es5006362

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7891 Ⓢ dx.doi.org/10.1021/es5007719

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7899 dx.doi.org/10.1021/es5009906

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7951 dx.doi.org/10.1021/es501398j

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7959 dx.doi.org/10.1021/es501818d

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7966 dx.doi.org/10.1021/es501874f

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Fang Jia, Lian-Jun Bao, Jordan Crago, Daniel Schlenk, and Jay Gan*

7974 dx.doi.org/10.1021/es502000d

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8003 dx.doi.org/10.1021/es405428t

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8012 dx.doi.org/10.1021/es5009032

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8021 dx.doi.org/10.1021/es501353x

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8284 dx.doi.org/10.1021/es502950c

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8285 dx.doi.org/10.1021/es502991w

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María Rosende, Luis M. Magalhães, Marcela A. Segundo, and Manuel Miró*

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