

Collaborative field trial for the harmonization of sediment sampling protocols in Switzerland

Michel Wildi¹, Carmen Casado-Martinez¹, Benoit J.D. Ferrari¹, Inge Werner²

¹Swiss Centre for Applied Ecotoxicology Eawag-EPFL, EPFL-ENAC-IIE-GE, Station 2, Phone: +41-(0)-2169 30896
CH-1015 Lausanne, Switzerland

E-mail:

²Swiss Centre for Applied Ecotoxicology Eawag-EPFL, Überlandstrasse 133
8600 Dübendorf, Switzerland

michel.wildi@centreecotox.ch

Introduction: In Switzerland, the 26 cantons are in charge of implementing the Swiss Federal Water Protection Ordinance that states that “sediments contain no persistent synthetic substances” but also that “other potential water pollutants do not accumulate in sediments” and “do not have any harmful effects on the communities of plants, animals and micro-organisms” [1]. In the absence of guidance documents, there are significant discrepancies in sediment sampling and pretreatment among cantons that makes the evaluation and the comparability of data at the national level difficult [2]. This situation is also evident at the EU level [3]. In 2015 the Ecotox Centre together with the Federal Office of the Environment launched a joint project to propose a harmonized protocol for sediment quality assessment in Switzerland, including sediment sampling and pre-treatment as well as the development of quality criteria for results interpretation. Here we will present the advancement of the preparation of a harmonized protocol for sediment sampling and pre-treatment, including the results of the validation exercise of the proposed methodology.

Methods: The first step for the harmonization was done by sending to all cantonal agencies a detailed questionnaire in order to collect the most accurate details on the overall monitoring strategies, sampling methodologies and pretreatments of sediments. Qualitative personal interviews have also been conducted to expand the results of the questionnaires. A first draft of a harmonized protocol was compiled with this information and other multiple bibliographic sources [4,5], which was later on approved by representatives of cantons, universities, private labs and research institutes for further validation. The validation exercise was composed of two steps. The first step consisted of a collaborative field trial organized with different cantons in order to evaluate the suitability for implementation of the proposed methodology and assess whether the results of the new method were “sufficient similar” (no significant bias or trend) to the currently applied methodology. The first step was also designed to assess repeatability and to answer specific questions that remained opened such as the

fraction of sediment that should be considered in the framework of sediment quality assessment and which extraction procedure for metals should be applied. One or two sites were sampled with each cantonal agency in order to consecutively apply the protocol used at present and the proposal of harmonized protocol. An in-situ sieving at 2 mm and ex-situ 63 µm was also performed to have the results of chemical analyses for the total and the fine fraction for each triplicate sediment sample. All samples were analyzed for trace elements by the same laboratory to minimize this source of variability.

Results and discussion: Eight out of 14 cantonal agencies that perform more or less regular in-situ sediment sampling (excluding dredging operations) participated in the collaborative exercise, which took place between June to November 2016. 14 sites were sampled that were representative of very different hydrodynamic conditions and pollution sources. Half of the sites were representative of mountain rivers with high flow and composed mainly of coarse sediment while the other half were more representative of depositional areas like small rivers, channels, deltas or sediment settling basins. Point sources were present mainly as WWTP and industrial discharge (metallurgy, chemistry) and diffuse sources by agriculture (pasture, wine) and transport (road, highway and airport). A total of 154 samples are currently being analyzed. The most commonly practiced metal extraction procedures are compared for chemical and ecotoxicological relevance.

Acknowledgements: this project is financed by the Federal Office for the Environment and the Swiss Centre for Applied Ecotoxicology. We acknowledge the environmental agencies from cantons Basel-Landschaft, Basel-Stadt, Bern, Saint-Gallen, Jura, Schwyz, Valais, Zürich for their participation in the field exercise and the advisory board of the project for helpful discussions.

References: [1] OFEV (2016). Waters Protection Ordinance of 28 October 1998 (WPO). [2] Flück, R. et al. (2011). [3] EC (2009). Guidance Document No. 19 (European Commission). [4] Schiavone et al. (2011). [5] US EPA (2001). EPA-823-B-01-002.