A new paradigm for biomonitoring: an example building on the Danish Stream Plant Index (Baattrup-Pedersen et al 2016) [1]

Despite intensive efforts for more than a decade to develop Water Framework-compliant assessment systems, shortcomings continue to appear. In particular, the lack of reference conditions has hindered the development of assessment systems capturing the heart of the Water Framework Directive (WFD) – that ecological status should be set as the deviation from the natural, undisturbed condition. Recently, the Danish Stream Plant Index (DSPI) was developed. This system contrasts existing systems in that it builds on an expert interpretation of the normative definitions of ecological status classes in the WFD without taking pressure–impact relationships into account.

Here, we substantiate the approach taken in the development of DSPI and examine whether the DSPI class decreases with increasing level of anthropogenic stress and, additionally, whether the deviation from the natural undisturbed condition increases with decreasing DSPI class *sensu* WFD using trait composition of plant assemblages from Danish streams around year 1900 as a reference. We furthermore examine the trait composition of the vegetation in sites classified into different DSPI status classes to explore whether predictable patterns exist that can be used to identify the ultimate cause(s) of failure to meet ecological goals and help guide the selection of appropriate mitigation measures.

We observed that DSPI declined with several parameters indicative of environmental stress in Danish streams and, furthermore, that the deviation from the natural undisturbed condition regarding the trait composition of plant communities declined with increasing DSPI, implying that the trait composition of plant communities in the high DSPI status class was most similar to those occurring in Danish streams around year 1900. We also found that trait characteristics capable of disentangling important stressors in Danish streams varied consistently among sites classified into different DSPI classes.

Based on our findings, we call for new thinking. We suggest that more effort should be directed at describing reference conditions and interpreting the normative definitions of good, moderate, poor and bad instead of focusing solely on developing assessment systems using pressure–impact frameworks. We find this particularly important with respect to streams as these are seldom impacted by only a single stressor.

Publication Date:

Monday, 7 November 2016

Full reference:

Baattrup-Pedersen, A., Göthe, E., Riis, T., Andersen, D. K., & Larsen, S. E. (2016). A new paradigm for biomonitoring–An example building on the Danish Stream Plant Index. Methods in Ecology and Evolution.

Link to DOI:

http://dx.doi.org/10.1111/2041-210X.12676 [2]

Links
[1] https://reformrivers.eu/new-paradigm-biomonitoring-example-building-danish-stream-plant-index-baattrup-pedersen-et-al-2016
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REFORM has received funding from the European Union's Seventh Programme for Research, Technological