

On the potentials of and challenges for indicator based trend analyses and forecasts

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Quantitative indicators are essential for an effective monitoring of applied policy measures. This applies in particular to the area of sustainability research: Even if it may not be possible to observe underlying causalities of, and corresponding individual impacts on political objectives directly, quantitative indicators facilitate an in-time reporting about current development trends. comprehensive indicator reporting systems have already been established in diverse policy areas. From an environmental viewpoint the Sustainable Development Goals (SDGs) adopted by the UN General Assembly in 2015 provide an (extremely ambitious) example of indicator-based monitoring processes.

Apart from short term indications of current development dynamics, policymakers and other stakeholders are generally also interested in unambiguous information about prospective long term developments. Essentially, this issue refers to the question whether an observed indicator features any significant trend developments. If quantified target values have been defined, standardised monitoring processes may then also derive expected future target achievement rates from applications of statistical estimation routines on historical indicator observations. A standardised cross-institutional evaluation procedure for trend assessments of sustainability indicators has not yet been established so far. Currently, individual institutions do thus apply different methodologies for similar trend evaluation purposes.

This paper documents own research and software development activities which were carried out by us in order to provide the German Federal Environment Agency with a novel state of the software environment which allows for (a largely automated) application of corresponding statistical procedures in own empirical analyses. The source code of this application was handed over to the Federal Environment Agency at the end of the project together with a separate manual documenting the functionality of the application and relevant technical parameters. Thereby, this project contributed an essential tool for future research work towards the establishment of a standardised methodology for indicator evaluation at the Federal Environment Agency.

In addition to an introduction to corresponding tool functionalities, the presentation focuses on a presentation of fundamental methodological challenges in the derivation of robust trend forecasts. As this project was not intended to foster comprehensive methodological research, the task of developing a self-contained evaluation algorithm for the robust projection of future indicator developments is left for future research activities. According to the author's view, the Federal Environment Agency is well advised to promote respective in-depth research by future research activities.