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Interactive comment on "The river absorption capacity determination as a tool to evaluate state of surface water" *by* Paweł Wilk et al.

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We very much appreciate the reviewer for comments and pointing to the reader's unclear parts of the article. This will allow us to make the necessary changes to improve the quality of our article.

Below we present an answer to the review.

(1) The RAC parameter we calculated was based on two load values: limit load (LL) and actual load (AL). Knowing the value of these loads is important in terms of determining the quality of surface water. The limit load (LL) of the selected pollutant that determines the water purity class has been calculated on the basis of the limit concentration value, which is determined by the regulation of the minister of the environment.

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Actual load was determined on the basis of data from State Environmental Monitoring (SEM). In both cases, the selected characteristic flow was used for the calculation. It is the difference between LL and AL defining whether we are dealing with a positive or negative RAC parameter (Figure 2). In addition, the load limit (LL) along with the critical load (CL) define the so-called uncertainty area (fig.1). The size of this area will be different for each water body, and its precise definition is very difficult because it is practically impossible to determine the critical load value beyond which the catchment will be permanently and irreversibly polluted. Already in 2009 Duarte at al. In the article "Return to Neverland: shifting baselines affect eutrophication restoration target" indicated that exceeding a certain pollution limit of basins with biogenic compounds will make it impossible to return to the original state. The discussion section of our article will be expanded with a section on the difference between critical load CL and load limit LL called uncertainty area, in which we will describe in greater detail the problem.

(2) In chapter 2.1 of this article we have presented mathematical formulas for calculating the RAC parameter for any water bodies limited by calculation profiles for which we have monitoring data. Determining the RAC parameter is relatively straightforward and requires no knowledge of many parameters. This can be both a drawback and an advantage of this method. Streams of monitoring data on water quality and flow rates are important. Due to the fact that the authors did not have enough monitoring data, it was decided to use Macromodel DNS / SWAT. Of course, the proposed method of calculating the RAC parameter also has its limitations. Without the specified LL boundary, the calculation of the RAC parameter will not be possible. It is often also discussed to use the characteristic flow of QSNQ to determine the load that is commonly used in environmental calculations in Poland. At present, the use of characteristic flows is abandoned and environmental flows are increasingly used to better reflect the hydrological characteristics of the river. In the revised version of the article, the RAC definition will be specified in the Introduction section, and the information in the discussion section will add information about its limitations in use.

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(3) The monitoring data we used to calibrate, validate and validate the mathematical model come from the years 2003-2009. We decided to calibrate, validate, and validate the mathematical model for this period, because at that time, the Middle Warta Basin, the Institute of Meteorology and Water Management, conducted its own parallel monitoring of SEM. Therefore, for this period of time, we have the largest database to better match modeling results to observations (especially for general nitrogen). The monitoring measures currently underway have confirmed that the values of general and general nitrogen concentrations in the Middle Warta basin remain at a similar level. In a revised version of the article, we will make a description of the data so that it is clear to every reader why this time period has been used.

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