

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

**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.

(1) In the article to describe the RAC method, three main types of pollutants were identified: actual natural load (ANL), limit load (LL) and critical load (CL). As suggested by the reviewer, section 2 of the article will be supplemented by the following content:  
- Limit load (LL) - this is the maximum load of the selected pollutant, which may be in the selected river section of the analyzed river, which has been classified in class II of clean water (good water status). This load was calculated on the basis of the limit

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concentration (LC), which is determined in Poland by the ordinance of the Minister of the Environment and the selected characteristic flow (CF); - good status - the method of determining the waters that meet, for most water quality indicators, the requirements for surface waters used to supply the population with water for consumption. As well as the values of biological water quality indicators show little impact of anthropogenic impacts;  
- critical load (CL) - the actual size of this load in practice is impossible to determine. Of course, it is possible to try to estimate the critical load value for selected catchment fragments, but this will always be approximate. The critical load can also be defined as the limit beyond which return to good status is no longer possible. The amount of pollutants in the river then is so great that the previous self-cleaning processes are permanently impaired and no longer function.

(2) In the case of Equation 1.9 (the error in numbering will be corrected), it was not sufficiently clear how the authors had information about individual components. The Macromodel DNS / SWAT used in the analyzes is a tool that requires the introduction of a series of data on the analyzed basin (these are described in more detail in Section 2.3.2.). The large amount of data introduced into the model allows it to simulate many processes occurring in the catchments such as the infiltration process and the associated pollutant load entering the catchment waters by this route. Also the amount of retention of pollutants can be determined using the data obtained from the modeling. As far as data on atmospheric deposition is concerned, data from the Norwegian Meteorological Institute are used for modeling, where mathematical models cover the Polish area. The description of Equation 1.9 will be extended to the above information.

(3) The reviewer rightly noted that the results of general phosphorus calibration using Macromodel DNS / SWAT are worse than for general nitrogen. This is due to the high daily and seasonal variability of this element in river waters and the relatively small amount of monitoring data needed to calibrate, validate and validate the model. In spite of this, the results of the statistical measures identified as "unacceptable" have been obtained mainly for the NSEs, so the authors decided to use the obtained model

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data for general phosphorus. The obtained RAC results for the general phosphorus are largely coincide with the actual state occurring in the basin, the water bodies that have been negatively affected by the RAC parameter are located, among others, in the main watercourse below the city of Poznań, which has a negative impact on the waters of the Warta river. The remaining water bodies, which had negative RAC values for total phosphorus, are small watercourses in the southern part of the analyzed basin, characterized by low flow rates and their sewage treatment sites and other point wastewater discharges. Discussion of the results in the article will be extended with information on this subject.

(4) The flow rate data used in the analyzes described in the article came from the Hydrological System of the Institute of Meteorology and Water Management. Information about the source of this data will be added to the article.

(5) The use of the word "absorbency" in the article to describe the RAC parameter is an error and will be corrected.

(6) In formula (1.2), as noted by the reviewer, there was an error. Actual load should be labeled AL. The error will be fixed. For formula 1.5, the description of the parameter "n" should be: number of elements in the analyzed set. In other words, "n" is the number of daily flow data used to compute the SNQ.

(7) All editorial errors identified by the reviewer will be removed and the final version will be reviewed for language correctness.

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